A COOPERATIVE PHONE RETURN EXPERIENCE

How nature inspires solving circular challenges

Esra Polat

A COOPERATIVE PHONE RETURN EXPERIENCE

How nature inspires solving circular challenges

Master thesis
Esra Polat

COLOPHON

Master Thesis
MSc Integrated Product Design

A Cooperative Phone Return Experience
January 2019

Esra Polat

Delft University of Technology
Faculty of Industrial Design Engineering

Supervisory team

Chair: Prof. dr. ir. Jo van Engelen
Design for Sustainability | Delft University of Technology

Mentor: Dr. ir. Ingrid de Pauw
Circular Product Design | Delft University of Technology

Mentor: Dr. ir. Flora Poppelaars
Circular Product Design | Delft University of Technology

PREFACE

This thesis is the result of the graduation project that is part of the Master program of Integrated Product Design at the Industrial Design Engineering faculty of the Delft University of Technology. The project has been carried out as part of the Circular Graduation Lab of the faculty and initiated through the PhD research of Ir. Poppelaars, who explores how a shift from ownership towards access as the core of consumption could be enabled in the case of mobile devices. The assignment was to create an effective consumer closure experience to make the return of end-of-use mobile devices an inseparable and enjoyable part of consuming products in a Circular Economy. This project focused on using cooperations in nature as an inspiration to maximise the circular behaviour at the end of use stage of mobile phones.

The topic of Circular Economy and its solution area usually concerns the integration of physical products, businesses and the consumer, which can be distinguished into the three IDE pillars: technology, business and human interaction. While usually a technical and economic viewpoint is used to design for a Circular Economy, the human interaction aspect is often neglected, which shapes the necessity to conduct research in this area.

I would like to thank my supervisory team for their contributions on this journey.
Jo, for the rich insights and immense knowledge, motivating words and critical view that helped me get this project to a higher scientific level. Ingrid, for the continuous support and enthusiasm in guiding me actively during project activities and improving the thesis, and to inspire me even right before the start of the project. Flora, for initiating this project, your guidance, positivity and understanding stance and for the trust that gave me the space to shape and direct the project and challenge myself.

I would also like to thank the biology experts who were willing to make time for me and help me out: Dr. Bertus Beaumont, Prof. Toby Kiers and Prof. Ronald Noë for the interesting input that helped me find my way in the field of biology. Also thanks to Maurijn Wognum, manager trading devices of KPN to open a doorway to conduct this project for KPN.

Big thanks to the participants of the interviews and user tests for making time and providing me with valuable insights. To my family and friends for their support, inspirational talks and valuable insights. To Zohaib for the interesting talks that helped structuring my thoughts and the English check.

Finally, I would like to acknowledge planet earth's rich, insightful resources that have been a source of knowledge, amazement en enthusiasm throughout this project.

Esra

ABSTRACT

Mobile phones are one of the most ubiquitous devices in our lives. The ever-growing demand for mobile phones and rapid upgrade patterns, gives mobile phones an unsustainable linear character, with a big contribution to e-waste. This study is about stimulating consumers to return their mobile phones to extend its life or fulfill another purpose through refurbishment and recycling processes.

This project is conducted for the case of KPN's return program and aims towards a beneficial exchange between KPN and consumer. Beneficial transactions of resources, already take place for millions of years in nature, where designers can learn and derive inspirations from. Therefore, these are explored and used as an inspiration throughout this project. Simultaneously an analysis of the mobile phone ecosystem is done to understand how and why retailers and consumers behave in the current context. An in-depth study with consumers resulted in insights on the impact of factors on current take-back programs.

Next, to financial incentives, family friendly practice and charitable/circular motives are identified as incentives during the end-of-use stage. Users need to be informed well on the importance of the return of phones, the ease of the method and their privacy. Also, the perceived value of payback should exceed the perceived financial, functional and sentimental value in old phones and the perception of effort. This requires the elimination of negative factors and enhanced benefits for both KPN and consumer in their cooperation. The insights enabled the generation of relevant elements in nature and a translation onto the case.

Based on the insights the design goal is formulated: a satisfactory disposal phase that ensures an alternative and long-term payback method for both KPN and users, that enables the involvement of other users for the spread of circular behaviour.

As a result, KPN Bewust is developed: a return system that promotes the spread of information and circular behaviour through its return service. In this system, returning an old phone and involving others, is the by-effect of purchasing the next contract with or without a phone with discounts, which reduces the perceived effort. Persuading friends and family to return their phones, is rewarded with mutual benefits. These generous offers will give KPN a competitive advantage compared to traditional take-back programs, with more longterm and satisfied clients in return. Through the KPN Bewust profile, an overview of the generated discounts, and contacts shows how the advantages of a returned phone can outweigh the advantages of keeping them. This experience will increase the likelihood of repetition and the spread of return behaviour.

CONTENT

GLOSSARY

Definitions and abbreviations used throughout this report

CIRCULARITY

Circular Economy (CE)
A regenerative system which aims to minimise resource input and waste by slowing, closing and narrowing material loops (Ellen MacArthur Foundation, 2015). This calls for minimal raw material extraction, reintroduction of materials already in the economy and no waste. (CE Guide, 2017)

Linear Economy
A 'take-make-dispose' model of resources (Ellen MacArthur Foundation, 2015).

E-waste/WEEE
Disposed electronic and electrical products. These products typically contain hazardous materials and require certified handling and recycling (CE Guide)

End-of-life (EoL)
The life cycle stage during which a product no longer has value to its original owner and is then disposed of (CE guide).

End-of-use (EoU)
The stage during which the user stops using the phone

NATURE INSPIRED DESIGN

(Definitions based on Baumeister et al., 2013)

NID
Nature inspired design

Biomimicry
Imitating nature's designs and processes for solutions in human society.

Ecosystem
The biological definition is a community of organisms and its nonliving, physical environment interacting as an ecological unit. In economic terms, this can be translated to a community of organisations and their customers surrounding a nonliving physical product that interact as an economic unit (own definition)

Symbiosis
An intimate relationship between two or more organisms of different species. It can be categorised into mutualism (in which each organism benefits from the relationship), commensalism (in which only one organism benefits, or parasitism (in which one organism benefits at the expense of the other).

Organism
An individual plant, animal, or other life form.

CONSUMER & BUSINESS

(definitions based on Woodruff, 1997)

Value
A trade-off between the benefits and costs (for KPN) /offerings (for consumers) that are proposed

Benefits
Advantageous attributes and consequences that are in line with a goal

Costs
Financial offering that needs to be made in order to receive the benefits of the proposition

Offerings
The sacrifices that have to be made in order to receive the benefits of the proposition

Satisfaction
Satisfaction occurs when the perceived value is more than what is expected, while dissatisfaction occurs when the perceived value is less than what is expected.

OTHER

Phone
In this report the term 'phone' is used for a mobile phone

Rest-value
The existing/remaining value of the phone - calculated based on demand, state of the phone and other factors

User
User of mobile phones (not necessarily KPN customers)

Cooperation
The satisfactory exchange of resources, between a company and a user, leading to long-term benefits

KPN Bewust
The final concept of this project

Voordelencheck
The digital tool accessible on the website and app which asks for the type and state of the phone and gives feedback on the benefits

1. INTRODUCTION

This chapter gives a brief introduction of the background of this project, the scope, aim and how the design challenge will be tackled.

1.1 | PROJECT BACKGROUND

This project is about stimulating consumers to return their mobile phones in order to get the phones or their materials used again. This is realised with a Circular Economy which aims to "keep products, components and materials at their highest utility and value, at all times" (Webster, 2015). To allow products and their resources to loop back into the system, products need to be, e.g., reused, refurbished, remanufactured and recycled (Ellen MacArthur Foundation, 2013). For this to happen, enabling the return of products by users and companies is crucial as depicted in Fig.1.

Return programs are implemented by companies in the mobile phone industry. However, users rarely bring back their mobile phones, which makes it harder to close the loop (Ellen MacArthur Foundation, 2012). One reason may be that current take-back programs do not represent an effective system yet.

Both consumers and companies have an important impact on a transition towards a Circular Economy. Especially for products like mobile phones, which form a crucial part of people's daily lives and are upgraded more often than other devices, this is a challenge.

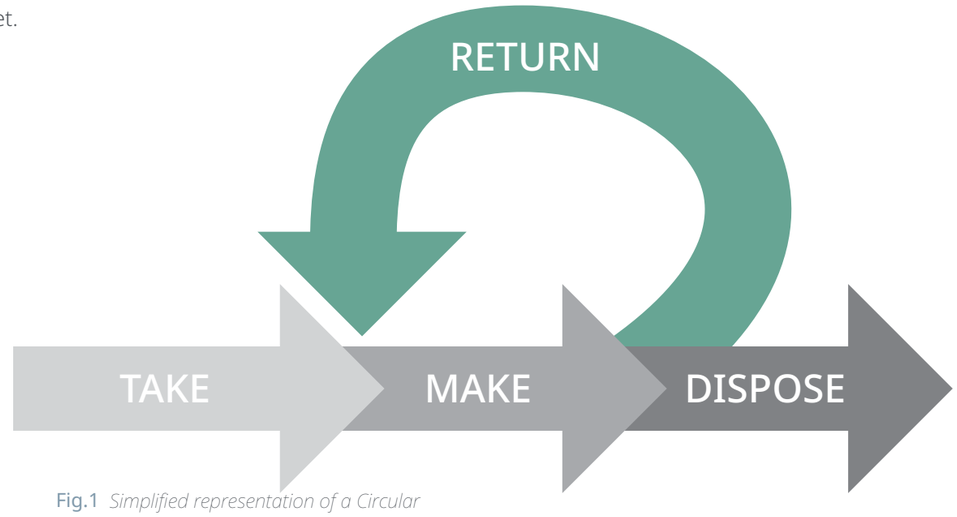


Fig.1 *Simplified representation of a Circular Economy, as opposed to a Linear Economy*

1.2 | SCOPE & AIM

Making the return of mobile phones an enjoyable and convenient part of the total experience could effectively stimulate consumers to return their old mobile phones. Mobile phones and corresponding services are provided by retailers. Therefore the design challenge will be tackled within the sphere of influence by retailers and users in the mobile phone industry.

This project is conducted in collaboration with KPN and develops a return program to be incorporated with their current services. The aim is toward finding how an effective and beneficial exchange for the return of phones can be created between KPN and consumer.

Beneficial transactions of resources already occur in nature's ecosystems that have been fine-tuned over millions of years, from which designers can learn and derive insightful inspirations. Therefore, these natural phenomena are explored and used as an inspiration for the development of ideas in the mobile phone 'ecosystem'. For this, KPN and consumer are seen as two actors, like two different types of organisms that will work together for their own advantage while benefitting the eco-system they are in as well.

The overall aim of this project can be summarised as follows:

Develop an effective stimulation and experience for the return of old mobile phones through phone retailers, by learning from interactions in nature, in order to enhance the retention & regeneration of resources in mobile phones.

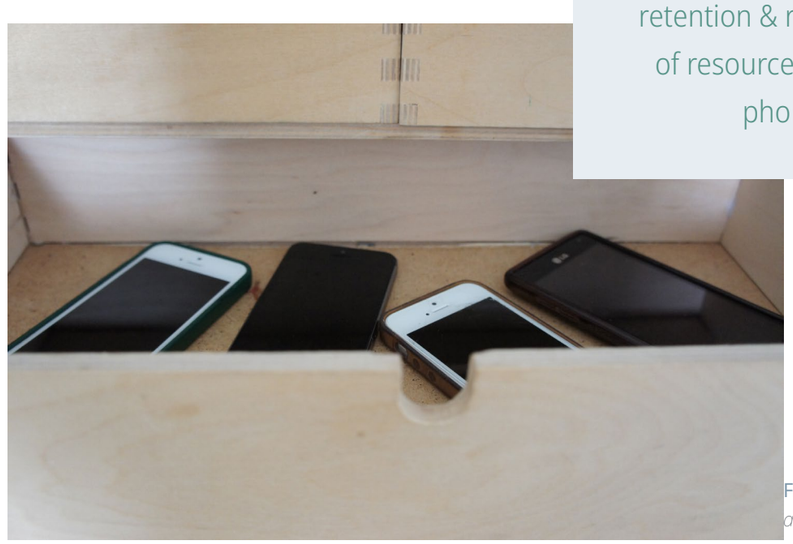


Fig.2 *Phones stored at home*

1.3 | A NATURE INSPIRED APPROACH

Nature inspired design strategies are used for the design of sustainable products and business models, such as biomimicry and cradle to cradle. These are strategies that base a significant proportion of their theory on 'learning from nature' (Pauw et al., 2010). Learning from nature as a tool of inspiration in this project is close to the biomimicry approach, in which nature's designs and processes are used for solutions on human societies (Baumeister et al., 2013). For social practices specifically, nature provides the examples of symbiosis (Pauw, 2015), which is defined as the interaction between biological organisms. Exploring this field can provide many interesting insights and solutions for problems that can be solved through behaviour and actions.

An exchange in nature is usually different from a business exchange in human-made systems. One uses natural resources without waste and additionally can retent and regenerate resources, which is a key aspect in a Circular Economy. In a business context generally, the exchange is built on monetary payments that are exchanged for products and/or services. Especially wasteful products, such as mobile phones and the businesses built around them, are not aligned with nature's principles, to begin with. A literal translation and direct application from examples in nature are therefore not possible nor intended with this project.

This project focuses on learning from these beneficial win-win situations existing in nature, and more specifically, how these interactions are managed, how the exchange of value occurs and how it can even influence behaviour. Inspirations in these areas will then be applied to the case of old mobile phones for the optimisation of their return. But first, the problem needs to be understood and the needs of both users and companies need to be considered. Retailers should be willing to accept old mobile phones, while consumers should be willing to return them. A clarification on biomimicry's integration in this design context is provided in section 2.3.

During this project, three biology experts were consulted:

Dr. Bertus J. E. Beaumont
Principal investigator & Assistant Professor
Delft University of technology | Department of Bionanoscience

Prof. dr. Toby Kiers
University research chair & Professor of Mutualistic Interactions
Vrije Universiteit Amsterdam |Faculty of Science | Animal Ecology

Prof. dr. Ronald Noë
Professor of Behavioural Ecology
Université de Strasbourg

1.4 | PROJECT PROCESS

A general approach for the project is visualised in Fig.3, which is based on the Biomimicry Thinking Framework (Baumeister et al., 2013), also called the Biomimicry wheel (see Appendix A.1). In comparison to other conventional design approaches, this method integrates the and makes lessons learned from natural phenomena the foundation of the design process. It is open for interpretation and offers flexibility, especially in the many iterations that take place in the research and design processes. In this thesis, it is used as a structuring tool.

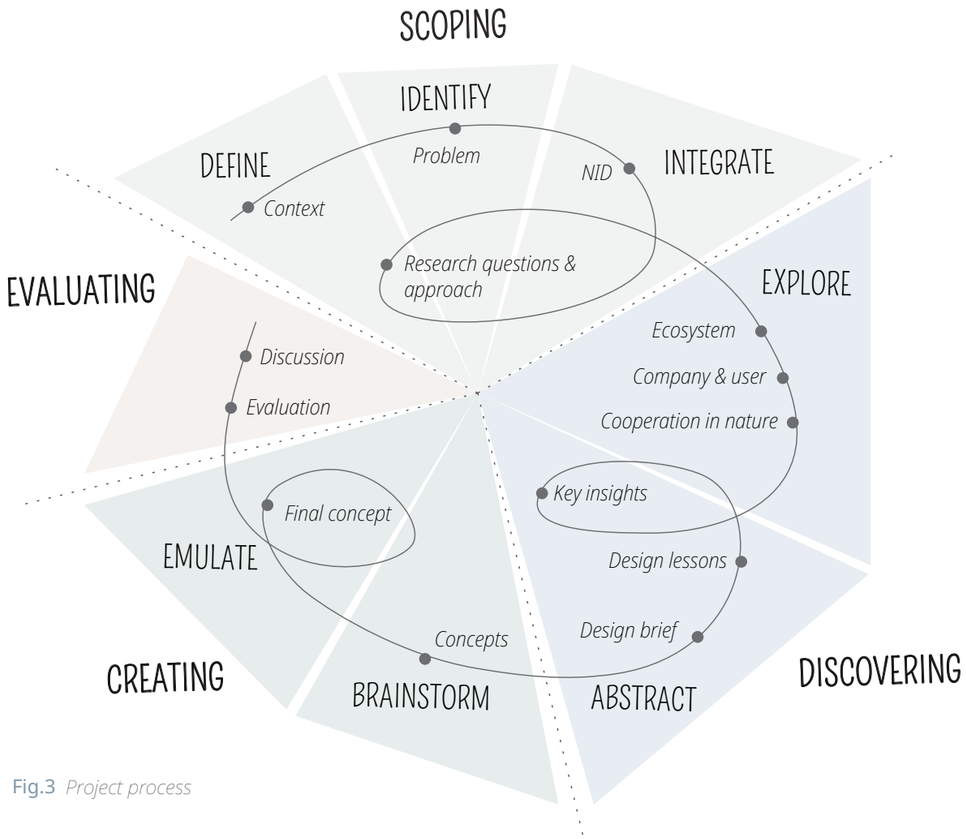


Fig.3 *Project process*

Scoping

In the scoping phase (Chapter 2), the context of the study is defined by explaining the current linear system of mobile phones and the desired shift to a Circular Economy. Based on the main problem resulting from this, the approach of nature inspired design is further refined. This ultimately led to the definition of a design challenge and six research questions, which together form the backbone of this report. The questions are related to specifying the problem, the need for more understanding, the use of nature as an inspiration and the design task.

Discovering

The largest chunk of the project consisted of the discovering phase, in which the research activities took place. To understand the context of the problem, the overall ecosystem of the mobile phone was analysed by looking at the stakeholders and the resource flows, the current solutions and the experience processes of a mobile phone (Chapter 3). Then, the factors that influence and shape the mobile phone return behaviour were explored, through research on KPN and users (Chapters 4 & 5). Finally, natural models were discovered and abstracted into design lessons (Chapter 6) . This led to the design brief.

Creating

This phase explains the creative process. Three concepts are developed according to the key insights and lessons acquired during the discovering phase, and are evaluated (Chapter 7). This resulted in a final concept with principles emulated from biological strategies (chapter 8).

Evaluating

Finally, the concept and the process were evaluated and recommendations were provided (Chapter 9).

2. DEFINING THE CONTEXT

Mobile phones are undoubtedly the most ubiquitous electronic products in the daily lives of many people: a life without mobile phones is hard to imagine. Even though these devices are often made of durable materials such as plastics and metals, they are used for a relatively short period of time before they are no longer considered valuable or useful. With the ever-growing demand for newer mobile phones, this wasteful character seems to stay.

This chapter explains the current linear system and how a circular economy can provide a solution to the wasteful mobile phone industry. Furthermore, the integration of nature as an inspiration tool is explained. Finally, this chapter is concluded with the research questions.

2.1 | THE LINEAR MOBILE PHONE SYSTEM

With the advent of the Industrial revolution in 1760, products began to be produced at a much larger scales which shaped and increased the linear economy, an economy purely driven by profit, in which products are rapidly made, used and disposed of with minimal regards for other factors. This stimulated the buying behaviour of "up-to-dateness", efficiency, style and the sense for modernness (Slade, 2009). Products are not made to last (be repaired), they are made to be used, eventually break down and be thrown away. This creates a materialistic environment in which more and more products are purchased, used for a short period and quickly disposed of. This is especially true for mobile phones, which are rapidly developing and manufacturers are always adding new features and tempting customers to replace their phone almost on a yearly bases. Many of these features, however, are seldom used by many people who are just driven by hype to get the latest and greatest model of the phone. This results in perfectly good working phones ending up as waste.

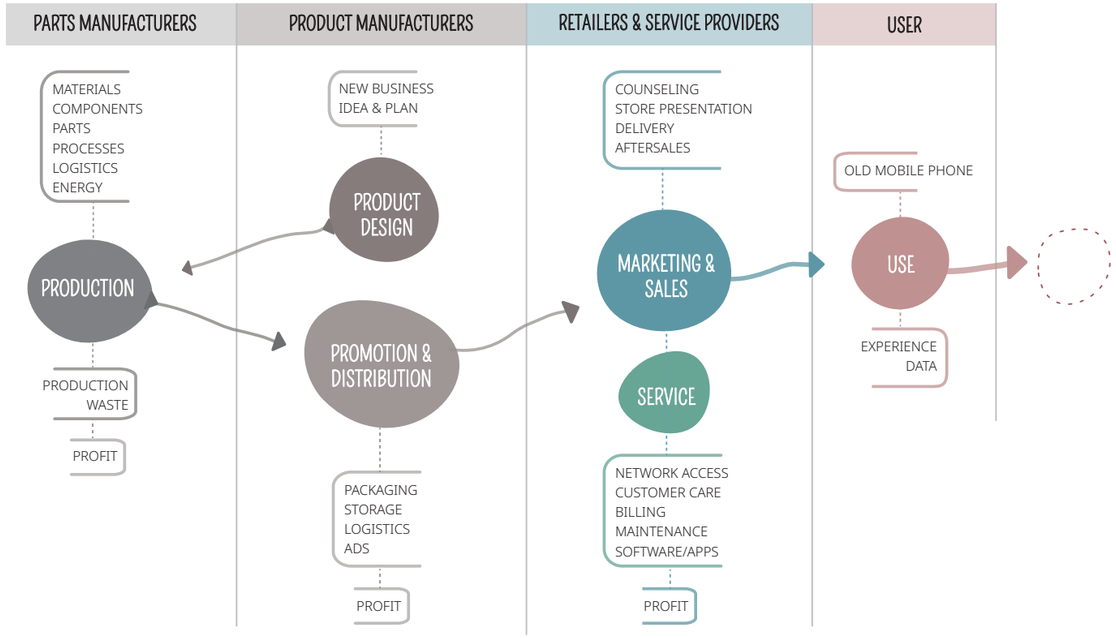


Fig.4 *Overview of processes and activities throughout the life-cycle of a mobile phone.*

2.1.1 The linear process (as opposed to circular)

Products are developed and produced through processes and activities by different companies. Fig.4 shows a generalised version of this process for mobile phones. In each step, resources are used leading up to the production and sales of mobile phones. This is followed by a relatively short life-cycle, which on average is only 22,7 months (Dunn, 2017).

Throughout the life-cycle of a mobile phone, the largest environmental impact (between 60 - 80%) arises from the manufacturing processes (Benton et al., 2010). With the short life-cycle, the phone is abandoned while still carrying this impact from e.g. the use of scarce materials, waste during manufacturing and distribution processes. When a product is used longer, the impact from its manufacturing processes can be spread over a longer time period. Therefore the phone's lifetime becomes the key determinant for its overall environmental impact.

If no action is taken at the end-of-use, the old phone is still owned by the user and the values in the phone are not used to their full potential. But what happens with these old phones?

A study conducted by Güvendik (2014), for Fairphone, demonstrated the problem with disposal in the mobile phone industry (Fig.5.). Even in a community that is in general environmentally conscious, the return rates mobile phones are low. Similar studies (Scholtz et al., 2015; Yin et al., 2014) confirm the low return rates and the preference to keep phones. The stocked phones are left for obsolescence, and at some point may be discarded, if not returned for a proper treatment. This is what happens in a linear economy: a one way take, make, dispose process (Ellen MacArthur Foundation, 2012).

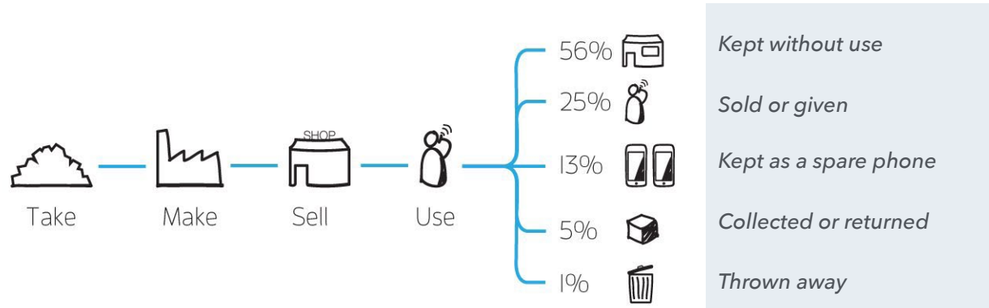
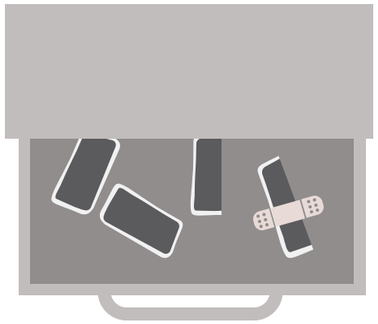


Fig.5 *Overview of where old mobile phones end after use, by Güvendik (2014).*

In the Netherlands, this high tendency to keep phones resulted in an average of 3,2 phones kept per consumer in 2015 (Fig.6). These phones have been replaced with another one, for which the motivations are given on the right. While half of the reasons deals with functional problems, 44% of the phones could still be in a good functioning state.



2,7 working 0,5 broken phones
kept home by average Dutch consumer

- 23% doesn't fulfill desire
  - 50% doesn't support latest software
  - 22% too slow
  - 20% battery fife too short
- 22% upgrade with renewed contract
- 20% new phone considered better
- 20% broken
  - 48% broken batteries problems with charging
  - 30% not working function(s)
  - 23% damaged buttons or casings

Fig.6 *Amount of old mobile phones kept by the average Dutch consumer and reasons why phones are upgraded according to Scholtz et al. (2015).*

2.1.2 Impact of a linear system

Waste of electrical and electronic equipment (WEEE), such as computers, TV-sets, refrigerators and cell phones, is one of the fastest growing waste streams in the EU (Eurostat, 2018a). Smaller and more frequently used and upgraded electronic products, such as mobile phones, are not likely to be disposed through collection programs. "IT and telecommunication equipment" forms the second largest product category of e-waste (Eurostat, 2018a). It is estimated that the e-waste that is documented only account for a third of the total waste, which could mean that (part of) the remaining WEEE are treated improperly or simply disposed of as part of residual waste by consumers and end up in landfills and incinerators (Eurostat, 2018b) (Fig.7.

3.9 million KG
e-waste from small IT devices in 2016

Around 7.8 million KG
estimated to be undocumented

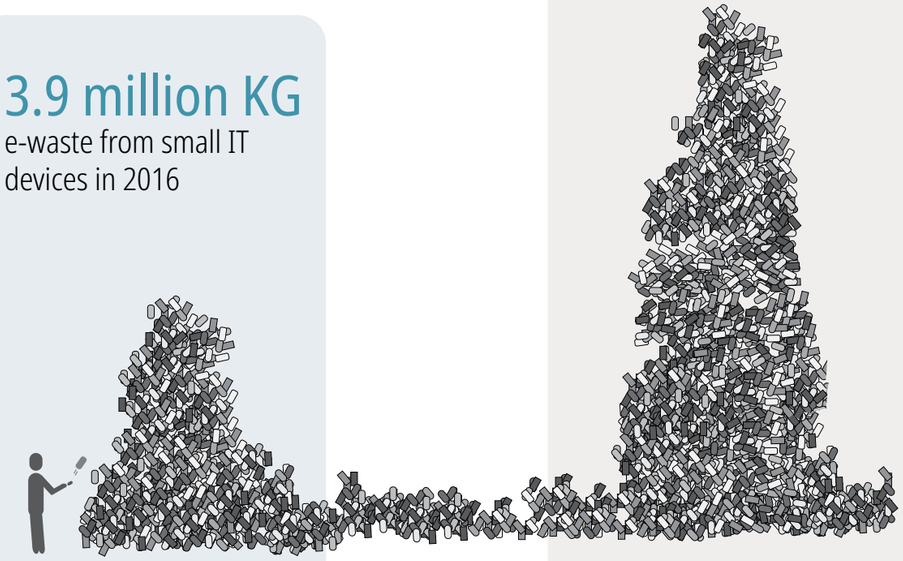


Fig.7 *Documented weight of e-waste in 2016 (United Nations University, 2017)*

The issue of storage without use is problematic if these hibernating devices are not returned back into a circular loop: the resources they contain leak out of the system and are essentially lost.

Currently, there are around 258,1 million smartphones users in Western Europe (Statista, 2018) and the average use period of mobile phones is at 22,7 months (Dunn), which means that yearly millions of smartphones are upgraded and add on to the millions of old unused smartphones lingering around on this planet, if not incinerated or recycled.

With an ever increasing global population and a growing middle class in the emerging markets, the demand for mobiles is only going to increase and as a consequence the waste. This will also further burden the rare material used in making these phones and pose a serious problem within this materialistic and linear way of consumption.

THE MOBILE PHONE. A MINE OF VALUABLE RESOURCES

Mobile phones contain many valuable resources. Although the relative weight of each mobile phone's metal content is low, for example copper, gold, palladium and silver only make up 13.2% of a mobile phones total weight (Yu et al., 2010), mobile phones represent a significant material resource. **In one million phones, there can be around 16 tonnes of copper, 350 kg of silver, 34 kg of gold and 15 kg of palladium** (Nogrady, 2016). The concentration of gold in a mobile phone is approximately 200 times greater than the concentration found in a South African gold mine (Takahashi et al., 2009).

2.2 | TOWARDS A CIRCULAR MOBILE PHONE SYSTEM

As discussed in the previous section the currently used linear model for mobile phones is unsustainable and a circular economic model is needed. The Circular Economy is defined as a regenerative system which aims to minimise resource input and waste by slowing, closing and narrowing material loops (Ellen MacArthur Foundation, 2015)

This is achieved by establishing circular processes (see Fig.8). The design of durable designs, maintenance during use, reparation, re-use, remanufacturing, refurbishing, recycling and upcycling, all lead to a minimised resource input, waste, emission and energy leakage (Geissdoerfer et al., 2017).

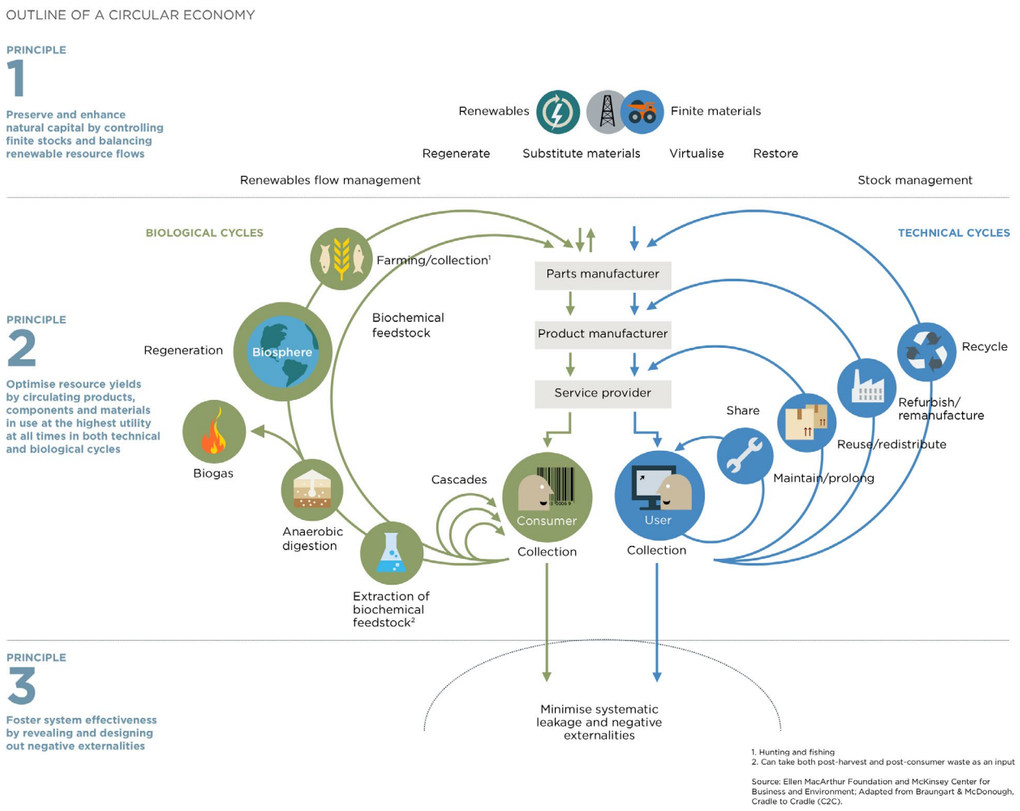


Fig.8 *The Circular Economy framework by the Ellen MacArthur Foundation (2018).*

2.2.1 Advantages of a CE

The circular economy provides advantages for the economic system in similar ways this happens in nature, but with the advantages that are beneficial for human systems.

Environmental advantages

The initial target for the circular economy is to have a positive effect on the ecosystem and to counteract the overload and the exploitation of the environment. Re-using, dematerialisation and service models result in fewer (polluting) materials, which leads to a reduction of carbon dioxide emissions (Ellen MacArthur Foundation, 2015).

Economic advantages

The circular economy provides economic benefits to the system. The economy can continue to grow, there are substantial material savings and growth in employment and incentives for innovation (Ellen MacArthur Foundation, 2015).

Business advantages

The Ellen MacArthur Foundation (2015) summarised the benefits for business in four opportunities: new profit opportunities, greater security of supply and resilience, demand for service models and new and enhanced customer relationships. By facilitating a return or leasing, more long-term relationships can be created between suppliers and consumers, because of the facilitation of more contact during the life of the product (Ellen MacArthur Foundation, 2015; Kraaijenhagen et al., 2016).

Societal advantages

The benefit from circular models and the flexibility that arises can create more value and the easier recovery of value for consumers (Ellen MacArthur Foundation, 2013). Additionally, the indirect benefits that may arise from benefits for environment, economy and business could bring advantages to individuals and communities, such as increased employment and reducing or compensating the negative effects of climate change.

A circular economy opens up opportunities in a wide range of markets. The focus of this project is product life extension and resource recovery through the stimulation of consumers to return their old phones. This requires cooperation among different organisations and also with the consumers of mobile phones. Through collaboration, businesses can enhance their positive impact on all stakeholders involved, the society and the environment (Kraaijenhagen et al. 2016).

2.2.2 Designing for a CE

Providing solutions for durable mobile phones and facilitating the circular practices shown in Fig.8 do not suffice alone when tackled in isolation. A Circular Economy requires system thinking, in which actors are part of a network in which the actions of one actor impact other actors (Ellen MacArthur Foundation, 2015).

Interventions can take place for hardware, software or business model. Even if a phone would be designed to be durable, maintained well, has extended software support and has standardised parts, the phone should somehow flow back into the system after use. Therefore the efficiency of such collaborations to circularise a mobile phone industry depend on an important link: the consumer. Unless required as part of a contract, consumers are free to do whatever they like with their old phones and as shown by data this is not taking place in an effective manner. Therefore collecting these phones efficiently from consumers, is the main focus of this project.

The CE is based on the following design principles (Ellen MacArthur Foundation, 2012):

- Design out waste and pollution by not creating any waste and using the material inputs again
- Keep products and materials in use by keeping products, components and materials in closed loops
- Regenerate natural systems by reclaiming and retaining regenerative ecosystems

These principles have their roots in nature, where resources are produced, exchanged and regenerated by fulfilling another purpose in closed loops of a larger system. The ability to understand how parts influence one another within a whole, and the relationship of the whole to the parts like in nature's ecosystems, is crucial for a non-linear approach. Therefore, acquiring lessons from nature, can be a useful tool in the design of circular systems.

2.3 | INTEGRATING NATURE INSPIRED DESIGN

The previous section explained how the goal in a Circular Economy is in line with how nature deals with its resources. In biological ecosystems, different organisms exchange resources they need and together maintain a functioning system, without creating waste. How can designers learn from this?

2.3.1 Biomimicry: an intro

The approach in which nature's designs, processes and systems are imitated for solutions in human society, is called biomimicry. Janine Benyus, the co-founder of the Biomimicry Institute, defined biomimicry as the "conscious emulation of life's genius" (The Biomimicry Institute, 2015). This means that the learning from living things happen intentionally to seek insights to the challenges we as humans want to solve. 'Life's genius' refers to the premise that life has found well-adapted solutions over time that endure.

Answers to many of the challenges faced by humans can be found in nature that has had over 3.8 billion years to come up with ingenious strategies that have been rewarded with fitness (survival) and the process of natural and sexual selection has ensured that the strategy is passed on to following generations. Only 0,1% of species that have ever lived on earth survive today (Baumeister et al.). This means that the species that exist today can be considered the success stories for the current conditions on the planet, resulting from their strategies.

BIOMIMICRY DESIGN APPLICATION: JUST IN TIME MANUFACTURING

Biomimicry has been applied for the design of many products and services. For example Interface, a carpet manufacturer. Most carpet companies ship their products from one location to other parts of the world. Interface has developed a way to use regional production in four continents and just-in-time manufacturing to be more attuned and responsive to their customers. This means that they manufacture a carpet after it gets ordered, which allows for customized products and the avoidance of stockpiling at each location where it is not needed. To prevent waste, they also produce different popular styles in each location, which might not be top sellers if produced in all regions (Interface, 2018)

2.3.2 Nature's principles

When we question how nature would solve the problem of old mobile phones that are kept and look for examples, it is obvious that the occurrence of production, consumption and waste generation happens in different ways and for different needs than the human world. Nature does not produce wasteful goods, but knows many examples of ecosystems in which resources are efficiently exchanged.

Every type of organism has a unique way of living, but upon reflecting many examples, patterns have emerged that show the similarities among living species on earth. These have been compiled into a set of strategies in nature, which are presented as Life's Principles (Baumeister et al.) (See Appendix A.2).

The way nature inspired design is used in this project, is to learn from the way organisms work together to exchange resources. Therefore the focus will be on a principle which is directly linked to this scope; 'cultivating cooperative relationships'.

A comparable concept to the symbiosis in nature is industrial symbiosis, defined as a partnership in which residual flows of company A are exchanged with company B, who can use the residual stream as resource in its own processes. This fosters eco-innovation and long-term culture change (Lombardi & Laybourn, 2012)

2.3.3 Learning from cooperation in nature

In nature, cooperative relationships are common in symbiosis which is defined as a longterm relationship between organisms (Baumeister et al.). From a non-biological perspective, cooperation sounds positive, however, it should be noted that nature's cooperations encompass any form of exchange between organism, even if this is at the expense of others. Appendix A.3 shows an overview of these types of symbiosis and page 31 shows some examples.

The cultivation of cooperative relationships in nature can be reached by finding value through win-win situations (Baumeister et al.).

In a study, Kiers (2014) focused on sociomicrobiology, the study of social interactions such as conflict & cooperation in microbes. The study concludes that microbes form complex networks of **successful coordinated and cooperative behaviour instead of standalone, asocial organisms.** This is reached by having sophisticated chemical communication, adapting to changes in environment, distributing tasks and prepare for the future. As 'economic' actors they evaluate the potential of their partner, sense the context of decisions and offer competitive pricing schemes.

This example shows how a combination of strategies can result in an optimised system in nature. And that with organisms without brains! The natural world is full of such cooperative relationships. Life itself is built on cooperation, by single cells that form groups (Kiers, 2014). Actors in nature are selected to **do the right things in the right moments, with the right partners, resulting in a beneficial cooperation.**

How can we do this for our systems?

A Value exchange

Value is a broad concept and poses an essential difference in perspectives. When considering human systems, especially in the Western culture, the focus of value is mostly from an individualistic point of perspective, in isolation of the larger system. Focusing on value for an individual, may it be one consumer or a single company, leads us to behave in a way that maximises this value: overconsumption without having concerns about the environment. This perspective is what drives a linear economy.

As opposed to this, nature promotes cooperation for a collective value that is beneficial for the ecosystem; (groups of) organisms and their environment. Therefore a shift towards a Circular Economy requires a (re)design of systems by considering the individualistic values of different parties while minimising the environmental impact.

The return of resources is not only up to one actor as in the case of users. The willingness to have the resources flowing in nature and their effectiveness, seem to be mutually valuable by two different actors. Therefore in the system thinking that is required for a shift towards a Circular Economy, the individualistic values should be considered.

One of the lessons that can be learned from nature is that the efficiency of a system cannot be achieved by an organism in isolation from other living things. In the case of returning a mobile phone, this lesson applies as well. Users depend on resources and services that are offered through a larger whole, while companies depend on the behaviour of users for the purchases and returns. What makes this a design task is to create a system in which the return of a phone is experienced as beneficial for both KPN and user. Learning from nature on the system level and emulating processes and systems can, therefore, provide valuable lessons and inspirations.

In order to understand why and how organisms exchange resources and evolved in longterm cooperation and apply this knowledge on the case, a deeper understanding is required into cooperation in nature.

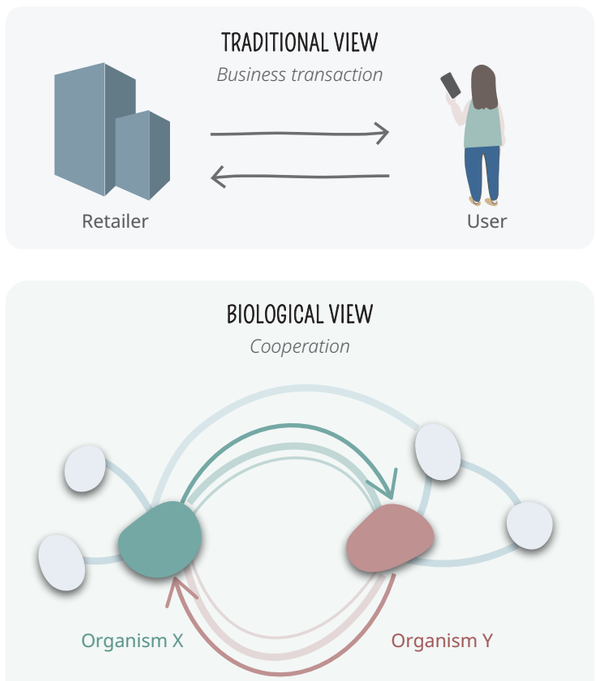


Fig.9 *Traditional take back programs as opposed to cooperations in nature, in which a flow of resources enables closed loops without waste.*

SEA ANEMONES & TROPICAL CLOWNFISH

In order to live among the anemone, clownfish first and foremost protect themselves from stinging tentacles of the anemone, which are used to capture prey and ward off predators. The tentacles are rich in nutrients, but the possibility of being stung while eating discourages the clownfish from nibbling on it. In return, the anemone has evolved to not strike the clownfish, who has by evolution a thick mucus layer that protects from a possible strike. In return for a safe and protective home, the clownfish benefits the anemone with cleaning, providing nutrients of their waste and scaring away predatory fish. (Roach, 2003) (Fautin, 1991).

SOCIAL NETWORKING BEHAVIOUR IN HERMIT CRABS

Unlike snails and mussels, hermit crabs cannot grow their own shell and must search for an empty snail shell as they grow. This is not easy: the shell should be in the right size and not broken. Hermit crabs have developed 2 systems for efficiently finding the perfect shell to save them time and energy. (1) When a hermit crab finds a suitable shell, it switches the old for the new one and leaves the old one for others, which leads to the shelss being used until broken. (2) When a hermit crab finds a shell that is too large, it waits there until the shell gets vacated by a slightly larger crab than itself. Smaller crabs line up in order of size next to the initial finder. When the larger crab arrives for the empty shell, an exchange of shells take place (Rotjan et al., 2010).

CLEANER WRASSES

Fish covered with annoying active parasites enter in a partnership with cleaner wrasses over time. The client fish gets cleaned and provides the cleaner fish with food. This services resulted in fixed 'cleaning stations' where client fishes line up to be cleaned. The client fish are usually much larger fish. They usually defend the cleaning station where there are a lot of small cleaner wrasses (Brough, 2006).

UNDERGROUNG MARKETPLACE

Approximately 80 % of all known land-base plant species form a symbiosis with mycorrhizal (soil fungi) making it one of the most important symbiosis on our planet. The majority of these mycorrhizal interactions are mutually beneficial for both partners where both parties exchange resources through the mycorrhizal interface. The plants provide the mycorrhizal with photosynthetically fixed carbon and in return the plants are provides by phosphate and nitrogen by the mycorrhizal (Bucking et al., 2012).

2.4 | RESEARCH APPROACH

For a shift towards a circular mobile phone industry, a change is required to the system in which mobile phone users and KPN exchange resources. The more detailed the system becomes (by finding elements, ties, interconnectedness, and relationships) the more designers can see the “whole picture” and increase the chances of being able to effectively adjust the variables (Baumeister et al., 2013).

In order to understand the position of KPN and user in the wider context, the current state needs to be analysed. According to Dr. Beaumont (personal communication, June 29th 2018), it is important to define what the own advantages are for both user and a retailer like KPN, to realise a beneficial cooperation. A study into these variables will form the bases and serve as guidelines in generating complementing insights from nature.

The main challenge of this project is defined as:

> Develop a cooperative exchange between users and KPN, by learning from interactions in nature, for an effective return of mobile phones as part of a phone return program.

This challenge is initially broad and the scope will be narrowed down by answering the following research questions during the course of this study:

RQ 1: What is the context of the problem regarding the return of mobile phones by users?

An understanding is required for the current state of the ecosystem, regarding the return of mobile phones. This should include all stakeholders, the flow of resources and processes.

Method: Mapping out the mobile phone system for the purchase, use and disposal stages and analysis into types of circular propositions for mobile phones, supported by the literature.

Results: Mobile phone experience insights & overview stakeholders and the circular opportunities that arise for retailers like KPN (Chapter 2)

RQ 2: What are the key factors and processes that influence and shape the return of mobile phones?

In order to understand the constraints with a user motivated return system and the values for retailers like KPN to offer such systems, available theories and insights from earlier studies related to the phone return behaviour are explored. This will result in a conceptual model with the influential variables for KPN and user and how they are related to each other.

Method: Conceptualising the creation of value for organisations and consumers and the process of circular behaviour of consumers based on a literature review will serve as a basis for the research into key factors. This will be supported by an interview with KPN and empirical studies in literature to find key factors.

Results: Conceptual model of value and consumer behaviour with variables that have an influence.

RQ 3: How do the key factors affect users’ behaviour with current phone return programs?

The variables defined in the conceptual model will be investigated in an in-depth user study, which will be related to the decision making process for an old phone. The insights obtained from RQ 2 are therefore used to specify sub questions and the method for this study.

The conclusion on this question forms a base for RQ 4.

Method: In-depth user interviews & experiment

Results: Insights user study & personas

RQ 4: What design lessons can be retrieved from cooperation in nature to enhance the return of mobile phones?

In an attempt to solve the challenges users and KPN have to deal with and make the return experience attractive for both actors, inspirations from nature will be used. The input from RQ 2 and RQ 3 will be used to define the scope of the research into nature’s lessons as this understanding helps in searching and generating more specific elements in nature and a relevant translation onto the case.

Method: Expert consultation and research available literature on cooperation in nature

Results: Selection & application of natural models, design lessons

RQ 5: How can the problem context, the influential factors and lessons from nature translate into effective design directions?

All input from RQ 2 - RQ4 are used for design solutions.

Method: Combine key insights from KPN, user and nature by using a morphological chart

Results: Design goal, concepts

RQ 6: Which design principles can KPN include in their take back program for an optimised phone return system?

This question is in accordance with the design challenge and will be specified with the design brief. To reach this, the three concepts were developed and evaluated of which one was selected to be developed further.

Method: Brainstorming & user validating

Results: Final concept: system & service design

2.5 | CONCLUSION

The Circular Economy proposes an alternative mindset to the 'take-make-dispose' processes promoted in a linear economy. In this way, products or their materials can be re-used and with refurbishment, remanufacturing and recycling processes, the value invested into them initially can be retained and regenerated. This flow of resources is in line with resource exchanges in nature's systems. Resources are created and developed and after use can benefit other organisms. For this resemblance, nature's cooperations, in which resources are exchanged to benefit both parties, is used as inspiration. The strategy in which nature's strategies, processes and functionalities are copied, is called Biomimicry.

In this chapter, biomimicry principles were understood and analysed which served as a frame of reference to guide the next steps that need to be taken to reach the goal (explained in section 2.4) Later on, it will be utilised in the creative processes by deriving inspirations from theory on cooperation in nature. The Biomimicry Resource Handbook (Baumeister et al., 2013) differentiates between a literal and metaphorical emulation of nature's strategies, principles and models. With such complex systems that can be beyond our understanding, it is relevant to look for a metaphorical emulation of cooperation in nature. This will be supported by conventional research processes for a well founded-base in the inclusion of nature's design lessons.

3. EXPLORING THE MOBILE PHONE ECOSYSTEM

In order to design a phone return system with a focus on stimulating the user, an understanding in the relationship between the consumer and the stakeholders regarding the purchase, use and disposal of a mobile phone is needed. This helps in exploring the problems with the current relationships and experiences regarding the return of mobile phones.

This chapter explores the components of the mobile phone ecosystem by looking at the stakeholders and the flow of resources and processes. This will be supported by the experience from the user's perspective and will be concluded by literature research into different types of return propositions.

3.1 | STAKEHOLDERS & RESOURCES

In order to better understand the ecosystem of mobile phones, a stakeholders map has been created which includes different types of stakeholders and the resources that are involved during the purchase, use and disposal stages. Stakeholders are categorised and their involvement during the purchase, use and disposal stages are mapped out (Fig.10).

Each stakeholder group, or even a company, has its own system. Each company is unique and has a certain way of dealing with the user. Also, a user can make use of multiple stakeholders during the purchase, use and end stages of their phone. Although this overview provides some clarity by having the stakeholders grouped and categorised, it should be noticed that each company can provide different values and can focus on different types and combinations of services. An overview of the stakeholder categories with companies can be found in Appendix B.1.

Users can purchase a mobile phone from the many types of mobile phone retailers or directly from other users, which usually comes after some research and decision making. During usage, they mostly make use of the mobile phone retailers that provide services, but do not have to get actively in touch with them, until they need to purchase additional items or need repair. Lastly, apps are purchased and can be used daily. In return, for most of the services, the companies will get value back in profit and a loyal and satisfied customer.

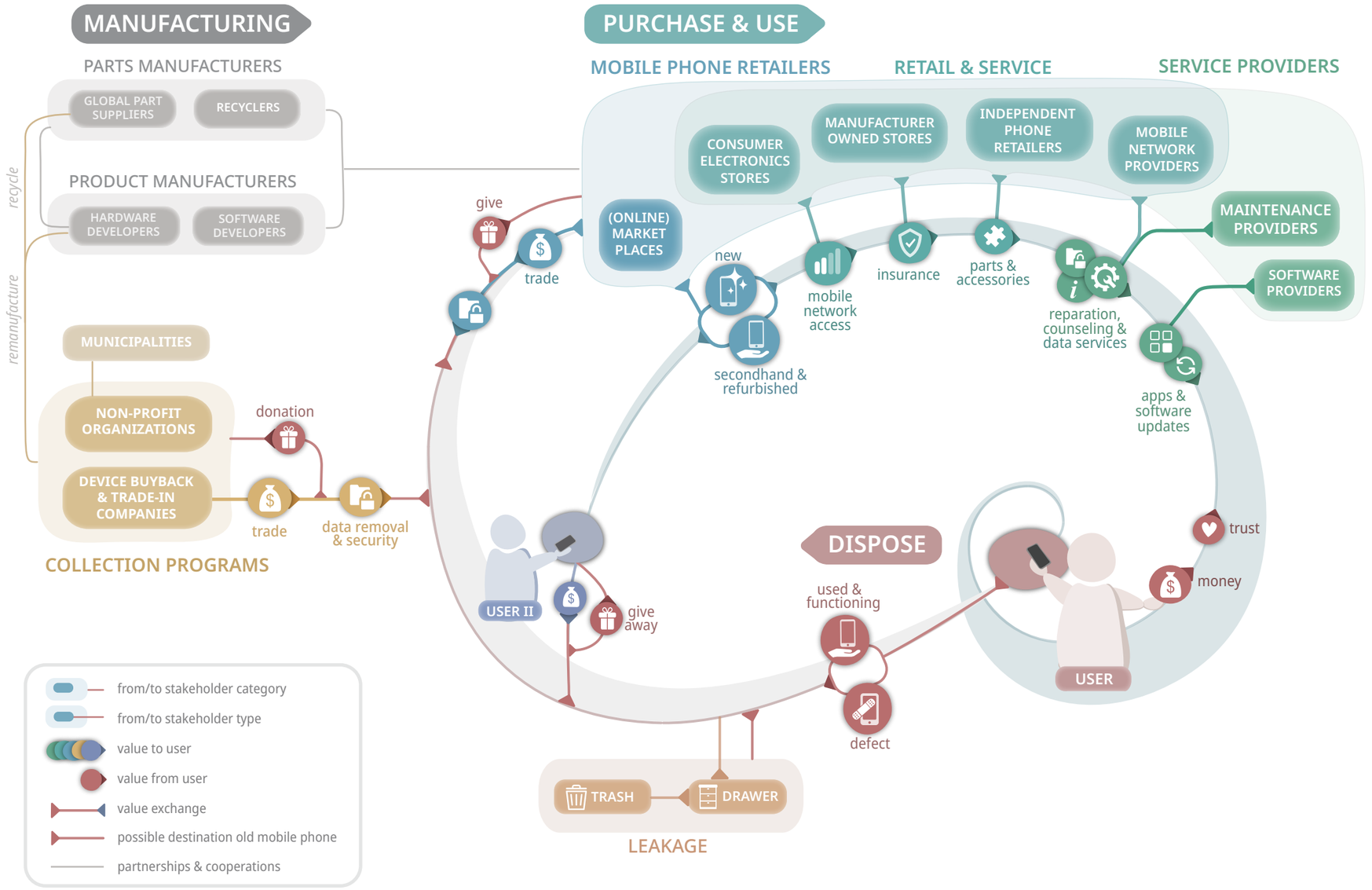


Fig.10 *Stakeholders & resources map of the total mobile phone experience with the user as the centerpiece.*

3.2 | THE EXPERIENCE GAP

In order to evaluate the interest and influence of stakeholders on circular behaviour in consumers, a stakeholder analysis is made, according to Ashby (2016) (see Appendix B.2). This shows the position of stakeholders and how they can be changed to influence users to return their mobile phones

During disposal, for example, after buying a new mobile phone, the user is the major influence. They can choose to e.g. :

1. Keep their phone
2. Throw it away
3. Pass it on to a family member or friends
4. Sell it through an online market place
5. Return it through a device buyback and trade-in company or directly to retailers
6. Donate to a non-profit organisation

Fig.10 showed that there are many options for the purchase and even more options for their return, but when the user chooses to keep it, this link and potential partnerships are broken. This also keeps the circular loop open and the value of the device out of the system.

To understand why the flow of resources is not a naturally occurring process (yet), it is relevant to know what happens during the purchase, use and disposal of a mobile phone from the user's perspective, According to Macleod (2017) the consumer experience of a mobile phone or any other product can be broken down into three stages: on-boarding, usage and off boarding of the product (see Fig.11). The purchase of products comes after information search and is followed by a use phase filled with interactions and experience until the end-of-life or end-of-use stages are reached.

At the end-of-life (EoL), the product has reached the end of its life-cycle. At the end-of-use (EoU), the product has not reached the end of its life-cycle yet, but is obsolete for reasons such as the desire to upgrade to a newer product. This may lead to the disposal of the product or leaving for obsolescence where an abrupt end of the experience occurs, giving products their unsustainable and wasteful character.

Considering the stock of existing mobile phones, it is important to make a distinction between two scenarios: the existing old phones and 'future' old phones.

As the existing old phones are already stored and not engaged with, it may be harder to get these back into the system. The 'future' old phones are the phones that are currently in use and will at some point in the future be replaced by another phone, on average in around two years (Dunn, 2017). As the replacement with another phone usually occurs at the same time of disposing the old phone. There may be an overlapping time of engagement with both, e.g. for data transfer. The active engagement during the next purchase poses an opportunity to minimise the risk of storage without use.

Given the low collection rates, what consumers actually experience during this stage and how they deal in this context, seem not to be evaluated, considered, and improved by retailers, which is a gap for an effective flow of resources in the current system.

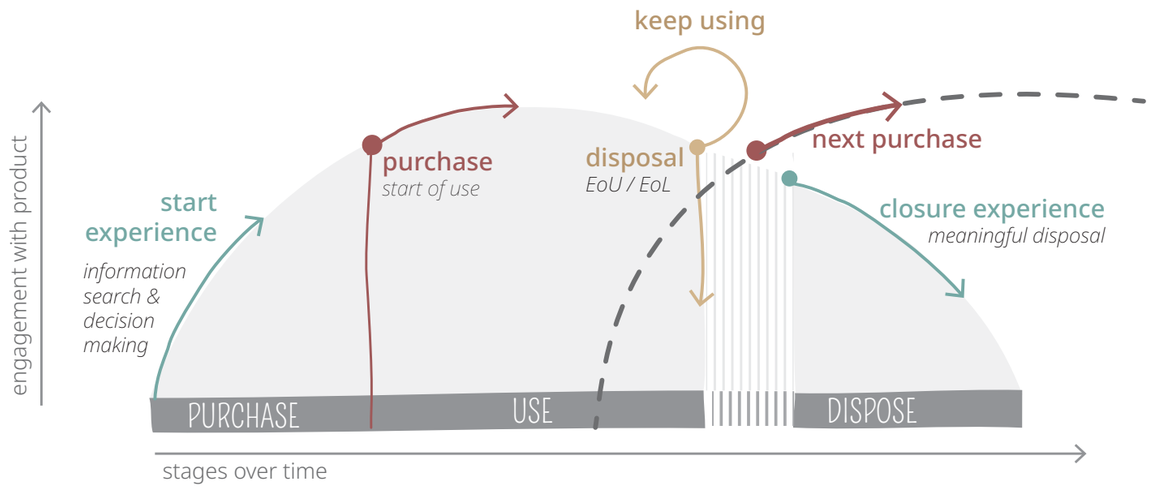


Fig.11 *Consumer product experience model and how the closure experience is distanced from the rest of the product experience as defined by Macleod (2017).*

3.3 | CURRENT TAKE-BACK SOLUTIONS

The e-waste problems caused by mobile phones has lead mobile phone manufacturers and some other companies to implement return programs. As shown in section 2.1, only 5% of mobile phones are taken back. This section provides an overview of current take back solutions and their problems. Phones can be returned through buyback programs, donation or leasing programs. These are run by manufacturers and retailers in return for discounts, vouchers or a payback value. Other options include giving phones up for donation to charities, disposing them in the we-cycle boxed that can be found in supermarkets and hardware stores, or handing them into any electronics store. There are some common strategies that have been implemented in recent years, which can be clustered into three categories.

1. Buy-back Programs

Buy-back propositions involve users handing in their phones in exchange for an incentive, often a monetary payment. These phones get refurbished and restored to a "functional and/or satisfactory state to the original specification" (Rathore et al., 2011), which are then sold at lower price than the new ones. An overview of the options to return and the financial values offered, can be seen in Appendix B.3.

2. Donation Programs

A donation is the type of take back in which phones are returned for charity. Little information is available about the effectiveness of these programs as opposed to buyback programs. In an interview conducted by Jochemsen (n.d.), some participants mentioned that a 'good purpose' was a sufficient incentive to return their phones.

3. Leasing Programs

Leasing a mobile phone falls under the non-ownership concepts that offer mobile phone usage based on use and function rather than owning the product (Bocken et al., 2014). This ensures that the phone needs to be returned after a period of use. With products such as mobile phones that are daily used, are personalized and carry a lot of data, this type of return arouses negative feelings among many users. In the research conducted by Salters (2014), only a small group (16%) was interested in the leasing proposition because this gives them the opportunity to easily switch and always use the latest smartphone.

In a quantitative study conducted by Salters (2014), 84% of respondents were interested in a take back proposition and a financial incentive has been mentioned as an important factor. Unfortunately, this does not mean that people who mention their preference over options, actually will act accordingly. This was apparent in a survey by McKinsey (2008) with 7,751 people in Brazil, Canada, China, France, Germany, India, the United Kingdom, and the United States, showed that when asked, 87% of consumers worry about the environmental and social impact of the product they buy. When it comes to actually buying green products, no more than 33% of the consumers in the survey say they are ready to buy green products or have already done so. When attitudes and values do not correlate with the actions, this is called a value-action gal (McKinsey, 2008). The result of the study shows how this gap can make it harder to design systems for humans, based on what they think or mention they value.

Many buyback & trade-in companies like Brightstar (for Apple and Vodafone) and Teqcycle (T-mobile) have very bad online reviews (Trustpilot, 2018) (Apple Communities, 2018) which leave consumers confused and dissatisfied.

The reason for this could be that consumers that orientate online to return their phones, will in almost any case see higher prices, because retailers or buyback companies often advertise paying back more. In the end, this value is much less after several cutbacks are made for administrative reasons or the condition of the phone. The price that you get in return for your old smartphone differs a lot per trade-in company and many don't accept all kinds of mobile phones.

Furthermore, the return of products is not included in current services or contract provided during use of a mobile phone. The option to return also seems to be hidden on websites of the mobile network provides. In some cases, this option can only be accessed by a specific search in Google.

3.4 | CONCLUSION

While circular systems can perfectly work in theory, the actual behaviour and engagement of consumers seem to be left out of the equation. Manufacturers could be appointed responsible for this, but even with an efficient design of products that fit the Circular Economy, the involvement of users and other stakeholders in the return of mobile phones, remains crucial for the effectiveness.

The focus of retailers and manufacturers remains primarily on the sales of mobile phones. The disposal stage of the mobile phone, is distanced from the purchase and usage stages. This 'gap' poses an opportunity to close the loop and have resources flow in a continuous loop, like systems occurring in nature. If a user would buy a phone first and has to consider the return of a phone afterwards, this is a missed opportunity for a retailer that could facilitate this experience. Otherwise, this can lead to even more 'existing old phones', which are harder to get back into the system.

Many companies have already implemented return programs. These programs offer financial incentives for old phones. The low return rates suggest that the consideration of user experiences during the return process is still missing. Another reason is the low active engagement and interest of retailers, which can especially be interesting for KPN on how to improve their return program.

For this, more research is required into the perspectives of KPN and user, to understand why the rate of returns is still low. As KPN does not have a return system yet, and there is an apparent disinterest of retailers to actively get involved in the return of phones, it is important to understand the benefits and concerns of KPN.

4. EXPLORING COMPANY & USER

This chapter explores the key factors and processes that influence and shape the return of mobile phones. To properly structure the research on the company and user, it is grounded in conceptual models. This helps in objectifying and visualising the factors and processes that are involved in the phone return experience for both KPN and user. Important theoretical outcomes through literature research and interview with KPN are added.

4.1 | OUTLINING THE CONCEPTUAL MODEL

4.1.1 Value through return

Creating a beneficial system that contributes to the Circular Economy, requires a good understanding of the key factors and processes that are involved during a return program, both for an organisation and the users of mobile phones. This should result in satisfactory results for both KPN and user for their contribution to the Circular Economy.

The beneficial relationships in nature that are taken as an inspiration for this project, can be created between a company and their customers, with the creation of value for both sides. A potential weakness by organisations in doing so, as described by Payne and Holt (2001), is the approach where the primary focus is on the value outcome for the organisation itself, resulting from providing and delivering customer value. This focus should be shifted to the creation of value for the ecosystem, including the environmental, the economic and societal aspects, as explained earlier in section 2.2.

Based on a review of different definitions of value from the customer's point of view, Woodruff (1997) proposed the following definition of customer value, which is seen as one of the most comprehensive definitions (Payne and Holt, 2001):

> 'Customer value is a customer's perceived preference for and evaluation of those product attributes, attribute performances, and consequences arising from use that facilitate (or block) achieving the customer's goals and purposes in use situations' (Woodruff, 1997)

In this definition, the term 'product' also stands for service. Woodruff (1997) also explains that the consumer may form an expectation of the value during the choice task and will actually experience the value during use. An area of consensus among the definitions of value is that the perception of value involves a trade-off between what the consumer receives (e.g., quality, benefits, worth, utilities) and what he or she gives up to acquire and use a product (e.g., price, sacrifices) (Woodruff, 1997).

Value is a subjective concept, which means that different people or organisations value things differently (Kortge and Okonkwo, 1993).

The satisfaction of customers is the result of a comparison process between perception and one or more comparison standards, such as expectations (Woodruff, 1997). Perceived value may lead directly to the formation of overall satisfaction (Churchill and Surprenants, 1982). Or they may be compared to one or more standards that influence overall satisfaction (Clemons and Woodruff, 1992; Woodruff et al., 1991). In order for an organisation to reach this satisfaction in contributing to the CE, value drivers should be used to balance the expectation and perception of the customer. The customer is satisfied when the product/service's performance is equal to what was expected and is a desired process for an organisation. If the perception exceeds the expectations, the customer is very satisfied and if below, the customer is dissatisfied. A model of this relationship is presented in Appendix C.1.

Satisfaction must be considered as a post-purchase construct and customer value is independent of the timing of use and can be considered as a pre or post purchase construct. While satisfaction is a temporary state that only plays at the post-purchase stage, it is something valuable for organisations, resulting in a long-term benefit.

KPN and consumers are part of this system and may receive direct and indirect benefits as the result of the return processes. Therefore it is necessary to look for ways to establish benefits for the whole ecosystem by generating benefits for an organisation and the customer, while this should not be at the expense of either of the parties. This describes an economic viewpoint of the symbiosis explained earlier in section 2.3, also called industrial symbiosis (Lombardi & Laybourn, 2012). KPN obviously would want to make a profit on the short-term, but the value of long-term profit cannot be overlooked when considering the benefits for customers and the eco-system.

In this study, the term 'benefit' is defined as a factor that provides an advantageous or desired situation. For the consumer, this is expressed in the desired attributes and consequences from the service, based on Woodruff's definition of value. 'Offerings' will be used as the non-financial factors that the consumer needs to give up in order to acquire the proposed service. The perceived value results from the trade-off between the benefits and offerings.

Benefits for the company, will be defined as a set of factors that positively influence the financial gains (e.g. positive brand image, customer satisfaction), while the costs are defined as financial factors that need to be minimised in order for the provision of the service to be beneficial for the company. The net benefit for the company is therefore expressed as a desirable and measurable outcome for the value that is offered. The terms 'benefits', 'costs' and 'offerings' are therefore closely linked to each other and are depending on the value proposed by the company.

4.1.2 Consumer behaviour during return

This section gives an overview of existing models that are used to define the role of consumer behaviour in returning phones.

A theory often used to describe consumer behaviour is the theory of planned behaviour by Fishbein & Ajzen (1985) which is developed further to the reasoned-action approach (2011) (see Appendix C.1). The model describes that the behaviour is followed by an intention, which is controlled by a set of factors grouped into attitudes, perceived norms and the perceived behavioural control. This behaviour can be influenced by actual control, that depends on the skills, abilities or environment. Yet, this model does not include the differences in moralities and influence of personal restrictions (Miniard and Cohen, 1981) and is therefore often criticised for being too rational.

Chapter 3 explained how the value-action gap occurs when the attitudes and values do not correlate with the actions (McKinsey, 2008). This emphasises the necessity of a distinction between the intention and actual behaviour. For this study, the term 'behavioural intention' is used as the perception of likelihood to perform a certain behaviour and is followed by the decision to return or not return the old phones. This intention does not ensure that the phone will actually be returned.

Kollmuss & Agyeman (2002) reviewed the most influential and commonly used analytical frameworks on linear progression, altruism, empathy and prosocial behaviour and sociological models, including the model of Ajzen & Fishbein (1980). They indicate that shaping a pro-environmental behaviour is so complicated that it cannot be visualised through one single framework or diagram. Based on an analysis of factors, that have positive or negative influence, and are grouped into external and internal factors, visualised in a model of pro-environmental behaviour.

This model strengthens the complications in defining pro-environmental behaviour. However, this covers a broader topic as it attempts to include all types of contexts in which pro-environmental behaviour occurs. The case of this study, however, only focuses on the return behaviour, and more specific, the exchange of values through the return of a mobile phone. For this process the influence of positive and negative factors will be adopted.

4.1.3 The conceptual models for research

The previously explained frameworks helped in structuring the outline of the inputs, outputs, content, assumptions and simplifications for the return of mobile phones in a conceptual model. For the purpose of this study, these models consists of general aspects and processes that can be applied on the return of mobile phones.

In Fig.12, the value model can be seen. For a company, their choice to provide and shape a certain product or service, has implications on the benefits and costs that they will receive. The consumer on the other hand, makes an evaluation based on the trade-off between the benefits and the offerings they have to make. This evaluation is based on the attributes and consequences of returning a phone with the organisation's proposed service. This evaluation of attributes and consequences leads to satisfaction when the perceived value is in accordance with the expectations of the consumer. Therefore not only does the perceived value matter, but also the expectations.

From the ecosystem point of view, the processes (e.g. communication, purchases, experiences) that take place within a cooperation, can be distinguished between short and long-term processes. A long-term relationship with satisfied customers, is most beneficial for KPN as it ensures repeated purchases. This focus on a repeated purchase of goods, is what drives a linear economic model. In a Circular Economy the return of these goods forms an integral part of closing the loops and therefore requires the same long-term commitment from both KPN and the consumer as with purchases. In an ideal situation, this would balance the flow of goods that are purchased and returned.

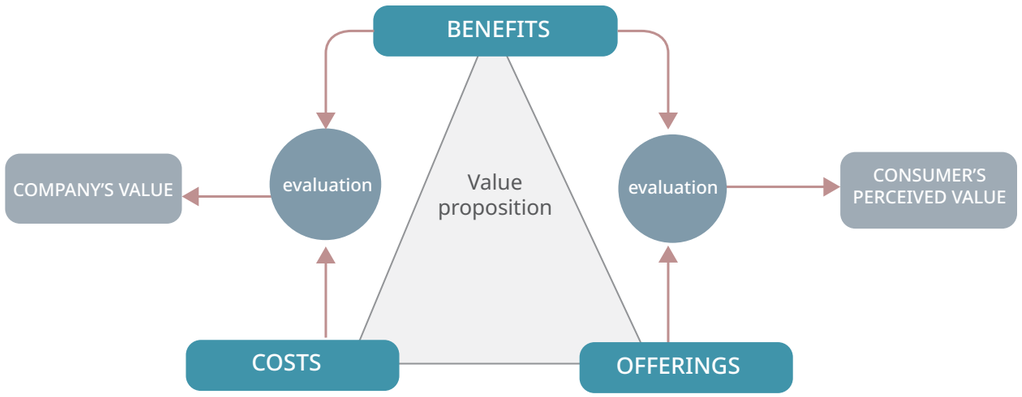


Fig.12 *Conceptual model of value for company and consumer*

The expectation and perception of consumers, can be influenced by various factors (see Fig.13). The perception of an expectation is shaped by communication; either by what companies promise to offer or what other customers have to say about it (e.g. peers, online reviews). Therefore, it is not only important to know what the perceived core value by an individual is, but also what a larger community experiences and how their satisfaction of the value proposition can be strengthened and spread within a community. Enhancing the effectiveness of this communication, can be beneficial for KPN in the long-term and of course for the environment, by promoting a circular behaviour. For this, it is relevant to know, which core value should be communicated initially by KPN.

The perceived value in combination with the positive and negative factors, influence the decision of consumers, which then shapes the intention for the behaviour the consumer foresees.
Acting upon the intention, is also influenced by positive and negative factors. If the negative factors outweigh the positive factors, the consumer does not act on the intention. Finally, the experience of the consumer and the extent of satisfaction, influences the future engagement in another phone return process and influences the perception of other consumers as well.

'Circular behaviour' in this study, is used for the scope of returning mobile phones and is based on the assumption that it is a result of a rational trade-off between positive and negative factors. For a beneficial exchange, products and services should produce benefits for both the provider of the products and services and consumers, while costs and offers need to be minimised.

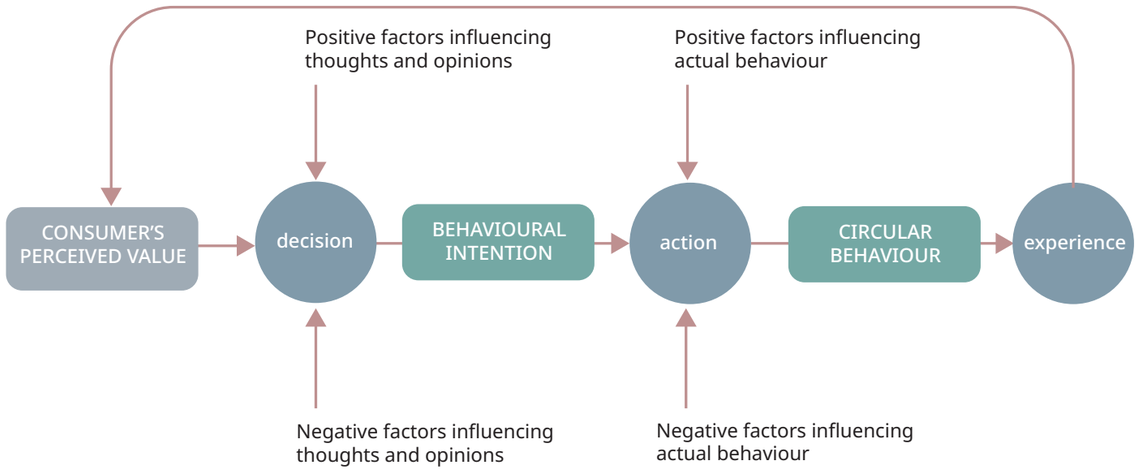


Fig.13 *Conceptual model of circular behaviour used in this study.*

The variables of benefits, costs and offers acquire meaning and can be associated with specific factors, when these parties are assigned to a company and users of mobile phones. While these aspects are easier to identify for a company, the differences within a group of mobile phone users makes the creation of a beneficial phone return process complex. Since the actual value for the consumer cannot be determined beforehand and depends on the perception, the perceived value of the return service will be considered in the process and will be followed by a study into consumers perceptions on return programs (section 4.3)

This section shaped a fundamental understanding on the concepts of value and consumer behaviour. The insights indicate the need for further research into the perspectives of KPN and user, to understand what is valuable to them and how the return behaviour of the consumers can be stimulated. This will uncover how a beneficial cooperation between KPN and users can be operationalised.

4.2 | UNDERSTANDING THE VALUES FOR KPN

4.2.1 Background info

KPN is a mobile telecommunication and IT-company in the Netherlands and provides landline and mobile phone, internet and television services to its customers of a wide variety of companies and consumers. The focus of this study is the business-to-consumer relationship. Their current relationship with users with regards to mobile phones, can be seen in Fig.14.

KPN has been called out the most sustainable telecom company in the world in 2017 (Telecompaper, 2017). They strive for a circular business model by 2025 (KPN, 2018). However, their annual report states that only 1% of mobile phones have been returned to them (KPN, 2017). According to Ken Webster, from the Ellen MacArthur Foundation, retailers would not be interested in accepting old phones, because there are not a lot of interesting values they can gain (personal communication, June 4, 2018). This is due to the low monetary value

In order to find why retailers are not actively participating (yet) to solve the linear mobile phone issue, an interview was conducted with Wognum, the manager trading mobile devices of KPN.

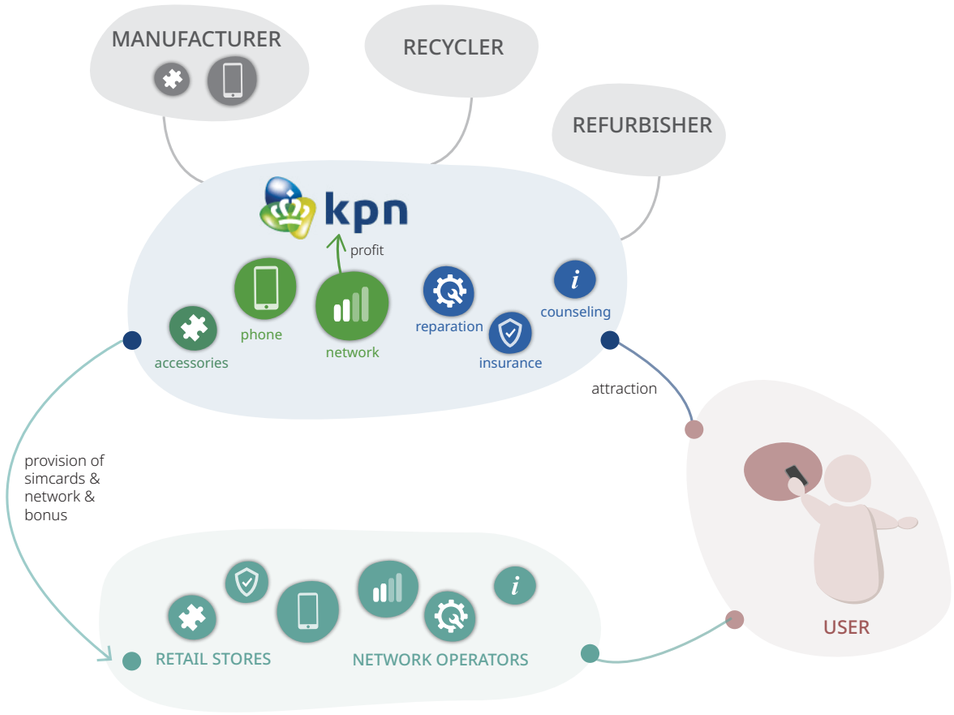


Fig.14 *KPN's mobile 'ecosystem'*

4.2.2 Value for KPN

KPN plans to introduce a buyback program. According to Wognum, this has earlier been difficult, because of marketing challenges. They want to prevent potential customer dissatisfaction with such programs (Wognum, June 2018, personal communication).

According to Wognum, the difference between mobile network operators and retailers and the many buyback companies, that build their business around collecting old mobile phones, is customer satisfaction. He mentions that as the interaction between buyback companies and the user concerns a 'one-time deal', the buyback companies are not concerned as much about the experience and satisfaction of users. This can be confirmed by the negative online reviews about these companies, earlier discussed in section 3.3. A reason for this can be that these companies do not offer other products and services that could be affected by this experience. For KPN, this experience and satisfaction have larger implications as the dissatisfaction caused by the return of a phone could affect the long-term relationship they (could) have in their core business: provision of mobile phone services.

According to Wognum, for KPN the phone is a means to sell sim cards and the contracts. The sales of the mobile phones itself do not directly lead to a profit, but leads to long-term benefits with the purchase of contracts. This confirms the effectiveness of the long-term benefits of an experience, earlier described in section 4.1.3.

For the return of mobile phones, profit generation is not necessary, as long as it does not result in extra costs. As for long-term benefits, Wognum mentions that it is valuable to have more consumers visiting the stores. If this can be facilitated by a return program, the long-term benefits result from the purchase of products as a result of visiting the store.

KPN's interest in implementing return programs and their concerns about dissatisfied clients is therefore key in this project. The benefits received are depending on the behaviour of consumers who may sim card contracts or other products, resulting from a visit to a KPN store for returning a phone. On the other hand, this could be at the expense of the relationship if the customer is dissatisfied. Based on the concern Wognum mentioned, customer satisfaction is an important factor. Also while the financial implication remains unknown, this is an opportunity for KPN to act according to their sustainability policy. By pursuing and achieving their circular objectives, they can gain positive public recognition.

4.3 | UNDERSTANDING THE VALUE FOR THE USER

According to the conceptual model in Fig.12 on page 47, after receiving information about the program, the consumer makes an evaluation of the benefits to be receives and the offerings to be made. This leads to the perceived value, which is one of the inputs in forming an intention about what to do. During this stage, there are positive factors that drive to return the phone or negative factors that keep the consumer from returning. To find factors that influence the behaviour of consumers literature research has been done by focusing on publications on empirical studies of consumer behaviour, with regard to the return of mobile phones.

4.3.1 Background info

Some studies showed that objective variables such as age, gender and income are not reliable and effective factors for recycling (Hornik et al., 1995; Visscher et al., 2009; Saphores et al., 2012). Darby and Obara (2005), however, found that low-income households recycle fewer electrical appliances, but exhibit a longer use phase. This could mean that people who have a lower income, could prioritise financial factors higher for mobile phones.

4.3.2 Factors influencing the user behaviour

Regarding the return behaviour in mobile phones, Welfens et al. (2016), made a selection of internal and external factors based on an analysis into different studies (Hornik et al., 1995; Røpke, 2003; Visschers et al., 2009; Tanskanen, 2012; Mäkelä, 2011; Suckling & Lee, 2015; Bookhagen et al., 2013; Welfens et al., 2013). Internal factors are defined as the factors that are influenced more at an individual level and are developed within and from the socio-cultural environment. External factors are defined as the factors that exert influence on decision making and are not determined by the action of consumers. The insights have been supported by analysing literature studies related to the return of mobile phones. An overview of the outcomes and their references can be found in Appendix C.2. Summarised overviews of the results are shown in Fig.15. This summary and simplification eliminated the difference of the positive and negative influence, as the extent, perception and occurrence of these factors can go in both directions.

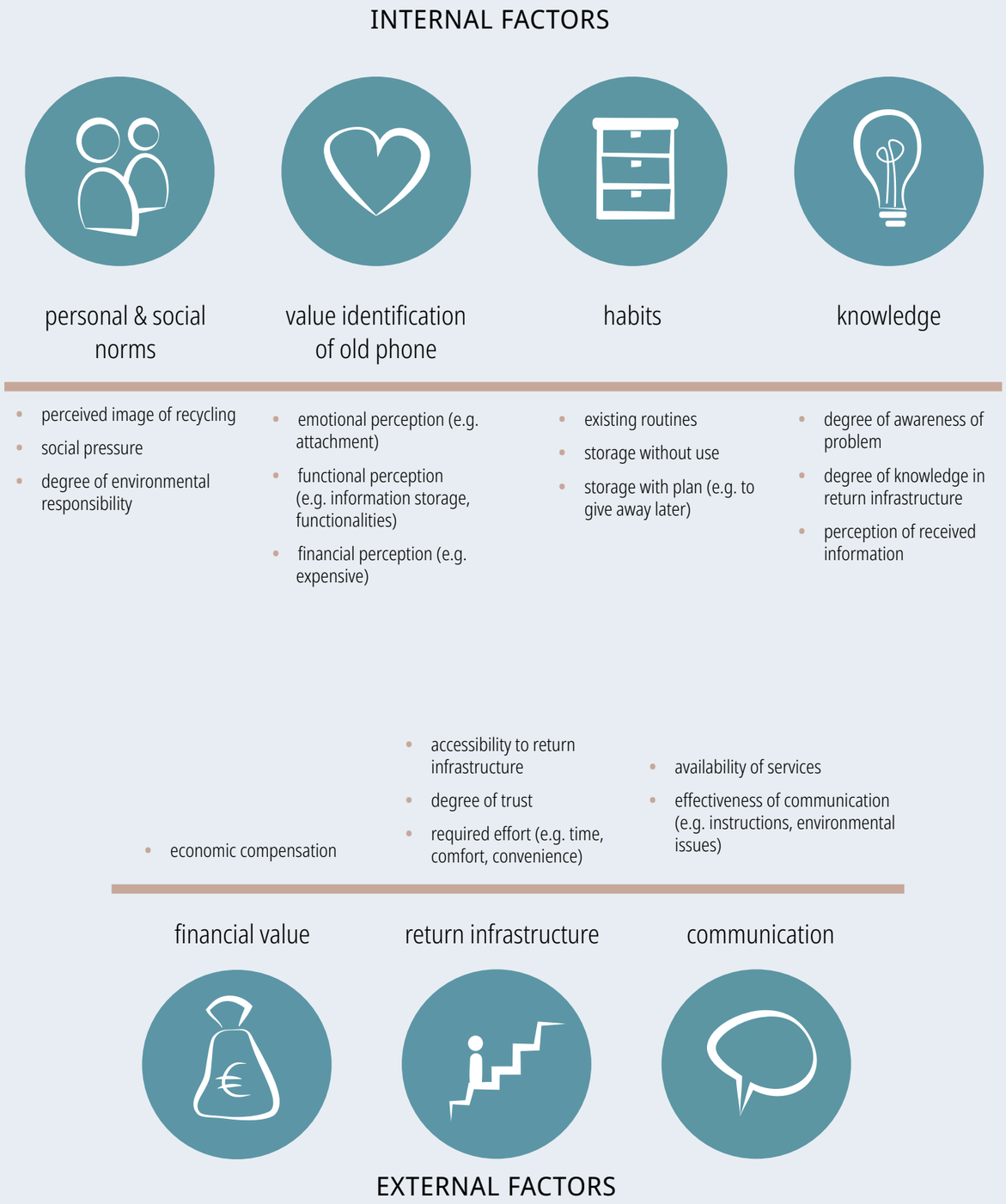


Fig.15 *Summarised overview of internal and external factors that influence circular behaviour based on a literature study*

Although the factors are categorised for a simplified overview, these factors never occur in isolation and can influence each other (Welfens et al., 2016). Also as the external factors gain value based on the perception of users, which is intrinsic, these factors can be perceived as both internal and external, depending on which perspective is taken. The distinction in internal and external factors also differentiates between the control that a user or a social community has, from the control that KPN could have by exerting influence on the external factors. Based on the conceptual circular behaviour model, the value and satisfaction of consumers, even with the positive external influence of KPN, still depends on the perceptions based on the internal factors.

Furthermore, Welfens, et al. (2016) identified two gaps: between ignorance and awareness and between knowledge and behaviour. While lack of awareness as a barrier explains itself, the gap between knowledge and behaviour seems to be a complicated problem. As there can be many different scenarios resulting from combinations of factors. For example, the stored information in the phone could be a barrier, but this can be a result of knowledge deficiency (not knowing how to make a backup and remove data) or because of perceived effort (too much effort to store data). Both reasons haven't been found in literature research but could be possible causes for a barrier caused by information stored on the phone.

Financial incentives are suggested as effective factors, in theory, However, payback programs have been widely applied by several retailers over the years, while return rates remain low. The experiences of consumers on review platforms, like Trustpilot, suggest that the negative ratings on take-back programs are related to the feeling of deception and disappointment for not receiving the financial value that they expected, sometimes not at all. The identified factors in this section gave insights on the type of trade-off that can be made between benefit and offerings. The cause-effect relationships remain unknown and therefore make it hard to identify the key problems and their solutions.

4.4 | KEY INFLUENCING FACTORS

Based on the insights shown in the previous sections, the found variables are filled in the conceptual models.

The exact benefit offering that influences the value for KPN and the consumer's perceived value will depend on the value proposed through a return service, which has yet to be created. Therefore the variable factors applied on the conceptual model, are simplified (see Fig.16).

The value for the company is expressed in financial factors. In the short-term, the returned phone will not make a profit, which is also not intended by KPN as long as it does not lead to extra costs.

The return program can facilitate increased traffic in the store, which increases the opportunity to sell products and have commitments with customers in the long-term. Furthermore, this can also positively influence the brand recognition of KPN. It hence can be concluded that the return program is beneficial for KPN when it results in a direct or indirect profit generation.

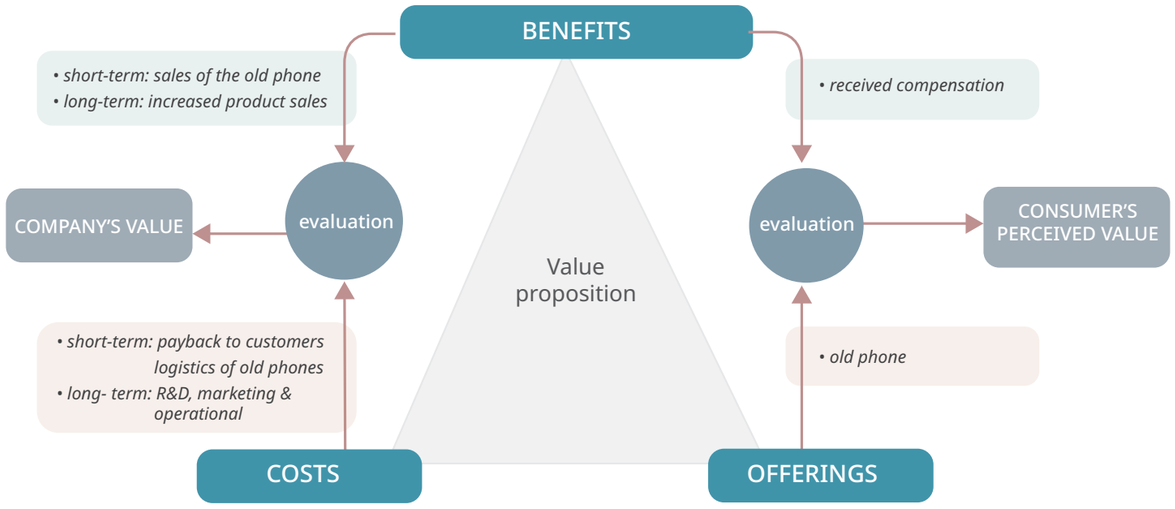


Fig.16 *Overview of the variables in the conceptual model for the creation of value*

For the user, the value is expressed by the communicated benefits and offerings as this is the same for each consumer. The variable factors that influence the thought and action processes are presented in Fig.17.

The perceived value is mostly shaped by an impression of the service on what to receive and what to offer. These factors lead to deciding whether to engage in the return program or not. If in doubt, the consumer is still evaluating the perceived value and the factors.

Based on the earlier model on behaviour discussed in section 4.1, it is assumed that the choice can be influenced by both internal as external factors, while the action can be particularly influenced negatively by the perception of certain factors.

The positive and negative factors on the behaviour are derived from literature study, however to what extent it has an influence on the decision and behaviour is not evident and therefore it is assumed that the identified factors can have an effect on both stages while the extent or effectiveness depends on the individual.

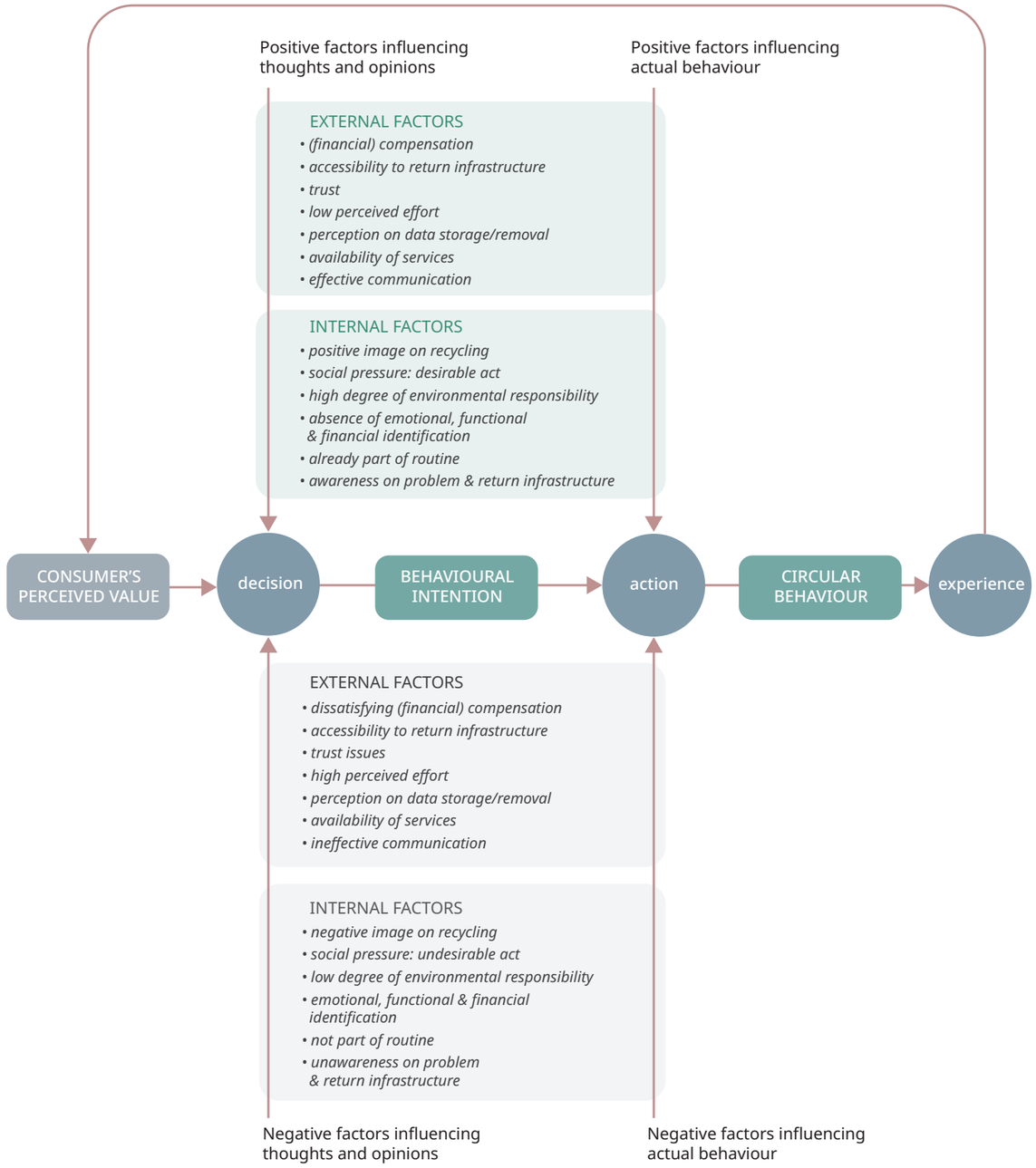


Fig.17 *Overview of the variables in the conceptual model for the behaviour in the return of mobile phones*

4.5 | CONCLUSIONS

The literature review on value creation and consumer behaviour resulted in conceptual models which have been used for the exploration into KPN and consumer's values and the process for the circular behaviour for consumers as a result. These should be taken into consideration when developing a return system. This study, however, reveals knowledge gaps in the scope of this project. A reason for this is that the studies mostly covered a broader context than only a return in take-back programs (e.g. throwing in recycle bins or other types of collections) and mostly concluded based on thoughts of participants prior to experiencing such programs. Therefore specific insights into the following aspects could have important implications for the course of this project:

- The influence of the elimination of negative factors related to awareness
- The effect of barriers in the presence of effective incentives
- The cause-effect relation between factors
- Influence of perceived value for different types of phones (e.g. price and state).

More study into the factors, for the context of return programs in the Netherlands, could result in specified problem areas and improvements for the design of an alternative return system as opposed to current take-back programs. To understand the trade-offs that are made for existing programs, in-depth research with consumers is required.

5. EXPLORING RETURN BEHAVIOUR

In order to facilitate a beneficial service for users more actively participate in, a more in-depth understanding is required on how and why users behave with previously defined factors when it comes to existing take-back programs. To understand how influential factors affect the behaviour of users, in-depth experimental research will be conducted by using propositions of current phone return programs. For this, the variables defined in section 4.3 will be used. This will also serve as a confirmation for these factors and the derivation of latent factors.

5.1 | CONCLUSIONS

5.1.1 Background & goal

With the current situation and the many solutions with differences in types and amounts of value given in return, it is interesting to see how a purchase experience or use patterns can have an influence on the choice of disposal. Also, considering the many different scenarios and types of old phones, it is helpful to find out how factors that stimulate users, differ for these scenarios.

Benefit for users

The findings of previous research conclude that payback programs are preferred and financial incentives act as effective factors. However, given the small return rates, this expression does not indicate that users will actually act accordingly. In order to understand and evaluate why these programs are not successful (yet), it is useful to study how consumers react on current take-back programs and which positive and negative factors influence their decision-making process. This will give valuable insights into the development of an alternative beneficial transaction with retailers.

Awareness

The lack of knowledge is mentioned as an internal factor that can be changed by external forces. Users all possess different levels of knowledge in this area and asking what they would do is limited to their knowledge space. To know more about the preference of users, it is relevant to include options that they are not aware of and to look for patterns in their preferences and the decision-making process.

Scenarios

In section 3.1 it was shown that the reason for a non-functioning phone, related to hardware or software issues, account for 43% of the cases that motivate an upgrade to a new phone. The effect of types of phones on the decision-making process is unknown while it may be an important influence. It can for example not be expected that a phone that is in a perfect state after one year of use, is experienced the same as a broken phone that was used for four years.

Research questions

The main question of the study is:

How do influential factors affect users' behaviour with current phone return programs?

This question will be broken up into four questions, that will uncover the aspects previously mentioned for a better understanding of the behaviour of consumers.

1. How does being informed on return options influence the choices of users?
2. Which kind of negative factors act when financial incentives are offered?
3. Which latent factors can be defined that can influence the decision making process?
4. How do different end-of-use states of mobile phones (functioning, partly defect, non-functioning) affect disposal choices?

Answering these questions will help in understanding what motivates or withholds consumers to return their old mobile phones through current take-back programs. This helps in identifying more specific problem areas underlying the low return rates of phones and the suggestions that lead to the design of an alternative phone return system.

5.2 | METHOD

In this experimental study, related to the decision-making process for returning an old phone, the variables of the conceptual model are used. To introduce current phone return programs to participants, an interactive setting is required. As the research has an explorative character, qualitative methods are used. The structure of the study is based on the research questions.

5.2.1 Research structure

The research will be conducted with interviews and an explorative session with the existing take-back programs. The study consists of the following parts:

1. Semi-structured interview

In order to determine the initial behaviour of users during the end-of-use of their mobile phones and their degree of awareness, a semi-structured interview has been conducted. The pre-determined questions can be found in Appendix D.1. The aim is to gather background insights on users in order to compare it with the behaviour during the experimental session in the presence of the key factors.

2. Questionnaire

The participants are asked to fill in a questionnaire before and after the experimental session, which assesses the relevance of factors based on their personal attitude. This is to detect how the experimental session changes their opinion. These factors are based on the results in section 4.3, which are translated to more understandable terminologies (See Appendix D.1).

Fig.18 *Participant compares the different options during the explorative session.*

3. Explorative session

The core of the research is the explorative session in which participants explore the different options for phone return programs that are currently available Fig.18.. The participants are asked to explain what they would decide for the three types of phones of an iPhone SE that is in: a (1) good state, (2) partly broken and (3) defect. This session is sub-divided into three stages:

- Stage 1: Most common/known actions taken at the disposal
- Stage 2: Less common/known actions
- Stage 3: Least/not common/known actions

These stages are presented on boards (Appendix D.2). After the first board is presented the participant explains and discusses the options and makes 'decisions' for the three types of phones. Participants are asked to think out loud about their opinions and considerations. All participants underwent the same explorative guide.

Fig.19 *Participant evaluates on the relevance of factors after the explorative session.*

4. Evaluation

The participants are asked whether there were changes in the relevance after 'experiencing' the return options.

Finally, the return options are evaluated. Participants are asked how they could be brought to behave differently. Participants who behave differently, during the session, then stated in their plans for their old phones during the interview, will be asked to do the same for their own phones. After two weeks, the actual behaviour in the real case will be evaluated.

5.2.2 Analysis

The data consisted of the transcription of the interview and explorative session and the ratings of the questionnaires. The relevance of factors, previous behaviour of participants and the preferred behaviour during the explorative sessions have been plotted in tables (Appendix D.3). Furthermore, the thought processes of participants that express needs, values, motivations, barriers and other types of reasonings are considered as important quotes, which are transferred onto statement cards (Fig.21), on which the quote is captioned with a shortened interpretation that concludes the quote and eases the categorisation.

Using colour codes ensured the identification of different participants to detect the patterns among participants. For the categorisation, the cards related to each other are put together and classified according to the purchase, use and disposal stages. During this process relations between different factors are found. Therefore the conclusions are re-clustered and links between factors and the purchase, use and disposal stages are made Fig.20).

Fig.21 *Statement cards*

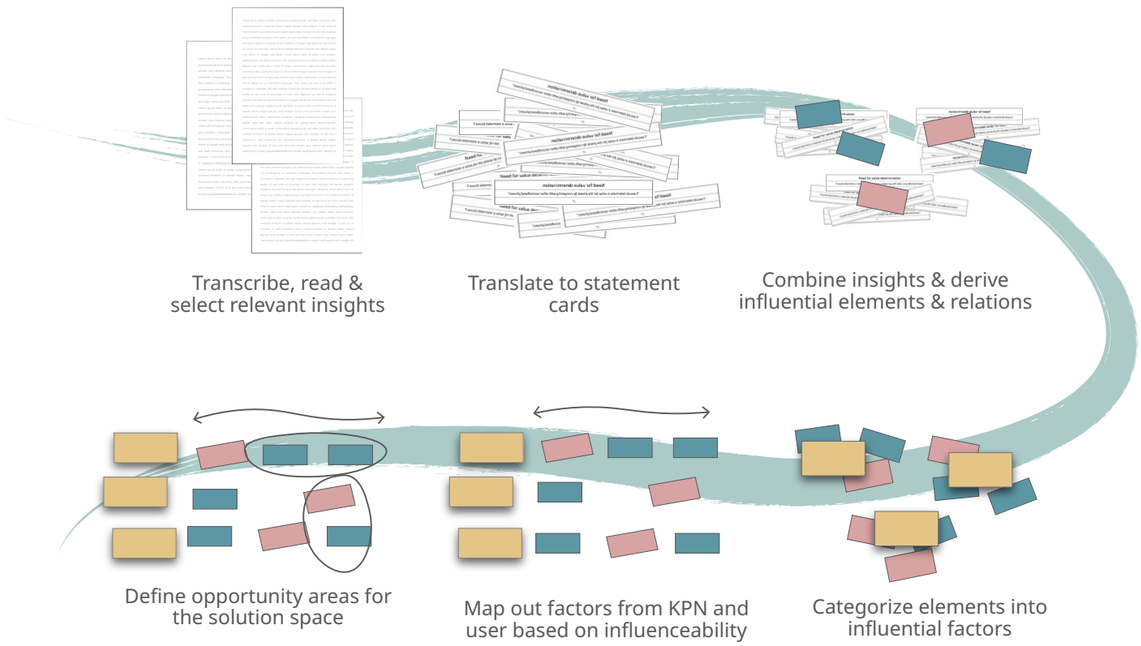


Fig.20 *Analysis method of experimental research*

5.3 | RESULTS: INFLUENCE OF KEY FACTORS

5.3.1 The process of desicion making

Based on the decision making process during the explorative session, a process for returning a phone is visualised in a conceptual scheme (Fig.22) and explained. This simplifies the complicated human through processes of reasoning, decision making and inconsistent behaviour.

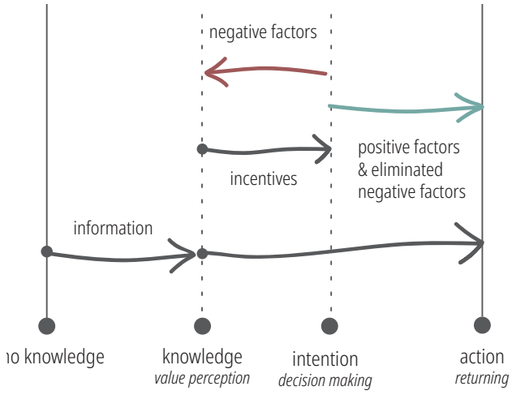


Fig.22 *Conceptual scheme of the process towards action taking.*

This scheme builds on the conceptual model of circular behaviour in chapter 4, as it identifies the type of factors acting during the different stages and differentiates between incentives and the influencing factors.

'No knowledge' is the state in which a user does not know about any return options and have not considered this because of the unawareness of the environmental impact caused by mobile phones. The formation of knowledge happens with the information that is provided by the company. Depending on the content of the information, the user is incentivised. An incentive is, in this case, an overarching direction that has a stimulating effect, which alone can arouse interest and the decision to return of a phone: the intention. Subsequently, the user can return the phone in the presence of incentives alone. This is based on the participants for whom the decision task was easy, because of the satisfaction with minimal financial compensation or nothing, resulting from the effectiveness of a circular/charitable motive.

When the presence of an incentive is not satisfying, negative factors affect the user. The actual effects and weight of factors are highly influenced by the personal attitude of users and the specific scenario they experience with their old phone. Therefore, no strict conclusions could be made for the weight of factors.

Based on Fig.22, three main scenarios are derived:

1. The incentive acts as motivation and results in action without barriers
2. The incentive attracts, but barriers keep the user from acting upon it.
3. The incentive attracts, but requires drivers and elimination of barriers in order to lead to action.

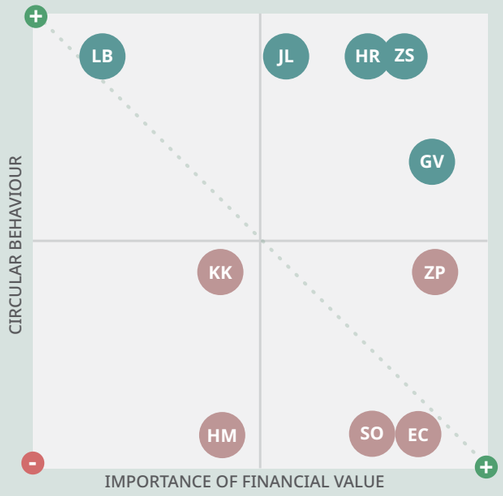


Fig.23 *Relation between the probability of involving in a circular behaviour and the importance of financial value*

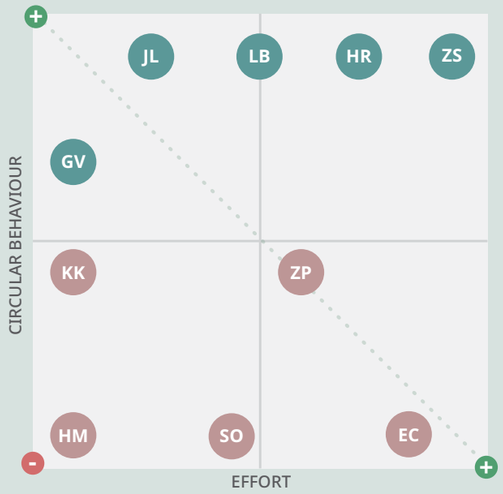


Fig.24 *Relation between the probability of involving in a circular behaviour and the perceived effort*

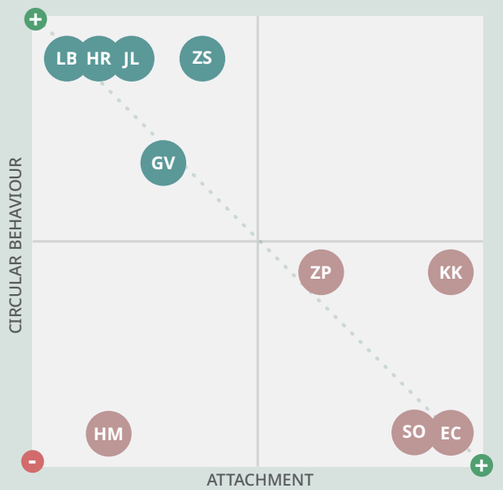


Fig.25 *Relation between the probability of involving in a circular behaviour and the emotional identification of the old phone*

5.3.2 Relation between factors

During the analysis, circular behaviour is defined as the behaviour in which users would like to return the phone or immediately pass the phone on to relatives without value loss. Passing the phone onto others usually required waiting until someone needs it. A relationship was found between the perceived importance of the financial value (Fig.23) and the amount of effort the participants were willing to put in returning a phone (Fig.24).

Also, those who showed to have a strong attachment with their phone, based on the emotional or financial identification, were less likely to show their interest in return behaviour (Fig.25). These participants were more likely to give the phone to family members.

For participants that valued a 'financial return value' higher, the perceived effort was less important. They were willing to do more effort for an attractive financial incentive.

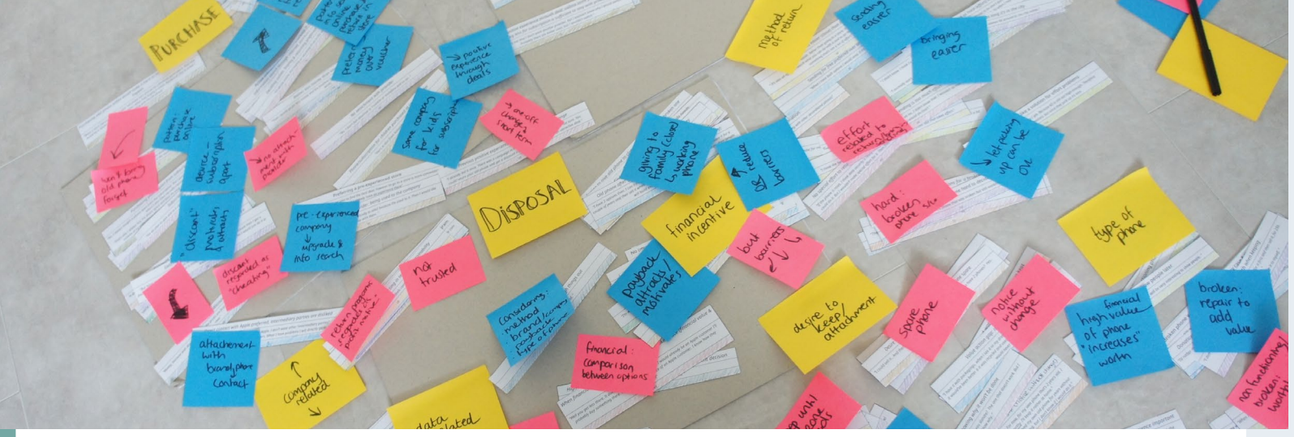


Fig.26 *Statement card analysis*

5.3.3 Effect of awareness

In half of the total thirty cases, participants made different decisions when they learn about new options. (Table 4 in Appendix D.3). This mostly happened in the case of a broken or defect phone. For the good working phone, however, the decisions made were mostly consistent with the initial choice (before options were shown) and could, therefore, be confirmed with earlier made choices for old phones.

The knowledge formed, provides information that includes the incentive. While financial incentive was mentioned to be an important incentive and is used commonly in take-back programs, other incentives that don't require financial worth in return are:

- Family friendly practices
- Charitable/circular motives

When these incentives work effectively on consumers, financial incentives are less interesting and even disliked. Charity in this case also concerns disposal through appropriate channels.

5.3.4 Influence of negative factors for a circular disposal

Negative factors are caused by both internal and external aspects. It usually depends on how the user perceives effort or value in their phones for example, while companies can also exert their influence on the method or payback value for example. Many of the key factors are interrelated and therefore usually multiple factors act at a time. Keeping was often mentioned as the most normal option, especially before the explorative session. The next page presents the factors in the order of occurrence during the experiment and interviews.

When participants mention that they intend to bring a phone back, further thinking often resulted in making a different choice. Most important factors that could change the decision even when incentives attract and the intention is there, are as shown in Fig.27. When an amount is perceived as satisfying, an unfamiliar or unreliable brand name could make participants opt for a choice where less is given, such as well known retailers. Issues regarding data did not keep participants from making decisions. Both transparency and payback time were rated as the least relevant factors in the questionnaires and were not mentioned during the explorative session.

Dissatisfying payback value

The principle of getting money for the old phone is attractive, however, the dissatisfying amounts have in many cases led to the decision to keep the phone and can be related to the initial costs made for the phone and the emotional attachment.

Effort perception in return

The type of return method came out to be an important factor in decision making. When the perceived effort was high, in the case of the participants this was usually when they saw that hey had to send the phone. Especially in the case when laziness was mentioned, no financial value nor other motives could change the mind.

Data on old phone

In some cases this is related to the lack of knowledge and uncertainty around removing data, rather than their misuse by companies. The data on the old phone usually occurs as one of the first concerns. After forming an intention on the desire to return, users do not consider this factor. Informing them about the safety and ease of data removal could eliminate this concern.

Functional attachment

This includes the wish to use the phone as a spare phone in case it's needed, but could also mean to use the phone actively for certain functionalities that miss on the new phone.

Emotional attachment

It can feel unnatural to return an old phone. While some deal with this barrier with the rationale that there's no good in keeping, others give in.

Company reliability

An unfamiliar company name or thought about a company's profit motive behind a return program acts as a barrier and may even lead to the consideration of a lower payback amount from a reliable perceived company.

Selectivity second user

Basically waiting until someone needs a phone temporarily or permanently. Just giving it to someone does not attract, instead, the phone is most likely to be passed on to a very close family member. When this does not happen, the phone is left for obsolescence.

Uncertainty

Often participants doubted whether they would really return it and even asked this to themselves. Being uncertainly motivated to wait with decision making. In real life, this could lead to forgetting the old phones.

Incentive	Key barriers
Financial	Payback value Method of return Brand image
Social	Selectivity second user
Charitable	Method of return Brand image

Fig.27 *Key barriers occurring for the three types of incentives*

5.3.5 Influence of positive factors for a circular disposal

The positive factors are reasons that are mentioned by participants that could motivate them in taking part in a phone return program.

Attractive financial payback value

Usually, this occurs when expectations are low and no comparisons are made. In this case, the financial value is seen as an extra benefit, and no other primary incentives act, such as a circular motive.

Circular motive

The knowledge of the environmental impacts of mobile phones that are not disposed of adequately can act as a driver. This is especially seen in the cases where Wecycle bins are used, or donation is preferred.

Knowledge on method

Informing about the exact method of sending, could help to change the effort perceptions. One participant who in no case wanted to send an old phone has been persuaded this way. This also accounts for the ease of data removal, back-up and transfer to another phone.

Company reliability

When barriers such as low payback value act, a certain connection with a company based on earlier experience or next purchase, can influence the decision of users.

Experience with prior routine

The realisation that despite how normal it feels to keep, this makes no sense, has been mentioned several times and worked as a motivation

Discount on next purchase

Not much different from an attractive financial payback, the combination of return and purchase was interesting and even preferred for some in order to get rid of it immediately and profit from the discount.

Incentive	Key driver
Financial	Payback value
Social	Needs of relatives
Charitable	Circular motive

Fig.28 *Key drivers occurring for the three types of incentives*

5.3.6 Effect of the state of the old phone

Table 4 in Appendix D.3,shows how the decisions made for different phones and the motives behind these decisions can differ for phones that are in different states.

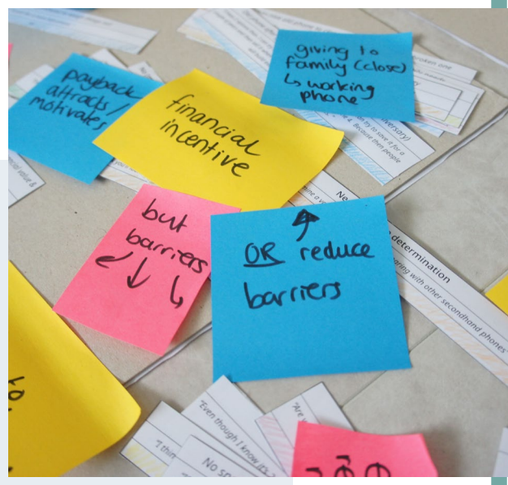


Fig.29 *Statement card analysis: finding relationships between factors*

Working phone

The working phone was in some cases the hardest decision to make. This type of phone is significantly related to the perceived value of the user, may it be financial, functional or sentimental. Working phones tend to be kept and saved more for when the user or someone they know needs it temporary or permanently. Six of the participants would like to pass this type of phone onto their relatives.

Broken phone

Half of the participants mentioned that deciding for the broken phone is the hardest of all. They usually do not know what to do with it and just keep it, for when they possibly need it. It is unconventional to pass this phone on to a relative. When aware of return options, participants usually opt for different options, of which only one participant considered repairs for further use.

Defect phone

A phone that does not work, was generally indicated as the easiest scenario when options were proposed. Two participants once threw a defect phone away and after awareness was brought to them, considered doing this through a Wecycle bin. For this phone, nothing is expected in return, however, a lot of effort is usually a key barrier. Generally, there was less concern about cheap and very old phones as well.

5.3.7 Patterns related to the totl experience

There were some insights that relate to the purchase and use stages of experiencing a mobile phone and could have implications on the end-of-use or end-of-life stages as well

Purchase Method

Phones can be purchased online and in phone stores. While all participants like to do research beforehand and use the internet, only two preferred to order online, because cheaper options are found and the ease of ordering online, although the store can be visited to “try” the phone out. For others, the information search happens online, while they prefer to buy the phone in a store. Usually, they already know which store, because of earlier experiences.

“When a store says you can bring your old phone here and we do something good with it. Then that would be a reason for me to go to a store, rather than buying it online. Because if I buy it online I would do nothing with the old phone.“

J. van der Laan

Discount on new purchase

While for some discounts on new phones can motivate & attract consumers, others prefer money to buy something they like.

“A discount on the new phone would motivate me. For example, not paying for the first 6 months of a subscription, but I don’t expect companies doing that. “

Z. Polat

Relation to contract

Many mentioned that the purchase of a new device was not related to getting or extending a phone contract. This can be related to the desire to use a phone longer than the usual contract period of 2 years. Wognum (2018) also mentioned that the purchase of phones (separate from the contract) elsewhere, rather than through operators, are increasing.

“Afterwards I hope it will be repaired and that I can use it for another while. Even when my subscription is expired.”

S. Ozer

Usage period

Most participants mentioned that they would like to use their phones until it does not function properly or is broken. This is also one of the causes for disliking a leasing program. Others find two years a logical period.

“That’s why I always buy the device apart and then it’s mine and I can decide what to do with it, instead of my subscription telling me that I’ll get a new one. I find that nonsense.”

J. van der Laan

“I think when I’m more stable financially, upgrading once in 2 years is a good frequency. Our contracts are also 2 years. I think that’s the most logical.

Z. Saleem

5.3.8 Overview

Based on the collected insights, an overview is made of the factors and categorised under knowledge formation, incentives and factors (Fig.30.

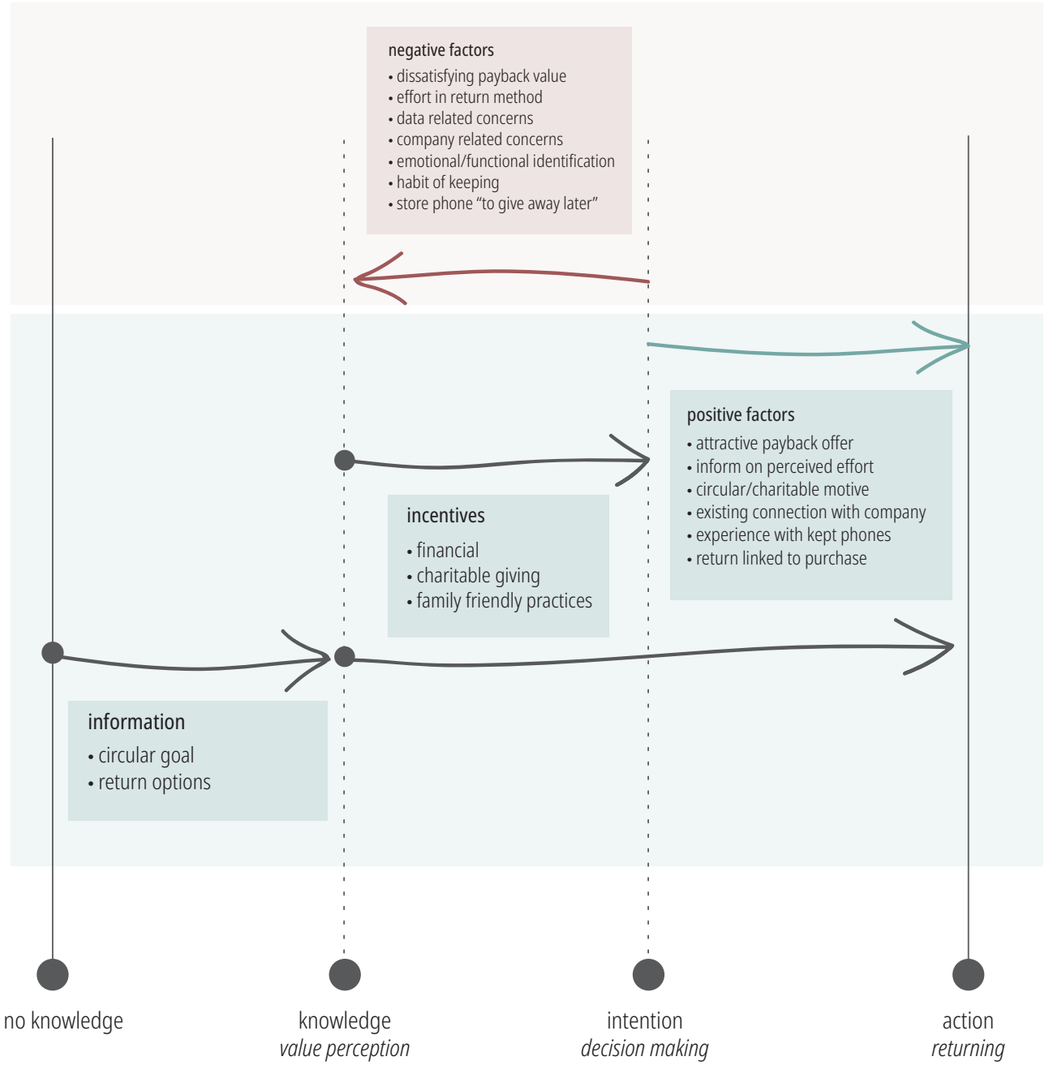


Fig.30 *Overview of key factors*

5.4 | PERSONAS

As mentioned earlier, the occurrence of factors never happen in isolation and they can influence each other. As part of the conclusion for the user study, a set of personas is made, to understand how the weight of certain factors influence the attitude and behaviour of users. While the benefits and concerns of KPN can be defined more clearly, the way benefit can be created for the user remains complex, because of the possibility of the incentives and many drivers and barriers acting differently on different users; a driver for one could act as a barrier for the other. Therefore different profiles can help to create an overview of different types of users KPN could interact with. Personas help to distinguish between users and get a consistent understanding of the users' values and needs (Van Boeijen et al,, 2013). The insights of the interviewees have therefore also been utilised to create a more specific persona.

These are based on characteristics that the participants have shown. These personas help in understanding how the drivers and barriers work and can result in different behaviours. These personas will serve as an evaluation tool for the assessment of concepts, as they represent a variety of users.

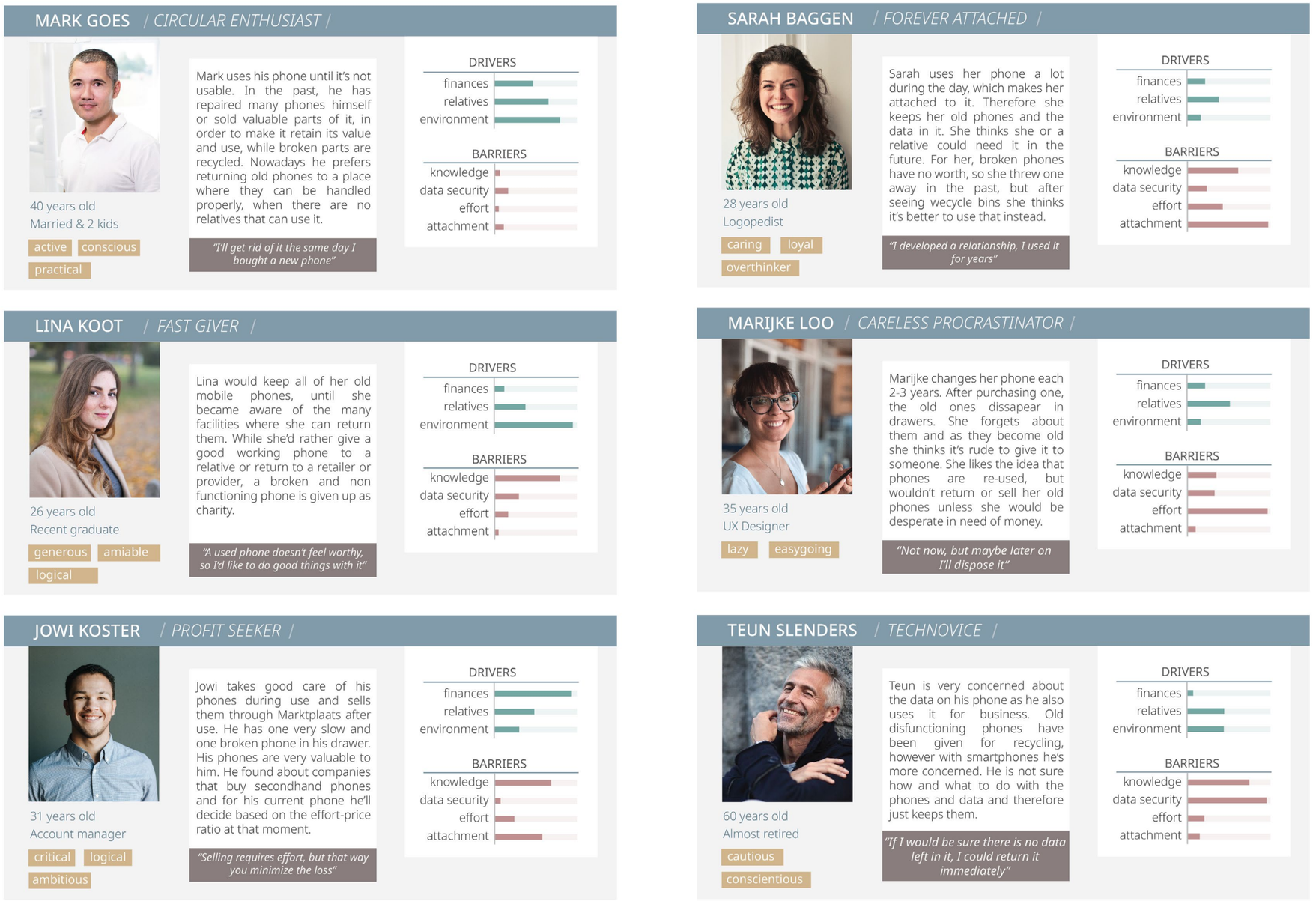


Fig.31 *The personas*

5.5 | SOLUTION SPACE

For the translation of the insights to opportunity areas, the company, literature and user study are used. This can be seen as the solution space deriving from the conducted research within the scope of this project, and therefore not limited to these areas. Earlier it was mentioned how internal and external factors are related to each other. Factors that are in the sphere of influence by external actors, based on the empirical experiment and analysis are shown in Fig.32.

A solution for some of the factors can be acquired by conventional creative sessions, such as brainstorming, while the stimulation through e.g. financial incentives poses a challenge that users and KPN would have to deal with in a return program. A change in the current behaviour can be achieved by overcoming such challenges. For this, the return experience should primarily inform the user well, after which the incentives and other factors should be integrated such, that a well thought-out system can be built. This could be reached with additional and alternative payback offers, compared to traditional take-back programs. To reach this, the input of previous chapters will be combined with lessons that can be learnt from nature.

PROCESS	FACTORS	DESCRIPTION
Informing the user	Circular motive	Educating users on the environmental impact can drive them closer to opting for an option that is environmentally friendly.
	Knowledge on return option	Users should be well aware of the return program in order to form an attitude about it.
	Knowledge on data storage	Misunderstanding on the data left on phones after resetting a phone, or the limited knowledge on backing up data, can leave users questioning on the security of phone return programs.
	Knowledge on method	Misunderstanding the method of return, gives users the perception that it takes too much time and energy. This is especially the case for return through shipment.
Use of main incentive	Financial	Receiving a financial incentive that is either in direct monetary payment or processed subtle in other resources, are most expected in return programs.
	Charitable	Some users who show no interest in receiving a financial value for a phone, can be stimulated by 'doing good'
	Social	Passing the phone on to a close relative is a widely accepted phenomenon, which is a missed value when returning a phone back.
Reduce or eliminate the negative factors	Payback type	In the presence of a financial incentive, the payback value should satisfy the user and could be provided with other resources than as a monetary payment.
	Method of return	Most users prefer to bring their mobile phone (Salters, 2014), while sending is perceived as too much hassle.
	Value identification old phone	Although mostly depending on personal factors, making the perceived payback value more worthy than keeping a phone, could reduce this barrier
	Data storage	When the necessary information on privacy and back up is provided, extensive support can be offered through the site and in the store, as being inexperienced with this process can be a barrier for return behaviour.
Exchange of an old phone	Habit of keeping	The habit of keeping a phone can be overcome by connecting the experience of return to another experience of the mobile phone life-cycle to ease the shift to a 'new behaviour'.
	Charitable	The expectations for a payback value are most with the working phone, which is also the one that is preferred to keep as a spare phone or given to others. Broken phones are mentioned to be the hardest and more uncertainty is present with broken and defect phones. For defect phones, minimal effort is preferred.

Fig.32 *The solution space as a summary of factors that influence the return of mobile phones and can be tapped on by companies*

5.6 | CONCLUSION

The research in this chapter described how different factors influence the return behaviour of mobile phones, regarding current take-back programs.

To positively influence users, the user should first of all be well informed of the existence of the program and the possibility to return a phone, for environmental considerations. This will tackle the negative impacts of unawareness in environmental issues regarding keeping phones and the return infrastructures. Secondly, financial compensation for the old phone should outweigh the perceived financial, functional and emotional value in old phones, as this is the perceived value of the offerings they have to make. On top of that, the effect of negative factors should be eliminated to enhance the perceived satisfaction, which is a key value for KPN.

Regarding the elimination of negative factors, compared to the current system, the solution should:

- Educate users on the environmental impact, even for broken and defect phones
- Inform users of the information storage on phones and how to make a back-up and remove them, in order to lower the perceived effort and concerns.
- Present a main incentive: financial, charitable or social.
- Enhance the perceived value through other resources than the limited monetary payment, which should be in balance with the perceived financial, functional and emotional value.
- Enable the option of return in the store
- Facilitate the return experience during the purchase of a new product, by introducing the return system.

The results of this research can serve as a guideline for the development of ideas. One aspect, however, requires 'out of the box' thinking, to differentiate from the traditional take-back programs: enhancing the perceived value. This is a challenge, because of the variety of perceptions that users can hold, especially when they have expectations. Therefore, it is relevant to find out how the perceived value can be delivered beyond the expectations and the perceived value for the old phone, to make users chose for KPN.

6. EXPLORING COOPERATION IN NATURE

This chapter explores cooperation in nature in order to seek inspiration, by building on the results from previous chapters, in an attempt to solve the challenges users and KPN have to deal with and make the return experience attractive for both actors. The input from chapter 4 and 5 will be used to define the scope of the research into nature's lessons as this understanding helps in searching and generating more specific elements in nature and a relevant translation to the case.

6.1 | BACKGROUND & GOAL

The research into nature's lessons will focus on effective cooperation between KPN and user. This will be done by searching for elements in nature's cooperations and a relevant translation onto the case that is related to the scope of:

- Offering an alternative and/or additional benefit for users
- Attract users to engage in a relationship with KPN

Benefits in nature are offered through commodities: tangible resources (e.g. nutrients) and intangible services (e,g, protection, grooming of monkeys, cleaning fish). (Kiers, 2018). Translated to the case of mobile phones, these are the advantages gained from money, products and services the user may receive. For KPN, this implies the generation of more customers, resulting in a long-term advantage. The value of benefits in a business context is defined earlier in 4.1. What are the values for organisms?

Conceptualising the value in nature

As nature does not deal with monetary systems, the received benefits and costs can be diverse, in comparison to human systems. This 'analysis' by organisms (Fig.33) may then conclude whether cooperation is mutualistic. Here the assumption is made that organisms think and behave rationally and that only two types of organisms are involved. The concept of beneficial cooperation in nature is defined as the relationship in which the benefits outweigh the costs.

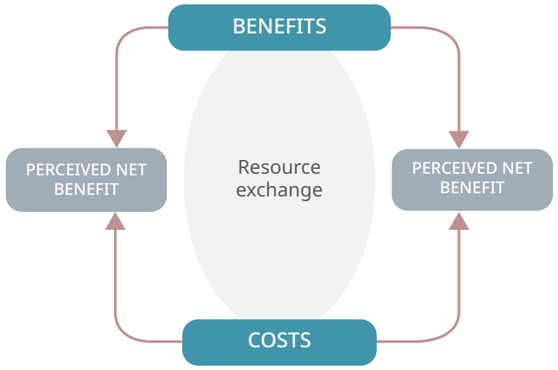


Fig.33 *The concept of a mutualistic cooperation in nature*

Scope of exploration

The main question of the study is:

> What design lessons can be retrieved from cooperation in nature to enhance the return of mobile phones?

The conceptual model for value in nature suggests the trade-off between benefits and costs in nature's organisms creates mutualistic relationships. To explore what can be learnt from these relationships, the main question is broken up into three questions:

1. What benefits lead to the formation of cooperation in nature?
2. Which lessons can be found in attracting partners in cooperation?
3. What design guidelines can be retrieved from nature's strategies?

The aim is to find answers to these questions, and together with the input from previous chapters, this forms the base of the conceptualisation phase.

6.2 | METHOD

The consultation of experts is crucial as guidance to limit pitfalls because the field of biology is broad. Therefore, Prof. dr. Kiers, Prof. dr. Noë and Dr. Beaumont, have thought along the design challenge from a biological perspective and have suggested sources to consult and derive inspirations from. Relevant insights are collected, categorised and combined into valuable design lessons.

The literature suggested by the biology experts is supported with a literature search for useful inspirational sources. For this, the databases of Google Scholar and ScienceDirect are used, focusing on publications on cooperation, partnerships and benefits in nature. This is done by using the following search terms and their combinations: “nature”, “cooperation”, “mutualism”, “interaction”, “relationships”, “behaviour change”, “selection”, “partnerships”.

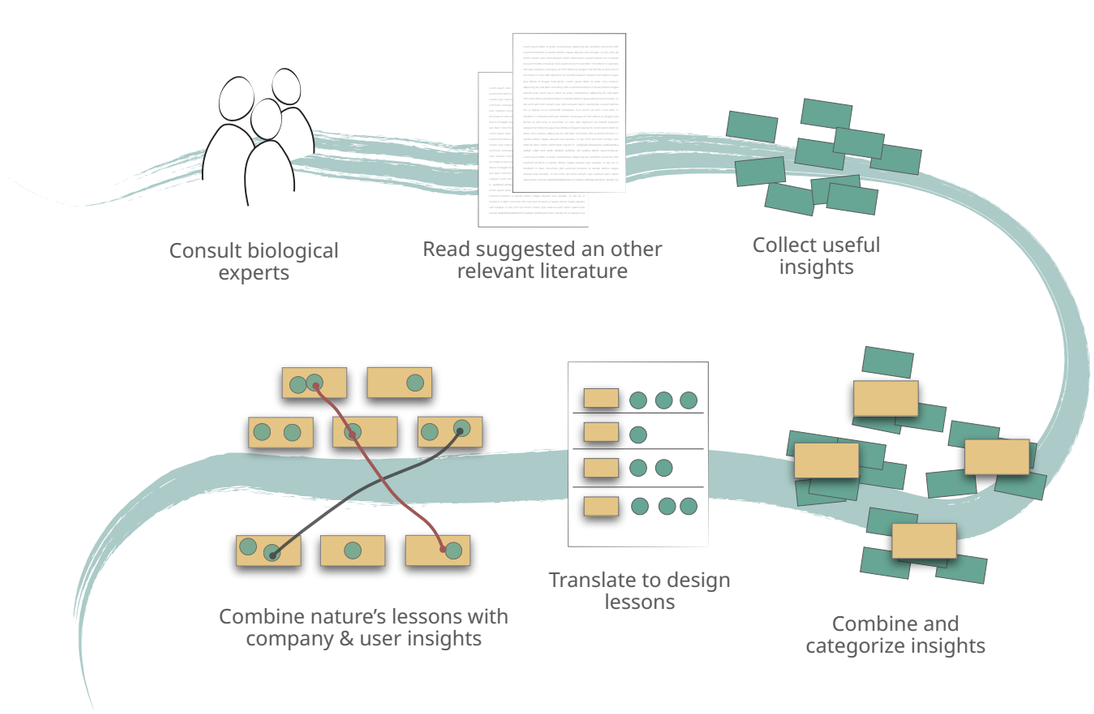


Fig.34 *Approach of analysing cooperation in nature*

The field of cooperation in biology is broad, and many publications can be found in this area. It is, however, not intended to do an extensive analysis of cooperation in nature, but rather to find inspiration. The selection of publications was made based on the relevance to the scope, which is restricted to finding inspirations for additional benefits and attracting users.

Fig.35 gives an overview of the four theories befitting the scope for the exploration of cooperation in nature.

Noë explains that these models, are more complicated concepts than they may seem. As mentioned earlier in section 2.3, the biomimicry approach that will be used is a metaphorical translation of the case. Therefore a non-literal interpretation will be used, as this adaptation is done from a biological paradigm to the human businesses perspective.

Inspirational goal	Theory	Sources
1. Lessons to form cooperations with benefits	▸ Cooperation models ▸ Levels of selection in evolution theory	Noë (2016); Kiers(2018); Beaumont (2018)
2. Lessons to attract partners	▸ Partner selection models	Barclay (2010)
3. Lessons for conceptualisation	▸ Key criteria for enduring partnerships	Baumeister (2017)

Fig.35 *The models that yielded in useful inspirations*

6.3 | RESULTS: DESIGN LESSONS FROM NATURE

In this section, the results and conclusions that are based on inspirations from nature are presented. These are the selections made, based on a comprehensive list.

6.3.1 Cooperation formation

Professor Noë has developed five different models that explain the existence and stability of different types of cooperation (Noë, 2018), based on the evolution of cooperation. These models are proposals on how cooperation works in nature and are as follows: kin selection models, green beard model, partner control models, partner choice models and group selection

Insights from behaviour in nature	Translation to the case
The greater the dependency in nature, the greater the stability of the cooperation (Kiers, 2018)	User and KPN should depend on each other. The user should need something that KPN has, which the user can only obtain through the return of mobile phones.
In mutualistic relationships, there is direct benefit (Kiers, 2018). Selfishness can drive cooperation benefits	Looking at other own interests than finances and donation (Beaumont, 2018), could yield in attractive solutions for users.
Kin relationships are a lot easier when relatives are involved (Kiers, 2018). The barrier to cooperate is much lower, when the benefits for own, or those for relatives are involved.	Keeping bonds with family and friends by passing phones on to them through return program, consumers can be driven through the self benefit or direct benefit to a relative
By promoting the fitness of its close relatives, an actor increases the chances that the genetic information that instigated him to show the cooperative behaviour is better represented in the next generations. (Noë, 2016)	Spreading the 'gene' of a circular behaviour through relatives, by engaging them in the return program
The closer the relative, the higher the chance that the relative carries the same genetic information as the actor, including the 'genes' prompting the carrier to behave in a cooperative way. (Noë, 2016)	Spreading a certain behaviour more effectively, by selecting a closer relative, like a parent with a child (Noë, 2018).

Fig.36 *Insights from behaviour in nature's cooperations and translation to the case*

West et al. (2007) describe how altruistic behaviour in cooperation can be favoured when the benefits are weighted by the genetic relatedness the receiver of the benefit has to the actor.

A general cost benefit analysis can be defined with the following equation (b= benefits, c=costs):

$$b - c > 0$$

The cooperation is then beneficial, when the benefits times the weight of the kin relationship, outweigh the costs (see Fig.37). The equation is as follows (where r= relatedness with organism/individual):

$$b \cdot r - c > 0$$

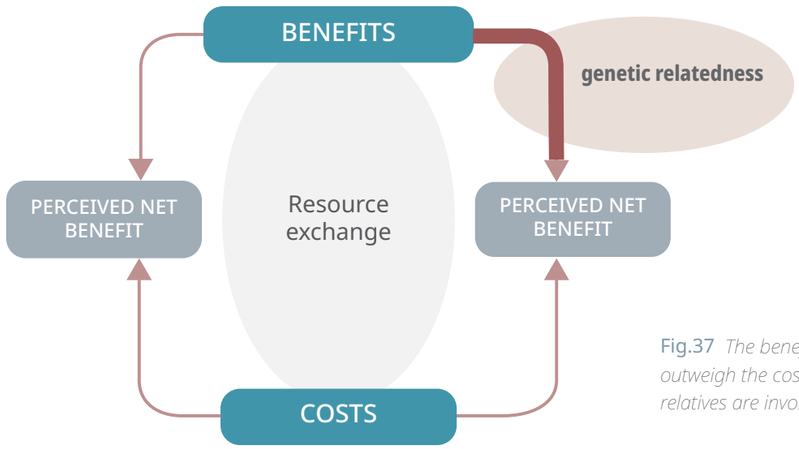


Fig.37 *The benefits can outweigh the costs when relatives are involved.*

Adding another link to the system, where both KPN and user can benefit from and the user can depend on, makes it harder to leave the cooperation. This can be achieved by involving another cooperation in the system: another user. Based on the insights listed above, this should be a relative for whom the user would wish at least the same benefits. By offering benefits for both user and the relative, the additional benefit sought for, could be created.

Finally an insight used, that initially was not in the scope of this exploration, is the case when an organism does something undesirable in the favour of another, to reach its own benefit. This is mentioned as the lack of binding contracts, described by Noë (2016). The example given for this is a bumblebee that cannot avoid taking up pollen when reaching for the nectar offered by a flower, i.e. the undesirable experience is a by-effect of a desirable experience.

6.3.2 Attracting partners

Barclay (2016) introduced the basics of biological markets and how they relate to traditional models of cooperation by making a distinction in three goals: choosing partners, attracting partners and maintaining partners. Fig.38 shows the translation of insights from this source.

From KPN's perspective, the goal is to make users' prefer to return their phones through them. This can be compared to the partner model, in which the goals of selecting, attracting & maintaining partners are distinguished. While for this case, attracting and maintaining the user is relevant from the perspective of KPN, the 'selecting' task is done by the user and occurs parallel to the 'attracting' efforts of KPN. Therefore during retrieving design lessons, the categories of informing, attracting, exchanging and maintaining are used. Within these categories, relevant insights to translate to design lessons are summarised.

Goal	Insights from strategies in nature	Translation to the case
Chosing partner (perspective of users in selecting KPN)	Approach partner according to own relative market value (Noë, Shi	Consumer will approach the return according to old phone's value assigned by the user. KPN should offer benefits for a wide range of phones.
	Balance the trade-off between having weak connections with many partners and strong connections with few	The cooperation with KPN could incite the user to become a client of KPN to have one strong connection to deal with in terms of purchasing, using and returning mobile phones
Attract partners (perspective of KPN)	Use generosity to compete over partners (Barclay, 2010a)	Compare with offers of competitors and provide generous offers. These could be services for which KPN could offer more discounts on, instead a low monetary payment.
Maintain partners (perspective of KPN)	Determining whether to stay or switch to better long-term alternatives	Link the return of mobile phones to a long-term experience.
	Entice desirable partners to stay by continuing to provide the commodities that attracted them to you	KPN should offer long-term benefits, but could also introduce short time benefits and evaluate to what extent they are attractive When users want to leave the cooperation, more benefits can be provided
	Prevent useful allies from leaving by imposing costs to prevent allies from leaving	Make it very hard to leave the cooperation, by offering benefits that competitors don't offer, or don't have.

Fig.38 *Insights from partnerships in nature*

6.3.3 Conceptualisation

Dr. Baumeister proposed some key criteria for enduring partnerships, based on a study done into 180 forms of partnerships in biological systems. These are used as a guide for conceptualisation, as they provide general guidelines for a long-term partnership. Fig.39 shows how these criteria are applied to creating concepts.

With the criteria that are based on nature's cooperations, an emulation to the case gave guidance on how to use biomimicry for conceptualisation, with criteria based on nature's cooperations. This set of guidelines will be used to set-up a method for developing ideas and concept.

Criteria	Guidelines for concepts
1. Must be a net benefit for each party which fosters a reinforcing feedback loop	▸ Using the strategical insights identified in 6.3.2 and 6.3.3 to enhance the perceived value for users ▸ The trade-off of benefits and costs for both KPN and user can be used as an evaluation tool.
2. The value exchange is of different resources or services	▸ The different concept should include different resources from KPN and user, such as different type of phones.
3. The benefit (of resources or services) is something each partner can readily provide to the other	▸ Mapping out all resources from both user and KPN (see appendix #) provides an overview from which a selection can be made, based on the type of system.
4. Partners respond and adapt to changing contexts	▸ The usage patterns identified in chapter 5 should be taken into account as changing contexts during the lifecycle of a mobile phone

Fig.39 *The application of the key criteria as part of conceptualisation*

6.4 | CONCLUSIONS

This chapter explored cooperation in nature in order to seek inspiration, by focusing on (1) seeking to offer an alternative and/or additional benefits for users as opposed to traditional take-back programs, and (2) attracting the user to engage in the return experience with KPN, resulting in a competitive advantage of KPN.

The goals for attracting partners inspired to categorise the process of return into four stages: (1) Inform (2) attract, (3) exchange and (4) maintain. For the purpose of strategies in nature, the inform and attract stages are combined, as the task of "informing" by KPN will be based on the required information based on the user studies in chapter 4 and 5. While the goal of this study was on the benefits and attracting, which concern the first and second stage, insights on maintaining partners were found additionally as a relevant stage to consider.

Fig.40 shows the insights that are combined and summarised into these stages. Although these themes show different implications for the case and are classified into the four different stages, they do have an influence on the other stages and can be combined to strengthen the effect of the strategy. Furthermore, this chapter provided guidelines for conceptualisation are extracted from this analysis, specifically regarding the benefits, exchange of resources and changing context, which will be used in the ideation process in the following chapter.

	Inform & attract	Exchange		Maintain
Themes	Generous offers that are difficult to obtain by users	Involve other users for the exchange	Exchange is the by-product of an experience	Manage an ongoing loop
Implications for case	Perceived value by users that is hard to replace by others	increase the chances of a spread in circular behaviour by offering benefits for others	The negative perceptions of returning an old phone, are minimised by combining this with another valued experience	Make it less desirable for users to engage in a one time exchange by offering commmitment & dependencies
				Long-term benefits
	A direct perceivable benefit	Sense of belonging to a group: sharing a goal, strengthens the willingness to participate		Change offers over time and more benefits when cooperation 'ends'

Fig.40 *A summarised overview of nature's inspirations and the implications on the case*

7. DESIGN FOR COOPERATION

In this chapter, the research and biological insights will be used to formulate design principles, in the form of concepts. These conclusions result in a new design brief and a morphological chart. The elements of this morphological chart were combined for ideation and the development of concepts. Finally, the concepts will be evaluated using the personas, cost-benefit analysis and the effectiveness during the three stages of inform & attract, exchange and maintain. The selected concept will then be evaluated with KPN in order to develop into a feasible concept.

7.1 | DESIGN BRIEF

A design brief is formulated based on the problems and results from the analyses of the previous chapters. It redefines the problem and the main insights that will be used to develop concepts.

7.1.1 Context & problem definition

Current payback programs are not effective and attractive for both retailers and users. While retailers do not necessarily gain profit from such programs, users are offered very low amounts which lead to disappointments and dissatisfactions. These transactions are usually a one-time experience and do not guarantee the return of future phones. By linking the return to another experience in the mobile phone lifecycle, a long-term benefit can be realised for KPN and the user This can be achieved with the combination of long-term resources of KPN.

Based on the research insights, the following key problems, with regards to users, have been selected to be addressed:

Unawareness in users

Many people are not aware of the effects of returning phones back and do not realise that they are an important link in the shift to a circular economy. Knowledge of return options helps users to make more considerate choices. Informing well on return method and data privacy reduces the perceived effort.

Lack of (satisfying) incentives

The type of payback should be worth the perceived financial, functional and sentimental value in old phones. This means that the benefit from the return program should exceed the perceived value in the phone. Furthermore, this requires the elimination of the effect of barriers and to enhance the benefits for both KPN and the consumer.

The return program could potentially bring additional value for KPN by increasing the traffic in the stores and the engagement with consumers in ways that brings more value to users. This can bring in more customers and also increase KPN's willingness for extra costs; more investment in return for a long-term profit.

Attracting more customers to KPN

The return program could potentially bring additional value for KPN by increasing the traffic in the stores and the engagement with consumers in ways that brings more value to users. This can bring in more customers and also increase KPN's willingness for extra costs; more investment in return for a long-term profit.

7.1.2 Design inspirations from nature

the strategies that are inspired by nature, are as follows:

1. Generous offers that are difficult to obtain by users

By offering products and services that would require more offerings by users without the return of an old mobile phone, users can be attracted and gain a higher perceived value than what is expected. The customer satisfaction resulting from the offers by KPN, could lead to a competitive advantage while contributing to a circular economy.

2. Involve other users

In light of the user study, social-friendly practices have been found to be an incentive. Relatives could be included to optimise the effectiveness of the return system. Also, consumer to consumer communication could pose more effective results, considering social pressure, altruism and persuasion and in the long-term lead to a societal behaviour change.

3. The phone exchange is a by-product of the total experience

For the cases where users have a high degree of perceived value in their old phones, the negative experience can be replaced by offering a context in which the return of a phone is the means along-side another experience, to reach higher net benefits.

4. Manage an ongoing loop

Offering commitments and dependencies can ensure users to keep contributing to the flow of resources in a closed loop. The change of type of offers over time when the cooperation is 'ending' , ensures an ongoing loop.

7.1.3 Design goal

The main challenge of this project was defined as:

Develop a cooperative exchange between users and KPN, by learning from interactions in nature, for an effective return of mobile phones as part of a phone return program.

Based on the above mentioned insights, the design goal is specified into the following:

Offering a satisfactory return phase, by ensuring benefits on the long-term to both KPN and users, in which an alternative payback method will enable users to involve more users to the disposal phase, leading to a spread in circular behaviour.

7.1.4 Design vision

Based on the design goal, a design vision has been created, which depicts the ideal experience that is aimed to achieve with the design. Instead of just returning a phone for cash-back, the return experience should provide more:

The user should feel like working together with KPN and other users and feel responsible for the reduction of environmental impacts, like two different types of organisms that help each other by sharing a goal and keep engaging in that behaviour, because of the satisfaction it gives

7.1.5 Concept requirements & criteria

This section presents a set of requirements and criteria (Fig.41) that are mostly based on the results of chapters 4, 5 and 6. The concepts should be in accordance with the requirements. The criteria will be used to evaluate concepts and select one to develop further. The criteria are converted from requirements into measurable parameters to evaluate effectiveness. Their measurement will take place by comparing the concepts.

	Requirements	Criteria
INFORM	1. The concept should facilitate clear communication of the return facility, the benefits, the method, and environmental implications.	1. The concept should target all types of consumers (reference: personas in section 5.4) 2. The concept should target many types of phones (in different states? Broken etc.)
ATTRACT	2. The user should be incentivised using financial, charitable and/or societal incentives 3. The concept should provide additional or alternative benefits for users, compared to a single monetary payback provided by existing take-back programs 4. The return should be accepted in the stores	3. The system is profitable for KPN 4. The perceived value should overcome the influence of perceived effort, attachment and the desire to keep the phone as much as possible
EXCHANGE	5. The designed concept should create long-term relationships between KPN and customers 6. For the exchange, KPN will use existing resources.	5. The system ensures the flow of as many old phones as possible
MAINTAIN	7. The concept should facilitate the engagement of other users, enabling the awareness and behaviour spread around circularity	6. The concept should enhance the spread of circular behaviour as much as possible 7. The concept should motivate users to keep returning their old phones

Fig.41 *Requirements & criteria*

7.2 | IDEATION

Informing users of the environmental issues, the importance of returning and the return facilities can be supported by marketing efforts. Increasing the perceived value for the user, however, is more complicated and requires the consideration of more factors that can play a role. For this, a morphological chart is generated based on the lesson from nature for conceptualisation in section 6.3.4.

7.2.1 Method

As mentioned earlier, many negative factors can be eliminated by informing users well, such as support on data removal. Offering a wide range of incentives can also minimise the perceived struggles as they can make it seem worth it. The selected negative factors are therefore based on 'extreme' reasons, which have also been experienced during the user study. Fig.42, presents the morphological chart that combines the relevant insights.

A full overview of resources KPN possesses can be seen in Appendix E.1.

This methodology ensured that the incentives, factors and insights from nature were utilised to develop different ideas. These are building blocks for the overall system.

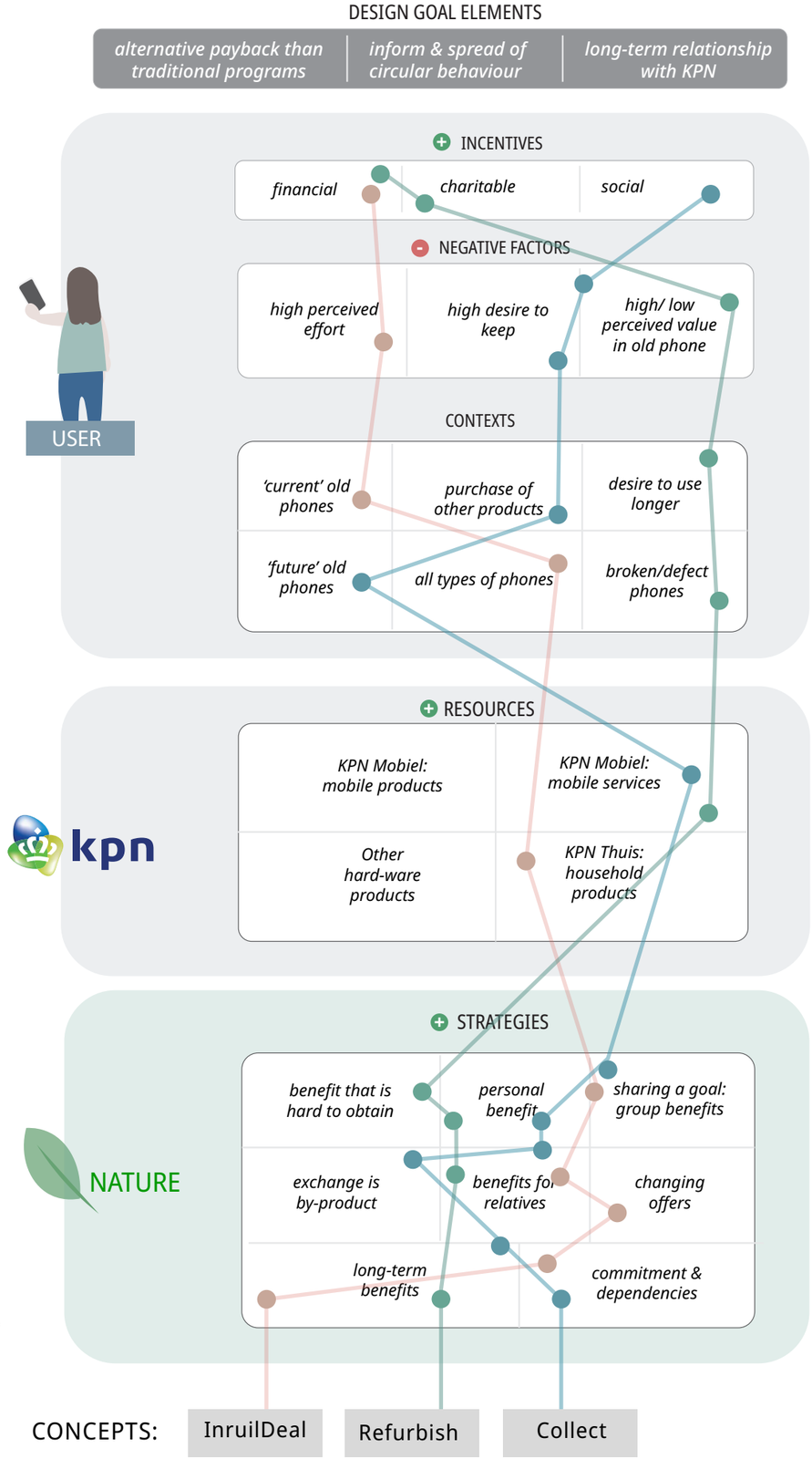


Fig.42
Morphological chart that combines the design variables

7.2.2 Overview of ideas

This section presents the concepts that followed from the morphological chart and shows the principles they are based on. In the chart, the different key aspects that resulted from the research, and need to be taken into account, are listed. By connecting the insights from nature with the contextual insights, three concepts have been created: KPN Inruildeal (Fig.43), KPN Collect (Fig.44) and KPN Refurbish (Fig.45), respectively covering the focus areas ofl the household, a community and the broken phones..

Fig.43
Summary of concept 1

Fig.44
Summary of concept 2

The concepts possess the following features concerning the engagement of other users:

- Concept 1: Cooperating within a household to enhance return quantity
- Concept 2: Cooperating with group to receive shared benefits
- Concept 3: Cooperating with a relative for a direct loop

Further, there are some aspects that are the same for all concepts which will be explained before presenting the concepts.

INFORM & ATTRACT

- The ability for KPN to reach and benefit more people through one client and thereby spread the importance and usefulness of re-using.
- Eliminate the perception of profitable motives behind the return program through generous offers.
- Effort: The effort problem was depending on two major reasons: whether the provided payback offer was worth it, and by personal perceptions of effort. The first is solved by providing different types of payback rather than a monetary price. The perceived effort is minimised by informing about the return method and the ease of availing it. Besides this, by connecting the disposal to purchase, no separate travel or time related efforts needs to be done on the user's end. The return of phones is part of the payment. Beforehand the number of points or other perks can be calculated. The phones can be brought to a KPN store nearby.

EXCHANGE

- Payback offer: The concepts offer different types of exchange benefits.. The discount or reward received, exceeds the predetermined price provided by the recycler or refurbisher. While the cooperation between KPN and recycler or refurbisher involves monetary payments, the cooperation between user and KPN involves other resources of KPN that still act as financial incentives through satisfactory compensations.
- Privacy security: In all cases security of the data on the phone need to be ensured. By guiding the user through a phone back up and wiping process, or providing this service in the store, the users can be sure that their data is not lost and not get into someone else's hands. .
- The progress of activation of benefits, can be tracked in the MijnKPN app. This will both ensure that the customer gets what was promised and ease the progress.

MAINTAIN

- The benefit is long-term by the long-term offer that is given in return. Instead of a one time payment for a one time disposal, users are rewarded with a long-term experience.

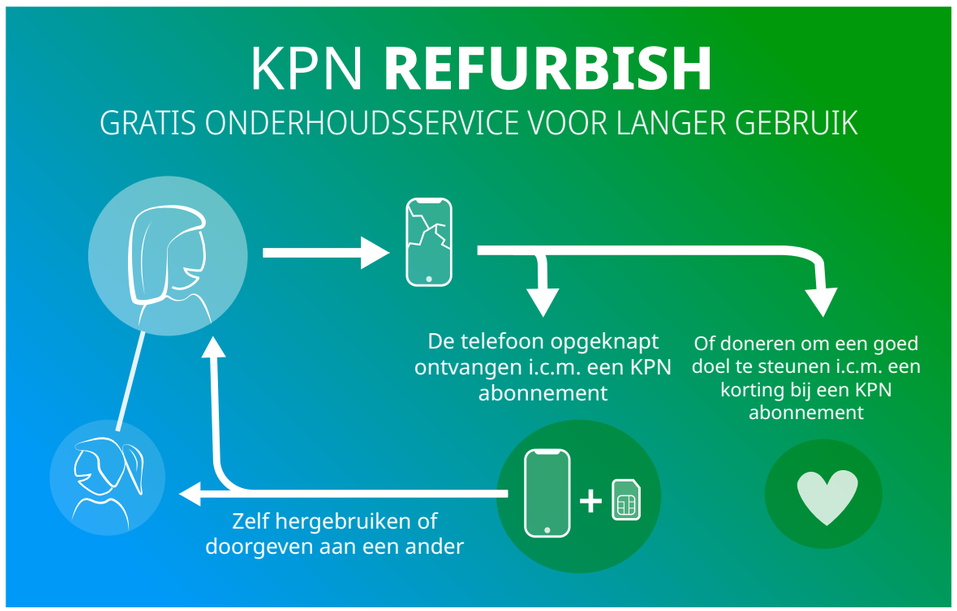


Fig.45
Summary of concept 3

7.3 | CONCEPT 1: INRUILDEAL

The first concept is KPN InruilDeal (Fig.46), that translates to ExchangeDeal. Phones can be returned through which points can be earned for benefits. This program could be an addition to the current KPN Compleet program, which is a program that offers deals when members from the same household have multiple products or services from KPN.

With the inclusion of KPN InruilDeal, returns will also be rewarded, next to additional purchases. This could mean that the pointing system of InruilDeal could be applied to KPN Compleet forn an integrated service.

Every household has old phones lingering around. With InruilDeal, the return of many phones at once is promoted by offering major advantages.

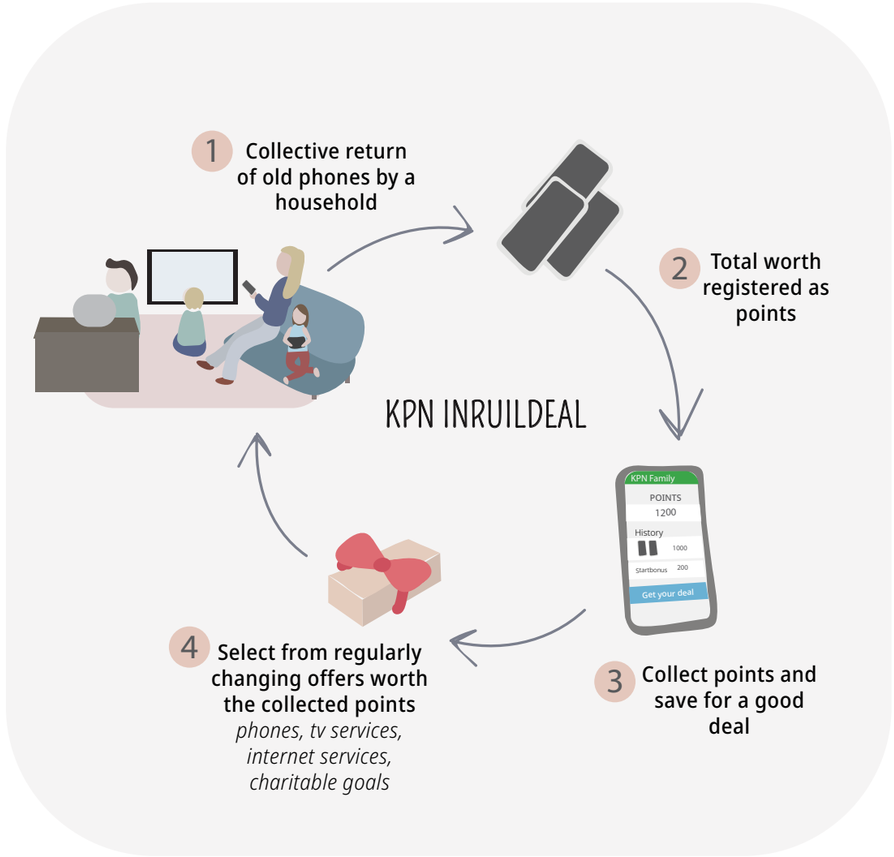


Fig.46 *Overview concept 1*

Key processes

INFORM & ATTRACT

In this concept, reaching one client means getting rest of the household involved as well. Existing clients are reached through the mail and app, while new clients are attracted through social media and during a new purchase on the website or a visit to the store. Only one person of a household needs to be or become a client of KPN by being a KPN mobile, internet or TV client. This gives them access to the MijnKPN app and the InruilDeal option. By comparing the loyalty points and the points required to get a deal, people are encouraged to return more products. Many of the services require monthly payments, which are expensive on the long-term. With the InruilDeal the user gets compensated with resources that benefit everyone living in the household.

EXCHANGE

This service promotes saving products to return them in exchange of deals. This makes users plan on returning their phones and that of others, such as partners, parents or children, who may experience high perceived effort. While they do not gain a lot from keeping all these phones, the experience of exchange will serve as a reminder for the old phones that are kept and bring awareness that a better maintained phone is worth more. This leads to a change in behaviour to be more careful with products and the insight that more valuable products could be obtained by returning a non-used product. The return of products is aimed to occur collectively, but only one person has to do this for others in the household. Furthermore, the app gives a sense of closeness, getting informed on deals and progress does not require lots of efforts, it's in your pocket! This reduces the overall effort for the users. Instead of a one to one contact and relationship with one client, the benefits are spread over the household.

EXCHANGE

By using the app, the clients experiences the long term advantages of having multiple products from KPN, but also of returning them. The relationship is maintained by offering new deals and rewards.

7.4 | CONCEPT 2: COLLECT

KPN Collect provides monthly discounts on a phone contract with the return of a phone, which can also be shared with family and friends (Fig.47). 'Collect' stands for the collection of old phones by KPN, but also the formation of communities by users.

Members are part of their own community, may it be family, friends or other relatives. They are encouraged to return their phones via KPN Collect, by knowledge and experience that is shared. By returning a phone, one member gets the discounts with the purchase of another phone or contract, corresponding to the worth of the phone. They can also involve others and receive a shared benefit.

Fig.47 *Overview concept 2*

Key processes

INFORM & ATTRACT

The user is informed through existing channels and the option to return will be available when the user is looking for a new contract. What is unique to this concept, is that this person can receive the highest benefits by encouraging others to take part]; it provides extra benefits for contributing to environmental benefits, a deal on top of a deal. The main attraction is the discount on the next contract. While through promotion the return can be perceived as access to a deal, on the website when purchasing a contract, it is kind of an alternative payment method or the byproduct of the deal. By calculating the monthly discounts, the user finds out that the discount is worth more than payback prices elsewhere. Additional to that, by involving more people, shared benefits can be obtained such as free calling, sharing of internet data.

EXCHANGE

The exchange happens in the store, but can be tried out on the website to see the advantages. With a simple form, the user defines the phone and its state to see the advantages for a subscription of one or two years. These are predetermined through a classification of price categories and the corresponding deals. By involving more people, not only does the benefit spread, but also the education on the recycling of phones and changing their end-of-use behaviour. Even for very old phones, there are deals, as this is the start of a long-term relationship and gives the sense that all phones carry some worth that are more useful when returned to the system than in drawers.

EXCHANGE

At the end of the contract period, the deal ends, but through the Collect App, the user has gained social benefits as well. To continue receiving these a phone can be returned again.

7.5 | CONCEPT 3: REFURBISH

Concept 3 targets broken and non-functioning phones (see Fig.48). Broken phones are a major reason why many upgrade, and selling or passing these phones on to others for re-use is usually harder than with phones that are in a good state. Also usually they are not worth the reparation costs. Finally, many people want to use their phone until it is broken. With the increasing prices of newer phones, this trend could grow. This means that the number of broken phones may also grow.
This concept offers users a free reparation service in combination with a new contract. The advantage to the user is that there is 'nothing to lose'. And this, next to a sim-only contract.

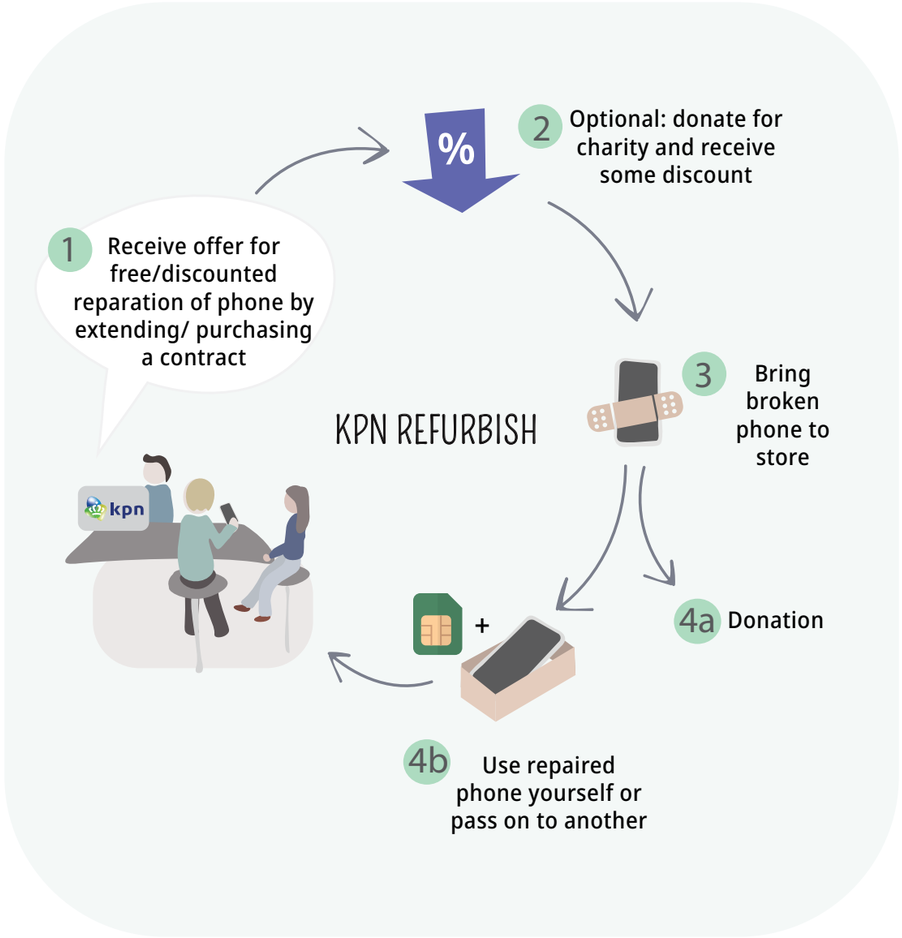


Fig.48 *Overview concept 2*

There are three main scenarios that this concept proposes:

1. Using the refurbished phone longer yourself

2. Passing the phone on to someone who needs it, such as a younger or older family member. This scenario is beneficial with the broken phones that are stored .

3. Giving the phone up as donation, which will be suggested when the reparation costs exceed the limit, or if the phone is not repairable. This scenario will give access to discounts on a phone contract. This requires KPN to cooperate with a charitable organisation. KPN already has the 'Mooiste Contact Fonds' aimed at visiting and talking with elderly who can feel alone. Through this initiative they already cooperate with well-known organisations such as het Rode Kruis (red cross), het Oranje Fond and de Leger des Heils. Organisations that already take phones in are e.g. Unicef and stichting Aap. This could be a gateway to partner up with more charitable organisations.

This offer only works within the limits of a certain budget that is determined by KPN. KPN will need to make a large investment with this concept, as the reparation costs will be covered with (part of) the profit from the purchased sim-only contract by the user. At the system levelhowever, the cheaper reparation tasks required for other users, may compensate for these investments.

Through this program, the loop for the phone is even smaller. It is returned, although temporarily, in order to get re-used immediately after.

Key processes

INFORM & ATTRACT

Users with broken phones will be attracted to ads on social media. The message will give them the sense that there is finally an advantageous solution to do something with the broken phone. By looking up on the website users can check whether their phone is eligible for the deal. Here, they can come across the option to donate. Even when one has no broken phones, getting informed could be in the benefit of relatives that have one and could avail the offer. Sufficient information should be provided that the user can check at the closest store whether their phone is eligible for the maintenance, to prevent disappointment later on. A free repairment service is the key attraction aspect of this concept, with the cost being the purchase of a two year contract. Considering the usability of a broken phone and the satisfaction level that comes with it, there is less to lose.

EXCHANGE

With this concept, the circular mindset is brought in by promoting reparation and re-use. In the case of passing the phone on to others, the sense of altruism is triggered. But also, more people get acquainted with this option. Involving more people, educating and changing their behaviour regarding broken phones would be beneficial for the environment.

MAINTAIN

The disposal is connected to a two-year contract. While the offer ends after those two years, the phone is still in a (potentially) usable state and could therefore be used longer, while staying with KPN's contract for another two years. Near the end of the second term the user will get a message with the offer to donate the phone for a discount when the contract will be renewed. By this time (after four years) it could be that the phone is too old or shows other software related issues which will again be an advantageous offer.

7.6 | CONCEPT EVALUATION

In this section, the three concepts will be evaluated and a selection will be made, based on the criteria set up in section 7.1.5. All these phones can be implemented as they cover different focus areas; the household, a community and the broken phones. For example one as a long-term program, while others could be preliminary deals. The purpose of the evaluation is to weigh out which concept offers the highest impact and optimal results on society, KPN's business and the old phones in terms of sustainability and poses therefore a better chance to be part of a long-term return program. The assessment will take place with the persona, a cost-benefit analysis and the evaluation of the effectiveness at the four experience stages.

7.6.1 Evaluation with personas

Rather than an overall assessment of the concepts, the concepts are evaluated using the personas as characteristics with behaviours based on different factors. As these personas are created based on the insights from real users, an indication can be given on how a person that possesses a certain preference could react on the three concepts and to what extent the concepts target the range of possible behaviours. The evaluation is done by rating the concepts from the perspective of these personas, with only one concept being able to be preferred by each persona. The stars suggest the likelihood of participation. One star means less interest, two stars indicate a doubtful case and thee stars the willingness to participate.

The results show that focus on different concerns applies to different contexts. These are the only assumption on which deal could fit the persona. For younger people, students or starters, the first concept may be less appealing in terms of the resources that are received, while the other concepts target a wider group of users.

The preference for concepts is evenly shared by the personas. As this evaluation was subjective, the aim was not to make a selection based on it, but rather to see what elements of the different concepts fit the factors different types of people would like to deal with. This strengthens the need for different type of take-back programs.

PERSONA	REASONING	Concept 1 InruilDeal	Concept 2 Collect	Concept 3 Refurbish
Circular ethusiast	Circular enthusiast: will like the initiative of KPN and their efforts in taking phones back. This will have positive influences on the brand image. It promotes sustainability and does not require buying a new phone. As he does not have old phones at home and is careful with his possessions, his choice is clear.	★★	★★★	★
Fast giver	The fast giver does not care about finances, but appreciates that something good happens with phones. She thinks she already used all of the value in her phone and now prefers doing something good with it after use.	★	★★	★★★
Profit seeker	The profit seeker wants to make the most out of an old phone and if he is dissatisfied, he will just keep it. In terms of own benefits, he would prefer exchanging a phone for the highest perceived financial benefits.	★★	★★★	★
Forever attached	The forever attached does not want to lose her phone. She even kept broken phones, for is she would ever need it. So she would get them repaired, if they do not cost her more than a new phone and as she does that she could give the oldest phones even up for donation.	★	★	★★★
Careless procastinor	The careless procrastinator forgot a long time ago about her old phones and would not even able to count how many she still has at home. She does not care about the old phones and would not even sense the loss. She is fine with letting other return it for a shared or their own benefit, as she is too lazy to return a phone or switch from provider.	★★★	★	★★
Technovice	The data concerns of the technovice will be overcome through information he received. As that was an area of insecurity for him, he can finally hand over all the phones that he kept over the years at once.	★★★	★★	★

Fig.49 *Rating of the concepts from the viewpoint of the personas. The stars indicate the likeliness of participation.*

7.6.2 A cost-benefit analysis

For a beneficial cooperation, the perceived benefits should be in balance with the costs. The first key criteria for conceptualisation (see section 6.2.3) was that the proposition must be a net benefit for all actors, which means, less perceived offerings/costs as opposed to the benefits. Although this perception is hard to measure, as it concerns internal factors of users, the criteria in section 7.1.5 suggested to measure the extent of profitability for KPN and overcoming the perceived effort, attachment and desire to keep a phone.

Costs here are defined as a disadvantage, while benefit is an advantage. Only the costs and benefits that are unique to the concepts are mapped out. This gives also suggests on what elements can be selected for further development. The costs and benefits for the user will be based on the insights from the user study. The perspective of KPN is estimated based on the amount of financial costs to be made, regarding investments, time and resources. The costs and revenues from the program, such as the further sales of the old phones, the distribution costs that are made and the payback to the user, that result in a break-even, are disclosed, as they are the same for each concepts.

A general note is that as perceived functional, emotional and financial identifications for an old phone is a strong internal factor, it is hard to have influence on a user that prefers to keep the phone in any case. While the provision for an attractive deal is an attempt to change this behaviour, the effectiveness of it cannot be guaranteed.

Concept 1: InruilDeals

Concept 1 is unique for its way of dealing with lazy consumers. When they are in for the benefits, they can let their friends or family return the phone for them. This would be a cost for KPN. KPN will exchange the old phones with an offer that compensates for the revenue of those phones. In exchange, only one person has to be in a long-term relationship with KPN.

Concept 1 could be changed to fit individuals as well, by also providing other offers for personal benefit. When four old phones are handed in comparison of returning them individually, the worth of the benefits can be shared, instead of receiving less individually. On the other hand, the user is paid with a service, which partly consist of a profit margin that does not cost KPN anything. In return, they will also receive the monetary payment from recyclers and refurbishers. In this way, KPN could even make profit out of the return of mobile phones or balanced out with providing more benefits to the user.

Concept 1: KPN InruilDeal		
	Costs	Benefits
User	‣ Satisfaction depending on the type of deal that is active for a certain period ‣ Switching from another provider ‣ No interest in the household deals	‣ Only one person needs to do it for the rest, eliminating the perceived effort for many ‣ The products/services can be perceived of high value.
KPN	‣ Only one “customer” while receiving phones of multiple consumers without being able to directly engage with them	‣ Compensation of deals with expensive contracts ‣ Probability of making profit with the return program
Environment		‣ Promotes the collective return rates

Fig.50 *Overview of key costs and benefits for concept 1*

Concept 2: KPN Collect		
	Costs	Benefits
User	‣ Having to purchase a contract for even older phones, which result in a low discount. ‣ Having to wait until the current contract period has expired ‣ Switching from another provider	‣ Value of long-term direct and extra group benefits
KPN	‣ Only one “customer” while receiving phones of multiple consumers without being able to directly engage with them	‣ Long-term engagement with multiple customers ‣ Promotion by itself through communication between the social community
Environment		‣ Fast spread of circular behaviour, promoting the reflow of resources into the system.

Fig.51 *Overview of key costs and benefits for concept 2*

Concept 2: Collect

The first key principle of concept 2 is that it is able to give users a higher perceived value in return of their old phone while offering new long-term relationships for KPN. Secondly, engaging friends and family to return their phone can also have more effective implications in comparison to the company communicating with users individually . As an addition, the point system of concept 1 could be integrated to concept 2 as well, to give more flexibility to choose for a discount, or save for other deals. When the phone is worthless, or when it is broken, the user will get minimal discounts per month.

Concept 3: Refurbish

Concept 3 is limited to broken or dysfunctional phones and therefore could also be implemented as an additional or temporary program in addition to the previous ones. The option to donate is added to this program, as it concerns broken phones, which may be perceived as less worthy. When users come to the store, they may be confronted with the requirements of the program, as it is not valid for very old phones, or phones which require extensive repair. While this could lead to dissatisfaction that comes with users who have not looked up to the requirements well, they might as well hand over their phone for donation as they made efforts to come to the store. The inflow of old phones will be limited, but a direct reflow to the users can be ensured.

The cost-benefit analysis showed some of the constraints and motivations for users and KPN. All three concepts have their unique way of offering benefits to KPN, user and the environment. The societal benefit offered in concept 2 can especially be beneficial for KPN and cannot be implemented for the other concepts, with their current principles. The benefits for KPN offered by concept 1 and 3, are not always necessarily and on the same value level as concept 2. Earlier, the importance of extra benefits for KPN was explained and this will be considered as an important advantage for concept 2 for the concept selection. Also for the benefits for the environment

Concept 3: KPN Refurbish		
	Costs	Benefits
User	‣ Working phones are a missed value ‣ Missing your phone for a while if it's the current used one	‣ "Free" ‣ Solution for previously not knowing what to do with broken phones ‣ Charitable incentive
KPN	‣ Dissatisfaction of consumers, caused by the required limits ‣ Less control over relationship after the expiration of the contract ‣ Possible extra costs for the reparation, compared to the benefits from the long-term relationship	‣ Long-term relationship with a customer ‣ No dependancy needed on other stakeholders
Environment	‣ Misuse by users who will store this repaired phone	‣ Promotes re-use of a phone without mediators of.a longer supply chain

Fig.52 *Overview of key costs and benefits for concept 3*

7.6.3 Concluding the overall efectiveness

The main goal of this project is the effective stimulation of the return of old mobile phones. This experience was split up in four stages, based on the insights in chapter 6.3. In this section the concepts will be assessed on the criteria defined in section 7.1.5. For criteria 1, the evaluation in section 7.6.1 with personas will be used. Criteria 3, 4 and 5 are based on the evaluation in section 7.6.2.

INFORM & ATTRACT

In all concepts, users are informed with the benefits through ads. Other than that, concept 2 is the only concept in which users can be rewarded by involving others. For concept 1, this type of rewarding by buying multiple products in one household is already realised with the KPN Compleet program, while for concept 3 the donation can be shared on social media, however does not ensure any involvement of others.

ATTRACT

For the resources used all concepts provide different options that do not have to be relevant for everyone. Not everyone is ready to switch from household services to another provider, or wait for the purchase of a new contract. Further, not everyone possesses a broken phone.

EXCHANGE

The effectiveness of exchange is measured by the number of phones that can be expected from certain target groups. While for concept 1, only one user in a household can return all the old phones at home, for concept 2 it is about the number of users who individually participate.

MAINTAIN

The user is given freedom at the end of use of the repaired phone in concept 3, the others guarantee the return, refurbishment/recycling and return on market in a state that ensures another lifecycle.

Although all concepts have their advantages and disadvantages, in terms of benefit for KPN, concept 2 was selected for the opportunity to capture optimal value. While all concepts contain elements that can be interesting and appealing for people with different characteristics, the cost-benefit analysis suggests that concept 2 will result in limited costs for both user and KPN. Also in terms of effectiveness compared to the other concepts, the potential of concept 2, especially with its principle of a growing social community for the spread of circular behaviour, poses an effective approach as an alternative for current take-back programs. Therefore concept 2 will be developed further.

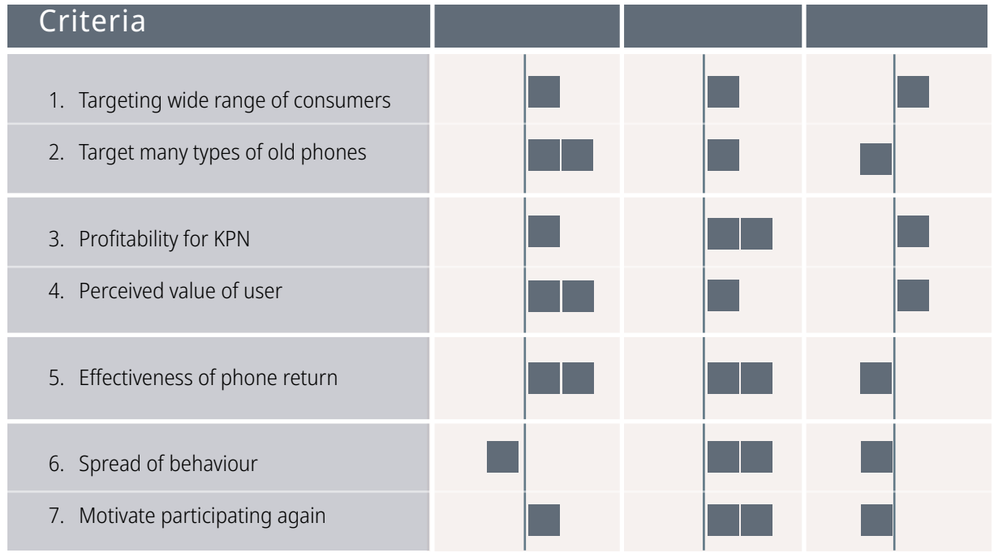


Fig.53 *Final evaluation with a Harris profile*

7.7 | CONCEPT IMPROVEMENT

This chapter presents the iteration steps for the development of concept 2.
The assessment in the previous section will be used to minimise the costs of concept 2, while learning from the benefits and effectiveness that resulted from the other concepts. An evaluation with KPN will bring further insights on the positive and negative aspects of the concept. Finally to reduce the need for a validation test for the usability aspects (UX research), an evaluation on improvements for current return programs will be used.

7.7.1 Concept comparison

The evaluation of the concept in the previous section (7.6), resulted in the following improvement areas for the further development of concept 2.

- Concept 1 provided better deals with more expensive contracts. This could be done for concept 2 with the different option for sim-cards. More benefit on the long-term for KPN can be rewarded for the user as well.
- Concept 3 had a donation program integrated, which will be applied to concept 2 as well. Also, the focus on broken phones can be adopted, by communicating the worth of even broken phones and the implications on the environment as well.
- Finally, the name of KPN Collect will be changed into KPN Bewust, as it can be mistaken for Collect calling, which is a service in which the calling party places a call at the called party's expense. Bewust means 'conscious'.

7.7.2 Evaluation with KPN

To evaluate the concept with KPN, a first digital prototype has been made (see Fig.54 and Fig.55) (more in Appendix E.2).

The goal of this evaluation is to validate the idea with KPN and to see whether there are other factors that have an influence and need to be taken into account.

The choices that were made is that the benefits can only be applied on the purchase of a simcard, with or without a new phone. The group benefits for engaging other contact are mutual free calling and MB sharing, Finally the personal benefits in engaging others was the collection of points, which could later on be exchanged for products and services provided by KPN.

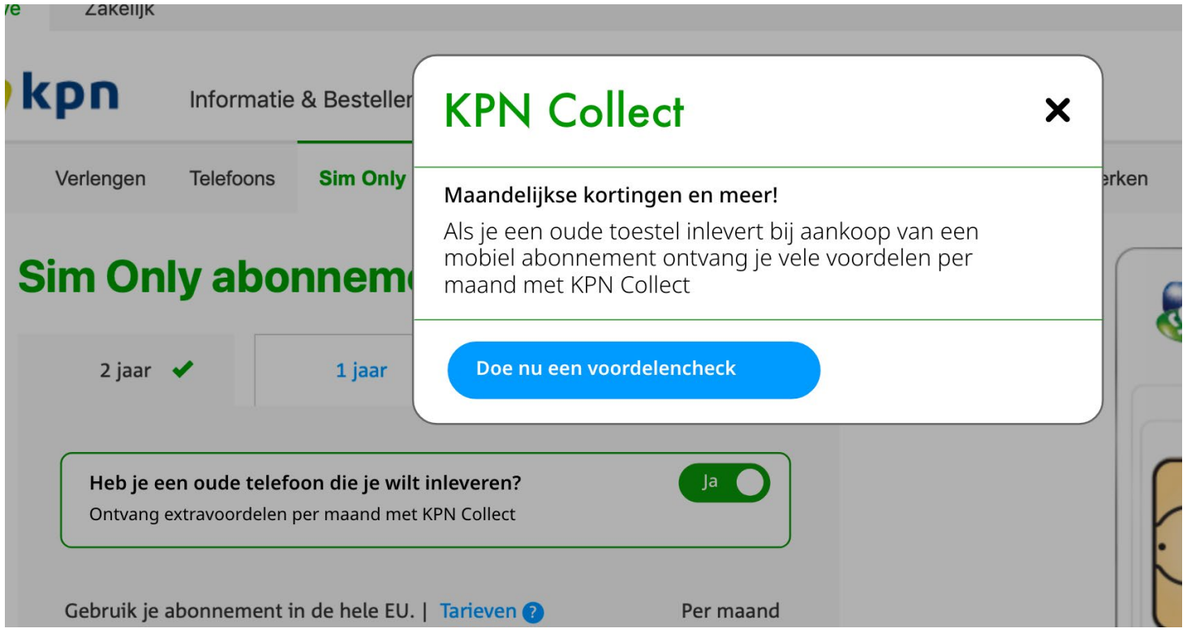
The pros and cons

The key value for KPN as mentioned by Wognum (personal communication, November 16, 2018) was that the program is facilitated in the store. This can reduce the dissatisfaction that comes from being too optimistic about the state of your old phone and as a result receiving the promise to get a high monetary value back, while the assessment by KPN results in a lower compensation value. Also any increased 'traffic' in the store is a value for KPN, as it poses more opportunities for users to purchase something.

The disadvantages of the concept for KPN are firstly the necessity to provide variable discounts based on the value of the old phone. This requires process-based tracking of the customers as the variable discounts can lead to billing mistakes. The user can already select a desired variable for the contract, based on the prepaid amount for the device. So applying another variable discount, will make it more complicated.

This results in more customers calling for questions and support, which are costs for KPN and not desired. Therefore this type of discount in the concept is not desired for the return of mobile phones. Secondly, the program does not require the purchase of a new phone, which may result in more older phones that are returned, which are not of high value

Fig.54 *The introduction of the Collect program when purchasing a sim-only contract.*



Legislations

Another aspect to consider is the legislation with regards to credit for devices (telefoonkrediet), based on the Wft (Wet op het financieel toezicht).

From May 1st 2017, the different contract for the device and telecom (data/sms/minutes) should be informed clearly. The monthly payments for the device itself are BKR registered as a goods credit, when the credit exceeds an amount of €250. This registration is needed to let companies assess whether someone is able to pay the monthly costs. This is monitored by AFM (Autoriteit Financiële Markten)

This does not include the one-time payment (deposit) which can be paid when purchasing a phone. Higher initial payment results in a lower monthly credit. This means that a discount on the prepayment of the device can have positive effects on those who do not want a BKR registration for their phone purchase.

This also means that telecom companies are not allowed to 'subsidise'. Offering a cash-back of €60 and a discount of €80, for example, with a contract, is not allowed. The cash-back should be the same for any case. The extra rewarding deals, however, can be integrated into the system in other ways. As with clearly communicating the distinction between the costs for the device and contract, the discount should also be applied separately.

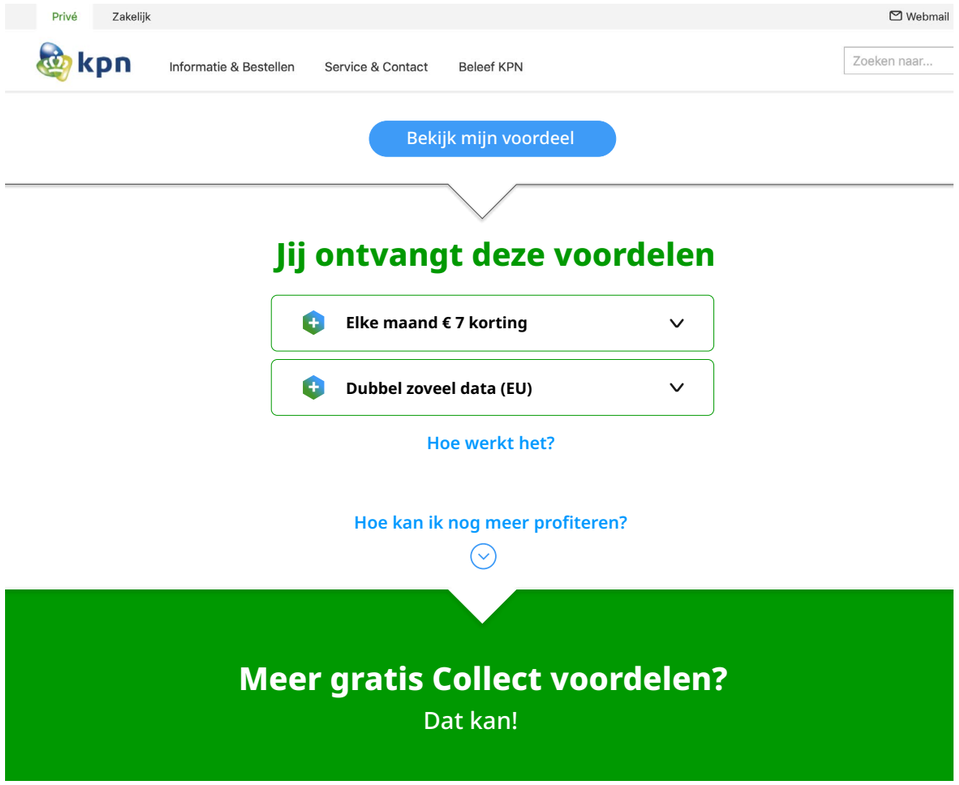


Fig.55 *The variable monthly benefit, based on the rest-worth of the phone*

Assumptions for further development

Furthermore, some assumptions are agreed upon to finalise the concept with.

- The logistics costs per old mobile phone that is returned and will also be applied as a reduction on the financial rest worth of the phone, amounts €15. It is costly to handle these old devices, as they should be handled in a certain way (sand etc.. find source)
- The communication needs to be provided in a simple and clear way.
- If there will be a discount directly resulting from the return, this should be applied on the device instead of the contract. Additional discounts can be provided by deals such as extra MBs and minutes. For this, current strategies and deals of KPN will be used as a reference for the type of resources.
- The rest-worth of the old phones changes monthly and are calculated beforehand by KPN. They also apply margins, so when a customer would think the state of the phone is better than the store employee thinks it is, they will not be too strict. For this project it was suggested to determine the rest worth of a phone by looking at the market values and the offers of other programs.

7.7.3 Evaluating existing return programs

To effectively identify areas of improvement and apply them during the development of concepts, existing return options are tested. These insights are adopted to the concept as improvements and minimise the necessity of a usability (UX) test, which focuses on the interaction and communication.

The following improvements have been found relevant to include in the concept.

- Going through many steps of defining the state of the phone, just to find out that some of the steps were not very necessary to determine the value. One just wants to try out what changes when slightly changing, and the same value appears. Therefore a quicker feedback would help, instead of going through all questions.
- Many other deals and discounts are very distracting and make it confusing. This option should be visible, but should not leave the user questioning about if it then would be more beneficial to them if they would keep the phone and go for another deal.
- Most return programs are very hard to find on the websites and are more easily accessed through a specified Google search. Especially since the option should be communicated when purchasing a new phone, this option should be easily accessible on the website.

7.8 | CONCLUSION

This chapter presented the conceptualisation stage of the project. First, a design brief was defined to narrow down the focus based on the results of the previous chapters. Based on this, concepts have been developed, by setting up a morphological chart, containing the elements resulting from the design brief in order to reach the formulated design goal.

The three concepts were: KPN InruilDeal, KPN Collect and KPN Refurbish, which respectively offered highvalue household deals in exchange of multiple old phones, personal and shared benefits by encouraging others to engage in returning and finally a free or discounted repair service for a broken phone when purchasing a contract.

An extensive evaluation assessed the three concepts on the effectiveness in terms of different types of users, the perceived values as opposed to the disadvantages for both KPN and user, and finally other aspects that have implications on KPN, user and the reduction of environmental impact. Concept 2, KPN Collect, is selected to develop further as it offers significant value for KPN and the environment, related to the societal contribution. Based on an evaluation of the benefits from other concepts, an evaluation with KPN and current return programs, the concept has been further improved as KPN Bewust.

8. FINAL CONCEPT: KPN BEWUST

This chapter presents the final concept that is developed based on the improvements of section 7.7. The Bewust system will be explained by looking at the working principle of the overall system, the experience of the user and the ecosystem by focusing on the relationship between actors, the flow of resources and the environment. Furthermore a validation test will be done with users to evaluate the interest and perception on benefits. This resulted in the specification of the experience of the system during the inform, attract, exchange and the post return stages. Furthermore, the business model around the value proposition of KPN Bewust will be explained and finally an implementation plan is suggested.

8.1 | KPN BEWUST: AN OVERVIEW

8.1.1 How it works

KPN Bewust is a return system that promotes the spread of information and circular behaviour by means of a return service. It focuses on old unused mobile phones; whether they are in the end of life or end of use, broken or in a good state, for years in drawers or currently in use. The system has three options that provide different types of values to the users, shown in Fig.56.

In this system, returning an old phone and involving others, is the byproduct of purchasing a new phone with contract discounts, which attempt to reduce the perceived effort. Persuading friends and family to return their phones, is rewarded with mutual benefits in the group that is formed, as well as the personal discounts.

Consumers who return their old mobile phones, receive discounts and extras on their new order and by involving others in this return system .

The developed concept, primarily focused on the system around a pay-back and extra benefits.

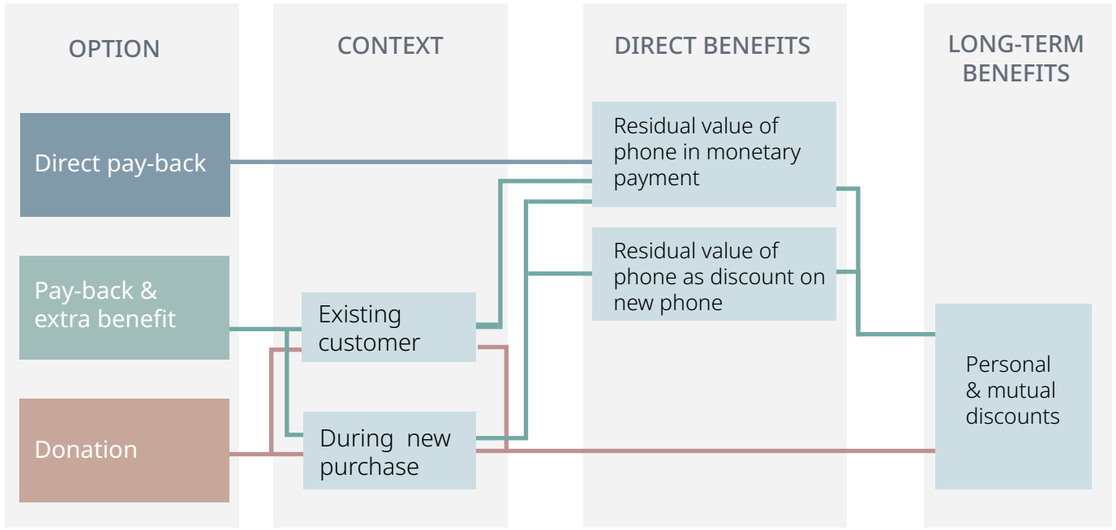


Fig.56 *The return options and the received benefits according to the context. An existing customer is a customer who wants to receive Bewust benefits, without purchasing a new product.*

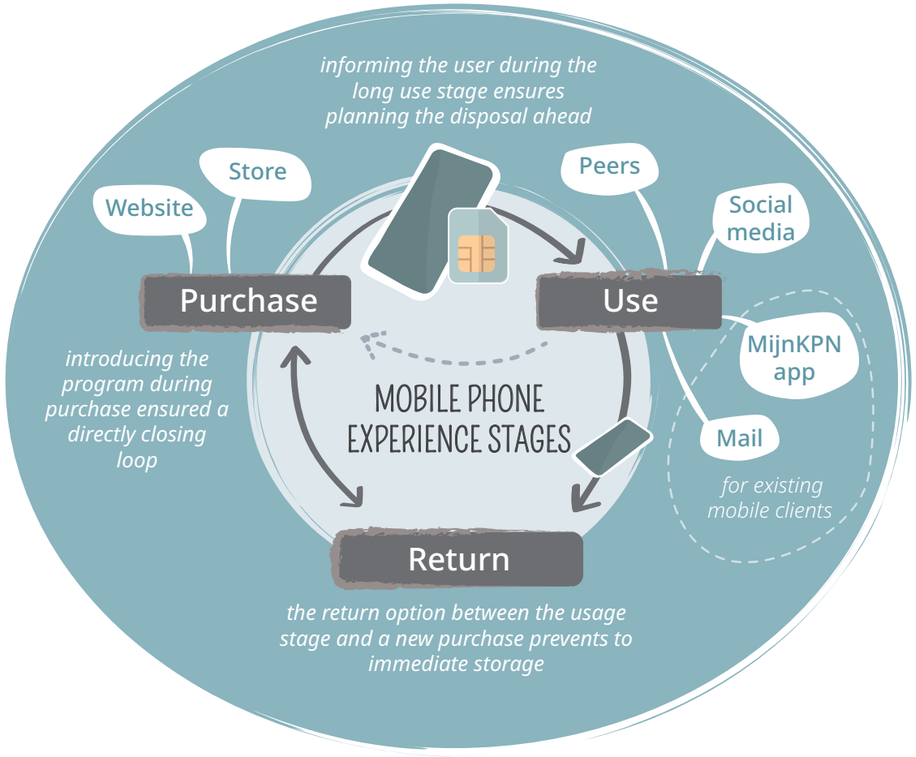


Fig.57 *Touch-points for KPN Newust during a mobile phone and/or contract purchase and use stages*

Through the KPN Bewust profile, an overview of the generated discounts, contacts and collected points shows how the advantages of a returned phone can outweigh the advantages of keeping them. This experience will increase the likelihood of repetition and the spread of return behaviour.

The generous offers will give KPN a competitive advantage compared to traditional take-back programs, with more longterm and satisfied customers in return.

8.1.2 User journey

Any person, living in the Netherlands, is regarded as the potential user of KPN Bewust. Existing KPN customers would be able to enter and accept this program easier, as the trust and relationship are already established and the touch-points for these users are increased. Being seamlessly integrated into the purchase system of KPN would minimise the possibility that a user who wants to purchase a new phone or contract with KPN will miss the Bewust option.

The experience of disposal is connected to others stages, mainly through the existing channels of KPN. Users can be informed through different touch-points during purchase and use stages of a mobile phone and contract. Via these touch-points the consumer visits the website where they are informed about the benefits and can check out immediately what they can get via the 'Voordelencheck', which literally translates to Benefits-check. There are options to choose and combine deals and when the consumer feels satisfied this can lead to closing the deal on the website or in a store.

When involving another user, they can start a group which they can name. Everyone who is added to this group can add other members. This is how the return of a phone does not stay a one time experience, but is the start of a longterm benefit. Awareness is raised by sharing the deal with others and starting conversations around the subject. Even when there is no sustainable motive behind informing others, the promotion of a sustainable behaviour will be a byproduct of sharing.

When the contract period is over, the user can simply stay in this group by extending the contract and profiting from the discounts and other perks that are offered by handing in another old phone, which keeps the user in the return loop. Via their accounts, users have an overview of their involvement and are encouraged to improve it. They get control over their own achievements, involvements and even the benefits that they receive.

Through the community page of KPN, users can reflect together on the program and share their experiences and thoughts. By making this community page a leverage point for education and engagement on circularity, customers can be encouraged to apply the principles of a circular economy in their lives.

An overview of the journey is shown in Fig.58.

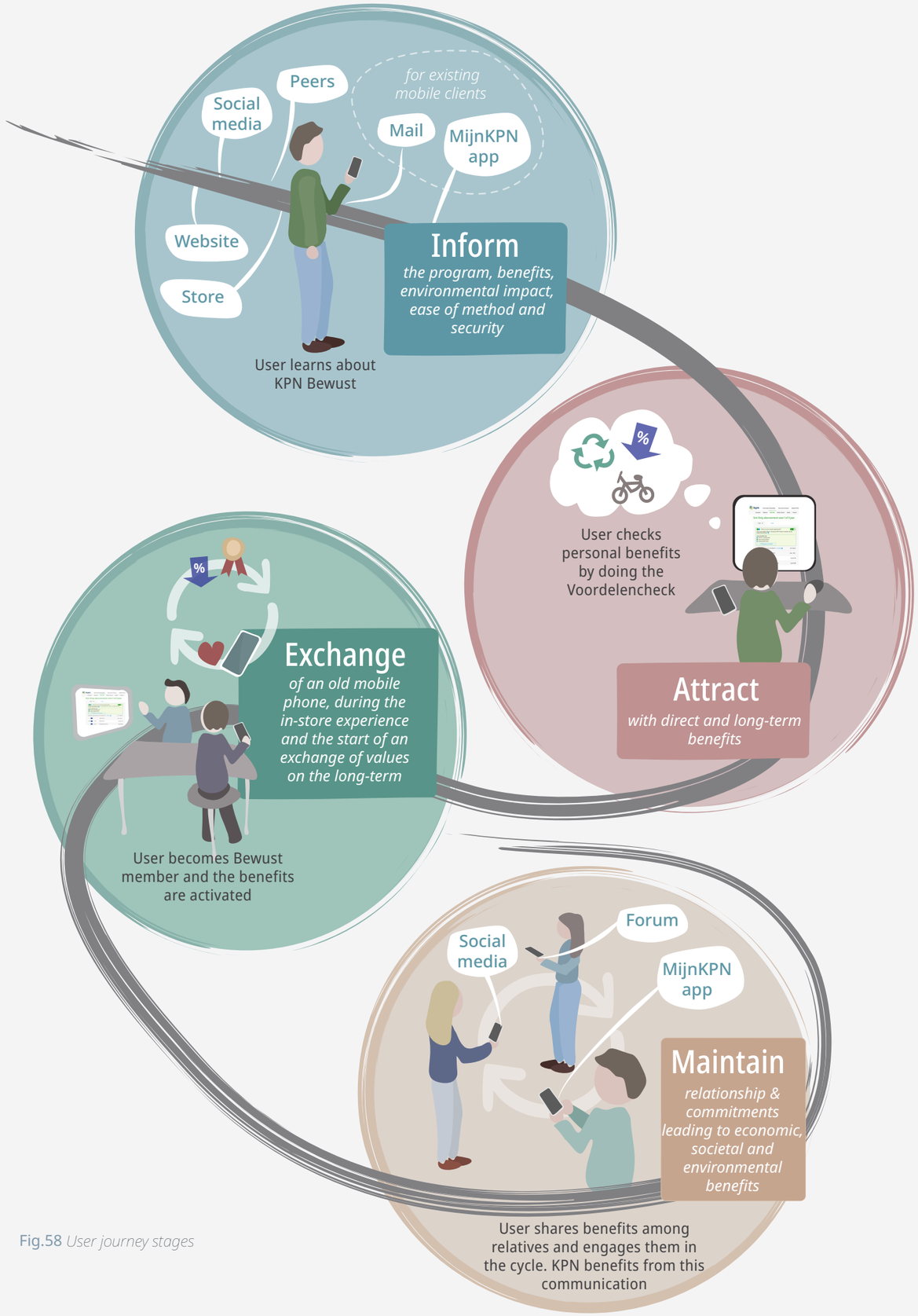


Fig.58 *User journey stages*

8.1.3 The Bewust 'Ecosystem'

The exchange of resources between the actors brings value for the economic, societal and environmental systems from which all actors benefit. Fig.59 shows the general working principle of the system with the main actors, resources and direct benefits.

Economic benefits

The short-term experience of returning a phone, will bring long-term benefits to KPN and users, and indirectly to the recyclers and refurbishers. KPN will experience economic advantages of relationships between KPN and user resulting from the increase in purchases, but also from the communication among community members as well. This will result from the spread of word to other users and getting them involved in the system by existing customers. Another contribution resulting from this 'Bewust' community is the sharing of experience through their existing forum. Indirectly, this return of old phones will also serve the market of refurbished phones, which is growing (Statista, 2018b).

Societal benefits

Beside the cash-back or discount for returning an old phone, becoming a 'Bewust' member gives the user monthly advantages on their subscription, such as a discount or extra MBs. The selection of the specific benefit will be based on the validation in section 8.2.

When engaging others, users will benefit from mutual free calling and MB sharing. Whether this will be sufficient to persuade contacts to become 'Bewust' as well, or including extra benefits, will also be based on the results of section 8.2. When becoming KPN 'Bewust' there will be a commitment with KPN and among users. These commitments in combination with the experience of received benefits, will stimulate the user to stay and keep returning phones.

Environmental benefits

The spread of circular behaviour and the flow of resources that would otherwise be stored at home will have environmental benefits. Older phones can be recycled and their materials used for other purposes. Phones that could be re-used can be refurbished and reused. In this way stocked resourced will be brought to use and reflowing in the system.

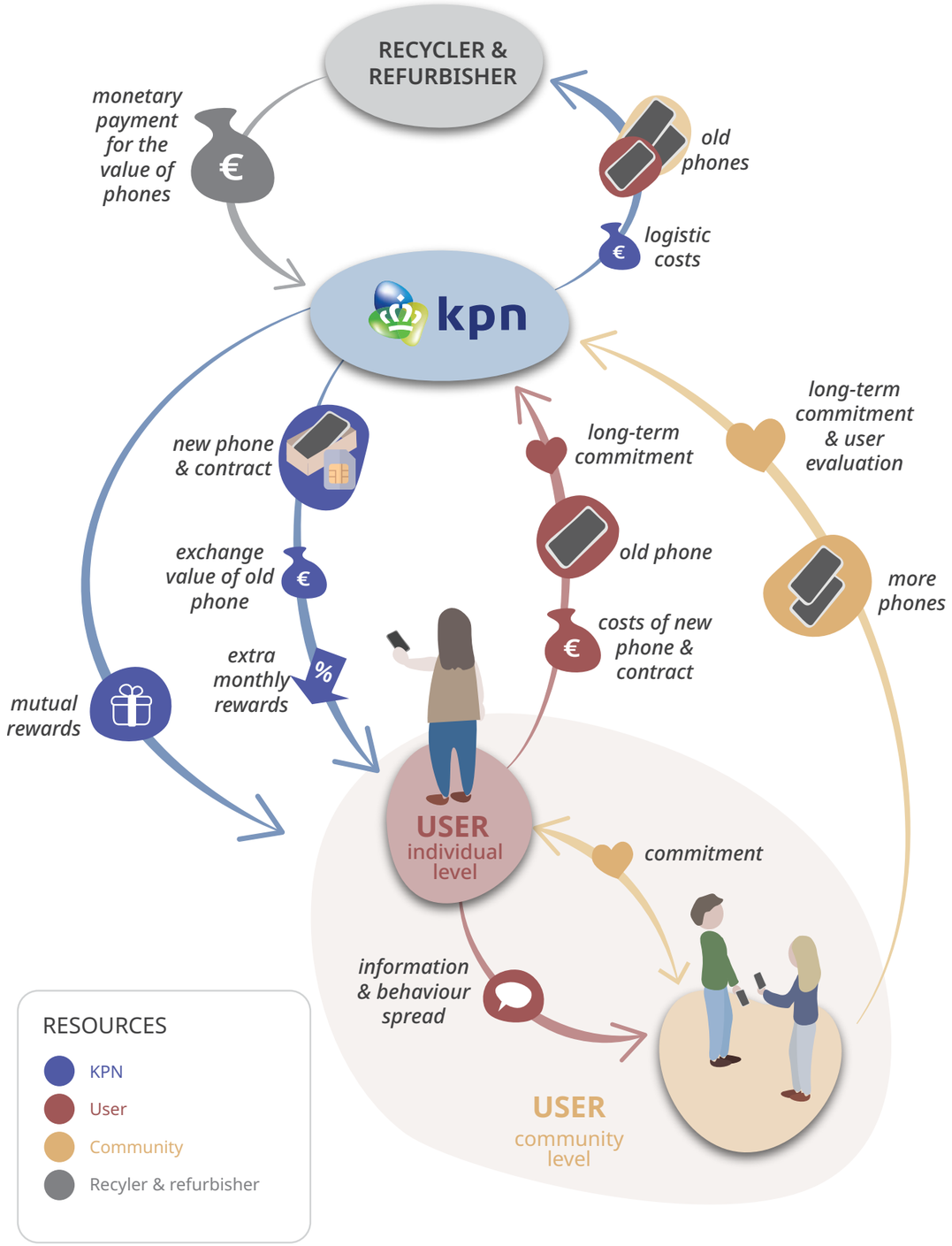


Fig.59 *Bewust system. In the case of a donation, the user only receives the extra Bewust benefits, without the pay-back*

8.2 | USER VALIDATION

8.2.1 Background & goal

During the conceptualisation, the benefits for the user were determined based on assumptions of current strategies and resources that are used by KPN. An evaluation with users will validate those assumptions. The goal of this validation is to find out what type of benefits are attractive for users during the stage of purchasing a new phone and contract. Also it serves as a validation for the effectiveness of this return program from the user's point of perspective and helps in identifying areas for improvement.

The aim of the test to discover areas of improvement for the following aspects:

- Attractiveness of the program during information search
- Communication of the program
- Preference for type of benefits
- Motivations for participating in KPN Bewust and Bewust contact
- Overall improvements from the user's perspective for fine-tuning

The focus here will not be on the rest-worth, which will be determined monthly by KPN for each phone that can be handed in.

8.2.2 Background & goal

The test is conducted in three parts: experiment, questionnaire and evaluation. The test is done with a sample size of 14 participants of ages ranging between 16 and 55. The participants were blinded; meaning that they were prevented from knowing about the goal of this study.

Experiment

For the experiment, a digital prototype was made (Fig.60). This prototype depicts the context in which the user is searching for a new phone with a contract and is introduced to KPN Bewust. The option to return a phone and receive more benefits is received and can be selected when interested. This leads to the Voordelencheck. The return value is presented and the user can select between two benefits: a discount of €2 on the contract and 1GB extra data. After explaining how the discount and additional benefits work, the user is asked whether they would like to read more about Bewust. If yes, they are informed about Contactenvoordeel and can look further for other options: receiving direct value or donation. This provides them with the needed information to get a value perception and shape their opinion. A more detailed explanation about this procedure and the prototype interfaces can be found in Appendix F.

Questionnaire & evaluation

The test concluded with a questionnaire (see Appendix F.1) to retrieve the relevant insights about the preferences, motivations and feelings of users using multiple choice questions. Afterwards, a short interview is done in which the expectations, the effectiveness of the benefits, the disadvantages and recommendations are discussed.

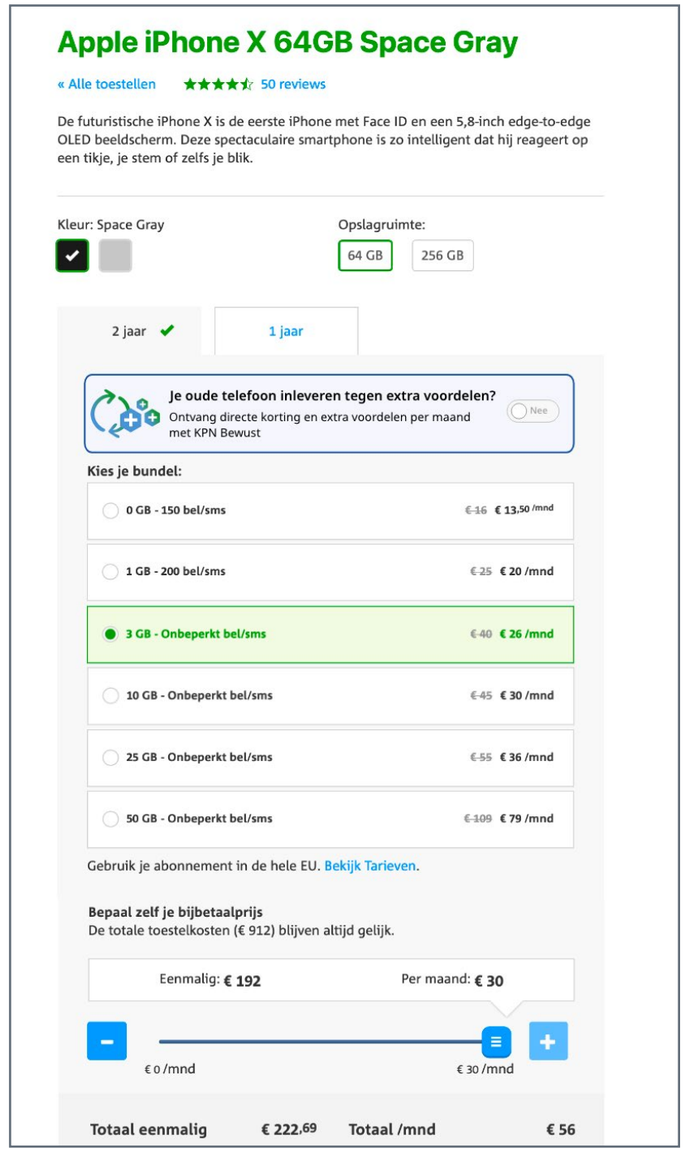


Fig.60 *Introduction to Bewust during purchase.*

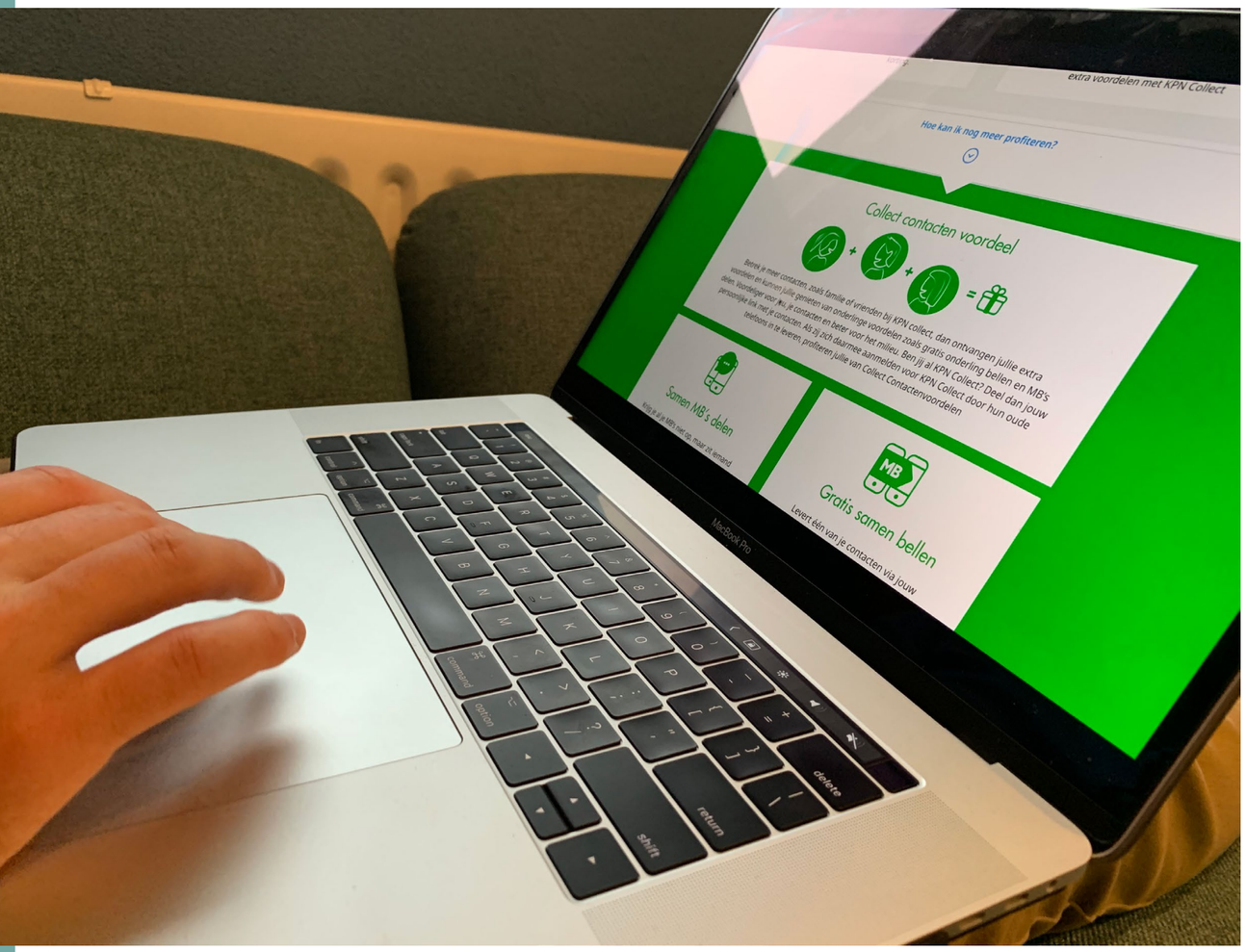


Fig.61 *A participants reading about the benefits of the return program*

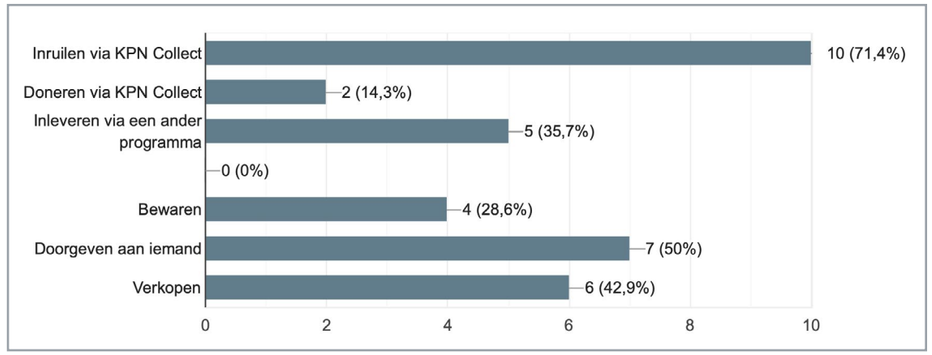


Fig.62 *The selection of preference of optipns at the end-of-use*

8.2.3 Results

This section presents the implications of the results for KPN Bewust.
All results of the user study can be seen in Appendix F.2.

Attractiveness

Of the fourteen participants only three did not like to return their phone via this program. They would to likely keep it and pass it on to someone else or sell it. The reasons that were given were one or a combination of the following factors:

- Other plans (e.g. selling)
- Dissatisfactory exchange value
- The need for a back-up phone

Others were satisfied and mentioned that for the benefits proposed, they could return the phone via this program, however, without excluding other options (Fig.62)

Most participants preferred to receive additional advantages in combination with a new phone Fig.63. One participant who participated in an earlier interview and was familiar with many take-back programs, mentioned that with those options she was more likely to do something else with the phone, but that KPN Collect attracted her more.

Also some disadvantages were mentioned, that are not directly part of the return program, such as the prices of the contract, which could affect their choice.

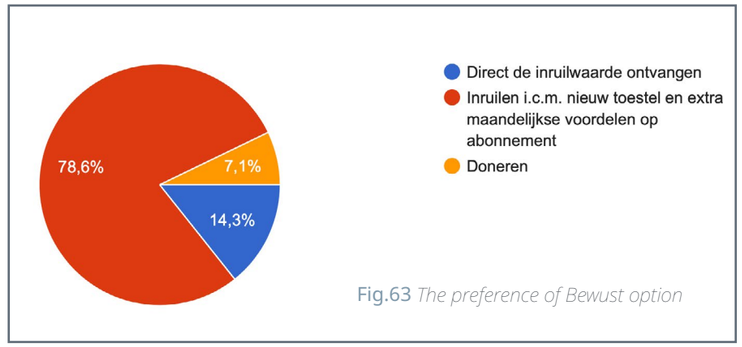


Fig.63 *The preference of Bewust option*

Communication of the program

Based on the observations and the answers to the questions, the overall communication of the program and the different options it was clear that certain aspects needed further attention, namely:

- The Bewust option needs to be more prominent as it had to be pointed out to four participants because they kept looking at the different contract types and the prices. Some of them saw it but were not sure whether they could click as they were told to look for a new phone. Therefore the focus was mostly on the selection of a contract after which the option is noticed. After seeing this, all participants showed interest and curiosity and clicked further.
- Some people overlooked the information about the possibility of return the phone in one of the stores and read this afterwards.
- The presentation of benefits after Voordelencheck caused some confusion. Many thought that they could choose between either the discount on the phone or the additional benefits. Based on experience of six participants and their suggestions, a plus sign has been added (see Fig.64). However, still one participant thought, that you can select from those two options and another needed some time to understand.
- Most participants expected to see the benefits/discounts applied directly to the prices, instead of being calculated afterwards.

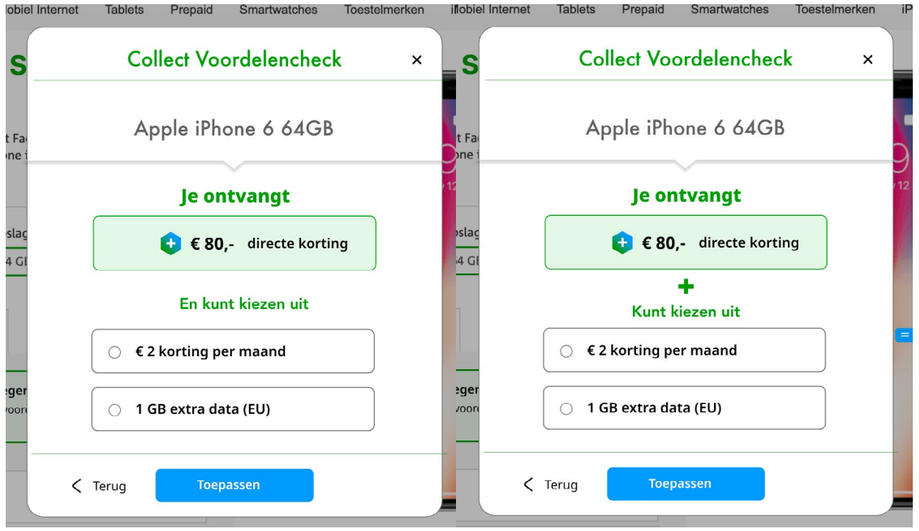


Fig.64 *Improvements as suggested by participants*

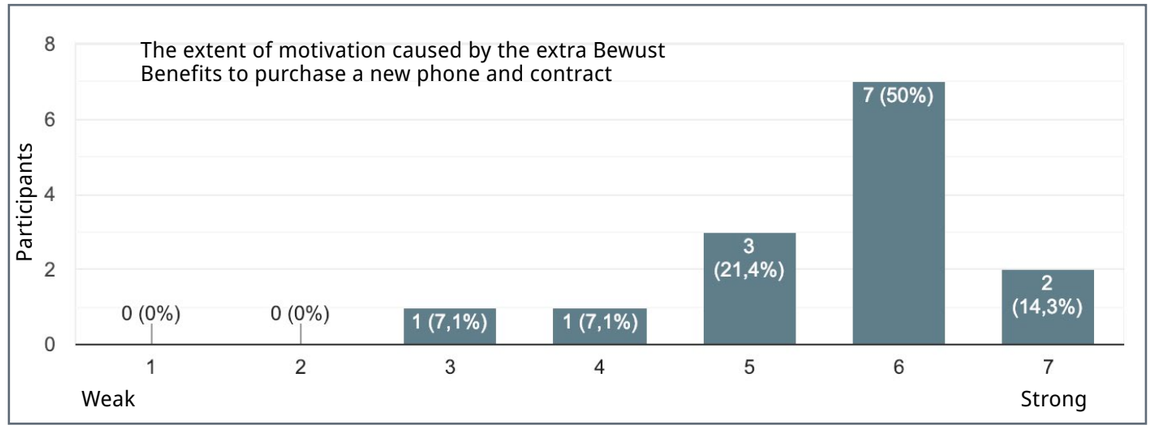


Fig.65 *Ratings on the question: to what extent do the extra Bewust benefits motivate you to purchase a new phone and contract?*

Preference of benefits

Some participants specified that their choice of benefits depended on the contract. If they are satisfied with the amount of internet data, they went for the discount (6), while others found the extra data to be more advantageous (8). As for Vriendenvoordeel, most participants (8) preferred free calling and MB sharing if they were given a choice, followed by an additional discount for both (3). The option to select themselves was perceived as a positive function by the participants.

Motivations

The motivation to participate in KPN Bewust was mostly from the financial aspects, while Contactenvoordeel was the weakest factor. For Vriendenvoordeel, the benefit for the family or friend to engage, was the strongest factor (Fig.66) followed by free calling among each other and the extra discount. The environmental factor was the weakest. When participants had to select one option, 8 of them chose for free calling and MB sharing.

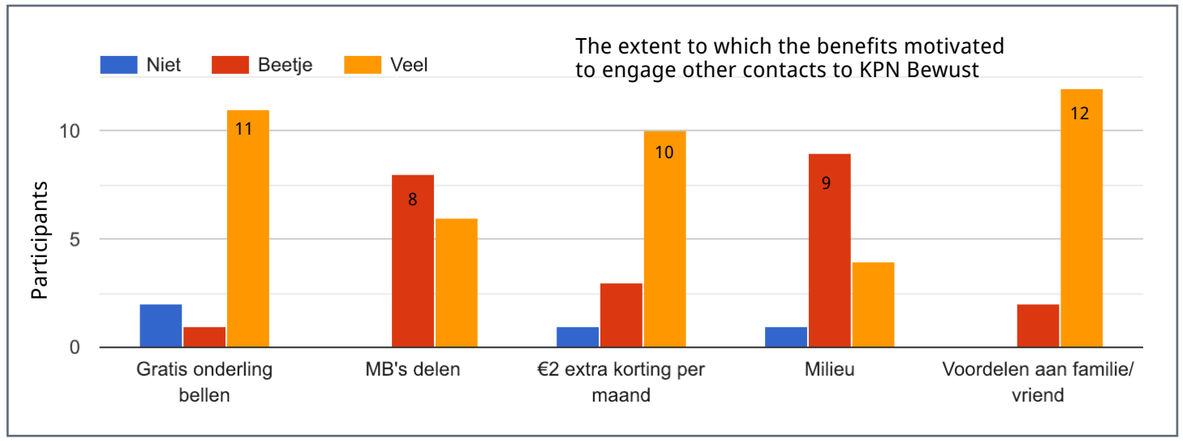


Fig.66 *To what extent do the following benefits motivate to engage other contacts?*

Satisfaction

Although most participants found the financial aspect essential for their motivation, those who were not impressed and chose not to return their phone, mentioned the financial aspects to be a reason. They believe they could receive more. On the other hand, those who were not very satisfied with the variable discount based on their phone mentioned they were likely to participate. The satisfaction rates are not low but show that additional motivations can have a positive effect on the perceived value and behaviour of users.

Sense of cooperating

Finally, the feeling that KPN cooperated with customers to minimise the environmental impact from phones differed. While more than half of the participants rated with a 6 or 7, some mentioned they would like to see more details about the environmental aspects on the website

8.2.4 Conclusion

The results show that introducing this program during information search can be an effective way to attract users. This also suggests the importance to inform existing 'Mobiel' clients, as they already have a contract and can receive extra benefits when extending through this program.

The attractiveness of the program depends on many factors and the actual action of users cannot be predicted with 100% certainty. There were also factors unrelated to the direct scope of the program which can also act as a barrier. These are the perceived costs of switching to another provider and include a higher monthly (contract) costs and the administration costs to switch over to KPN.

In the final concept, the communication should also be improved with a particular focus on;

- Promoting the return option during the main search,
- The clarity of fixed benefits and selectable benefits, and
- The environmental aspects

There were no clear preferences among the additional benefits. However, the option to chose was perceived as something positive. Those who selected for extra internet data expressed that they did not need a €2 discount or that it was perceived as low. On the other hand, the participants choosing the discount were not necessarily negative about the option to get extra MB's. Additionally, with the extra data/MB's users could select a cheaper monthly contract as mobile data is more important for users than call minutes and texts. This trend is likely to grow further due to the rise of VOIP services, like WhatsApp, FaceTime, iMessage etc., which utilise data for calling and messaging. The amount of MB's will then depend on the type of contract. This variety will give them the option to opt for a cheaper contract, which provides more benefits than €2 per month. As mentioned earlier, KPN would need to take extra care with regards to variable invoices. Even when the benefits fall under KPN Bewust, the invoice system will need to differentiate between a discount or extra data.

For Contactenvoordeel, the desired benefit was free calling and MB sharing, followed by €2 discount per month. Since Contactenvoordeel was not a very strong factor in the motivation to participate in KPN Bewust, the benefits can be divided such that it enhances the motivation for both involving in KPN Bewust and the Contactenvoordeel.

	Direct cashback/ discount in store	Collect member benefits	Collect engage group benefits	Collect engage personal benefit
Before test	85	€2 discount /month OR 1GB extra	Free calling + MB sharing	-
After test	85	Double MB's	Free calling + MB sharing	€2 discount / month

Fig.67 *The change in benefits*

8.3 | KPN BEWUST: THE SERVICE

In this section, the service itself will be explained in detail. The three stages of the service: inform & attract, in-store experience and post-return experience will be addressed. Section 8.2.2 explained the user journey and how the introduction to the system can vary. This section will guide through the service, from the perspective of a user who does not know about KPN Bewust and encounters the option on the website. As the option of donating or not receiving any cash-back still leads to users receiving Bewust benefits, this chapter will merely focus on the case where a user returns a phone during a purchase.

8.3.1 Inform & attract

Current customers will receive the option to return a phone via mail and can view the option in the app. Other users, will be introduced when browsing the site or purchasing a product.

This will guide the user in a flow of information, which can also be accessed through a link on the main page (see Fig.68). This page contains information about the environmental issue, the safety of privacy and the ease of return.

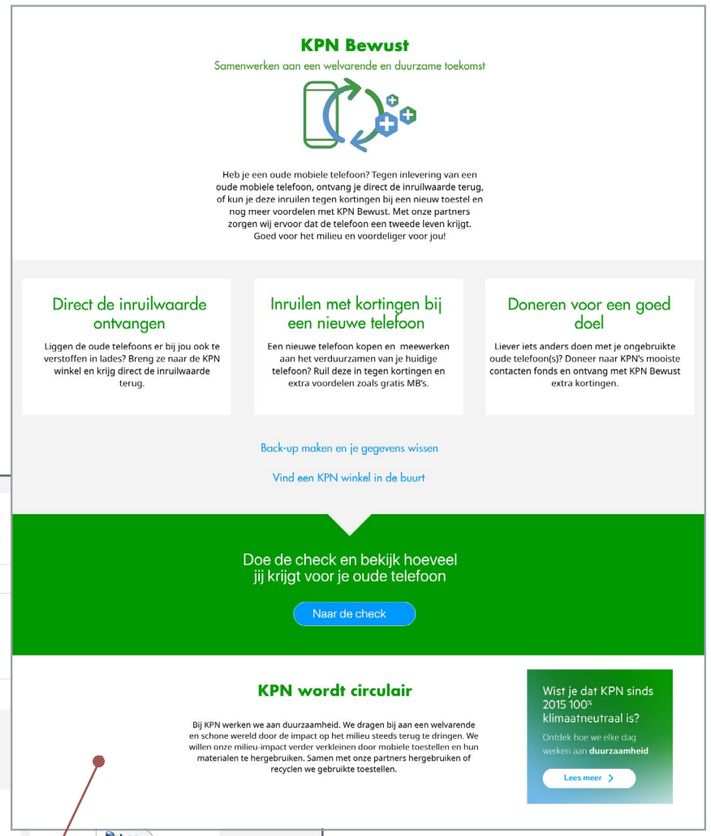


Fig.68 *KPN Bewust option on the homepage & access to the Bewust main page*

The three options will be communicated and the user can do a check to see what values they get. This information will also be brought to users attention who are looking for a new phone or contract in the physical store. When purchasing a phone, the Bewust option is integrated and doing the Voordelencheck will result in the benefits being applied on the actual worth of the device (see Fig.69). The journey for the Voordelencheck in the app, can be seen in Appendix G.

By turning the option on, a brief introduction will be given about the KPN Bewust program. If the user is interested, he/she can do the 'Voordelencheck' which translates to benefit check. Even when the user is not due for a contract renewal this option will make help him/her plan ahead. The user can quickly fill in the model of phone and using a dropdown menu select the right model and the data storage capacity of his/her existing phone.

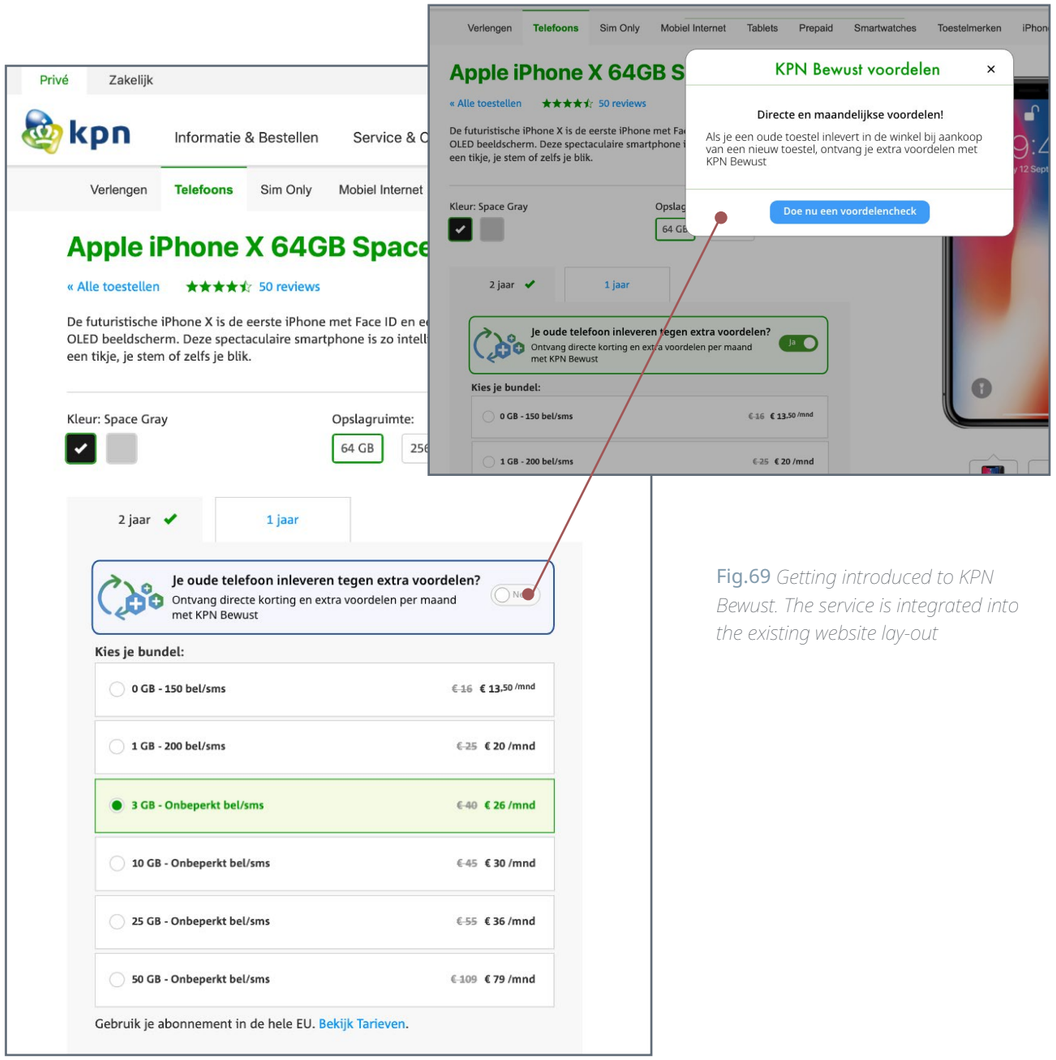


Fig.69 *Getting introduced to KPN Bewust. The service is integrated into the existing website lay-out*

The user is further asked to define the state of the phone. Clicking or hovering on the question mark icons next to the options will result in a pop up window that explains what the different options mean. A phone that functions well, however has normal traces of use, will be accepted as 'in a good state'. Considering the optimistic perceptions of users on their old phone, a small margin reduction will be applied to prevent disappointment.

This process ends by showing the advantages of engaging one's contacts (i.e. other uses) to also participate in the return program and clearly showing the distinct group and personal advantages. Furthermore, two important and relevant links will also be included on this page. Firstly, a link to instructions on how to backed up and wiped data of the phone before handing it in and finally, to search and find a KPN store nearby.

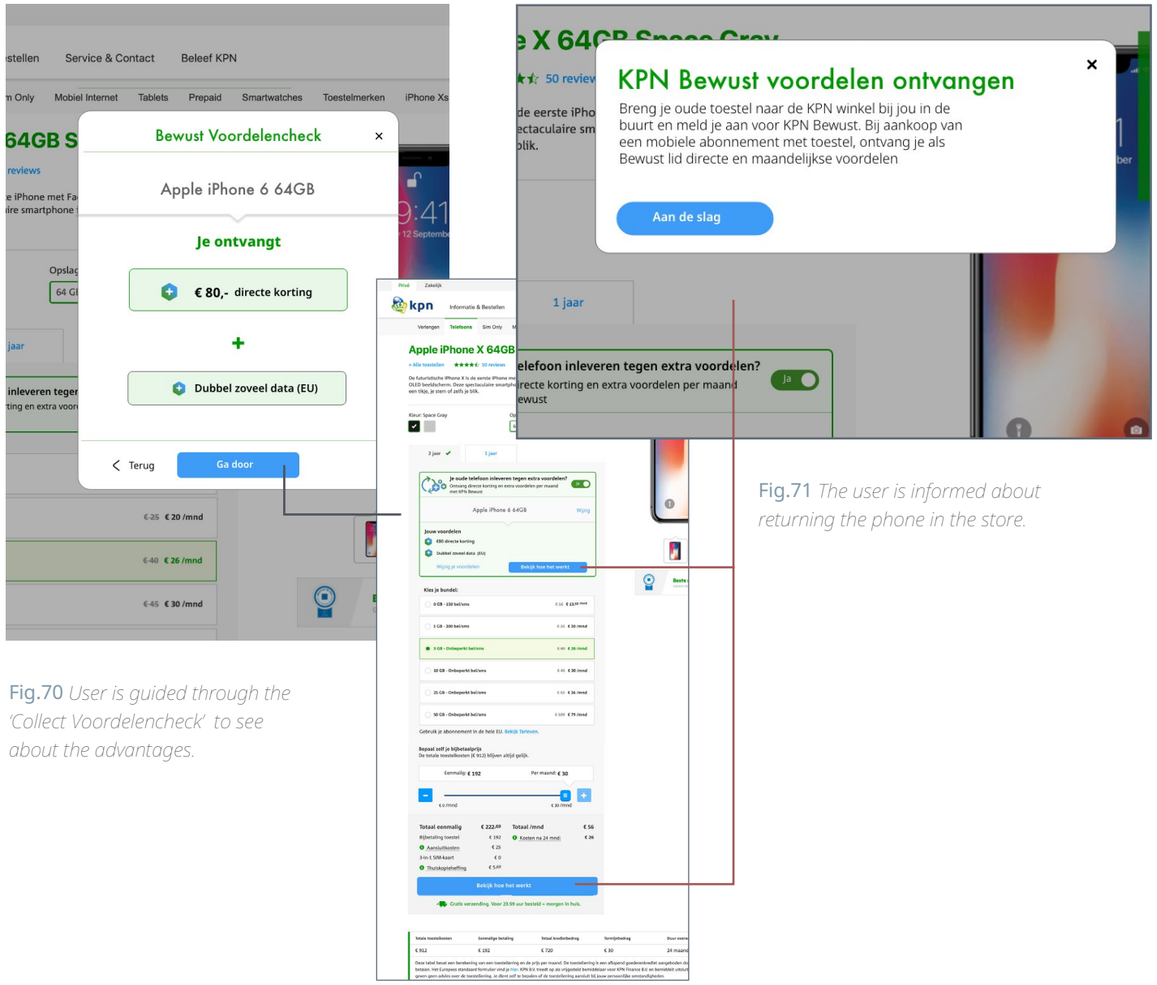


Fig.70 *User is guided through the 'Collect Voordelencheck' to see about the advantages.*

Fig.71 *The user is informed about returning the phone in the store.*

8.3.2 In-store experience

When the user has decided to return a product, a visit to the store is necessary. Especially for the introduction phase, this is an important touch-point. The user can receive direct feedback from the store employee. In return, this will give KPN feedback from the consumers, which will help in detecting elements of the service that are unclear and require revision.When clients become eligible for a contract renewal or are interested in a new contract from KPN, the interested clients should preferability make a backup of their existing phone at home, or will be helped with this at the store. They can do the Voordelencheck (again) if they wish and if they decide to take part in the program, they will go through the digital form.

Through the system, the employee will send the user a link that directs to the Bewust page in the app (Fig.72). If the user does not have the app yet, they will be directed to the website and can download the MijnKPN app. In the app, the KPN Collect tab will be opened and the user will see the screen as shown in Fig.73.

After the final step on the digital form, the user will receive direct feedback in the app, which asks to confirm the details of the offers selected (fFig.74) Upon confirming, the phone will be handed over to the employee. This will be followed by a brief introduction by the employee or a guided tutorial in the app.

Fig.73 *Starting with Bewust*

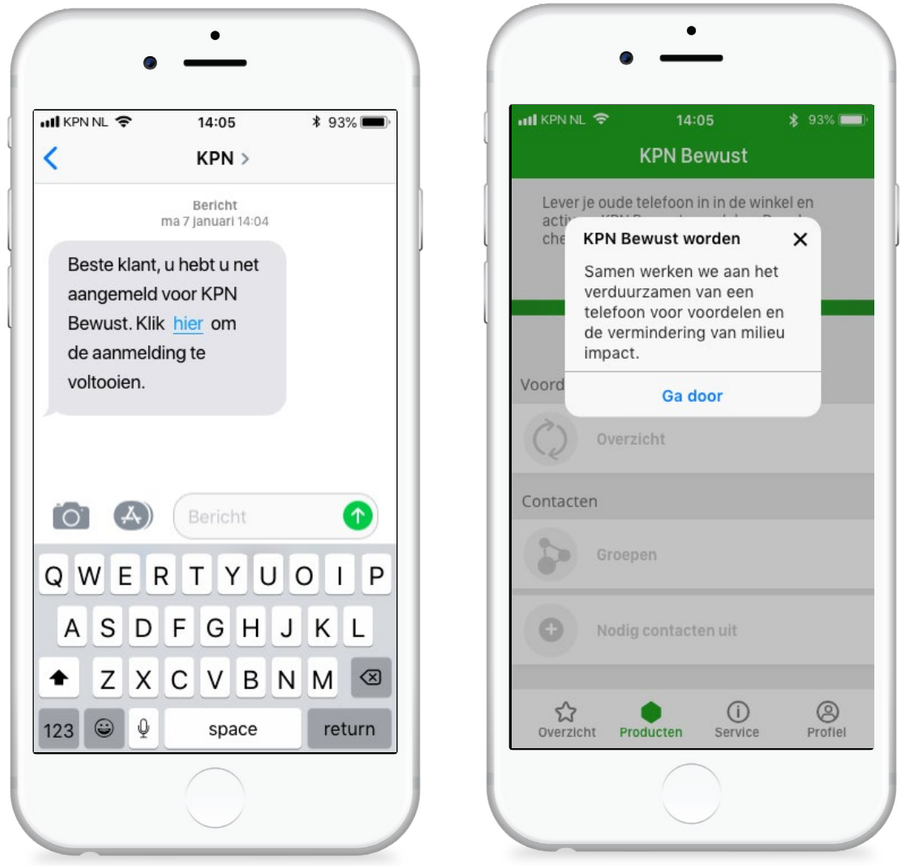


Fig.72 *In-store return interaction*

8.3.3 Post return experience

After handing over the old phone in the store, the user leaves with the mobile app on his/her new phone and the perks gained from returning the old phone. Entering the 'Bewust' page on the MijnKPN app shows an the phones returned (see ifg). In 'Overzicht' an overview will be given of the activated benefits and their period.

Bewust contact

When the user brings in another contact or gets involved in the program by someone else, the two receive mutual benefits: free calling, MB sharing and a €2 discount on their contracts, for the remaining of their contract durations (see Fig.76). The user can share a link, with the user through the app. This link contains a code that can link both users through 'Voordeelnummers' (translates to benefit numbers). The user can show this code to the store employee when returning a phone to activate the mutual benefits. While free mutual calling and MB sharing, can be benefitted for the time the user is a KPN 'Mobiel' customer, the discount only has effect for the duration of the contract. When the contract period expires, the user should hand in another phone to receive the doubled GB and they should engage someone to get an extra discount again. Finally, the user can only benefit one time from the extra discount of Bewust Contact, during a single contract period. The motivation to keep engaging them will be to enable the mutual benefits and a discount for the other.

Fig.74 *Confirming the benefits*

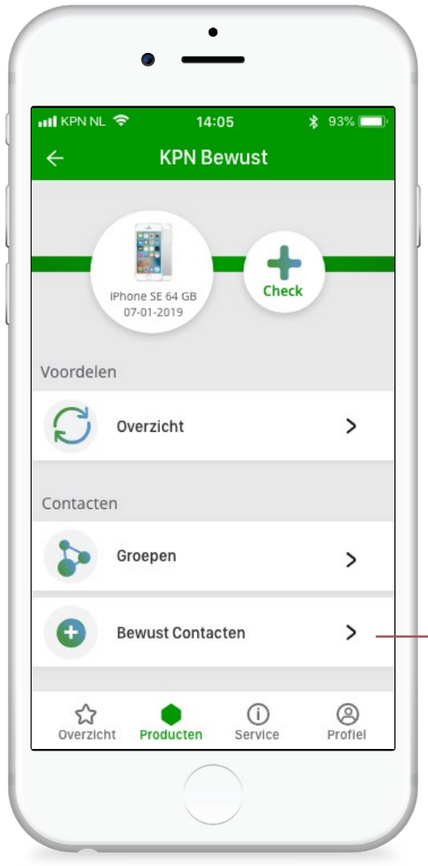


Fig.75 *Start screen of the KPN Bewust section of the MijnKPN app.*

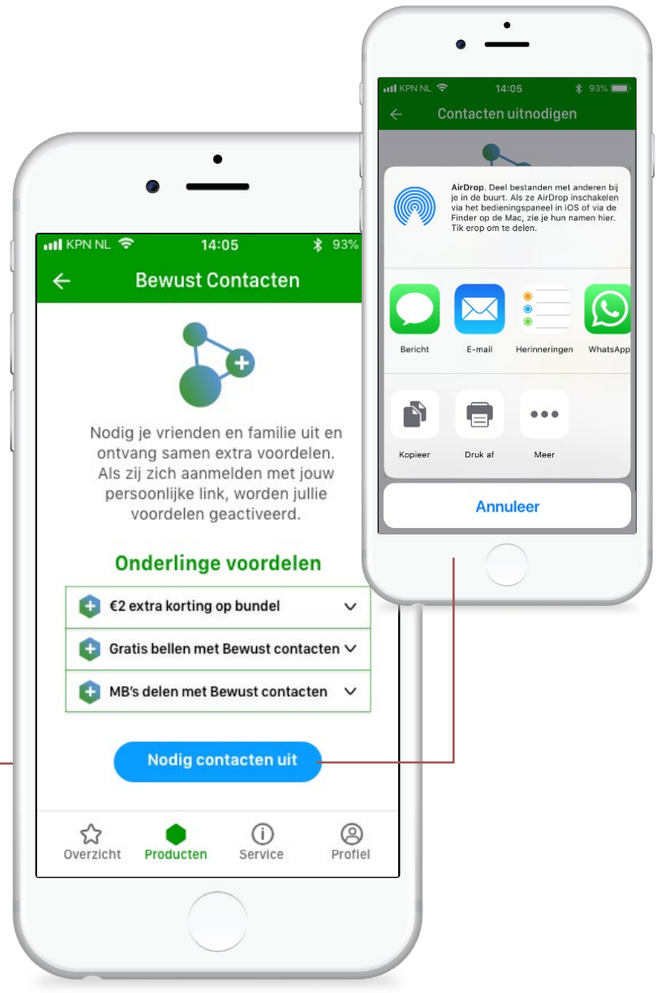


Fig.76 *The user gets informed on the advantages of engaging others and can send them a personal link.*

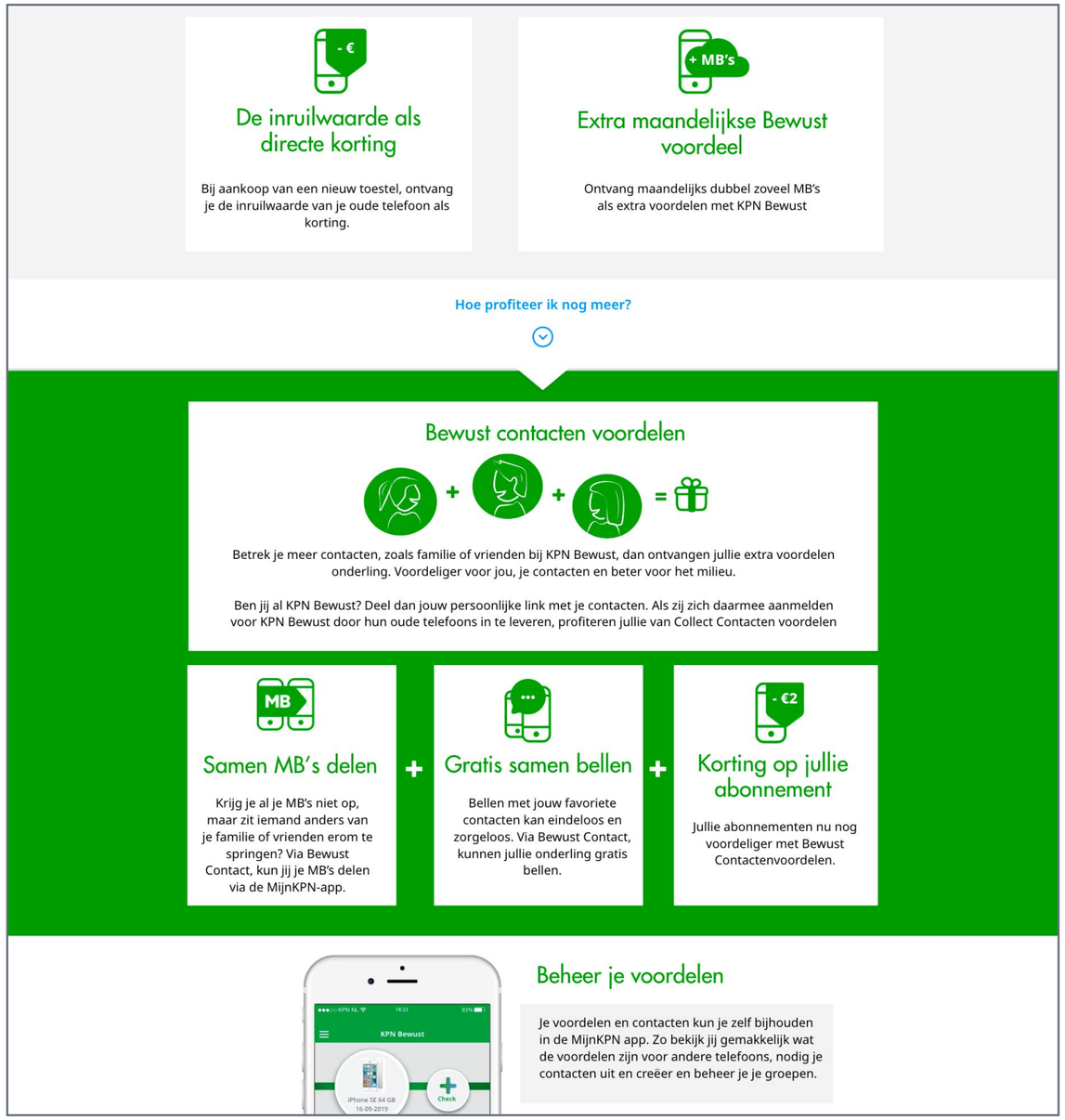


Fig.77 *The Bewust contacten voordelen on the website*

Forum

Users can communicate and discuss about Bewust on the forum (sFig.78). Furthermore the user also earns a 'KPN Bewust' badge when becoming KPN Bewust (Fig.79). Users can get badges depending on their activeness on the forum. The Bewust badge will be added to their profiles which other users will be able to see. This would also prompt other user to find out what it is and also stimulate them to take part in the program.

End of contract

The end of the mobile has effect on the benefits received. The customer stays a Bewust member and thus will stay receiving Bewust Contact benefits, as long as they stay a KPN customer. When extending the contract, however, the extra MBs and the discount received from Bewust Contactenvoordeel comes to an end. This means that

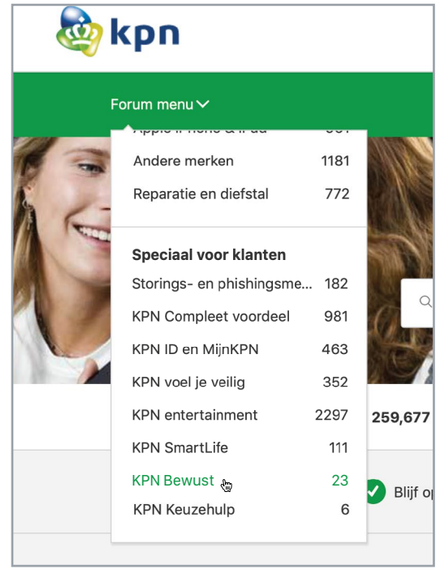


Fig.78 *Bewust topic in the forum*

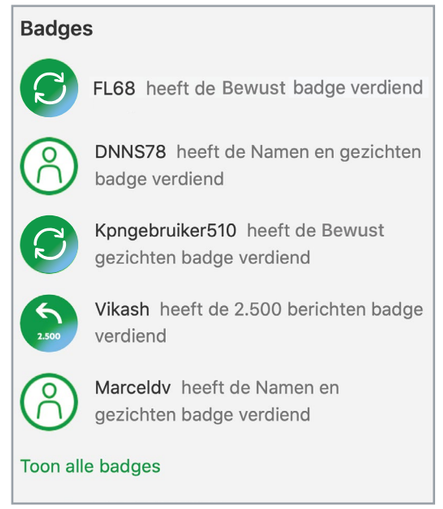


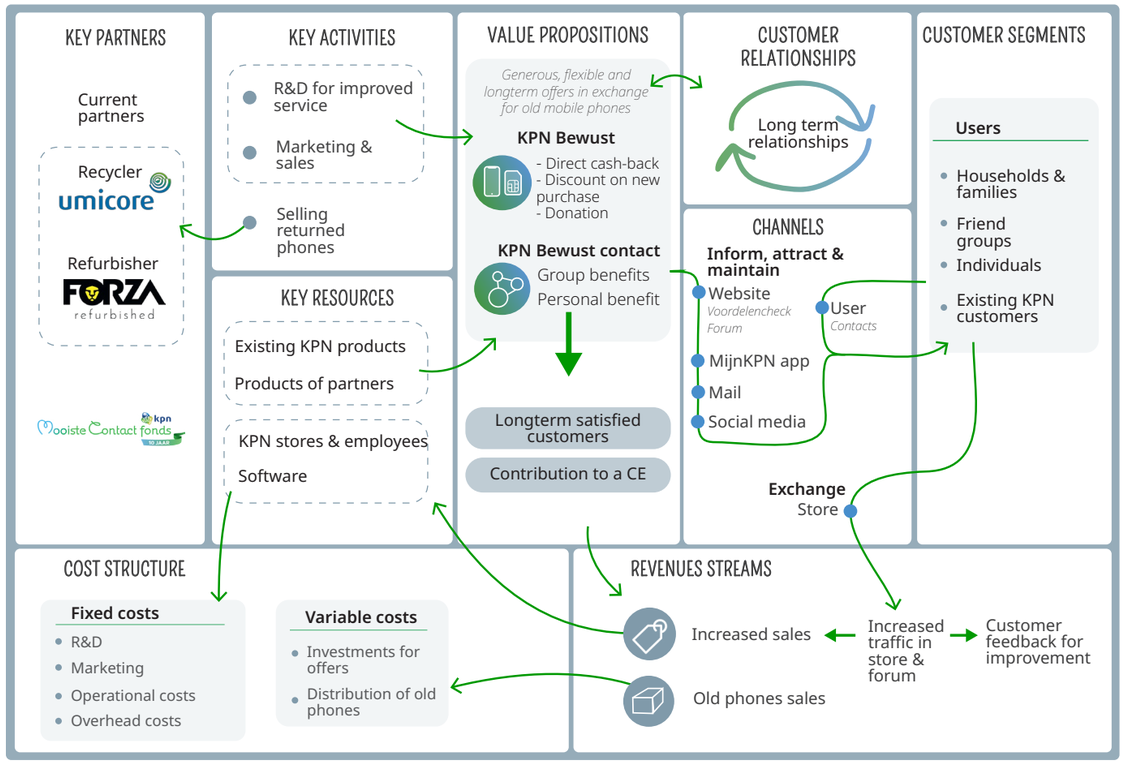
Fig.79 *Bewust badge in the forum*

8.4 | BUSINESS MODEL

Some key aspects of the return program as a business will be explained in this section. This model shows the assumptions made for the different business aspects of the Bewust program and the business logic that are used. This model be used for further analysis, comparison, assessment, communication and innovation (Ostderwalder et al., 2005; Bocken et al., 2014).

In the centre of Fig.80, the value propositions are shown, which result from the value offered to the user. In order to successfully offering these values/benefits to the customers, the program depends on external partners that will fulfil outsourced tasks of recycling and refurbishing. As clients would not be paid based on the monetary exchange between KPN and these companies, KPN will use this as a compensation of the discounts and other free offers, provided through the returns of mobile phones and engagement with other users.

Fig.80 *Business Model Canvas of KPN Collect. (Model: Osterwalder et al., 2010)*



KPN will receive the value of the phones returned in form of monetary payment from the recycling and refurbishing companies. The value of the phones will vary significantly from one model to another and in addition costs of marketing will also be incurred. The margins on these old phone will not be huge but like mentioned before the long-term profits will be generated by increased interaction with customers and new potential customers and the positive environmentally friendly image for KPN.

Generally, very old mobile phones are not accepted in most return programs and by offering this opportunity to users could prove to be a competitive advantage for KPN by getting involved with a larger target market. KPN also currently has partnerships with some charitable organisations. By providing the user the option to donate, the worth of those phones can be used to directly support these charities.

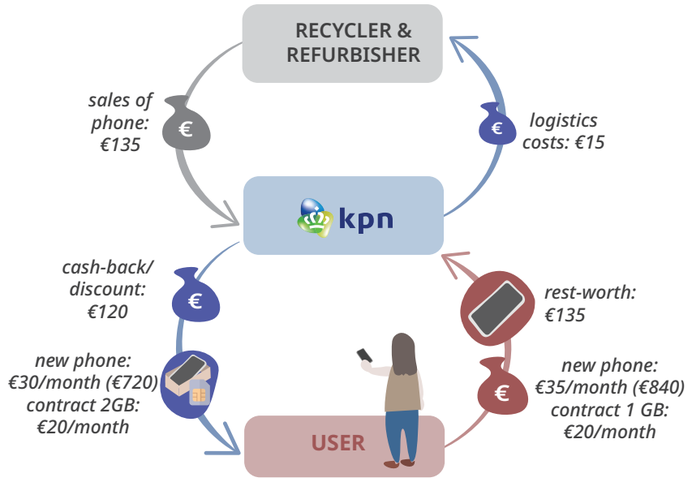


Fig.81 *Financial flow of resources*

Financial flow

The Bewust program is a semi subscription-based service. Optimal benefits can be received by users when becoming a Bewust member. An example of how the return during purchase works, in terms of costs, can be seen in Fig.81. Finally, an overview of the benefits received for the three options, can be seen in Fig.82.

KPN Bewust options	Received value for old phone	Bewust benefits	Bewust Contact benefits
Direct cash-back	Rest-worth - €15	-	
Cash-back/discount with new purchase		Doubled GB	- €2/month Free calling MB sharing
Donation	-		

Fig.82 *Bewust benefits*

8.5 | IMPLEMENTATION PLAN

KPN already possesses the resources to implement KPN Bewust and the main actions that would be needed are shown in Fig.83. As KPN was working on implementing a take back program during this project, the realisation should not require more time. The activation of benefits should be enabled in KPN's system.

It is recommended to implement the three options simultaneously, in order to prevent disappointing customers, especially clients who would have signed-up for a new contract just before the launch for KPN Bewust and feeling that they missed out a nice opportunity. As for Bewust Contact, this could be implemented in the following phase, when the KPN Bewust community will already exist.

The details of the service will need to be ironed-out. The phases require evaluation and updatingbased on data analytics and customer reviews.

Furthermore the plan suggests the implementation of an online return system, that enables the activation of benefits later during purchase within a limited time (i.e, 6 months). When users return their phones and receive direct cash-back, they receive a coupon with which they can earn the Bewust benefits when making a purchase for a new phone at KPN. They can also give this coupon to someone else, again leading to the spread of value and behaviour, while promoting the KPN bewust system.

Finally, the service can be expanded to other mobile devices, such as tablets, smar and smart watches, which KPN sells. This requires further research and design.

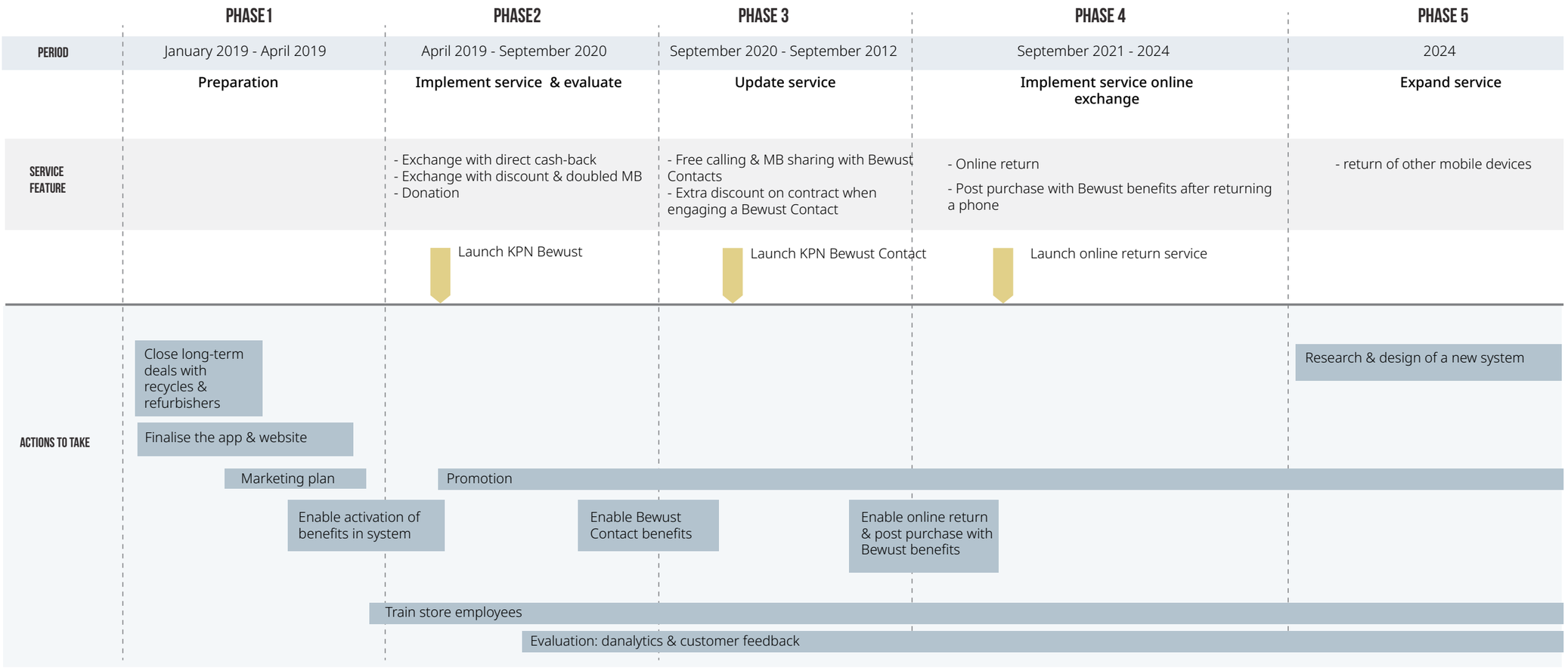


Fig.83 *Implementation roadmap for KPN Bewust*

8.6 | CONCLUSION

This chapter presented the final concept proposal that KPN could implement for their return program. The design goal was:

Offering a satisfactory return phase, by ensuring benefits on the long-term for both KPN and users, in which an alternative payback method will enable users to involve other users to take part in the disposal phase, leading to a spread of circular behaviour.

The validation test gave positive results: 11 participants (n=14) were satisfied with the benefits received. Besides the discount resulting from the worth of the returned phone, extra MBs on top of the existing bundle were valued positively by participants.

This would give users the flexibility to select a cheaper contract, with or without a phone. Also, mutual free calling was favoured above an extra benefit of €2 discount per month. Furthermore, the business model around the value proposition of KPN Bewust is explained and an implementation plan is presented, which suggest the development of a return experience online as well as the expansion of the return system to other mobile devices.

9. EVALUATION & DISCUSSION

This chapter gives an evaluation and discussion of the concept and other project results by answering the design questions. Also, the experience of integrating biomimicry on this case and the process is reflected on.

9.1 | ANSWERING THE RESEARCH QUESTIONS

The aim of this research & design project was to explore through inspirations from nature, how an effective return of old mobile phones can be realised. The design challenge as as follows:

> Develop a cooperative exchange between users and KPN, by learning from interactions in nature, for an effective return of mobile phones as part of a phone return program.

This challenge was initially broad and the scope was narrowed down by tackling the project with research questions. This section evaluates this process by giving answers to these questions.

RQ 1: Whis the context of the problem regarding the return of mobile phones by users?

The modern phone is a marvel of engineering and is made using significant resources which also include many rare materials. The sales of phones is growing and with the growing population and especially the rise of the middle class in developing countries this trend is going to become even larger. Due to rapidly developing innovation and technologies users are also being tempted to upgrade their phone as quickly as possible with no consideration for 'disposal' EoL/ EoU phase of the phone. The scale of the issue can be understood with that fact that only 5% of the mobile phones being returned using the take-back programs. There seems to a general disconnect and lack to understanding and effort from all stake holders. Although there are a few buy-back and leasing programs but they do not seem to be popular and have their own shortcomings. The value in these phones is therefore going to wasted and staying out the system. Serious effects are therefore required to overcome these issues before they go completely out of hand.

RQ 2: What are the key factors and processes that influence and shape the return of mobile phones?

To KPN a return program is beneficial when it can indirectly result in purchase of other products and does not require direct costs regarding the pay-back value for the old phones. The return of the phone depends primarily on the action and effort on the users' part and therefore, the key factors mainly relate to them. The factors can be categorised into internal and external types. The internal factors include; Personal & social norms, emotional identification, habits and knowledge of the user. These factors vary among users and are also reflected in the different persona that were created in section 5.4. External factors are the factors that can impact the user behaviour and generally depend on the companies and business involved in the mobile phone industry. These factors include: Financial value/ compensations, infrastructure/the ease of returning and education and communication about the return programs.

RQ 3: How do the key factors affect users' behaviour with current phone return programs?

From the interviews it was found that the internal factors vary quite a bit among users. Based on the characteristics that the participants demonstrated personas were created to help better understanding how the drivers and barriers work. One of main factor hampering the current return programs seems to be the lack of knowledge and information on the return options, the security provided and the ease of the method, which are negative factors that could be overcome by effective communication. Further, the low perceived value and the lack of clear incentives that are presently being offered to users do not justify the high level of effort required and expectations based on their value perception of the phone. These factors therefore act as barrier to a seem-less circular model for mobile phones.

RQ 4: What design lessons can be retrieved from cooperation in nature to enhance the return of mobile phones?

Although the cooperation in nature is hard to compare with a linear economic model currently in use for mobile phones, still inspirations can be derived from nature to help improve the system. Section 6.3 addressed this topic in detail and it would not possible to list all the findings, therefore, a brief overview will be given with a few examples. The search for inspiration was divided into three areas, effective cooperation, the attraction of partners and conceptualisation. For each of these areas different models for nature were found and then these insights from the different models were translated to the case of returning mobile phones. These insights included, for example, the need for greater dependency for more stable cooperation which can be applied to the relationship between users and KPN to make the collaboration between them stronger. Also, the importance of kin and close relatives from nature can be used to involved close family and friends of users into the system to make it more effective.

RQ 5: How can the problem context, the influential factors and lessons from nature translate into effective design directions?

First a design brief was made, based on the previously gained insights. Further the insights from the user, KPN and nature were used to set up a morphological chart (see Chapter 7). Three concepts resulted from this: KPN IntruilDeal, KPN Collect and KPN Refurbish, targeting at the focus areas of respectively: the household, the social community and the users with old broken phones. Further, an extensive assessment, based on the criteria (types of users, benefits & costs and environmental contributions) was useful to indicate further improvements.

RQ 6: Which design principles can KPN include in their take back program for an optimised phone return system?

The selected concept (KPN Bewust) has the following principles:

- Giving users a higher value perception by implementing benefits on the long-term, which in turn are also beneficial for KPN.
- Enabling the engagement of contacts contributes to the spread of circular behaviour in terms of environment and to the increase in customers on KPN's side.
- Commitmens make it harder for users to quit when they have shared benefits with others. Although the Bewust Contact benefits will stay intact as long as the user stays KPN customer, the benefits with a contract can be obtained when returning another phone.

9.2 | LIMITATIONS & RECOMMENDATIONS

9.2.1 KPN Bewus

Evaluation

Direct access to KPN resources and customer statistics like detailed prices, information about customer behaviour with regards to contract renewal and especially the KPN Compeet etc. would have helped formulate even more accurate scenarios and test cases.

The selection of the final concept was based purely on the statistical analysis of the data that was gathered during the interview/ tests and due to time limitations experts, or other users in the field were not consulted to also weigh in on this decision.

Suggestions

There are some areas that were not within the scope of this project such as the determination of rest-wroth in old phones, or the assessment of these phones with Voordelencheck. It can however be recommended to program the check such, that no necessary questions are asked. Starting with general questions on the state of the phone and giving further options based on the selected state, could cut down this process and will not guide the user unnecesarily through those questions, to find that the phone is worth nothing.

Further research

In depth validation of design by user tests at KPN store will give insights for further improvements.
The concept has been shaped to fit with the company's existing objectives and plans for a return program and that's why the focus was mostly on the return during purchase.

First KPN's internal knowledge and research on customers can be used to evaluate the design and allign this to their own values and shape it in accordance to their policies.

Also KPN Bewust should be tested with current customers of KPN to evaluate the design. Customers could be asked to hand in devices for the three options of direct cashback, combined with a purchase for extra discounts and donation. Participants could later on be contacted by phone or mail to share their opinions.

Furthermore a pilot can be done in some stores, where the introduction will be given and the effectiveness for both the realisation in the store, as the satisfaction of customers can be evaluated.

9.2.2 Recommendations for further study: consumer behaviour

The effect op payback value on decision making and drivers that help in stimulate the user to return a phone have been explored. For this purpose, merely financial incentives are used, however, research on different types of payback, such as an existing service that the company offers, could give customers a higher perception of value.

9.2.3 Recommendations for NID

Ecosystem map

Mapping ecosystems out for companies can be a time consuming process, however, in complex systems, this can help in the creative process. Although the necessity does not arise on an early stage, it could help on a later stage when looking for beneficial resources or relationships. This adds opportunities on a deeper level, but mimics the systems in nature better. For the purpose of this study, the focus was merely KPN and user, but for example, the relationship between KPN and Fairphone could also have been included in the system. Information search

Search for inspiration

Most literature and models in Biomimicry focus on the design of physical products. Therefore, one of the challenges of this project was to constantly adapt to a new approach, trying to find something useful. The hardest part of that is, that when looking for inspiration you don't know where to start, because the lack of knowledge on biology and ecology, but also because there is no standard approach.

AskNature is a well known platform set up by the Biomimicry Institute, in which inspirations from nature can be found by simple search actions. These require specific functions a product should possess. While this is a very useful tool, there was no such 'function' outcome for this project, making it hard to find direct analogies from nature. Searching for 'return', 'exchange', 'symbiosis' and 'interaction', does not yield in useful insights. The strategies from nature's cooperation could be incorporated into the platform to use as design principles.

Approach

There is no fixed approach on how to discover relevant inspirations for such projects. Based on the experience gained, the following structure is proposed:

- **Consulting experts at a very early stage**
  As (studying) designers our knowledge on biology and evolution is limited. This also forms a limit in specifying a clear method for a case. Consulting an expert should therefore happen at an early stage, as soon as the choice for biomimicry as an approach has been made. This helps in finding what research has to be done and helps in approaching the challenge. After the required information is obtained through research into to crucial aspects in the context, more experts can be consulted to help making analogies and to look for specific areas in biology. Experts usually don't know how they can help, so in making sure that the information they have will provide is very useful and interesting to your challenge and the design world, will help persuading them.
- **Study suggested literature**
  There is an immense amount of literature to be found on one specific topic as cooperation in nature, which apply to other topics as well. During this project the terms feedback loops, symbiosis, mutualism and cooperation all were the main focus point at some point and sometimes even misguided and have led to loosing track. Therefore it's also important to ask experts where you should look into.

- **Scoping down**
  Based on the initial insights the exploration focus should be very limited. This has been too broad for a large part of this project. At the beginning this was related to the limited knowledge. However when the scope of 'cooperation in nature' was obvious, very specific targets have to be determined. Not noticing the need for this, resulted in unstructured phases and processes during this project.

- **Facilitating a creative session**
  Because a lot of time goes into the search for useful theory to apply on the case, the process of translating useful insights from nature has been done by myself, as part of the time constraints during this project. This is a creative process and when the theories are selected and generated in advance, it could result in very rich results when brainstorm activities are done in a group, as every designer can have their own interpretation, especially with a non-literal application of nature to the case.

10. REFERENCES

Ashby, M. (2016). Materials and Sustainable Development. Cambridge University and Granta Design, Cambridge, UK. ISBN: 9780 08 100176 9

Apple (2018). Apple Giveback. Retrieved April 28th 2018, from https://www.apple.com/nl/trade-in/

Apple Communities (2018). Website

AskNature (2017). Swarm Logic technology reduces energy use. Retrieved August 22th 2018, from https://asknature.org/idea/swarm-logic-technology-reduces-energy-use/#.W5fTqy2iHzI

Barclay (2010).

Baumeister, D., Tocke, R., Dwyer, J., Ritter, S. & Benyus, J. (2013). Biomimicry Resource Handbook: A Seed Bank of Best practices, Missoula, USA, Biomimicry 3.8

Baumeister, D. (2013). Biomimicry Resource Handbook. Missoula, MT USA.

Baumeister, D. (2017) Exploring the power of cooperative relationships in nature. Retrieved from https://synapse.bio/blog/2017/10/9/why-nature-fosters-cooperation

Benton, D., Coats, E., & Hazell, J. (2015). A circular economy for smart devices. Opportunities in the US, UK and India. Green Alliance.

Beaumont, B. (2018, June, 28). Personal communication

Beukering, P.J.H. van, Bergh, J.C.J.M. van den (2006): Models of International Recycling. In: Resource Conservation and Recycling, 46, pp. 1-26.

Biomimicry Institute (2018). Nature's Unifying Patterns. Retrieved 20th September, from https://toolbox.biomimicry.org/core-concepts/natures-unifying-patterns/resilient/]

Bocken, N., Short, S., Rana, P., Evans, S. 2014. A literature and practice review to develop Sustainable Business Model Archetypes. Journal of Cleaner Production, 65, 42-56.

Boeijen, van, A. G., Daalhuizen, J. J., Zijlstra, J. J., Van Der Schoor, R. S. & (2013). Delft Design Guide. Amsterdam: BIS Publishers.

Brightstar (2014). Mobile Trends Report. In Brightstar Intelligence. Retrieved June 13th, 2018 from http://www.brightstar.com/assets/uploads/docs/2014_Mobile_Trends.pdf

Brightstar (2018). Website

Bücking, H., Liepold, E., Ambilwade, P. (2012). The role of Mycorrhizal Symbiosis Nutrient Uptake of Plants and the Regulatory Mechanisms Underlying These transport Processes.

Darby, L., Obara, L. (2005): Household Recycling Behaviour and Attitudes towards the Disposal of Small Electrical and Electronical Equipment. In: Resources, Conservation and Recycling, 44, pp. 17-35.

Dunn, J. (2017). People are holding onto their smartphones longer. Retrieved 20-03-2018, from https://www.businessinsider.nl/how-long-people-wait-to-upgrade-phones-chart-2017-3/?international=true&r=US

Ellen MacArthur Foundation. (2012). Towards the Circular Economy: Economic and business rationale for an accelerated transition. 1.

Ellen MacArthur Foundation (2015). Towards a Circular Economy: Business Rationale for an Accelerated Transition. Retrieved 03-09-2018, from https://www.ellenmacarthurfoundation.org/assets/downloads/TCE_Ellen-MacArthur-Foundation_9-Dec-2015.pdf

Ellen MacArthur Foundation (2016). Intelligent Assets: Unlocking the Circular Economy Potential. Retrieved 03-09-2018, from https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation_Intelligent_Assets_080216.pdf

Ellen MacArthur Foundation, IDEO (2017). The Circular Design Guide. Retrieved from https://www.circulardesignguide.com

European Parliament (2014). Turning waste into a resource - moving towards a 'circular economy'. Briefing December 20140. Retrieved September 2018, from http://www.europarl.europa.eu/RegData/etudes/BRIE/2014/545704/EPRS_BRI(2014)545704_REV1_EN.pdf

Eurostat (2018a). Waste statistics – electrical and electronic equipment. Retrieved 19-03-2018, from http://ec.europa.eu/eurostat/statistics-explained/index.php/Waste_statistics_-_electrical_and_electronic_equipment#Further_Eurostat_information

Eurostat (2018b). Waste electrical and electronic equipment. Retrieved 26-03-2018, from http://ec.europa.eu/eurostat/web/waste/key-waste-streams/weee

Fishbein, M., & Ajzen, I. (2011). Predicting and changing behavior: The reasoned action approach: Taylor & Francis.

Geissdoerfer, M., Savaget, P., Bocken, N., Hultink, E.J. (2017). "The Circular Economy – A new sustainability paradigm?". Journal of Cleaner Production. 143, 757–768.

Google (2014). Google Nederland: Connected Consumer Survey. Retrieved September 7, 2015 from https://docs.google.com/file/d/0B3hFuIkJTHWMaF8xMFdTenA5aTA/edit

Green Alliance (2015). A Circular Economy for Smart Devices. Retrieved 21-03-2018, from http://www.green-alliance.org.uk/resources/A%20circular%20economy%20for%20smart%20devices.pdf

Hanttu, A. (2015). Six attributes of a good service designer. Retrieved February 21, 2016 from http:// futurice.com/blog/a-good-service-designer

Hirshleifer, J. (1997). Economics from a Biological Viewpoint. The Journal of Law & Economics, 20(1), 1-52.

Hornik, J., Cherian, J., Madansky, M., Narayana, C. (1995): Determinants of Recycling Behaviour. In: The Journal of Socio-Economics, 1, pp. 105-127

Huang, E., Truong, K.N., (2008). Breaking the Disposable Technology Paradigm: Opportunities for Sustainable Interaction Design for Mobile Phones. CHI 2008, April 5–10, 2008, Florence, Italy.

Jang, Y.-C., Mincheol, K., 2010. Management of used & end-of-life mobile phones in Korea: a review. Resour. Conserv. Recycl. 55, 11–19.

Jochemsen, K.S.R. (2015). Applying service design to the circular economy

Kiers, T. (2014, November). Pioneers of Nature Inspired Innovation. Symposium Circular Product Design, Delft University of Technology, Delft, Netherlands

Kiers, T. (2018, July, 10). Personal communication

Kirk, P. M., Cannon, P. F., David, J. C. & Stalpers, J. (2001). Ainsworth and Bisby's Dictionary of the Fungi (9th ed.). Wallingford, UK: CAB International

Kollmuss, A., Agyeman, J. (2002): Mind the Gap: why do people act environmentally ad what are the barriers to pro-environmental behaviour? In: Environmental Education Research, 8 (3).

KPN (2017). Appendix 6: Environmental figures. KPN Integrated Annual Report 2017.

KPN (2018). Visie op Duurzaamheid. Retrieved, June 20th, from https://overons.kpn/nl/kpn-voor-nederland/duurzaamheid/visie-op-duurzaamheid

Lombardi, D. R. and Laybourn, P. (2012), Redefining Industrial Symbiosis. Journal of Industrial Ecology. 16(1), 28-37.

Macleod, J. Ends: Improve Off-boarding and Add Responsibility to Consumption. Retrieved March 14th 2018, from https://www.youtube.com/watch?feature=youtu.be&v=OIZ7-XFGQyo&app=desktop

McKinsey. (2008). Helping 'green' products grow.

Neutel, A. (2014). Feedback loops: How nature gets its rhytms. Retrieved July 15th, from https://www.youtube.com/watch?v=inVZoI1AkC8&frags=pl%2Cwn

Noë, R. (2018, July, 23). Personal communication.

Noë, R. (2016). How do biological markets compare to the markets of economics?. Retrieved 09th July 2018, from: https://www.researchgate.net/publication/305253797_How_do_biological_markets_compare_to_the_markets_of_economics

Nogrady, B. (2016). Your Old Phone is Full of untapped Precious Metals. BBC. Retrieved October 2nd, from http://www.bbc.com/future/story/20161017-your-old-phone-is-full-of-precious-metals

Osterwalder, A., Pigneur, Y., Smith, A. (2010). Business Model Generation. Wiiley Published.
Pauw, de, I.C., Kandachar, P., Karana, E., Peck, D., Wever, R. (2010). Nature Inspired Design: Strategies Towards Sustainability. ERSCO-EMSU conference, October 25-29, 2010, Delft, The Netherlands

Payne, A., Holt, S. (2001). Diagnosing Customer Value: Integrating the Value Process and Relationship Marketing. British Journal of Management, 12, 159-182.

Pauw, de. I.C. (2015). Nature Inspired Design: Strategies for Sustainable product Development.
Rathore, P., Kota, S., & Chakrabarti, A. (2011). Sustainability through remanufacturing in India: a case study on mobile handsets. Journal of Cleaner Production, 19(15), 1709-1722.

Salters, I. (2014). From consumers to users and contributors: Changing customer behaviour towards the Circular economy of mobile devices.

Saphores, J.- D. et al. (2012): Willingness to engage in a pro-environmental behaviour, In: Resources, Conservation and Recycling, 60, pp. 49-63.

Scholtz, A. & Witte, E. (2015). Rapportage UNETO-VNI: Mobiele telefoon en tablet reparaties. GfK, .

Shyam, S. (n.d.). ...

Slade, G. (2009). Made to Break: Technology and Obsolescence in America. Harvard University Press. ISBN: 9780674043756

Solomon, M.R., Bamossy, G.J., Askegaard, S.T., Hogg, M.K. (2013). Chapter 6: Motivation, Values and Lifestyles. In: Consumer Behavior: A European perspective, 5th edition, Edinburg: Pearson Education

Statista (2018a). Western Europe Smartphone users 2014 -2018. Retrieved 20-03-2018, from https://www.statista.com/statistics/494554/smartphone-users-in-western-europe/

Statista (2018b). Market Revenuw of Refurbished Smartphones Worldwide 2014 - 2017). Retrieved 14-12-2018, from https://www.statista.com/statistics/744259/worldwide-market-revenue-refurbished-smartphone/

Tietze, F., & Hansen, E. G. (2013). To own or to use: how product service systems impact firms' innovation behaviour. Eur Financ Rev Aug–Sept, 53-56.

Tanskanen, P. (2012): Electronics waste: Recycling of mobile phones. In: "Post-consumer waste recycling and optimal production", Prof. E. Damanhuri (Ed.), InTech. (Available online, retrieved March 2015: http://www.intechopen.com/books/post-consumer-waste-recycling-and- optimal-production/electronics-waste-recycling-of-mobile-phones).

Van Boeijen, A.G.C., Daalhuizen, J.J., Zijlstra, J.J., Van der Schoor, R.S.A. (2013). Delft Design Guide. Amsterdam: BIS Publishers

Visschers, V., Tobler, C., Cousin, M.E., Brunner, T., Orlow, P., Siegrist, M. (2009): Konsumverhalten und Förderung des umweltverträglichen Konsums. Bericht im Auftrag des Bundesamtes für Umwelt (BAFU). Consumer Behaviour, May 2009.

Webster, K. (2015). The Circular Economy—A Wealth of Flows, 1st ed.; Ellen MacArthur Foundation Publishing: Cowes, UK, 2015.

Webster, K. (2018, June 4). Personal communication

Welfens, M.J., Nordmann, J., Seibt, A., Schmitt, M. (2013): Acceptance of Mobile Phone Reutnr Programmes for Increased Resource Efficiency by Young People – Experiences from a German Research Project. In: Journal Resources, 2,1. (Available online, retrieved October 2015: www.mdpi.com/journal/resources).

Welfens, M.J., Nordmann, J., Seibt., A. (2016). Drivers and Barriers to Return and Recycling of Mobile Phones: Case Studies of Communication and Collection Campaigns. Journal of Cleaner Production, 132, 108-121.

West, S.A., Griffin, A.S., Gardner, A. (2007). Evolutionary explanation foor cooperation. Current Biology, 17, 661-672

Wildy, D.T., Pate, J.S. (2002). Quantifying Above- and Below-ground Growth Responses of the Western Australian Oil Mallee, Eucalyptus kochii subsp. plenissima, to Contrasting Decapitation Regimes. Annals of Botany. 90(2), 185-197).

Wilhelm, W., Yankov, A., Magee, P., 2011. Mobile phone consumption behaviour and the need for sustainability innovations. Journal of Strategic Innovation and Sustainability, 7.

Wilson, G.T., Smalley, G., Suckling, J.R., Lilley, D., Lee, J., Mawle, R., (2016). The Hibernating Mobile Phone: Dead Storage as a Barrier to Efficient Electronic Waste Recovery. Waste management, 60, 521-533

Wognum, M. (2018, June, 12). Personal communication

Yin, J., Gao,, Y., Xu, H. (2014). Survey and analysis of consumers' behaviour of waste mobile phone recycling in China. Journal of Cleaner Production, 65, 517–525.

Yla-Mella, J., Keiski, R.L., Pongracz, E., 2015. Electronic waste recovery in Finland: consumers' perceptions towards recycling and re-use of mobile phones. Waste Managent, 45, 374–384.

Yu, J., Williams, E., Ju, M., 2010. Analysis of material and energy consumption of mobile phones in China. Energy Policy, 38, 4135–4141.

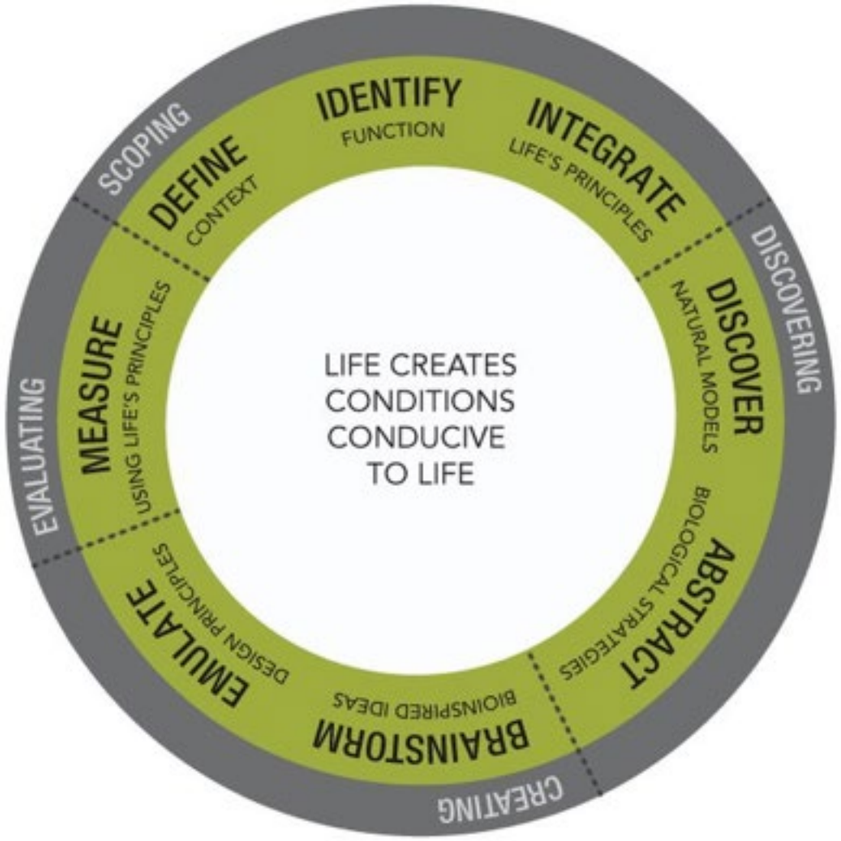
Zhang, K., Schnoor, J.L., Zeng, E.Y., 2012. E-waste recycling: where does it go from here? Environmental Science and Technology, 46, 10861–10867.

11. APPENDICES

Appendix A: Biomimicry

Appendix A.1: Biomimicry Wheel

(Baumeister et al., 2013)



Appendix A.2: Life's Principles

(Biomimicry Group., 2011)

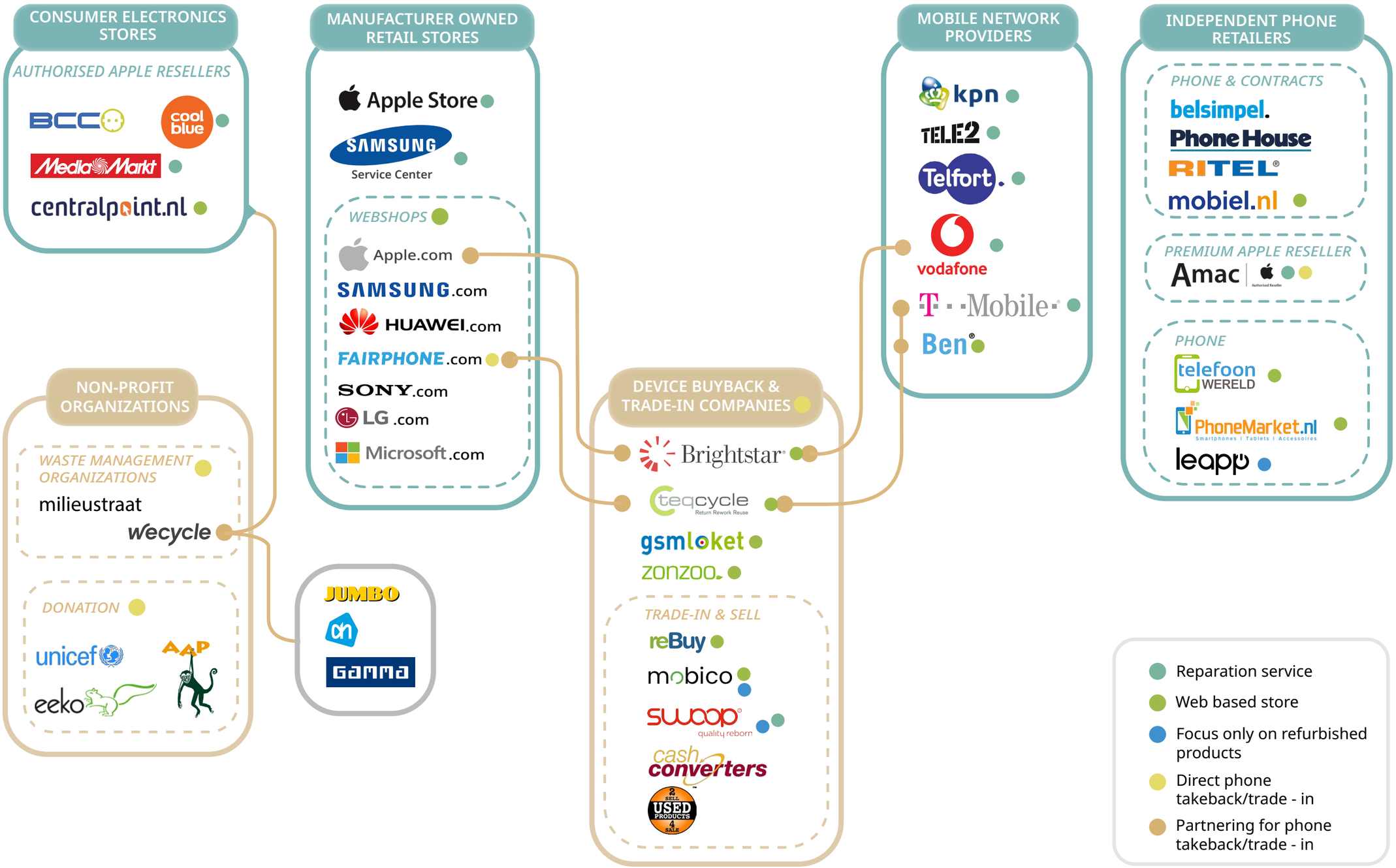
Appendix A.3: Types of Cooperation in Nature

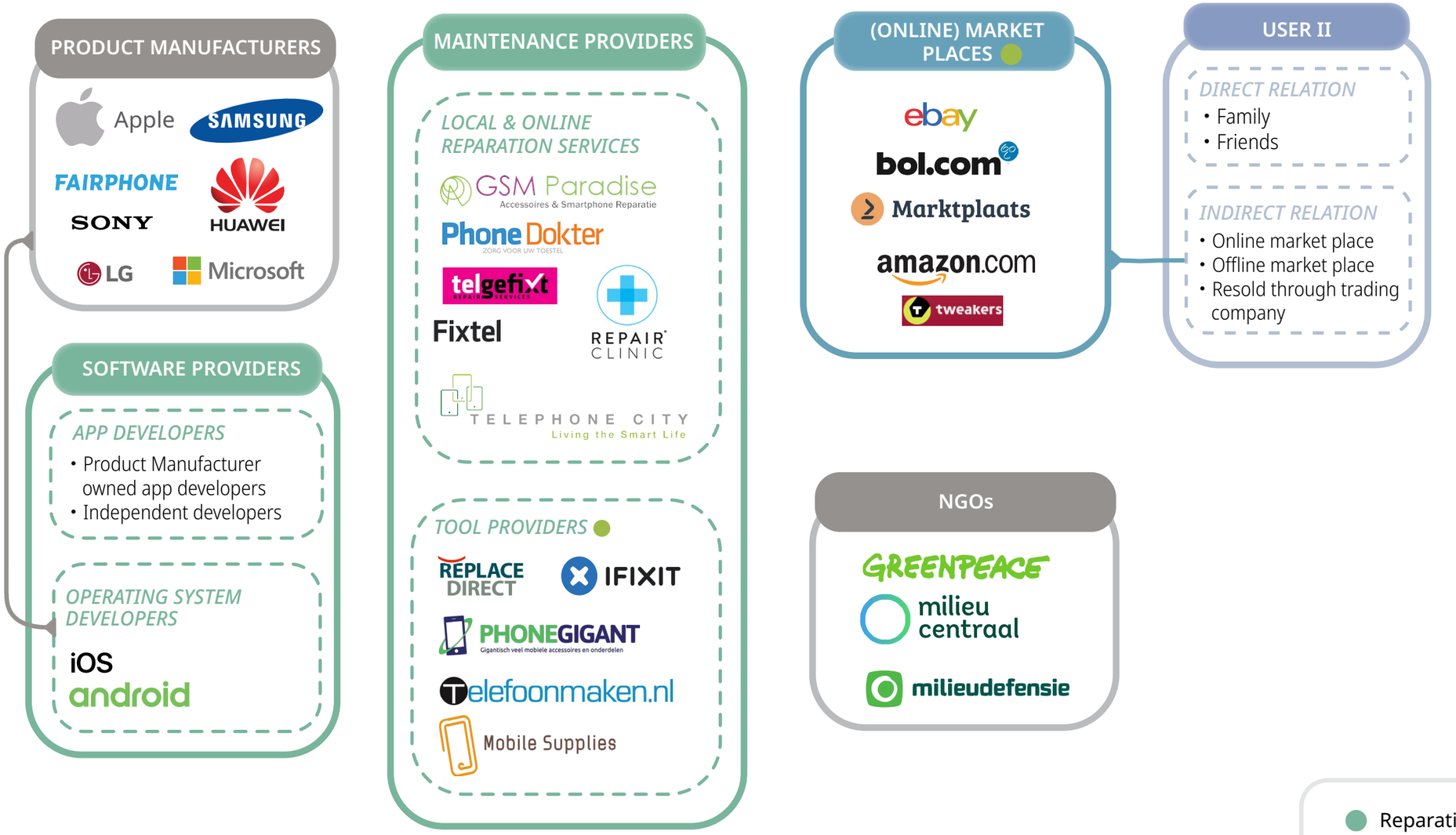
(Baumeister et al., 2013)

Type	Partner A	Partner B
Mutualism	Benefits	Benefits
Commensalism	Benefits	Neutral
Parasitism/predation	Benefits	Suffers (wants to get away)
Co-existence (no official terminology)	Neutral	Neutral
Contextual side effect	Neutral	Negative (but has benefit for other party in system)
Competition	Suffer	Suffer

Appendix B: Ecosystem

Appendix B.1: Stakeholders' overview




PRODUCT MANUFACTURERS
Apple
SAMSUNG
FAIRPHONE
HUAWEI
SONY
LG
Microsoft
SOFTWARE PROVIDERS
APP DEVELOPERS
• Product Manufacturer owned app developers
• Independent developers
OPERATING SYSTEM DEVELOPERS
iOS
android
MAINTENANCE PROVIDERS
LOCAL & ONLINE REPARATION SERVICES
GSM Paradise
Accessoires & Smartphone Reparatie
Phone Dokter
ZORG VOOR UW TOESTEL
telgefixt
Fixtel
REPAIR CLINIC
TELEPHONE CITY
Living the Smart Life
TOOL PROVIDERS
REPLACE DIRECT
IFIXIT
PHONEGIGANT
Gigantisch veel mobiele accessoires en onderdelen
Telefoonmaken.nl
Mobile Supplies
(ONLINE) MARKET PLACES
ebay
bol.com
Marktplaats
amazon.com
tweakers
USER II
DIRECT RELATION
• Family
• Friends
INDIRECT RELATION
• Online market place
• Offline market place
• Resold through trading company
NGOs
GREENPEACE
milieu centraal
milieudefensie
Reparation service
Web based store
Focus only on refurbished products
Direct phone takeback/trade - in
Partnering for phone takeback/trade - in

Appendix B.2: Stakeholders' analysis

Stakeholders with little interest and little influence are unlikely to demand attention, but they can be informed and even involved to support a strategy. Stakeholders with great interest and great influence (key players) pose a great opportunity for a change in behaviour in consumers. This is also the case with stakeholders with great influence but little interest (context-setters). They have the power to impose rules and ideas, but their lack of interest keeps them away from active participation. Finally, there are stakeholders with great interest but less power, especially for specific contexts like that of mobile phones. These groups can participate actively in stimulating the consumers, by exerting pressure on other stakeholders or cooperating with them (Ashby, 2016).

Existing old & unused phones

The current devices in drawers, whether they function or not, are usually not interacted with anymore and don't carry services, like a phone contract, and therefore no stakeholders are actively involved. Therefore it's harder for stakeholders to have an influence on already abandoned devices and is the awareness and intention of the user for their old phone a crucial factor on what behaviour the consumer will show.

Key players and context setters can show more interest and responsibility towards the problem of e-waste as well, by integrating options into their focus on sales and consumption. Currently, the option to return the phone isn't always easy to find on sites. The main pages focus on sales and there are not obvious links that invite consumers to return an old phone, during their information search for new phones.

Device buyback & trade-in companies deliver the highest financial value for even non-functioning phones. Their business is built on used phones, however, they also focus on the resales of those phones after they're refurbished. During the research, these ads kept showing on social media and the focus on sales of their refurbished phones, rather than the intake became more obvious. For these companies, collaborating with other retailers to promote the return of phones, could gain more influence, instead of waiting for users to find them, might be a useful approach.

Concerned citizens are affected by the influence of other stakeholders, but lack power over the user. Their position remains stable, because of their dependence on other stakeholders and not being directly in touch with stakeholders.

The actual return of the mobile phone depends on the consumer and their search for options. Whether the knowledge on options will translate into action, is up to their will. Since older abandoned phones could be forgotten about, reminders in the shape of campaigns and ads could make consumers acquainted with the return of old phones.

'Future' old & phones

Devices that are currently in use and will at some point in the near future, be upgraded by another phone. They are still close to the user, as the stakeholders from which services and additional products are being purchased during use.

The purchase is generally done at a retail store, whereby the decisions for the product, but also packaging, for example, are made by the product manufacturer. Therefore this group will have more power over the other channels through which the phone can be purchased.

Among retailers, the mobile network providers will be able to have a stronger relationship through the network access and service provided, which enables contact and interaction over a longer term. They are able to maintain regular contact with the user, through messages, calls and emails.

Although the diagram gives an indication and the decisions per company can range from showing no interest to a lot of interest, moving towards a position that will, despite the decisions made by the product manufacturer, can still have a lot of influence on the user.

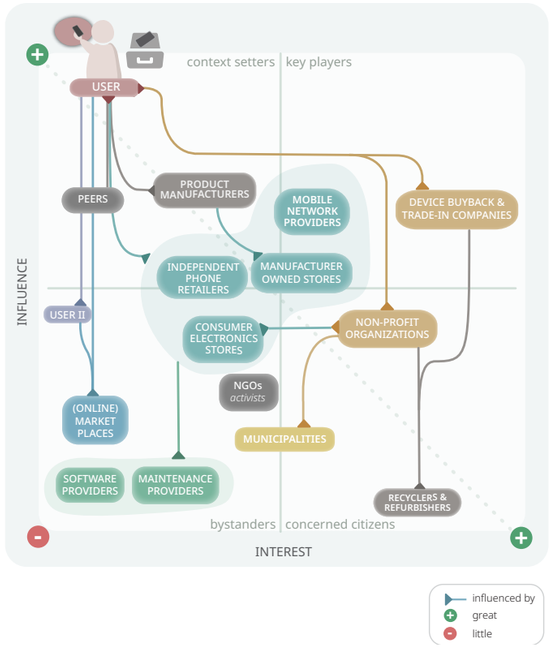


Fig. *influence map for existing old mobile phones*

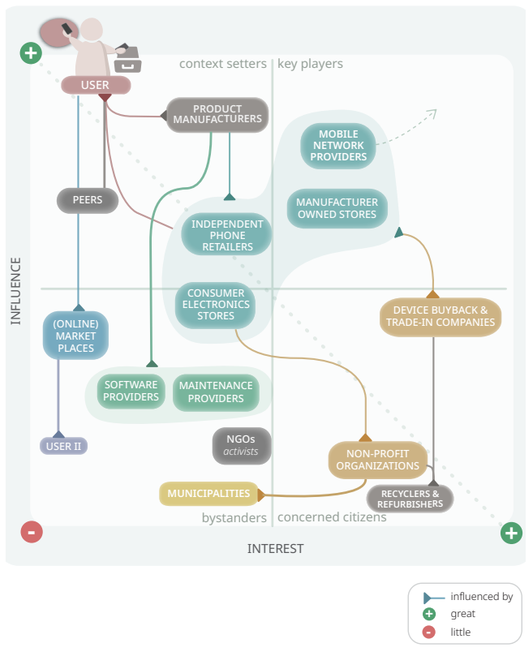


Fig. *Influence map for 'future' old mobile phones*

Appendix B.3: Return values of existing take-back options

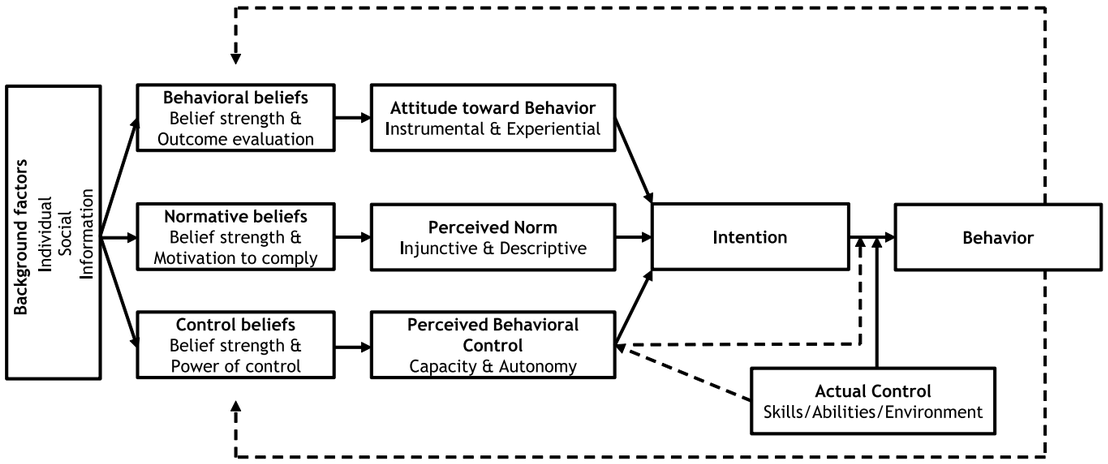
VALUE RETURN BUYBACK PROGRAMS

	PHONE TYPE & CONDITION																						
STAKEHOLDER TYPE		MOBILE PHONE RETAILERS																	COLLECTION PROGRAMS				
STAKEHOLDER GROUP		**ONLINE MARKET PLACES**	**CONSUMER ELECTRONIC STORES**				**MANUFACTURER OWNED STORES**				**INDEPENDENT PHONE RETAILERS**		**MOBILE NETWEORK PROVIDERS**				**DEVICE BUYBACK & TRADE-IN**			**NON PROFIT ORGANIZATIONS**	
SUBGROUP											Phone & Contracts	Premium Apple Reseller	Phoneshops							WASTE MANAGEMENT	DONATION
COMPANIES		ebay Marktplaats	MediaMarkt	BCC MediaMarkt	coolblue	centralpoint.nl	Apple		SAMSUNG	FAIRPHONE		Amac	mobico	swoop	vodafone	T-Mobile	Ben	reBuy	gsmloket	zonzoo	wecycle MILIEUSTRAAT	unicef AAP eeko
PARTNER COMPANY				wecycle			Apple Store	Brightstar		teqcycle					Brightstar	teqcycle							
RANGE																							
FINANCIAL VALUE	IPHONE SE - new New value 442 Refurbished value: 279	250	150?*	0	/	150	104	105	/	0*		150	151	130	71	110	110	218	157,5	126	0	0
	IPHONE SE - used 1,5 year	200-250	130?*	0	/	120	105*	105*	/	0*	On demand in store?	120*	130	105*	71*	98*	106*	168,85*	150*	126*	0	0
	IPHONE SE - bad state	100	?	0	/	60	0	0	/	/		60	30	25	53	30	38	77	75	40	0	0
	IPHONE SE - deficiency	0	0	0	/	0	0	0	/	/		0	20	10 --- 35	36	28	32	0	23	40	0	0
	IPHONE SE - not working	0	0	0	/	0	0	0	/	/		0	20	5	18	0	0	0	0	40	0	0
	Super old LG working (2012)	x	0	0	/	x	x	x	/	/		x	Only iPhone	Only Samsung & iPhone	x	x	x	x	6	2	0	0
*			Service employee decides based on state of phone Giftcard		Stopped	Only Apple products	Need to spend immediately in store Money indications taken from online price	Apple Store Giftcard Value can change	Temporary program. When you buy a Samsung Galaxy phone	Donation		As discount Value can change		35 euros extra when spend as giftcard at swoop	6 extra to remove data	Can change	Can change	Can change	can change	Can change		Charity
HOW?			Bring to get informed on value	Bring		Pick up from home		Send	Send	Send		Bring to store	Can send or bring	Can send or bring	Send	Send	Send	Send	Send			
More Suitable for		Functioning	Functioning	Disfunctioning		Functioning	Functioning	Functioning	Functioning	Functioning	Functioning	Functioning	Both	Both	Both	Both	Both	Functioning	Both	Both	Disfunctioning	Disfunctioning

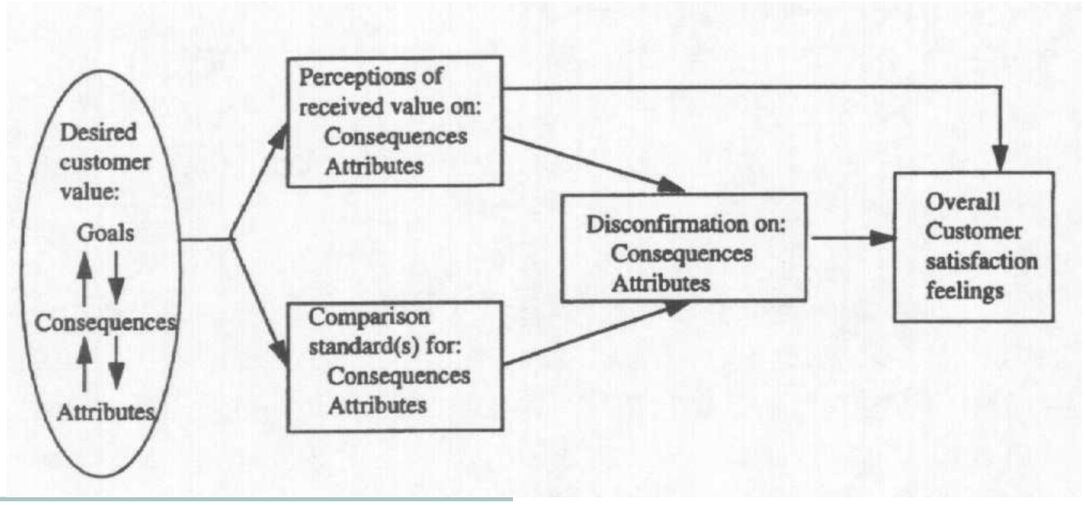
Appendix C: Value exploration

Appendix C.1: Theoretical models

THEORY OF REASONED ACTION
by Fishbein & Ajzen (2011)



VALUE & CUSTOMER SATISFACTION
The relationship between customer value and customer satisfaction (Woodruff, 1997) presenting how desired and perceived value fit into a disconfirmation-type satisfaction mode.



Appendix C.2: Overview of facturs

The tables shows the reason for storage without use in which between 40.3 - 84.9% of the participants mentioned to store their phone. The reasons that were given in the questionnaires and interviews, for a minimum of 10% of the consumers are selected.
The categorisation is based on Welfens et al (2016) , who analysed the studies of (Hornik et al., 1995; Røpke, 2003; Visschers et al. 2009; Tanskanen, 2012; Mäkelä, 2011; Suckling & Lee, 2015; Bookhagn et al. 2013; Welfens et al., 201

EXTERNAL FACTORS

CATEGORY	Positive factors	References	Negative factors	References
financial value	Incentive system that relies on material compensation motivates more people to recycle their old phone	Welfens et al. (2013); Welfens et al. (2016); MPPI (2006); Salters (2014); Jenah & Sarmah (2015)	Lack of economic incentives	Barr et al., (2001); Bouvier and Wagner, (2011); Wagner (2013); Salters (2014)
			Most people will not return mobile phones in absence ov financial incentives	Welfens et al (2013)
infrastructure perceived effort	Easy access to recycling bins, boxes and other collection points	Welfens et al. (2016)	Mistrust due to non-transparent recycling processes “no harm when phone stays in drawer”	Welfens et al. (2016)
	Perceived effort (e.g. the cost/benefit ratio of the action)	Welfens et al. (2016)	High perceived effort/ ‘offerings’ (e.g. loss of time, discomfort), higher than incentive	Salters (2014); Welfens et al. (2016)
	Perceived comfort and convenience & Removal of data	Kollmuss and Agyeman (2002); Salters (2014)	Small size doesn’t bother keeping generations of mobile phones at home	Welfens et al. (2016)
education & communication	Education and communication by informing a society about resource scarcity, recycling and sustainable use < may also contribute to reducing mistrust	Welfens et al. (2016)	Lack of services and awareness	Barr et al., (2001); Saphores et al. (2006); Thomas and Sharp, (2013); Valle et al., (2004)

INTERNAL FACTORS

CATEGORY	Positive factors	References	Negative factors	References
personal & social norms	Social pressure because recycling is seen as a desirable act	Welfens et al. (2016)	Negative image of recycling	Welfens et al. (2016)
	High degree of environmental responsibility Positive attitude towards the environment	Welfens et al. (2016); Salters (2014)	Low sense of responsibility Negative attitude towards the environment	Welfens et al. (2013); Welfens et al. (2016)
emotional identification	Emotional identification	Welfens et al. (2016)	Phone is emotionally charged / perception as a personal accessory	Thorsteinsson (2014), Spinks (2015); Bakker (2014) ; Chapman (2009); Thorsteinsson (2014); Welfens et al. (2016)
			Perceived value of phone	Jang and Mincheol (2010); Ongondo and Williams (2011); Rathore et al., (2011); Salters (2014)
			Thinking it's not worth anything	Ongondo and Williams (2011); Wilson et al. (2016)
			Valuable information stored	Ongondo and Williams (2011); Yin et al. (2013) ; Salters (2014); Wilson et al. (2016)
habits	If recycling is already part of a person's everyday routines, this acts as a driver	Welfens et al. (2016)	Change in routines	Welfens et al. (2016)
			Keeping as a spare phone	Welfens et al. (2016); Huang and Truong (2008); Wilhelm et al., (2011); Ongondo and Williams (2011); Yin et al. (2013); Welfens et al. (2013); Yla-Mella et al. (2015); Wilson et al. (2016);
			Keeping to give away later (to family/friends)	Ongondo and Williams (2011); Yin et al., (2013); Welfens et al. (2013)
knowledge	Awareness of problem	Welfens et al. (2016)	Unawareness of need to recycle is unsatisfactory	Welfens et al. (2016)
			Unclear instructions	Welfens et al. (2016)
	Communication perceived as clear	Welfens et al. (2016)	Not knowing what to do	Huang and Truong (2008); Ongondo and Williams (2011); Yin et al. (2013); Welfens et al. (2013); Yla-Mella et al. (2015); Wilson et al. (2016)
			Not knowing why/never thought about it	Huang and Truong (2008); Welfens et al. (2013); Wilson et al. (2016)
			Lack of knowledge of recycling infrastructure	Welfens et al (2013)

Appendix D: User exploration

Appendix D.1: Research materials: interview & questionnaire

A structure of the interview can be found below. Based on the conversations, further questions were asked.

Semi-structured interview

1. *What phone do you have? Bought from where?*
2. *Previous phone? Bought from?*
3. *What happened with the previous phones?*
4. *What will most possibly happen with the current mobile phone?*
5. *How many phones at home?*
6. *Why are they there? Do you plan to get rid of them?*
7. *What are all options out there to do with your old phone?*
8. *What do you think is the best way to dispose your phone?*
9. *When is the right time to change your phone? (Features of new product, Performance old product, Opportunities/sale with new subscription, Broken/not functioning)*
10. *Describe the usual process when you buy a new phone.*
11. *What's the difference between the phone and its content? (attached to it)? What does it mean to you?*
12. *How many times do you think of the previous phones and the phones in drawers*
13. *Do you recycle things?*
14. *Packaging still at home?*
15. *Accessories like casings still kept with old phone?*

Evaluation after assignment

1. *Relevance of factors evaluation - put in order*
2. *Location: online or in store*
3. *During upgrade or afterwards giving?*
4. *Which were the hardest and easiest decisions to make?*
5. *What would make it easier for you to return the phone?*
6. *Connection with your mobile network operator - or brand?*
7. *Do you use a profile or app of your mobile network operator?*
8. Will/would you actually act according to the selected choices in the assignment?

The questionnaire was filled in before anf after the regenerative session. First an introduction was given on what the interpretation of the factors was. These are based on the factors found in literature research, but were defined with other terms on the questionnaire for a better understaning.

- Financial return value: the expected financial return value when disposing a phone through a company
- (data) security & privacy: the concerns with privacy around the information that is stored on phones
- Effort: the perception of effort (further could be interpreted by participants whether this concerned convenience, comfort or time.
- Care for environment: Importance of environmental issues
- Attachment with phone: the emotional identification.
- Feeling of value loss (waste): the extent one feels bad for disposing the phone, based on the perceived financial and functional worth.
- Information: the information provided by the company around what happens with the phone after returning
- location to bring phone: effort perception based on the return method and location
- charity: the interest to donate a phone

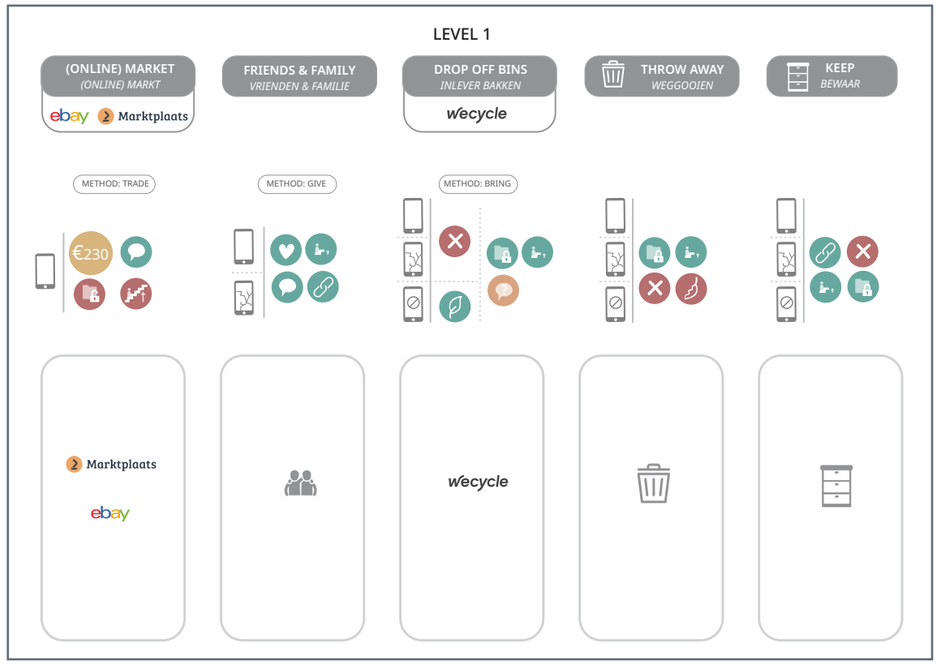
Name:

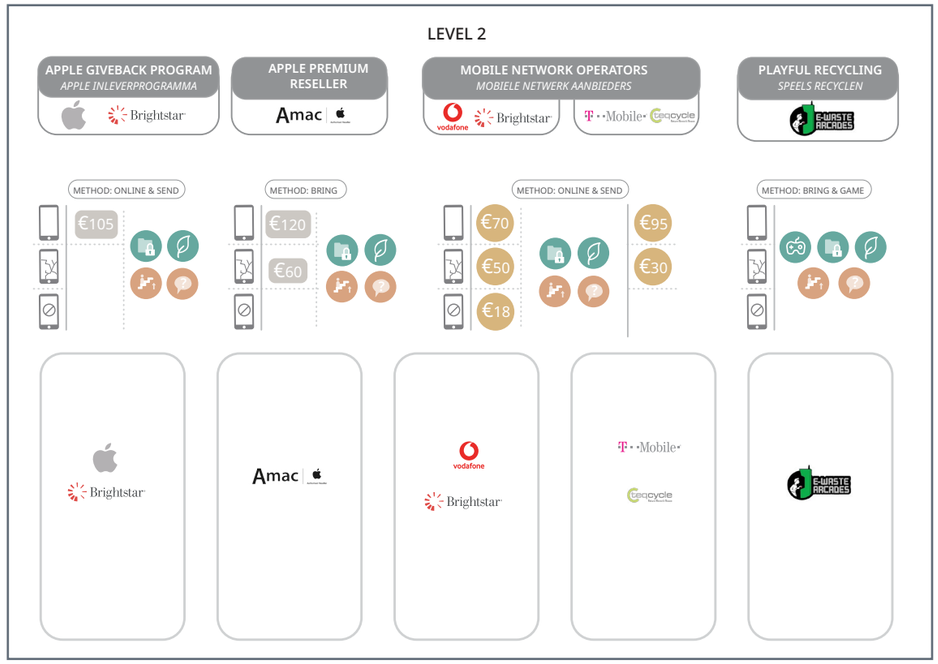
Select the relevance of the following factors for decisions made for your old phone
Selecteer de relevantie van de volgende factoren bij besluiten die gemaakt worden voor je oude telefoon

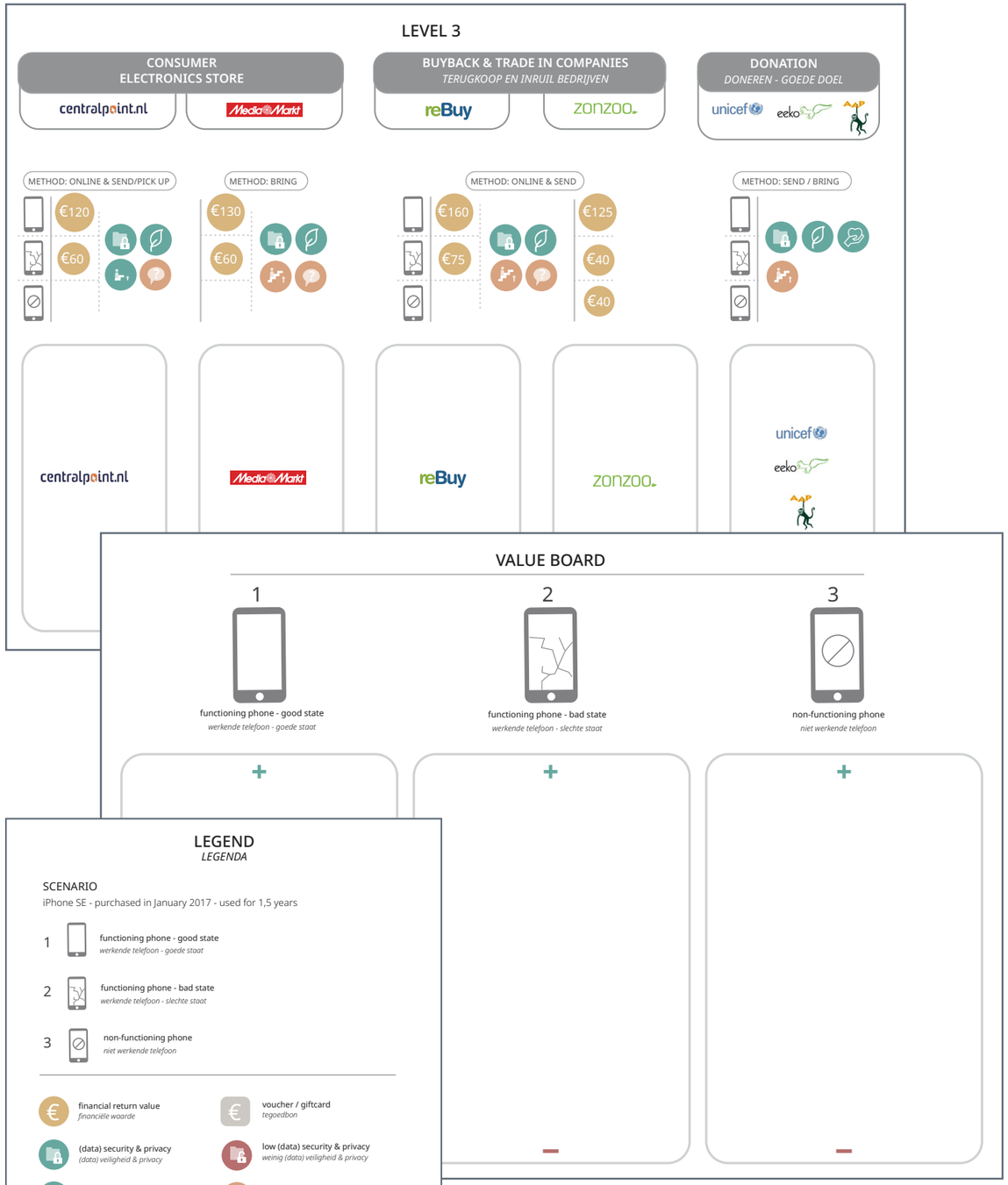
financial return value (selling) *financiële waarde (bij verkopen)*	irrelevant ○—○—○—○—○ very relevant
(data) security & privacy *(data) veiligheid & privacy*	irrelevant ○—○—○—○—○ very relevant
effort *moeite*	irrelevant ○—○—○—○—○ very relevant
care for environment *zorg voor het milieu*	irrelevant ○—○—○—○—○ very relevant
attachment with phone *hechting aan telefoon*	irrelevant ○—○—○—○—○ very relevant
feeling of loss of value (waste) *gevoel van waardeverlies (verspilling)*	irrelevant ○—○—○—○—○ very relevant
information *informatie*	irrelevant ○—○—○—○—○ very relevant
payback time (when selling) *terugbetalingstijd (bij verkopen)*	irrelevant ○—○—○—○—○ very relevant
location to bring phone *locatie om telefoon te brengen*	irrelevant ○—○—○—○—○ very relevant
charity *goede doel*	irrelevant ○—○—○—○—○ very relevant

Appendix D.2: Research materials: explorative session

The option boards are categorised into the three corresponding levels of possibly widely known option, less known options and finally the least known options. With the value board, the participants could decide on whether the factor was positive or negative, with small disks of foam (see picture on previous page). It was clearly communicated that the factors defined for the effort were based on assumptions and it was asked whether they agreed with that. The participants first could explore the options themselves and after indicating their interest, more information is provided. The participants then could place the 3 types of phones on their prefered option.







Appendix D.3: Research data

Table 1: Relevance of factors on scale of 1-5 before and after the explorative assignment. Arrows show whether the relevance has increased or decreased after the assignment and to what extents.

	ZP		HM		ZS		KK		EC		LB		GV		SO		JL		HR	
Financial value	5	>	3	<<	5		1		5		1	<	4		3		3	>	3	>
Data security	4		2		3		2		5		5		5		5	>	4		5	
Effort	5	>	5		3		5	>>	3		5		4		3	<	2		1	
Environment	4	>	3	>	5		5		5		5		2		3	>	4		5	
Attachment	5	>	2	<	3		5		4		1		3		5		1		1	
Value loss	4		4		4	>>>	4		4		5		4		3		4		4	
Information	4	<	2		1		1		5		5		5	>	4		2		4	
Payback time	4	>	3		3		1		5		2		5		5		2		1	
Location	4	<	5		4		4		5		5	>	2	<	5	>	4	<	3	
Charity	3	<	4		3		5		5		5		2	>	5	>	4		4	

Table 2: Relevance of factors on scale 1-10 after the assignment

	ZP	HM	ZS	KK	EC	LB	GV	SO	JL	HR
Financial value	1	6	2	6	3	9	2	3	4	3
Data security	3	10	6	4	2	3	1	2	2	2
Effort	4	1	3	5	10	1	3	8	8	6
Environment	5	5	1	3	4	4	9	7	1	1
Attachment	2	8	7	1	1	10	8	1	10	10
Value loss	6	3	4	8	5	7	7	6	5	9
Information	7	9	9	10	6	2	4	9	9	7
Payback time	8	7	8	7	7	8	6	5	7	4
Location	9	2	5	9	8	6	5	4	3	8
Charity	10	4	10	2	9	5	10	10	6	5

Table 3: Previously made decisions

		Phone type	Purchase	(plan for) Disposal
ZP	Current	Samsung S6	Independent phone retailer Ritel	Sell/keep as backup/give to young sister
	Old	LG 4x HD	Bought over from uncle	Kept (very slow)
	Old old	Samsung S4+	Bought over from uncle	Sold
	Old old old	Blackberry	Marktplaats	Sold
HM	Current	iPhone 6S	Apple store (online)	Keep
	Old	iPhone 6	Apple store (online)	Stolen
	Old old	iPhone 5	Apple store (online)	Kept
ZS	Current	iPhone 6	GSM web (online)	Family
	Old	iPhone 5	T-mobile (online)	Brother (> recycle)
	Old old	iPhone 4	T-mobile (online)	Father (> recycle)
EC	Current	iPhone 7	Independent phone retailer	Keep as backup
	Old	Samsung A4	Tele 2 webshop	Kept
	Old old	Samsuns S3		Defect > Thrown away
LB	Current	Samsung S7	Husband (Mediamarkt)	Fairphone
	Old	iPhone 4S	Husband's old	Kept
	Old old	Fairphone		Kept
KK	Current	Samsung S6	Independent phone retailer	Give to family
	Old	Samsung Note 1	Marktplaats?	Kept (saving for family)
	Old old	Motorola	From father	Stolen
SO	Current	iPhone 7	Independent phone retailer	Keep as backup/give to family
	Old	iPhone 5	Ritel	Keep as spare phone
	Old old	Samsung	Ritel	Broken > thrown away
GV	Current	iPhone 6	Father's old	
	Old	iPhone 5s	Father's old	Kept
	Old old	iPhone 4	Father's old	Kept
	Old old old	Samsung Galaxy		Brother
JL	Current	Samsung Galaxy J3	KPN store	Return
	Old	Samsung Galaxy J3	Hollandsnieuwe (online)	Stolen
	Old old	iPhone 5s	Hollandsnieuwe (online)	Kept (broken)
HR	Current	Sony Xperia	Work	Have to give back
	Old	Blackberry	Work	Returned
	Old old	Nokia		Donation

Table 5: Preference for method of purchase and disposal

	Disposal	Reason	Purchase
ZP	Bring to store	Security	Check online, purchase in store
HM	Bring to store	Ease	Check online, purchase both online & store
ZS	Send online	Ease	Check online & store, purchase online (cheaper)
EC	Doesn't matter	Convenient	Store
LB	Send online	Ease	Check online, purchase in store
KK	Bring to store	Ease	Check online, purchase in store
SO	Bring to store	Security	Check online, purchase in store
GV	Bring to store	Financial	Gets from father
JL	Bring to store	Ease	Check online, purchase online (could buy in store when bringing old phone)
HR	Bring to store	Convenient	Check online, purchase in store

Table 4: Explorative session results.
1: working phone, 2: broken phone, 3: defect phone

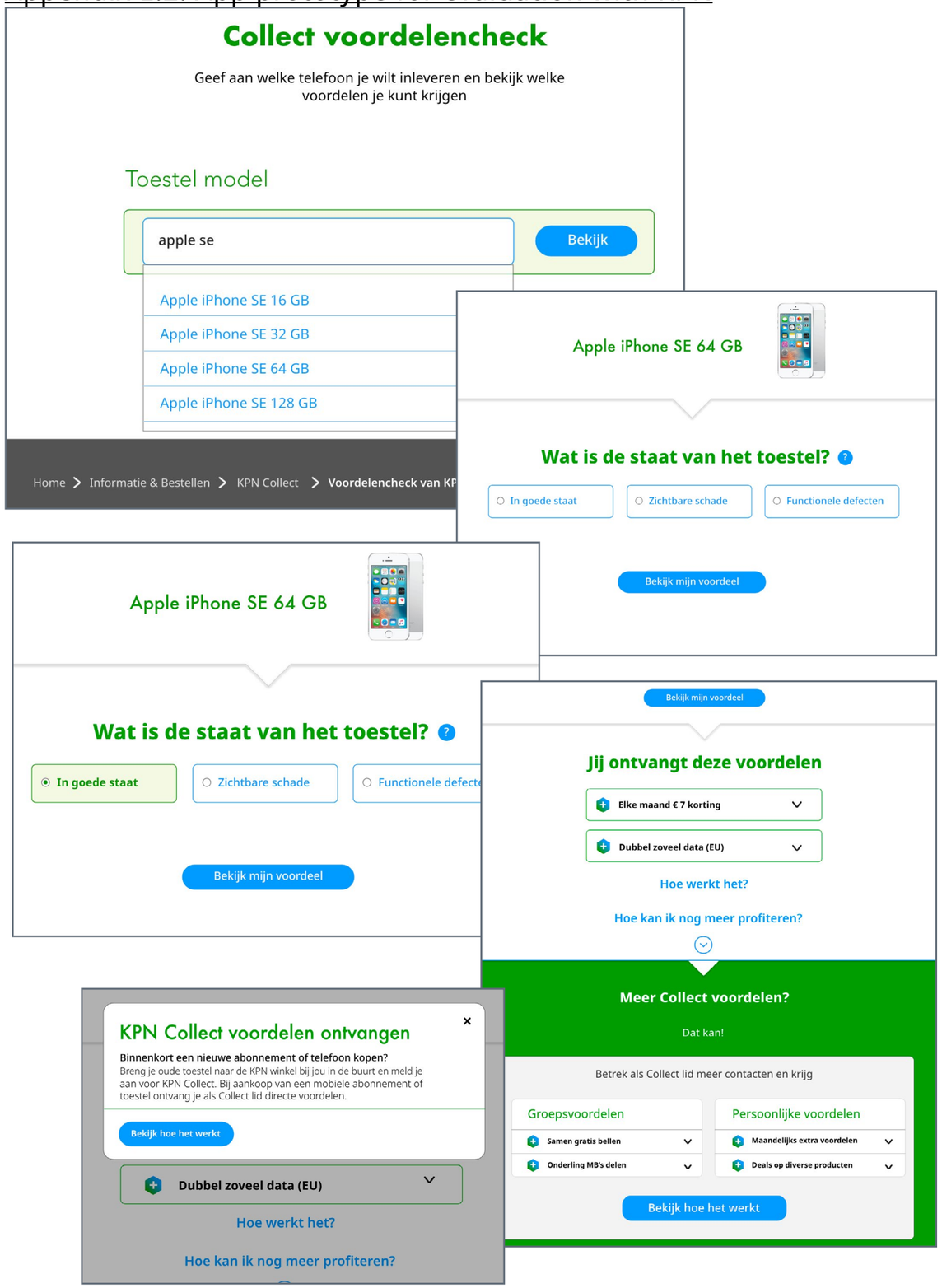
		Already done	Plan for current	LEVEL 1	LEVEL 2	LEVEL 3	Motive
ZP	**1**	Selling	Sell/use as backup/give to young sister	Family/Selling	Family/Selling	Family/Selling	Relatives & money
	2	Keep		Keep > family	Keep > family	ReBuy	Money
	3			Keep	Vodafone	Vodafone	Money
HM	**1**	Keep	Keep / borrow to friends	Friends/family	Friends/family	Friends/family	Ease/Relative
	2			Keep	Amac	Donation	Ease
	3			Wecycle	Wecycle/e-waste arcade	Wecycle/e-waste arcade	Ease
ZS	**1**	Family / sell	Give to brother/ father.	Friends/family	Friends/family	Friends/family	Relative
	2		Too old: Secondhand shop/ kringloop Broken: recycle	Reparation> friends/family / selling	Reparation> friends/family/ selling	Reparation> friends/family/ selling	Circular/money
	3		Sell/recycle parts	Disassemble parts > wecycle bins & markplaats	Disassemble parts > wecycle bins & markplaats	Disassemble parts > wecycle bins & markplaats	Circular/money
EC	**1**	Keep	Keep	Keep	Keep	Keep > sell	Spare phone
	2			Keep> Family/ friends	Keep > family/ friends	Keep > Family/ friends	Spare phone
	3	Thrown away		Wecycle	Wecycle	Zonzoo	Money/useless
LB	**1**	Keep	Use until breaks	Friends/family	Friends/family	Friends/family	Relative
	2		Keep	Keep	Povider	Donation	Circular/charity
	3	Keep	Keep	Keep	Provider	Donation	Circular/charity
KK	**1**	Friends/ family / provider for discount	Friends/family	Friends/family	Friends/family > Amac	Friends/family > Amac	Attachment/ Relative/money
	2	Give to someone that sells parts		Keep > friends/ family	Keep > friends/ family	Keep > friends/ family	Ease/relative/ attachment
	3	Wecycle		Wecycle	Wecycle	Wecycle	Ease/useless
SO	**1**	Keep	Keep/ family	Keep > family/ friends	Keep > family/ friends	Keep > family/ friends	Ease/Attachment
	2			Keep	Amac	Amac	Money
	3	Thrown away	Throw away	Wecycle	Wecycle	Wecycle	Useless/ease
GV	**1**	Family > Sell	Keep	Keep	Amac	Rebuy	Money
	2	Keep	Keep	Keep > family/ friends	Keep > Amac	Rebuy	Money
	3		Keep	Wecycle	Provider	Donation	Useless/Charity
JL	**1**	Use until defect	Use until defect	Family	Family	Mediamarkt	Money/Ease
	2	Repair > use	Repair & use until defect	Repair > Marktplaats	Repair > Marktplaats	Mediamarkt	Money/Ease
	3	Keep	Keep/Return somewhere with campaign	Keep	Keep	Keep/recycle	Circular
HR	**1**			Family/friends	Amac	Amac	Money
	2	Donation	Donation	Keep (> donate)	Keep	Donation	Charity
	3		Donation	(Donate) wecycle	Wecycle	Donation	Charity

Appendix E: Conceptualisation

Appendix E.1: Resources KPN

	Products	Service
KPN Mobiel	Telefoon Tablets Smartwatches Headsets	Abonnement Toestelverzekering Toestelveilig (Android) KPN Wifi Hotspots
KPN Thuis	(gratis) Modem bij internet Vaste telefoon Wifi-versterker	Spotify Premium/Family iTV Internet Netflix Internet en TV (basis/4K) KPN Veilig (5 apparaten) KPN Smartlife
KPN Compleet		MB's delen Gratis zenderpakket Dubbel data en belminuten Gratis bellen onderling
KPN Mooiste Contacten Fonds		Geld doneren MB's doneren in ruil voor winacties

Appendix E.2: App prototype for evaluation with KPN



Appendix F: User validation

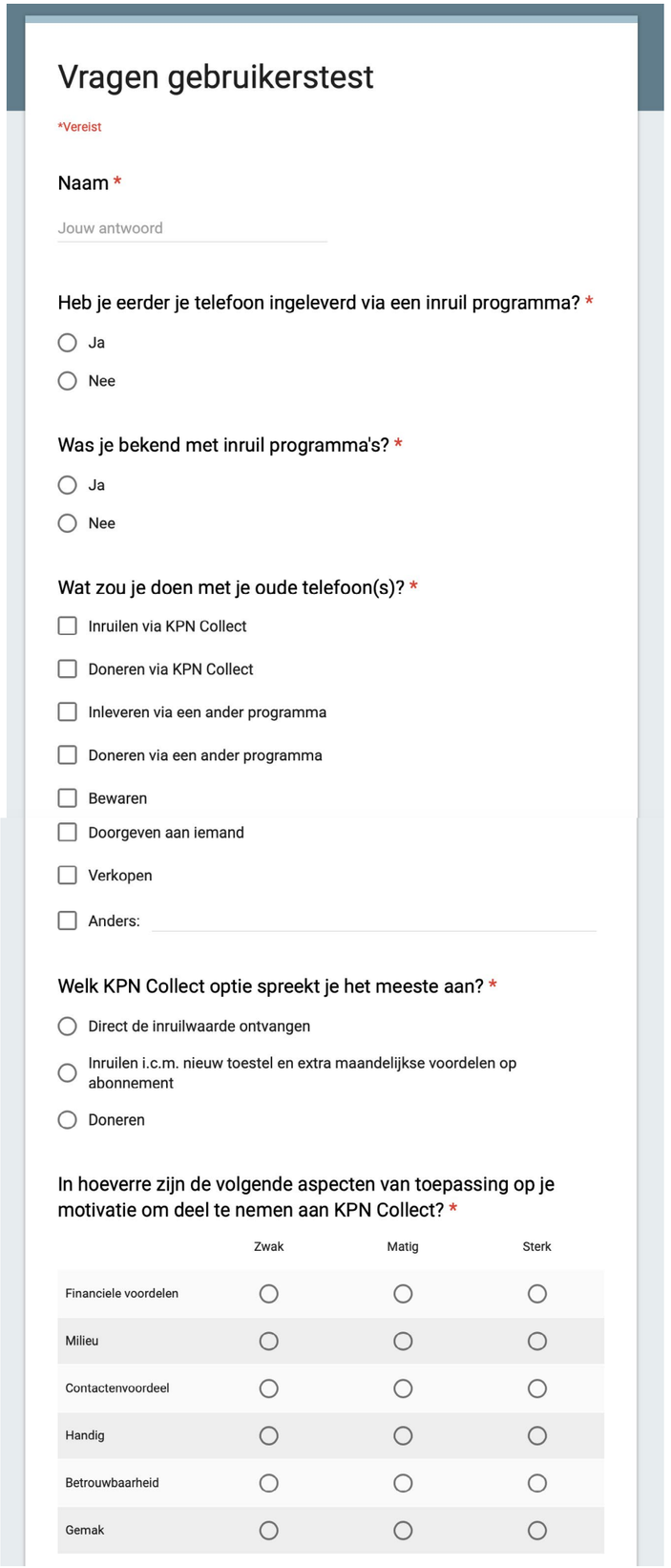
Appendix F.1: Test procedure

Participants were asked to act as they would in a specific context: they are in search for a new phone (iPhone X for iPhone users and Samsung S9 Plus for Android users) with contract and are looking on the KPN site. Also they were asked to select between a 1GB or 3GB contract. These choices were predetermined to limit the interactions on the site and simplify the prototype.

Starting from the homepage of KPN, participants could search for the phone of their scenario. They selected the contract. When participants did not notice the return option, they were asked whether they saw something unusual on the site that they would like to read. After this, the participant enters the voordelencheck, where information about the phone is asked.

While the phone types differed, all participants selected “working in a good state” .

The variables that are used are the phone types including memory and the state of the phone, which has been simplified to three options: working in a good state, working with damages/deficiencies and defect. For this test, the current phones or recently old phones of participants are set in the prototype. The following phones are used: iPhone 5S, 6, 7, 8 Plus and Samsung Galaxy S6, S7, S7 Edge. The exchange value of the phones were determined based on their market values and the worth from existing programs. These were around 20% of the market value after two years.



Vragen gebruikerstest

*Vereist

Naam *

Jouw antwoord

Heb je eerder je telefoon ingeleverd via een inruil programma? *

- Ja
- Nee

Was je bekend met inruil programma's? *

- Ja
- Nee

Wat zou je doen met je oude telefoon(s)? *

- Inruilen via KPN Collect
- Doneren via KPN Collect
- Inleveren via een ander programma
- Doneren via een ander programma
- Bewaren
- Doorgeven aan iemand
- Verkopen
- Anders:

Welk KPN Collect optie spreekt je het meeste aan? *

- Direct de inruilwaarde ontvangen
- Inruilen i.c.m. nieuw toestel en extra maandelijkse voordelen op abonnement
- Doneren

In hoeverre zijn de volgende aspecten van toepassing op je motivatie om deel te nemen aan KPN Collect? *

	Zwak	Matig	Sterk
Financiele voordelen	○	○	○
Milieu	○	○	○
Contactenvoordeel	○	○	○
Handig	○	○	○
Betrouwbaarheid	○	○	○
Gemak	○	○	○

Heb je andere motivaties?

Jouw antwoord

Hoe tevreden was je met de inruilwaarde van de oude telefoon? *

	1	2	3	4	5	6	7	
Zeer ontevreden	○	○	○	○	○	○	○	Zeer tevreden

Voor welk extra voordeel heb je gekozen? *

- ○ €2 korting per maand
- ○ Extra MB's

In hoeverre motiveren de extra voordelen om een nieuw toestel en bundel te nemen?

	1	2	3	4	5	6	7
Zwak	○	○	○	○	○	○	○

In welke mate motiveren de verschillende voordelen je om contacten te betrekken *

	Niet	Beetje	Veel
Gratis onderling bellen	○	○	○
MB's delen	○	○	○
€2 extra korting per maand	○	○	○
Milieu	○	○	○
Voordelen aan familie/vriend	○	○	○

Voor welk voordeel zou je contacten uitnodigen als je moest kiezen? *

- ○ Gratis onderling bellen en MB's delen
- ○ €2 extra korting per maand voor jou en je contact
- ○ Extra MB's per maand
- ○ Kans op prijzen en toegangskaarten

In hoeverre had je het gevoel dat KPN samenwerkt met klanten aan het verminderen van milieu impact?

	1	2	3	4	5	6	7	
Erg weinig	○	○	○	○	○	○	○	Sterk

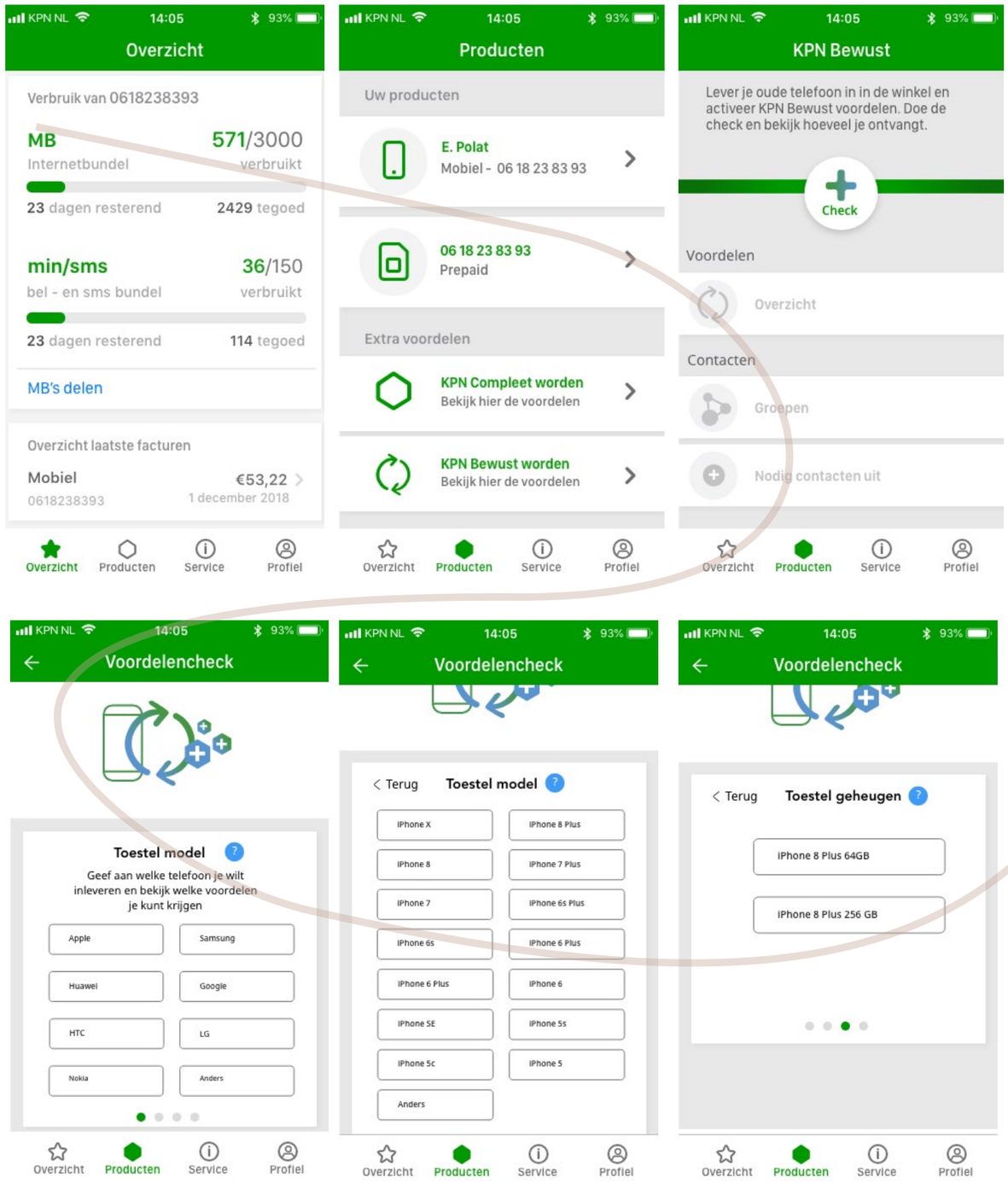
VERZENDEN

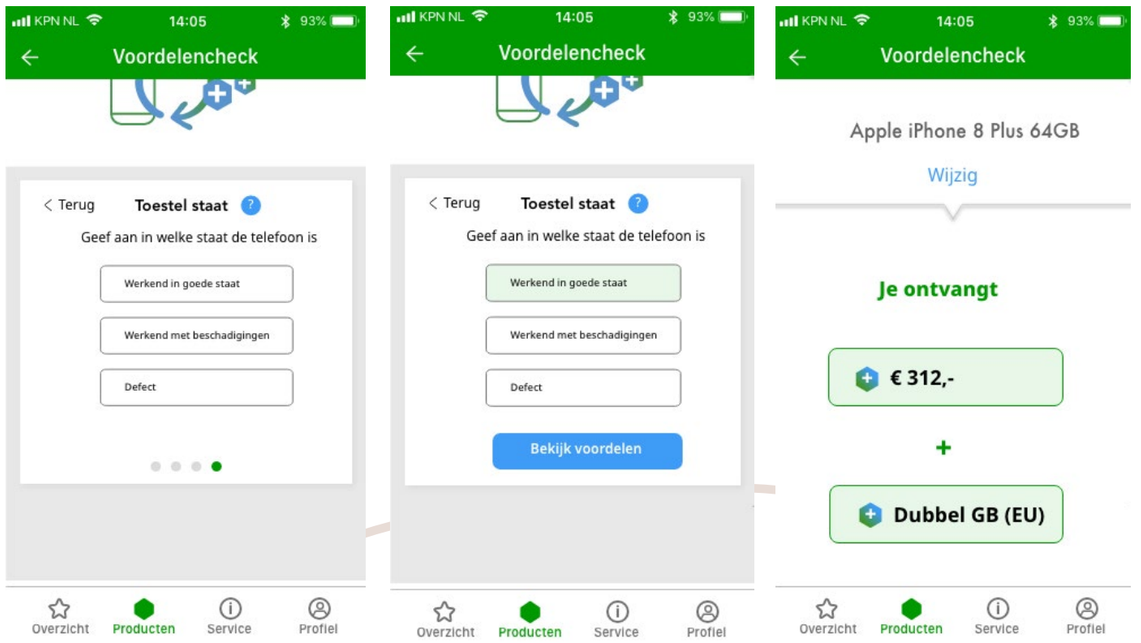
Appendix F.2: Test results

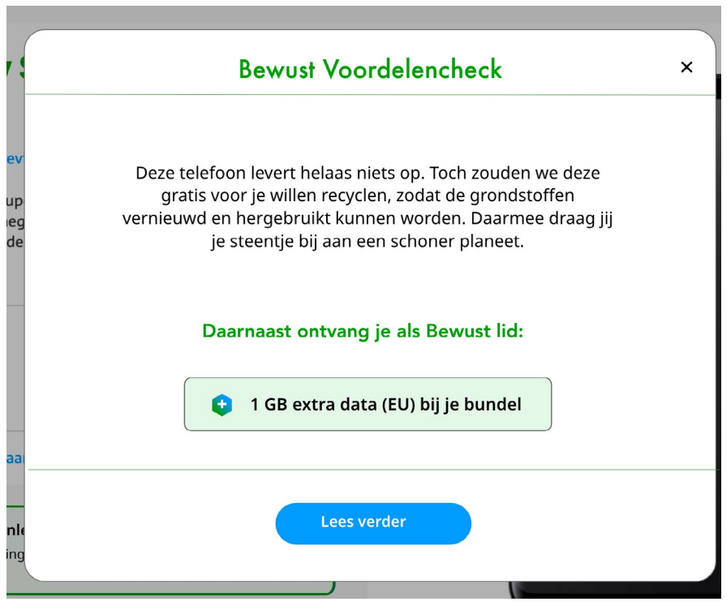
		OBSERVATIONS (thinking out loud)				
	Leeftijd	Observaties interesse	Observaties communicatie	Eerdere ervaring met inruilrpogramma	Bekendheid met inruilprogramma's	Wat zou je doen met je oude telefoon(s)?
1	35	Heeft gezien en is benieuwd.	Keuze van voordeel lijkt alsof je tussen korting of extra voordelen moet kiezen.. Als ik een andere abonnement had gekozen, had ik misschien €2 korting genomen. €2 is niet echt veel.	Nee	Ja	Bewaren, Doorgeven aan iemand, Verkopen
2	24	Leest alles zelf en klikt zonder aanwijzing.	"Maar kan ik ook deze kiezen?" over de €2 korting. Verwachte dat totaal bedrag verrekend zou zijn. "Hoe kan ik nog mer profiteren" kan duidelijker	Nee	Nee	Inruilen via KPN Collect, Inleveren via een ander programma, Doorgeven aan iemand
3	24	Zag de optie iets later zelf.	Denkt dat je moet kiezen uit €120 korting of €2 per maand. Bij "ontvang de voordelen" : "Er gebeurt niets toch als ik hier klik?"	Nee	Nee	Inruilen via KPN Collect, Doneren via KPN Collect, Verkopen
4	37	Bovenste viel niet op, ik moest aanwijzen	Lijkst alsof ik moet kiezen tussen korting of extra voordeel. Ging er niet vanuit dat de korting beneden gewijzigd was: "ik kan zelf berekenen"	Nee	Nee	Inruilen via KPN Collect, Inleveren via een ander programma
5	25	Heeft het gezien, maar niet meteen naar gekeken.	Zelfde verwarring bij selectie. Wist niet wat ze zou kiezen. Had waarden in een overzicht verwacht. "Dit is dus voor een oude telefoon en dit voor de huidige?" - over direct cashback en inruil met toestel. "Het zou fijn zijn als de opties in een overzicht staan. "	Ja	Ja	Doneren via KPN Collect
6	29	Optie valt niet op. "Ik kijk meteen naar abonnementen, misschien kun je het rood maken, daar letten mensen wel op"	Zelfde selectie verwarrng. "Je moet er een grote plus bij zetten." "150 vind ik wel goed". "Ok maar ik vind dit overbodige info, ik heb toch al mijn keuze gemaakt?" - over de Collect page	Nee	Nee	Inruilen via KPN Collect, Verkopen
	After six participants some changes applied in prototype: - a + between the advantages to see whether it helps with the confusion - the necessity to go to store also communicated afterwards					
7		Bekijkt lang de prijzen van abonnementen: "Het voelt alsof de prijzen goedkoper zijn dan normaal" - dacht dat de abonnementsprijzen de totale kosten waren. Heeft de optie meteen gezien, maar niet dat het in de winkel kan.	MB delen is wel leuk. Als ik een kapotte telefoon had zou ik alleen voor de inruilwaarde gaan. Als de telefoon niets oplevert vind ze extra MB's ook fijn.	Nee	Nee	Inruilen via KPN Collect, Inleveren via een ander programma, Bewaren
8	55	Ze bekeek alles grondig.	Het is beter dan dat het thuis rondslingerd of wordt weggegooid.	Nee	Nee	Inruilen via KPN Collect, Doorgeven aan iemand
9	39	Zag het later pas, keek ook meer naar alle andere opties zoals geheugen, abonnementen, kleur..	"Handig voor met je partner"	Nee	Nee	Inruilen via KPN Collect, Inleveren via een ander programma, Doorgeven aan iemand, Verkopen
10	16	Ziet de optie niet.	Ze noemt dat ze het niet zou doen. "Wat als er iets gebeurd met de nieuwe telefoon". Maar zou wel benieuwd zijn wat je krijgt.	Nee	Ja	Bewaren
11	27	Kijkt vooral naar de abonnementen en prijzen. Ziet erna de bovenste melding: "dat is mooi"	Selectie verwarring nog.. "Ik wil die 72 eu, wat moet ik met €2 korting"	Ja	Ja	Inruilen via KPN Collect, Bewaren, Doorgeven aan iemand
12	35	Zag eerst niet, ik moest vragen of er iets was wat hem opviel. "Oh dat is iets bijzonders"	Verwarring met selectie. Dat het in de winkel kan over het hoofd gezien.	Nee	Nee	Verkopen
13	25	Ik wees ernaar " ja zag ik, maar mocht ik erop klikken?"		Nee	Ja	Inruilen via KPN Collect, Inleveren via een ander programma, Doorgeven aan iemand, Verkopen
14	44	Bekijkt alle opties, ziet de collect optie en klikt	Zou niets doen met telefoon dus die inruilwaarde is meer als een bonus	Nee	Nee	Inruilen via KPN Collect, Doorgeven aan iemand

QUESTIONNAIRE																INTERVIEW			
	In hoeverre zijn de volgende aspecten van toepassing op je motivatie om deel te nemen aan KPN Collect?									In hoeverre zijn de volgende voordelen van toepassing op je motivatie om contacten te betrekken?								
Welk KPN Collect optie spreekt je het meeste aan?	[Financiele voordelen]	[Contactenvoordeel]	[Milieu]	[Handig]	[Betrouwbaarheid]	[Gemak]	Hoe tevreden was je met de inruilwaarde van de oude telefoon? (1-7)	Voor welk extra voordeel heb je gekozen?	Sterkte van motivatie door extra voordelen om een nieuw toestel en bundel te nemen? (1-7)	[Gratis onderling bellen]	[MB's delen]	[€2 extra korting per maand]	[Milieu]	[Voordelen aan familie/vriend]	Voor welk voordeel zou je contacten uitnodigen als je moest kiezen?	In hoeverre had je het gevoel dat KPN samenwerkt met klanten aan het verminderen van milieu impact? (1-7)	Expectations	Effectiveness benefits	Disadvantages	Recommendations
Inruilen i.c.m. nieuw toestel en extra maandelijkse voordelen op abonnement	Sterk	Matig	Sterk	Zwak	Zwak	Zwak	4	Extra MB's	4	Zwak	Matig	Sterk	Sterk	Sterk	€2 extra korting per maand voor jou en je contact	2	Iest hogere kortng op de telefoon of de bundel korting	Nee ik zou het niet doen, ik kan meer voor mijn telefoon krijgen.	Lage waarden	Dat het alleen in de winkel kan ook achteraf vermelden. Kortingen moeten toegepast weergegeven worden. Op de collect page lijkt het ook alsof het of die of die voordelen zijn, misschien 1 witte balk van maken of +bij zetten
Inruilen i.c.m. nieuw toestel en extra maandelijkse voordelen op abonnement	Sterk	Matig	Matig	Sterk	Matig	Sterk	6	€2 korting per maand	6	Sterk	Sterk	Sterk	Matig	Matig	Gratis onderling bellen en MB's delen	4	Ik dacht alleen een waarde terug te krijgen.	"Ja natuurlijk"	Als ik dit vergelijk met de interview opties, zou ik het nu sneller kwijt kunnen. Ik voel meer motivatie. Dan zou ik liever hiervoor gaan dan mijn energie steken in het verkopen ervan.	De opties om zelf te kiezen, waren erg fijn.
Inruilen i.c.m. nieuw toestel en extra maandelijkse voordelen op abonnement	Sterk	Matig	Sterk	Sterk	Sterk	Sterk	7	Extra MB's	7	Sterk	Matig	Sterk	Sterk	Sterk	€2 extra korting per maand voor jou en je contact	7	"Dat dit daadwerkelijk wordt toegepast"	"Alser zulke voordelen zijn wel"	Niet echt	Misschien meerdere mogelijkhede en aanbiedingen. Het is fijn om te kiezen tussen €2 korting en extra MB's. Dat trekt juist aan, dat je mag kiezen als klant. Misschien alleen voor mij, maar voor een ander niet. Extra MB's zijn voor mij al een prima aanbod. Ik vond contactenvooordelen ook fijn. Vooral als je daar ook kunt kiezen.
Inruilen i.c.m. nieuw toestel en extra maandelijkse voordelen op abonnement	Sterk	Matig	Sterk	Sterk	Sterk	Sterk	7	Extra MB's	6	Sterk	Sterk	Sterk	Sterk	Sterk	Extra MB's per maand	6	Geen, was duidelijk	Wel fijn, is een goede optie. Vooral internet. Normaal kost het veel om extra GB's erbij te krijgen	Geen	Misschien makkelijker als er minder wodt gevraagd, dat de waarde op basis van de aankoopprijs wordt bepaald met marges
Doneren	Matig	Matig	Sterk	Sterk	Sterk	Matig	7	Extra MB's	6	Sterk	Matig	Sterk	Sterk	Sterk	Gratis onderling bellen en MB's delen	6	Was erg duidelijk, er miste niets	Heeft voor doneren gekozen en extra voordelen daarbij zou motiveren om klant te worden.	Van wat ik zag niet, maar als je klant wordt en dat er dan nog kosten zijn, zoals administratiekosten.	Niet, vond goed in elkaar zitten.
Inruilen i.c.m. nieuw toestel en extra maandelijkse voordelen op abonnement	Sterk	Sterk	Matig	Sterk	Sterk	Sterk	6	€2 korting per maand	7	Sterk	Sterk	Sterk	Matig	Sterk	Gratis onderling bellen en MB's delen	5	"Eigenlijk niet, wat zou ik nog kunnen verwachten"	Ja ik zou het doen, wanneer ik eraan toe zou zijn mijn telefoon te vervangen.	Betrouwbaarheid van gegevens alleen.	Ik dacht dat ik er al klaar mee was en op dat moment kwam er nog info. Kon misschien eerder gecommuniceerd worden. Ik wilde afronden op dat moment.
Inruilen i.c.m. nieuw toestel en extra maandelijkse voordelen op abonnement	Sterk	Zwak	Zwak	Matig	Matig	Matig	5	€2 korting per maand	6	Zwak	Matig	Sterk	Zwak	Matig	Extra MB's per maand	2	Meer info over recyclen	ja zou het doen voor die voodelen	De prijs voor de nieuwe telefoon en abonnement, vergeleken met andere providers.	Het was wel duidelijk.
Inruilen i.c.m. nieuw toestel en extra maandelijkse voordelen op abonnement	Sterk	Sterk	Sterk	Sterk	Matig	Matig	4	€2 korting per maand	5	Sterk	Sterk	Sterk	Matig	Sterk	Gratis onderling bellen en MB's delen	7	Ik verwacht kwaliteit en dat het goedkoop is	Zou het doen	Nee het is beter dan weggooien	
Inruilen i.c.m. nieuw toestel en extra maandelijkse voordelen op abonnement	Sterk	Sterk	Matig	Matig	Sterk	Sterk	4	€2 korting per maand	5	Sterk	Matig	Sterk	Matig	Sterk	Gratis onderling bellen en MB's delen	5	Nee ik doet niet zoveel met mijn telefoon	Ja ik zou het doen	De opzegtermijn.. Meestal zit je dan 2 jaar vast aan een abonnement. Ik zou meer flexibileit willen, een flexibele abonnement zou fijn zijn.	Ik mis flexibiliteit. Als je de kans had om per 3 jaar van telefoon te wisselen en daarmee vaste kortingen kreeg bijv, ipv per 2 jaar.
Direct de inruilwaarde ontvangen	Matig	Sterk	Matig	Matig	Sterk	Sterk	5	Extra MB's	3	Sterk	Matig	Zwak	Matig	Sterk	Gratis onderling bellen en MB's delen	6	Geen	Ze weet dat ze het gaat houden, voordelen boeien niet zo. Financiele waarde die hoger is zou haar wel motiveren en aanzetten tot inruilen	Dat er geen back-up telefoon thui is. Zou wel makkelijker terug kunnen geven als er nog een oude telefoon thuis is.	
Inruilen i.c.m. nieuw toestel en extra maandelijkse voordelen op abonnement	Sterk	Sterk	Sterk	Sterk	Sterk	Sterk	5	Extra MB's	6	Sterk	Sterk	Matig	Matig	Sterk	Kans op prijzen en toegangskaarten	7	Geen	Of ik het zou doen... Van een 10 een 7. Het Is nog niet helemaal overhalend, maar de prijzen en toegangskaarten spreekt me wel aan. Mijn huidige provider doet zulke voordelen niet.	Wtat je ervoor terug krijgt is niet wow.. Meer geven zou me meer aanspreken. Ik ben toevallig bezig mijn toestel te verkopen, dus ik bekijk en onderzoek en weet dat ik het voor meer kwijt kan.	
Direct de inruilwaarde ontvangen	Sterk	Sterk	Matig	Sterk	Sterk	Sterk	4	€2 korting per maand	5	Sterk	Sterk	Matig	Matig	Sterk	Gratis onderling bellen en MB's delen	3	Meer geld voor de oude telefoon	Contactenvoordeel was ok, maar zou het eerder verkopen. Als de voordelen meer zijn, zou hij het doen.	Liever verkopen	
Inruilen i.c.m. nieuw toestel en extra maandelijkse voordelen op abonnement	Sterk	Matig	Sterk	Sterk	Sterk	Sterk	5	Extra MB's	6	Matig	Matig	Sterk	Matig	Sterk	€2 extra korting per maand voor jou en je contact	6	Lagere abonnements prijzen	Het fijne is dat ik kan kiezen tussen voordelen. Abonnement met 1GB is duurder dan die van 0GB, dan kan ik kiezen voor die GB extra en heb ik een abonnement die ruim 6eu goedkoper is. Minder belmin zijn dan ook voldoende.	De abonnement kosten van KPN. Als de toestelprijzen overal ongeveer gelijk zijn, zou ik liever een abonnement ergens anders nemen. Die zijn elders goedkoper. En dat is nodig voor die maandelijkse kortingen. Misschien als de kortingen iets hoger zijn, of dat ik data krijg en kan gaan voor een goedkoper abonnement. Alleen terugbrengen.. als overal toch hetzelfde wordt gedaan qua recycling, zou de volgende voorkeur een hogere inruilwaarde zijn	De berekening voor contactenvoordeel neem ik bij aankoop niet mee, dat is iets waar ik later over kan denken. Ik zal daar niet van uitgaan.
Inruilen i.c.m. nieuw toestel en extra maandelijkse voordelen op abonnement	Sterk	Sterk	Sterk	Sterk	Sterk	Sterk	7	Extra MB's	6	Sterk	Matig	Matig	Matig	Sterk	Gratis onderling bellen en MB's delen	6	Geen, duidelijk	Zou het doen	Doet niets met oude telefoons, dus kan het primakwijt	

Appendix G: KPN Bewust







This Master thesis is about stimulating consumers in the return of old mobile phones for a Circular Economy. This thesis presents the processes from research to design.

Esra Polat

January 2019