# EXPLORING HOW SERVICE DESIGN CAN ENCOURAGE BEHAVIORAL CHANGE: A SHIFT FROM LINEAR TO CIRCULAR WAY OF THINKING

How might we, through service design, aid in educating students in primary schools on responsible waste management and encourage a circular mindset?

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# ABSTRACT

The general awareness and understanding of the topics sustainability, circular economy, and waste are on the rise and gaining popularity amongst people daily. It is a common belief that children are the change-makers of tomorrow and focusing on their development is of high importance as they will determine the course of action for the future. Hence, the idea of introducing the topics of sustainability, circularity, and waste in children's education naturally emerges. This thesis explores the possibilities of raising awareness and introducing new perspectives on waste within education, inducing a circular mindset, from the service design perspective.

The investigation is supported by a literature review that lays the theoretical base for the practical case study, revolving around environmental education and circular economy through composting. The thesis presents the results of the case study based on the concept of platforms highlighting the importance of value exchange through different perspectives. The platform aids the implementation of the service in schools, showing the students the circular economy loop and planting a circular mindset for their future.

**KEYWORDS**
Circularity, Circular Economy, Education, Service Design, Platforms, Bio Waste, Composting, Sustainability

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# 1. INTRODUCTION

There is no doubt that current conventional linear consumption patterns (take-make-dispose) are encountering resource availability constraints. The resource challenges are exacerbated by rising demand from the world's expanding and increasingly affluent population (EMF, 2013). The demand for raw materials is increasing as the world's population grows. The supply of critical raw materials, on the other hand, is limited (European Parliament, 2015). The amount of stress placed on the environment is enormous, and it is increasing by the day. Moving to a circular economy could have a number of advantages, including lessening environmental impact, improving raw material supply security, increasing competitiveness, stimulating innovation, and boosting economic growth (European Parliament, 2015). Advocates argue that current linear resource and energy systems must be reconfigured into loops of re-use, repair, refurbishment, and recycling, displacing primary production and reducing greenhouse gas emissions in the process (Hobson, 2019). The Ellen McArthur Foundation (EMF) calls on everybody to try to imagine an economy in which today's goods are tomorrow's resources, forming a virtuous cycle that fosters prosperity in a world of finite resources (EMF, 2013). These reasons lead to the focus of this thesis that aims to investigate a shift from a linear to a circular way of thinking through the service design practice. Service design is now being used to solve a wide range of social problems and challenges (European Commission, 2009). Designers and engineers influence the development of products and services, having a direct impact on society and the environment (Papanek, 1971). To take it a step further, designers can reduce environmental impacts by intentionally shaping behavior toward more sustainable practices (Bhamra et al., 2008, Elias et al., 2008, Lockton et al., 2008, Wever et al., 2008). This being said, the group feels a high sense of responsibility towards the environment and is passionate about exploring these topics deeper.

With this in mind, the group believes that introducing these topics early in life makes it more likely for the children to adopt a circular mindset.

Hence, this thesis is focused on educating children in primary education on responsible waste management. This mainly involves incorporating environmental education in the curriculum of primary schools and subsequently encouraging a circular mindset in the students. The topics of circular economy, behavioral design, and social innovation as well as platforms are covered on the theoretical level in the literature review and furthermore explored in the case study. The case study is following a design thinking approach through which the group emphasizes with the users and current issues concerning waste and critically reflects upon the topics. These are afterwards synthesized and ideated, resulting in a preliminary concept. This is subsequently prototyped and tested, and resulting from the early stages of the process a concept of platforms emerges. This elevates the case study to a new level, nevertheless still maintaining the focus on waste in education established in the beginning, whilst incorporating platforms and scalability of the service.

## 1.1 THESIS OBJECTIVES

In this section, the official study objectives, as well as the learning goals of the thesis group, are described.

### 1.1.1 Official learning goals

According to the official curriculum established by AAU the following goals and objectives relating to knowledge skills and competencies should be reached:

Students who complete the module will obtain the following qualifications:

**Knowledge**
Students must:

- Have **knowledge** about the possibilities to apply appropriate methodological approaches to specific study areas.

- Have **knowledge** about design theories and methods that focus on the design of advanced and complex product-service systems.

**Skills**
Students must:

- Be able to work independently, identify major problem areas **(analysis)**, and adequately address problems and opportunities **(synthesis).**
- Demonstrate the capability of **analyzing,** designing, and representing innovative solutions.
- Demonstrate the ability to **evaluate** and address **(synthesis)** major organizational and business issues emerging in the design of a product-service system.

**Competences**
Students must:

- Master design and development work in situations that are complex, unpredictable, and require new solutions
- Independently initiate and implement discipline-specific and **interdisciplinary cooperation** and assume professional responsibility
- Be capable to independently take responsibility for own professional development and specialisation

(Aalborg University, 2012).

### 1.1.2 Personal learning goals

In addition to the official learning goals, a few mutual goals were set, which the group would like to fulfil through this project. They are the following:

- Extend knowledge on application of qualitative and quantitative research methods
- Improve project management skills and decision making
- Improve at implementing suitable methods and tools throughout the whole design process
- Understand and explore the discipline of social innovation in relation to service design practice
- To explore and understand in depth the dynamics of circularity
- To apply service design in a circular and sustainable manner

## 1.2 LIMITATIONS & DELIMITATION

Throughout the process of this thesis, certain delimitations and limitations had to be faced. Creswell and Guetterman (2012), define delimitations as factors that are decided by the researcher which can affect the research study, specifically the boundaries set on what to include or exclude. Limitations, however, refer to influencing factors that the researcher cannot control, which can be considered as potential weaknesses to the research study (Creswell and Guetterman, 2012). The following section will clarify the delimitations and limitations present.

**Limitations:**

**Covid-19 pandemic**

The biggest limitation affecting different spheres of the project was the Covid-19 pandemic. Due to the government safety regulations, all investigations, interviews, and tests were held online for the safety of all participants, which posed certain issues in regards to technical challenges. Moreover, due to these reasons, the group was only able to interview and test a certain number of participants and therefore collect less data. Consequently, this data could not be used for statistical purposes. In connection to Covid-19, the issue of access to literature also presented itself, as options were limited in acquiring needed material, as both the university campus and general libraries

were mostly inaccessible, hence literature was limited to online available versions and already acquired books. The group was also forced to carry out the majority of the work online, but due to a large variety of available online tools *(see section 4. Methodological approach, p. 24)*, this was made possible and subsequently served the work and general communication between the group members well.

### Time

Another influencing factor relates to time, in terms of both time management as well as the allocated time in the thesis period. Although this type and size of project is not unfamiliar to the group, the Covid-19 pandemic did result in challenges in managing and utilizing the time needed for a project like this. It became evident that the scope of the topics and the connecting tasks (including iterations of the design stages), required efforts beyond what was at times possible. Further, depending on (and finding) participants for the survey, in-depth interviews, as well as testing of prototype, also proved time-consuming, and as such the testing was scaled down to only include parts of the developed service concept.

## Delimitation:

### Selection of material

Initial delimitation concerns the amount of mentioned material in e.g. the literature review. The group is aware that the mentioned topics are infinitely rich in terms of information. Thus, acknowledging this, a decision was made to be profoundly selective in terms of chosen literature, meaning that only directly relevant points are mentioned throughout. It is important to note, that although this selection inevitably excludes some authors and perspectives on the topics mentioned in the literature review, a big effort was made to ensure that the included literature still reflected a critical approach and analysis of the chosen material, including various authors and perspectives providing a critical evaluation of the topics. Additionally, this decision was also made for the sake of clarity as well as the necessity of length and complexity of the thesis.

### Biases:

The presence of biases in connection to the collection of data can rarely be avoided, as every choice and decision made or method and technique used, can on an unconscious or conscious level influence the research result (Stickdorn et al., 2018). This can concern not only the researcher (in this case the group) but also the participating factors (in this case the respondents and participants of the survey, in-depth interviews, and testings). To combat biases when conducting research it is crucial to consider the sample selection, which involves who to include as well as how to select them. When discussing sample selection, specifically concerning richer types of data such as in-depth interviews, Stickdorn et al. (2018), present various strategies for the selection. The strategy used by the group is convenience sampling, which simply involves finding available people to participate, however, certain criteria were determined prior, such as respondents for the survey being limited to families in Copenhagen, and interview participants involving only teachers of primary schools, also located in Copenhagen. The approach to select these contributors will be elaborated upon further in the thesis. An important note when conducting research is to include a mixture of methods (desk research and participant approaches; in-depth interviews), as this can aid in minimizing the presence of potential biases (Stickdorn et al., 2018).

As people are hard-wired as subjective and irrational beings and thus prone to hundreds of proven biases that cause them to think and act illogically, being generally aware of biases helps individuals to be more critical, which in a project like this is of utmost importance (Lebowitz et al., 2020).

# 2. LITERATURE REVIEW

This section presents the theoretical foundation for the thesis, in which relevant topics are researched and explored in connection to the process of determining a research focus and question. As a starting point, the literature review will provide a short introduction to the concept of service design, however, the focal point will primarily be on circular economy with a specific focus on the contribution service design can have on circular economy. Subsequently, introducing design for behavioral change and social innovation, and lastly touching upon the platform as a service, where various perspectives will be presented on the aforementioned topics. Additionally, the literature review will act to support the practical case study on the topic of waste, which will be explored and presented further in this thesis. The literature review has continuously been developed throughout the project as it evolved, and thus a section on platform business as a service was added. The literature review will conclude with the chosen research question in which the thesis will revolve around.

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# 2.1 SERVICE DESIGN

## 2.1.1 Origins of service design

Service design as a term was first introduced by Shostack in 1982, who noted that products were not alone in creating value for customers, but that the service that often accompanied these products played an equally important role in creating and delivering value. The process of creating a product, a tangible object, includes various steps in which physical evidence and specifications are made, however, no similar process existed in relation to the process of developing services. Shostack (1982), thus saw the need and relevance for developing a system in which, much like the process and steps of creating a product, mapped out the structure of a service in an objective and explicit manner, including all necessary and crucial functions; what came to be known as the service blueprint. The service blueprint operates as a tool to structure a service by establishing the different processes, actors, and flows that exist in a specific service (Shostack, 1982).

Although the term service design was not recognized until the 1980s, service design as a practice is said to be traced back to the field of industrial design in the 1920s, where the use of industrial technology was explored in the pursuit to improve people's standards of living. Specifically, this included the production of products in a more efficient way, which not only aimed to be more useful for people but also sought to provide optimism about the future. Over time as human needs have changed, so has the field of service design. Today, the standard of living has reached its natural peak, and as such the human need has inevitably shifted from focusing on materialistic wealth to concerning the value of quality of life (Polaine et al., 2013).

In the field of service design Stickdorn et al. (2018), originally proposed the following five principles of service design: *(1) user-centered: experience a service through the customers perspective, (2) co-creative: the service design process should include all stakeholders, (3) sequencing: the service should be visualized as interrelated actions, (4) evidencing: intangible services should be made tangible through physical artifacts and (5) holistic: the entire service environment is to be considered.*

## 2.1.2 Service design today

The five principles have since been updated concurrently with the changes of human needs as well as the needs of organizations and Stickdorn et al. (2018), offer a revised version of the now six principles as such: *(1) human-centered: experience a service through the perspective of all people involved, (2) collaborative: stakeholders of different functions and background should participate in the service design process, (3) iterative: exploratory, adaptive and experimental approach reaching implementation through iteration, (4) sequential: the service should not only be visualized but also structured as interrelated actions, (5) real: research and prototyping should hold a footing in reality and intangible services reflect reality physically or digitally and (6) holistic: services are to sustainably regard all needs of stakeholders through entire service as well as across businesses.*

Service design can, as such, be defined as the practical approach to the creation and improvement of service offerings, through the implementation of a design thinking mindset, in which the design process reflects a human-centered, collaborative and iterative approach. The use of user research and prototyping as well as applying visualization tools make for experiences that take into consideration the needs of participating stakeholders, which eventually will lead to service innovation (Stickdorn et al., 2018).

# 2.2 CIRCULAR ECONOMY

This section explains the model of consumption that mankind has adapted throughout the last century and the consequences this way of consuming and producing brings with it. Moreover, this section introduces the terms sustainability and circular economy and the potential of those concepts.

## 2.2.1 Conventional consumption model

The industrial revolution has brought new ways of machine manufacturing processes, which have led to a constant and rapid acceleration of consumptive and extractive economies (EMF, 2013; Brears, 2019). Ever since then, the conventional economy involves economic actors, people, or organizations, which engage in the economic activities of production, distribution, consumption, and resource maintenance (Brears, 2018). Throughout these activities, large quantities of cheap and easily accessible materials flow in a straight line from resource extraction to manufacturing and when a product no longer serves its purpose to discarding (EMF, 2013; Brears, 2018). In fact, todays 'take-make-dispose' model has led to an exponential growth of negative externalities, amongst others the supply risk of non-renewable natural resources, the economic losses and structural waste, cheap production, and increased levels of pollution (EMF, 2013).

## 2.2.2 Sustainability

Since the 1960s, Western cultures have begun to discover that the economic and technological practices that followed the industrial revolution had a direct effect on the world and social balance. Evidence of growing global-scale environmental threats like climate change, ozone depletion, and biodiversity loss raised concerns about whether existing prosperity trends can be maintained in the future (Geissdoerfer et al., 2017). The term sustainability was transferred to the context of ecology and describes the principle according to which no more may be consumed than can grow back, regenerate, and be made available again in the future (Duden, n.d.). In a report on Environment and Development (Brundtland, 1987) the rising global challenges of the consumption models are described and the first official definition of development towards sustainability introduced. According to Brundtland (1987), sustainable development is one that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainability is increasingly gaining attraction, as estimated by Johnston et al. (2007) there are around 300 definitions of the term. Many definitions towards a shared goal, to preserve the earth's ecosystem by optimizing the human lifestyle to support security, health, and wellbeing, particularly by ensuring the supply of non-replaceable goods and services.

## 2.2.3 The concept of circular economy

The notion of circular economy has deep roots and cannot be traced to a single date or inventor; however circular economy has gained momentum since the late 1970s, driven by a small number of thought-leaders, academics, and businesses (EMF, n.d.a). Already in 1966, the British economist Boulding described the Earth as a closed and circular system with limited capacity. According to Boulding (1966), the economy and environment should co-exist in balance. Influenced by the work of Boulding, economists Pearce and Turner (1989) investigated the conventional consumption model and the open-ended characteristics of this economic system and suggested ideas for production and consumption towards a circular system (Geissdoerfer et al., 2017). Moreover, industrial analysts Stahel and Reday (1976) coined the concept of an economy in loops or circular economy, that would impact job creation, resource efficiency and savings as

well as waste prevention in the industrial economy. Furthermore, Stahel developed a ‘closed-loop’ approach to production processes and founded the non-profit organization Product Life Institute in Geneva, promoting circular economy while pursuing four main goals: product-life extension, long-life goods, reconditioning activities, and waste prevention (EMF, n.d.a). Stahel also proposes a ‘Performance Economy’ and the importance of selling services rather than products (EMF, 2012). Sharing the idea of a circular/loop economy, chemist Michael Braungart and architect William McDonough introduced the Cradle-to-Cradle concept. The healthy and efficient processes of nature’s ‘biological metabolism’ are seen as a model for developing a ‘technical metabolism’ flow of industrial materials in Cradle-to-Cradle design (Braungart and McDonough, 2002). Under these metabolisms, product components can be engineered for continuous recovery and reutilization as biological and technological nutrients (EMF, n.d.a). More, the framework supports design for effectiveness towards positive product impacts and is characterized by three principles, (1) everything is a resource for something else, (2) use clean and renewable energy, and (3) celebrate diversity (Braungart and McDonough, 2002; EMF, n.d.a). However, the circular economy and its practical applications to economic systems and industrial processes have evolved to include various features and contributions from many authors. Other relevant theoretical influences towards closed-loop systems are ranging from Biomimicry (Benyus, 2002), Eco-efficiency (Huppes and Ishikawa, 2009), Regenerative Design (Lyle, 1994), Industrial metabolism (Ayres, 1994) to the Blue Economy (Pauli, 2010).

Throughout the years, the concept of circular economy has attracted attention amongst decision makers, impacting governments and intergovernmental agencies at local, state and international levels. In fact, circular economy has been implemented into national laws and strategies on a supranational level, like the EU action plan towards circular economy (European Commission, 2015). Nowadays, circular economy is widely known as an industrial economy that is restorative or regenerative by intention and design. Its main goal is to maintain devices, parts, and resources as useful and valuable as possible at all times while differing between technological and biological cycles (EMF, 2013). A circular economy is a regenerative mechanism in which resource input and waste, emissions, and energy leakage are minimized. It is based on three principles, (1) design out waste and pollution, (2) keep products and materials in use, and (3) regenerate natural systems. A circular economy can be accomplished by long-term design, renovation, repair, reuse, remanufacturing, refurbishing, and recycling (EMF, n.d.b).

### 2.2.4 Circular economy & sustainability

The concepts of sustainability and circular economy share concerns about the contemporary use of technology and linear consumption models threatening future generations. Moreover, both concepts are highlighting worldwide issues and the importance of collaborations between distributed systems. However, the considerably older concept of sustainability seeks to support the environment, communities, and cultures, and is thereby rather holistic and can be adapted to different contexts. In fact, sustainability finds its origin in forestry in the early 18th century, where the harvesting of wood was limited to make sure the amount of harvested wood could grow again (Geissdoerfer et al., 2017). With a focus on ecology, respecting nature’s ability to restore itself, the term sustainability has evolved to include social aspects to protect people and benefit society (United Nations, n.d.a). The concept of circular economy focuses mainly on economic systems and environmental benefits and only tacitly on social benefits. While it focuses on optimizing the use of resources, waste, and leakage, there are rather limited possibilities for optimization and execution within a circular economy. Whereas the concept of sustainability is more open-ended and can be constantly adapted (EMF, 2013). It can be concluded that the concept of circularity is contributing towards a more sustainable world and is therefore a part of sustainability.

### 2.2.5 Circular design

Design is the way things are created, whether it is products, services, or systems. During the World Design Summit (2017), the Montreal Design Declaration described design as: “The application of intent: the process through which we create the material, spatial, visual and experiential environments in a world made ever more malleable by advances in technology and materials, and increasingly vulnerable to the effects of unleashed global development.”

When something is designed, critical choices must be made, which impact the manufacturing and the lifecycle of the product/service/system. Design is the gateway towards circularity and plays a crucial part in the first circular economy principle design out waste and pollution. There are innumerable strategies and innovations to achieve circular design, *like moving from products to services, designing products that last longer or safe and circular material choices,* just to mention a few (EMF, n.d.c).

As an early pioneer for the sustainable design movement, Victor Papanek (1972) advocated for socially and environmentally responsible design. In his work ‘Design for the real world’, Papanek (1972) encouraged new generations of designers to utilize design towards social change with an emphasis on environmental responsibility, social inclusion, and political transparency.

Moving from the current ‘take-make-dispose’ economy towards a closed-loop one requires a redesign of current systems. EMF and IDEO have made a Circular Design Guide (n.d.) available, offering tools, methods, and mindsets that should ease the incorporation of circular economy principles.

## 2.3 DESIGN FOR BEHAVIORAL CHANGE

One of the main themes of this thesis is design for behavioral change, therefore the group deemed it relevant to review the literature, theories, and practices of this topic. Change, especially in behavior, goes hand in hand with social innovation, thus it will also be touched upon. Subsequently, how service design can support social innovation and behavioral change is explored as well. This section reviews, defines, and critically reflects upon various points of view within the field of behavioral change, its connection to social innovation and design, and additionally identifies gaps and possibilities. Moreover, design for change is examined from the service design perspective as well as from a sustainable point of view considering its relevance, possibilities, problems, and shortcomings.

### 2.3.1 Beginnings

As implied by the name, the basis of this approach is human behavior. Social psychologist Kurt Lewin defined behavioral change by three steps known as the unfreeze-change-refreeze model, requiring prior learning to be rejected and replaced. For Lewin, the process of change requires creating the perception that a change is needed in the first place, subsequently moving toward the new, craved level of behavior, and finally solidifying the new behavior as the norm. The model is widely used up to this date and serves as the basis for many modern change models. It can be said that this provides the basis for any behavioral change, since Lewin’s work stemmed from his concern to find an effective approach to resolving social conflict through changing group behavior (whether these conflicts are at a group, organizational or societal level) (Lewin, 1947; Study, 2012).

Design is increasingly concerned with changing people’s behaviors

and designers have a lot of power when it comes to shaping society in terms of the offered possibilities and consumption. Shaping what people see, use, and waste, mainly done by providing solutions to challenges that people face on a daily basis (Berman, 2009). Designers shape the advancement of products and services, directly impacting society and the environment (Papanek, 1971). To take this even further, designers are in a position to diminish use impacts through purposefully shaping behavior towards more sustainable practices (Bhamra et al., 2008, Elias et al., 2008, Lockton et al., 2008, Wever et al., 2008). For example, technology innovation and optimization, as well as removal of choice, have long been the footing for technical approaches aiming to change user behavior. An example of this is a heating system that turns off automatically (Greening et al., 2000, Herring and Roy, 2007, Horvath, 2004), using optimized technology and removing the choice of the user to turn the device off themselves, automatically and subtly alters the user's behavior.

Nudging (Thaler and Sunstein, 2008), persuasive design (Fogg, 2003), design with intent (Lockton et al., 2010), motivational design (Keller, 2010), instructional design (Smith and Ragan, 1993), design for X, where X refers to a specific domain of interest, such as sustainable or socially responsible behavior (Tromp et al., 2011), or behavioral design are all terms that are referring to design for behavioral change, thus influencing, altering or changing human behavior through design. The key benefit of behavioral design is that implicitly integrating the intervention into an artifact decreases the probability of conscious recognition, and therefore knowledge, which may reverse the intended impact. This contrasts with persuasive design's general emphasis on successful, technologically-enabled tactics in which users are faced with an intrusion, which can lead to counteraction. Behavioral design targets automatic response, which prevents potential counteraction by implicit effect while maintaining freedom of choice (Cash, et al., 2017). A common characteristic of behavioral design approaches is directionality. Ideally, users can, in principle, have a clear understanding of a product's intent or message (i.e., products provide clarity) or participate in a specific course of activity (i.e., products provide guidance) as the designer intended (Boon, et al., 2018). An example of this would be the circles on the Apple watch, that motivate the user to physical activity in order to complete the circles or compete with their friends.

However, technical approaches alone are deficient for sustaining behavior change (Lilley, 2009). A key issue, or a challenge is not only that a technical shift in the used product is required, but that people's behavior must also be changed; it is important to make reducing waste (in the case of this thesis) attractive for people. The main issue has been that users must make the relation between 'the information', their behaviors, and the effects, which makes motivating to modify the majority of their behavior difficult (Bhamra et al., 2008; Darby, 2001). To bring this to a sustainable level, the causal link between behavior and positive or negative environmental or social consequences must be reinforced to encourage behavioral change (Darby, 2001).

### 2.3.2 Social innovation & sustainable development in terms of change

Academics, industry professionals, and government representatives have been paying increasing attention to Sustainable Development (UNITED NATIONS ECONOMIC and SOCIAL COUNCIL, 2018), along with a perception that innovation is a key driver for sustainability (Bocken and Geradts, 2019). The literature recognizes that sustainability should be approached through innovation-centered approaches (Silvestre, 2015a). This is because sustainable development is a pressing problem that necessitates urgent action and reforms on the part of governments, industry, and society as a whole (Silvestre and Ţîrcă, 2019). Here, social innovation can be defined as a novel mechanism that increases the welfare of the individuals who adopt it compared with the status quo (Young, 2011) or as new ideas (products, services, and models) that simultaneously meet social needs and create new social relationships or

collaborations. In other words, they are innovations that are both good for society and enhance society's capacity to act (Murray et al., 2010). DESIS Network's founder provided the following concept of design for social innovation: "Everything that expert design can do to activate, sustain, and orient processes of social change towards sustainability." (Manzini, 2015).

Since the external environment and our way of life are continuously influenced and changed through innovations (Huisingh et al., 2013), they are the critical elements in which organizations, supply chains, agencies, cultures, nations, and countries can drive change and implement sustainability. Innovation and change are important components for businesses/companies to boost their environmental performance and, as a result, advance in their road to sustainability (Silvestre, 2015b). As mentioned above, the presence of innovation (i.e., technology, product, procedures, business practices, or policy approach) is not sufficient for this to occur (Lilley, 2009; Silvestre and Silva Neto, 2014). Furthermore, the initiative's success is contingent on the organization's willingness to accept such innovation and completely incorporate it into business processes (i.e., to change), necessitating shifts in top management and staff mindsets. This is strongly supported by Manzini's (2015) reflection on the role of designers, saying that the activity of design is no longer completely under the control of the designers but rather it is passed on to users who play a crucial role in the success of the design (Silvestre and Ţîrcă, 2019). These include the above-mentioned top management and staff. If a parallel is to be drawn between a company and a society, the top management would be the government. It can be said that a change in the mindset of the government is necessary to enable social innovation. Therefore, individuals within a company, or in this case, a society, cannot change if the surroundings (society, social norms, and systems) do not allow it. This point is also supported in a paper by Millard (n.d.) on *How social innovation underpins sustainable development.* Additionally, a willingness to endorse and truly assimilate such innovations into business processes (i.e., the willingness to change) is also crucial (Silvestre and Ţîrcă, 2019).

Gardner and Stern (1996), and Jackson (2005) identify four main methods for influencing and potentially changing people's environmental attitudes and hence behavior: (1) laws, regulations, and incentives, (2) education and awareness-raising, (3) community management of environmental resources, and (4) reference to moral, religious or ethical principles. It is interesting to notice that methods (3) and (4) more likely refer to groups of people rather than individuals which only underlines the presence and need of social innovation when it comes to behavioral change.

### 2.3.3 Strategies

The theory of behavioral change has been operationalized in a range of design processes and method propositions. These describe a variety of behavioral techniques, from fully conscious to fully unconscious, or a mixture of both. In this case, the word 'strategic' refers to the overall approach to behavior change, which involves implementation, action, tracking, and data collection (Fogg, 2009; Kelders et al., 2012). Furthermore, the application of sustainable design strategies can substantially minimize the environmental and social impacts of these products and services (Lewis et al., 2001) including physical removal of choice (Herring & Roy, 2007).

Researchers in the field of psychology have concentrated on interpreting behaviors and thus providing theoretical guidelines for strategies and interventions in practice. For example, Prochaska and Velicer's (1997) Transtheoretical model describes an individual's decision-making process in terms of six stages, from precontemplation to action and maintenance. From an ethical standpoint, there is no simple agreement as of yet, about what constitutes an appropriate degree of action/intervention or how to determine the seriousness of the effects enacted by various actions. This study hypothesizes that a sequence of strategies, ranging from 'passive' (or 'informative') to 'assertive' (or 'persuasive') to 'aggressive' (or 'coercive'), should be applied in sequential order. These are the user's level of compliance, the gravity

of the consequences of actions taken, and the context in which the interaction takes place (Lilley, 2009).

### 2.3.4 How can service design support social innovation

The service design discipline has matured now and attained a distinct identity *(see sections 2.1.1 The origins of service design and 2.1.2 Service design today of this review, p. 11)*. Design for Behavioral Change is a new discipline that aims to influence - without coercion - individual and group behavior for a better personal life and the world. It draws on a variety of disciplines, including psychology, sociology, behavioral economics, and social innovation. Governments, non-profit organizations, and businesses are all taking advantage of its potential. The commonality in attention to the long temporality of design interventions is a significant congruence in these two disciplines, offering opportunities for synthesis to leverage their synergy (Mahamuni et al., 2018).

It can safely be said that influencing user behavior can be challenging. Despite more than a decade of campaigns encouraging consumers to act differently and use products more efficiently, consumers are slow to adopt more sustainable habits (DeVries, 2006; Siegle, 2006) and behavioral changes made are often short-lived (Scott, 2004). Motivation researcher Edward Deci has suggested that if the behavioral change is to be sustainable, it is necessary to stop thinking of motivation as something people ‘do’ to other people and instead think of it as something service designers can help service users do for themselves (Bisset and Lockton, 2010). In reality, service design can be looked at as a holistic technique for assisting service providers in the development of explicit and measurable design solutions (Mager & Sung, 2011), or as a comprehensive and co-creative approach to innovating services, which involves taking into account customers’ and service providers’ views in their contexts and translating these viewpoints into new service system experiences and potential service futures (Holmlid and Evenson, 2008). Especially that the aim of service design is not only to create an integrated, delightful, and unforgettable experience for customers, but mainly a viable, efficient, and effective solution for businesses (Moritz, 2005).

Service design has been used in social innovation not only as a result of a general focus on value co-creation (Blomkvist et al., 2010) but also because of the structured design activities and valuable tools for value co-creation that comes with it. Design for social innovation can be described as something design can do to start, improve, promote, enhance, and replicate social innovation. It provides structured design activities and valuable tools for value co-creation (Manzini, 2014). Nowadays, service design has continuously been applied to a wide range of social problems and challenges (European Commission, 2009), and a growing volume of studies (Bradwell and Marr, 2008; Parker and Heapy, 2006; Tanigawa and Tanaka, 2006) have discussed the application of service design in public service innovation, such as in the British NHS Medical System, American Kaiser Permanente, and the Japanese Emergent Medical System. In addition, a small but increasing number of design agencies and design-led social enterprises have been practicing design for social innovation, such as UsCreate, ThinkPublic, Participle in the United Kingdom, and Project H in America (Thackera, 2007; Pilloton, 2009).

‘Collaborative services’ is an initial term introduced by Manzini and his colleagues. The designer’s job is to first promote the production of new ideas and then to make them attainable so that they can contribute to the formation of social enterprises (Jégou and Manzini, 2008). The transcendent aim of a design for social innovation would be a synergistic process that allows the designing network to eventually achieve a more shared, comprehensive, and centered understanding and consensus, resulting in creative ideas that contribute to a mutually recognized final solution (Morelli, 2011; Emilson et al, 2011).

Design has the potential to help spark, fund, and scale-up social

innovations. It is becoming increasingly apparent that there are new modes of design practice emerging outside of consumer culture, one of which is in the area of design for social innovation. These new practices would necessitate closer collaboration between design and other disciplines (Manzini, 2011) involved in and creating social innovations (Mulgan, 2009).

## 2.4 PLATFORMS

Throughout the design process, the concept of platform emerged and therefore literature on this topic is reviewed in the following section. It is important to note that this section was added later than the previous ones and likewise lays the theoretical base for the solution.

### 2.4.1 The concept of platforms

According to the Oxford dictionary (oxfordlearnersdictionaries, n.d.), a physical platform is a raised level surface on which people or things can stand. On the other hand, according to Choudary et al. (2015), who are some of the top business and strategy thinkers and co-authors of platform revolution among many others, the definition of platform is a business built on facilitating value-creating connections between external suppliers and customers. A platform establishes governance conditions for these interactions by providing a transparent, participatory infrastructure. The ultimate goal is to complete matches between users and facilitate the exchange of goods, services, or social currency, allowing all participants to create value. The exchange of value may involve the exchange of physical goods (e.g. eBay), virtual goods (e.g. Medium, Youtube) standardized services (e.g. Uber, Airbnb), non-standardized services (e.g. Taskrabbit, Upwork), or data (e.g. Waze and Nest) (Ibid.). In other words, platforms are seen as hubs for value exchange (Eloranta and Turunen, 2016), facilitating both direct and cross-platform network effects (McIntyre and Srinivasan, 2017). At the core of the platform's ecosystem are the parties using the platform to engage in value-creating interactions; however, the ecosystem may also encompass other actors, such as data partners or industry actors who do not directly participate on the platform (Choudary, 2018).

The contrast between platforms and many conventional businesses is the use of a system commonly called a pipeline which employs a linear value chain arrangement for creating and transferring value, with producers at one end of the pipeline and consumers on the other. Whereas in the platform structure, the pipeline is transformed into a more complex circular relationship between producers, customers, and platform providers (the platform itself). In the platform structure, producers and consumers often switch roles, however, never in the same interaction since a well-designed platform makes it easy for the user to move from role to role. In the process, they interact and use resources provided by the platform (most often information) and during these interactions, they exchange, consume, and co-create value (Choudary et al., 2017). For example, Amazon started as a traditional online store but aggregated additional supply-side scalability as it moved toward an online marketplace model and therefore it changed from stores to marketplaces, and from pipes to platforms (De Götzen, 2020).

These three activities – source, assemble, and deliver – are increasingly made more efficient, leading to higher repeatability of the core process of pipelines. Platform businesses do not focus on any of these activities. With the goal of enabling interactions, platform businesses have three rather different priorities:

1. **Pull:** The platform must pull producers and consumers to participate on the platform.
2. **Facilitate:** It must facilitate interactions between them.
3. **Match:** It must match demand with supply to ensure that the right producers and consumers interact with each other.
   (Choudary et al., 2016).

It can be said that platforms beat pipeline businesses due to their efficient

scalability and removal of old-fashioned gatekeepers often used by pipelines. Not only can they scale more quickly because gatekeepers are replaced by market signals, but they also give customers more flexibility of choice based on their wants and needs rather than pipeline one size fits all. Platforms also beat pipelines because they unlock new sources of value creation and supply and furthermore create value using resources they don't own or control and they grow much faster than traditional businesses (Choudary et al., 2017).

### 2.4.2 Platforms & ecosystems

Despite their many variations, all platforms have the same basic ecosystem, which consists of four types of players. Platform *owners* are in control of their intellectual property and governance. *Providers* act as the platforms' user interface. *Producers* build their offerings, which are then used by *consumers* (Choudary et al., 2016).

In platform ecosystems value is created by interactions between users, powered by data. Data science improves the platform's ability to orchestrate interactions in the ecosystems (Choudary et al., 2015). Furthermore, value creation is influenced through many choices, including governance (Tiwana et al., 2010; Gawer, 2014), competition (Choudary et al., 2016), openness (Parker and Van Alstyne, 2008), as well as quality and how consumer expectations are managed (Zhu and Iansiti, 2011).

In a networked environment, the notion of an ecosystem as a new source of supply and value development represents a significant change. Scale is now accomplished by exploiting connections in the environment rather than accumulating labor and capital within a company or non-scalable contractual relationships outside the business (Choudary et al., 2015). The ecosystem stores the inventory, while the network coordinates the distribution of that inventory to meet demand. Even though the platform may manage or orchestrate the physical distribution of products from warehouses, it does not own significant amounts of the inventory it sells (Ibid.). Overall, a service ecosystem perspective emphasizes that the context of value co-production, especially the social context, is collectively constructed by actors (Edvardsson et al., 2010). It can be said that since labor and resources no longer need to be aggregated internally, there is no physical concentration, no centralized control but rather distributed systems. Where the platform plays the role of sole facilitator rather than the owner and they derive most of their value from the communities/ecosystems they serve (De Götzen, 2020).

### 2.4.3 Platform design

How do we create a platform that invites participation and creates significant value for all users? A poorly designed platform produces little or no value at all and generates weak network effects (Choudary et al., 2017).

Platforms can facilitate direct interaction and exchange between the users like in the case of social networks where the connections made create value exchange. On the other hand, there are platforms like Youtube where there is no direct connection between creators and consumers but value is still being exchanged. These exchanges can occur in the real world or the virtual one but in every such exchange, three things are present - information, goods and services, and some form of currency (Choudary et al., 2017).

Information plays a crucial role in platforms, in fact, some platforms function only to exchange information like Reddit. Nevertheless, even platforms that enable the exchange of physical goods must provide information. In fact, one of the fundamental characteristics of a platform business is the information exchange that takes place during the platform itself (Choudary et al., 2017). When it comes to goods or services, these can be exchanged through the platform itself like on social media or it is only the information that gets exchanged through the platform and the exchange of goods are carried out of it. Nevertheless,

platforms enable, facilitate and make the exchanges more convenient (Choudary et al., 2017).

With the word currency, the first thing that comes to people's minds is usually money. But in the case of platforms, currency refers to any form of value with which the consumers 'pay'. In the case of Uber it is money, but in the case of YouTube, the currency is attention or in the case of Tripadvisor it is done by reviews, which also add value to the producer. Therefore, attention, fame, influence, reputation but also information and other intangible forms of value can act as currency on a platform (Choudary et al., 2017). Just like in the case of goods, the exchange can take place on or off a platform. Nevertheless, usually the monetary payment takes place through the platforms (Airbnb, Uber) even though the service delivery is executed off the platform, the loop (financial/monetary payment) is closed through it. The platform goal is to enable these three forms of exchange mentioned above providing tools and roles to make these exchanges efficient and rewarding.

The first step when designing a platform is to determine the main purpose and core interaction, including main interactions that take place in the platform, and related mission and goals (Gawer and Cusumano 2008; Choudary et al., 2016). A core interaction is the one main action taking place on the platform and involves three key points - participants, value unit, and filter. The main purpose of the platform is to facilitate the core interaction. Most platforms enable and facilitate various interactions but there is always a core one (Choudary et al., 2017). The value unit is delivered to consumers based on filters. A filter is an algorithmic software-based tool used by platforms to enable the exchange of appropriate units between users - creating a perfect match. If the filter is badly designed or not present at all, users are flooded by irrelevant and valueless units which discourage their use of the platform altogether (Ibid.).

Since platforms are designed around two or multi-sided markets, the second step entails defining the specific market structures and key players representing various structures by identifying the set and types of platform users, as well as the minimum necessary stakeholders for the system to function (Morris and Ferguson, 1993; Choudary et al., 2016). Two-sided markets bring together (or match) two distinct groups in a relationship where the value for one group increases as the number of participants from the other group increases (Evans, 2003). Evans (2003) emphasizes the necessity of a multi-directional flow of value.

The general policies, rules, and 'laws' that are implemented by the platform leader or other instances for the participants are often taken into account when designing the platform governance (Boudreau and Hagiu, 2009; Choudary et al., 2016). Important choices include data and information protection (e.g. user identity), content creation, and who regulates this content (consider e.g. the variety of YouTube video contents).

Oftentimes, platforms only provide the infrastructure and filters for the interaction but have no control of the inventory. However, they can contribute by creating filters and quality curation (Choudary et al., 2017). The key to minimizing most negative network effects is quality curation, which increases the chances of a happy match between the producer and consumer (De Götzen, 2020).

To avoid market failure and promote repeating interactions, a platform must ensure quality and cultivate trust among its users. To accomplish this, a platform's architecture must include a reputation system, which is a mechanism for distinguishing between good and bad actors within the platform's users. To keep up with the network's development, the reputation system must be scalable. To assess trends of good behavior or violence, reputation systems often depend on codifying and monitoring the actions of platform members. They often depend on mechanisms such as ratings and reviews for feedback (Choudary, 2018).

There are many effective tools like the Platform Canvas developed to help businesses cover all the important points mentioned above when

designing a platform, including producer and consumer side, filters, value, curation and customization, currency, and more (De Götzen, 2020). An example of such a canvas can be seen on figure 1.

### 2.4.4 How can platforms support circular economy

Online platforms have recently been identified as an enabler for a circular economy (e.g. Lewandowski, 2016). Some argue that online networks have aided in the implementation of a circular economy by allowing individuals and organizations to share access to underutilized physical resources, reducing surplus capacity and sluggish resource loops (Henning, 2015). Google, one of the most popular online platforms, has teamed up with the Ellen McArthur Foundation to help the circular economy go digital (EMF, 2017).

The majority of previous research has focused on the environmental sustainability of online networks in the so-called sharing economy. Their possible environmental effect tends to be mixed: Platforms for the sharing economy will both lead to long-term sustainability (e.g. by reducing excess capacity) and inhibiting it (e.g. by increased energy use of growing data centers) (Lelah et al., 2011; Frenken and Schor, 2017). According to the literature included in this review, online platforms can be used to (1) sell/market, (2) run, and (3) co-create products, components, and materials.

Whether online platforms as markets lead to environmental sustainability is, in general, a product of deliberate design choices (Tukker, 2015; Bocken, 2017). The Materials Marketplace facilitates the reuse of company-to-company industrial waste. These platforms thus make deliberate choices to enable the slowing and closing of resource loops via online platforms (Konietzko et al., 2019). Sharing economy networks, in particular, tend to rely on and maintain current, potentially unsustainable infrastructure. For example, the car-sharing service Zipcar relies heavily on fossil-fuel vehicles. Airbnb gives people access to houses that use a lot of electricity. What is more, online networks have added to the cumulative environmental impacts of mobile communication due to their reliance on mobile and cellular infrastructure (Boons and Bocken, 2017).

Online platforms can serve to operate product-service systems (Manzini and Vezzoli, 2003; Cenamor et al., 2017). A product-service system is a collection of goods and services that work together to provide value to customers (Boehm and Thomas, 2013). Intermediate services are often used to prolong the life of goods (e.g. through maintenance contracts). Advanced services, in which businesses retain control of their goods, encourage businesses to invest in long-lasting, easy-to-maintain and repair products. As a result, they will help to enable a more circular economy (Tukker, 2015).

Lastly, online platforms can empower people to co-create products and services (Evans et al., 2007). The majority of online platforms that allow the co-creation of circular economy products and services are part of the so-called open-source movement (Bakker et al., 2018). The movement proposes that individuals want or need to participate in creating a circular economy. This interpretation is currently manifested in repair cafes, maker rooms, shared economy networks, and distributed manufacturing (Ibid.).

## 2.5 CONCLUSION

The purpose of this literature review is to provide an overview of how service design techniques can be utilized to create and develop service offerings from a holistic, human-centered perspective and how that can be applied to assist sustainable initiatives that support circularity. The theory included in this review clearly shows a need for solutions that bring balance between the environment and economy due to increased environmental consciousness, simultaneously requiring critical thinking

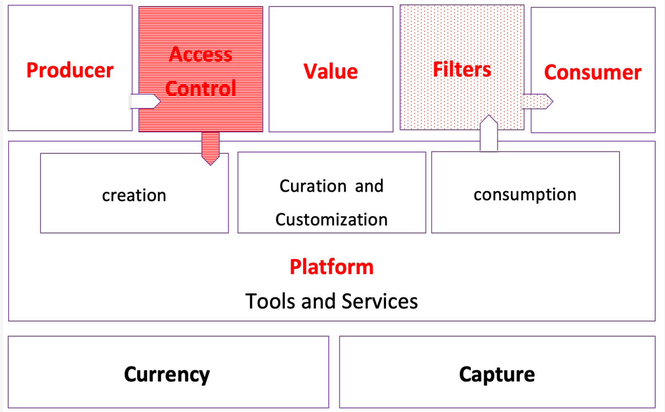



Figure 1: Platform Canvas (De Götzen, 2020)

in the choices and decisions behind design, which has the power to influence change or shape behavior towards a common (sustainable) desire.

Design for change is not without challenges, but if done correctly it can inspire movements to take action and demand change for the greater good, such as is seen through social innovation. Reflecting on these points, the notion of a platform as a business model can be considered to connect them through facilitating value exchange by providing an infrastructure that supports participation for value creation. Additionally, the platform business model can be viewed as an enabler for the circular economy through a shift from a linear value chain to a continuous loop, by functioning as product-service systems providing access to underutilized resources and/or prolonging the life of goods. However, this similarly requires deliberate design decisions, to ensure that the platform service in itself remains sustainable in its operation.

These findings shed light on challenges, gaps, and possibilities that insist on new perspectives. Through a case study on the topics of waste and education, the subjects will be further explored, investigated, and tested, as the main purpose is to highlight how awareness and consciousness on the matter, can lead to better, more sustainable decisions through the utilization of innovative methods.

# 3. RESEARCH QUESTION

The initial problem statement/research question was commonly decided on by the group, based on the literature review, perceived issues, opportunities, and common interest in the topic. The problem statement presents the initial direction and focus area of this thesis - a starting point. Nevertheless, it will most likely be altered during the process of the project, based on the upcoming investigation that will shed light upon new realities. It goes as follows:

# EXPLORING HOW SERVICE DESIGN CAN ENCOURAGE BEHAVIORAL CHANGE: A SHIFT FROM A LINEAR TO A CIRCULAR WAY OF THINKING:

*How might we, through service design, aid in educating students in primary schools on responsible waste management and encourage a circular mindset?*

# 4. METHODOLOGICAL APPROACH

This section will represent the methodological approach and the chosen framework for this project. Frameworks provide a structure and guidance on how to do something in a desired manner, without being too detailed or static (Ellis, 2008). Thus, frameworks aid to provide a direction, while at the same time leaving space for the application of tools and methods throughout the process. In design practice, using frameworks and models enable the designer to observe, understand and visualize complex social systems of service organizations (Sangiorgi, 2009).

For this project, the group has considered two design thinking frameworks, the IDEO and the Double Diamond. After careful consideration, it has been decided to merge those two:

**The IDEO** is a human-centered approach to design thinking consisting of 5 main stages *Empathize, Define, Ideate, Prototype,* and *Test* (IDEO, n.d.). The framework allows space for constant iteration, meaning going back and forth between the stages to explore and develop the most relevant and feasible idea. The iteration and repetition of steps can be seen in figure 2.

**The Double Diamond** is a framework for innovation by the Design Council (Ball, 2019) providing a clear and visual description of the design process including four phases: *Discover, Define, Develop, Deliver* (Ball, 2019). Moreover, the two diamonds (figure 3) represent a method of diverge and converge thinking patterns, where at first issues are explored widely and deeply and then taken into action.

The group has decided to use the IDEO design thinking stages for the design process, while adding the delivery part as well as the diverge-converge thinking method of the Double Diamond. Thus, taking advantage of IDEO's flexibility and space for iteration between the different stages, which allows for more complex and accurate results in combination with double diamond divergent - convergent thinking patterns, ensuring that many possible ideas and choices are explored. Moreover, adapting the Double Diamond delivery stage will aid to round up and complete the project.

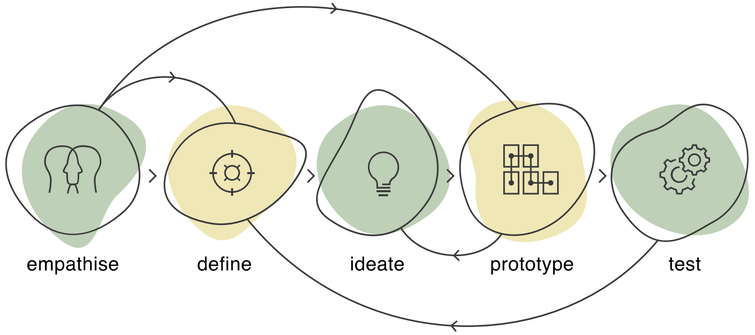



Figure 2: IDEO (Author's creation)

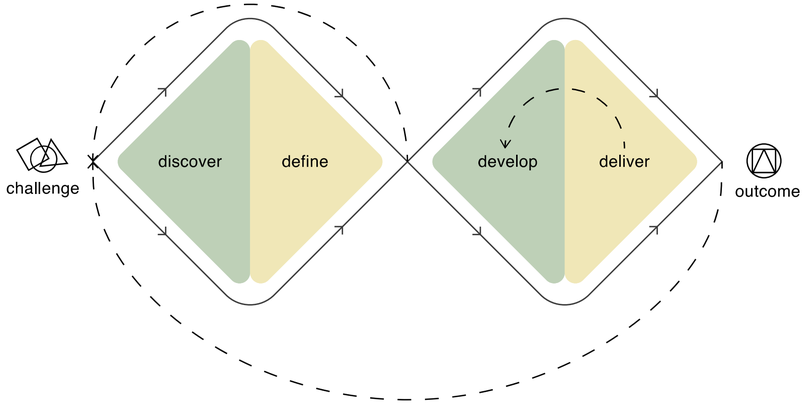



Figure 3: Double Diamond (Author's creation)

## 4.1 STAGES

**Empathize**
This is the first stage in the design thinking process, and it involves understanding and acknowledging the problem to solve. This is primarily done through user research, in which information is gathered on users and their needs and problems, to figure out how to develop a solution that seeks to solve the problem. As the name indicates, it is particularly crucial to empathize with the users, in order for the designer to see the world from the user's perspective and avoid biases through own assumptions of the status quo (Yu Siang, 2009; Dam and Siang, 2019a).

**Define**
During the second stage, the information accumulated in the first stage (empathize) is analyzed to uncover and define core problems. This is done through synthesizing and clustering the research in order to make sense of it and acts as a preliminary brainstorming step before the next stage (Yu Siang, 2009; Dam and Siang, 2019a).

**Ideate**
In this stage, the focus is on generating ideas based on the results of the previous two stages. Specifically, this includes identifying possible solutions to develop by viewing the problem from various perspectives, seeking to explore all potential ideas. The ideation stage reflects a process in which the used techniques aim to encourage free-thinking and exploration, gradually narrowing down the scope and ideas until a concrete idea and solution has emerged (Yu Siang, 2009; Dam and Siang, 2019a).

**Prototype**
This stage involves the creation of prototypes of the developed solution based on the three previous stages. The prototypes can vary in medium, however, common to them all is that they are often inexpensive scaled-down versions. The purpose of this stage is to investigate and determine the best problem-solution (Yu Siang, 2009; Dam and Siang, 2019a).

**Testing**
The testing stage concerns the assessing of the developed solution, in which the prototyped solution is continuously tested to uncover any problems and re-define/re-adjust to improve the overall experience for the users. This stage aids in providing useful information and understanding of the extent to which the users' wishes are met as well as problems are resolved (Yu Siang, 2009; Dam and Siang, 2019a).

**Deliver**
Finally, the deliver stage of the Double Diamond revolves around the final concept, final testing, production, and launch. As the previous stages are covered in the IDEO process, the Double Diamond deliver stage will be focused on the present solutions and future scalability. The previous stages led to designing a service to solve a particular problem which upon completion can then be delivered (Innovation English, n.d.).

## 4.2 PROJECT PLANNING AND PLATFORMS

For this project, the group will use the online project management tool Trello (Trello, n.d.), to aid in structure and keeping track of the process of tasks and deadlines to be upheld. Furthermore, the online whiteboard tool Miro (Miro, n.d.) will be used to facilitate and quickly visualize research and brainstorming sessions.

# 5. FOCUS AREA

Before moving any further with the project, a focus area needed to be agreed upon. As the topic of this thesis revolves around sustainability and circular economy, it has been decided to center the attention of the thesis case study on waste. However, it is crucial to establish a specific category of waste as it is an exceedingly broad field with many subcategories *(see section 6.1.1 Waste typologies, p. 30).* According to waste statistics conducted by the Danish Ministry of Environment (Miljøstyrelsen, 2020), the largest amount of waste produced is construction waste at 3.910 tons with domestic/household waste as a runner up with 1.245 tons in 2019. During that year, 50% of the domestic waste was being recycled, which is an improvement from previous years and demonstrates a rising curve (figure 4). Furthermore, this indicates an opportunity for improvement, as well as a growing willingness of people to change their mindset and behavior and recycle (Miljøstyrelsen, 2020). This report addresses the waste in its full complexity listing all the sources and typologies of waste and therefore offers a thorough overview. Based on this information, the group has decided to dive deeper and investigate waste related to households and educational institutions. Not only in regards to the numbers mentioned above but also in terms of human behaviors, which the group would like to investigate through this thesis. Essentially, the focus will be on municipal waste, since household and educational institution's waste is not categorized into one larger cluster other than municipal waste (Bundesministerium für Umwelt, 2020a). Therefore, medical, construction, production, or agricultural waste are not going to be considered nor mentioned further on.

To narrow down the focus even more, a target group has been agreed upon when formulating the initial problem statement. The focus fell on children in education due to a genuine interest of the group. It is a common belief that children are the changemakers of tomorrow and investing in them is of high importance as they will determine the course of action for the future (Clark et al., 2020). The keywords that have been strongly present during this decision-making process were circularity and designing for behavioral change, concerning waste. This was one of the reasons why the practical case/investigation of this thesis will primarily be focused on children in education.

Danish citizens are obligated to attend ten-year compulsory schooling, including grade zero and nine years of primary school education. After primary school is completed, young adults in Denmark can choose whether to continue with a general upper secondary education or vocational education/training. After completing secondary education, there are several higher education programs to choose from. The Danish education system aims to ensure three main goals in particular: *Quality assurance, lifelong learning, and active participation* (Ufm, 2018). The development of children can be divided into 5 general phases: *infant, toddler, play age/preschool, school age, teenage age.* Hence it has been decided to limit the focus to this group (school age 6-12) (hereafter referred to as children in primary school or student), who are excited to learn and start to understand that learning is significant for the future. In school-age (6-12 years), children are excited to learn and start to understand that learning is important for the future. During grade zero up to grade sixth, the child becomes good at learning and cooperating (Psykiatrifonden, 2021). Learning takes place through the child's own experience and the adult's communication. Although much of the children's learning is self-motivated and self-directed, other people, eg. parents, caretakers, teachers, are major guides in fostering the development in the learning of children (Bransford, 2000; Tanggaard, 2020). In school, the child is a student and has the chance to learn in another way, while experimenting, playing, and immersing themselves in a completely different way than outside the school environment (Tanggaard, 2020). Thus, it can be said that children can adapt to new, more sustainable ways of thinking and managing waste and nudge their parents towards more circular behavior as well.

Since children at this age are not decision-makers and live with their parents, the parents are considered decision-makers and need to be considered and addressed in connection to the use of the service,

| **Affaldskilder** | Genanvendelse<br>Ton (1.000) | | | | |
|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 |
| Hus-holdninger | 44 % | 46 % | 46 % | 48 % | 50 % |
| Service | 55 % | 56 % | 54 % | 60 % | 60 % |
| Industri | 73 % | 75 % | 72 % | 69 % | 74 % |
| Bygge og anlæg | 88 % | 87 % | 85 % | 36 % | 36 % |
| Andet erhverv | 86 % | 82 % | 83 % | 38 % | 46 % |
| Total | 69 % | 69 % | 68 % | 45 % | 47 % |

Figure 4: Recycling of domestic waste (Miljøstyrelsen, 2020)

besides the educators and teachers in primary schools and educational institutions.

Initially, the case will be built within the Danish education system, more specifically in schools in Copenhagen, where the waste consumption habits will likewise be studied with the aim to propose new ways of improving the waste system and establishing circular value streams. The focus was set on Copenhagen since it is where the group is located and already has built a certain network which allows for a deeper and more thorough investigation. Complexity and tangibility reasons related to the size and feasibility of the project also played a role in the decision-making process. Even though Copenhagen is the initial focus in terms of location, the group is keeping scalability in mind and intending for the final service to be adaptable in different locations. This provides a very diverse environment for a broad investigation and development and at the same time offers some guidelines.

# CASE STUDY

# 6.1 EMPHATIZE

# 6.1 EMPHATIZE

At first, the group started out with desk research in order to understand the context of the problem area. As outlined by Stickdorn et al. (2018), desk research or secondary research describes the collection, synthesis and summary of already existing research gathered by someone else. With desk research, the aim was to become familiar with the topics of waste and composting, sustainability, childhood learning stages as well as behavior and nudging. In addition to the secondary research, primary research is collected by the group to gain a deeper understanding of the user. Primary research is any type of research that includes self-collected data for a specific purpose (Stickdorn et al., 2018). This section explains the primary data collection of a conducted survey on waste behavior as well as interviews on sustainability approaches of schools.

## DESK RESEARCH 1.0

### 6.1.1 Waste typologies

Waste comes from many sources in many diverse forms and can be categorized in a variety of ways. For instance, the European Commission classifies waste according to the European List of Waste, which is publicly accessible. According to the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety in Germany, there are 842 different types of waste (Bundesministerium für Umwelt, 2020b).

The waste can be categorized, for example, by the sector that produces the waste, or its character. The sectors include households, services, industry, construction and demolition waste, agriculture, sewage, and waste from other sources. Simultaneously, the character, which is in most cases the material, include glass, wood, plastic, water, food, clothing, oil, medicine, construction, organic, sewage, electrical, production and packaging, and more, depending on the selected criteria one decides on to classify waste (The Danish Environmental Protection Agency, 2017).

It is the term, applied to waste from private households and similar facilities, such as medical and law practices, administration buildings, schools, kindergartens, hospitals and care homes, and household-like commercial waste. Municipal waste includes bulky waste, market waste, road sweepings, biological waste (from now on referred to as bio-waste), and separately collected recyclable materials such as glass and paper (Bundesministerium für Umwelt, 2020a).

In Denmark in 2020, a new deal has been approved, aiming to cut 0.7 million tonnes of emissions and make the country's waste sector carbon neutral by 2030. To achieve this, Danes need to sort their recycling into ten different containers (The Local, 2020). There has been a rising curve when it comes to the percentage of recycled waste from households, according to the Danish Environmental Protection Agency. In 2013 only 40% of generated household waste was recycled, whereas in 2015 it was 44%, and in 2019 it went up to 50% (Miljøstyrelsen, 2020). Therefore, it can be said, every year, more people are recycling their waste. This sheds light upon yet another classification of waste, which is arguably the most relevant, the recycling bins (see figure 5).

Additionally, it is now possible to compost in Copenhagen. However, there are certain rules to recycling, for example, everything has to be cleaned and free of food particles. For this reason, pizza boxes cannot be recycled. Unfortunately, not many people are aware of this fact, and they sort their waste incorrectly even though this information is publicly accessible (McOmish, 2017). This only underlines the importance of waste education and waste management awareness.

#### FOOD WASTE

Food waste makes for a large part of the household produced waste, and it is a very complex and problematic category. Food waste can


Figure 5: Waste sorting guide (Københavns Kommune, n.d.)

be divided into avoidable and unavoidable food waste. The avoidable food waste is defined as the food that could be eaten, but instead was thrown away regardless of the reason. Whereas, the unavoidable food waste is the food that would not be edible under normal circumstances (e.g. bones, banana peel, etc.). Although, a large section of the unavoidable food waste can be repurposed into compost (Cambridge Carbon Footprint, n.d.).

Food waste was estimated at 183 kg per household per year (86 kg per person per year), of which 103 kg per household (48 kg per person) per year was avoidable food waste and 80 kg per household (38 kg per person) per year was unavoidable food waste. This means that people could avoid producing more than 50% of food waste per person if they approached it differently. The mass of avoidable food waste discarded per household increased in line with household size. However, there was no statistical evidence that a household containing one person throws away more avoidable food waste per person than households containing more than one person (Edjabou, 2016).

### 6.1.2 The city of Copenhagen

Copenhagen municipality is currently working on developing sustainable actions that support a circular economy as part of their extensive Resource and Waste Management Plan, in which proper waste sorting and management as well as recycling of waste is a high priority on the agenda. Some of these actions have already been introduced and implemented in Copenhagen, such as waste management through source-sorting as well as initiatives encouraging citizens to recycle and reuse waste instead of discarding it, through the use of recycling hubs placed throughout the city (Københavns Kommune, 2019).

To make waste management as effective and manageable for citizens as possible, Copenhagen municipality provides information regarding how to sort waste based on source, through the official website as well as through pamphlets and brochures. On the official Copenhagen municipality website, private citizens can search specific sources and types of waste to learn more about how to properly dispose of it (Københavns Kommune, n.d.c).

Businesses are required to properly manage their commercial waste through source-sorting similarly to private citizens, likewise Copenhagen municipality provides businesses with informational guides to waste sorting to guarantee that the waste is properly disposed of (Københavns Kommune, n.d.a.; Københavns Kommune, n.d.b).

To further the initiatives set in motion through the Resource and Waste Management Plan, Copenhagen municipality has developed a sub-part of the plan called Circular Copenhagen, which seeks to advance the steps needed towards a more sustainable city. The Circular Copenhagen plan includes three main objectives of which the various initiatives will contribute to achieving (Københavns Kommune, 2019):

1. 70 % of household waste and light industrial and commercial waste to be collected for recycling.

2. 59.000 tons reduction in CO2 emissions by utilizing bio-waste for biogas as well as divert plastics intended for incineration.

3. Triple reuse and recycling by making it easier and more appealing for Danes to swap, share or reuse waste instead of disposing of it.

Besides the actions regarding waste sorting and management as well as recycling and reuse of waste material, the Circular Copenhagen Plan also explores initiatives supporting educational efforts to inform and teach children and young people on the topic of sustainability and circular economy. The aim is to raise awareness on resources, waste prevention, and waste management through participation, which will encourage them to adapt to change and adopt a more sustainable behavior and besides inspire them to influence and impact those around them, such as the parents and peers (Københavns Kommune, 2019).

## 6.1.3 Copenhagen Municipality Sustainable Development Goals

As part of the agenda for a more sustainable city, Copenhagen municipality is utilizing the United Nations Sustainable Development Goals (SDG) which seek to achieve a more sustainable and resilient future for people and the planet. Common to all the seventeen SDG are three interconnected core elements: Economic growth, social inclusion, and environmental protection. The SDG address global challenges, including climate change, poverty, inequality, environmental degradation, peace and justice (United Nations, n.d.b).

The SDG support Copenhagen municipality's climate plan's goal of becoming CO2 neutral in 2025 (Københavns Kommune, n.d.d). Many initiatives are already contributing to a more sustainable city across all of the SDG, and concerning the topic of waste, sustainability, circularity and the environment some goals are more relevant to elaborate on (figure 6) (Københavns Kommune, n.d.e):

### SDG 7

Aim to ensure access to energy for all with a focus on sustainable renewable energy (United Nations, 2018a). In particular Copenhagen municipality tackles this goal through recycling of waste into resources through increased responsible waste sorting based on source, specifically converting biomass and organic waste into energy (Københavns Kommune, n.d.e).

### SDG 11

Due to global rapid urbanization, consequences can be seen in struggling infrastructures and services, one of which is waste collection, ultimately leading to the worsening of air pollution as well as unplanned urban sprawl (United Nations, 2015). Copenhagen municipality invests in development projects with Amager Ressource Center involving matters of protection of climate and environment, responsible for Amager Bakke, Copenhagen's newest waste energy plant aiming to reduce CO2 emissions whilst extracting 20% more energy from waste (Københavns Kommune, n.d.e).

### SDG 12

Worldwide consumption and production is directly linked to natural resources, and more importantly how mankind uses these. The focus is on doing more and better with less, by increasing resource efficiency and promoting sustainable lifestyles (United Nations, 2018b). Copenhagen municipality targets this goal by limiting amount of waste through prevention, reduction, recycling and repurposing for both citizens and businesses, by implementing better waste schemes around the city and change the view of waste from being an issue to being a resource (Københavns Kommune, n.d.e).

## 6.1.4 Learning practices & methods

To support further the focus on children in education and gain a deeper understanding of how children learn, research has been done on various learning methods. Additionally it is to understand and determine how to approach and address information for optimal learning purposes. The VARK model, created by Fleming and Mills (n.d.), is an acronym for four sensory modality learning types: (1) Visual , (2) Aural, (3) Read/ Write, and (4) Kinesthetic.

**Visual modality**

The visual modality preference includes information in the form of maps, diagrams, graphs, charts, designs, shapes, and formats that highlight information that otherwise could have been presented in words. It is worth noting that this modality does not include visual information such as pictures, images, videos, and movies.


Figure 6: Sustainable Development Goals (United Nations, 2018a).

### Aural modality

The aural modality concerns a learning preference in which information is heard or spoken, and this includes information provided through either lectures, discussions, the act of talking out loud or to oneself, or other speaking activities. The learning arrives through speaking about the topic in order to gain an understanding of the matter at hand.

### Read/Write modality

The read/write modality considers the information presented as words and primarily consists of text-based input and output; reading and writing in all forms, however especially in the form of either reading and/or writing manuals, reports, essays, and assignments, etc.

### Kinesthetic modality

The kinesthetic modality is based on experiences or practices either real or simulated, portraying a reality that can reflect personal experiences. It can include information being delivered through demonstration, simulations, videos, and movies of real events and things and has a tangible element to it. This modality considers a preference for obtaining information by applying learning by doing attitude.

It should be noted that although people may have a preference for a specific modality when it comes to learning and understanding new information, they often prefer a combination of the four modalities in order to sufficiently obtain information. (Fleming and Mills, n.d.)

## 6.1.5 Behavior

#### NUDGING

When people make decisions, they make them in an environment where various features, both obvious and non-obvious, can impact the final decision, and the person in charge of creating that environment is defined as a *choice architect*. Choice architecture can be used to nudge and steer people towards making better decisions, as numerous studies confirm that people, although they might believe otherwise, do not make for the greatest decision-makers (Thaler et al., 2010; Thaler and Sunstein, 2008). According to Thaler and Sunstein (2008), a nudge can be defined as a means to shift and influence people's behavior in a way that does not forbid nor remove any options, but merely easily intervene and offer alternatives (Thaler and Sunstein, 2008). Whilst choice architects undoubtedly can be used against people's best interest, the intention as set by Thaler et al. (2010) is to use nudging in choice architecture for the better of people, by having a good sense of understanding of people and behavior, to improve lives through the development of user-friendly environments (Thaler et al., 2010; Thaler and Sunstein, 2008).

#### BEHAVIORAL PATTERNS REGARDING WASTE MANAGEMENT

It was decided to investigate Danes' behavioral patterns regarding waste management to uncover and determine the current state of awareness and consciousness. The research showed a continuous increase in recycled household waste, numbers from 2019 showing a total of 50% of household waste (domestic waste) being recycled. Furthermore, the total share of waste collected and sent for recycling has also increased to 47 % in 2019 (Miljøstyrelsen, 2020).

The numbers from the Danish Environmental Protection Agency support other inquiries done by Bolius (knowledge center) and the political interest organization, The Danish Waste Association regarding Danes' approach to waste management. The inquiries show that 7 out of 10 Danes sort their waste based on its source. The general consensus is positive towards these increasing efforts within waste management and recycling, with 3 out of 10 Danes interested in increasing own efforts for proper waste management if municipalities simultaneously increase options, thus indicating that the current initiatives supporting these sustainable efforts work; bins and informational brochures from the municipalities (Baltzer, 2019; Dansk Affaldssortering, 2021). The group least interested in and likely to sort their waste are young men aged 25 and under, as well as citizens living in apartment buildings as investigations show there is more of a distance between tenant and waste despite having the same options for waste sorting and management available to them (Baltzer, 2019).

## 6.1.6 Circular economy cycles

As aforementioned, the concept of circular economy aims to combat the traditional consumption model that has been established throughout the past decade, which is based on a ‘take-make-dispose’ approach. The circular economy is restorative and regenerative by design while focusing on keeping the goods of today to become the resources of tomorrow.

The circular economy diagram (figure 7) provides an overview of how the concept could function as a whole and outlines specific sources of key economic value creation potential. It visualizes the continuous flow of technical and biological materials through the circular economy system. The left side of figure 7 represents the biological cycles in green, where materials can be reintroduced safely in the biosphere through non-toxic, restorative loops. The right side represents the technical cycles in blue, where materials such as plastics and synthetic chemicals, on the other hand, cannot re-enter the environment (EMF, n.d.b). Instead, to capture and recapture the value, those materials continuously cycle through the loops by maintaining, reuse/ redistribute, refurbish/ remanufacture.

As stated by the EMF (2013), the tighter the cycles of the circular economy the greater the savings of embedded costs in terms of resources, labor, energy, capital, and the related externalities such as greenhouse gas emissions. Compared to the linear economy and its supply chain inefficiencies, the inner circles of the circular streams benefit from a higher virgin material substitution effect. Especially within the inner circle, maintaining the shape of products/components means prolonging the usage and circling longer. A circular economy makes economic sense, wherever the costs of collecting, reprocessing, and returning the product/ material into the economy is lower than the linear alternative. Concerning increasing resource prices, end-of-life treatment costs, and higher productivity gains, this economic model becomes more and more attractive (EMF, 2013).

Another way of circular use is the cascading of products/components or materials across different product categories. To generate maximum value, the aforementioned circular streams require material quality; a certain purity of material, and quality of products/ materials. The segmentation of single products or materials makes it easier to preserve purity and quality. Product design improvements will result in efficiency gains in terms of ease of separation, better detection of embedded components, and material replacement (EMF, 2013).

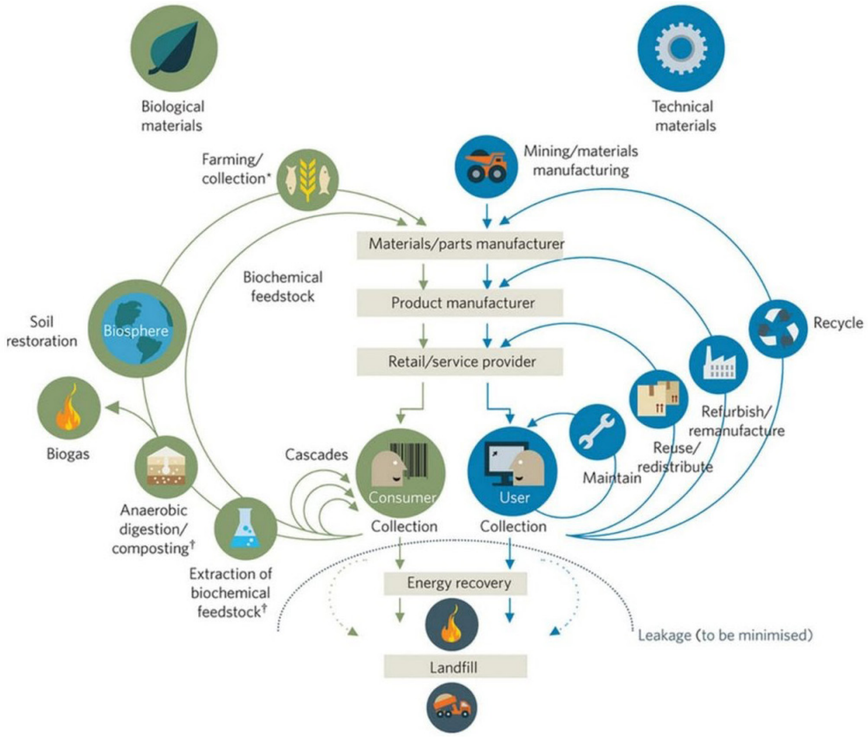



Figure 7: The circular economy diagram (EMF, 2013).

## 6.1.7 Trends towards waste & circularity

This section is looking into trends that affect and influence the above-investigated topics of waste, education, and circular economy. Researching the driving forces of today and tomorrow, megatrends show what is known about a likely future globally.

### MEGATREND: NEO-ECOLOGY

A major megatrend of the next decade is called Neo-Ecology. It is present in many areas, from the spread of organic markets, EU plastic regulations to the energy transition. The social understanding of values has changed fundamentally, whether it comes to personal purchase decisions, social values, or corporate strategy. Consumers are increasingly aware of the environment and responsibility and are looking for new ways to make conscious decisions. According to that, companies and retailers have to adapt their business processes to live up to customer demands (Pinker, 2020). The megatrend Neo-Ecology has several subtrends, which are described below:

#### Zero Waste

1.3 billion tonnes of food, approximately a third of all produced food, is lost or wasted globally every year, (Lyons et al., 2018). However, there is a growing awareness of the continuing problem of food waste and as a result, changes in buying habits, leftover food rescue, and the use/consumption of products beyond the best before date, are trending topics. Moreover, consumers are increasingly willing to buy less attractive fruit and vegetables, and thereby avoid goods being simply thrown away because of the look (Zukunftsinstitut, n.d.a). As a part of the food waste reduction movement, there are several trends supporting initiatives, described below:

#### Ugly foods are pretty too

Services like Eat Grim save food from being wasted by offering subscription boxes of “ugly” fresh and organic fruits/ vegetables that do not meet unfair beauty standards. Moreover, ‘secondary supermarkets’, eg. TooGoodToGo and food sharing initiatives pursue the goal to save unsellable food from being wasted (Eat Grim, n.d.).

#### Avoidance of Packaging

The issue of waste prevention is another important zero waste goal. People are nowadays increasingly questioning the sense of plastic packaging. The first supermarkets have started selling unpackaged goods in large containers to customers who bring their containers with them. Moreover, packaging will continue to change in recyclable forms, including the use of smaller boxes, light-weight bottles, and other kinds of recyclable versions of common throwaway items (Linchpin, 2021).

#### Waste Recycling

Municipalities and governments will be more involved in waste recycling and are introducing regulations for collecting and processing waste. As a part of that, new waste programs will create significant changes that involve consumers in recycling and composting. The communication and cooperation between various entities will be the key success factor of future waste management solutions (Linchpin, 2021).

#### Composting

Discarded food, also known as green waste or bio-waste, makes up billions of tonnes of waste every year. Composting initiatives aim for the recycling of bio-waste into biofuels. The composting infrastructure is planned to expand in many areas in 2021 (Linchpin, 2021).

#### Mindfulness & Consciousness

As an important counter-trend to the permanent sensory overload of the digital age, through mindfulness, people are questioning the way they deal with themselves and their environment. Mindfulness is more than a lifestyle topic, it is the art of not losing sight of the here and now, of knowing one’s own needs and living values (Zukunftsinstitut, n.d.b).

## 6.1.8 Good case practices

This section includes relevant practices, innovative processes, and concrete examples of how companies around the world have implemented circular business models. The purpose is to explore the potentialities of a circular economy, waste management practices, and nudging, and to illustrate the many different ways in which viable circular business models are established.

The good case practices presented below are categorized into 5 themes based on their character and focus area.

### CIRCULAR ECONOMY

**Baterkaren (Slovakia)**
Community reuse center where people can bring the things they no longer use instead of throwing them out, so others can take and repurpose them, prolonging the life cycle of things and bringing the circular economy mindset closer to people, also through classes that they offer (Baterkáreň, n.d.).

There are others, quite widely spread practices like sharing services, where cars (Car2go), bikes (Donkey bikes), scooters (Lime), and even apartments (Airbnb) are shared among users for a certain fee. This could be considered a circular economy model or a strategy on its own since sharing is one of the core values of a circular economy. These represent how the circular economy is adapted among people and implemented in their daily lives.

Other popular commonly used practices are swapping (e.g. clothes or furniture), niche refurbishing (oftentimes clothes), goodwill, or especially popular with electronics like Apple, 'bring back to the store' practice where customers bring their old device, the company takes it and recycles/reuses it and gives the customer a discount on a new product. Facebook Marketplace and Den Blå Avis are likewise popular channels for executing these practices, however, not because of the circularity of the practices and customer's desire to recycle but rather the prospect of economical benefit (The Danish Environmental Protection Agency, 2016)

**Circular subscription model (e.g. VIGGA)**
Based on a subscription fee, customers receive goods (in the case of VIGGA, baby clothes). Once the goods are no longer suitable or useful for the customer, they are returned and exchanged for more suitable ones. This way the customer is not owning the goods and does not create any waste but rather is paying for lending the goods (State of Green, 2017).

### FOOD WASTE

**Groundcycle (NewYork)**
A composting center where people bring their scraps for composting and take organic veggies from composted soil home, for a subscription fee (Groundcycle, n.d.).

**Too Good To Go (app)**
An initiative to save perfectly good, surplus food from local stores. It is always a surprise, at a great price, and an instant good deed for the planet (Too Good To Go, n.d.).

**Public community fridge (Copenhagen)**
Public fridge where anybody can bring their surplus food and on the other hand anybody in need can take it (Madbroen, n.d.).

### WASTE NUDGING

**Vote to reduce cigarette buts (Copenhagen)**
Voting ashtrays are being used in different countries including Denmark. The ashtray is divided in half with different statements on each side and through this, the smokers vote for the statement that they sympathize with more. The innovative ashtrays have proven to reduce cigarette litter by 46%, as measured by Southend Council in 2017 (Medium, 2020).

**Basketball hoop above trash bin**
A typical and very popular example of nudging whereby placing a basketball hoop above a trash bin, people are more likely to throw garbage in the bin rather than on the street (Medium, 2020).

**Green footprints (Copenhagen)**
Footprints leading to a trashcan to decrease littering in the city (Stasinopoulos, 2019).

EDUCATION

**Foundation for Environmental Education (FEE)**
The world's largest environmental education organization, with members in 77 countries. "Through our five groundbreaking programs, we empower people to take meaningful and purposeful action to help create a more sustainable world." (Foundation for Environmental Education, n.d.).

**Environmental Education**
A study on environmental education in Vietnam proves that environmental education has a positive influence on children and their knowledge regarding waste management and sustainability (Phan Hoang and Kato, 2016).

CITIES & WASTE MANAGEMENT

**Be Circular (Brussels)**
A program that aims to support 50 new retail businesses and 200 start-ups/existing businesses to adopt circular economy principles. The program also aims to train 2,000 economic operators in the city through events in-person and 20,000 through online information (Climate KIC Circular City Project, 2018).

**Circular Glasgow**
A program of activities aimed at businesses of all sizes, to provide support, tools, and expert knowledge for more circular operations (Climate KIC Circular City Project, 2018).

SERVICES

**reCIRCLE**
The market-leading industrial solution for reusable packaging for takeaway catering. The "lunchbox as a service" concept saves millions of disposable containers every day (Recircle, n.d.).

## 6.1.9 Key findings - Desk research 1.0

The conducted desk research provided valuable insights to the further progression of the thesis, presented below are the key findings from this section.

- In Denmark, the percentage of people recycling their waste has been steadily increasing, indicating a positive consensus towards responsible waste management and advocating for increased awareness on the topic of recycling.
- Food waste makes up for the majority of household waste and is a complex category, as it can be divided into avoidable and unavoidable waste.
- Composting has proven to be an effective alternative to the traditional disposal of food waste.
- Circular economy contributes to a more environmentally friendly way of handling waste, through two different approaches/cycles; biological matter which can be converted into renewable energy, or technical matter which cannot (i.e., suitable for recycling, etc.)
- With the growing awareness of sustainable options, there has been an increase in industries within education, waste management, and circular economy pursuing viable businesses on these value

- Copenhagen Municipality is actively engaging in and pursuing initiatives that support sustainability, by implementing the SDG in their plan for a more circular and carbon-neutral city.

- The VARK model supports exploring different learning methods based on a preferred modality. Understanding them is a crucial step for optimal learning.

- An investigation on the topic of human behavior and decision making (including nudging) showed that people normally make decisions in an environment designed to encourage a specific action, although they are oftentimes not aware of this.

# FIELD RESEARCH 1.0

This section covers various methods of direct data collection within primary research. These enable one to gain a better understanding of the chosen topic. More specifically, it is a deep dive into behaviors regarding waste management within families and their homes, their personal opinions and points of view on these topics as well as on circular economy. Both qualitative and quantitative methods are used. Due to this, understanding the context of this case as well as the scope and direction can be narrowed down providing a more concrete perspective.

## 6.1.10 Survey

The first step in field research was to gain a better understanding of the user behavior patterns and point of view in terms of waste management, circular economy, and to understand the problems and opportunities on waste based on the daily lives of families in Copenhagen. Moreover, the aim is to discover which direction this project should take. In order to probe thoroughly and most accurately on this level, it has been decided to conduct an online survey. Nevertheless, this comes with advantages as well as disadvantages; since the survey is not happening in real-time, but rather the respondent is given the opportunity to do it in their own time, it can result in deeper reflections, leaving them with more time to consider and reflect upon their answers. It is also structured as a form of an interview that allows respondents to answer at their convenience, providing the possibility of answering and editing whenever they have the time (Bjørner, 2015). However, the method also omits important aspects such as the lack of immediate response, body language, intonation, and the immediate opportunity to ask follow-up questions on the spot (Ibid.). This will inevitably influence the answers, but given the circumstances of Covid-19, the method is still believed to be valid as it will fulfill its purpose and present valuable insights on opinions on the topic of responsible waste management and circular economy. Further, it will help the group understand the parent's opinions when it comes to teaching their children the topics of waste management, environmental education, and circularity.

There are plenty of available platforms online for carrying out a survey, both free or paid. The decision has fallen to use the open-source Google Forms (Google, n.d.a) due to its ease of use and general familiarity among people. Additionally, this platform also provides a clear and simple overview of the acquired data in the form of comprehensive graphs.

The survey was posted in different Facebook groups with families living in Copenhagen since those are our primary focus. Even though all the Facebook groups had a lot of members and possible participants, it needs to be taken into consideration that a lot of people are busy taking care of their children at home during this time whilst simultaneously working, hence a large number of replies could not be expected. This affects the credibility of the survey, but for the purposes of this project still provides relevant information. Moreover, it is important to gather data from people coming from different groups and that way get a diverse overview on the aforementioned topics (Gibbs et al., 2007). The online survey questions and findings can be seen in appendix 1.

### PILOT TESTING

To iron out any possible mistakes that the group may have made regarding understanding the questions, flow, or question phrasing, as well as the relevance of the survey due to the close involvement to the project, a pilot test was conducted. The survey was tested on fellow service designers, who could offer perspective alongside the professional knowledge that a person without service design background would not be able to do. Based on this, minor adjustments were made and the survey was shared publicly.

### SURVEY FINDINGS

The survey generated a total of 20 responses despite a vigorous effort to increase the number of recipients, and as such the amount

of responses does not qualify to present a statistical view or provide quantitative insights on the topic of habits and behaviors on waste management and circular economy. The survey was structured based on the following three main topics: *waste, education,* and *circularity,* due to a desire to understand the behavior and habits of families in the Copenhagen area in relation to waste management, education on waste (specifically regarding their children), as well as circularity and sustainability.

## DEMOGRAPHIC

To get an understanding of what the average family in Copenhagen looks like from a demographic point of view, questions regarding the amount of people in a household as well as how many of these consist of children were included in the survey. 45 % of the respondents live in a household of 4 people, with the last 55 % consisting of either 3, 5, or 2 people, presented in order of highest to lowest percentage (figure 8). Of these households, half of them consist of two children, whilst the other half included households with either 1 or 3 children (figure 9). 75 % of the children were between the ages of 0-6, with the remainder being between 6-18 years old. 1/4 of the children attend first grade in primary school, whilst the majority of the children, aged 0-6, either do not attend an educational institution or are currently enrolled in nursery or kindergarten.

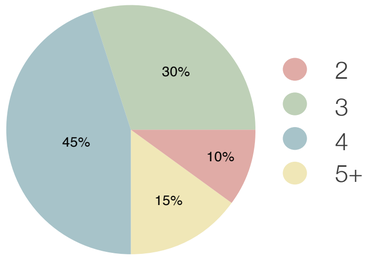



Figure 8: Households (Author's creation)

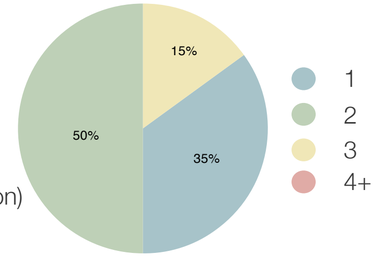



Figure 9: Children (Author's creation)

## WASTE

The majority of the respondents, 80 %, claim to be conscious of the amount of waste that they produce (figure 10), with the main reason being due to pollution and the impact it has on the environment, closely followed by a motivation to ensure the quality of the future for the sake of their children. The remainder of the respondents who are not conscious about their waste production cite priorities being elsewhere or claim the responsibility mainly lies with the manufacturers and their choice of packaging. When asked about the probability of whether the respondents would change their waste management habits on a scale from 1 to 5, 1 being least willing to and 5 being most, 75 % of the respondents answered either 4 or 5, indicating a strong desire to change their current habits (figure 11). The majority of respondents express that sorting waste responsibly is important to them, with 95 % stating that they currently recycle/sort the waste they produce (figure 12). When asked about the kind of waste the respondents recycle/sort, the following types of waste were listed from most to least recycled type of waste: *glass, electronics/batteries, metal, cardboard, paper, plastic, pant, and organic/bio-waste*. Wanting to get insight on general awareness and knowledge on the topic of waste and responsible waste sorting, the respondents were asked whether they believe to be recycling/sorting their waste properly. The majority answered yes, indicating either a thorough understanding of proper waste sorting, or a perceived belief that they do in fact sort responsibly, whilst a third of the respondents express doubt on whether or not they sort their waste correctly.

## EDUCATION

When asked whether the respondents find it important to teach children the topic of responsible waste management the general consensus leans towards somewhat important/very important, with two-thirds of the respondents finding it to be very important (figure 13). In connection, 80 % of the respondents appear to be teaching their children the topic of waste and sustainability. Additionally, 45 % of the respondents answered yes to their children being taught the aforementioned topics in school, whilst the remainder of the respondents either answered no

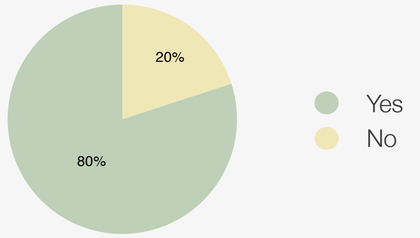



Figure 10: Waste 1 (Author's creation)

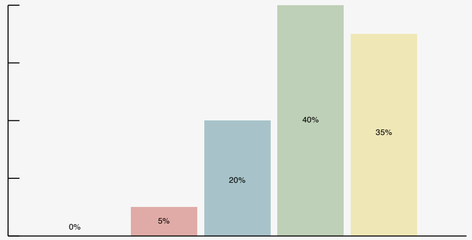



Figure 11: Change of habits (Author's creation)

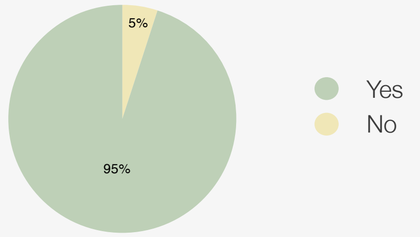



Figure 12: Waste sorting (Author's creation)

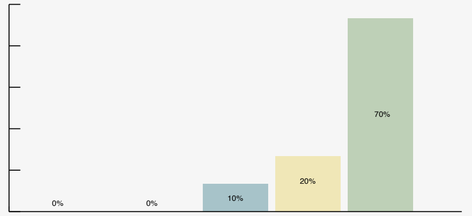



Figure 13: Importance of waste education (Author's creation)

or unsure, to whether these topics are part of the teaching. 55 % of the respondents claim that their children show interest in the topic of waste and sustainability, which reflects that the initiatives that the parents (respondents) cultivate in, in relation to waste management, as well as educational activities on the topics have an impact on the younger generations. Inquiring into whether the respondents would show a greater interest in responsible waste management if their children show interest in the topic, the answers are far more divided, ranging from being not likely to very likely to sort their waste properly. The majority of the respondents however agreed to wanting their children to receive environmental education in school, and also generally agreed to be likely to implement habits based on input from their child. Furthermore, when asked whether the respondents would participate in educational activities related to circularity provided by their child's educational institution, 75 % answered yes, with approximately 60 % answering yes to then being open to implementing these activities in the household (figure 14).

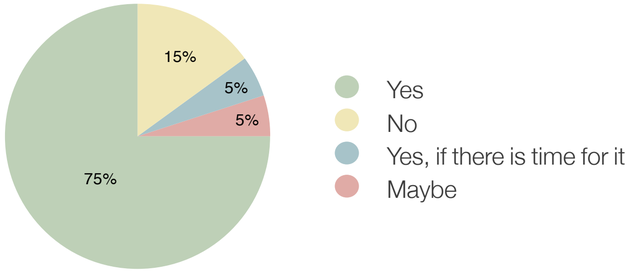



Figure 14: Educational activities at school (Author's creation)

## CIRCULARITY

About circular economy, 80 % of the respondents appear to have an understanding and knowledge of the concept, whilst 20 % express uncertainty (figure 15). In connection, when asked about if and which circular economy based services they use, the respondents mention the following services from most to least used: *selling/buying secondhand from Facebook, Den Blå Avis, secondhand shops and recycling centers, ride-sharing (car and bike sharing), donating to charitable organizations (Røde Kors, Kirkens Korshær, Red Barnet), libraries and returning to store for recycling (Nespresso, Apple repair).* When asked about their motivation for using these types of services, 95 % of the respondents mention the environment as the main reason, followed with a financial incentive to either earn money or get discounts. This is due to sheer desire to do so, preferring to rent rather than own if not necessary and due to their children showing interest in these services as well (figure 16). Asked about their behavior towards no longer needed and/or broken items/products, the majority of the respondents' first instinct reflects a conscious and circular mindset, listing repairing, recycling, donating/selling, and resting as first instincts before throwing away/discarding/repurchasing. This behavior is also apparent when asked whether the respondents are likely to purchase second hand/used items, which despite a third being less likely, generally reflect an interest in supporting second hand/used shops with two-thirds of the respondents claiming to be very likely. Finally, when asked whether quality is more important than price when purchasing a product, 80 % agree that the quality is the main deciding factor, whilst other reasons include *price, application of product, actual product, and combination of both price and quality.*

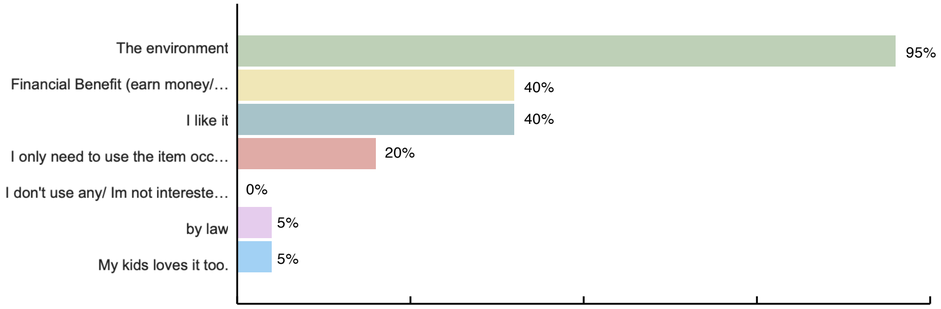



Figure 16: Reasons to use sharing services (Author's creation)

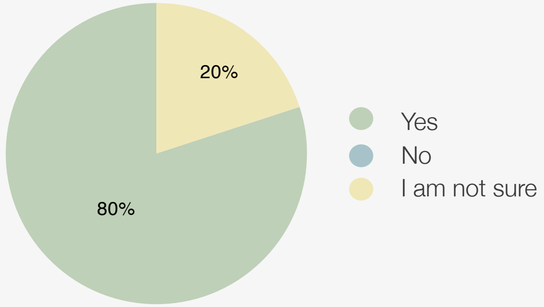



Figure 15: Circular economy knowledge (Author's creation)

### 6.1.11 Key findings - Field research 1.0

- There is a conscious understanding of responsible waste management and circular economy and its importance.
- Respondents express a desire and motivation to change habits to support sustainability.
- The respondents claim their children as the main reason for engaging in sustainable activities, due to a desire to teach their children to adopt and apply a more sustainable mindset.
- The respondents support educational initiatives that can work to inform and enlighten the children on these topics (waste management, sustainability, and circularity).
- Results point in a direction towards exploring educational services to mold, inspire and encourage the younger generations to adopt a mindset that supports a circular economy, and raise awareness on the topics.

## 6.1.12 Preliminary brainstorming & focus selection

Based on the research done so far as well as the results of the online survey, a preliminary brainstorm session was held to clarify and narrow down the focus. This resulted in a couple of guideline parameters that will shape the case from this point onward. They represent certain criteria that the group would like the final project to live up to, highlighting which specific features should be emphasized in the future process. They can be considered as a form of limitation, concept criteria, or a framework in order to avoid losing focus.

The first important result of the session was the main focus in terms of waste. As mentioned earlier, waste can be divided into two groups avoidable and unavoidable, and since this project aims for change, its focus needs to be something that can be changed, thus the avoidable waste. Initially, the intention was that no further specification would be made in terms of waste, as the focus is not specifically set on food waste or electronic waste, etc., but rather on the perception, attitude, and mindset of people when it comes to disposing of the waste. Hence, the aim would be to target the decision-making process and aim for a circular rather than linear attitude, which could ideally be applied to any type of waste.

With this in mind, the brainstorm session resulted in the following: as for the quality that the future service should carry, it is to be educative/informative on a main topic. As for an aspiration resulting from the use of the service, as mentioned above, it should be habit creation/mindset adaptation. One of the considerably most important points is ‘making it attractive’, meaning that people would be more likely to not only use the service itself but also the existing services that are focused on circularity and sustainable waste management. Since there are already a lot of solutions and possibilities out there for these issues that are not being used to their full potential, it is believed that making them more attractive in the eyes of the customer is the key to success *(see literature review section 2.3.1 Beginnings, p. 14).* Last but not least, the focus is on children in education since their minds are not set in stone and they are the future, hence they are change-makers (Clark et al., 2020).

Upon reflection on this process, it became clear that further specification, although initially not wanted, is crucial for further development of the project. The goal to target the change in the mindset remains. Nevertheless, based on case studies, research, and brainstorming, it has been decided that the focus will fall on bio-waste or organic waste and composting systems/processes, specifically in educational institutions. The reasons underlying this decision include the fact that bio-waste is a topic that children can relate to and through the process of composting the opportunity to turn waste into something useful emerges. More so, there is a strong circular potential in bio-waste that gets composted. This way the children can directly see the circular process and possibilities but most important benefits of reusing waste. Through using bio-waste as a case, ideally, the children would start seeing other types of waste as reusable too and adapt a new circular mindset. It is important to note that these are the results of preliminary brainstorming that only determine the focus of the future service without any further specification on how the service will function and what it will include. Therefore, this topic requires further investigation which will be carried out and elaborated on in the section Desk research 2.0 (p. 45), focusing on bio-waste and composting.

## 6.1.13 Second (final) research question

After narrowing down the scope and deciding on bio-waste and composting as the main focus, the problem statement was adjusted accordingly and goes:

# EXPLORING HOW SERVICE DESIGN CAN ENCOURAGE BEHAVIORAL CHANGE: A SHIFT FROM A LINEAR TO A CIRCULAR WAY OF THINKING :

*How might we create a service that educates students in primary school to perceive waste as a resource through composting?*

# DESK RESEARCH 2.0

Another round of desk research was conducted focusing on exploring the narrowed down topics of bio-waste and composting as well as good case practices connected to these topics. Moreover, qualitative research in the form of interviews was conducted, to gain more insights into the education of primary school students and teachers' approaches towards sustainability.

## 6.1.14 Bio-waste

Bio-waste is the type of waste that is considered biodegradable in its whole and amongst others includes garden and park waste, food and kitchen waste (raw and cooked, coffee grounds, tea leaves and filters, cut flowers), and waste from processing plants. However, it does not include forestry or agricultural waste or other biodegradable waste such as paper, processed wood or textiles (European Commission, n.d.). In Europe, about 60% of the bio-waste accounts for food waste, which equals approximately 20% of all food produced going to waste. If the demand for food is reduced by preventing avoidable food waste (also called preventable waste), it would be more environmentally beneficial than recycling food waste, as it can decrease the environmental impacts of production, processing and transportation of food (EEA, 2020). The European Union has set forth newly updated waste legislations and adopted a range of goals and provisions that will guide both the prevention and the sustainable management of bio-waste, with composting being the most common method of treating separately collected bio-waste (EEA, 2020).

### BIO-WASTE IN DENMARK

Denmark is considered to have one of the lowest landfilling rates in Europe, which has remained steady at around 5-6 percent over the past ten years. This has been accomplished due to regulations, such as the landfill tax in 1987 and the landfill ban of all waste suitable for recycling or incineration in 1997 (Dakofa, n.d.). The majority of the biomass used in the Danish biogas plants accounts from livestock manure, while the rest comes mainly from residual products from the food industry, including slaughterhouse waste and other sources such as household waste (Landbrug og Fødevarer, n.d.). Since 2013, biogas production has increased and the process has upgraded, including the removal of CO2, therefore biogas can replace natural gas (fossil fuel). As natural gas is a fossil fuel, the resources will be depleted over time. In comparison to the other fossil fuels like oil and charcoal, the burning of natural gas releases half the emissions of CO2, making it the most environmentally friendly fossil fuel. The Association for Biogas Industry estimates a sharp increase in biogas production in Denmark by 2050, and that all natural gas will be replaced by biogas in 2040 (Landbrug og Fødevarer, n.d.). The biogas can be sold on the natural gas network, where it displaces natural gas. The degassed biomass turns into natural fertilizer that can replace artificial fertilizer (European Commision, n.d.).

### BIOGAS PRODUCTION

Bio-waste can, when regenerated into soil-improving fertilizer and renewable energy biogas, contribute to a circular economy. The process of recycling bio-waste into biogas include:

- The sorting of bio-waste in biodegradable bags that are made of cornstarch and are biodegradable.
- The collection of bio-waste transported for reloading.
- Clearance of impurities (like plastic packaging) and shredding it into a so-called pulp (biomass).
- The transportation of the pulp/biomass to a biogas plant, where it is turned into electricity and heat. Moreover, degassed biogas is rich in nutrients and used as a natural fertilizer to grow new foods.

(Vestforbrænding, 2020).

## 6.1.15 Composting

Composting is a natural process of recycling organic matter such as food and bio-waste into fertilizer for soil and plants. This process speeds up the decomposition of the material by creating an ideal environment for worms and microorganisms like fungi and bacteria to thrive. The finished product (composted soil) can be used for various purposes including gardening and agriculture. Composting exists both on a large scale level through industrial facilities as well as on a smaller scale level through community composting sites (Hu, 2020).

### THE PROCESS OF COMPOSTING

For organic waste to successfully decompose four key elements are needed: nitrogen, carbon, air, and water. Composting is a matter of achieving the correct amount of nitrogen, carbon, air, and water for the decomposition to begin. Nitrogen allows for growth and reproduction and as such consists of fresh organic matter (food scraps, coffee ground, grass clippings). Carbon functions as a food source for the decomposers (worms and micro-organisms) by keeping them alive and mainly consist of dead leaves, twigs, branches, and paper. The final two elements water and air help with the compost speed process can be maintained and adjusted based on personal preferences. The process of composting is also dependent on a ratio of other varying factors such as temperature, aeration, moisture level, size, and location of the compost bin (Hu, 2020; US EPA, n.d.).

### BENEFITS OF COMPOSTING

Beyond the recycling of bio-waste, composting is also beneficial in terms of the reduction of waste ending up in landfills as well as the unavoidable production of methane emissions from said landfills (US EPA, n.d.). When organic matter decomposes it undergoes the process of aerobic decomposition which deteriorates through the microorganisms' need for oxygen. When organic waste (compostable waste) decomposes in a landfill, the pressure of the enormous amount of waste cuts off oxygen, and as such the decomposable waste ends up undergoing an anaerobic decomposition instead, which is the deterioration of the waste through microorganisms that can live without oxygen. During this particular process, biogas is created as a bi-product, which contains 50 % methane and 50 % carbon dioxide greenhouse gases. Additionally, composting can aid in creating and improving soil health, reduce the need for chemical fertilizer, encourage the production of beneficial bacteria which creates nutrient-filled material, conserve water as well as reduce personal food waste produced by people (Hu, 2020; US EPA, n.d.).

## 6.1.16 Good case practices on bio-waste & composting

**TagTomat**
Community aiming to encourage and educate citizens on circular and sustainable initiatives and topics such as DIY urban gardening, up-cycling, local community, and school gardens as well as material and workshops for students and/or educational institutions (TagTomat, n.d.a; TagTomat, n.d.b).

**ARC**
Non-profit joint municipal company functioning as a waste energy plant handling waste and recycling facilities - other initiatives include educational programs concerning waste understanding and proper disposal of waste (ARC, n.d.a; ARC, n.d.b).

**ØsterGRO**
Urban gardening roof farm offering visits and programs for students and educational institutions based around the topic of farming, developing an understanding between the connection of agriculture and nature and the soil to table/farm to table circuits (ØsterGRO, n.d.).

**Impact Earth**
Residential and commercial composting service with a subscription

model for citizens to reduce bio-waste, additionally offering educational material and workshops teaching about zero-waste, recycling, and composting (Impact Earth, n.d.a; Impact Earth, n.d.b).

**Black Earth Compost**
Residential and commercial composting service, offering educational programs teaching students about reducing waste and the process of composting and growing produce (Black Earth Compost, n.d.a; Black Earth Compost, n.d.b).

## 6.1.17 Key findings - Desk research 2.0

The second round of desk research with a narrowed scope, particularly focusing on bio-waste and composting as well as the connecting good case practices, further clarified the direction of the thesis and laid a foundational understanding of these specific areas. The key points of this stage are the following:

- Biowaste consists of waste that is biodegradable entirely and can be distinguished between different types of waste such as specific food waste and non-food waste.
- Food waste makes up for over half of the bio-waste in Europe.
- Denmark is considered to have one of the lowest (steady) landfill rates due to regulations and legislation banning waste suitable for recycling or incineration instead of ending up in the landfill.
- The majority of biomass used in biogas plants in Denmark comes from, amongst others, food waste and scraps and the process of turning bio-waste into renewable energy biogas contribute to a circular economy.
- Numbers show an increase in biogas production, indicating an already established sustainable mindset, regarding the use and disposal of waste.
- The natural process of composting recycles organic matter into fertilized soil.
- The procedure of turning bio-waste into compost requires four key elements, *nitrogen, carbon, air,* and *water*, as well as an understanding of the balance between the ratio of these elements, in order to achieve a successful compost.
- The benefits of composting include the minimization of methane production (landfill decomposition), production of healthy, fertilized soil, reduction of the need for chemical fertilizer, conservation of water, as well as the elimination of avoidable food waste.
- Composting can exist on a small as well as large scale level, and many circular economy services currently exist within the field of compost and sustainable waste management.
- Services include composting and community/utility gardens, educational programs to enlighten people on the topic.
- Data confirms not only an increase in awareness and consciousness on the matter but also reiterates the viability of a circular economy business.

# FIELD RESEARCH 2.0

## 6.1.18 In-depth interviews

To gain a better understanding of how to create a service that meets a certain need and can be implementable in primary schools, in-depth interviews with teachers were conducted.

Interviews with relevant stakeholders can serve as a tool to collect insights on expectations, experiences, operations as well as a person's needs, attitude, ideas, environment, etc. In design practice, it is most common to conduct interviews with semi-structured guidelines, starting with broad questions, making the participant feel comfortable, and with time becoming more detailed with the questions related to the research (Stickdorn et al., 2018).

As a preparation, the group specified the scope of the interviews with the intended goals and the desired number of participants. The overall goal was to gain insights into the structure/routines of primary schools in the greater Copenhagen area, the teacher approaches on different learning methods, and both schools and teacher's approaches to the topic of sustainability and circular economy. Therefore, the group conducted semi-structured online interviews with teachers working in primary schools in the greater Copenhagen area (see appendix 2 for the in-depth interview guide). To create a service that caters to the different needs, the group aimed to conduct interviews with a minimum of five teachers from different schools, which however became a challenging number to reach. However, it turned out that in the group's network, only three people were meeting the requirements. Posting in various Facebook groups (Expats Copenhagen and Teachers in Copenhagen) with several attempts, unfortunately, did not broaden the reach. It was decided to conduct the online interviews with the three participants, as the aim was to gain qualitative insights into different schools' structures and needs instead of quantitative insights. The interviews were held through the online tool Microsoft Teams and were recorded (see appendix 3 for recording link), but due to technical issues, two interviews have not been saved. Fortunately, notes were written down throughout those interviews (see appendix 4 for in-depth interview notes).

Key points from the interviews were that all teachers prefer to mix learning methods and apply a combination of teacher lessons and active learning as well as contextualizing and playful learning. According to the teachers, students in the age of 6-9 years show a great interest in the environment and animals. Furthermore, there is a positive consensus towards inclusion and participation of parents in events and projects, and the teachers see a benefit for all; student, parent, and teacher. The concepts of sustainability and circular economy are well-known to the teachers, and although some initiatives are working towards sustainability, teachers expressed the importance of including them more across various subjects. For that matter, it was underlined that teachers are lacking inspiration and support on how to include the topics in their teachings. Schools have a definite interest in including sustainability in an educational manner and are open to long-term projects and new initiatives that support these topics.

## 6.1.19 Key findings - Field research 2.0

Interviews are a useful method to investigate areas in-depth and from an individual's perspective, uncovering thoughts and needs. The key findings from interviews are"the following:

- The insight identified similar patterns between all three interviews.
- Teachers express great interest and motivation to include the topics of sustainability and circular economy in the class.
- Assumptions were confirmed that primary school children are a suitable target group for an educational service in the field of sustainability and circular economy, due to their stage of development as well as the freedom for the teachers to introduce the topics into the classroom.
- There is an interest in environmental education and the inclusion of parents in school/classroom projects by the teachers.

# 6.2

# DEFINE

# 6.2 DEFINE

In the second stage of the design process, the group structured all the primary and secondary data gathered in the previous empathize stage into subtopics by creating a research wall (figure 17). In order to define the core problems, research insights were structured and analyzed by clustering the data, using affinity diagrams, creating user stories, and defining possible stakeholders. The following section describes the process of using these diagrams to further define the problem area.

## 6.2.1 Research wall & data clustering (affinity diagrams)

During the process of research 1.0 and 2.0, the data was being noted down in the virtual whiteboard Miro alongside the preliminary brainstorming sessions. To make the future synthesizing and analyzing of the data more comprehensive, the data was organized into a research wall (figure 17). The data is organized into colorful squares based on the topics of the research like waste, education, behavior or composting, and more. Additionally, a cluster with in-depth interview data was added synthesizing the findings, visually dividing between desk and field research. The research wall provides not only a visual arrangement of the researched data but also makes it easier to synthesize, determine patterns, clusters, and insights afterwards (Stickdorn et al., 2018).

RESEARCH WALL - SECONDARY RESEARCH

RESEARCH WALL - PRIMARY RESEARCH

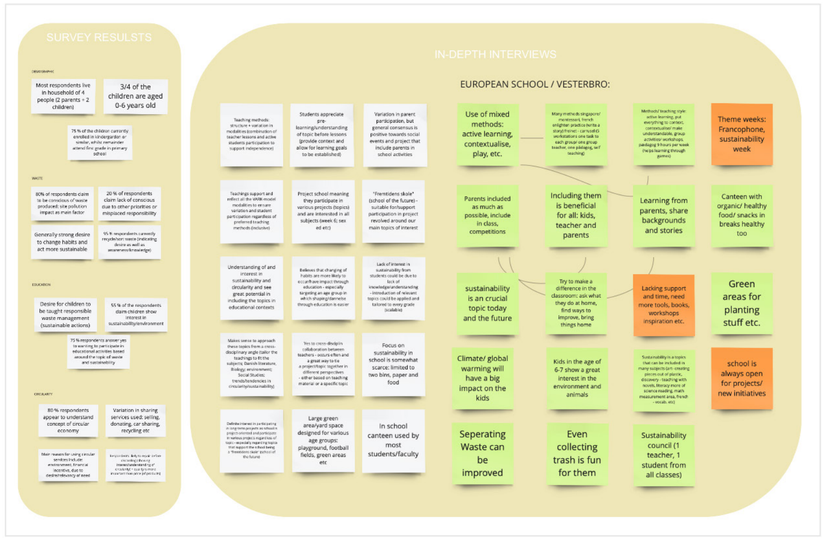



Figure 17: Research wall (Author's creation)

As the gathered data is fairly large and complex, affinity diagrams were chosen as a clustering tool for sense-making and insight creation. Affinity diagrams can be used at different stages of the design process from emphasize to ideation. They are a very effective tool when there is a lot of mixed data, helping to organize it into groups or themes based on the relationships between the data and its nature. The process consists of several steps. Firstly identifying the most relevant data and grouping them based on patterns and similarities amongst them. After these groupings are done, it is time to connect the dots and transform the data into deeper insights, which will help define the ideas and possibilities for the solution, going from analysis to synthesis (Dam and Siang, 2019b). The created affinity diagrams can be seen in figure 18.

The reading order is from bottom to top, starting with the overview of gathered data, which is grouped into common groups on the second level. From each of the 4 groups, specific insights are drawn synthesizing the most important key points of the research phase of the project. Finally, on the top level, 4 main themes are identified which will stand for these insights and shape the following brainstorming. The first theme is ‘it takes both sides to build a bridge’ standing for the gap between the municipal goals and actions and beliefs when it comes to sustainability. Highlighting that both parties are crucial for the goals to be fulfilled. This is underlined by the need of the individual to see what their impact is and how their individual actions contribute to making a difference. Second, ‘knowledge is power’ focuses on the educational aspect, using education as a tool to shape minds towards more sustainable living. Moreover, research has shown that understanding and experiencing a process firsthand is crucial for learning and adaptation of new habits. The third theme is ‘One person’s trash is another person’s treasure!’ standing for the ideology of turning waste into something useful and essentially perceiving waste as an asset within communities. There is a large potential when it comes to waste and circularity as people are becoming more willing to share rather than own. Especially, within bio-waste, the city of Copenhagen shows that bio-waste accounts for more than 40% of household waste. Last but not least, the theme ‘sharing is caring’ stands for the ever-growing popularity in sharing services, alongside upcoming trends like ‘ugly food’. But most importantly, people show interest in changing their habits towards a more sustainable way of living.


Figure 18: Affinity diagrams (Author’s creation)

## 6.2.2 User stories

The research brings forward two different types of users with diverse wants and needs. Categorically, they are the student and the teacher (figure 19). Especially since children are not the decision-makers, and this role falls upon their caregivers/parents a significant part of their profile is determined by them. For this reason, it has been decided against creating personas but rather, to introduce different users of the future service through profiling user stories. These can be used in various stages of the design process and in this case, it is to summarize and present, based on the conducted research. Specifically, that involves what customers or users want to be able to do, what their role in the service will be, and to bridge design research with defining requirements for the concept development. At the same time, offering the reader a perspective of the user can be more relatable through a story (Stickdorn et al., 2018). The following user stories on the previously mentioned users, were created in Miro and are a combination of the gathered data in primary and secondary research, and to a certain extent, the group's assumptions. All of the stories are written in the first-person perspective to be more realistic and relatable.

### THE STUDENT

Represents the children in primary education, between the grades 0-5, who are the end-users of the service as they are the ones the service is primarily designed for.

**Story**

I am a student in 4th grade of primary school and I like to learn interesting, I am a student in 4th grade of primary school and I like to learn interesting, new and useful things at school so I know more about the world and I can tell my parents about it. I prefer when every day at school is different and when we learn in various ways (author's note: altering learning types/modalities). I would like to learn more about the environment and animals because I am very interested in them. I really like going on field trips and doing things by hand because it makes me understand them easily. I enjoy participating in various school activities, and when I am doing something I want to see the results of my effort so I know that what I am doing makes sense.

(Author's note: The story is attempting to use simpler language like a child would do, but for the sake of correct understanding the language has been altered to a higher level.)

### THE TEACHER

Stands for the teachers in primary education, between the grades 0-6. They play a crucial role in the execution of the service as they are the bridge between the service provider and the service end-user (students). It can be said that the teacher is the main user of the service, as the role is to communicate and teach the students the relevant information as well as to oversee the educational and environmental processes.

**Story**

I am a 4th grade teacher in primary school. I am very invested in my students' education because I want to provide them with enough understanding to encourage them to be independent and I believe in changing and forming habits through education and learning. I see that the students appreciate variety so I use different teaching methods depending on what they respond to but I like to be creative with them. Especially at this age, they like to physically touch and do things and learn this way. I like when the school is involved in interesting and stimulating projects for students, and I also try to involve the parents as much as possible. I would like to include sustainability and environmental education in my classes and I believe separating waste at our school can be improved. It is a crucial topic for the future of the student but we are lacking support and educational materials.

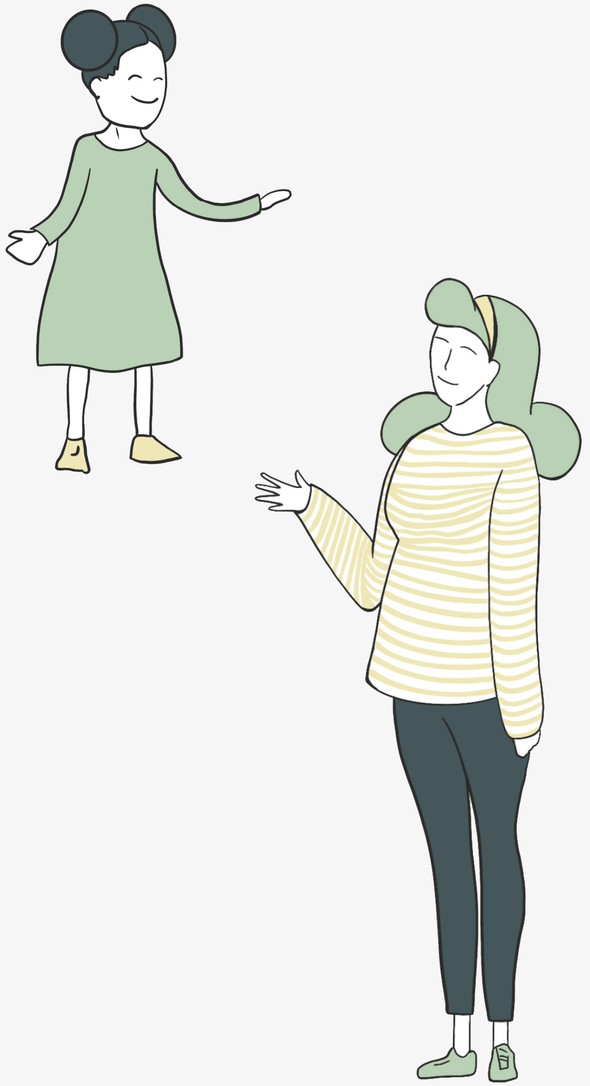


Figure 19: Users (Author's creation)

## 6.2.3 Possible stakeholders

A stakeholder is an individual person, an organization, or a group with an interest or connection to the service. A stakeholder may be internal, with a direct connection to a company, or external, with no direct connection but the significant impact (Smaply, 2019).

Soon moving into the ideation phase, it is important not only to know the user but also to have an overview of the possible stakeholders that are relevant for the future service (figure 20). As the focus is on primary schools, they and the Ministry of Education stand as a strong stakeholder alongside the local municipality (in this case Københavns Kommune). On the environmental/bio-waste side the possible stakeholders would be composting centers, local farmers, community and urban gardens, farmers markets, individuals interested in compost, school canteens, and external partners within the field of composting and circularity such as Østergro or Tagtomat.

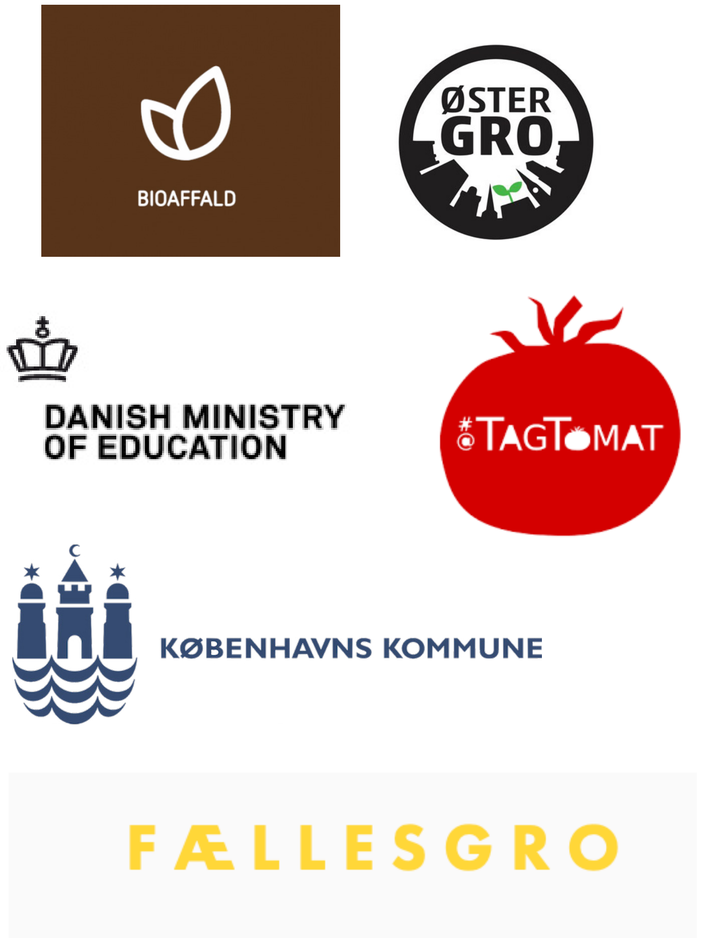



Figure 20: Possible stakeholders (Google, n.d.b)

# 6.3

# IDEATE

# 6.3 IDEATE

In the third stage of the design process, ideas are generated based on the outcome of the previous stages. This section explains the group's ideation process, where many techniques were applied to explore different perspectives on the problem and identify potential solutions. For that matter, the following techniques were chosen as tools to explore the ideas: Brainstorming, Mind mapping, the card, and checklist set method, the HowNowWow matrix, User Journey Mapping, Platform Canvas as well as Stakeholder and Value Network Mapping.

## 6.3.1 Brainstorming

To initiate the ideation phase, the brainstorming method of mind mapping was chosen due to its ability to encourage free exploration, which is useful in order to determine preliminary concept(s) through the broadening of scope and ideas. This process supports a divergent approach in which there are no restrictions or limitations, but rather allows for creativity to free-flow around a given topic of focus, which in this case revolves around composting as a service in an educational setting (Moggridge, 2007). The mind mapping (see figure 21) consisted of two rounds of brainstorming, with each round lasting for three to five minutes and with the intent of each round to further clarify and narrow down the scope. The first round included a completely free flow of thoughts and ideas, with only the topic of focus (How can we make composting in schools a service?) to guide and direct suggestions. After the first round, it was decided to cluster the contributions based on similarities and this resulted in six different clusters; composting at school, education, collect and exchange compost, collaboration, compost kit, and gamification. Subsequently, to structure the initial ideas, the second round likewise focused on free exploration, however, the mind mapping now took outset in the above six clusters, thereby being more confined to specific areas of interest and focus. After the second round, it was decided to end the mind mapping session as

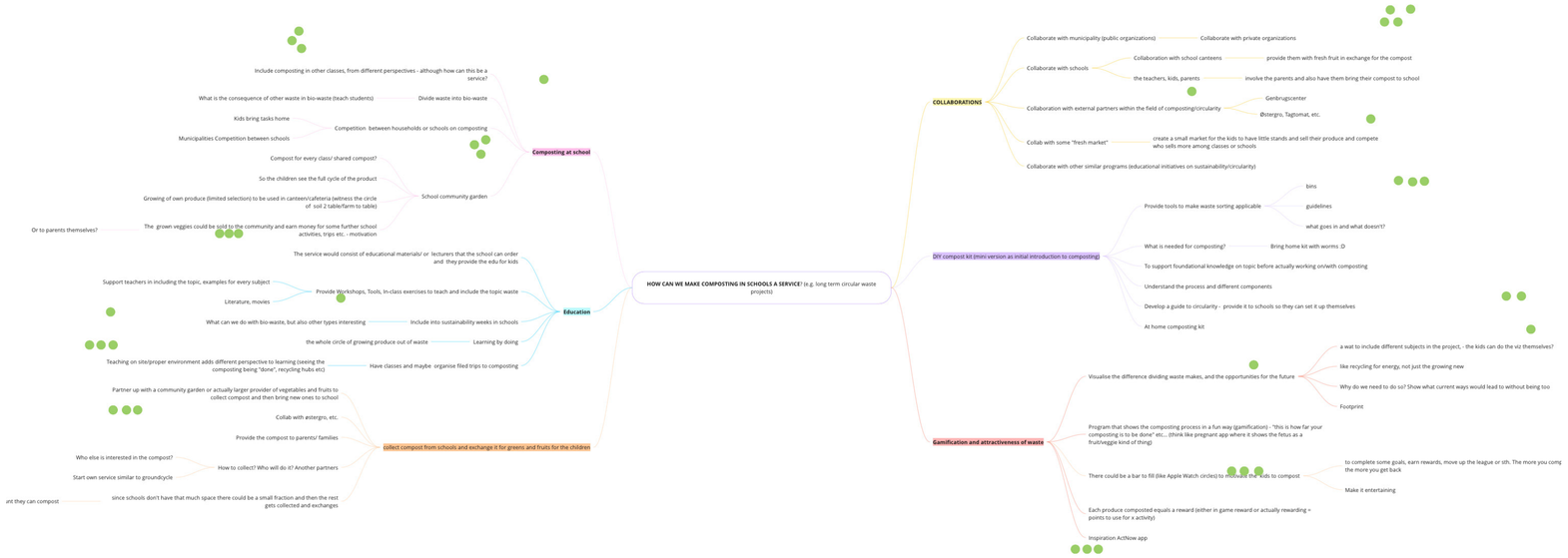



Figure 21: Mind mapping (Author's creation)

no new ideas emerged, and ultimately the results of the brainstorming had helped uncover preliminary concept ideas.

Despite the fact that the mind mapping sessions had proved effective as a first ideation step, the process was not without challenges, specifically concerning uncertainty in identifying how to move on in regards to shaping the core service concept. Due to this, it was decided to approach brainstorming again, this time being inspired by the cards and checklists set method, as this method is particularly useful when feeling stuck and/or wishing to explore the unfamiliar (Stickdorn et al., 2018). There are many versions of cards and checklists set methods, of which one of the most recognized ones is The Oblique Strategies developed by Brian Eno and Peter Schmidt in 1975. The main purpose of the method is to ignite discussion as well as aid in structuring ideas,

and the method often includes a set of cards with predetermined instructions used to spark various suggestions (Stickdorn et al., 2018). However, in this instance, the method was used by creating card sets consisting of possible service criteria for the concept solution. The process of the method was similar to the mind mapping session, consisting of two rounds of brainstorming and clustering of insights. The first step involved brainstorming on general criteria through free exploration and unrestrictive thinking, followed by a clustering of any repetitive or connected ideas and contributions, subsequently accompanied by a second round of brainstorming based on the (6) criteria, where more specific and concrete ideas were suggested, thus laying the foundation for the concept development process (see figure 22).

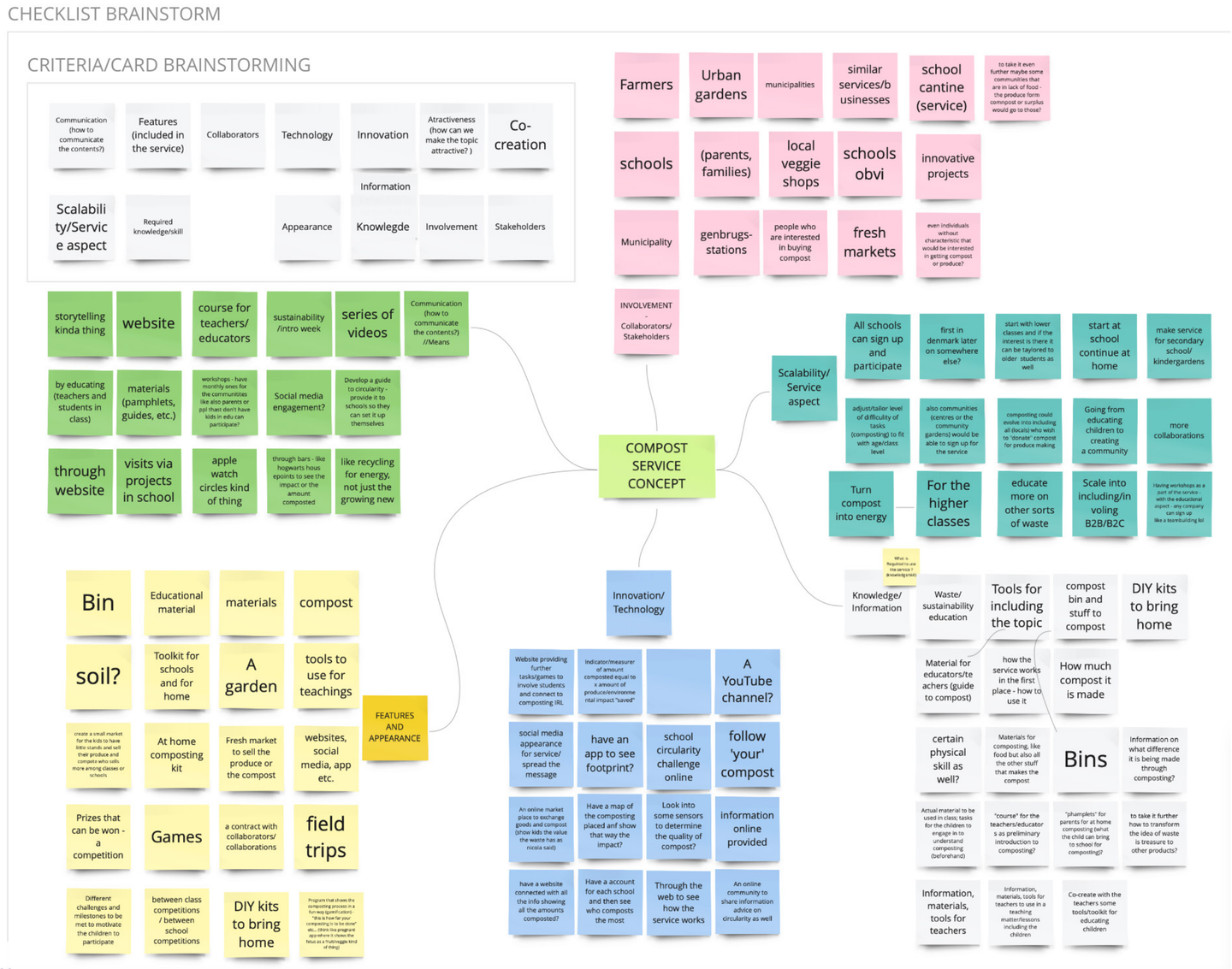



Figure 22: Concept checklist (Author's creation)

## 6.3.2 Concept development

Originally, the group planned to use the ‘How-Now-Wow Matrix’ for the next step towards concept development. This method can aid in evaluating and structuring collected ideas according to their feasibility and originality (Designthinking Methods, n.d.). As the brainstorming session led to a large number of ideas, the next step was to preselect and further structure those ideas. Discussing all the results of the aforementioned criteria and card brainstorming, the group identified the most important points, while keeping in mind the ideas to be feasible and original. However, the How-Now-Wow Matrix was not carried out following the steps and visualizing the four quadrants to assess the ideas, instead, the discussion and evaluation of the ideas have led to the group’s own way of restructuring and connecting the most important points (figure 23).

During the concept development session, the group discussed and clustered the ideas into four main points of the service: Online appearance, education, and compost:

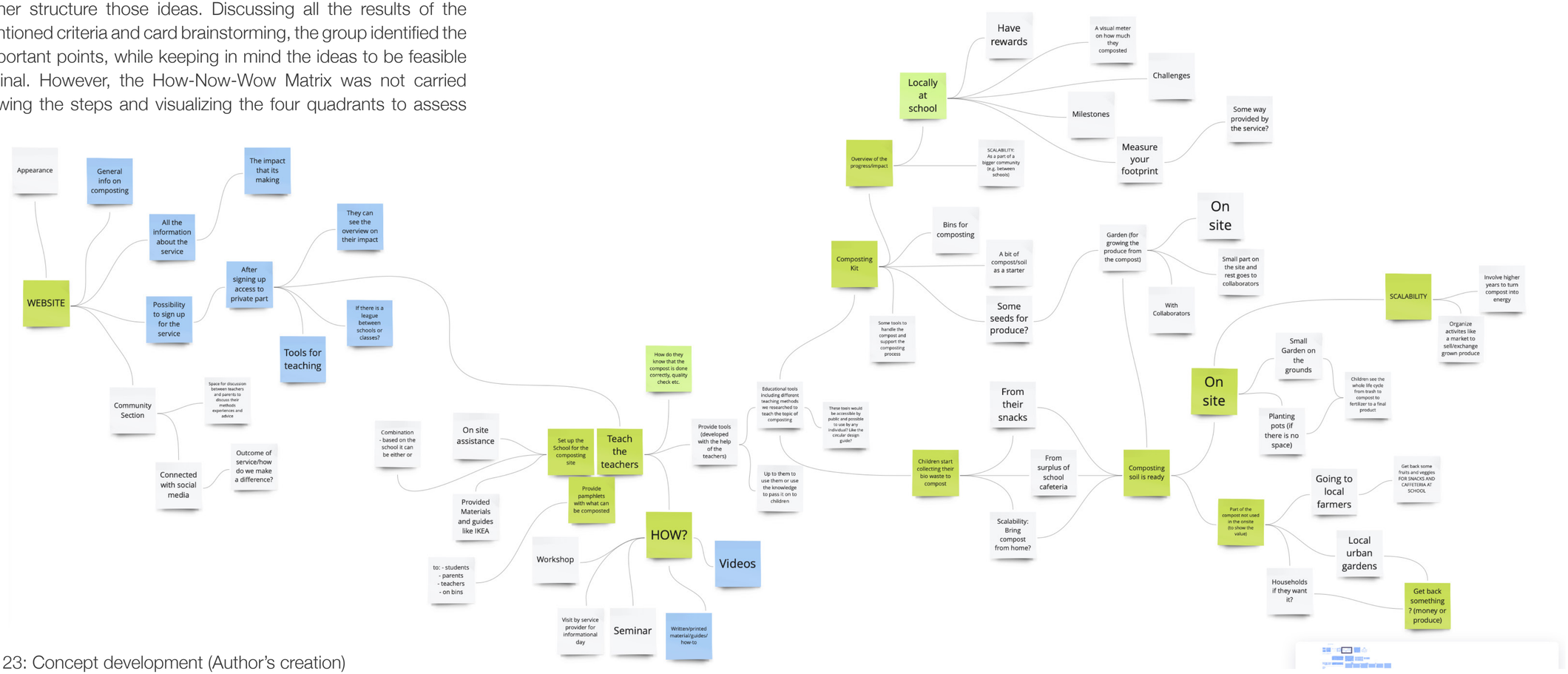



Figure 23: Concept development (Author’s creation)

### Online appearance
This included how to make the schools and teachers aware of the service. The appearance of the service has been discussed, specifically how the users (teachers) will find out about the service and what information is to be passed on through online channels. In the process of evaluating the ideas, the group evaluated the online appearance to be a crucial touchpoint for the first interaction with users.

### Education
Many gathered ideas and points revolved around different channels and how the service transfers information. These ideas included various types of material, both written material (brochures, pamphlets, guides, etc.) and online accessible material (videos, workshops, seminars, etc.) that aims to create a foundational understanding of the topic. The brainstorm also included what material can be useful to incorporate in class with ideas ranging from leaflets on composting, exercises and tools for composting, etc.

### Compost
Considerations were made on how to use the produced compost in a circular way. The brainstorm on the compost revolved around education on circularity, collaborations, and scalability of the service.

Discussing and assessing the ideas while using this method has been helpful to narrow down the scope and define the core aspects of the service. Thereby, some ideas were rated as unnecessary, whereas others were simply decided to be too extensive. Hence, a couple of interesting points are kept in mind as scalable service points. The outcome of the sessions is available in the section 6.3.4 The service concept description.

## 6.3.3 From stakeholder to user

During the concept development stage, discussions on the users prompted further reflections, and as such, the perspective shifted. It became apparent that it made more sense that the previously assumed possible stakeholders, instead be considered direct users of the service similarly to the main users. Specifically, this concerns the stakeholders within the environmental/bio-waste side, such as composting centers, local farmers, community and urban gardens, farmers markets, individuals with an interest in compost, school canteens as well as other external parties operating within the relevant field.

### CONSUMER
Representing any actor in the local community wishing to acquire compost and engage in sustainable initiatives (figure 24).

### User story
I am a local citizen with a great interest in the environment, actively participating in activities that support sustainability and circularity. I am aware of the current state of the environment and climate and seek to do my part to make conscious decisions in the aim for a better planet. Thus, I make sure my actions reflect my mindset and am always on the lookout for sustainable alternatives. I can see the advantages and benefits of contributing to a circular economy and am motivated by others who share my beliefs and values, as it is my hope that I can inspire others to choose a more sustainable option when possible.

## 6.3.4 The service concept description

Based on the research carried out and followed by the brainstorming sessions, the group was able to form the service concept for CompostIT (figures 25, 26).

**CompostIT** is a platform-based service offering *(see literature review, section 2.4 Platforms, p. 18)* for primary schools aiming to include the topics of sustainability and circular economy in the curriculum. CompostIT is a free service to sign up for, providing a variety of materials and tools

Figure 24: Farmer (Author's creation)


Figure 25: Concept images 1 (Author's creation)

for teachers to include in-class across various subjects both online and offline in the form of a composting kit. The educational materials provided focus on the biological life cycle of the circular economy (figure 7), revolving around the topic of bio-waste and composting. Materials, hands-on exercises, and tools for incorporating composting at school aid to make the topic understandable and relatable to the students. By producing compost, the students will experience the whole biological lifecycle, turning bio-waste into compost and re-using it for growing their own produce in school gardens. Since the nature of a platform is to create value for all participants, a part of the produced compost will be available to people or companies interested in acquiring compost, which could be community gardeners, local farmers, and other organizations. The platform facilitates the exchange of value between the producers (schools) and consumers (people interested in the compost). It is important to note that no monetary (financial) currency is introduced on the platform but rather the produce is exchanged for whatever both sides deem relevant (e.g. fresh produce, information, etc.) Therefore, the service considers three types of users, the teacher, the student, and the consumer. Here it is important to note, that the main users are described as teachers, as they are the decision-makers and decide to use the service, therefore they are involved in all stages of the service encounter. The students are considered as the service end-user/recipient of the educational part of CompostIT. Moreover, the consumer is using a part of the service only, which is the exchange of goods.

The overall aim is to create awareness on bio-waste and make students understand the benefits of sorting waste correctly, as well as to engage them in taking sustainable actions and promote the topics in the future. Furthermore, to change the perception of waste into a resource and understand the value of it thanks to the exchange on the platform.

The group has designed the concept of CompostIT platform without a specific client for which the project was meant for. Therefore the platform owner/service provider, whose role is to lead, sustain, and maintain the platform, is not specified to one person or organization but rather it is open to who would be interested in taking up this project. Nevertheless, the group deemed it relevant to note down several possible and suitable service providers that have been considered to be of importance. Since the platform is standing as the facilitator between the consumer and producer, offering value to both sides, neither would act as the service provider. Instead, the group proposes potential service providers that include the Copenhagen Municipality, Ministry of Education, European Union, FællesGRO, non-profit organizations, or private individuals/ investors interested in this cause or already existing similar services. It is important to note that the above are solely examples of the character of the possible platform owner/service provider but they are in no sense limiting the possibilities. From this point forward, when the group refers to the platform owner/service provider, it is with these suggestions in mind.

## 6.3.5 Platform canvas

Over the course of the process, the service has evolved to involve several actors that are exchanging value among each other. As briefly indicated before, there is the (1) service provider, offering information to the (2) teachers (that are transferring it to the students), which are the producer of the compost that is offered to the (3) consumer, a person or company that wants to acquire the compost. As the service encompasses information, services and goods, as well as currency, the idea to create a platform emerged. A service platform can facilitate value-creating connections between producer and consumer and thereby enable the exchange of these three things (Choudary et al., 2017).

The group decided to use the platform canvas as a tool to design a platform (figure 27). The tool considers all important aspects from the producer and consumer side, such as value, filters, curation and customization, currency, and more. As a part of exchanging components, information plays a fundamental role. For the service to take place, the service provider gives important information about


Figure 26: Concept images 2 (Author's creation)

the service to the producer and consumer. The platform is providing an infrastructure containing general information that is accessible to everyone, whereas some parts require registration for the service. On the one hand, signing up as an educational institution gives access to all educational material both online (videos and educational material) and physical (composting kit and in-class material), a community section, and the marketplace. On the marketplace, producers can offer their compost, and therefore it is them that are in control of the inventory and not the service provider. On the other hand, a sign-up as a consumer gives access to the community and the marketplace. The consumers can find compost nearby by using filters which will ease the use of the platform. In the community section, users can exchange useful tips, tricks, and experiences as well as meet like-minded individuals. The platform enables producers and consumers to exchange information with each other through the platform. Through this, the core interaction which is the exchange of the goods (compost) is facilitated. Whilst the compost is not exchanged for money, the consumer can offer something in return (produce, information, etc.). The amount and character of the currency is commonly decided by the producer and consumer who agree upon the value in exchange (as long as it is not monetary). This ensures that the exchange is valuable for both sides and shows children the value of compost.

Choudary (2018) makes an important point that a platform's architecture must include a reputation system, which is a mechanism for distinguishing between good and bad actors within the platform's users. They often depend on mechanisms such as ratings and reviews for feedback. For this reason, a rating/review scheme is introduced, where after every exchange the producers as well as consumers rate and review their experience as well as the received product (compost, currency). This way, each user builds a reputation on the platform and quality curation is ensured. Moreover, this also motivates the users to be more responsible and proper towards their product/currency as well as the exchange because the better reviews they get the more exchanges they can acquire.

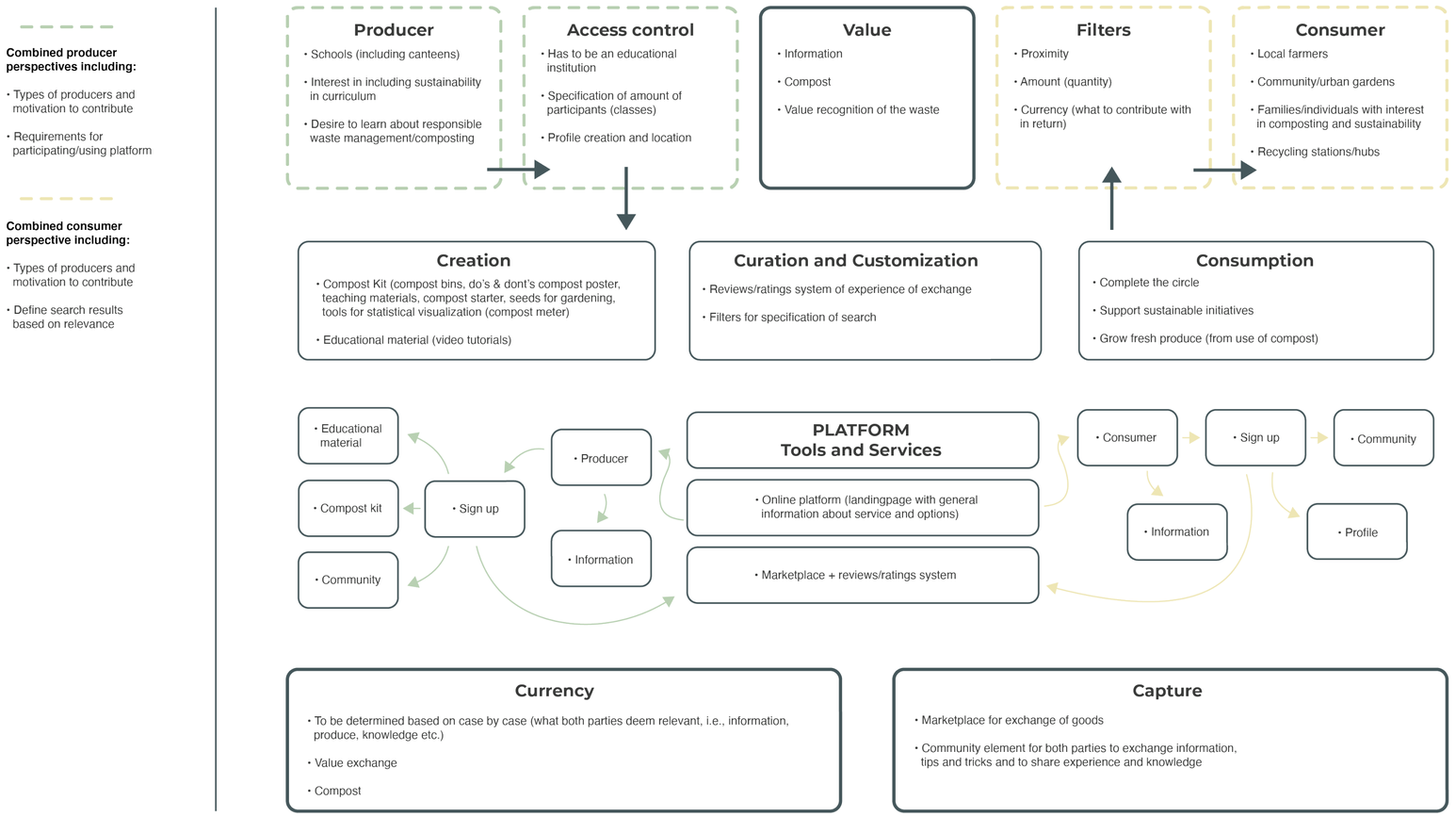



Figure 27: Platform canvas CompostIT (Author's creation)

## 6.3.6 Stakeholder map & value network map

The stakeholder map provides a visual representation of the various persons or organizations involved in the service experience on different levels. It can be extended with the value network map used to illustrate the value exchanges between the stakeholders (Stickdorn et al., 2018).

The three-circled stakeholder map (figure 28) was applied to define the core (inner circle), primary (second circle), and secondary stakeholders (outer circle) of the CompostIT service offering. As the group aims to create a user-oriented service, it was decided to place the users in the center. The more important a stakeholder is, the closer it is placed to the center of the stakeholder map (Smaply, 2020). Next, the primary stakeholders are the people that are essential and important to the service offering, which are defined as the school, suppliers, etc. The secondary stakeholders are the ones who can affect or be affected by the service but are not as important as the primary stakeholders, e.g., the Ministry of Education and similar initiatives.

The more detailed value network map (figure 29) shows the connection and value exchanged between the different stakeholders across the circles. Various forms of value have been discussed and are shown in icons (see figure 29 - legend for understanding). The most crucial value exchanges for the service implementation are the information shared amongst the platform owner and both of the users, as well as the compost kit to the producer.

Mapping the stakeholders aided to gain an understanding of the services ecosystem, by defining the people and organizations involved and reflecting their level of importance. Moreover, it has helped to establish the connections and value exchanged between the different stakeholders. As service systems are dynamic, it has proven to be a difficult task to use these maps in the early stage of concept development, as maps need to be adjusted several times over time when further defining the service.

In addition to the chosen maps, the group discussed applying the ecosystem map, which goes beyond the value network map and includes further systems like mobile applications and IT systems. However, applying the tool was determined to be trivial as the involved systems are the CompostIT platform only.

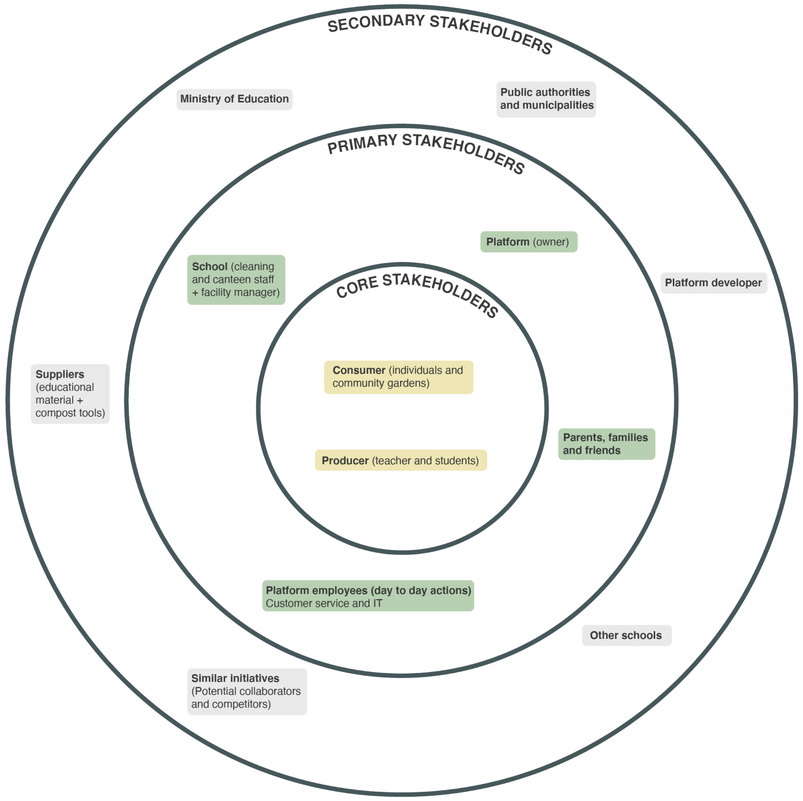



Figure 28: Stakeholder map (Author's creation)

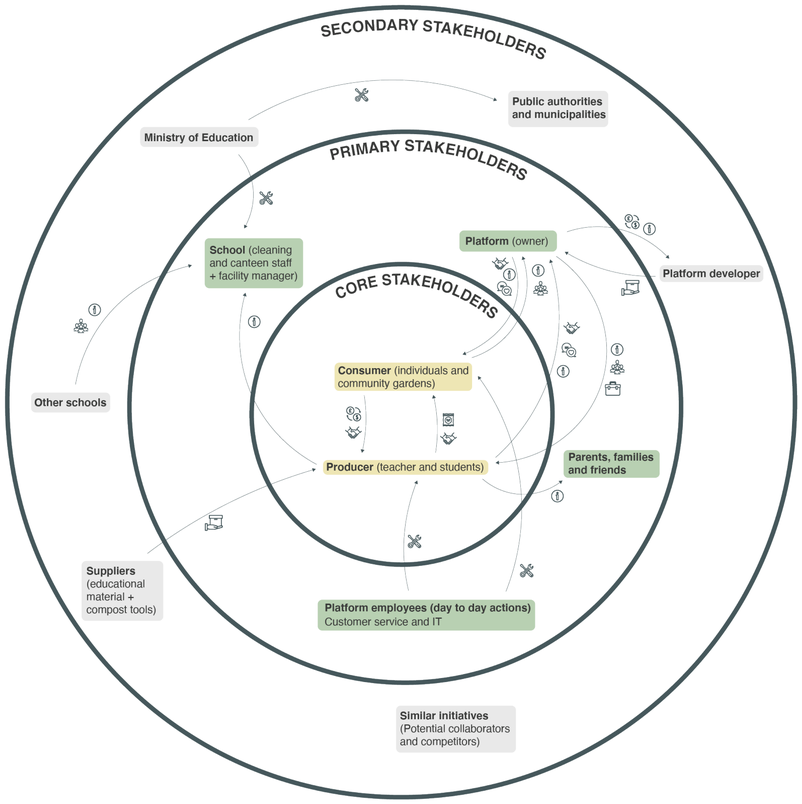
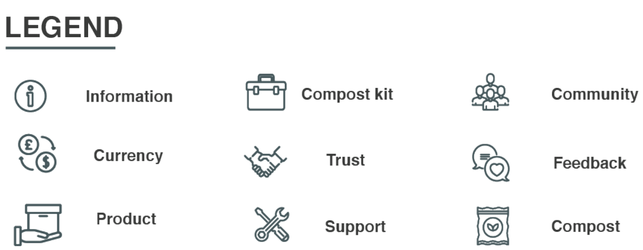



Figure 29: Value network map (Author's creation)



## 6.3.7 Journey maps

Journey maps are a visual representation of a service or product a person experiences over time. As a human-centered design tool, journey maps include all steps of the users' interaction with the product or service, and beyond that it reveals all key steps of an experience (Stickdorn et al., 2018).

Applying the journey map gives an idea of the single phases of a service, and aids to find gaps in customer experiences and explore potential solutions. It can be used to visualize the user actions and what they are interacting with along the way, also known as touchpoints. Due to its complexity, the platform touchpoint for the teacher user journey has been further distinguished into the following: 'Information on the educational aspect', 'teacher section with educational material', 'marketplace section' as well as the 'community section'. The touchpoints for the consumer user journeys are likewise distinguished within the platform touchpoint and are as follows: Information, sign-up/create a profile, marketplace section as well as community section.

Moreover, it makes intangible experiences visible in a simple way and can help to facilitate a common understanding between group members. A journey map focuses on the experience of one main actor, such as a group of users or a persona (Stickdorn et al., 2018).

The journey mapping was applied as another tool during the ideation process, to determine the specific dynamics of each actor in the service. While taking into consideration the previous visualization of the concept development (figure 23, p. 58) which was already structured in chronological order. For the user journey to represent the entire service and to empathize with the different user perspectives, it was decided to create one for the teacher and the student, as well as for the consumer (figures 30, 31). The aim was to identify each stage and step of the service the user is going through and when gaps occur along the way, to further elaborate on the service aspects.

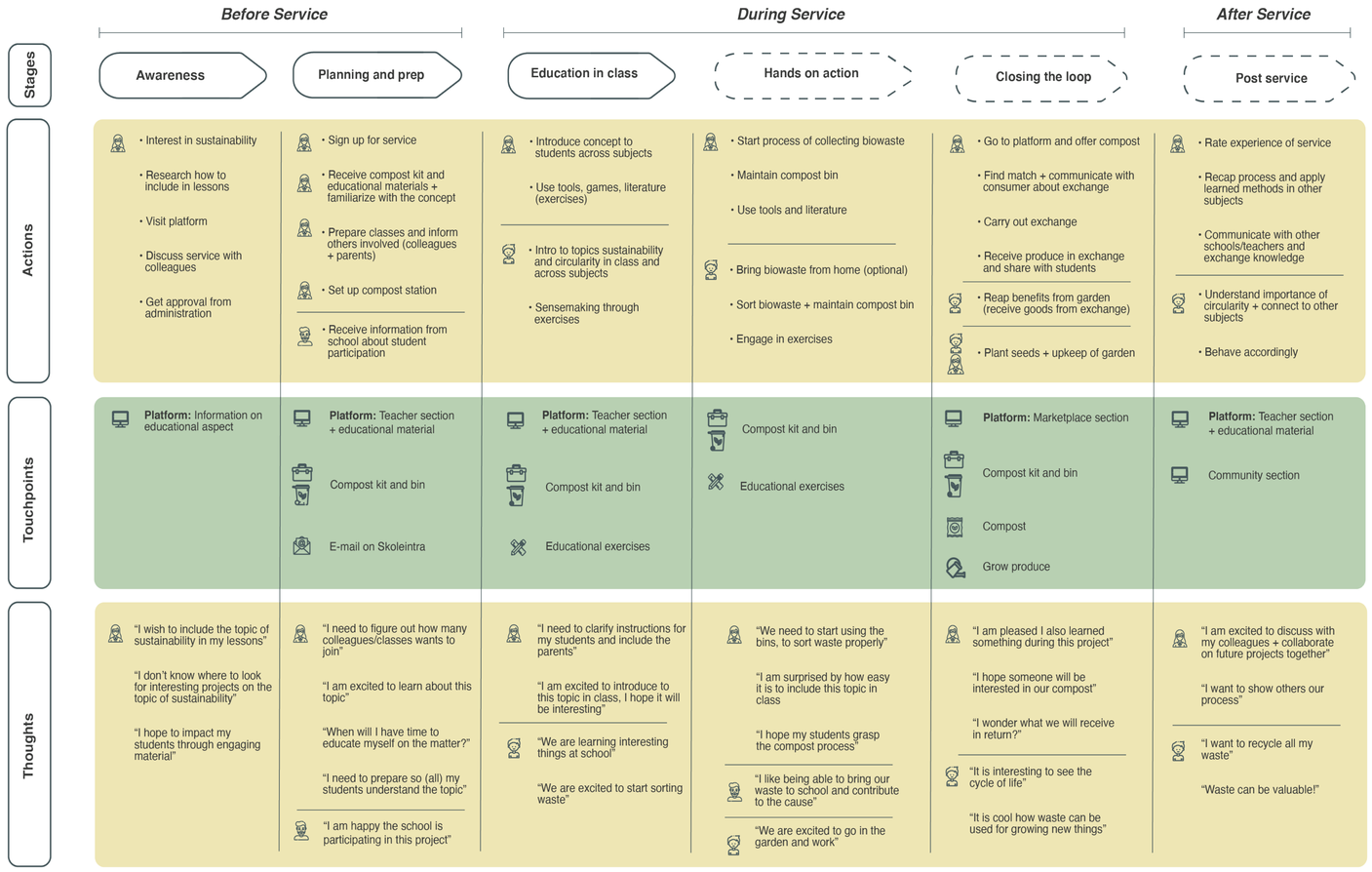



Figure 30: Producer journey map (Author's creation)

The stages were defined to be ranging from awareness to the closing the loop/and post service stage. It is important to note that for each stage, the actions happen chronologically in a sequence, as they are written and not at the same time. The stages ‘before’ and ‘after service’ for the teacher and the student show many similarities as they are taking part in the service together, whereas the teacher is acting as a facilitator and the student as an active participant. However, in the stage ‘before service’ it is up to the teacher to decide to sign up the class and do the planning and preparation. Taking the research question into consideration, the most vital stage for the students is the ‘during stage’, where the informing, application, and closing the loop takes place which ideally would encourage a circular mindset for the future. Here they are exploring the topic through information, tasks, and hands-on activities that include producing their own compost and growing produce at school to visualize the entire circular economy circle. It is, however, up to the teacher to deal with the communication and planning of the exchange when a consumer is interested in the produced compost.

The consumer comes into play when compost is needed and the platform is visited (figure 31). In order to find compost nearby and establish contact with teachers, the consumer is required to sign up for the service. The consumer suggests the form of a value in return for the compost, and the teacher and consumer agree upon a date and time for the exchange.

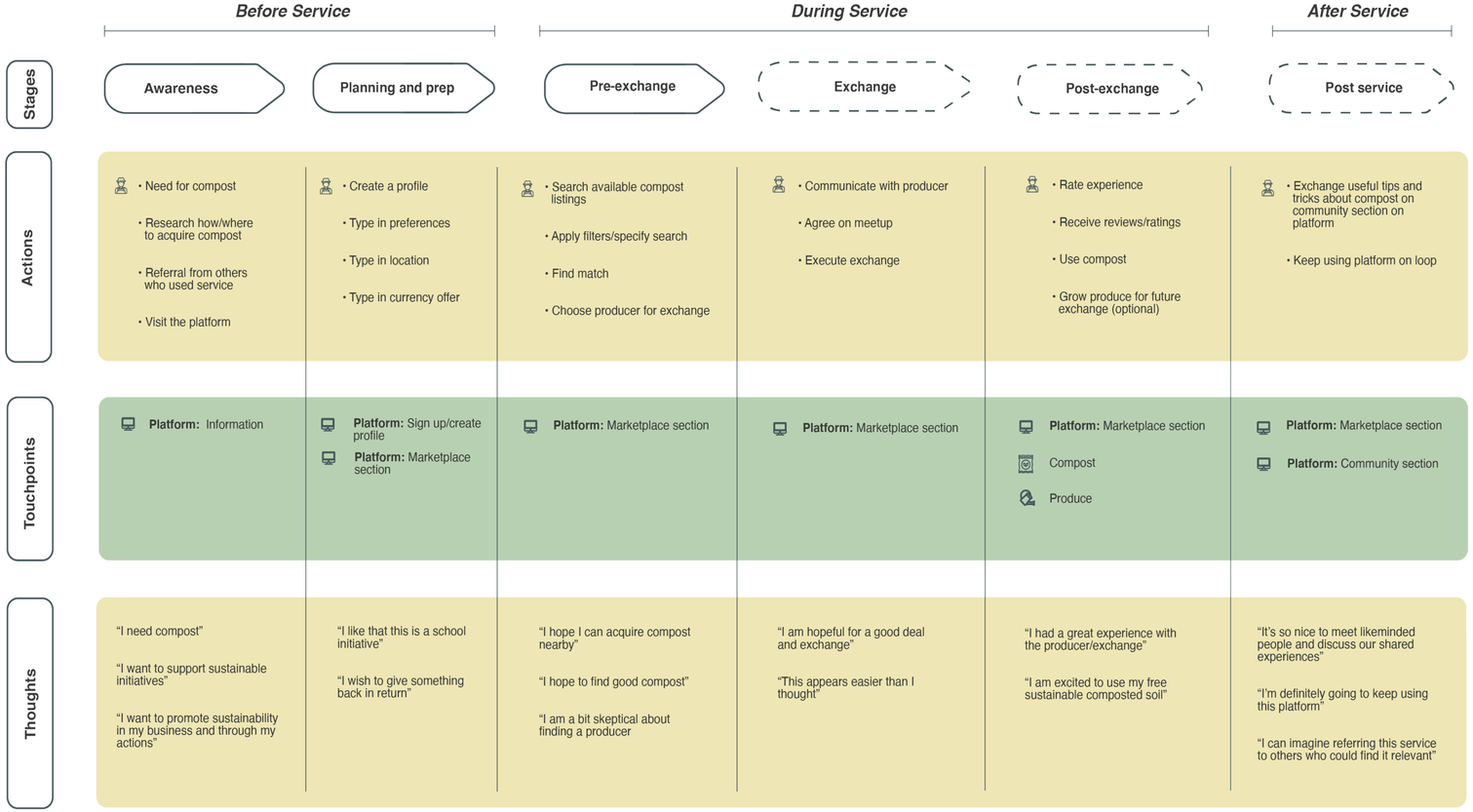



Figure 31: Consumer journey map (Author’s creation)

# 6.4 PROTOTYPE & TEST

# 6.4 PROTOTYPE & TEST

The next stages of the design process include prototyping a solution and testing it with the users both from the teacher's and the consumer's perspective. Since the group is using a prototype for testing, it has been decided to merge the two design stages in one section.

For testing the concept from the teacher's perspective, a concept walkthrough is used as a low-fidelity prototyping method, which serves as a quick and easy way to present the concept to the teachers (Stickdorn et al., 2018). Secondly, it has been decided to find potential consumers of the service (e.g., community gardens and similar organizations) and conduct semi-structured interviews, to present the concept and gain insights into their needs, wishes, and expertise in order to validate the concept.

## 6.4.1 Concept walkthrough

The concept walkthrough is used to prototype the service concept in the early design process and is particularly useful for assessing the usability and feasibility of the concept, providing feedback on potential pain points before implementation. Also known as cognitive walkthrough, the focus of this method is to evaluate how easily the user can perform the proposed tasks within the service concept, with minimum instruction (Polson et al., 1992). The method includes an elaborate description of the service concept design, scenario tasks, assumptions about the intended users and the context of use, as well as a series of actions to be completed. The method aims to have the participants evaluate and reflect upon the design of the service concept (user interface), as well as the expected behavior of the required steps/actions, pointing out any problems or obstacles that could occur (Polson et al., 1992).

In order to understand the intended end-users experience and their impression of the service concept, it was decided to conduct the test with primary school teachers, using the concept walkthrough (figure 32, enlarged figure 34) as a step-by-step simulation (see appendix 5 for concept walkthrough guide).

Furthermore, the aim was to identify and uncover any potential gaps in the service, to not only ensure that the concept meets the user's expectations but also reflect realistic actions and behavior from their perspective. The testing was done with two of the same teachers from the in-depth interviews *(see in-depth interviews, p. 48).* The testing took place as online interviews (see appendix 7 for the recording link), beginning with an introduction to the service concept, followed by a presentation of the concept walkthrough (the scenario) to be performed as well as the connecting tasks, guiding the participants through the service journey. The participants were instructed to reflect upon and express their impressions of each step, as well as provide any general comments on the structure of the service concept and the expected actions performed by them. Additionally, the participants were shown visual examples of educational material (compost guide) seen on figure 33, with the intention of getting their input on how it performed as educational material.

Generally, the consensus towards the service concept was positive and the participants expressed enthusiasm about the project. However, the testing unveiled a repeating pattern between the two participants, specifically concerning challenges within the service concept. Certain things were clarified, such as whether approval from school administration was necessary in order to pursue projects like the CompostIT, which depends on the size of the project. Furthermore, there are protocols in terms of how to include (new) topics in class, consisting of copious research traditionally using learning/teaching portals or educational communities where topics/literature are mutually shared between professionals. Alternatively, topics can be sourced directly based on either interest or due to inspiration, however this is not as common Additionally, it was confirmed that preparation prior to in-class lessons reflected the current reality of the participants daily schedule, including a plan to first get acquainted with the topic and subsequently

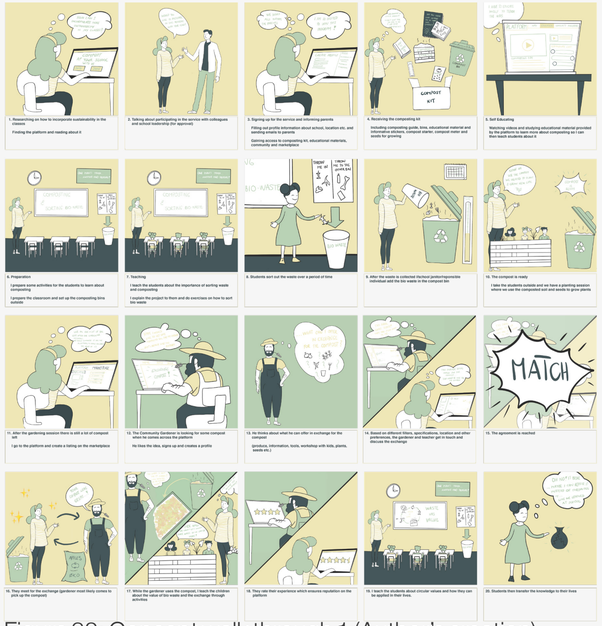



Figure 32: Concept walk through 1 (Author's creation)

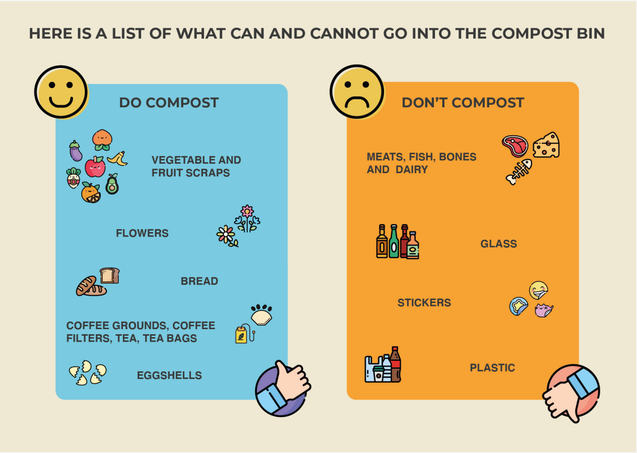



Figure 33: Compost guide (Author's creation)

determine how/when to introduce various aspects of said topic to in-class lessons (practically). Preparing the students with in-class activities before practical exercises is likewise a common step, which supports learning and teaching goals to be set, making the effectiveness of the lessons more measurable. In connection, it was deemed beneficial if the education material used for the teacher could also be included in class activities, to a certain extent. Looking at the practicality of sorting and maintaining the various bins, concerns were expressed about who should take on the role. Suggestions included either the janitorial crew or the students themselves, as it is not uncommon to assign students with smaller tasks, to simultaneously encourage engagement, motivation and understanding of the topic. One of the primary concerns of the service concept pertains to the exchange part, specifically the extra work required, which would not be considered part of the traditional preparation. Instead, suggestions were made to either keep the procedure as simple as possible, include only teachers passionate about the specific topics, or limit the exchange to certain groups within the consumer segment; families. However, advantages could be seen in the final stages of the service concept on the matter of connecting and incorporating the topics as well as the exchange (i.e., produce or information) in new subjects and/or projects. Overall, the testing confirmed that the main aspect of service, the educational part, was successful in providing and setting the proper environment for teaching and encouraging change in behavior.

Finally, the visual example of educational material was well received by both participants, with remarks on not only the resemblance to similar materials, but also due to its ability to combine various learning modalities.

Figure 34: Concept walk through 2 (Author's creation)

## 6.4.2 Expert Interview

To gain a deeper understanding on the consumer perspective, potential consumers have been investigated and contacted. The focus was put on people or organizations with a greater understanding within agriculture and composting, that might have an interest in acquiring compost produced by schools who could provide feedback and validate the concept. The group picked three participants representing (1) FællesGro, (2) GoGetGreen, and (3) Amager Fælled Eco-gardens, to contact for expert interviews (figure 35).

**(1) FællesGro**
FællesGro is a community-supported agriculture that connects organic farmers directly with nearby consumers of fresh and organic produce. This membership-based concept assures security for the farmers and fresh and seasonal organic produce for the members (Fællesgro, n.d.).

**(2) GoGetGreen**
GoGetGreen is providing an application for small producers to sell their own produce and consumers to buy the seasonal raw materials. The couple behind GoGetGreen is partly living self-sufficient (growing their own produce, using renewable energy, etc.). The concept promotes sustainable production both on land and water to achieve a reduction of the CO2 footprint (GoGetGreen, n.d.).

**(3) Amager Fælled eco-gardens**
Amager Fælled Økohaver is a small organic community garden association since 2010, where engaged, gardening-interested people could get hold of their own little garden space (Oekohaver, 2018). The eco-gardens gardening consultant John Emil Norrie is educated as a gardener and landscape architect and has great knowledge in gardening and plants (diseases and pests) and composting.

The different organizations are all working in the field of organic farming and gardening as well as sharing resources with a common goal towards sustainability/regenerative agriculture.

By calling representatives of the companies/organizations, the group aimed to obtain insights into their field expertise as well as the needs and requirements when it comes to acquiring compost. The semi-structured interviews were held over the phone and consisted of a service concept description, followed by a couple of questions that sparked interesting conversations with the experts (see appendix 6 for the expert interview guide, and appendix 7 for recording link). Through this, the group received comments and feedback which aimed to serve as a validation of the service concept from the consumer perspective.

All representatives have informed that compost is used by both private individuals and farmers, for the application on fields or in gardening. Both farmers and community garden owners produce their own compost, which can often be supplemented by compost acquired from e.g recycling stations. That being said, when it comes to the quality of compost, the easily accessible recycling station compost is evidently not a good option, as especially farmers and people with extensive knowledge may have greater criteria when it comes to the compost they are using. Experts expressed the importance of compost quality, as it may not include fish and meat rests, but rather solely vegetarian waste. Some farmers even wish to use organic compost only. It can be said that all experts show a positive consensus towards the schools producing compost and children learning early about waste separation and use. However, they shared the opinion that the compost produced by schools will appeal to private individuals in particular, in fact for them they see a high potential. This may involve people living close to the schools, community gardeners as well as the parents and grandparents of the students, as they may not produce their own compost and are also not in need of greater amounts. Yet, experts indicated that when it comes to private persons, signing up in order to acquire compost only could be a hurdle. Finally, the experts advised to keep the concept simple, from the process of composting to the distribution.

FÆLLESGRO

GoGetGreen


Figure 35: Expert interviews (Google, n.d.b)

## 6.4.3 Key Findings - Testing

- General consensus towards the service concept is positive, confirming not only interest and awareness of the topics of circularity and sustainability but also the feasibility of the educational aspect.
- Teachers appreciate the simplification of research of materials to be included in the class.
- Many actions concerning planning and preparation of material reflect the day-to-day schedules for the teachers.
- Using the material as a learning goal (measurable) for the teachers as well as students is an advantage, and even more so if the material can be multifunctional (used for both teacher preparation and in-class educational material for the students).
- The main issues for both the teacher's and consumer's perspectives concern the exchange part of the service concept.
- The expressed issues pertain to the extra time required to devote to the task (for the teachers), as well as the potential hurdle for individuals to use the service (lack of incentive due to a sole focus on compost).
- Suggestions from both perspectives point to a simplification of the exchange stage to ease and increase the use of the service concept.
- The testing and interviews confirmed areas in the service concept in need of improvement to meet the needs of the users, taking into consideration the feasibility and usability of the concept.

6.5

# DELIVER

# 6.5 DELIVER

In the final delivery stage, the service concept is modified and further defined addressing the above-mentioned problems identified during the testing and explores possible solutions. This section describes the process of defining the solution by using the following tools: Scenarios, Value Constellation Mapping, Platform Canvas, Stakeholder Network Maps, Journey Maps, and finally a Blueprint on the platform's most crucial part.

Testing the service with both users has revealed a few pain points from both the teacher's and the expert's perspectives. As the group aims for creating an effective and efficient service for the users, the concept evidently needed to be adjusted. Therefore, the insights and most crucial pain points when it comes to usability of the service were discussed. These revolve around the exchange part of the service, which requires *extra time for the teachers*, as well as t*he lack of incentive for the consumers* to sign up for the service due to a sole focus on compost.

## 6.5.1 Scenarios & value constellation

The group discussed alternative options and mapped out different scenarios. Design scenarios are hypothetical stories to explore a particular aspect of the service offering. With the tool, problematic aspects of a service offering may be turned into scenarios to generate ideas and alternative concepts (Stickdorn et al., 2010).

For each of the scenarios, a value constellation map is created (figures 36, 37, 38) to understand the connections and values exchanged by the different actors and compare them against each other. The purpose of creating a value constellation is to understand the core interactions between the consumer and the service organization and how it differs in the different scenarios.

The value constellation map was developed by Normann and Ramirez (1993) and is used to represent how various actors are connected and how they together construct the service offering (Patricio et al., 2011).

The three possible scenarios are proposed and discussed on the following pages.

## SCENARIO A

*Incorporate CompostIT into an existing platform* (as suggested by GoGetGreen), functioning as a marketplace for individuals to allocate their local produce. Consequently, the value constellation map (figure 36) distinguishes between CompostIT, the educational platform, and the existing platform (green, acting as primary stakeholders), which is a new actor in this scenario. Moreover, it includes the users which are the teacher and student as well as the consumer of the platform (yellow) as core stakeholders. The material suppliers (dotted line) as secondary stakeholders remain connected to CompostIT. The CompostIT educational platform is where the teachers can sign up and gain access to the educational material, whereas the platform is connected to the existing platform which is used as a marketplace to exchange the value with the consumer. By moving the marketplace part of the CompostIT platform into an existing platform, the issue that the consumer has to register for a service that only gives them access to compost is eliminated and CompostIT will gain a better reach, e.g., more people become aware of composting which can lead to more consumers. Therefore, this scenario would solve the lack of incentive from the consumer perspective. On the other hand, it would ease the service's usability for the teacher when it comes to the exchange part, as they could easily mark compost as available (including pick-up information) on the application. However, this would also mean that the teacher would have to invest time in the application and the exchange, resulting in that the issue of time would not be completely solved by scenario A.

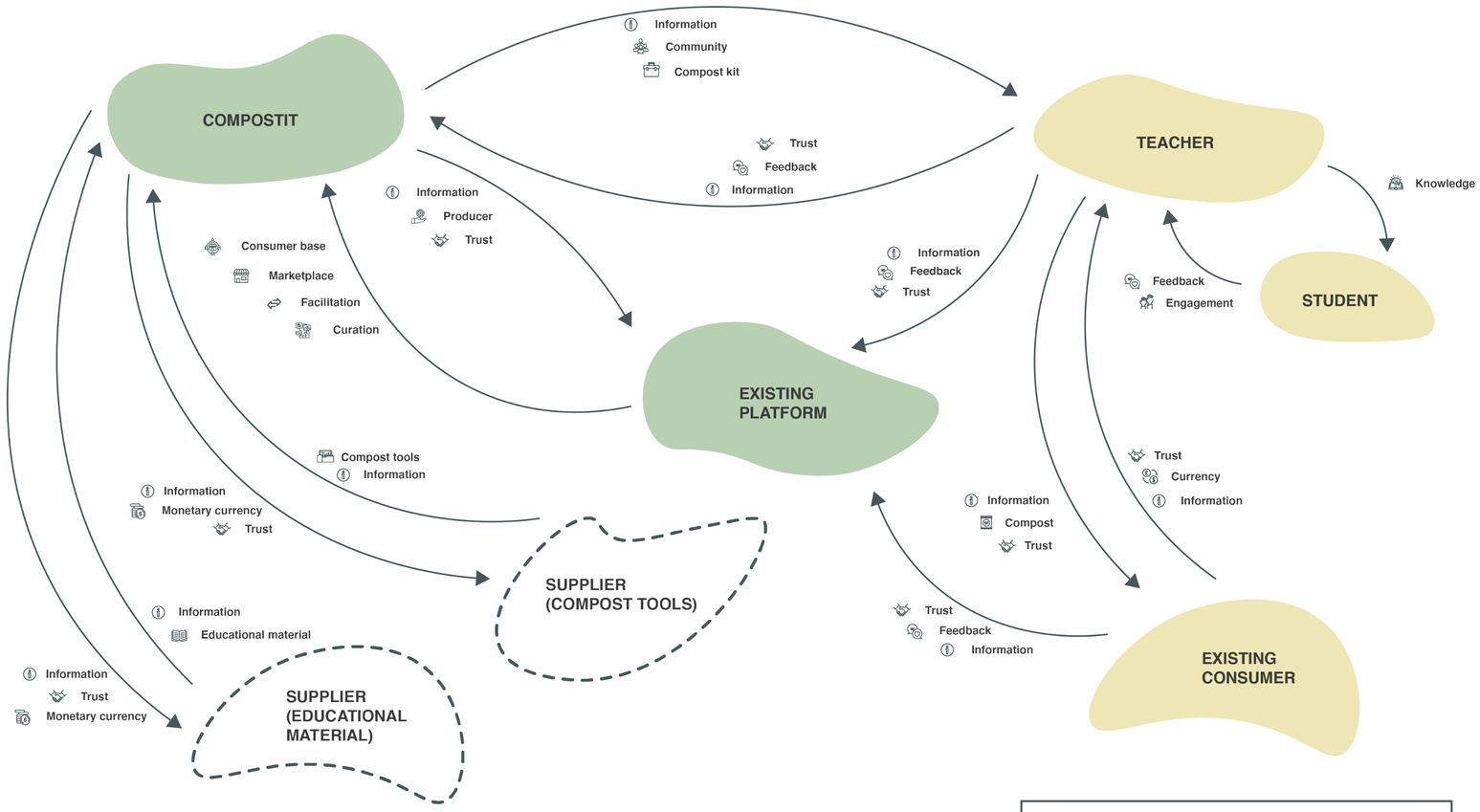



Figure 36: Value constellation A (Author's creation)

### LEGEND

Compost Kit · Currency · Engagement · Community · Information · Producer(s) · Consumer base · Educational material

Curation · Trust · Knowledge · Feedback · Compost · Marketplace · Facilitation · Monetary currency · Compost tools

## SCENARIO B

The platform provider is the facilitator between the producer and consumer, instead of them having direct communication with each other. Hence, the value constellation map (figure 37) distinguishes between the primary stakeholder, CompostIT (green) as well as core stakeholders, the users, which are still the teacher, student, and consumer (yellow). The material suppliers (dotted line) as secondary stakeholders remain connected to CompostIT. In this scenario, the team behind CompostIT is facilitating the match and exchange of the value between producer and consumer. Therefore, the majority of the values are exchanged through CompostIT, whereas trust is the only value that is shared amongst the users. Scenario B requires more employees for CompostIT, meaning that it is a more expensive option that would require a membership fee, which could introduce another issue if schools do not have the budget to pay for the service. However, the issue revolving around finding a match, communicating, and executing the exchange is tackled on both users' ends, resulting in an advantage for the teachers by requiring less time and effort from them. Although, on the consumer end, the sign-up part remains which means that the issue of the lack of incentive will not be solved with scenario B.

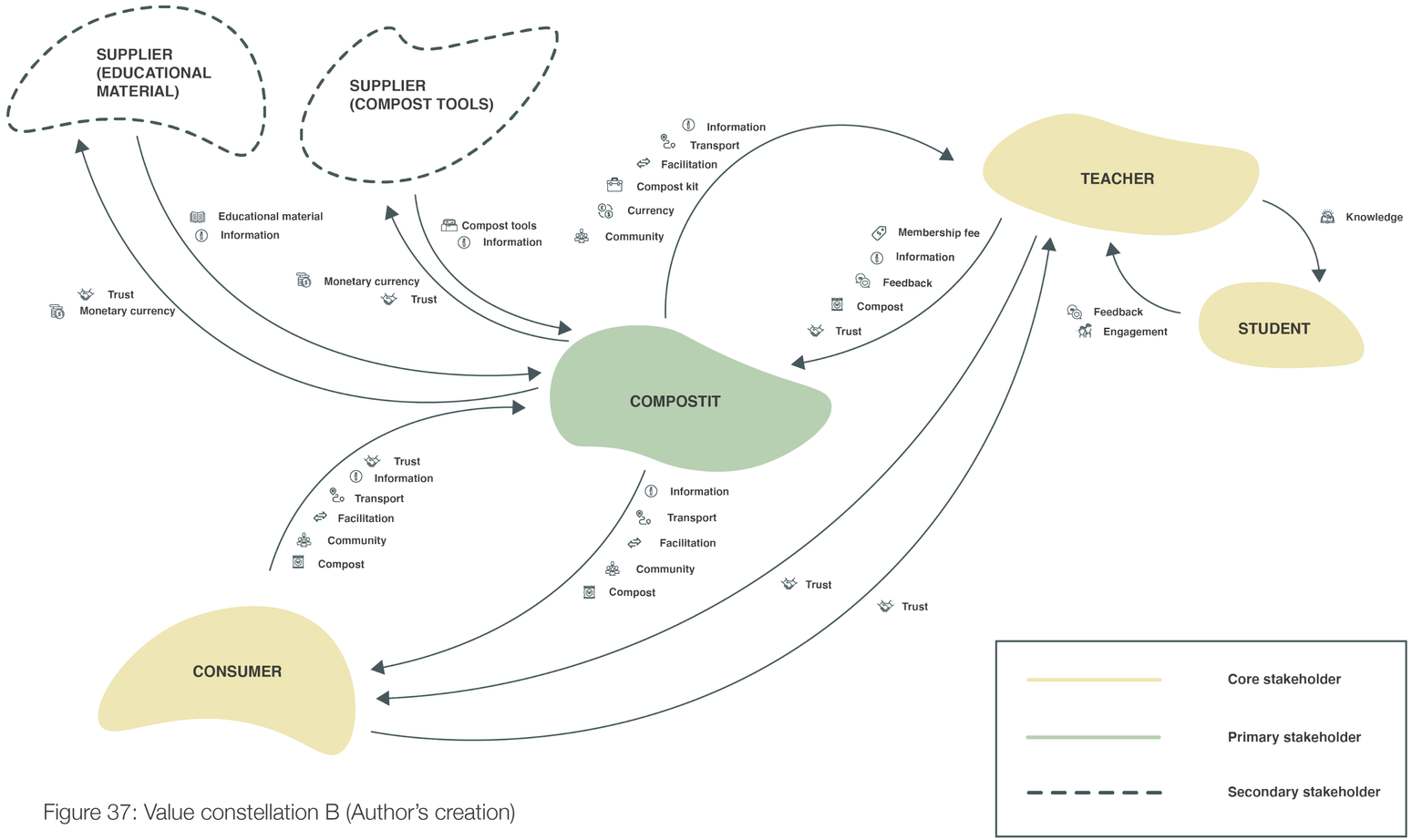



Figure 37: Value constellation B (Author's creation)

## LEGEND

Compost Kit · Currency · Engagement · Community · Information · Transport · Educational material · Compost tools

Trust · Knowledge · Feedback · Compost · Facilitation · Membership fee · Monetary currency

## SCENARIO C

The platform owner is the facilitator, whereas the teachers become the consumer of the service. In scenario C, the platform is owned by the municipality and focuses on the educational aspect of composting at schools, whereas the exchange of values between the consumer and the teacher is canceled. The value constellation map (figure 38) includes CompostIT, the educational platform, and the platform employees (green) as well as the municipality (green) as the platform owner, as primary stakeholders. In this scenario, the compost does not act as the produce like in the previous scenarios, but instead it is the currency that the schools exchange for the service offering (educational material). The municipality receives the compost and utilizes it through a new secondary stakeholder which is the municipality gardener. The service's users in this case are the teachers and students only (yellow), who are acting as CompostIT's consumer (educational material, compost kit), they keep being the core stakeholders. The material suppliers (dotted gray line) are in this scenario classified as primary stakeholders as their role is now more important, they are considered as producers of the value (compost tools, educational material). They are connected to the municipality and CompostIT. More precisely, the municipality employs a team for CompostIT, which is in charge of the distribution of material, assistance/customer service, and pick-up of the leftover compost and use of it within the municipality. The exchange does not take place between two users, instead, it is the platform and the teacher that exchange value in the form of educational material and compost. Scenario C focuses on the educational part and removes the teacher's issue of spending time on the exchange of the compost. By removing the consumer for the compost, the lack of incentive for the consumer sign-up is logically removed as well, meaning that both of the main concerns are avoided. Scenario C does not include an exchange of value in the form of products, which was seen as another way to make the closing of the loop visible to the students. However, the exchange of value is taking place in the form of educational material and compost.

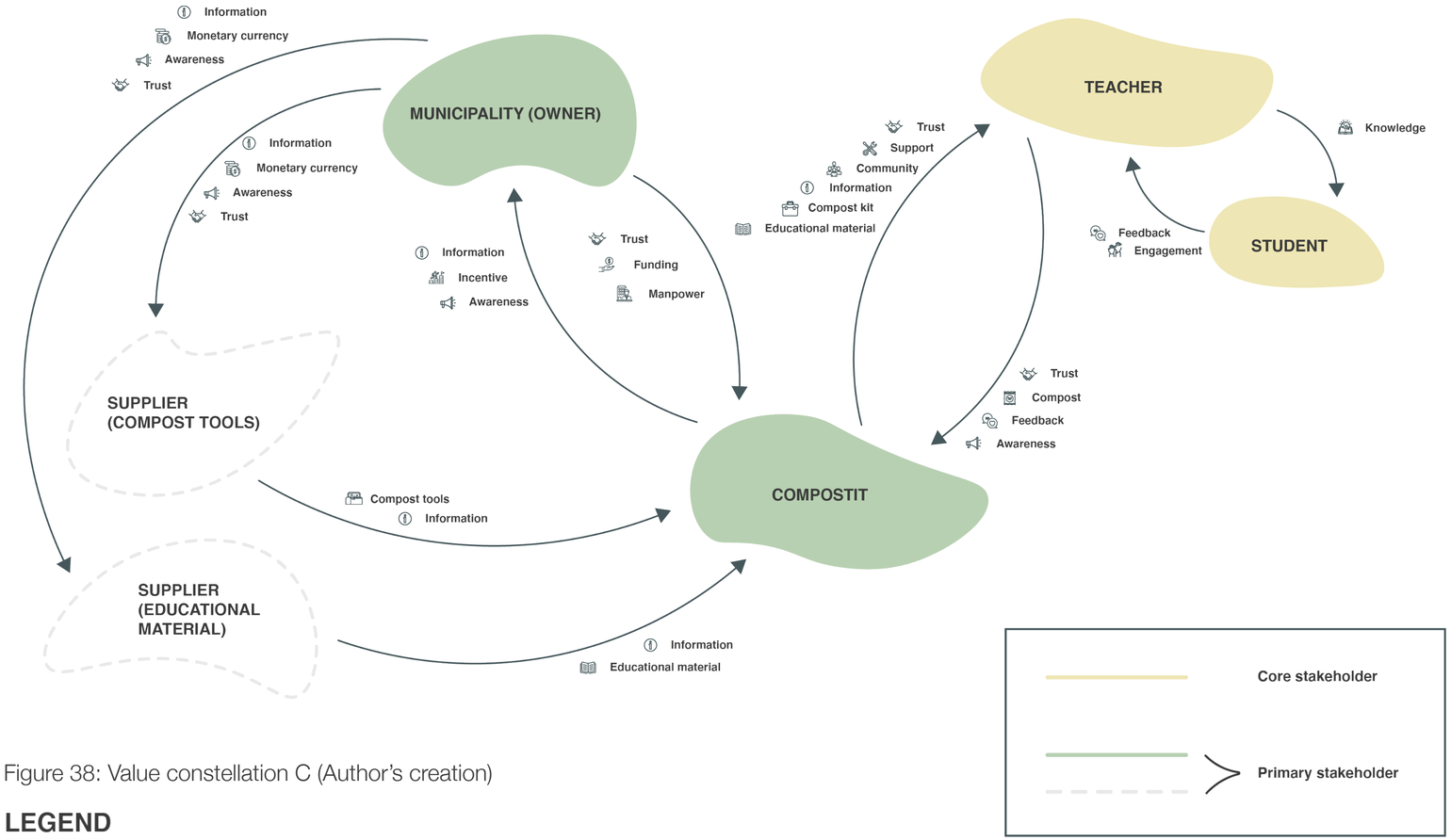



Figure 38: Value constellation C (Author's creation)

## LEGEND

- Compost Kit
- Monetary currency
- Engagement
- Community
- Information
- Funding
- Trust
- Knowledge
- Feedback
- Educational material
- Support
- Awareness
- Compost tools
- Compost
- Manpower (office employees)
- Incentive (motivation)

Following the development of the three scenarios, a round of reviewing and discussing their feasibility was completed. In order to result in a service concept that is achievable and assures great usability, it was clear that the scenarios would require further testing. However, due to time constraints in the final stage of the thesis writing, further testing was not considered an option. Therefore, the group decided to settle on one scenario that was deemed the most feasible one, scenario C, where the focus lay on designing the service to be as user-friendly and easy to incorporate for the main users, the teachers. Throughout the entire process, the education on waste and circular economy has been the center of attention, intending to plant a change-making mindset in the younger generation. Teachers are the decision-makers when it comes to the education in their classes and they decide which specific topics they want to incorporate, according to the guidelines given by the Ministry of Education (see appendices 3 and 4). Consequently, it was deemed of high importance to cater to the needs of the teachers by removing the issue of lack of time to spend on the exchange.

## 6.5.2 New platform canvas

Adjusting the concept and the stakeholder roles in scenario C has led to introducing new and removing previous stakeholders. Naturally, by taking away the consumer and changing the platform to focus on the educational part, the platform canvas has changed significantly. Therefore, it has been decided to create another platform canvas according to scenario C.

Zooming into the new platform canvas (figure 39), it is visible that the roles differ from the original one (figure 27). In this scenario, the producers are the material suppliers, producing the online educational material for the teachers as well as the compost tools for the in-class education. On the other hand, the schools (teachers and students) are now the consumers of the service instead of the producers unlike the previous CompostIT concept. The teachers are using both online and offline provided materials to educate themselves and the students and to implement composting in the class.

The curation and customization now include the educational material and feedback/review for the overall service, whereas the filters for compost search and the review for users are deleted. The filters to navigate the online educational material were introduced instead.

Moreover, the platform owner is included in the middle of the supplier and the consumer, being the facilitator of the service. The exchange now consists of the educational material being exchanged for the compost produced by the schools, this way eliminating the consumers (e.g farmers). In fact, scenario C is predominantly focusing on the educational part, capturing the awareness and enhanced mindset towards circularity by providing the knowledge and the community.

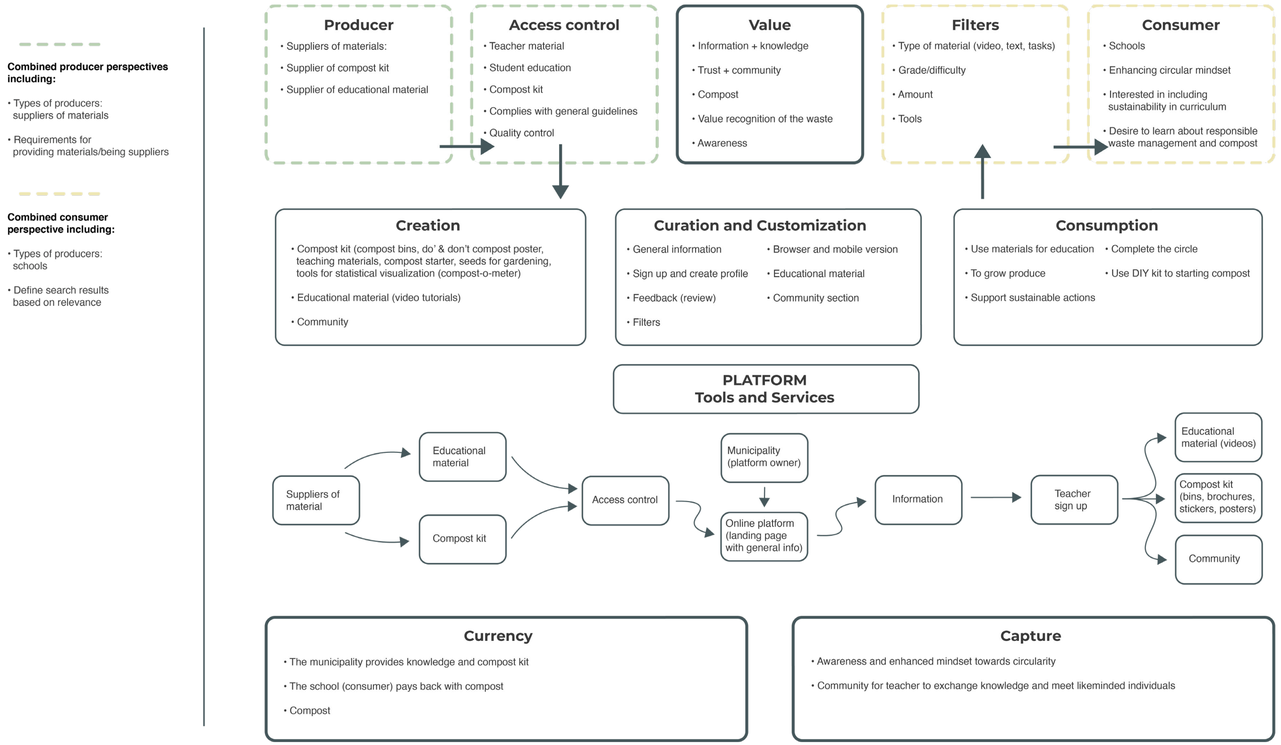



Figure 39: New platform canvas (Author's creation)

## 6.5.3 New stakeholder & value network maps

As the chosen scenario draws new stakeholders with it, it was decided to do another round of stakeholder and value network mapping (figures 40, 41), especially to identify what changes in the concept, compared to the original service concept (see figures 28, 29, p. 62). By removing the compost consumer from the service, the main users in the core of the stakeholder map are now the teacher and the students (yellow). Moreover, scenario C introduces the municipality as the service owner and moves them from secondary to being primary stakeholders (green). The municipality is in charge of the service implementation by controlling the material acquisition, exchanging information, monetary currency, compost tools/material, and trust with the suppliers. In fact, the municipality's platform employees for CompostIT are in charge of the value exchange with the user, as they assemble the compost tools and materials into the compost kit and book a courier to deliver it to the user. Moreover, families of the students are now in the secondary stakeholders, as they inactively play a role and no longer are considered as optional consumers of the compost. The teachers and students are solely receiving value in the form of educational material, compost kit, information, and support whereas the currency is removed with the compost consumer.

By applying the maps to scenario C (adjusted concept of CompostIT), it once again has shown the complexity of systems and underlined how quickly the stakeholder roles and value exchanges can change.

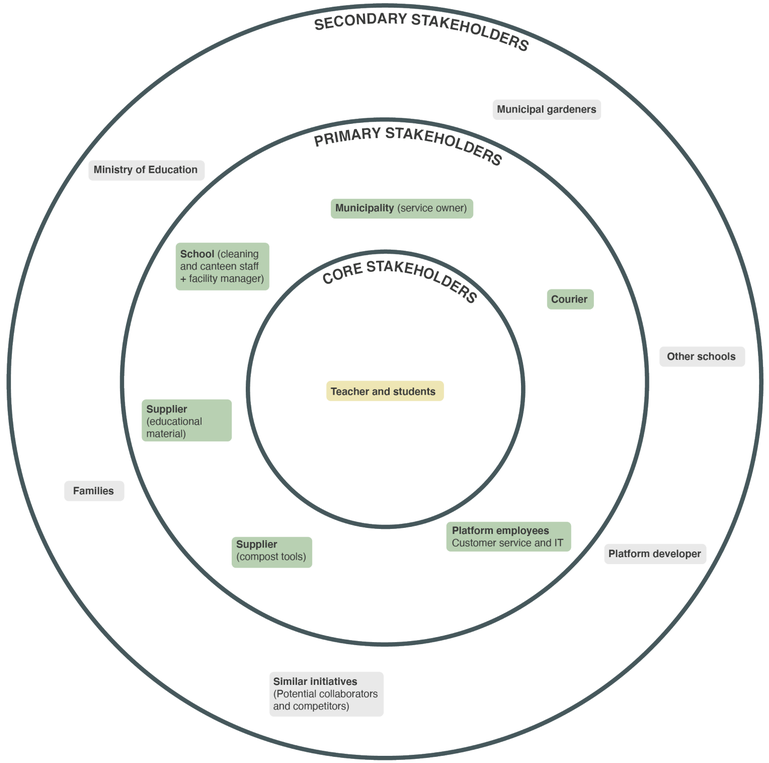



Figure 40: New stakeholder map (Author's creation)

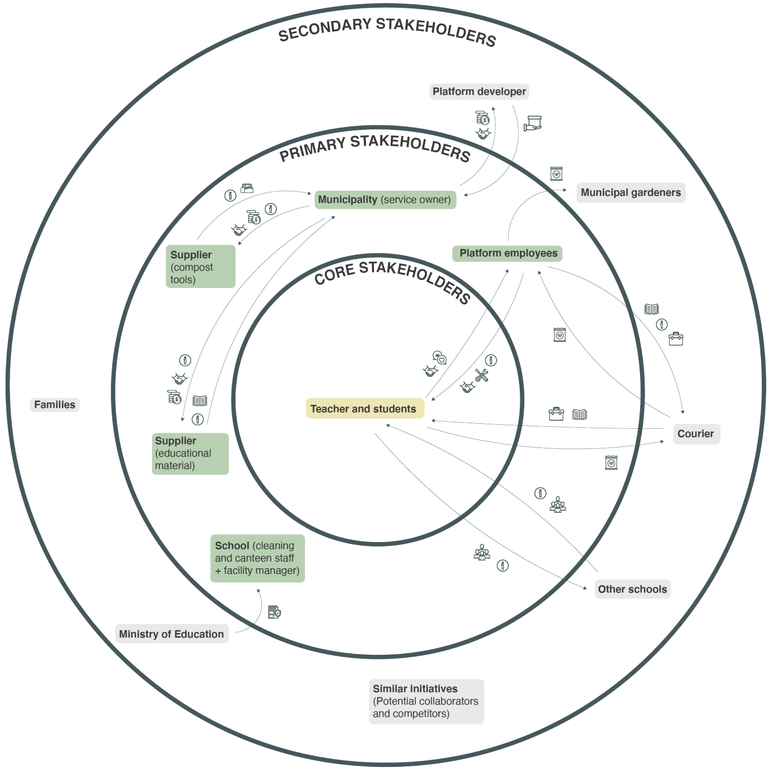



Figure 41: New value constellation map (Author's creation)

## LEGEND

Information
Compost kit
Educational material
Support
Compost
Community
Monetary currency
Trust
Feedback
Product
Guideline for curriculum
Compost tools

## 6.5.4 New journey map

With the chosen scenario C, the journey map of the user experience of the service concept needed to be revised to fit with the changes regarding the actions and steps taken, as well as points of interaction (see journey map for original service concept, figures 30, 31, p. 63, 64). As the main changes happen within the exchange part of the service, the new version removes previous actions in the closing the loop stage and replaces them with ones fitting the new service option. The actions replaced are: *'Go to platform and offer compost'*, *'Find match + communicate with a consumer about exchange', 'Carry out exchange'* and *'Receive produce in exchange and share with students'.* Instead, the following actions have been incorporated: *'Go to platform and notify compost being ready'*, *'Get compost ready for pickup'*, and *'Inform about date and time for pickup'* (see figure 42). Furthermore, various touchpoints within the platform are updated and replaced to match the interactions between the service offering and the user: *Teacher section with educational material is now called 'educational section' (but the content remains the same) and 'marketplace section' has been replaced with a profile section.*

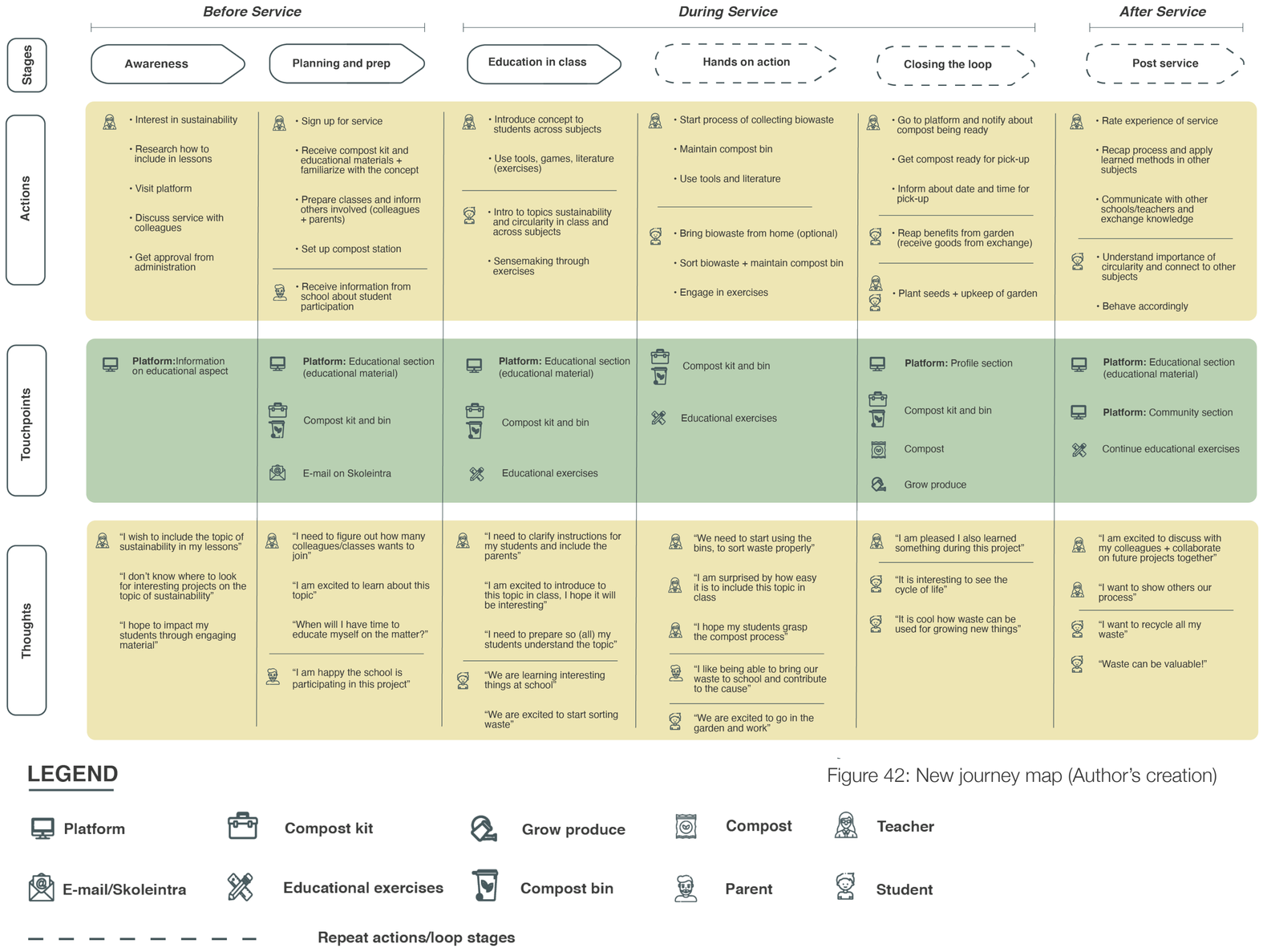



Figure 42: New journey map (Author's creation)

## 6.5.5 Service blueprint

A service blueprint can be presumed for an extended version of a user journey. It is a visual representation of the service system in detail, providing a deeper understanding of the interactions between the user experience, touchpoints, and backstage process in a corresponding time sequence (Stickdorn and Schneider, 2010).

The blueprint gives a clear overview of the actors in the front stage and backstage, divided by the line of visibility, along with the touchpoints and actions in time supported by the lines of interaction and visibility that support the blueprint and provides a better understanding of the interactions. The service blueprint for scenario C can be seen in figure 43 and is focusing in detail on the awareness, planning, and preparation stages. The group has decided to only focus on one part of the service that was deemed most relevant and important to understand, due to the complexity of the service and blueprinting. It covers actions in the frontstage and backstage of the service after the teacher decides to sign up until the moment they receive the composting kit and set it up in the school. The blueprint can be read from left to right, according

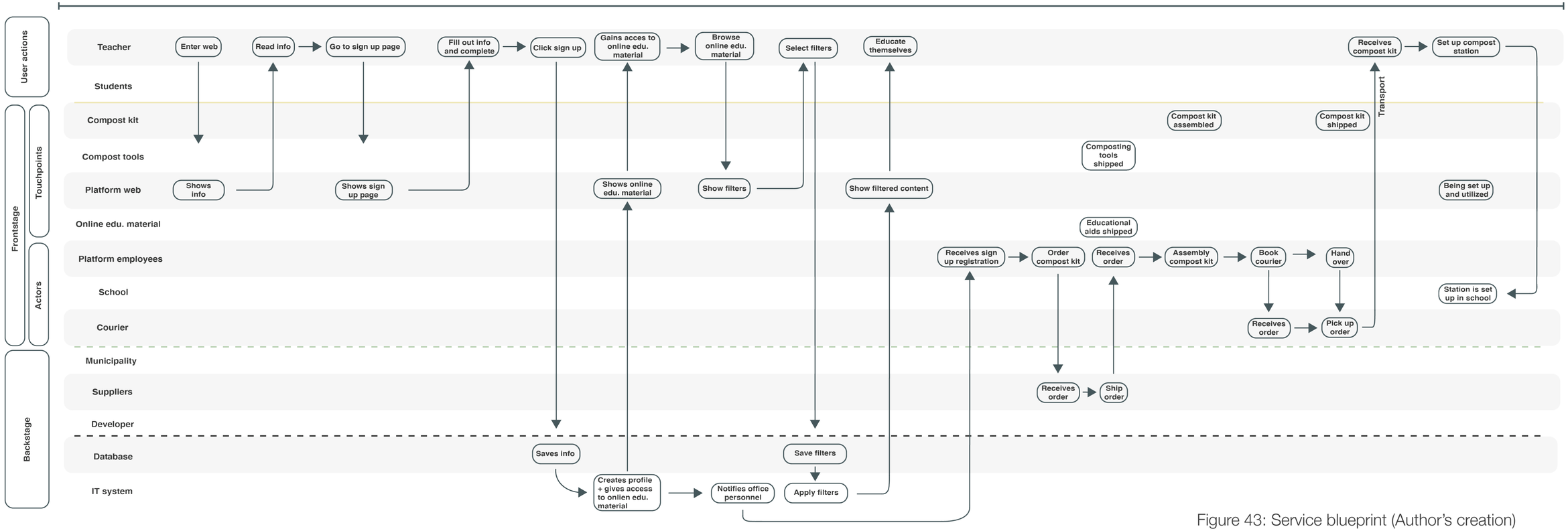



Figure 43: Service blueprint (Author's creation)

to the legend, following user actions and corresponding arrows. It is important to note that the blueprint also mentions actors like students or municipality, who, at this stage of the service, do not play any roles. Nevertheless, the group has decided to include them, since they are significant actors in the service and play an important role as the service progresses. This stage of the service only consists of one-time actions, meaning that the user does not have to repeat these actions more than once throughout the continuous use of the service. The blueprint highlights the moment the teacher signs up for the service, and after, the preparation of the teacher in terms of educating themselves and using the platform to access educational material through filters is also included. Simultaneously, the blueprint captures the actions, dynamics, and touchpoints for platform employees, suppliers, courier, database, and IT systems, all supported with physical evidence to provide a thorough overview and deep understanding of the service system.

### 6.5.6 Future & scalability

By definition, the term scalability describes the ability and capacity of a product, company, system, or, in this case, service to cope with increased load and provide services matching an increase in demand (Holiday, 2020; Built In, 2020). When assessing scalability, two factors need to be taken into consideration, the performance and load that are being put on the service (Holiday, 2020). Scalability is influenced the most by design, which is at the bottom of the pyramid (figure 44). As one progresses up the scalability pyramid, the ability to influence scalability decreases (Diranieh, n.d.).

The group deemed it important to go over the scalability of the three scenarios mentioned above and compare how it changes from one scenario to another based on its character and features since scalability can occur on different levels like performance, availability, maintenance, or expenditures (Larsson, 2015). This section not only includes the ability of each scenario to scale but also how they could possibly be elaborated on in the future if more time was dedicated and further testing was conducted.

Firstly, scenario A revolves around incorporating CompostIT and mainly its educational features into an already existing e-commerce platform focusing on the exchange of sustainable products. As the platform is already existing, so is the consumer base and therefore there is larger exposure, and possibilities for growth are increased. In terms of scalability, this would mean a larger variety of features, larger collaborations, more participants, and possibilities to move from Copenhagen to other locations since it is not bound by one municipality. In terms of value exchange, the diversity of currency (what is being exchanged for the compost) is also significantly larger than the other two scenarios.

Secondly, scenario B, where CompostIT acts as the ultimate facilitator and arranges everything for both types of users. However, this scenario requires a membership fee due to the load of tasks that need to be tackled by the employees of CompostIT. In this case, the scalability applies to the number of employees and performance of the platform itself that grows exponentially with the number of users and thus needs to be accommodated. The increase of users from the educational side (producer) would allow for collaborations with larger farms and further industrialization of the service. Same as scenario A, there is also the possibility to expand to other regions or countries.

Last but not least, scenario C focuses mainly on the educational part of the service. The owner of the service becomes the municipality and the school who, in the other two scenarios is the producer, becomes the consumer here. In the future, if the service is successful, growth can happen on different levels. Just like the previous two scenarios, the service can expand from the area of Copenhagen to other parts of Denmark or even other countries. However, since the municipality is the owner of the service, with the expansion the owner would also have to change or a system similar to the franchise would need to be put in place. As education is the focus, in terms of scalability, the target

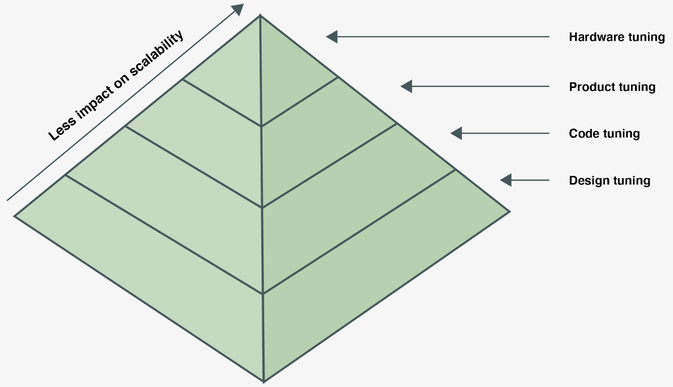



Figure 44: Scalability pyramid (Author's creation)

group of the service would expand from 6-12-year-olds to other age groups through adjusting the educational material. To take this a step further, the service could be adapted by the Ministry of Education and classify as a part of the official curriculum, which would then again change the dynamics of the service in terms of the owner.

In all the scenarios above, the scalability in terms of maintenance or expenditures would need to be compliant with the current development of the service in time and cope with demand. Needless to say, that all of the suggestions mentioned above are simply predictions and hypotheses done by the group based on assumptions made to imagine future possibilities and highlight the scalability of each scenario, but can in no case count as fully accurate.

# 6.6

# REFLECTIONS & DISCUSSION

# 6.6 REFLECTIONS & DISCUSSION

This section discusses and reflects upon the academic research question based on the outcomes and findings of the case study. Throughout this thesis, several theoretical concepts were presented along with the practical case study. Combined, the concepts lay grounds for opening a discussion upon answering the research question. Additionally, reflections on tools, decision making, the design process, and our role as service designers are discussed. Moreover, this section reflects on the personal and official learning goals, and the overall learning process. And lastly, a discussion on how Covid-19 influenced the design process and results are presented.

## 6.6.1 Research question

Exploring how service design can encourage behavioral change: A shift from a linear to a circular way of thinking:

How might we create a service that educates students in primary school to perceive waste as a resource through composting?

Coming from the case study and more specifically delivery, it can be said that the research question above does not have one clear answer, but rather there are various possible solutions/answers. Nevertheless, the group believes that the process bred significant findings and resulted in a major learning experience, which paves the road for the future development of this research question. It is the group's conviction that service design can support and enhance the educational process, and encourage a circular mindset, which has been proven by showcasing the value of waste through incorporating platforms in the service. What is more, the group has discovered, as pointed out in literature review *(see section 2.4.4 How can platforms support circular economy, p. 21)* that the concept of platforms can be a very effective tool to encourage circularity on the systemic level.

Even though the case study does not result in one final solution but rather proposes three scenarios, each of these scenarios explores the possibilities that the service concept holds based on the findings from the testing. What is more, it offered the group a thorough learning experience, especially when it comes to the concept of platforms, their theory as well as practical application. It has been discovered that platforms are definitely not a one-size-fits-all kind of concept but rather a very complex one, yet dynamic and adaptable. The use of a platform canvas revealed that access control (producer), filters (consumer), and curation and customization (figure 27) are significant pieces of the puzzle that, when designed well, can determine the platform's success. Additionally, understanding who is the service owner and provider is crucial to understanding the concept of platforms. It is important to note that the owner or service provider can be one person or company but can also be two different stakeholders. Furthermore, this status can change depending on the scalability of the platform, which also affects the value constellation and exchange.

Although the three scenarios differ, the aspect that stays the same is the educational part, as the testing has proven this part to be highly feasible and realistic. Additionally, education has been the main focus since the beginning of this thesis. The findings coming mainly from research and testing prove that service design can play a significant role in nudging people's perceptions. In addition, testing has confirmed that showcasing the circular approach in one situation can shape the mindset, which can then be applied to other situations. More specifically, it has been discovered that revealing and showing the value of waste can change the student's perception from waste to resource, which is the ultimate goal of a circular economy (EMF, 2013). Developing this obtained circular mindset and further applying it to everyday situations is the ideal outcome. The group is aware that the credibility of the findings is arguably low, due to the sparse number of field research and testing participants, which significantly affects the results of the

case study. The group cannot predict how the findings would change if the number of participants had been higher or if different tools had been used. Additionally, as mentioned above, the three scenarios are based on assumptions and hypotheses and a credible selection of one would require more time for further testing.

## 6.6.2 The process

When reflecting on the process of this thesis (figure 45), from theoretical to practical, the group has agreed that it has been unpredictable but very organic and academically enriching. Kicking off the process with the literature review has been fairly challenging for the group, as there is an enormous amount of literature on the topics that the group deemed relevant to review. Naturally, not all of the sources that were discovered could be considered reliable and therefore the group had to assess very carefully every source that has been used. This has been an exceedingly deep learning experience for each member of the group. Additionally, the iterative process also affected the literature review. Specifically, when topics like platforms emerged that were so noteworthy, they needed to be reviewed as well. Hence, the literature review was changing throughout the process of this thesis. Due to the complexity and magnitude of the reviewed topics, the group needed to learn how to be selective not only in terms of the reliability of the sources but also in terms of the amount of material and its depth. Learning when to say enough and being aware of the limits was a crucial skill that the group has learned throughout the process of writing the literature review. As previously mentioned in limitation and delimitation (p. 8) the group needed to be very selective with the information that was being put in, for the sake of length and red-thread of this thesis based on the relevance of the information to it. For example, when it comes to platforms, the group has considered extending the literature review with a section on “educational platforms”. After careful consideration and assessment, it has been decided not to include it, as the discovered literature was mainly focusing on educational platforms that students directly use to extend their knowledge beyond what their educational institution provides, or literature that focused mainly on users of a significantly higher age than the focus group of this thesis. Hence the relevance of the literature was not high enough to match this specific case. All in all, the group appreciates the process of reviewing the literature, as it not only provided a theoretical base for the case study and better understanding for the reader, but it also broadened and deepened the knowledge of the group members on the reviewed topics.

Admittedly, coping with such a broad topic as waste has been tricky to navigate at first but got clearer as more knowledge on the topic was gained. Even though the methodology has been established at the beginning of the process and arguably has been followed throughout, a lot more iteration occurred than initially expected, which the group finds enormously beneficial. The complexity of the design process is also a very important thing to consider. Even though the research question has been determined quite early on, the findings turned out to be very unpredictable, thus requiring an iterative approach and adjustments along the process. The group is also aware that they have shaped the design process and indirectly affected the results through a determined choice of steps and tools. It can be said that if different tools, approaches, or even the sequence of steps were applied, the results would differ. This implies that the design process is not only unpredictable but also strongly biased by the choices of the designers. Furthermore, other participants in the process like interviewees, whose answers cannot be predicted nor controlled also contribute to the complexity.

When choosing which tools to use throughout the process, various factors were taken into consideration. The group has chosen tools based on their own knowledge and learnings acquired during this master’s degree. The process differs from tool to tool, but general criteria included assessing which tool from the portfolio would reach the desired goal, the feasibility, and credibility of each tool as well as how time-consuming the tool is due to the constraints given by this thesis. An example of this would be the testing stage, where the

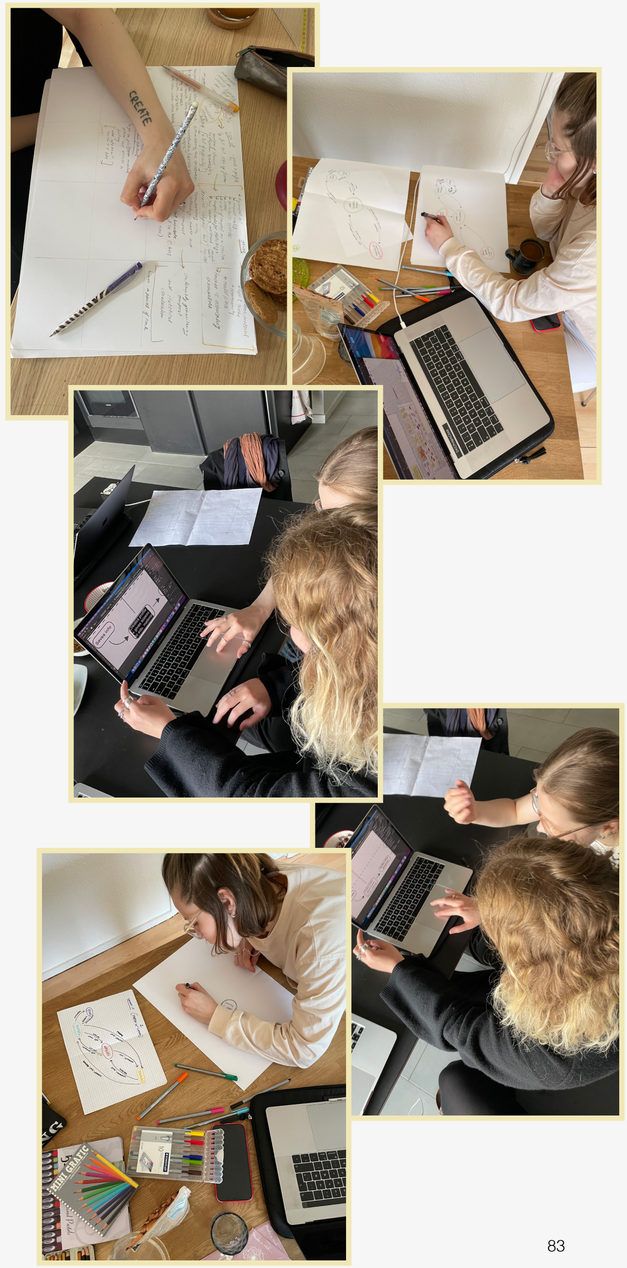



Figure 45: Process pictures (Author’s creation)

concept walkthrough has been prototyped and subsequently tested with the participants. The group assessed the concept walkthrough as the best option given the circumstances, and arguably it has proven effective in determining the benefits and gaps in the service. Reflecting back, if given the time and opportunity the group would have liked to test in a more realistic setting through re-acting the service or creating a clickable prototype of the platform, to gain more authentic feedback and to possibly uncover deeper flaws in the system, which a low fidelity prototype like concept walkthrough has less of a chance to do. Additionally, the testing has been done with the teacher, who would be the main user of the service, but the group believes it would be beneficial to include students in the process of discovery and testing as well. Defensibly, it can be said that the concept walkthrough has been successful and sufficient at the early stage that the case study has been in, whilst these methods (re-acting, clickable prototype, etc.) would have been more effective when further testing the three proposed scenarios in delivery.

Additionally, the group has also used tools in the process, that after further assessment were not included in this paper, due to various reasons like lack of relevance or repetition. A tool like this was a motivational matrix that was applied during the initial concept development to understand the connections between the different actors and define the motivation behind their action (Manzini et al., 2004). After careful evaluation, it has become clear that the motivational matrix did not bring any new value or information to the table in this case, as the same information was portrayed in the value network map already. Nevertheless, the group believes the motivational matrix is a valuable tool and benefited from using it on a professional level.

### 6.6.3 Service design

Being a designer comes with a certain amount of responsibility and required competencies or capabilities. The group has been able to observe these in the process of this thesis and reflect and learn from them. Throughout the design process, the designer needs to take on different roles. In the beginning, it is crucial to be an empath and to let go of any prejudice or personal opinions, in order to deeply understand the issues and users, by putting themselves in their shoes without making assumptions and jumping to conclusions. Speaking from experience, this has proven to be more difficult than expected, more so when dealing with a topic one is passionate about. During interviews, the group realized that they do not have much control over the results and have to accept that the project is in the participant's hands to a large extent, and therefore it is even more crucial to empathize with the user. Another example of this was during the prototyping stage when the group chose a unified visual language for all the visualization and the first attempt of visualizing the educational material for students (compost guide figure 33) was compliant with the language. However, the group soon came to realize that the target audience of this material are children and therefore it should have a different language from the unified visual communication of this project, one that is more suitable for a younger audience.

Children being the focus group of this thesis also carried some challenges. As the children are not of legal age, they are not the decision-makers, instead, this is the role of either their parents/caregivers or a responsible individual (e.g. teacher at school). Meaning that the daily routine of the child is not determined by them but rather by their decision-makers. This naturally affects the dynamics of a service. The group had to keep this in mind and incorporate it in the service, e.g. through sending an information email about the school participating in the service and getting the parent's approval. Yet, the service cannot be designed only for the decision-makers, since they act mainly as the facilitators. More importantly, it needs to be designed also for the children as they interact with the service the most as the end-users, and they are the ones that the designers want to attract. The group believes it is of utmost importance for a service designer to find a good balance between the users, reflecting them and their needs.

Amongst other roles that the group has experienced as service

designers throughout the process of this thesis has been as a facilitator, more specifically during in-depth interviews and testing. The group has quickly become aware that a key to a good interview or testing is not only to have well phrased questions and prototypes but also to ask them the right way, let the participant speak without nudging them into a certain direction, or suggesting ideas that may change their answer. During this process, the designer has to be very conscious about their actions and words in order to extract the most authentic information from the participants. At the same time, even during semi-structured interviews, it is important to give clear and impartial directions, instructions, or explanations, as these can also affect the way the participant understands the question or task at hand and thus responds to it accordingly. Hence, if various members of the group are facilitators, they need to be aligned in terms of the instructions they are giving to the participants, because it may cause the results to be incomparable.

Last but not least, as cited before, service design, and by extension service designers, cope with a wide range of social problems and challenges (European Commission, 2009) and can have a direct impact on the development of society and the environment (Papanek, 1971). Not to mention, designers can reduce environmental impacts by intentionally shaping behavior toward more sustainable practices (Bhamra et al., 2008, Elias et al., 2008, Lockton et al., 2008, Wever et al., 2008). The group has found these claims to be true while working with these topics on a social level and retrospectively feels an immense responsibility towards society and the environment. This responsibility is not an easy one by far, yet it feels empowering to be able to influence social innovation through design. Reflecting back on the role of a service designer in this project, it was a substantial learning experience that has only proven to the group the vast importance of service designers within society and economy.

### 6.6.4 Covid-19

It can be said that the Covid-19 pandemic has significantly influenced the design process and the results. Most of the work and activities have been moved to an online environment, and the group believes it has also affected the number of participants in the interviews and testing.

Nonetheless, it comes with its benefits as well as drawbacks. Due to this, the group has learned the importance of flexibility and adaptability in design. The group discovered that working in an online environment can undoubtedly streamline the workflow due to online tools like Miro, Trello, or Google Docs. However, the authenticity of interviews, when conducted online, comes into question, as it makes it more difficult to perceive body language or assess how legitimate the answers are. The group has considered these limitations when analyzing the gathered data, yet deems it important to be transparent about these drawbacks. More, when planning the activities that were to be carried out during the case study, the group needed to take the pandemic into account and bypass activities like workshops, observations, or re-enactments. These activities could elevate the process towards a more co-creative one and breed more authentic results. Hence, there is a high possibility that the results of the investigation would be different if these circumstances were not present, yet the group cannot predict how.

### 6.6.5 Learning goals

This thesis was a unique opportunity to deepen already acquired knowledge in the service design field and explore thoroughly the topics and themes that were of interest, due to the flexibility of the thesis. As the group had the freedom to choose the topic themselves, it landed on one that they were passionate about. This also came to aid when the group was facing challenges during the process. It has been a

stimulating experience to be able to explore and apply the relevant service design knowledge in the context that was truly intriguing to the group.

## OFFICIAL LEARNING GOALS

When reflecting on the official learning goals set by the study board, the process of this thesis allowed the group to deepen their theoretical knowledge on approaches, methods, and theories that were later applied practically in the case study, providing a well-rounded learning experience that enriched the project immensely. The latter has been particularly helpful in understanding the complexity of the chosen topic on a systemic level, analyzing and synthesizing the findings, and later on, mapping out the service. Additionally, the group has learned to respond to situations that arose unexpectedly and unpredictably, e.g. when testing did not result in one clear solution, new circumstances with new ways of action needed to be adapted, which in this case were the three proposed scenarios.

Due to the complexity and magnitude of the topic, the group quickly realized and learned the importance of independence and self-discipline. This has been amplified by the time restrictions of this thesis that were quite limiting in an investigation as big as this one. Nonetheless, it is the group's belief that these traits are of utmost importance and will only be beneficial in the future. Alongside, the group has perceived an improvement in transferable skills like communication and cooperation between the participants, as well as designers and leadership and management of tasks according to skills of the group.

## PERSONAL LEARNING GOALS

In addition to the official learning goals, the group has reflected on the personal learning goals that they have set for themselves in relation to this thesis. One of the main goals was to improve at implementing suitable tools and methods, including extending the knowledge of the application of qualitative and quantitative research methods. It can be said that the group faced some challenges when trying to implement suitable tools and methods, especially when it came to mapping the service. Initially, the group found it difficult to choose the tools to use for mapping the service, both in terms of their character as well as the amount of tools applied. However, through the process, with the help of thesis supervisor Nicola Morelli, the group learned how to identify and correctly use these methods in different situations and stages of the design process. In terms of the qualitative and quantitative methods, however, the group sees a space for improvement. Even though on a theoretical level these research methods have been explored and considered, due to time constraints, Covid-19, and a low number of participants the group managed to recruit, these methods were not used to their full potential on a practical level. Meaning that both qualitative and quantitative methods were used for data collection, yet the group did not gather quantitative data nor explore and apply different possible variations but rather used the most convenient ones.

Next, the group set a goal related to the chosen topic of this thesis. That was, to understand and explore the discipline of social innovation in relation to service design practice and to subsequently understand the dynamics of circularity and the application of service design in a circular manner. Through conducting the review of relevant literature on these topics, the group gained a deep understanding of the different cycles within circular economy and its influence on social innovation. The understanding that these topics are all very closely connected and influence each other has been met. With this knowledge, it has proven less challenging to carry out the case study and profoundly analyze and apply the dynamics of the circular economy through design and this way attempt social innovation. In addition, the group did not expect to work with platforms, as this concept emerged only later in the process, during brainstorming sessions. Not only has the process been very enriching and iterative, but also presented opportunities for further learning that was not initially anticipated by the group. Hence, the concept of platforms and their practical application and use in

different scenarios have been investigated in-depth and contributed to the learning experience tremendously.

Last but not least, the group wanted to improve project management skills and decision-making. Due to the pandemic situation, project management has proven to be a very crucial skill, as the process has been directed online. Naturally, that involves a lot of individual work fueled through independence and self-discipline, and reflecting back the group can see significant improvement in their project management skills, including timing and delegation of tasks. The complexity of the project forced the group to make decisions promptly but rationally, without any redundant discussion. Practices like voting have proven to be very effective in this matter, along with the deliberate choice of tools that would help this cause. Hence, as already mentioned above, the group considers this goal a success.

# 6.7 CONCLUSION

The current linear consumption models have led to enormous pressure on the environment as reflected in increasingly limited resource availability and the tremendous amount of greenhouse gas emission. There is a growing sustainability awareness amongst people and an increase of sustainable options. However, there is no doubt that a behavioral change is required to save the environment and increase the chance for the next generations to live with the resources that are present nowadays.

Throughout this thesis, the group has investigated the concept of circular economy with the aim of encouraging people to act more responsibly towards the environment. In the very beginning, the focus was centered on young children in primary education, as they not only have a great interest in the environment, but are also the next generation and change-makers of tomorrow. As the topic of circular economy is a very complex one, it can be approached in various ways either through the technical or the biological circle. Hence, it was decided to narrow down the scope by focusing on the biological circle with an emphasis on bio-waste, in particular, due to the large amount of bio-waste produced in Denmark as well as the possibility of re-using this type of waste. To conclude this thesis, the final research question is presented and subsequently, the outcomes of the process are concluded in order to provide an answer to the research question:

How might we create a service that educates students in primary school to perceive waste as a resource through composting?

1. **Through validating a need and interest**
   Investigating families' waste behavior and teachers' approach to circular economy and sustainability have shown a desire to change their habits as well as an overall aim to live more sustainably. Furthermore, a positive interest was expressed in teaching the younger generation about the topics.

2. **By researching relevant topics as a base for ideation and defining the service concept:**
   Thorough desk research has not only provided valuable knowledge but also served as inspiration when it came to designing a new service concept. Clustering the insights and identifying the main characteristics resulted in the concept idea for CompostIT. By providing educational materials to the teachers, the service concept aids in introducing the topics of circular economy and sustainability in the means of incorporating composting in primary schools and through that educating the students on the topics.

3. **By prototyping and testing the concept:**
   This was accomplished by creating a prototype in the form of a concept walkthrough, tested by teachers, and by critically evaluating several aspects of the service offering. Simultaneously, the concept has been validated through interviews with experts within the field of composting. The testing aided with an overall validation of the service which showed a positive consensus towards the service concept. At the same time, it uncovered issues concerning the time required to devote for the exchange part as well as the possible lack of incentive from the consumer side, which the group deemed to be crucial to tackle.

4. **Redefining the service concept:**
   Three possible scenarios were proposed in the delivery stage, based on the previous CompostIT concept, however with adjustments tackling the above-mentioned issues discovered in the testing stage. Moreover, the three scenarios were compared based on their value proposition, and even though these scenarios differ, the aspect of knowledge exchange and the students' education stays the same. Thus, ultimately leading towards a service offering that supported the student education and the research question the most. Additionally, the proposed service focuses on a less

demanding yet more realistic implementation of the service, aiming to create an incentive for the teachers to use the service.

Although another round of testing would be required to come up with a clear answer to the research question, the group proposed a service concept that is predominantly aiming to make the students aware of circular economy and sustainability to, in particular, plant a sustainable mindset and achieve a change in their behaviors. CompostIT would undoubtedly aid teachers who see the relevance of circular economy but need assistance and motivation in introducing it to their students, by providing educational material and a compost kit to demonstrate the circular economy.

On that account, it can be concluded that the case study aided in exploring and presenting how service design can support circular economy and education in practice, proving the immense responsibility and importance of the field and its many possibilities and applications. Additionally, the concept of platforms has proven to be a beneficial and innovative tool to achieve the objectives of service design in this context. It can be said that platforms and service design support each other and hold a lot of potential to support social innovation and systemic change, through creating platform-based services and open new possibilities and perspectives for the users, beyond the conventional linear approach.

7.

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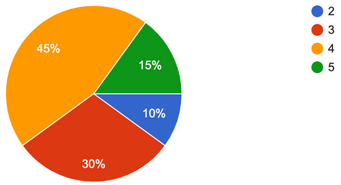
# APPENDICES

# APPENDIX 1 - Survey questions findings

## HOUSEHOLD

How many people does your household consist of?

20 svar




How many children do you have?

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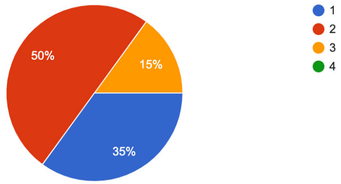
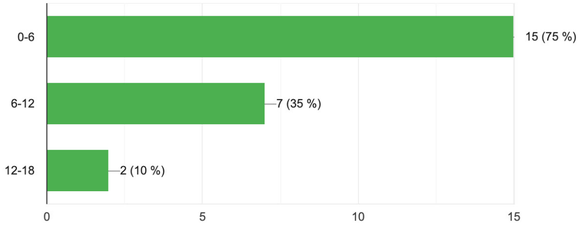



How old are they? (if you have more children, tick a box for each)

20 svar




What grade do they attend at school? (if you have more children, tick a box for each)

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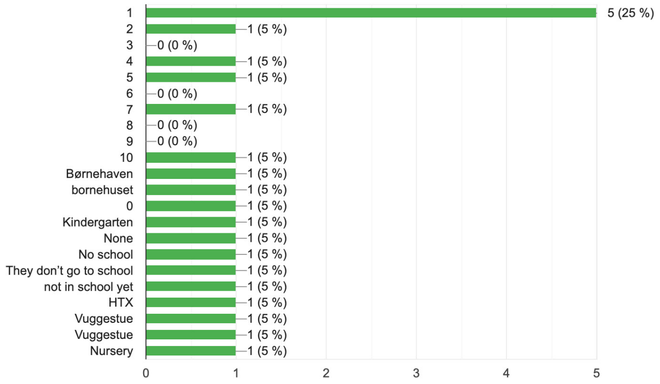


## WASTE

Do you think about the amount of waste you are producing?

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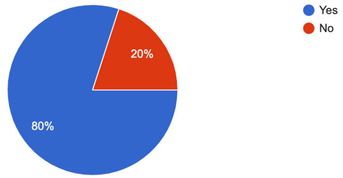
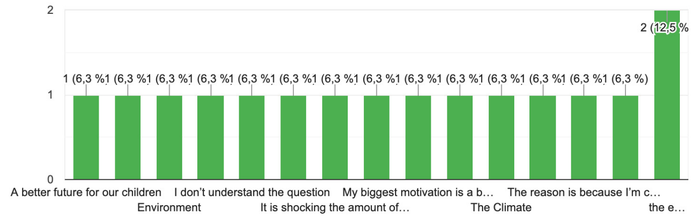



## If you think about the waste you are producing

What is your reason and motivation?

16 svar



## If you do not think about the waste you are producing

What is your reason ?

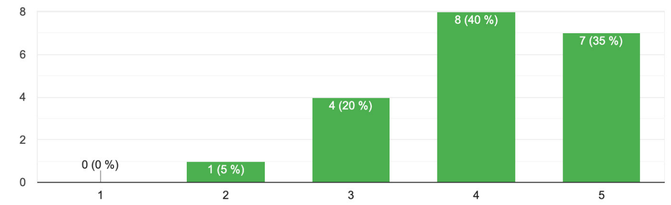
4 svar

- We sort our waste, but we other things we prioritize. For example, we could buy all fruit without packaging (enkeltvis) but we choose not to.
- Due to goverment waste-management thererw are not much possibilities left to produce waste as a private custoþer/household
- Our waste is widely decided by manufacturers and how the goods are packaged
- It's too time consuming

## WASTE II

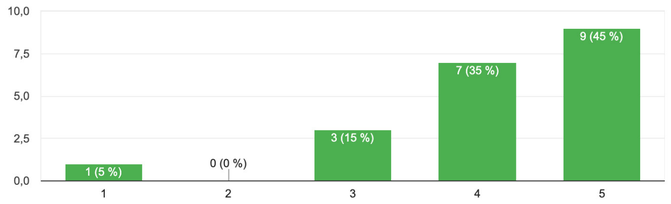
I am willing to / I would like to change my waste management habits

20 svar




Sorting/responsible disposal of waste is important to me

20 svar




Do you recycle/ sort your waste?

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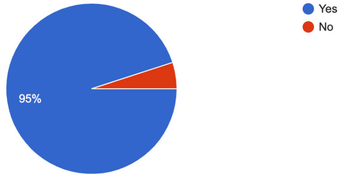
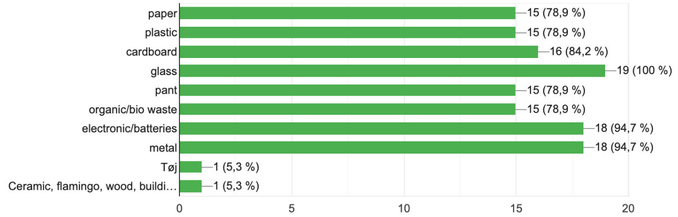



## If you sort/recycle your waste

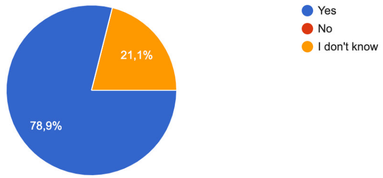
What kind of waste do you sort?

19 svar




Do you think you sort your waste correctly? (E.g do you know you need to wash your plastic containers before throwing them out or that you cannot recycle pizza boxes because they are dirty.)

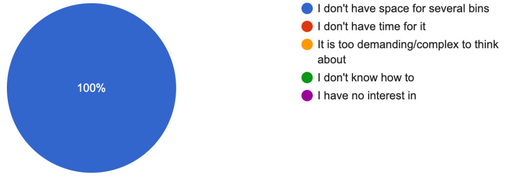
19 svar



## If you do not sort/recycle your waste

### Why do you not sort ?

1 svar



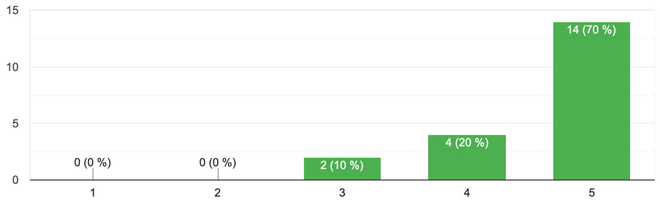

### What could make you sort your waste?

1 svar


## Education

### It is important that your children learn about responsible waste management

20 svar




### Do you teach your children about waste/ sustainability?

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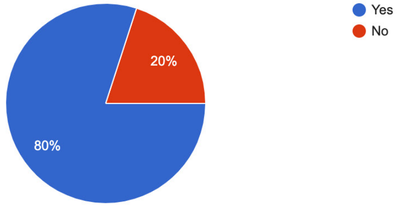


### Do your children learn about waste at school?

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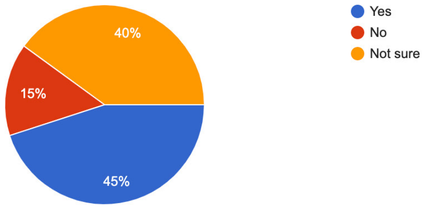


### Are your children interested in these issues?

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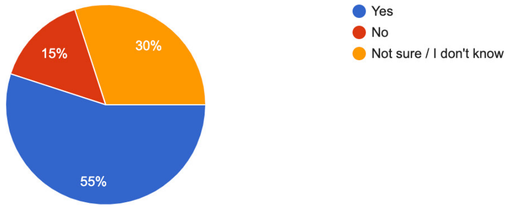
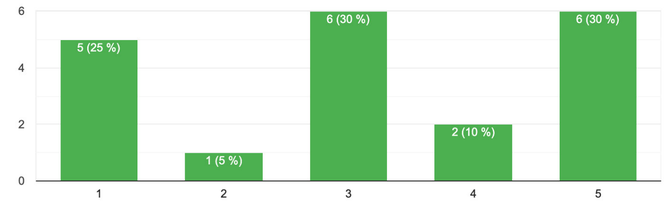


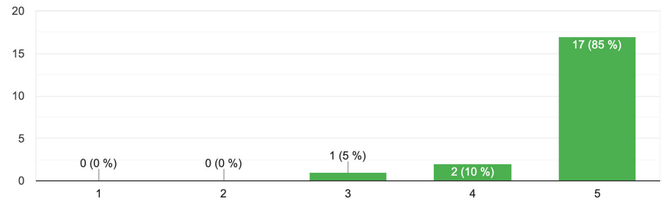
I would be more likely to sort/repurpose my waste if my children were interested in it

20 svar



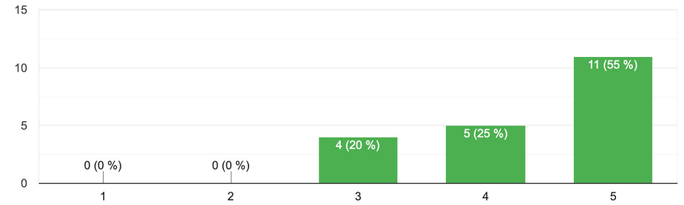

I would like for my children to get environmental education in school?

20 svar




I am likely to implement new habits based on an input from my child?

20 svar




Would you participate in an educational circular project/ activities organized by your children's school?

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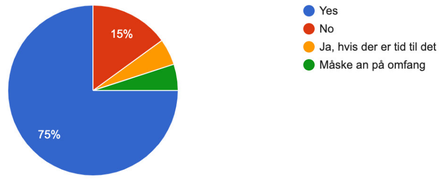


If yes, would you implement these in your home?

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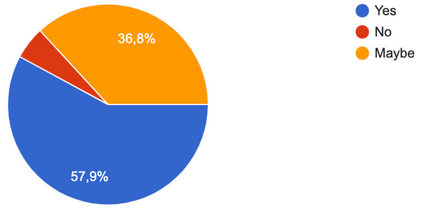


## Circularity

Do you know / understand the concept of circular economy?

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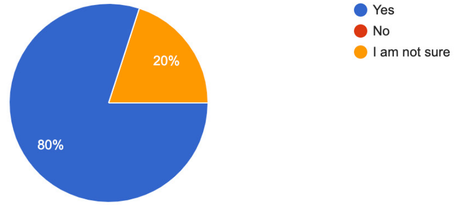


Are you using any circular economy based services ?

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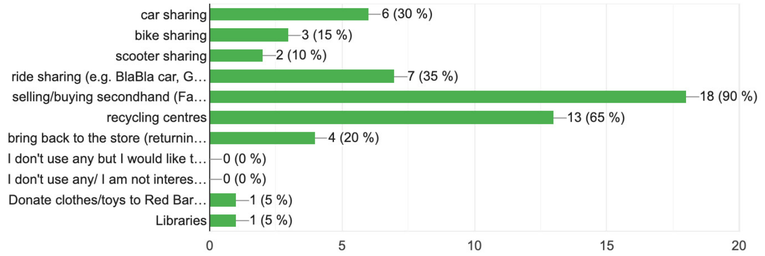

What is your motivation to use these services?

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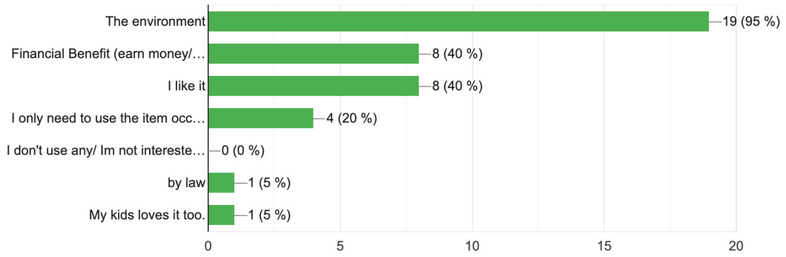


When an item breaks or you do not need it anymore what is your approach?

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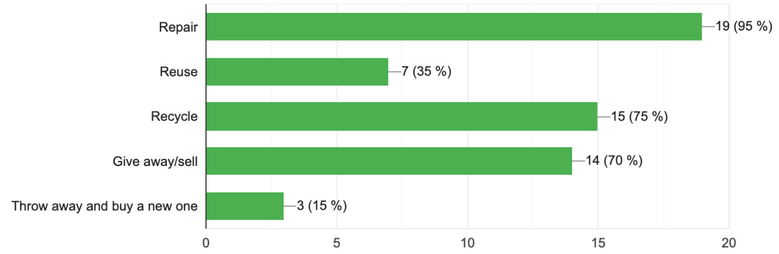
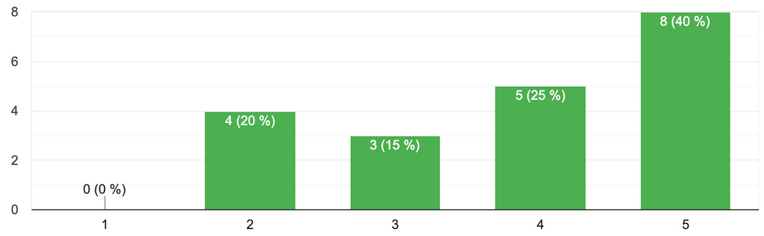


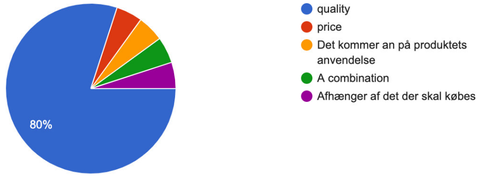

I am likely to buy second hand used items

20 svar




When purchasing a product, quality is more important than price (buy higher quality that lasts longer rather something cheaper now that will last less)

20 svar



# APPENDIX 2 - In-depth interview guide

TEACHER INTERVIEW GUIDE

**Personal:**
How old are you?
What grades do you teach?
What's the typical work day look like for you?

**Children/Teachings**
Do you follow a specific educational method? Do you notice if the children prefer one method over another (also tools or activities counts)? If so, why do you think they like it?

What does a typical day for the children in your school look like?
Are parents of the children engaging in school activities? If so, how do you include parents in school activities?

**Waste/ Sustainability:**
Are you familiar with sustainability and circular economy?

What is your opinion on approaching waste and circular mindset in an educational manner? (Could it be interesting to include the topic waste in school, why?)

Do the students show an interest in the environment/sustainability? If so how does their behavior reflect it?

Would there be space in the curriculum for teaching sustainability?

How could you imagine educating the students?

Do you collaborate with other teachers on topics across subjects? If so, how is that working?

**School:**
Does your school focus on sustainability, how? Is there a designated person in charge of sustainable actions?

Does your school separate waste in general (paper, cardboard, plastic, biowaste)?

Does your school offer a canteen/cafeteria or home brought lunch? (Is any food/drink offered to the students by the school?)

What kind of snacks do the children bring to school? (If any)
Is there a yard or a space dedicated for activities for the children in your school?

Do you think your school would be/is interested in initiatives or long term projects on circularity?

# APPENDIX 3 - Recordings from In-depth interviews

CLICK HERE

# APPENDIX 4 - Notes from In-depth interviews

**TEACHER INTERVIEW**
European School Copenhagen/ Vesterbro

**Interviewee:** Chloé
**Date:** 29th March 2021
**Interviewer:** Madeline

**Personal:**
*How old are you?*
Chloé: 30 y/o

*What grades do you teach?*
Chloé: Grade 1, the kids are between 6-7 years old

*What's the typical work day look like for you?*
Chloé: Kids arrive at 8 and the lessons start at 8.10, usually start with french and english before break, 10.10 morning break for 20 min, after break math lesson, lunch break 12-12.30 for 25 min, most days finish at 14, after that I am planning and preparing for the next day.

**Children/Teachings:**

*Do you follow a specific educational method? Do you notice if the children prefer one method over another (also tools or activities counts)? If so, why do you think they like it?*
Chloé: We follow the European school curriculum, methods/ teaching style is mostly active learning where I try to contextualise the topics. That makes it understandable for the students. A Pedagogue is assisting me 9 hours per week, and in collaboration we do many group activities and workshops. He is assisting to include learning through games in the class.

*What does a typical day for the children in your school look like?*
Chloé: Very similar to teachers day, they arrive at 8 and the lessons start at 8.10, usually start with french and english before break, 10.10 morning break for 20 min, after break math lesson, lunch break 12-12.30 for 25 min, most days finish at 14.

*Are parents of the children engaging in school activities? If so, how do you include parents in school activities?*
Chloé: Yes (except covid times), usually I have coffee mornings 3-4 times a year, where I talk with parents and the children and show things to parents. It is very important for me to work with parents as a team. For instance, we have the subject discovery of the world, where I like to invite parents to tell interesting stories that teach the students (this could be about jobs, etc.). We, in the french department, have a Francophone week, where the parents (who come from Switzerland, Canada, North Africa) can contribute and share culture stories, talk about music etc.) this week is taking place 100 days after the new school year has started.

**Waste/ Sustainability:**
*Are you familiar with sustainability and circular economy?*
Chloé: Yes.

*What is your opinion on approaching waste and circular mindset in an educational manner? (Could it be interesting to include the topic waste in school, why?)*
Chloé: It is very important, due to global warming and climate issues we are facing, which will have a high impact on the kids, so therefore yes it is very important to teach them the topics. I try to make a difference in the classroom, and let them bring things home that we have done in class, also I ask what they do at home, and try to find ways to improve (like for instance with waste).

*Do the students show an interest in the environment and sustainability? If so, how does their behavior reflect it?*
Chloé: Definitely, they especially love animals and the topics concerning

animals, which includes the environment. They are very motivated for challenges, where they learn about nature. They even like to collect rubbish in that age.

*Would there be space in the curriculum for teaching sustainability? How could you imagine educating the students?*
Chloé: There are always topics that can be connected to sustainability! At my school, we have one theme week about sustainability, where it's up to us teachers to decide what to do. Last time we made art pieces out of plastic, and taught the students about the plastic issues of our oceans.

*Do you collaborate with other teachers on topics across subjects? If so, how is that working?*
Chloé: Yes, especially during theme week, but in general we are collaborating together, working on common themes and trying to create things together (little art exhibitions etc.). During the sustainability week, we are covering all sections.

**School:**
*Does your school focus on sustainability, how? Is there a designated person in charge of sustainable actions?*
Chloé: I think so, as we have a sustainability council (one teacher in charge), where she includes one student from each class (no 0.-class) and work on planning sustainability week etc.

*Does your school separate waste in general (paper, cardboard, plastic, biowaste)?*
Chloé: We have three bins and separate into paper, general waste, and bio-waste. But during corona times, we are eating in class (instead of cantine), where all waste is going in one bin, which I am trying to improve.

*Does your school offer a canteen/cafeteria or home brought lunch? (Is any food/drink offered to the students by the school?)*
Chloé: We have a canteen, where most of the students and us teachers are eating lunch. The canteen focusses on organic food and has a 'Madskole'.

*What kind of snacks do the children bring to school? (If any)*
Chloé: The school encourages parents to provide the kids with healthy snacks, like fruits, veggies and cereals.

*Is there a yard or a space dedicated for activities for the children in your school?*
Chloé: Yes, we have a yard with pots, but we are lacking green areas.

*Do you think your school would be/is interested in initiatives or long term projects on circularity?*
Chloé: Yes, the school is always open for new initiatives.

**TEACHER INTERVIEW**
European School Copenhagen/ Vesterbro

**Interviewee:** Magalie
**Date:** 29th March 2021
**Interviewer**: Madeline

**Personal:**
*How old are you?*
Magalie: 41 y/o

*What grades do you teach?*
Magalie: Grade 2, the kids are between 7-8 years old

*What's the typical work day look like for you?*
Magalie: The kids arrive at 8 and the lessons start at 8.10, we start the lecture, 10.10 morning break for 20 min, lecture again, lunch break 12-12.30 for 25 min, most days finish at 14, after that I am planning and preparing for the next day.

**Children/Teachings:**

*Do you follow a specific educational method? Do you notice if the children prefer one method over another (also tools or activities counts)? If so, why do you think they like it?*
Magalie: I use a mix of many methods including singapore and montessori, french enlighten practice (includes writing a story) and freinet - which is a form of carrusel, we have 5 workstations one task to each group/ one group teacher, one pädagog, self teaching.

*What does a typical day for the children in your school look like?*
Magalie: Very similar to teachers day, they arrive at 8 and usually finish at 14.

*Are parents of the children engaging in school activities? If so, how do you include parents in school activities?*
Magalie: I try to include them very often in class and the classroom door is always open for parents. Usually parents can join for half an hour the full day, where they can participate in the classes, teach and join challenges (dictation, workshops, science, etc.). I really like them to be present a lot and watch how the students are doing and contribute. Last time I invited the grandparents to participate in a virtual activity.

**Waste/ Sustainability:**
*Are you familiar with sustainability and circular economy?*
Magalie: Yes.

*What is your opinion on approaching waste and circular mindset in an educational manner? (Could it be interesting to include the topic waste in school, why?)*
Magalie: It is a crucial topic for today and especially the future and we need to teach the students about. However, I am lacking support and time to include the topics more in class. I would like to have inspiration for more tools, books, and workshops that aid including the topics.

*Do the students show an interest in the environment and sustainability? If so, how does their behavior reflect it?*
Magalie: Of course, the children are very interested in everything that has to do with the environment.

*Would there be space in the curriculum for teaching sustainability? How could you imagine educating the students?*
Magalie: Yes, I could imagine it to be very suitable in the department of discovery. That is a nice area to investigate sustainability, where we teach with novels, discovery. But I see the topic suitable across various subjects.

*Do you collaborate with other teachers on topics across subjects? If so, how is that working?*
Magalie: Yes, we collaborate a lot when the topics are of common interests and suitable to the curriculum.

**School:**
*Does your school focus on sustainability, how? Is there a designated person in charge of sustainable actions?*
Magalie: Yes, with the sustainability council and sustainability week as well as focus on organic food in the canteen.

*Does your school separate waste in general (paper, cardboard, plastic, biowaste)?*
Magalie: We have three bins and separate into paper, general waste, and bio-waste. But during corona times, it is more difficult as we are eating in the class.

*Does your school offer a canteen/cafeteria or home brought lunch? (Is any food/drink offered to the students by the school?)*
Magalie: We have a canteen, where most of the students and us teachers are eating lunch. The canteen focusses on organic food and has a 'Madskole'.

*What kind of snacks do the children bring to school? (If any)*
Magalie: Mostly fruits, veggies and cereals.

*Is there a yard or a space dedicated for activities for the children in your school?*
Magalie: Yes, we have a school yard.

*Do you think your school would be/is interested in initiatives or long term projects on circularity?*
Magalie: Yes, I could definitely see a great interest from the school in sustainability long-term projects.

# APPENDIX 5 - Concept walkthrough guide

Teacher walkthrough

**Introduction to understand the concept:**

In connection to our master thesis in service design, we are currently working on a project on the topics circular economy and sustainability. We have designed a service platform available for teachers in primary schools that provides materials and tools to include the topic of composting in class. On the platform, teachers can sign up for the service, to gain access to educational material, to learn about composting, introduce the topic in the classroom and start a composting process. As a part of it, students will turn bio-waste into compost, which farmers, community gardens and private persons can get hold of. On a platform, people can get into contact with schools to get hold of compost.
With this walkthrough we aim to test the service concept we have prototyped. We want to take you on a journey, where we simulate each step of the service use.

We kindly want to ask you, whenever you have inputs, comments or doubts, please let us know after every line/group of steps.

**Reflection after each line/ group**:
What is your impression in terms of children's interest, feasibility, benefits, drawbacks or anything that comes to mind

# APPENDIX 6 - Expert interview guide

In connection to my master thesis in service design, my colleagues and I are currently working on a project to include composting in schools. As we thought your company/organization might use compost for growing produce, we would like to ask you a few questions. Would you have a couple of minutes, it could be really helpful for our project (would it be okay if I record our call?)? To give you a bit more context, we are designing a service that educates the younger generation about sustainability and circular economy. We want to show students the circular value of products and show that waste can be used to grow new things. As a part of it, students will turn bio-waste into compost, which will be available to others. On a platform, people can get into contact with schools to get hold of compost.

**Questions:**
What do you use compost for?
Where do you usually get it from/ how often/ how much/ do you have to pay for it?
Could you be interested in acquiring compost produced by schools?
Would you be willing to sign up for an online platform to get in contact with schools that have compost available?
Would you be willing to give schools a form of currency in exchange (could be something that you grow and would like to give in exchange for compost)
Do you think this is a feasible concept?
Do you have any criteria for the quality of compost, if so which?
In which scenario, if any, could you imagine using a service like this?

# APPENDIX 7 - Recordings from testing

CLICK HERE