CIRCULAR ROLLOUT

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Bridging the design-implementation gap in circular economy

Graduation thesis
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“Sustainability is like teenage sex. Everybody says they’re doing it, very few people actually are doing it. Those that are doing it are doing it badly.”

- Andrew Maynard, sustainable architect

Preface

Dear reader,

This graduation thesis documents the graduation project of my master in Strategic Product Design at TU Delft. The project was performed over the course of 7 months from September 2017 to April 2018 in collaboration with Critical Minds, a project management consultancy and the client company issuing this graduation assignment.

The project allowed me to adventure, wander, explore, get lost, find my way, grow, learn, panic and laugh, but most of all it allowed me to meet many interesting, fun and inspiring people! I'd like to thank them all.

First of all, thanks to Bas for having the guts and vision to initiate Sustainable Minds. Without you this entire project wouldn't have been possible. But more importantly, thanks for all the Surinamese egg salad, it became a thing. I had a blast working with you, making fun of Radio Moerdijk in the car and brainstorming in Café Willemsbrug, you were the best mentor ever.

Thanks to the rest of Critical Minds for their enthusiasm, support and all the fun I had with you guys. I felt at home straight away and was involved in everything you do. Special thanks to Henk, Kester and Meike from the Sustainable Minds team for all of the times you had to review my ideas and designs and sit through my fuzzy words.

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Thanks to my fellow students who participated in the creative session: Maarten, Joerie, Kaj, Ditmar, Feyo and Mark. Your crazy ideas managed to open up my mind.

Last but not least, thanks to the friends and family who supported me during this project: mom, dad, Gian, Daan, Lars and Joerie but especially Isa. Thanks for the love, I love you back for it!

Enjoy reading,

Erik Bottema

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Executive summary

Circular Economy

Exponential growth in human activity has caused exponential changes in Earth system variables, like greenhouse gas emissions and global temperature. Human influence on the planet has reached far beyond safe parameters and could lead to disastrous consequences for large parts of the world. This is attributed to the resource dependency of the current economic system. Resources are taken from the earth and products are made which are quickly disposed of after use. As a result of this 'linear economy', increasingly more resources are required to sustain economic growth. However, resources are depleting, leading to rising and volatile resource prices. In the meantime, humanity's impact on the environment is increasing as well, displayed in the large amounts of pollution and waste that are generated. The need for a new economic system has been expressed and the 'circular economy' has been proposed as an alternative model, in which resource use is minimised, waste is prevented and resources are cycled in the economy. Governments, businesses and academia have expressed the desire to move towards a circular economy, but little has been implemented thus far. This graduation project aims to address this issue.

Assignment

Critical Minds is a project management consultancy. It wanted to accelerate the transition to a circular economy by starting a new consultancy service (Sustainable Minds) to help industrial companies implement circular business models. This graduation project was initiated to answer the need for more research into the process of implementing circular business models at industrial companies and the possibilities for consultancy by Sustainable Minds to facilitate this process. The following research question was created:

"How can Sustainable Minds help industrial manufacturing companies bridge the gap between design and implementation in the circular business model innovation process?"

Research

To investigate the research question, three studies were performed: an internal analysis of Critical Minds and Sustainable Minds, external analysis of the circular economy consultancy market and a qualitative interview study of the circular business model implementation process, barriers and success factors. 12 interviews were conducted with companies aspiring to implement a circular business model, with companies that had successfully done so and with experienced circular economy consultants. Changing mindsets was found to be the biggest barrier and successful implementation required the circular business model to be aligned with existing company objectives.

Synthesis

The insights were synthesised to create a circular implementation strategy and framework for Sustainable Minds. It focuses on breaking the transition to a circular business model down into smaller steps and running a series of implementation projects. It was concluded that clients need help turning circular opportunities into an actionable project proposal. The following design challenge was created:

"Design a method and tool for Sustainable Minds to support industrial companies in bridging the circular design-implementation gap by helping them turn a set of circular opportunities into an actionable project proposal."

Design

To create a design that is in line with the design challenge above, a series of design activities were performed. Two creative sessions were organised, one with 6 design students from TU Delft and one with the Sustainable Minds team. The creative sessions were used to create a rough layout for the design and formed a starting point for the design phase. This layout was then detailed, tested and iterated in a series of 7 design sprints. These iterative sprints were structured using elements of the lean startup: by building, testing and learning.

Circular Rollout

Circular Rollout is a structured approach that Sustainable Minds can use to help their clients turn circular opportunities into a proposal. It consists of a method, workshop and set of tools. The circular rollout method focuses on setting the right scope for the circular project and creating a project proposal. This proposal can then be pitched to the board and other stakeholders of the client company. The project proposal is created in a circular rollout workshop. Using the circular rollout toolkit, the workshop is focused on determining the desired scope of the project, comparing three projects, selecting one, determining project actions and creating a Big Hairy Audacious Goal. The toolkit consists of 5 tools: a circular project selector tool, circular project description tool, circular project value tool, circular project challenges tool and circular rollout tool.

Validation

The Circular Rollout workshop and toolkit were continuously tested in an iterative manner during the design phase of this project and the final design was validated in a usability test with all Sustainable Minds team members. The team members were able to independently use the toolkit and apply it to a case description. The toolkit was evaluated positively and the team members are planning to start using it. However, it is advised to first tested it in a real life implementation project to fully validate its effect.

Glossary

BM - Business model
The rationale of how a firm creates, delivers and captures value (Osterwalder & Pigneur, 2010).

BMI - Business model innovation
The process of devising and realizing a novel way to create, deliver and capture value (Linder & Williander, 2015).

CBM – Circular business model
A business model based on circular economy principles.

CBMI – Circular business model innovation
The process of devising and realising a circular business model.

CBMIP - Cambridge business model innovation process
A circular business model innovation process developed by Geissdoerfer et al. (2017).

CE - Circular economy
A regenerative system in which resource input, waste, emission and energy leakage are minimised by slowing, closing and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling (Geissdoerfer et al., 2016).

CIRCO
A semi-governmental organisation of CE consultants that organises 3-day CBMI workshops ('tracks').

CM - Critical Minds
A project management consultancy and the initiator of this graduation project.

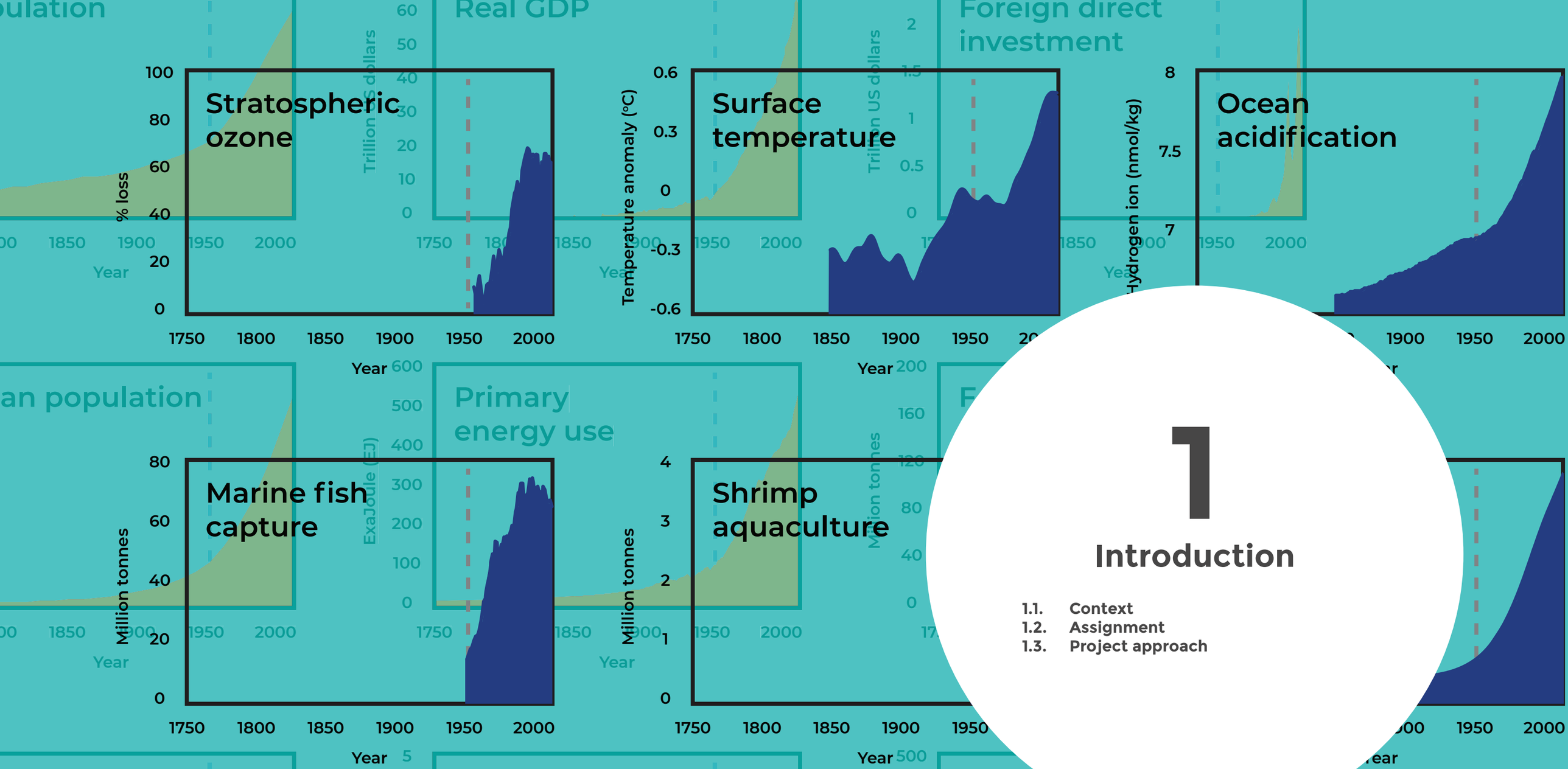
(to) Implement
To put a plan into action (Cambridge English Dictionary, 2018).

SM – Sustainable Minds
One of the 5 market teams of Critical Minds, focused on circular economy.

System
A set of elements or parts that is coherently organised and interconnected in a pattern or structure that produces a characteristic set of behaviours, often classified as its function or purpose (Meadows, 2008).

Systems thinking
A discipline for seeing wholes and a framework for seeing interrelationships rather than things, for seeing patterns of change rather than static snapshots (Senge, 1990).

Contents



1

Introduction

1. Introduction

This chapter introduces the context of this graduation project, how it came to be and its relevance. It explains the company who issued the project, Critical Minds, and formulates the graduation assignment. It also introduces the approach that was taken during the project, the scope, aim and research question. It concludes with an overview of the structure of the project.

1.1. Context

Exponential growth

Since 1950, human activity has increased dramatically, causing changes in the functioning of the earth. Various global socio-economic trends like population, consumption and energy use saw a strong increase. Global population increased from 2.5 billion in 1950 to 7.5 billion in 2017 (United Nations, 2017), global GDP has risen from $10 trillion in 1960 to $78 trillion in 2016 (World Bank, 2017) and primary energy use has increased from 92 EJ in 1950 to 603 EJ in 2014 (De Stercke, 2014). Meanwhile, a number of ecological (Earth system) variables also saw a strong increase. Amongst others, atmospheric carbon dioxide concentration increased from 316 ppm in 1959 to 407 ppm in 2017 (NOAA, 2018) and global temperature (deviation from the long-term average) rose from -0.18°C in 1950 to 0.99 °C in 2016 (NASA, 2018b). Human activity is expected to increase further in the future as population is expected to rise to 9.7 billion in 2050 (United Nations, 2017) and Global GDP is expected to grow by an average annual 2.6%, doubling in size by 2042 (PWC, 2017). This phenomenon of exponential growth was named 'The Great Acceleration' (Steffen et al., 2015). Steffen et al. (2015) argue that a causal relation exists between increases in human activity and changes in the Earth system, mainly because the Earth system changes are far beyond historical variability. For example, atmospheric carbon dioxide concentration rose beyond 400 ppm in 2013, which is higher than it has ever been for the past 400.000 years (NASA, 2018a). Because of this, scholars have argued that the world is entering a new geological era: 'The Anthropocene' (Crutzen, 2002; Steffen et al., 2015). However, Rockström et al. (2009) warn that human influence on the earth has reached far beyond safe parameters and could lead to disastrous consequences for large parts of the world.

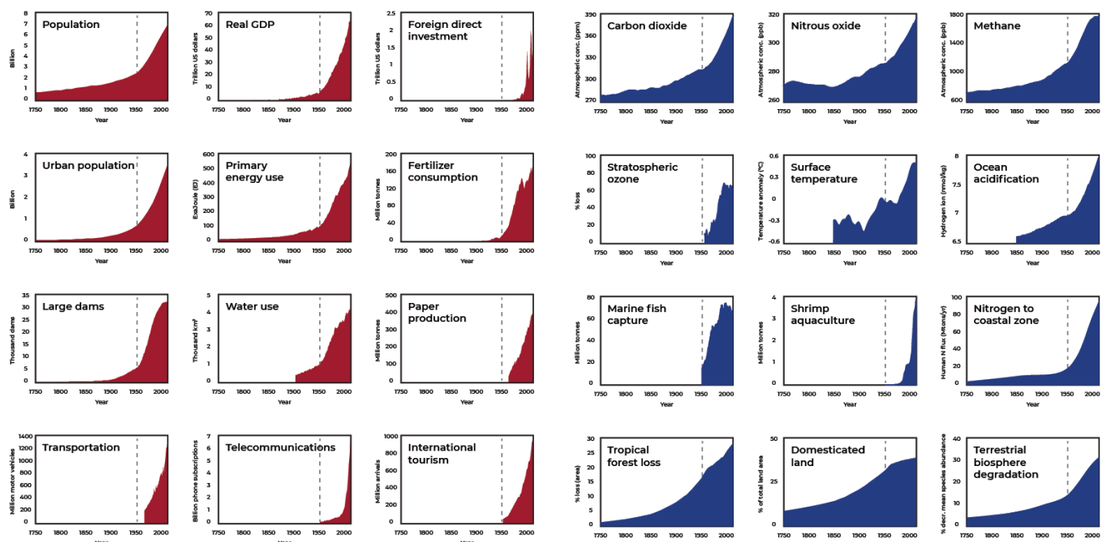


Image 1: The Great Acceleration. Exponential growth in human activity (left) and earth system variables (right), starting in 1950 (dotted line) (Steffen et al., 2015).

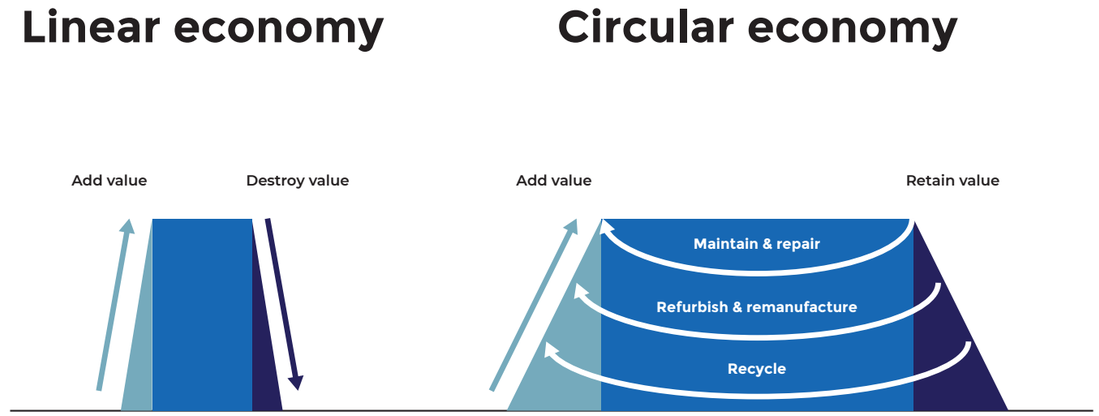


Image 2: The difference between the linear and circular economy, visualised using the 'value hill'

The linear economy

Humanity's impact in the planet can be traced back to the industrial revolution and the functioning of the economy. The industrial revolution changed the way people produced goods and materials were used. This brought prosperity and comfort, but also altered production and consumption patterns into a culture of fast-fashion, throwaway products and planned obsolescence (Siegle, 2006; Mathews, 2011; Strasser, 2000). Nowadays still, resources are taken from the earth and products are made which are quickly disposed of after use. This 'Take-Make-Dispose' paradigm is also named the 'linear economy' (Sauvé et al. 2016). As a result of the linear economy, increasingly more resources are needed and larger amounts of pollution and waste are generated during production, use and disposal of products. Precious resources are now depleting, causing the European Commission to publish a list of 27 raw materials that are considered critical (European Union, 2017). As a result of this depletion, resource prices are expected to rise in the future and become volatile (European Union, 2012; Chatham House, 2011). This could bring economies under large amounts of risk and financial insecurity.

The circular economy

To prevent a potential economic and environmental disaster, economic growth has to be decoupled from resource use and environmental impact (United Nations Environmental Programme, 2011). As an alternative for the 'linear economy,' the 'circular economy' has been proposed to solve these problems in a way that is environmentally, socially and economically beneficial. The 'circular economy' (CE) aims to minimise resource use, prevent resources from ending as waste and stimulates reducing, reusing and recycling resources (Ellen MacArthur Foundation [EMF], 2017). The chapter 'literature study' gives a more detailed explanation of the concept. Although CE has also received criticism, notably on its foundations in nature (Skene, 2017) and the so-called rebound effect (Zink & Geyer, 2017), CE has gained growing attention recently and organisations, companies and governments worldwide presented it as a promising alternative for the future (EMF, 2015b). Also, various organisations are working on facilitating and accelerating the transition to a CE. Critical Minds is one of those organisations, as it wants to facilitate the implementation of circular business models by industrial manufacturing companies.

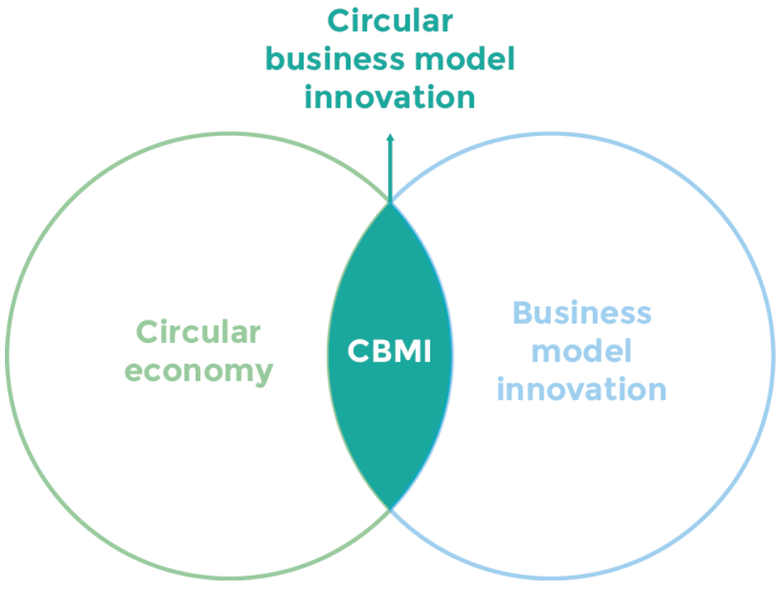


Image 3: Theoretical background. The theoretical background of this graduation project is circular business model innovation, drawing on both circular economy and business model innovation theory.

1.2. Assignment

Circular economy at Critical Minds

Critical Minds (CM) is a project management consultancy located in Kamerik, The Netherlands (see chapter 'internal analysis' for a detailed analysis of the company). CM employee Bas Hillerström developed an interest in the concept of circular economy and discovered that existing clients of Critical Minds did as well. He became a trainer in circular design workshops at CIRCO (CIRCO, 2018), using the 'Products that Last' framework (Bakker et al., 2014). Bas noticed that industrial companies were able to redesign their business models and products during the CIRCO design workshops, but concepts were hardly ever implemented in practice. Bas also noticed a gap in existing CE consultancy, "who write endless reports but never get their hands dirty." He decided to create a new consultancy service for Critical Minds, focused on implementing circular economy and named Sustainable Minds. The aim was to make it an action-oriented consultancy service, focused on doing and realising actual results. However, it was still unclear how Sustainable Minds could exactly do this. This graduation project was initiated to answer the need for more research into the process of implementing circular business models at industrial companies and the possibilities for consultancy by Sustainable Minds to facilitate this process.

Academic relevance

Current CE research provides methods, tools and examples of circular economy practices, including circular business models (Bocken et al., 2016) and circular business model innovation (CBMI) processes (Evans et al., 2014; Geissdoerfer et al., 2017; Mendoza et al., 2017; Mentink, 2014), but only few companies have successfully managed to implement these circular business models (Evans et al., 2017; Laukkanen & Patala, 2014; Mendoza et al., 2017; Rashid et al., 2013). Scholars argue a so-called circular design-implementation gap exists between circular economy theory and implementation practice and expressed a need for more research into the process of implementing circular business models (Geissdoerfer et al., 2017; Mendoza et al., 2017; Mentink, 2014).

1.3. Project approach

Project scope

The scope of this graduation project is determined by four factors: the Sustainable Minds team, Critical Minds as a company, circular economy theory and business model innovation theory and practice.

Sustainable Minds

Sustainable Minds is the initiator of this graduation project. The results of this project should fit the needs and wants of the Sustainable Minds team. The results should also be in line with the knowledge and skills of the Sustainable Minds team members to be practically usable by them.

Critical Minds

Critical Minds is the parent company of the Sustainable Minds team. This means the results of this graduation project should also be in line with the core values and qualities of Critical Minds as a company.

Circular economy

Circular economy theory is vast and growing every year. This graduation project focuses on circular business models. This relates to the way circular economy principles are translated to the rationale of how a firm creates, delivers and captures value.

Business model innovation

This project focuses on the process of business model innovation using circular economy principles. Specifically, it focuses on the gap between the design of circular business models and implementation practice.

Project aim

The aim of this graduation project is to develop an approach that Sustainable Minds can use to help industrial manufacturing companies bridge the gap between design and implementation in the circular business model innovation process.

Research question

"How can Sustainable Minds help industrial manufacturing companies bridge the gap between design and implementation in the circular business model innovation process?"

Project structure

This project was split into three subsequent phases: research, synthesis and design. The activities that were performed during each phase of the project are described below.

Research

- A research approach was written
- A literature review was performed
- An internal analysis of CM & SM was performed
- An external analysis of the CE consultancy market was performed
- An interview study was performed
- Results were analysed

Insights were found into the CBMI process and the design-implementation gap. These insights function as theoretical and empirical foundation for the synthesis and design phases.

Synthesis

- An implementation strategy was created
- An implementation framework was created
- A set of design guidelines was created

A strategy and framework were created as underlying support for the design phase. This strategy and framework could also support Sustainable Minds in their consultancy service.

Design

- A design approach was written
- A creative session was performed with 6 design students
- A creative session was performed with SM
- Iterative design prints were performed
- A usability test and applicability test was performed with SM

A method, workshop and set of tools were created to support Sustainable Minds in helping their clients bridge the design-implementation gap. The method, workshop and set of tools were tested with the SM team and applied to a case description from a client project.

Activities

Research

Research approach

Literature review

Internal anlysis CM & SM

External analysis CE market

Interview study

Analysis

Synthesis

Implementation strategy

Implementation framework

Design guidelines

Design

Design approach

Creative session students

Creative session SM

Design sprints

Usability test

Applicability test

Project structure

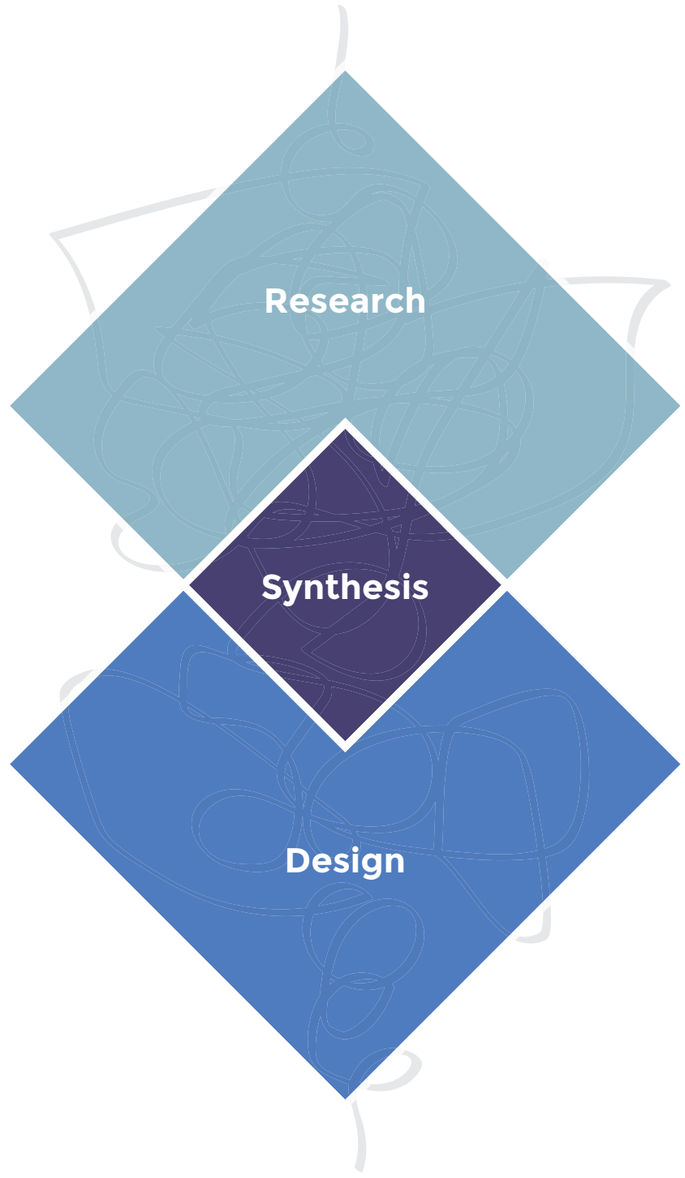


Image 4: Project structure and related activities

2

Literature review

2. Literature review

Academic literature can provide further insight and understanding of the topic at hand. This chapter explains the literature review that was performed during this graduation project. It covers literature about circular economy, circular business model innovation and implementation practice.

Literature was found through online academic databases (Google Scholar & TU Delft Library) using the following search strings: "circular economy" AND definitions; "circular economy" AND implementation; "circular economy" AND "business model" OR "business model innovation"; "circular economy" AND "design"; "circular economy" AND barriers OR "success factors". The resulting body of literature was scanned for relevant information about the process of implementing circular business model innovations, phases, activities, barriers and success factors. Related articles were found by cross-referencing and a focus was put on articles published post-2010. The literature search was continued until a satisfactory degree of relevant information was found.

2.1. Circular economy

The circular economy (CE) has been proposed as an environmentally, socially and economically beneficial path for the future. In essence, it aims to minimise resource use, prevent waste and maximise resource utility and value (EMF, 2017). The circular economy received significant academic attention recently (Lieder & Rashid, 2016), but no agreement has been reached on the exact meaning of the term 'circular economy' (Geisendorf & Pietrulla, 2017). Kirchherr et al. (2017) performed an extensive literature study on 114 CE definitions, comparing 7 existing literature studies. They conclude that while literature is divided on the exact meaning of CE, its core elements are: sustainable development, a systems perspective, a waste hierarchy (prevent resource use in the first place instead of waste generation), 4R-framework (reduce, reuse, recycle & recover), business models and consumers.

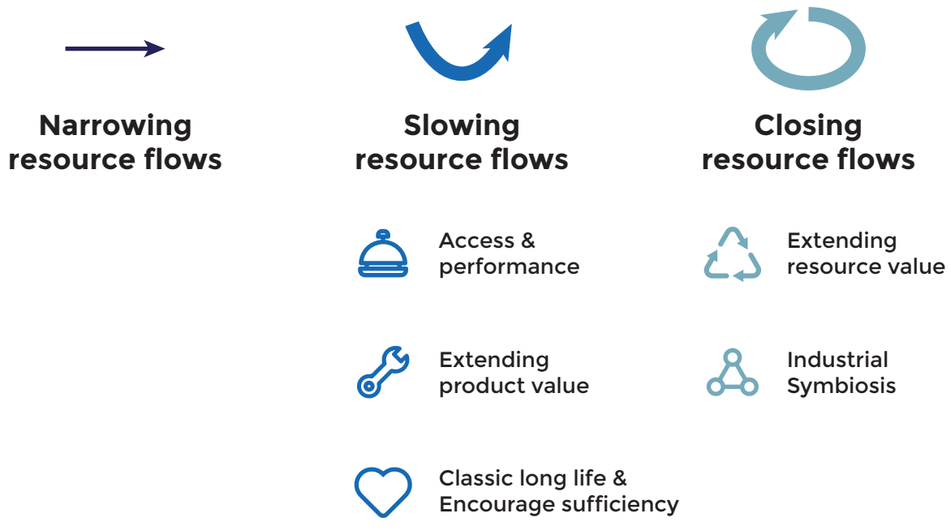


Image 5: Circular business strategies and circular business model archetypes (Bocken et al. 2016).

According to Geissdoerfer et al. (2016), the circular economy can be defined as:

"a regenerative system in which resource input, waste, emission and energy leakage are minimised by slowing, closing and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling."

I choose to follow this definition as it is very comprehensive. It mentions the circular economy as a system, shows a clear relationship between the why, how and what of CE: the overall goal (a regenerative system in which resource input, waste, emission and energy leakage are minimised), how it can be achieved (by slowing, closing and narrowing material and energy loops, hinting at business models) and what activities can be undertaken to realise this (this can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling).

Moving from a linear business to a circular business will require a new way of thinking and doing business (Bocken et al., 2016). Geissdoerfer et al. (2016) hint at three strategies to realise a circular economy: narrowing, slowing and closing resource loops. This is based on the circular business strategies from Bocken et al. (2016). Narrowing means using fewer resources, slowing relates to using resources for a longer time, closing means returning resources into the economy. When applied to a business, the three circular business strategies can result in new business models, which are core enablers of the CE (Kirchherr et al., 2017). A business model (BM) describes "the rationale of how a firm creates, delivers and captures value" (Osterwalder & Pigneur, 2010). A business model based on circular economy principles is known as a 'circular business model' (CBM). Bocken et al. (2016) identified 5 archetype CBMs and classified them into the three circular business strategies: the access and performance model, extending product value model, classic long life model, extending resource value model and industrial symbiosis model. The access and performance model uses servitisation, shifting from product to service. Extending product value focuses on exploiting the residual value of products. Classic long life is built around manufacturing and selling durable products that last long. Extending resource value focuses on resource extraction. In Industrial symbiosis, the by-products of one industry feed as resource into another.

Besides the circular business model archetypes by Bocken et al. (2016), various other frameworks exist that facilitate the design of circular business models on a conceptual level, like the 9R-framework (Potting et al., 2017), the ReSOLVE-framework (EMF, 2015a). Although these frameworks provide conceptual inspiration when designing a new CBM, they lack guidance through the process of design and implementation (Mendoza et al., 2017).

2.2. Circular business model innovation

The process of designing and implementing a new business model is known as business model innovation (BMI): "the process of devising and realizing a novel way to create, deliver and capture value" (Linder & Williander, 2015). Various business model innovation (BMI) processes exist (Frankenberger et al., 2013; Osterwalder & Pigneur, 2010) but few are specifically tailored towards the CE: circular business model innovation (CBMI). Mentink (2014) developed a 4-step CBMI process based on the 4I framework (Frankenberger et al. 2013), Kraaijenhagen et al. (2016) developed a 10-step CBMI process focused on collaboration, Geissdoerfer et al. (2017) developed the 8-step Cambridge Business Model Innovation Process (CBMIP) and Mendoza et al. (2017) created the 10-step Backcasting and Ecodesign for the Circular Economy (BECE) - framework. Each process is divided into phases and steps, with descriptions of activities during each step. All of the processes mentioned above feature 'implementation' as final step or phase, but the CBMIP by Geissdoerfer et al. (2017) features the most detailed description including 2 steps during the implementation phase.

Although these CBMI processes provide guidance, they do not specifically focus on overcoming the gap between design and implementation. However, some of abovementioned processes describe barriers that can inhibit progression through the process, as well as success factors that can enable successful CBM design and implementation. These barriers and success factors can be combined with other empirical research to determine a set of potential barriers and success factors.

Barriers

The CBMI processes by Mentink (2014) and Geissdoerfer et al. (2017) both mention potential barriers. Mentink (2014) mentions the following barriers: balancing the innovation team, understand the CE concept, thinking in systems, analysing players, analysing change drivers, overcoming linear logic, thinking in business systems, developing new ideas, creating multiple values, integrating the business system, coordinating collaboration, dealing with confidentiality and trust, managing dependencies, overcoming internal and external resistance, mastering increased complexity, competing in a linear environment, defining pilots, trials and prototypes and collectively identifying a leader. Geissdoerfer et al. (2017) mention the following barriers: identifying opportunities, integrating management and other stakeholders, lack of ambition, insufficient mutual understanding, making the concept too unrealistic, lack of experiments, pilots and understanding of risk, too much/little detail, inadequate timing, insufficient information, documentation, funding and communication, wrong or lack of adjustment and unsuited diversification.

Various other studies also included barriers to CBM implementation and categorized them into groups. Laukkanen and Patala (2014) find various barriers to CBM implementation in the categories of regulatory, market, financial, behavioural and social barriers. Planing (2015) identified 4 possible reasons for non-acceptance of circular business models: Customer irrationality, conflict of interest within companies, misaligned profit-share along supply chain and geographic dispersion. Bouzon et al. (2015) found 7 barriers for reverse logistics: Technology and infrastructure, economic, management, governance and supply chain process, knowledge, market and competitors, and policy. Similarly, Abdulrahman et al. (2014) discovered 4 barrier categories: Management, financial, policy and infrastructure. Roos (2014) also found 4 barrier categories related to: Technology, legal, economic and mindset.

Compiling the abovementioned barriers from literature, a set of barrier categories was derived. Internal barriers can be related to: technology, finance, organisation, culture and knowledge. External barriers can be related to: market, partners and ecosystem. The categories are explained in further detail below.

Internal

- Technology
- Finance
- Organisation
- Mindset
- Knowledge

External

- Customers
- Partners
- Ecosystem.

Technological barriers are related to research and development. For example: new scientific insights that are needed or the development of new technologies, products and processes for design, engineering and production.

Financial barriers are related to investing, financing and accounting. These barriers could for example be the development of new revenue models and cost structures when shifting to a new business model or developing ways to finance a large investment.

Organisational barriers are related to company employees and changes to the organisation. For example: creating a sustainability vision for the future to steer the company or creating a new team to explore the potential of CE.

Mindset barriers are related to the mindset of individual employees and the company as a whole. For example convincing top management of the potential of CE and embedding it in the rest of the organisation.

Knowledge barriers are related to knowledge and skills of employees. These barriers could for example be insufficient knowledge of CE itself or of circular business and design but also training factory employees in using new manufacturing techniques.

Customer barriers are related to company-customer interaction. For example: convincing customers to start buying a circular product in the first place or actively involving customers in the product development process.

Partner barriers are related to interacting with other organisations. For example: starting value chain collaborations, but also looking to other sectors for inspiration and looking at the economy with a systemic view.

Ecosystem barriers are related to the ecosystem the company operates in. These barriers could be laws that inhibit the legality of a circular business or regulations that set unrealistic demands on refurbished products.

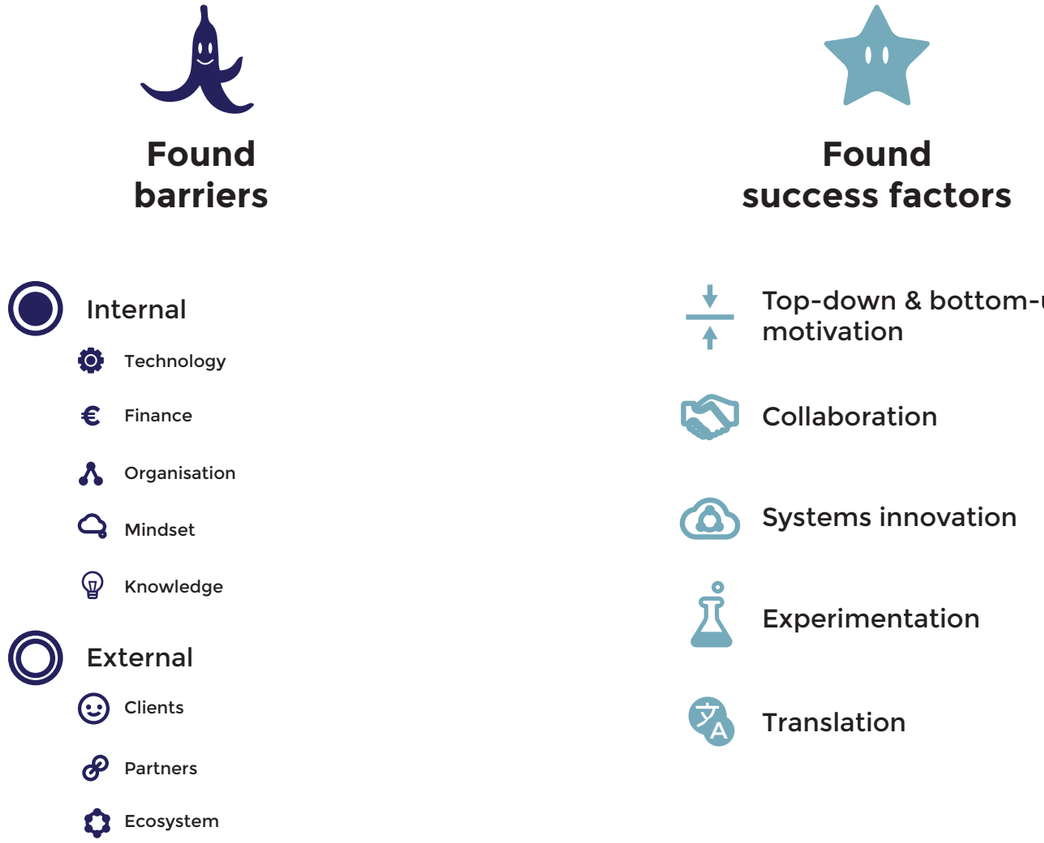


Image 6: Expected barrier categories and expected success factors.

Success factors

Barriers to CBM implementation provide insight into potential inhibitors, but these barriers have to be overcome. This is why insight into success factors is needed to find potential enablers of CBM implementation.

Various studies have researched the success factors of CE implementation. Kirchherr et al. (2017) mentioned systems thinking as a core principle of CE and customers as a key enabler. Roos (2014) found 4 enablers that contribute to successful circular business model innovation: leadership, collaboration, motivation and customer behaviour. Geissdoerfer et al. (2016) found a set of requirements for implementation, among which: the cooperation of different stakeholders, systems change/design at the core and business model innovation as a key for industry transformation. Karlsson et al. (2017) discovered 6 success factors for business model innovation at Swedish biogas producers: long-term perspective, business strategy, influential enthusiasts, cooperation, entrepreneurial skills & experience and a secure market. Based on the abovementioned research, the following success factors for CE implementation were identified: integration, system innovation, collaboration and experimentation.

Success factors

- Motivation
- System innovation
- Collaboration
- Experimentation

Since the implementation of a CBM involves radical change, it requires motivation and support throughout the entire organisation (Kraaijenhagen et al., 2016). Successful examples of enterprise level implementation (Xerox, Caterpillar, RICOH, Interface carpet) have implemented CE with top-down commitment, integrating CE as part of the business strategy (Rashid et al., 2013). Schaltegger et al. (2011) also find the sustainability strategy determines the degree of business model innovation for sustainability purposes.

Top-down commitment is necessary to provide sponsorship and leadership, but bottom-up commitment is also required to make the new CBM work. If work floor employees do not believe in the new strategy and business model, they could potentially block the CBM implementation (Coghlan, 1993; Lieder & Rashid, 2016).

By nature, CE is about the economic system as a whole, this means system innovation is key. Meadows et al., (1972) and Senge (2008) wrote about the importance of Systems Thinking when innovating for sustainability purposes. Evans et al. (2017) also confirm this in their perspective of systems thinking for sustainable business model creation. A system is "a set of elements or parts that is coherently organised and interconnected in a pattern or structure that produces a characteristic set of behaviours, often classified as its function or purpose" (Meadows, 2008, p. 188). Systems consist of 3 parts: elements, interconnections and a function or purpose. A way of thinking is needed to produce these systems, called systems thinking. Senge (1990) defines systems thinking as "a discipline for seeing wholes and a framework for seeing interrelationships rather than things, for seeing patterns of change rather than static snapshots." In practice, this means businesses that want to become circular have to look beyond their own company, to their value chain and customers.

Collaboration with value chain partners and customers is a key success factor for CBM implementation. A circular business strategy of closing resource flows involves taking back products for reuse, refurbishment, remanufacturing or recycling. This means that by nature, CBMs require companies to be involved with their value chain. Depending on the amount of value chain integration, a business has to interact with other companies or is able to close loops within their own organisation (Mentink, 2014). Kraaijenhagen et al. (2016) write that collaboration is inevitable in CBM implementation. Senge (2008) also notes that sustainability challenges are too complex to solve in isolation or by one single actor and that collaboration is necessary for future innovation. Karlsson et al. (2017) also find collaboration as a key success factor.

Although value chain collaboration is necessary to close loops, customers also form an essential part of the CE (Kircherr et al., 2017). Customers are the ones who purchase and use the actual products and services and are the ones to hand them back in. Therefore, customer engagement, collaboration and participation are prerequisites for successful design and implementation of CBM and CPSS (Jonker et al., 2017; Kraaijenhagen et al., 2016).

Shifting to a new business model requires big changes in an organisation, experimentation is key to decrease risk and make implementation a success (Chesbrough, 2010; McGrath, 2010). Schuit et al. (2017) also stress the importance of business experimentation when shifting to a CBM, to break up the shift into smaller steps. Large scale pilots can require a big investment and thus, larger risk. Small scale experiments can help companies to their propositions at relatively low cost and effort (Osterwalder et al., 2014; Ries, 2011). In a business setting, experiments focus on testing 'hypotheses' about the potential future business, for example: What type of customers are interested? How does the proposition need to be formulated? Will customers value the new services?

2.3. Literature conclusion

Circular economy and circular business model innovation literature provides theoretical background on the process of designing and implementing circular business models and the design-implementation gap. Various circular business model frameworks were found that facilitate the design of circular business models on a conceptual level. Several circular business model innovation processes exist that describe the steps and phases that companies can take to design and implement a CBM. These processes can provide guidance on a conceptual level. Barriers and success factors have been identified that shed light on the factors that inhibit and enable companies to successfully complete this process and implement a CBM. These barriers and success factors signal unmet needs that companies experience and that require consulting.

This project aims to provide Sustainable Minds with the practical tools to help their clients bridge the gap between design and implementation in the circular business model innovation process. However, although the knowledge that was found provides general insight, it was not directly applicable to Sustainable Minds because it was not specifically derived from them and their (potential) clients. This is why exploratory research was needed to describe the characteristics of Critical Minds and Sustainable Minds as well as the circular business model design and implementation process that they and their (potential) clients experience.

3

Research approach

3. Research approach

This chapter explains the research approach that was used during the exploratory research of this graduation project. Since this project aims to provide a practical contribution to Sustainable Minds, the aim of this research was to gain practical understanding of the context Sustainable Minds is operating in and to identify opportunities for and boundaries to the design phase of this project.

Three studies were performed: an internal analysis, an external analysis and an interview study. The internal analysis researched Critical Minds as company and Sustainable Minds as team. The external analysis analysed the CE consultancy market. The interview study researched the CBMI process and design-implementation gap that companies and consultants experience.

3.1. Internal analysis

An internal analysis was performed to analyse Critical Minds and the Sustainable Minds team. The aim of this internal analysis was to gain better understanding of the strengths and weaknesses of Sustainable Minds and identify a set of requirements for the design phase.

The SWOT-framework was used to analyse results. SWOT is a widely used strategic analysis framework that is simple to use and widely applicable (Helms & Nixon, 2010). The SWOT-framework consists of 4 elements that are analysed in parallel: strengths, weaknesses, opportunities and threats. These 4 elements are covered by both the internal and external analysis. The internal analysis focuses on the strengths and weaknesses of Critical Minds and the Sustainable Minds team.

Strengths and weaknesses of Critical Minds were analysed through desk research. Documents that were used include the Critical Minds website and the vision/mission presentation that describes CM's vision in detail. The Sustainable Minds team was assessed using personal profiles. All Sustainable Minds team members were asked to fill in a short profile containing their name, education, CM experience, CE knowledge (on a scale of 1-5) and personal strengths. The key strengths and weaknesses of the Sustainable Minds team were then selected and used in the SWOT-framework.

3.2. External analysis

An external analysis was performed to analyse the CE consultancy market. The aim of this external analysis was to gain better understanding of the opportunities and threats of the CE consultancy market and to identify opportunities and requirements for the design phase.
Similar to the internal analysis, the SWOT-framework was used to analyse results. The external analysis covers the opportunities and threats of the CE consultancy market. Opportunities and threats of the CE consultancy market were assessed using market analysis. Threats of competitors of Sustainable Minds were identified by analysing market scope (Chen, 1996; Langerak et al., 2004). Different markets were layered on top of each other, with decreasing scope. Sustainable Minds is at the centre of this model, in the smallest market scope. Competitors were then identified using desk research, and categorised into their respective markets using the company descriptions on their respective websites. This way, the difference between direct and indirect competitors became clear. The findings were represented in an Euler diagram, visualising the decreasing market scope as layers of an onion model with the competitors that are active in each market. Opportunities were found by analysing the size and attractiveness of the CE implementation consultancy market. This was done through desk research, searching for existing assessments of the CE market in Europe and the Netherlands, as well as spotting relevant trends and developments in activity in the CE market. The analysis was concluded by selecting the key opportunities and threats of the CE implementation market from the abovementioned analysis. These were used in the SWOT-framework.

3.3. Interview study

A qualitative interview study was performed to research the process of CBM implementation and the design-implementation gap. The purpose of this study was to gain deep understanding of the design-implementation gap in the circular business model innovation process and to discover opportunities and boundaries for Sustainable Minds to help their clients bridge this gap. This is why special emphasis was put on barriers and success factors that companies and consultants experience during this process, for these inhibitors and enablers could be used as inspiration to facilitate the CBM implementation process.

Participants

This study included 12 participants selected based on purposeful sampling out of 3 groups that are important in the process of becoming circular: 6 participants from companies that aspire to implement a CBM, 3 participants from companies that successfully implemented a CBM and 3 participants as CE experts. To minimise bias and strengthen the findings of the research, triangulation was used by interviewing multiple data sources (3 participant groups) (Eisenhardt, 1989).

Companies that aspire to implement a CBM

1. Damen shipyards
2. Heerema marine contractors
3. Van Oord dredging
4. IHC dredging
5. IHC dam dredging
6. Rijksrederij

Companies that successfully implemented a CBM

7. Schelde Exotech
8. Interface carpet
9. Van Houtum / WEPA

CE experts

10. Douwe Jan Joustra
11. Pieter van Os
12. Thirza Monster

The companies that aspire to implement a CBM group are 6 companies that joined a 3-day CIRCO CBMI workshop (CIRCO, 2017) in which they analysed their linear business and designed a CBM. At the end of the workshop, the companies were interviewed about how they plan to implement their CBM and what barriers and success factors they expected to experience.

The successful companies group consisted of 3 companies that have successfully implemented a CBM. These companies could explain their drivers for implementing CBMs and their experiences in doing so. They could also explain the barriers and success factors that inhibited and enabled their successful implementation.
The CE experts group consisted of 3 experienced CE consultants that have experience in helping companies design and implement CBMs. These experts could explain their experiences as an outsider, trying to help companies design and implement CBMs.

Materials

Semi-structured interview guides were prepared for each participant group. 3 interview guides were developed in total (see appendix). A smartphone app was used to record audio. Pen and paper were used to take notes during the interviews. The findings from the literature review were used to prepare the interview guides to make sure important topics were included (Patton, 2002).

Procedure

This research used a qualitative research methodology, with semi-structured interviews to gather data. Participants were interviewed to gain understanding of the CBM implementation process, success factors, barriers and ways to for consultancy to support them in similar projects in the future. Rich and anecdotal information was required in order to provide a throughout understanding of the projects and implementation process (Eisenhardt, 1989). Depth interviews were selected as research method instead of group sessions because of practical reasons and because it would enable the participants to speak more freely and in depth about their experiences.

All of the interviews were done in person. Half of the interviews (6/12: companies that successfully implemented a CBM and CE experts) took place in a formal setting, on location at the office of the interviewee in question. The other half of the interviews (6/12, companies that aspire to implement a CBM) took place in an informal setting on location after performing the 3-day CBMI workshop by CIRCO.

To capture data, 6/12 interviews were recorded on audio, using a smartphone app. Since the 6 interviews with companies that aspire to implement a CBM took place in an informal setting, these could not be captured on audio. All formal interviews were captured on text while interviewing, the informal interviews were captured on text directly after completing the interview. Textual data capture was in the form of extensive interview summaries to describe everything that was said, as well as highlighting the most important conclusions: The process of CBM implementation, barriers and success factors. After interviewing, the summaries were compared with the audio recordings to include missing data.

Analysis

To analyse the results of the interview study, the interview summaries and audio recordings were used to create interview statements, which were subsequently analysed using 'analysis on the wall' (Sanders & Stappers, 2013). The interview summaries were decomposed into interview statements and each individual interview statement was written on a statement card. 3 colour sticky notes were used to create the statement cards: yellow for companies that aspire to implement a CBM, green for companies that successfully implemented a CBM and pink for CE experts. In total, the analysis was threefold: Interview statements were clustered and structured chronologically to create a journey map and the barriers and success factors were categorised into expected barriers and success factors as derived from literature.

First, the barriers were categorized in relation to the expected barrier topics as derived from literature. This gave insight into which barriers during the implementation process were mentioned most and were thus considered important by the interview participants.

Internal barriers

- Technology
- Finance
- Organisation
- Mindset
- Knowledge

External barriers

- Customers
- Partners
- Ecosystem.

Second, the success factors were categorized in relation to their expected topics as derived from literature. This gave insight into which success factors during the implementation process were mentioned most and were thus considered important by the interview participants.

Success factors

- Motivation
- System innovation
- Collaboration
- Experimentation

Third, the statement cards were structured on a timeline to create a journey map. The journey map was structured into several layers: phases, activities, barriers, success factors and opportunities. All interview statements were plotted on this journey map into their respective categories. They were clustered into themes. The themes were based on (dis)similarities and quantity of insights that were gathered. This resulted in insights regarding the CBM implementation process, what steps companies take, what the barriers and success factors along the way inhibit and enable this process and what opportunities exist for Sustainable Minds to facilitate this process.

4

Research results

4. Research results

This chapter explains the results of the exploratory research that was performed in this graduation project. It consists of three studies: an internal analysis, an external analysis and an interview study.

4.1. Internal analysis

The internal analysis contains elements from inside Critical Minds (CM) and the Sustainable Minds (SM) team. It describes CM as organisation, but also the SM team to determine their strengths and weaknesses.

Critical Minds

Critical Minds (CM) is a project management consultancy located in Kamerik, The Netherlands. It was founded in 2012 by Floris Groeneveld and Tjardo Meulenbroek and currently employs 28 people. Critical Minds is the initiator of this graduation project.

Self-steering principles

Critical Minds was founded on the principles of self-steering organisations, based on the work by Brazilian entrepreneur Ricardo Semler (2001). This means employees have a lot of freedom and also a lot of responsibility. Instead of using top-down control to run the company and ensure consistency of results, CM uses more of a bottom-up approach. It aims to involve its employees as much as possible in steering the organisation. For example, besides 1 human resources manager, no specialised positions exist in the company. No difference is made between junior or senior consultants as well. Instead, CM is run by its own employees who run the company in part-time project teams. Employees join a team voluntarily, and do everything from sales, marketing, recruitment to finance themselves. As a result, employees are intrinsically motivated to contribute to the company.

Vision

Critical Minds' vision consists of 4 elements:

- A bigger goal (Why do they exist?)
- Core values (What do they stand for?)
- An ambitious goal (Where are they going?)
- Core qualities (What do they excel in?)

Critical Minds' bigger goal is: "Making the difference by being yourself." This is their beacon on the horizon which they might never achieve, but which will always guide them. It refers to their self-steering principles: providing an open, safe and trusted workplace where people feel free to be themselves. This way, their personal qualities can be put to best use to make the difference in their work. Critical Minds has 4 core values: sincere, transparent, positive and driven. The core values show what kind of people they are, what is important to them, what leads their actions and how to make good decisions. Critical minds' ambition is to become the #1 Great Place To Work in the Netherlands in 2020 and the #1 Great place to work in Europe in 2025. The core qualities of CM employees are: critical, analytical, connecting, entrepreneurial. These core qualities show what CM and its employees can do and describe their unique combination of talents.

What Critical Minds does

Critical Minds helps industrial organisations to gain lasting control over their projects. It creates support for new ideas, makes processes transparent and manages projects. Critical Minds' approach gives organisations tools to monitor projects and adjust their course when they are at risk of delay. Three principles are leading in the execution of assignments: Make projects predictable, shorten lead times and reduce costs (Critical Minds, 2017). The core of Critical Minds' project control method is the focus on an integral planning from start to finish and the 'critical path' to reach this finish. Although projects never follow the original plan, the completion date remains the same. The critical path determines the delivery date. It is the sum of all related activities that have to be completed in a sequence. By mapping the dependencies between activities and by updating the planning with periodic progress information, it becomes clear if the critical path is affected. The critical path determines which activities have priority and by monitoring it the delivery date can be met. As a result, not all activities have to be executed according to the original plan. Daily tasks consist of measuring progress, adjusting the planning, creating insight, meeting with project stakeholders, creating support and changing mindsets. Incidentally, they also organise sessions and give trainings

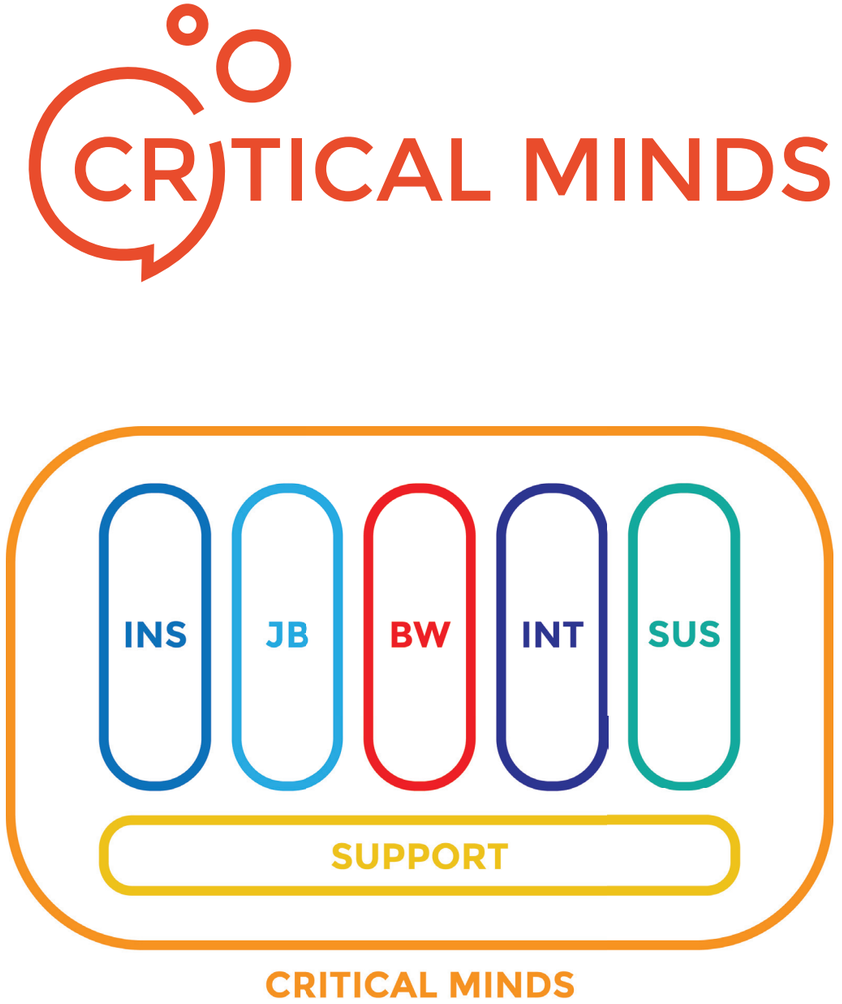


Image 7: The organisational structure of Critical Minds with its 5 market teams: industrial shipbuilding, yacht building, construction, international and sustainable.

Critical Minds' client network

Critical Minds' current client base is mainly located in the shipbuilding sector. Critical Minds is organised into two market teams: industrial shipbuilding and yacht building. The shipbuilding projects of their clients are so complex that they take years to complete, so help with project management can drastically improve lead times and reduce costs. Among Critical Minds' current clients are: Damen, Heerema, IHC, Van Oord, Van Lent, De Vries, Alewijnse and De Voogt. The client network was mainly established by Critical Minds' founders through their personal contacts, experience in the sector and through events. A project team has recently been founded around expanding the sales channel and involving all employees in sales, but the founders continue to be the main driver.

Entrepreneurship

Besides Critical Minds' work in the shipbuilding sector, the company is exploring new opportunities. In line with Critical Minds' self-steering principles, there is much room for entrepreneurship at the company; employees have the possibility to help expand Critical Minds' business themselves. Employees are constantly challenged to take the initiative, be creative, dare to take risks and use opportunities. It all serves to realise good results and achieve their goals together. Lately, Critical Minds has been expanding its horizon from project management in Dutch industrial shipbuilding and yacht building to three new markets: industrial shipbuilding USA, the construction sector and circular economy.

Sustainable Minds

The new circular economy market team of Critical Minds is called Sustainable Minds. Initiated by CM employee Bas Hillerström, the idea behind Sustainable Minds is to use CM's knowledge and experience in project management and implementation to help their clients implement circular business models. Bas noticed a gap between theory and practice of CE. The hands-on attitude of CM employees and their experience in project management could translate into a CE implementation service.

The Sustainable Minds team

Bas created a team of CM employees around his vision, the team consists of 4 members, most of which junior CM employees with a business education. Bas is the only employee in the team with more experience at CM. Below, all team members are described in a short profile containing their name, age, education, CM experience, CE knowledge (on a 1-5 scale, self-assessed) and personal strengths.

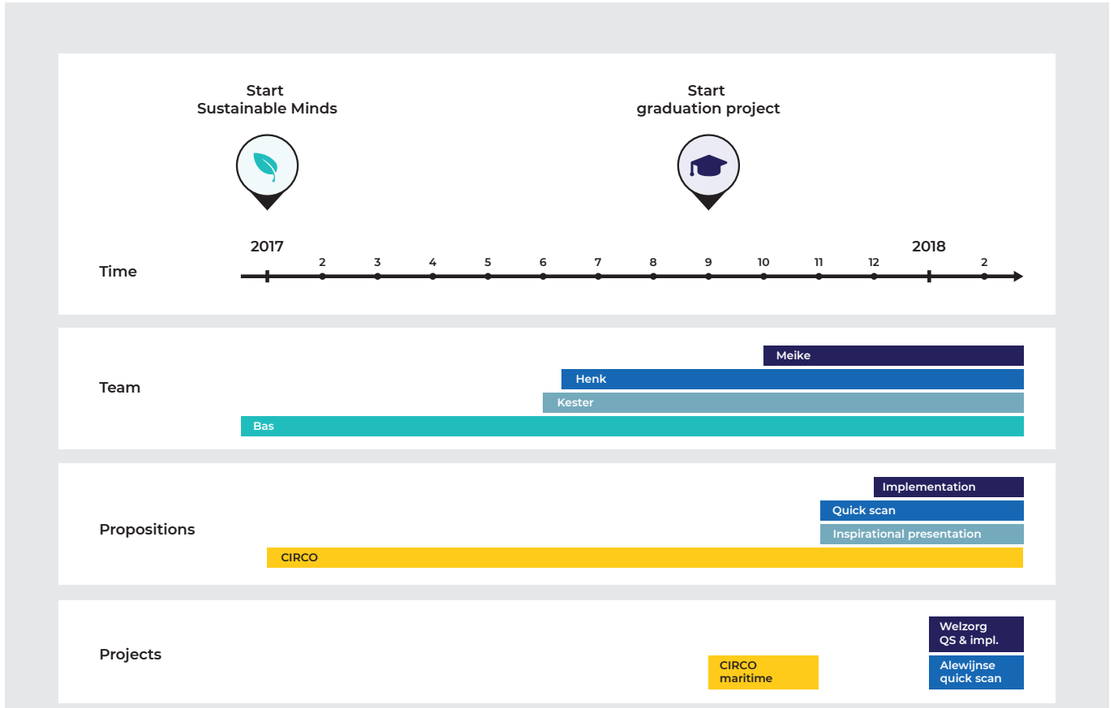


Image 8: Timeline of the development of Sustainable Minds

Bas Hillerström

Age	29
Education	Industrial Engineering & Management
CM experience	4 years Is programme manager of a large digitisation project for a healthcare company, previous work included two planning projects in the shipbuilding sector. Is active in CE since 1 year.
CE knowledge	●●●○○
Strengths	Vigour, drive, passion, persuasiveness

Kester Meursing

Age	27
Education	Technology, Operations & Supply Chain Management
CM experience	1 year Helped project management at an electro technical company with zooming in on processes, improving them and documenting them. Is now implementing new processes by training and coaching project teams.
CE knowledge	●●●○○
Strengths	Communication and social skills, positive, taking people along with change, analytical & making ideas tangible.

Henk Duit

Age	28
Education	Nautical Business Management
CM experience	1 year Is improving planning of two construction units at a superyacht company and improving planning in general
CE knowledge	●●○○○
Strengths	Commercial mindset, creative, sharp, positive, analytical and social

Meike Broenink

Age	24
Education	Business Administration
CM experience	1 year Setting up project planning for two departments at a superyacht company.
CE knowledge	●●○○○
Strengths	Positive, entrepreneurial, creating oversight

Image 9: The Sustainable Minds team

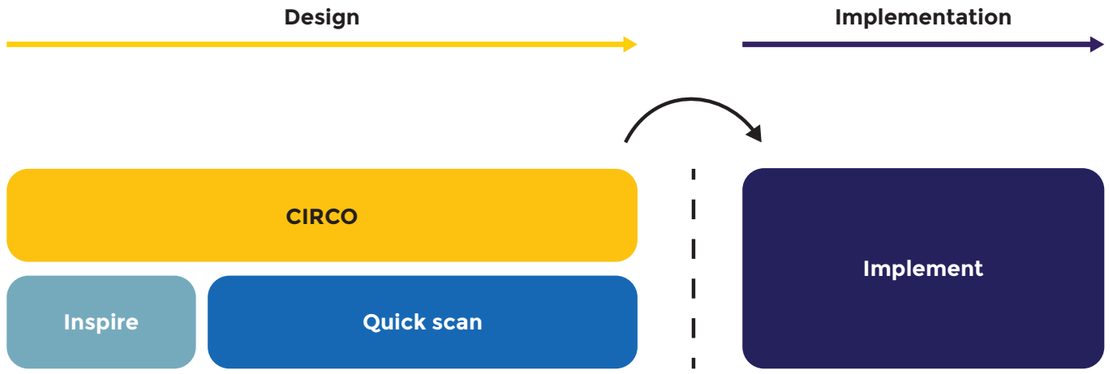


Image 10: The Sustainable Minds consultancy service and the design-implementation gap.

The Sustainable Minds consultancy service

Sustainable Minds was initiated by Bas Hillerström in January 2017 when he became a CBMI workshop trainer at CIRCO. The developments since then are recorded in a timeline (below). Kester Meursing and Henk Duit joined the market team in June 2017, Meike Broenink joined the team in October 2017. A first CIRCO track was launched in September 2017, at the start of this graduation project. Eight industrial companies from the maritime industry participated in the CIRCO track. The experience that was gained in the CIRCO track was used to expand the Sustainable Minds service. An inspirational presentation was developed to inspire companies of the potential of CE as well as a 'quick scan', a short research project in which the SM team scans a company for CBM opportunities by interviewing employees. A proposition for an implementation project was also developed, based on the project management experience of the team members. In January 2018, two projects were launched: A quick scan for Alewijnse and a quick scan and implementation project for Welzorg. Both companies were existing CM clients where Kester and Bas were previously active.

The design-implementation gap

After completing the track, the CIRCO participants were followed-up to monitor whether they would or would not implement the circular business models they designed in the track. After 5 months, none of the CIRCO participants implemented a CBM. This provides insight into the design-implementation gap for Sustainable Minds. It is located between the completion of a CIRCO track, or potentially a quick scan, and the start of an implementation project.

SWOT-analysis

A SWOT-analysis was performed to structure the findings from the internal analysis into strengths and weaknesses.

Strengths

- **The core values and qualities that all CM employees share.**
  CM employees are characterised by their core values and qualities: sincere, transparent, positive, driven, critical, analytical, connecting and entrepreneurial. These values and qualities are what make them unique as people and as a company and are a core differentiator between them and their competitors.
- **CM as safe environment to experiment and develop new business.**
  CM is an entrepreneurial playground in which employees are challenged and invited to expand existing business. The SM team has the freedom to set up their new consultancy service with financial backing from CM, but without the risks of a conventional startup.
- **Established client network in the manufacturing industry.**
  The SM team can profit from the established name and network of CM in the industrial manufacturing business.
- **Experience in project management and implementation.**
  The SM team members have gained experience in project management and implementation from previous CM projects.
- **Strong belief in the potential of CBM implementation consultancy.**
  All of the SM team members have a strong belief in the circular economy and the opportunity of helping companies implement circular business models.
- **Business education background.**
  All of the Sustainable Minds team members have a business education background. This gives them the perspective to translate circular economy theory to daily business practice.

Weaknesses

- **Consultancy service is still in development and customer needs are still unclear.**
  The Sustainable Minds consultancy service is still in development. The market team is still in the start-up phase and their exact benefit is still unclear. The needs of their (potential) clients that attempt to cross the design-implementation gap are also still ambiguous.
- **Lacking theoretical and practical expertise of CE**
  The SM team members have self-assessed their CE expertise an average of 2.5 out of 5. This could be a weakness of the team and both their theoretical and practical knowledge of CE could be improved.
- **Little experience in consulting in general**
  Three out of the four team members have only one year of experience in consulting at CM. This could result in a lack of practical understanding as well as a lack of credibility when convincing clients.
- **Are still active on existing CM projects.**
  All of the Sustainable Minds team members are still active on existing CM projects. This means they have limited time available to invest in Sustainable Minds. This could become a practical barrier.
- **Little diversity in team education**
  Although the business education background of the complete SM team makes them suitable for understanding business practice, it also makes their perspective and skill set undiversified. This could be a weakness if it reduces their ability to keep a fresh perspective. It also means the team members have a limited knowledge and skill level related to the design phase of the CBMI process.

4.2. External analysis

The external analysis contains elements that influence the SM team from outside. In this case, the CE consultancy market and possible competitors are analysed to assess the opportunity of CE implementation consultancy and threats for the SM team.

Market scope

To find possible competitors of Sustainable Minds, its market first had to be defined. Critical Minds currently operates in the market of interim project management for industrial companies. Sustainable Minds wanted to keep the focus on industrial companies but deviate from interim project management to circular economy. Various other companies operate as consultants in markets related to sustainability and circular economy. Some give advice, others are more action-oriented and help deliver results. Three levels of scope were defined, decreasing in scope related to increasing involvement in the implementation phase of the CBMI process (Geissdoerfer et al., 2017):

Levels of market scope

- CE consultancy
- CBMI consultancy
- CBM implementation

The first level is the largest scope of CE consultancy. Companies who operate at this level give advice as external consultants. This can be in the form of research, reports, visioning, goal-setting, strategy, advice, management and more. The common element is that these companies take an external position, give advice on abstract, strategic matters and are not involved with realising the results. This consultancy advice is used in strategy and policy development, before the actual start of the CBMI process. Cirkellab for example helped the Drechtstede municipal region develop an energy strategy for the coming years.

The second level focuses on circular business model innovation consultancy. This includes companies who help their clients design new business models, start collaborations, redesign products and services. These companies use a mix of advice, design and action to help their clients progress in their circular ambition. However, they are not always involved with making sure the results are actually achieved. Companies in this scope are involved with the first 2 phases of the CBMI process by Geissdoerfer et al. (2017): concept design and detail design. CIRCO for example uses a three-day workshop to help companies analyse their value chain, redesign their value proposition and create an implementation plan.

The third level has the smallest scope and focuses on the implementation of CBMs at industrial manufacturing companies. Companies who operate at this level help their clients move from plan to action by assisting them in the realisation and execution of a circular project. This means they are involved with the final phase of the CBMI process by Geissdoerfer et al. (2017), implementation. No companies were found that focus on this scope only, but some of the companies in the other scope levels are occasionally involved in this process. Noorderwind for example is involved with starting circular ventures and Innoboost is involved with running circular business experiments. However, none of the above are involved with implementing circular economy at industrial companies.
Sustainable Minds was born out Bas Hillerström's frustration with current CE consultants, "who write endless reports but never get their hands dirty." This is why Sustainable Minds wants to focus on the third level: CE implementation at industrial companies, focusing on the existing client network of CM and helping these industrial companies move from plan to action.

Market potential

In 2015, the Ellen MacArthur Foundation and consulting firm McKinsey estimated the opportunities for a circular economy in Europe (EMF, 2015a). The report estimates Europe would be able to grow resource productivity by up to 3 per cent annually by adopting a circular economy. This would result in an annual total benefit of around €1.8 trillion versus today, comprising of resource, non-resource and externality benefits and a GDP of 7 percentage point more than the current development scenario.

Motivated by the growing evidence of this opportunity, the European Commission decided to move the European Union (EU) towards a circular economy: "In a world with growing pressures on resources and the environment, the EU has no choice but to go for the transition to a resource-efficient and ultimately regenerative circular economy." (European Commission, 2012). The European Commission presented a new circular economy package in December 2015 (Bourguignon, 2016). The package contains an action plan for the circular economy, mapping out a series of actions planned for the coming years, as well as four legislative proposals on waste, containing targets for landfill, reuse and recycling, to be met by 2030.

Circular economy has significant potential in the Netherlands as well, and policies are being adjusted to realise a CE. TNO estimated the opportunities of a circular economy in The Netherlands (Bastein et al., 2013). The overall annual impact of the circular economy in the Netherlands is estimated at €7.3 billion, creating 54,000 jobs. The current value of the circular economy for 17 product categories in the metal and electrical sectors is €3.3 billion, and the Netherlands could achieve additional annual market value of €573 million.
The use of the 34 most important waste streams already represents value of €3.5 billion. An estimated investment of €4–8 billion in new technologies could create added value of €1 billion a year for the circular economy in bio-refining, bio-gas extraction, and sorting of household waste. To align its goals with those of the European Environment Agency and other European countries, several Dutch ministries have published a shared vision for the circular economy in The Netherlands (Dijksma & Kamp, 2016). The Dutch government developed a programme to stimulate the transition to a circular economy. It wants its economy to become 100% circular in 2050 and reduce primary resource use (minerals, fossils and metals) by 50% in 2030. In January 2018, the Dutch government presented its transition agenda towards a circular economy, with the manufacturing industry as one of its 5 focus areas. Its strategy is to move from critical resources (metals and minerals) to common resources, increase efficiency and reuse of metals and minerals in all steps of relevant value chains, develop new business models and products, increase the demand for circular products and services and move from fossil to renewable resources. The Dutch government aims to achieve this by stimulating circular business models, creating legal flexibility for circular entrepreneurs and by being the example themselves (Dijksma & Kamp, 2016).

CE is gaining attention among Dutch engineers and industrial shipbuilding companies as well. In October, CIRCO, a 3-day circular business design programme, also hosted a circular business design track for the shipbuilding industry in which 8 companies redesigned their business model and product (CIRCO, 2017). KIVI, the Dutch royal institute of engineers, is the largest society of engineers in the Netherlands. It has more than 20.000 members including industrial, maritime and offshore engineers and has CE as its 2-year theme (KIVI, 2017). It hosted a conference about CE in November 2017 with speakers from leading companies in the manufacturing and shipbuilding industries.

The industrial manufacturing sector contributes to a considerable amount of the Dutch economy and has been growing steadily over the past years. The industrial manufacturing sector accounted for €76.6 billion in 2016, this was roughly 11% of the Dutch GDP (€703 billion). In 2016, the size of the Dutch industrial manufacturing industry increased with 3.0%, 0.8% more than the Dutch GDP, which increased with 2.2% (Centraal Bureau voor de Statistiek [CBS], 2018a). This trend of growth in the industrial manufacturing sector appears to continue, as production in every month of 2017 was higher than the year before. For example, December 2017 was 5.2% higher than December 2016. The production of machinery increased the most in December 2017, with 24.1% compared to December 2016 (CBS, 2018b).

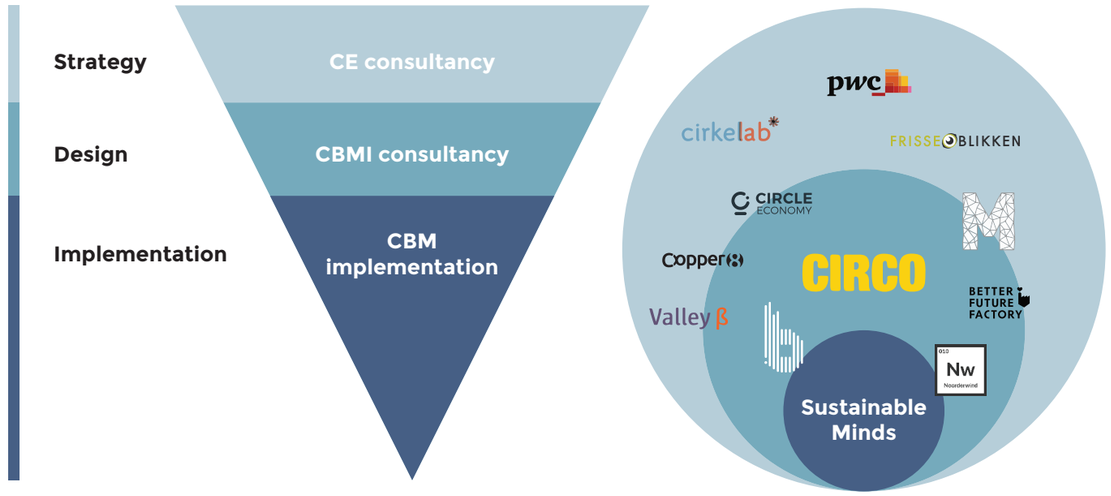


Image 11: Market scope and competitors

SWOT-analysis

A SWOT-analysis was performed to structure the findings from the external analysis into opportunities and threats.

Opportunities

- The circular economy forms a large potential and an increasing market in the future.
  The CE market in the Netherlands is expected to increase the coming years, with a potential annual impact of €7.3 billion.
- The industrial manufacturing industry is a substantial and growing sector in the Netherlands.
  The sector contributed to €76 billion in 2016, roughly 11% of the Dutch GDP and is growing 3-5% annually, with some sub-sectors up to 25%.
- CE is gaining attention among industrial companies.
  Notable industrial companies have expressed their attention and interest of the circular economy.
  Its potential is being acknowledged by industry organisations and companies are joining CBMI workshops.
- No competitors were found.
  No competitors exist that focus on the market of CBM implementation consultancy, especially in the industrial manufacturing sector.

Threats

- Competitors could easily enter the implementation market.
  CE consultancy companies or CBMI consultancy companies can easily enter into the implementation market as well. There is little to prevent them from doing so, especially considering the increasing potential of the CE.
- Inability to cross the design-implementation gap.
  Although potential clients exist, they have yet to be convinced of moving towards implementation in the first place and using SM as implementation partner. Since SM has no knowledge yet of how to help their client move from design to implementation, a risk exists of not being able to do so.
- Little experience in CBM implementation
  Since the SM team has no experience in CBM implementation yet, the first project contains a risk of failure.

Image 12: SWOT-matrix.

4.3. Interview study

During the interview study, 12 participants were interviewed about their experiences in CBM implementation. 3 participant groups were used: 6 participants from companies that aspire to implement a CBM, 3 participants from companies that successfully implemented a CBM and 3 participants as CE experts. The interview study resulted in 12 extensive interview summaries (see appendix). These were analysed using interview statement cards. The resulting insights are described below.

Barrier categories		Success factor categories	
Technology	0	Motivation	23
Finance	2	Systems innovation	5
Organisation	9	Collaboration	17
Mindset	22	Experimentation	12
Knowledge	3	Translation	9
Customers	6		
Partners	6		
Ecosystem	5		
Total	**53**	**Total**	**66**

Table 1: Interview statements categorised into barrier categories and success factor categories.

Barriers and success factors

All barriers and success factors that were mentioned were categorised into the categories that were identified in the literature study. The expected barrier categories were: technology, finance, organisation, mindset, knowledge, customers, partners and ecosystem. This gave insight into what kind of barriers were mentioned most. The expected success factor categories were: motivation, systems innovation, collaboration and experimentation.

B: The importance of soft barriers
Most barriers were related to organisation, mindset, knowledge, customers and partners (46 mentions). This provided evidence that the 'softer', human and social aspects of CBM implementation process were considered important by the interviewees, compared to 'harder' barriers like developing new technologies or calculating new revenue models. Thus, focusing on the softer barriers provides an opportunity for Sustainable Minds.

"Ultimately it is about people that want something and want fight for something to achieve it. This counts for circular economy as much as anything else."

- Thirza Monster, expert

B: Mindset change
The barrier category that was mentioned the most was mindset, with 22 mentions. This provided evidence that the mindset change from linear to circular is the most difficult barrier to overcome. It also translates to employees throughout the organisation, top and middle management as well as work floor employees.

"An important barrier is that companies do not 'feel' the opportunity and importance of CE and the issue of non-sustainability."

- Douwe Jan Joustra, expert

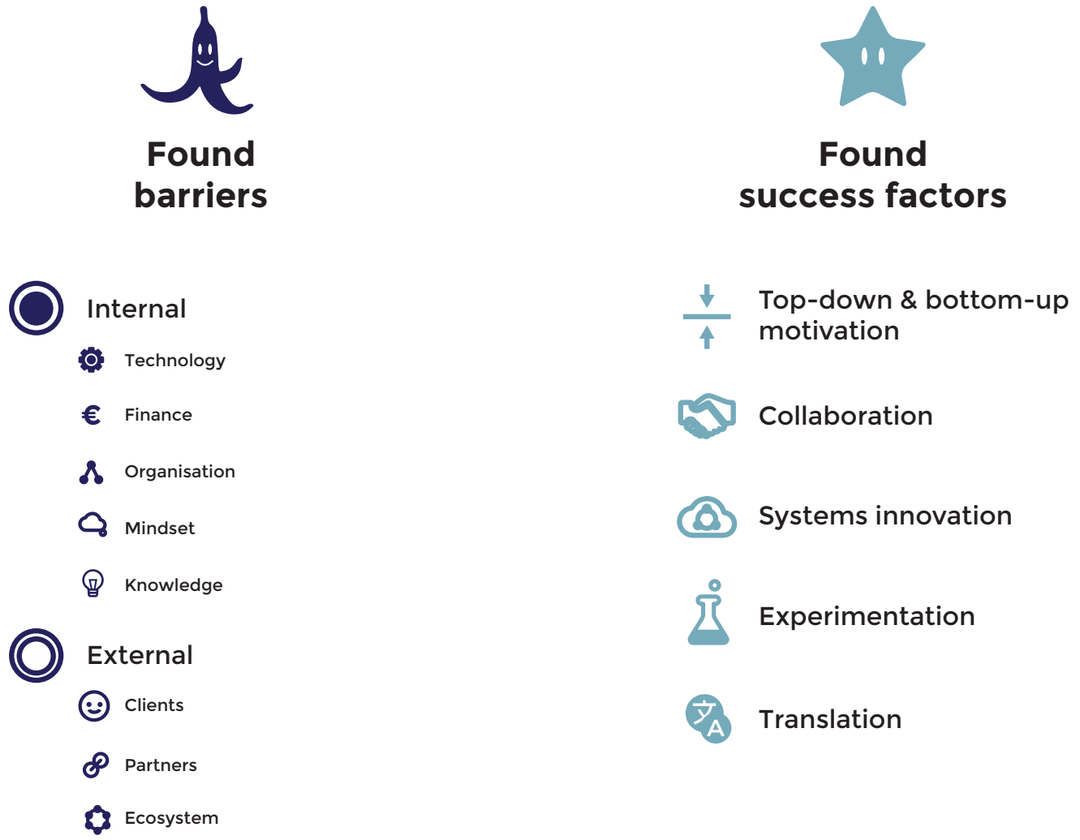


Image 13: Barriers and success factors that were found in the interview study.

SF: Translation
An additional success factor arose from the analysis that was not identified from the literature study: translation. Translation is about being able to translate one language to another, for example translating sustainability benefits to business language or technical language (Hart & Milstein, 2003; Porter & Kramer, 2011). With 9 mentions more popular than systems innovation, which was regarded a core element of CE (Kirchherr et al., 2017). This is why it was included in the success factor categories list.

"Convincing people about sustainability is about knowing what language to speak."

- Interface, successful

SF: Motivation
The success factor category that was mentioned most was motivation, with 23 mentions. This provides evidence that intrinsic, shared motivation to implement the CBM is necessary to make it a success (Chesbrough, 2010; Geissdoerfer et al., 2017; Mentink, 2014).

"The transformation can only be successful is the entire company believes in it."

- Douwe Jan Joustra, expert

General insights

SF: Guidance during the process
It became clear that all interviewees in the aspirational group greatly valued the guidance their received from CE consultants and designers during the CIRCO workshop. The interviewees from the successful group also frequently used advice from external consultants to guide them through the process of CBM implementation.

"Help could also be in the form of guidance. In the CIRCO track, it was clear that all of the companies really enjoyed having someone to guide them through the process."

- Thirza Monster, expert

B: Setting too complex goals
Using the archetype CBMs (Bocken et al., 2016), some of the aspiring companies created very ambitious and challenging goals during the CIRCO workshop. Van Oord and IHC for example, wanted to start a performance business model for pay-per-use dredging. Realising this CBM would require intense and long-term collaboration from both parties. As a result, the project seemed very daunting and was hard to sell to top management (Geissdoerfer et al., 2017; Schaltegger et al., 2011; Teece, 2010).

"Start with something that fits well with existing strategic goals of the company like reducing product and portfolio complexity or improving customer retention."

- Pieter van Os, expert

SF: Starting small and scaling up later
Although large changes to business models might be necessary to fully realise a circular economy, it doesn't mean that companies cannot start small and scale up their activities after proving successful (Chesbrough, 2010). Heerema for example, decided to set a realistic, yet impactful short-term goal during the CIRCO workshop. They developed a modular, reusable rigging and grillage to transport oil platforms, which could save tens of millions in material use compared to the custom-built disposable installations they use today. It was only a small adjustment to their business model, but an impactful one. Above all, the project was realistic enough to be realised in one year.

"The best approach will be to start small with a simple ship and explore the possibilities"

- Rijksrederij, aspirational

Journey map

A journey map was created to structure the insights from the interview study in chronological order. It was structured into several layers: phases, activities, barriers, success factors and opportunities. The journey map is descriptive of the CBM implementation process that was described by the interviewees. It describes what steps companies take, what the barriers and success factors along the way inhibit and enable this process and what opportunities exist for Sustainable Minds to facilitate this process.

The journey map consists of 7 phases with in total 13 activities. The journey as a whole is cyclical and iterative, which means the process can be repeated. Each activity corresponds with a barrier, success factor and opportunity. The 7 phases are: prepare, convince, integrate, collaborate, design, implement and scale. Integrate and collaborate are optional phases and are applicable in CBM implementation projects with a large scale, long-term or collaborative character. This is a result from two of the general insights mentioned above: that some of the participants from the aspirational group tended to make the CBM too complex and difficult, although they could also start small and scale up later. In a smaller scale project, collaboration with value chain partners, customers and governments as well as company-wide integration of a circular mindset might not be necessary. This means the integration and collaboration phases can be skipped. For example in the Heerema case, the company was able to greatly reduce resource use by reusing their products, this project didn't require any collaboration with external parties to be realised.

Scope

B: Making the CBM too radical
Making this goal too radical might result in a CBM that doesn't fit the company strategy. This means it will be difficult to convince management later on to invest in the project (Geissdoerfer et al., 2017; Schaltegger et al., 2011; Teece, 2010).

"Start with something that fits well with existing strategic goals of the company like reducing product and portfolio complexity or improving customer retention."

- Pieter van Os, expert

SF: Starting small is easier
Starting small and scaling up later on is a safe strategy to guarantee success (Chesbrough, 2010; Geissdoerfer et al., 2017; Mentink, 2014).

"The best approach will be to start small with a simple ship."

- Rijksrederij, aspirational

O: Help set ambitious yet realistic goals
Sustainable Minds could help set an ambitious yet realistic goal (Bocken et al., 2016; Mendoza et al., 2017).

"A big transition is needed to become circular, consulting can help approach this transition."

- Douwe Jan Joustra, expert

Convince

B: Getting lost in the daily hassle
Company managers could get lost in the daily hassle, without time and resources to develop this business case.

"It's not that they don't want to or can't become more circular, but it's easy to get lost in the daily hassle."

- Thirza Monster, expert

SF: Having an ambassador for the CBM
An ambassador who is intrinsically motivated, and who pushes the project forward helps to make it a success (Chesbrough, 2010; Geissdoerfer et al., 2017; Mentink, 2014).

"The board shouldn't be difficult to convince, they have already expressed their interest in this topic."

- Van Oord, aspirational

O: Make it as easy as possible
Sustainable Minds could make the process as easy as possible, lowering the threshold to develop a solid business case that will convince the board.

"The most important barrier preventing successful implementation is the fact that the issue of non-sustainability and the opportunity and importance of CE is not really felt by organisations."

- Douwe Jan Joustra, expert

B: Non-believing board and stakeholders
A non-believing board and other stakeholders could also be a barrier in this phase (Chesbrough, 2010; Geissdoerfer et al., 2017; Mentink, 2014).

"Most people actively work against sustainability. There is a lot of disbelief and scepticism, people think a focus on sustainability will lead to lower competitiveness and higher costs"

- Heerema, aspirational

SF: Speaking the right language
Speaking the right language to is a success factor to convince the board. CE has the potential to benefit a company in many ways, but what arguments will trigger different employees to be interested in the topic? (Hart & Milstein, 2003; Porter & Kramer, 2011).

"It wasn't easy to convince people, it's all about knowing what language to speak"

- Interface, successful

CBM implementation journey map

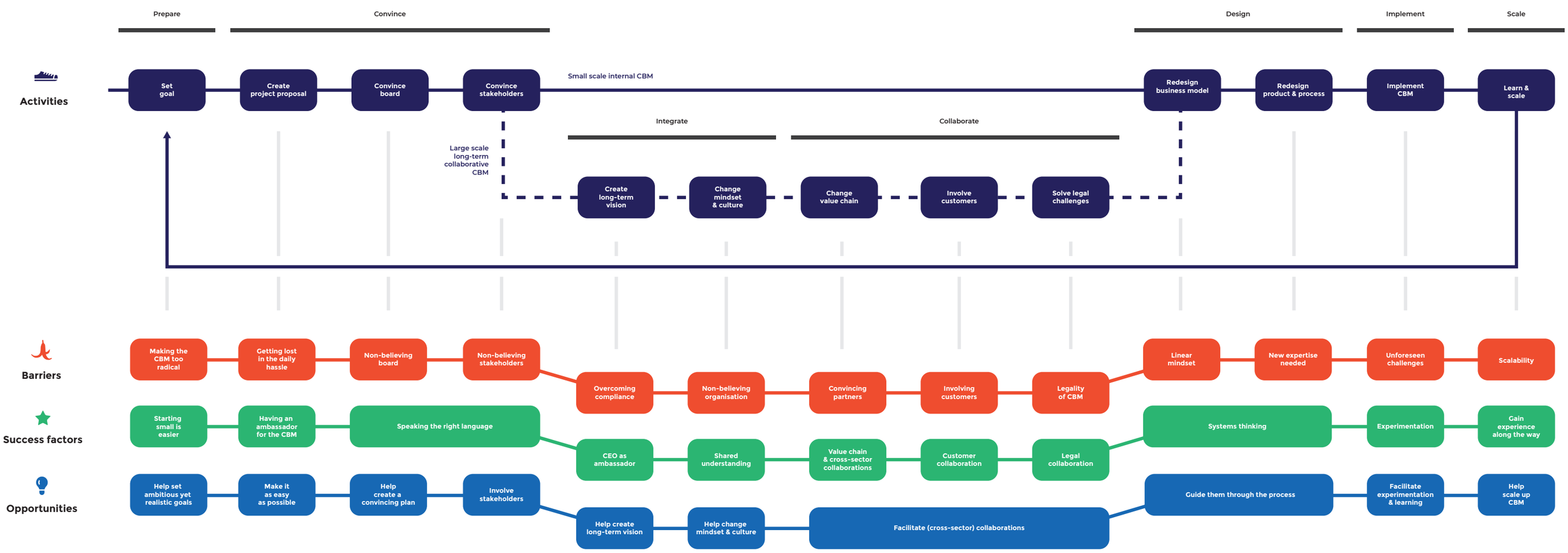


Image 14: CBM implementation journey map

O: Help create a convincing plan
An opportunity exists to help create a solid plan to convince the board and to involve other influential stakeholders in the process.

"The biggest challenge will be convincing people throughout the entire company that this is a promising innovation, but if we can present a solid business case, the board should be easy to convince."

- Van Oord, aspirational

Integrate

B: Overcoming compliance
Compliance with existing laws and regulations can be a barrier to create an ambitious CE vision (Chesbrough, 2010; Bettis & Prahalad, 1995).

"Existing laws and regulations can be a mental barrier to create a CE vision"

- Thirza Monster, expert

SF: CEO as ambassador
Having the CEO as ambassador will greatly help. A long-term vision from the CEO will be needed to guide a large scale project.

"Our CEO created our 'Mission Zero' statement, the goal of achieving an environmental footprint of zero with closed loop manufacturing and to contribute positively to ourselves as a company and to society by 2020. Of course, this meant the entire company had to change the way it did business"

- Interface, successful

O: Help create long-term vision
Sustainable Minds could help create a long-term vision that will guide the company for the years ahead.

"Consulting could be in the form of a Why/How/What workshop to rethink the company vision."

Douwe Jan Joustra, expert

B: Non-believing organisation
A non-believing organisation is a barrier to integrate the CBM in company culture (Chesbrough, 2010; Coghlan, 1993; Lieder & Rashid, 2016; Mentink, 2014).

"Companies can set goals, but if employees don't believe in those goals, they won't be achieved. This counts for circular economy as much as anything else"

- Thirza Monster, expert

SF: Shared understanding
Shared understanding between employees is a success factor to integrate CE throughout the organisation and create a company vision that every employee believes in.

"The only way to transform an organisation successfully is when everyone believes in the new way it is set up. This means people from different organisational layers have to be brought together to think about the new organisation and its new activities"

- Douwe Jan Joustra, expert

O: Help change mindset and culture
Consultancy can help facilitate this process from a neutral standpoint.

"Consulting can be in the form of teaching CE, raising awareness and understanding."

- Thirza Monster, expert

Collaborate

B: Convincing partners
In some cases, value chain partners might become obsolete or new partners will arise. Convincing partners to join in on the CBM might be a challenge (Kraaijenhagen et al., 2016; Mentink, 2014).

"We also had to say goodbye to suppliers that were not willing to help us in our ambition, this took a lot of guts."

- Van Houtum, successful

SF: Value chain and cross-sector collaboration
If the CBM involves other companies in the value chain, these will have to be involved in the CBM implementation process. Hence, the need for value chain collaboration (Kraaijenhagen et al., 2016; Roos, 2014).

"Cross-sector collaboration can be a key success factor but can be a challenge as well, since many companies have a restricted view on their business and value chain."

- Thirza Monster, expert

B: Involving customers
A company might not have experience in customer contact. This is why involving customers could be a barrier.

"An air conditioning company had no idea how its products actually performed for their customers, so it decided to start contacting them. However, its employees had no knowledge or experience in customer service and had to be trained."

- Pieter van Os, expert

SF: Customer collaboration
Customer involvement will improve the BM if changes to the value proposition are made or new customers are addressed (Planing, 2015; Teece, 2010).

"Although customer involvement was only a small process change, it lead to a lot of knowledge about its products, better customer satisfaction and opportunities for innovation."

- Pieter van Os, expert

B: Legality of the CBM
The CBM can also result in legal challenges. Existing laws and regulations might not be suited for the new CBM (Mentink, 2014).

"Regulations can be difficult. Many regulations changed over time, most regulations got tougher to pass. This means refurbishment and remanufacturing is not always possible."

- Exotech, successful

SF: Legal collaboration
Collaboration with governments will be necessary to change these laws and regulations.

"I open up a discussion and usually reach an agreement, as long as I can prove my products are safe enough. This can be difficult, since there are different demands for new and remanufactured products and there is a grey area into which category my products fall."

- Exotech, successful

O: Facilitate (cross-sector) collaborations
Sustainable Minds can help set-up collaborations with value chain partners, customers and governments.

"Consultancy could also be in the form of helping set up cross-sector collaborations."

- Interface, successful

Design

B: Linear mindset
Linear economy logic has to be overcome. Employees might be stuck in linear logic, this could prevent the successful design of the CBM and product (Mentink, 2014).

"It is difficult for them to imagine how a different business model would translate into their organisation. After all, a new business model has an enormous organisational impact, so how should they do it?"

- Douwe Jan Joustra, expert

B: New expertise needed
New processes have to be designed if the CBM results in new activities. This might require special expertise that is not yet available.

"Optimising products and processes was difficult but not annoying."

- Van Houtum, successful

SF: Systems thinking
Systems thinking is key to overcome linear logic (Evans et al., 2017; Kirchherr, 2017; Meadows et al., 1972; Senge, 2008). Systems thinking creates an overview of the entire system, which means it helps to make the impact of the company on the value chain clear.

"Systems thinking? Yes! Very important to realise a change in business model. This is the core of CE."

- Douwe Jan Joustra, expert

O: Guide them through the process
Consultancy can help this phase by guiding the design process.

"The big added value of consulting is to have someone to guide you through the process."

- Thirza Monster, expert

Implement

B: Unforeseen challenges
Uncertainty can be high and unforeseen challenges may arise. If the unforeseen challenges are big, they could be a barrier for continuing implementation.

"We will definitely encounter problems, but these can be solved along the way"

- Rijksrederij, aspirational

SF: Experimentation
Experimentation is key to make it a success. Testing assumptions early, working iteratively and reducing uncertainty and risk as quick as possible (Chesbrough, 2010; Evans et al., 2017; Geissdoerfer et al., 2017; McGrath, 2010; Schuit et al., 2017).

"We should just go for it and experiment with our ship manufacturers."

- Rijksrederij, aspirational

O: Facilitate experimentation and learning
Consultancy can help structure and facilitate this experimentation, make sure the organisation learns from it and guide the project to a successful finish.

"Experimentation is important because often, the outcome of circular business propositions is unknown at the start. So either way you just go for it and improvise as you go along, or try to think through every possible scenario. Consulting could play a role in this, helping companies to manage their circular pilots"

- Pieter van Os, expert

Scale

B: Scalability
Scalability might be an issue if the CBM is not designed to be scaled.

"Experimentation is important, but it should lead to a parallel business that is scalable."

- Douwe Jan Joustra, expert

SF: Gain experience along the way
Gaining experience and learning along the way is a key success factor. Continuous improvement is necessary to keep adapting the CBM (Geissdoerfer et al., 2017; Teece, 2010).

"Companies are highly interested in taking small steps."

- Pieter van Os, expert

O: Help scale up CBM
Helping improve and scale up the CBM could also be an opportunity for Sustainable Minds.

"After a first experiment has proven successful, it will be easier and less risky to apply a similar design to the rest of the fleet"

- Rijksrederij, aspirational

Relevant success factors during the process

A set of success factors was found in the literature review and interview study which contribute to successful CBM implementation. However, the journey map shows that the different success factors vary in relevance during the CBM implementation process. Below, the most relevant success factors during each phase of the circular implementation framework are shown.

Experimentation is relevant in the scope, implement and scale phases. During the scope phase it is expressed in the approach of scoping the CBMI project to start small and scale up later. During the implement and scale phases it is expressed in booking initial success on a small scale, learning along the way and then scaling up. Intrinsic, top-down motivation is relevant in the convince and integrate phases. During both phases it is expressed in having an ambassador in the boardroom for the project. For example: a board member that has already expressed interest in the topic, or a CEO who is determined to create a circular vision for his company. Translation is relevant during the convince phase. It is expressed through speaking the right language to trigger people throughout the organisation. Bottom-up motivation is relevant in the integrate phase. It is expressed through raising awareness of the CE throughout the organisation and creating shared understanding between employees. Collaboration is relevant during the collaborate phase. It is expressed through setting up (cross-sector) collaborations with companies, customers and legal entities. Systems innovation is relevant during the design phase. It is expressed through shifting from a linear to circular mindset when redesigning the business model, product and business processes.

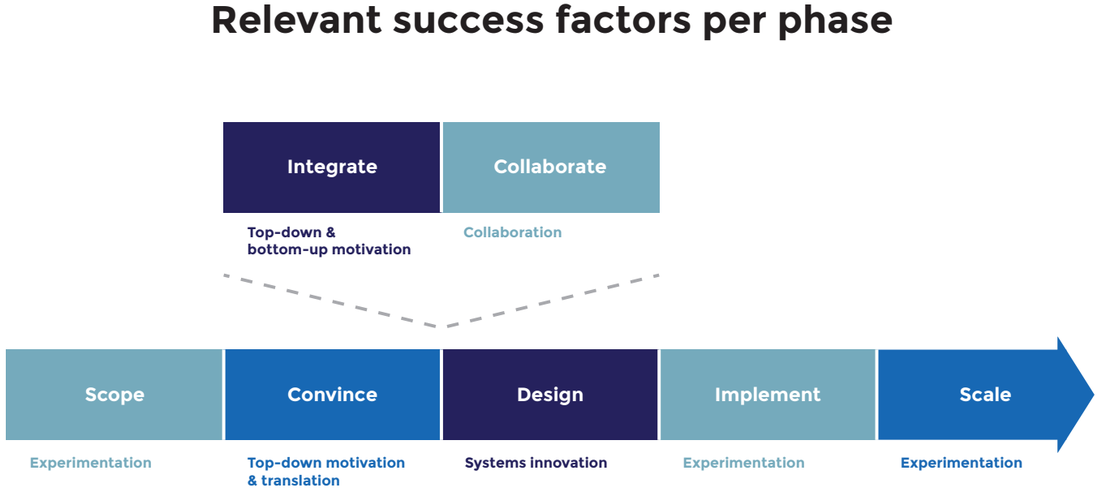


Image 15: Relevant success factors per phase of the journey.

5

Synthesis

5. Synthesis

This chapter describes the key insights that were found in the exploratory research, and how those insights were translated into an implementation strategy and framework for Sustainable Minds. A set of design guidelines is also formulated, along with a design goal and design challenge.

5.1. Key insights

The SM team has a strong business education background, but no design skills.
All of the Sustainable Minds team members have a business education background. This gives them the perspective to translate circular economy theory to daily business practice. However, it also makes their perspective and skill set undiversified. This could be a weakness if it reduces their ability to keep a fresh perspective. It also means the team members have a limited knowledge and skill level related to the design phase of the CBMI process.

Limited CE knowledge and experience
The SM team members have gained experience in project management and implementation from previous CM projects, but they also have little theoretical and practical expertise of CE and little overall work experience. The SM team members have self-assessed their CE expertise an average of 2.5 out of 5. This could be a weakness of the team and both their theoretical and practical knowledge of CE could be improved. Three out of the four team members also have only one year of experience in consulting at CM. This could result in a lack of practical understanding as well as a lack of credibility when convincing clients.

Empty, but easy to enter market
No competitors were found, but they could easily enter the implementation market. The circular economy forms a large potential and an increasing market in the future, with a potential annual impact of €7.3 billion. The industrial manufacturing industry is also a substantial and growing sector in the Netherlands and CE is gaining attention among industrial companies. No competitors exist that focus on the market of CBM implementation consultancy, especially in the industrial manufacturing sector. However, CE consultancy companies or CBMI consultancy companies can easily enter into the implementation market as well. There is little to prevent them from doing so, especially considering the increasing potential of the CE.

The SM service is still in development
The Sustainable Minds consultancy service is still in development. The market team is still in the start-up phase and their exact benefit is still unclear. Also, all of the Sustainable Minds team members are still active on existing CM projects. This means they have limited time available to invest in Sustainable Minds. This could become a practical barrier.

Changing mindset and convincing is the biggest barrier
Most barriers were related to organisation, mindset, knowledge, customers and partners (46 mentions). This provided evidence that the 'softer', human and social aspects of CBM implementation process were considered important by the interviewees, compared to 'harder' barriers like developing new technologies or calculating new revenue models. Convincing top management to invest in the CBMI project is necessary in the first steps of crossing the design-implementation gap.

"Most people actively work against sustainability. There is a lot of disbelief and scepticism, people think a focus on sustainability will lead to lower competitiveness and higher costs"

- Heerema, aspirational

Shared intrinsic motivation through translating benefits
Shared, intrinsic motivation is the biggest success factor when crossing the design-implementation gap and the ability to translate one language to another and communicate the right benefits is a way to achieve it.

"Convincing people about sustainability is about knowing what language to speak."

- Interface, successful

It starts with setting the right goal
CBMs that did not align with company objectives were not implemented. This is why the process starts with setting the right goal. A goal that is ambitious yet realistic, this is key to make implementation a success (Geissdoerfer et al., 2017; Schaltegger et al., 2011; Teece, 2010).

"Start with something that fits well with existing strategic goals of the company like reducing product and portfolio complexity or improving customer retention."

- Pieter van Os, expert

Starting small and scaling up later
Although large changes to business models might be necessary to fully realise a circular economy, it doesn't mean that companies cannot start small and scale up their activities after proving successful (Chesbrough, 2010; Geissdoerfer et al., 2017; Mentink, 2014). This is how experimentation plays a role in the scope, implement and scale phases.

"The best approach will be to start small with a simple ship and explore the possibilities"

- Rijksrederij, aspirational

5.2. Implementation strategy & framework

The key insights from the internal analysis, external analysis and interview study provided insight into the process of CBM implementation, phases, activities, barriers, success factors and opportunities. These insights were combined to create a CBM implementation strategy and framework for Sustainable Minds. This strategy and framework describe the CBMI implementation process. They can be used by Sustainable Minds to structure their CBM implementation consultancy service. It can help Sustainable Minds to guide companies towards implementation and provide guidance through the necessary steps to start implementing a CBM.

Implementation strategy

The implementation strategy describes the approach that Sustainable Minds will take to help their clients bridge the gap between design and implementation in the circular business model innovation process.

The key insights explain that the main barriers to cross the design-implementation gap are related to the softer, human side. Changing mindsets from linear to circular is the single biggest barrier. In line with this, important success factors are related to creating intrinsic motivation by translating the benefits of the CBM to the right language. Finally, the scope and goal of a CBM project has to be aligned with business objectives. It is easy to make a CBM too ambitious and complex, starting small and scaling up later is a safe way to guarantee success and a way for CE business logic to prove itself.

The advised strategy for Sustainable Minds to help their clients bridge the design-implementation gap is to break up the shift from a linear to a circular business model into smaller steps. Each step can be a CBMI project, starting small and scaling up later. This way, the strategy is iterative by nature, featuring a series of projects. However, each project follows roughly the same structure, which is explained in the implementation framework. This way, Sustainable Minds and their clients can address unexpected challenges and opportunities, minimise risk and scale up later (Geissdoerfer et al., 2017).

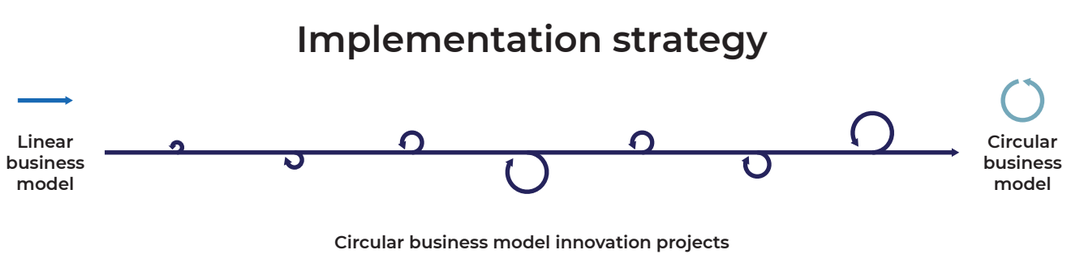


Image 16: The Sustainable Minds circular implementation strategy.

Implementation framework

The implementation framework describes the steps and phases that Sustainable Minds will go through in a CBM implementation project. It is based on the steps and phases that were identified in the interview study. The phases are: scope, convince, integrate, collaborate, design, implement and scale. Integrate and collaborate are optional phases, which are only relevant in larger scale projects.
The nature of the implementation framework is cyclical and flexible. It can be repeated several times, slowly increasing the scope and scale of the CBM that is being implemented. Steps can be added in or left out, for no one-size fits-all solution exists to describe the CBMI process (Mendoza et al., 2017).

Scope

In this phase an ambitious yet realistic goal for the project is set that fits the company strategy. Making the CBM too radical can be a barrier and starting small is a success factor. Sustainable Minds could help set an ambitious yet realistic goal.

"A big transition is needed to become circular, consulting can help approach this transition."

- Douwe Jan Joustra, expert

Convince

Convince consists of 3 activities: Creating a project proposal for the CBMI project, convincing the board and convincing other stakeholders. To convince the board, a strong business case has to be developed. However, it can be a lot of work and it is easy for companies to get lost in the daily hassle. Having an ambassador for the CBM is a success factor. Sustainable Minds could help in this step by making it as easy as possible for the company to develop the business case. When trying to convince the board and other stakeholders, a linear mindset can prevent them from believing in the CBM. Translating the CBM to a language they understand is key to convince them. Sustainable Minds could help to create a convincing project plan and by involving relevant stakeholders in the process.

"It wasn't easy to convince people, it's all about knowing what language to speak"

- Interface, successful

Integrate

Integrate is an optional phase, relevant in a large scale project. It consists of 2 activities: creating a long-term vision and changing mindset and culture. When creating a long-term vision, compliance with existing laws and regulations can be a barrier for ambition. However, having the CEO as ambassador can be a success factor. Sustainable Minds could help create this vision. When changing the mindsets and culture of a company, a non-believing organisation that is stuck in a linear mindset can be a barrier. Shared understanding is key to make it a success. Sustainable Minds could help change these mindsets and company culture.

"Consulting can be in the form of teaching CE, raising awareness and understanding."

- Thirza Monster, expert

Collaborate

Collaborate also is an optional phase and consists of 3 activities: Changing the value chain, involving customers and solving legal challenges. First, when changing the value chain, convincing partners can be a barrier. Value chain and cross-sector collaborations are a success factor. Second, when involving customers, the very activity of involving customers can be a barrier. Companies can be inexperienced in customer contact, or customers might have to be convinced. However, collaborating with customers is a way to make it a success. Third, when solving legal challenges, existing laws and regulations can inhibit the legality of the CBM and can be a barrier. Collaborating with legal entities is necessary to achieve success. Sustainable Minds could facilitate collaborations between companies, customers, legal organisations and governments.

"Consultancy could also be in the form of helping set up cross-sector collaborations."

- Interface, successful

Design

Design consists of 2 activities: Redesigning the business model and redesigning products and processes. The business model and product design might need further development, but also company processes might have to be redesigned to facilitate new activities. When redesigning the business model, a linear mindset has to be overcome. When redesigning products and processes, new expertise might be needed. These topics can be barriers. Systems thinking is essential to make the design phase a success. Sustainable Minds can guide companies through the design process.

"The big added value of consulting is to have someone to guide you through the process."

- Thirza Monster, expert

Implement

In this phase the CBM is realised and put into practice. However, unforeseen challenges may arise, these can inhibit successful implementation. This is why experimentation is necessary. Sustainable Minds could help facilitate this experimentation and make sure the organisation learns from it.

"Experimentation is important because often, the outcome of circular business propositions is unknown at the start. So either way you just go for it and improvise as you go along, or try to think through every possible scenario. Consulting could play a role in this, helping companies to manage their circular pilots"

- Pieter van Os, expert

Scale

In this phase the CBM has been implemented, but some parts of it might still have to be adjusted. The scalability of the CBM might be a barrier, and gaining experience along the way is a success factor. Sustainable Minds could be involved by helping to scale up the CBM.

"Experimentation is important, but it should lead to a parallel business that is scalable."

- Douwe Jan Joustra, expert

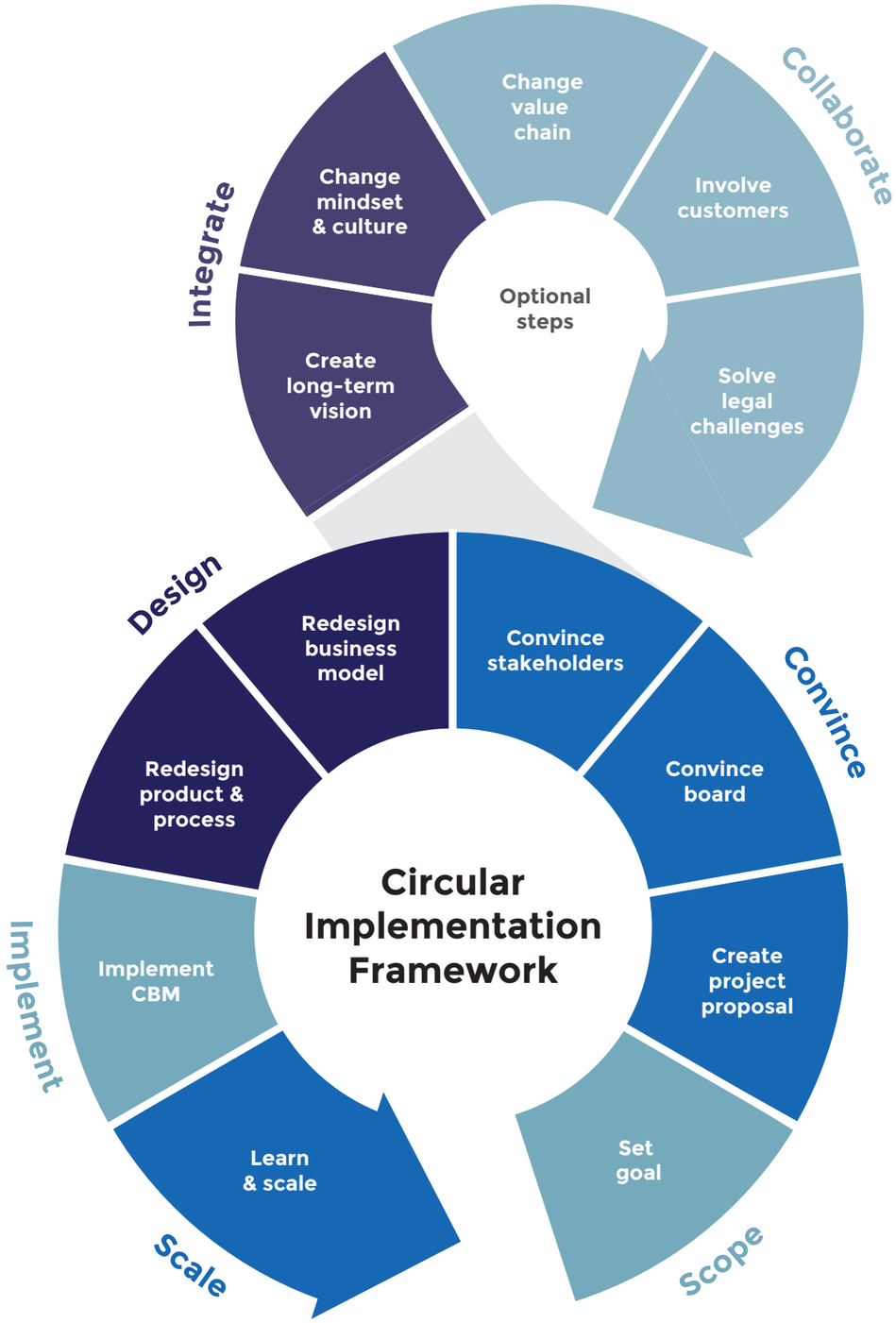


Image 17: The Sustainable Minds circular implementation framework

5.3. Design guidelines

The key insights from the exploratory research were translated into a set of design guidelines. First, a set of general guidelines are described. Second, more specific guidelines are described that specify the goal that the design should fulfil. Third, a design challenge is introduced to frame the scope of the design phase.

General guidelines

In order for the design to be usable by Sustainable Minds it should adhere to the following guidelines. The guidelines were mainly based on the internal analysis of Sustainable Minds.

Easy to understand and intuitive to use
The design should be easy to understand by both the Sustainable Minds team and their clients. The Sustainable Minds team members and their clients have limited knowledge of CE, so the design should be accessible to all. It should not be too time consuming, but quick and efficient. Clients can get lost in the daily hassle, so the design should make the CBMI implementation process as easy as possible. The design should be intuitive to use by the SM team and their clients. It should guide the user through the CBM implementation process to ensure the design-implementation gap can be crossed.

Practically applicable
The design should be practically applicable to the implementation projects that Sustainable Minds will perform. This means it should resonate with the needs of their clients during the CBMI implementation process. For example, the design could help relieve barriers or increase success factors.

No design skills required
Sustainable Minds has no design knowledge in-house. This is why the design should not require any design knowledge or skill, but be usable by someone with a business education or background. This also increases the usability by SM's clients.

Low-budget, quick to implement
Given the limited budget of the SM team and the startup phase they are in, the team requires a solution that is low-budget and quick to implement. Sustainable Minds cannot afford to invest a large amount of money into a long-term solution, because they need to get their consultancy service up and running.

Design goal

To prioritise and choose a focus for the design phase, the key insights were used to develop a design goal. Potential clients of Sustainable Minds are located at the start of the CBM implementation process. The companies that participated in the CIRCO track for example, have analysed their value chain, found opportunities and developed an idea for a new CBM. However, this is where the CIRCO proposition ends. They return into their organisation and their daily hassle, and the CBM is hardly ever followed-up with and implemented. With other potential clients, SM will have performed a quick scan to find CBMI opportunities. In this case, these opportunities also have to be converted into a convincing CBMI project proposal that is ambitious yet realistic. This makes the first 2 phases and 4 activities of the circular implementation framework most relevant to focus on at this time.

Sustainable Minds can play a valuable role in this. The SM team has a business education background and experience in project management, their expertise could be used to help their clients create a strong, convincing business case and circular project plan. Moreover, the core strengths of Sustainable Minds lie in who they are as a team. Their social skills and unique characteristics can be a valuable asset, especially since the majority of CBM implementation barriers mentioned were related to human and social aspects. Especially during the first steps of the implementation framework, their social skills can be an important success factor to help their clients convince top management. Concluding, the following steps of the framework will be addressed during the design phase:

1. Set goal
The first step in the process is to set an ambitious but realistic goal for the project. Help the client to avoid a too radical proposition by aligning the project with existing business objectives and project requirements. This will make the project more interesting to top management, which will increase the ease of convincing them and increase the potential of successful implementation. After a successful finish, the CBMI project could always be scaled up or expanded to other parts of the organisation.

2. Create project proposal
Second, a strong project proposal and business case will be needed to convince the board of the client company. To prevent the client from getting lost in their daily hassle and not following up with the CBM, helping them in the development of this project proposal could ensure a follow-up. Creating insight into the different kinds of value creation for the company and its stakeholders will result in different benefits. The right benefits can then be selected to create the business case.

Design challenge

The following design challenge was developed to phrase the scope for the design phase of this graduation project in line with the abovementioned focus.

"Design a method and tool for Sustainable Minds to support industrial companies in bridging the circular design-implementation gap by helping them turn a set of circular opportunities into an actionable project proposal."

6

Design approach

6. Design approach

This chapter explains the approach that was taken during the design phase of this graduation project. It gives an overview of the design process that was performed to reach the final design. It discusses the two creative sessions that were organised and a series of 7 design sprints that were performed to iteratively design the final result.

6.1. Design process

The process during the design phase of this graduation project was structured using diverging and converging activities as well as iterative loops. The research insights, design guidelines and design challenge were used as input for 2 creative sessions, one with a group of design students and one with the Sustainable Minds team. The results from the creative sessions were then iterated in 7 sprints, taking inspiration from the Welzorg implementation project in parallel. This resulted in the final design: the Circular Rollout method, workshop and toolkit.

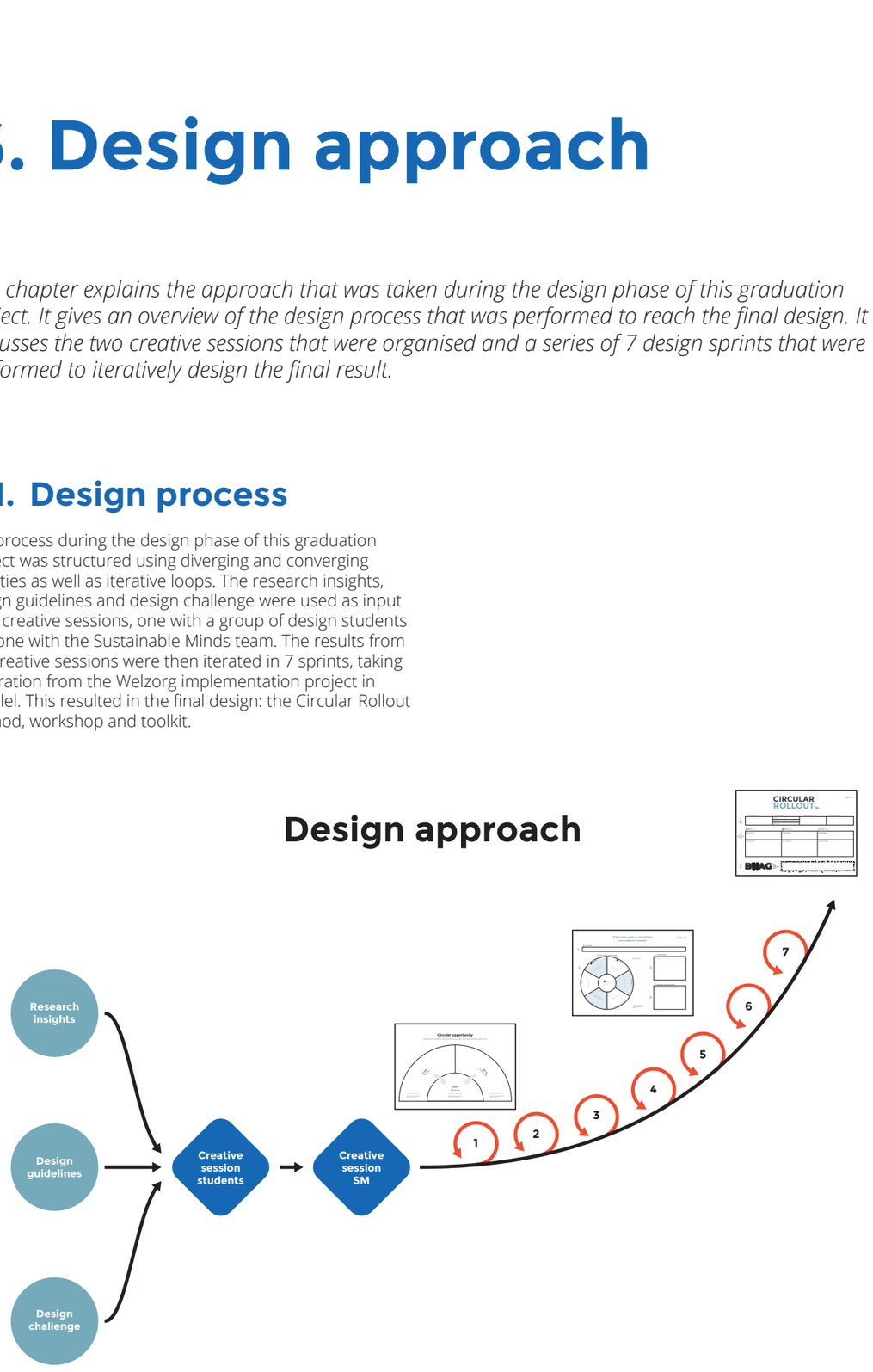


Image 18: Design approach.

6.2. Creative sessions

Creative session with Design students

A creative session was organised with a group of design students to explore potential conceptual solutions to the design challenge and to gain a fresh perspective. The aim of the session was to 'diverge' the thinking process of the design phase and broaden the perspective of possible solutions into unexplored territory.

Participants

A group of 6 master students from the Industrial Design Engineering faculty joined the creative session as participant group. The group was made up of 3 students from the Integrated Product Design master and 3 students from the Strategic Product Design master. This allowed the group to be split up in 3 teams of 2 students during the process, with a member from each master in each team.

Procedure

The creative session was organised on a Monday evening from 20:00 - 22:00 at the IDE faculty. The session lasted 2 hours and the session plan is described below. The participant group was first introduced to the topic of circular economy. Next, the problem was explained: Participants of the CIRCO workshops often do not implement their CBMs. The following design challenge was then introduced to the participants: "How to convince management of an industrial manufacturing company to assign resources to a CBMI project?" The target group was presented using photos of actual CIRCO participants. After answering questions from the group, the session was kicked off with an energizer to get the creative juices flowing.

Starting the actual session, the participant group was first asked to purge their initial ideas into an 'idea bank'. This allowed them to empty their mind and prevented any biases from inhibiting their creative process. The ideas in the idea bank could still be used later on as inspiration. Next, three 'creative diamonds' or consecutive sets of diverging, clustering and converging activities were performed to explore different solutions, cluster these solutions to create better understanding of the similarities and relations among them and select the most promising solutions. After each diamond, the 'solution space' became more specific and thus went from ambiguous ideas to presentable concepts.

During the first diamond, the participant group was asked to brainstorm on H2s, related to the original problem statement. H2s are 'How to ...' questions, used to (re)frame the problem. This way, various sub-problems were be explored. After a satisfactory amount of H2s were generated, the group was asked to cluster the H2s into themes. To finish the first diamond, the group was asked to select the 6 most promising H2s. These were used to continue into the second diamond.

After a quick break, the second diamond was started. To diverge, a 653 brainwriting exercise was used. In this exercise, each group member is given an A3 sheet of paper and is asked to write one of the 6 H2s on top. Next, the group sits down and is asked to write down at least 5 solutions to their H2 question during 3 minutes. After the three minutes, the sheets are rotated. After rotating 6 times in 18 minutes, at least 6*5*3=90 solutions are generated. Next, the group is again asked to cluster the solutions and choose 3 of the most promising ones. To select solutions, each team member was given 6 Dots, small coloured stickers to stick on the most promising solutions. 3 solutions with most votes were used to continue into the third diamond, the team was allowed to merge and combine related solutions.

During the last diamond, the group was split up into 3 teams of 2 students. Each team consisted of 1 IPD member and 1 SPD member and each team was given one of the three concepts. The teams were asked to develop their concept in more detail and create a presentable poster. The session was ended with a round of presentations where each team presented their final concept.

Session plan

- Introduction: CE, problem statement & design challenge
- Energizer: Crazy Frog – Axel F
- Purge: Initial ideas

1. Diamond 1: Problem finding
- Brainstorm related H2s
- Clustering
- Selecting 6 H2s

2. Diamond 2: Solution finding
- 653 Brainwriting: 6 people write at least 5 ideas per person, rotate every 3 minutes.
- Clustering
- Hits & Dots: Selecting 3 concepts

3. Diamond 3: Concept design
- Split up the group in 3 teams of 2 participants (1 SPD & 1 IPD)
- Develop concept into a presentable poster
- Present final results

Insights

The creative session resulted in various insights, which appeared to the participants during the process. These insights are described below.

Change manager mindset
The linear economy mindset is the most important barrier preventing CBMI implementation. This is why changing the mindset of managers themselves is an important focus point. If managers of industrial companies are to convince their superiors and other employees of the importance of CE, they themselves must first believe in it.

Make CE tangible to managers
The circular economy is an abstract concept. This can make it difficult to grasp and understand to managers of industrial manufacturing companies. They might have difficulties to translate the CE theory to their business environment. This is why making CE tangible is an interesting strategy to change their mindset from a linear to circular one.

Make the urgency of CE visible
Being stuck in a linear mindset is an important barrier preventing implementation. One of the issues that was identified in the creative session is related to the sense of urgence of CE. Compliance with existing laws and regulations can be an inhibitor for ambition, so the problem and risk of continuing the status quo might not be clear to managers. Making the problem and risk of the linear business model and the urgency of CE visible in some way might help to increase this sense of urgency.

Make CE function in 1 day
The benefits of CE or of a CBM might be difficult to grasp and understand. In line with making the CE tangible, making it function in 1 day could be a very impactful way to directly prove the potential of CE and of a CBM. This way, any conceptual doubts that the company might have can be swept away with a proof of concept.

Make it fun, make it a game
The business environment can be a rational and boring one. Turning CE and CBMI into a fun game can be an interesting way to grasp attention and increase enthusiasm amongst industrial managers. It could also release them from a potentially rational, problem oriented mindset into a more creative and solution oriented one.

Final concepts

3 concepts were developed by the participants of the creative session. The final concepts are described below.

From waste to value challenge
This concept is focused on making the CE tangible, making the urgency visible and making the CE function in one day. A big transparent box will be placed in the parking lot of the client company. During the course of one week, company waste will be put inside the box. This way the amount of waste that the company generates becomes visible to all. When the box is completely full, a one day CE challenge will be organised to create value from this waste. Maybe old products that are partially broken can be repaired, refurbished or remanufactured and resold again, or maybe another company is interested in buying a selection of products and materials from this waste stream. This way the value, workings and benefits of CE are made tangible and visible in a quick way.

Industrial CE Tamagotchi game
This concept focuses on making the urgency of CE visible, changing mindsets and making CE a fun and interactive game. It consists of a mobile app which simulates and visualises a company's environmental footprint, very much like an old-fashioned tamagotchi game. SM clients get to install the app and a small pet-version of their company pops up. A few times per day, the managers has to make a decision for their pet-company, in various forms but always between 2 simple choices: Do something in a linear (polluting) way or do something in a circular (clean) way? Their choices directly impact the environment of their pet-company. If linear choices are made, the company earns more direct profit, but the invironment is polluted much more. If circular choices are made, the company earns more long-term profit, and the environment Is saved. This way, the value and impact of CE are made visible and fun.

CE promotion campaign
This concept focuses on changing mindsets, making CE visible and making it fun. A CE promotion campaign is created which consists of short videos in which the impact and urgency of CE is made clear is a funny and visual manner.

Image 19: Creative session with design students.

Creative session with Sustainable Minds

A creative session was organised with the Sustainable Minds team to turn the research insights, design guidelines and creative session insights into a rough layout for the Sustainable Minds circular implementation consultancy service.

The creative session was organised on a Wednesday afternoon at the CM office in Kamerik and it lasted 1 hour. All 4 members of the Sustainable Minds team were present. The goal of the session was to create a rough layout for the design, based on the research insights. The key insights from research were explained to the team and all participants were allowed to ask questions. The team was then introduced to the following design challenge: "Design a method and tool to help industrial manufacturing company managers convince their board and other stakeholders to invest in a CBMI project." The exploratory research insights were used as basis. Ideas were generated using the research insights and creative session with design students insights as inspiration. The most promising ideas were selected and the session was concluded with a rough layout of the design: A consultancy workshop and a tool that guides the user through a series of steps. This layout was used as a first draft to start the design phase of this graduation project.

Over the course of 7 sprints, the layout would be iterated and refined further, so changes were made. View chapter 7 for a detailed description of the final design.

Design layout

1. Set goal

- Determine strategic business objectives
- Determine project demands
- Determine an ambitious yet realistic scope for the project

2. Develop business case

- Value creation
  Select important stakeholders
  Determine how the project creates value for various stakeholders
- Risks and challenges
  Assess BM changes between the CBM and the old BM.
  Assess risks and challenges of the project and minimise them.
- Project evaluation
  Compare various projects: making it smaller, larger and doing nothing..
  Select the project that fits the business objectives and project requirements best
- Calculate business case

3. & 4. Convince board and stakeholders

- Communicate the project in the right language

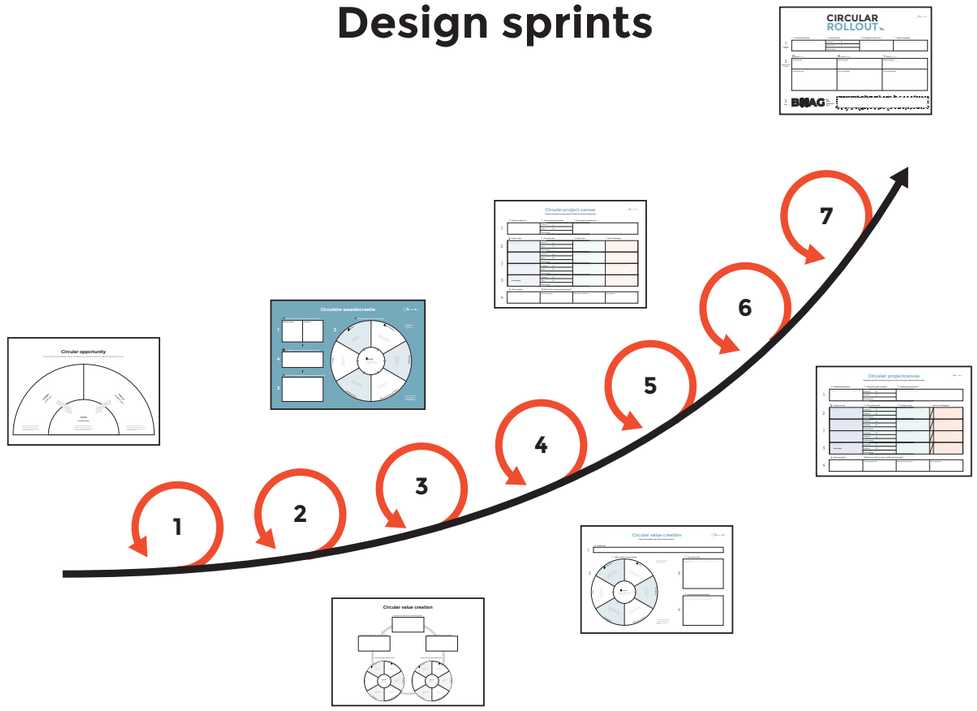


Image 20: Overview of design sprints

6.3. Design sprints

A series of 7 sprints was performed to iteratively design, test and evaluate the workshop and tool. Four sprints were completed in total. Prototypes were developed and tested in each sprint. Stakeholder or client feedback was gathered during each test, this feedback was then used to create the next prototype. An overview of the design sprints with a selected prototype from each sprint is given below, all prototypes are displayed in detail in the appendix.

Iterative loops

The approach that was taken during the design phase borrows elements from the lean startup approach (Ries, 2011). It focuses on running experiments to quickly validate assumptions. This way, uncertainties are reduced quickly and the direction of the design can be steered into an alternate direction if necessary. The following elements from the lean startup approach are used:

- An iterative approach is used following the build, measure and learn loops. The aim is not to build a perfect product at once, but to fail and learn as fast as possible to build a better product eventually. This way, risky assumptions are tested quickly and can the design can be improved.
- The approach is structured in a series of sprints, during which a design is made, tested and evaluated in experiments.
- Time and effort is invested in evaluating the process and thinking not only about doing things right, but also about doing the right things. This eliminates waste and increases the speed at which the product or service can be developed.
- Assumptions are made clear and hypotheses-driven entrepreneurship is the aim, which underlines the act of continuously stating testable hypotheses regarding the product. Feedback from users, purchasers and partners is used to feed the experiments.

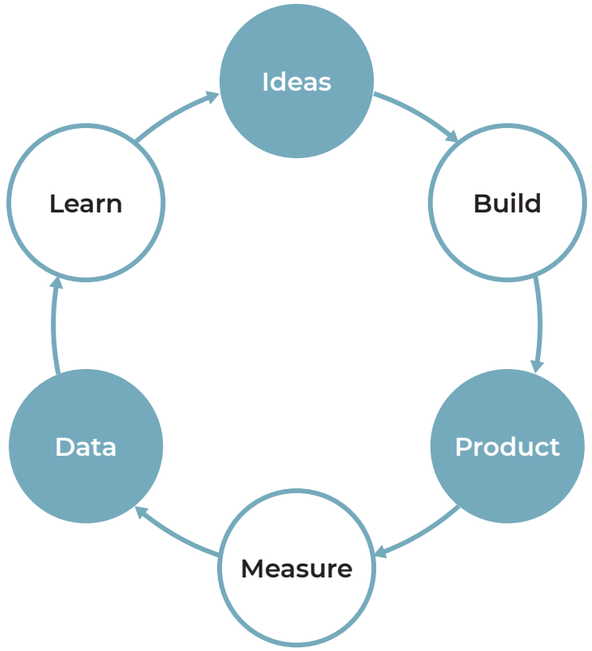


Image 21: Build-measure-learn loop (Ries, 2011)

Experiment boards

Experiment boards were used to document the experiments. They were based on experiment boards from the lean startup approach (Ries, 2011). The boards can be found in the appendix. The following elements are described in an experiment board:

- What is the target group of this experiment, what characteristics describe this group?
- What is the purpose of the experiment? What assumptions does it test?
- What methods will be used in the experiment? What are the tools, questions, steps, metrics and hypotheses?
- What are the results of the experiment? What are the observations, learnings and actions?

Experiment

Customer	
Who am I targeting?	
Relevant characteristics	

Purpose	
What is the purpose of the experiment?	
Most uncertain and crucial assumption	
Sub-assumptions	

Methods	
Tool	
Main questions	
Steps	
(Target) Metric	
Hypotheses	

Results and actions	
Observations	
Learnings	
Actions	

Image 22: Experiment board template

7

Circular Rollout

7. Circular Rollout

Circular Rollout is a consultancy method, workshop and set of tools that helps clients of Sustainable Minds cross the design-implementation gap by turning circular opportunities into an actionable project. This chapter explains this method, workshop and toolkit functions.

7.1. Method

The circular rollout method is a process that can be used by Sustainable Minds to help their clients bridge the gap between design and implementation. A service blueprint was created to further enlighten the positioning of the circular rollout method in the Sustainable Minds service. Note that this is an envisioned blueprint. In the Sustainable Minds service, it can be positioned between the design and implementation phases: after completing a CIRCO track or a quick scan. At the end of a CIRCO track or quick scan, CBM opportunities are presented. The circular rollout method can then be used to turn these opportunities into an actionable project proposal. This will be done during the circular rollout workshop, in which Sustainable Minds uses the circular rollout toolkit to guide their client through the process. Afterwards, the project proposal can be detailed further in a more detailed project description and presentation to convince the client company board and other stakeholders. After the project proposal has been approved, the implementation project can begin.

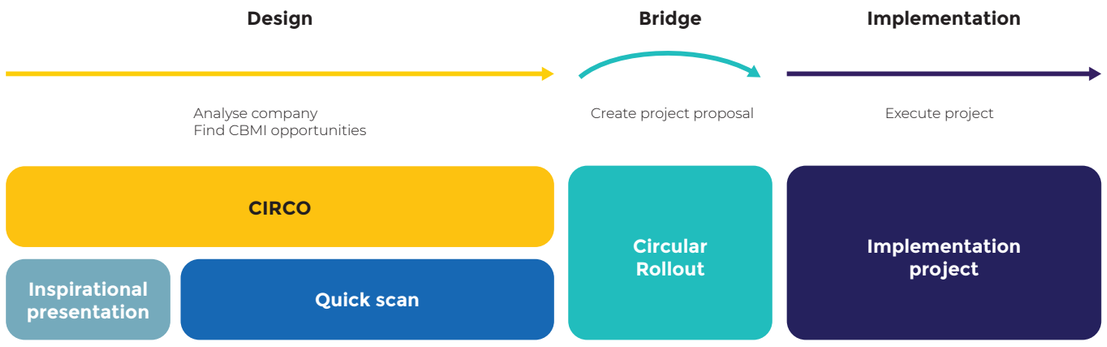


Image 23: The circular project toolkit positioning in the Sustainable Minds service

Sustainable Minds service blueprint

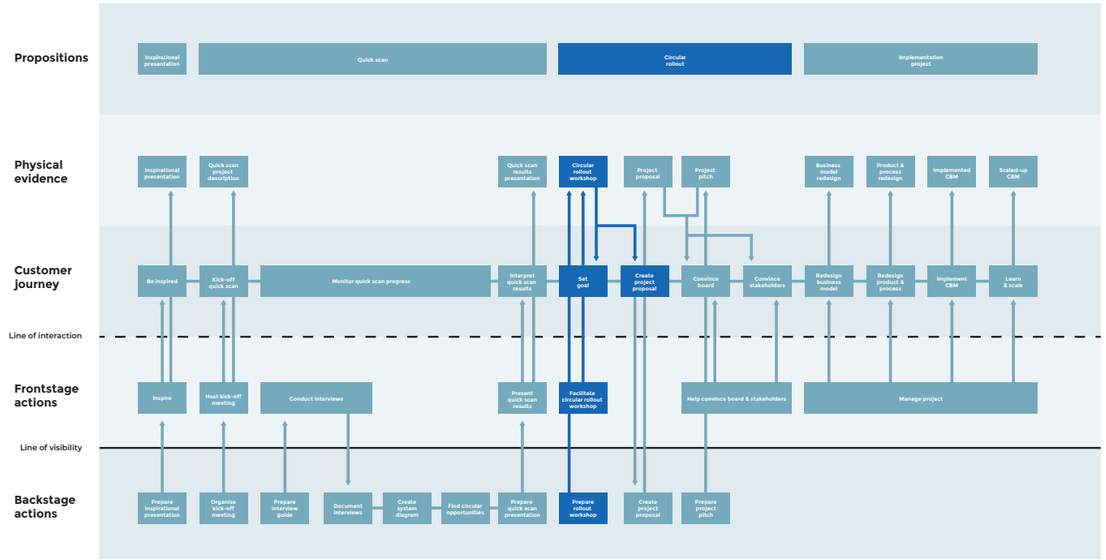


Image 24: The Sustainable Minds service blueprint, circular rollout highlighted in dark blue. View high-resolution version on the next page.

Sustainable Minds service blueprint

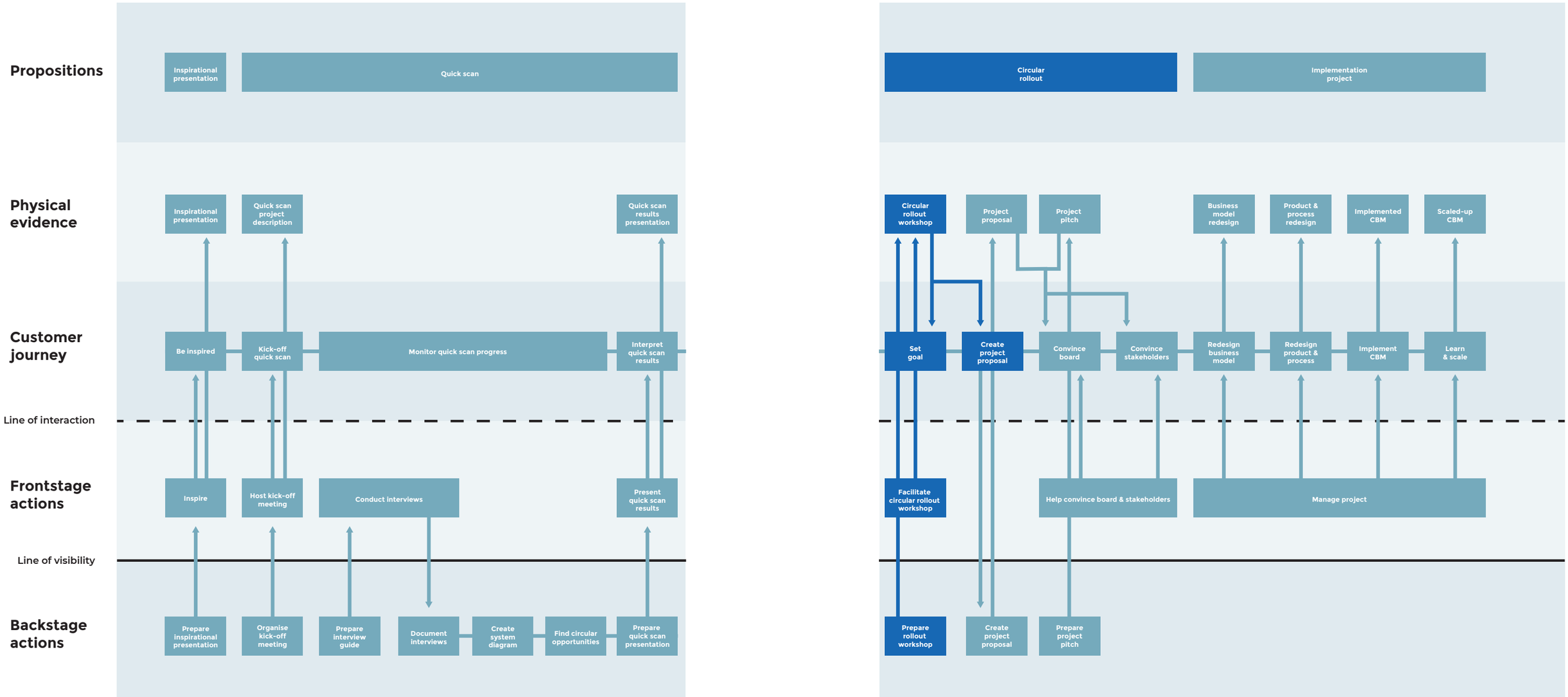


Image 25: The Sustainable Minds service blueprint, circular rollout highlighted in dark blue.

7.2. Workshop

The circular rollout workshop is the part of the circular rollout method in which circular opportunities are turned into a project proposal, using the circular rollout toolkit. An overview of the workshop process, steps, objectives, input, tools and outcomes is shown below. The client company is analysed to determine the desired scope of the project, three projects are compared to explore the potential of projects varying in scope, a project is selected that fits best with the desired scope and arguments are explained, project actions are determined to promote experimental thinking and a Big Hairy Audacious Goal is created to include the long-term perspective. After the workshop has been completed, the client can hang the toolkit on their office wall to 'rollout their project' and present their proposal to colleagues. The proposal can then be turned into a more detailed project description and presentation.

Circular rollout workshop process

Step	Objective	Input	Tools	Outcome
1. Analyse company	Determine desired scope of the project	General company information Circular opportunities from CIRCO or quick scan	Circular project selector	Business objectives, project requirements & circular opportunities
2. Compare 3 projects	Explore the potential of projects varying in scope	Circular opportunities from CIRCO or quick scan	Circular project selector Circular project description Circular project value Circular project challenges	3x project description, value and challenges
3. Select a project	Fit the project with the desired scope and explain arguments		Circular project selector	Project selection Financial arguments Value creation arguments Challenges arguments
4. Determine phases & actions	Promote experimental thinking		Circular rollout tool	Goals & actions of phases small, bigger & biggest
5. Create BHAG	Include long-term perspective		Circular rollout tool	Big Hairy Audacious Goal

Image 26: The circular rollout workshop process

Image 27: Circular Rollout Toolkit rolled up and ready for use

7.3. Toolkit

The circular rollout toolkit consists of 5 tools: circular project selector, circular project scope, circular project value, circular project challenges and circular rollout. An overview of the toolkit structure is given below. The circular project selector is used to compare three projects and select one. The circular project description tool is used to find the right scope for a circular project. The circular project value tool is used to assess what and how much value the project creates for the company and its stakeholders. The circular project challenges tool is used to assess necessary changes and potential project challenges. The circular project description tool, circular project value tool and circular project risk tool can be used as an extra step for each potential project that is being compared. They have been colour-coded, to increase the ease of use between the tools in the toolkit. The scope, value and risk tools are optional add-ins, but provide a more in-depth way to assess each project individually. This way Sustainable Minds and their clients can choose to do a 'fast-track' workshop or they can go through the entire toolkit in a longer, more in-depth workshop. This increases the flexibility and ease of use of the toolkit. The circular rollout tool is used to summarize, add concrete actions and to create a long-term goal.

To increase the ease of use of the toolkit, it was made into a coherent package by including a user manual and by creating an outer shell. After brainstorming with the SM team on the design of this outer shell, it was decided to make it from fabric, as a roll up container. Two versions were made: one from a thin sheet of cork and one from woolfelt, both are natural materials and not too expensive. Small holes are cut at the top and laces are tied to the roll, to make fastening easier and provide a way to hang it on an office wall.

This way, Sustainable Minds can easily pack and transport the toolkit by rolling it up and fastening it with the strings. On location, they can unfasten the strings and 'rollout' the toolkit. The user manual will appear on top with the workshop tools in the correct order below. After the workshop has been completed, the client can pin the circular rollout tool to the roll and hang it on their office wall to 'rollout their project' and present their proposal to colleagues.

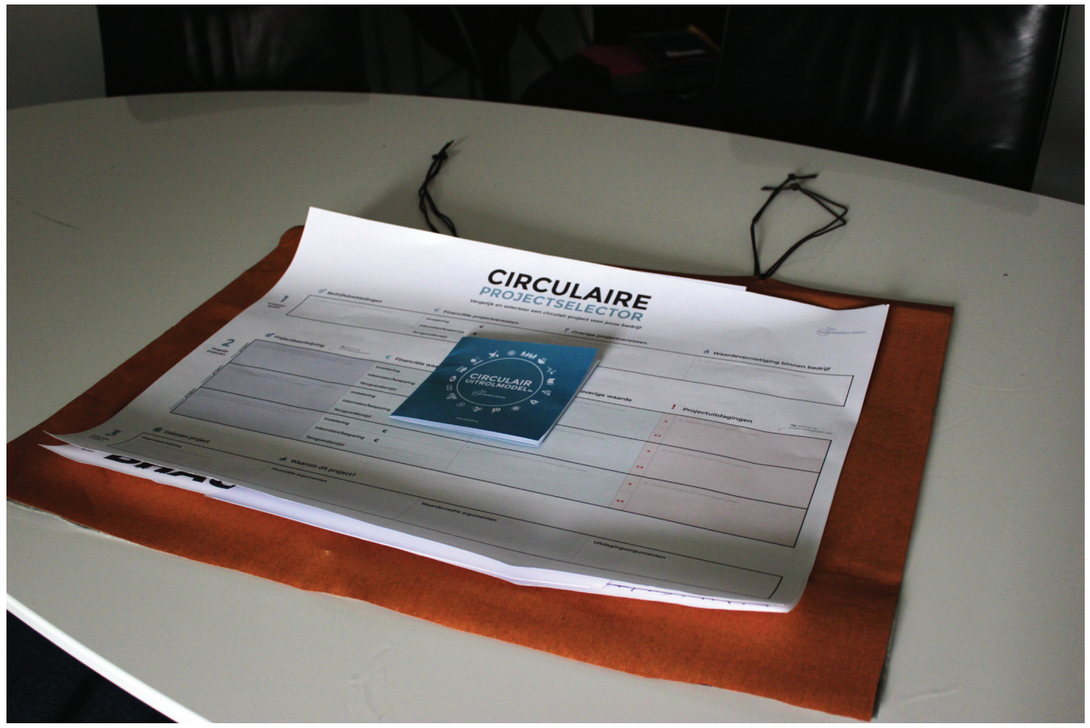


Image 28: The circular rollout toolkit unrolled and ready for use

Circular rollout toolkit structure

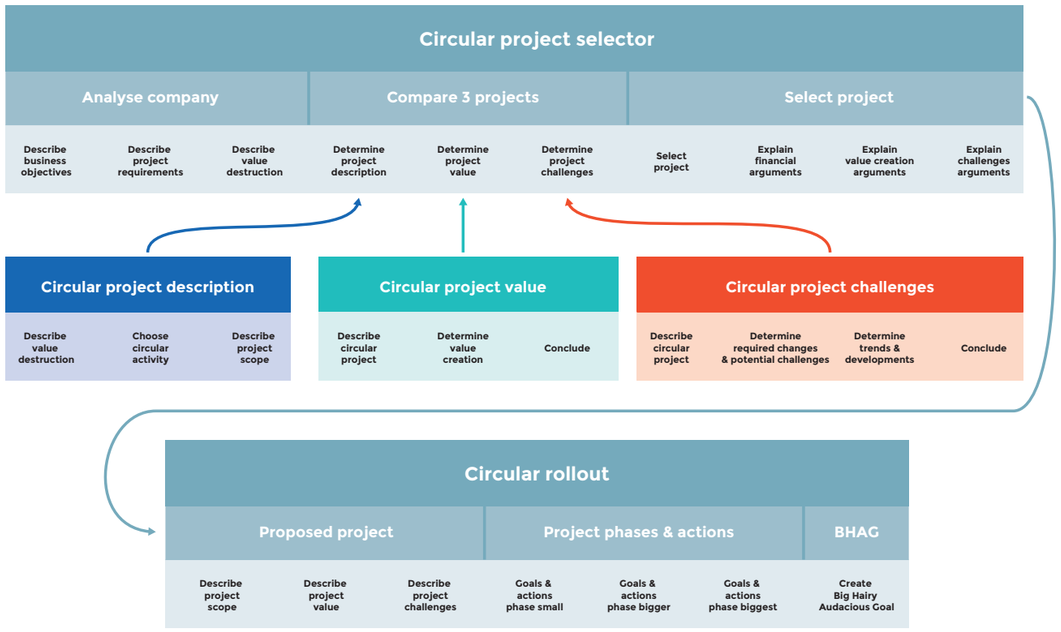


Image 29: The circular rollout toolkit structure

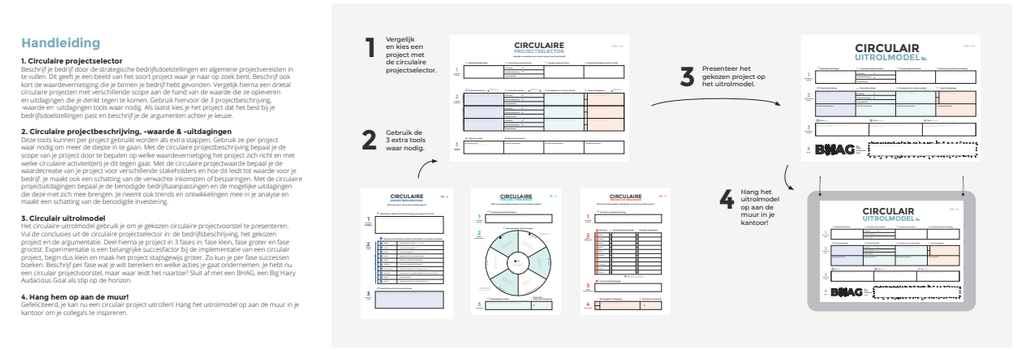


Image 30: Impression of the user manual (Dutch)

1. Circular project selector

The circular project selector is the starting point of the workshop. It is used to analyse the company, compare three projects, select the right project and explain convincing arguments for the project.

1.1. Analyse company

Start by determining business objectives, financial project requirements, other project requirements and value destruction or opportunities. To align the circular project with company goals, these goals, demands and requirements first have to be made explicit. Also, an overview of the different forms of value creation is needed to determine the scope of each project.

First, strategic business objectives are determined. These are strategic objectives that the company as a whole wants to achieve. For example, saving costs by €20 million or reducing customer churn by 5%. A circular project that contributes to these goals is more likely to gain favour from top management.

Second, financial project requirements are listed. These are generic financial requirements that the company uses to make an investment decision and that the company is likely to ask from a circular project as well as any other project. Three financial metrics were selected: investment, return or saving and payback period. These are generic financial demands that many companies use and that were specifically mentioned by Bas Hillerström during the evaluation session in sprint 4.

Third, other project requirements can be written down. The company might have other, more specific requirements that it asks from its projects or from this project specifically. These requirements could be financial, organisational or anything else. The user is free to add anything he or she finds necessary. For example, no collaboration with partners can be required.

1.2. Compare 3 projects

In this step three projects can be compared. The projects are described in three horizontal rows, one per project. The aim is to compare projects of varying scope, and select the one that fits the desired scope best. This is why the left side of each project row is indicated with “small’, ‘bigger’ or ‘biggest’. Projects are assessed by comparing project scope, financial value, ecological and other value as well as project challenges. The three dedicated add-in tools (project description, value and challenges) can be used for each project to provide more guidance and make a more in-depth judgement. These tools are explained in more detail further below.

Project scope describes the problem and solution of the project: The value destruction that the company is aiming to minimise and the circular activity that the company is planning to perform in the project to create or retain value. For example, “We want to reduce material use by €1 million through refurbishing old products. Value destruction refers to the reduction of economic, ecological and social value due to business activities. Value destruction is also known as ‘negative externalities’. For example, high material use, short product lifetime or large amounts of pollution generated.

Financial value is an estimation of the required project investment, project return or saving and payback period. These metrics can be used to determine the financial attractiveness of the project.

Ecological and other value can be any other important value that the project creates for the company and its stakeholders. For example, marketing value for the company, waste prevention for the environment or cost reduction for its customers.

Challenges are related to the circular activity that the company is planning to perform. Changes to the business have to be made which can result in potential challenges. For example, starting refurbishing activities might require new employees with a different skill-set and an investment in the company’s factory and warehouse. Trends and developments might also play a role. The challenges can be large or small, a + or ++ can be coloured to signal the size of the challenges.

1.3. Select project

In the last step, the circular project is selected that fits best with the business objectives and requirements. Project scope can easily be compared with strategic business objectives, project financial value can be compared with financial project requirements, ecological and other project value can be compared with the other project requirements and project challenges can be compared with the other project requirements as well.

The description of the selected project is then written down under ‘chosen project’ and a set of arguments can be listed why the project is chosen. These arguments can be related to finance, value creation or challenges.

CIRCULAR
PROJECT SELECTOR

SUSTAINABLE MINDS

Compare and select a circular project

1 Analyse company

Business objectives	Financial project requirements		Other requirements	Value destruction or opportunities
Eg. save costs by €20 million, differentiate product portfolio ..	**Investment**	€ *500.000*	Eg. No collaboration with partners required	Eg. €50 million material unnecessarily wasted
Save costs by 20 million	**Return / saving**	€ *1.000.000*	*No collaborations required*	*Products lifetime is short & design is not universal.* *Valuable product parts are not reused.* *Waste is not separated & recycled*
	Payback period	*1 year*		

2 Compare projects

	Project description (Tip: use the project description tool)	Financial value (Tip: use the project value tool)		Ecological and other value		Project challenges (Tip: use the project challenges tool)
Small project	Propose a small project. Eg. "We want to reduce waste costs by €100.000 within 1 year by better separating and recycling our waste streams."	**Investment**	€ *50.000*	Eg. Waste reduction for the environment, better relationship with waste company	+	Eg. Limited purity in separation possible.
	Reduce waste cost by better separating & recycling	**Return / saving**	€ *100.000*	*E: Waste reduction* *B: Cost reduction*	++	*Limited purity in separation possible* *Return is still unknown*
		Payback period	*6 months*			
Bigger project	Propose a bigger project.Eg. "We want to reduce material use by €1 million within 1 year by refurbishing old products."	**Investment**	€ *200.000*	Eg. Marketing value for the company, cost reduction for customers	+	Eg. No experience in refurbishing products
	Reduce material cost by remanufacturing product parts	**Return / saving**	€ *1.500.000*	*E: Waste & material reduction* *B: Cost reduction & margin* *S: Employment*	++	*Limited experience in refurbishment* *Setting up storage space for reman. parts*
		Payback period	*1 year*			
Biggest project	Propose the biggest project. Eg. "We want to create a new market segment within 5 years by moving from a product to service."	**Investment**	€ *1.000.000*	Eg. Risk reduction for customers, competitive power for the company	+	Eg. Suppliers might not be willing to collaborate
	Improve product design to last long and be easy to repair and maintain	**Return / saving**	€ *5.000.000*	*E: Material saving, waste reduction* *B: Cost reduction, margin, competitive edge* *S: Employment* *C: Cost reduction*	++	*Suppliers willing to collaborate?* *Technical uncertainties related to design* *High investment, long-term*
		Payback period	*5-10 years*			

3 Select project

Chosen project			Why this project?		
Project description		**Financial arguments**		**Value creation arguments**	**Challenges arguments**
Which project best fits with the business objectives?					
Reduce material cost by remanufacturing product parts		*Exactly fits financial requirements.* *Short-term, low risk, high return*		*Creates environmental, social & business value* *Direct impact, visible result*	*Challenges are limited* *Storage space is only real issue.*

Image 31: Circular project selector

2. Circular project description

The circular project description tool is an add-in that can be used to determine the scope of a circular project in a more in-depth manner. It consists of three steps: Describe the current value destruction to focus on, choose circular activity to create value and describe the project scope.

First, value destruction is determined. It is any activity that currently occurs inside the company or out in which economic, ecological or social value is unnecessarily decreased. For example: €1 million worth of refurbishable products are wasted every year. This is the problem that the circular project is trying to solve.

Second, one or more circular activities are selected. The circular activity aims to add or retain value to prevent or reduce the value destruction. It is a selection of one or more value-adding circular activities from the 9R-framework: refuse, rethink, reduce, reuse, repair, refurbish, remanufacture, repurpose, recycle and recover (Potting et al., 2017). These activities are potential solutions to the value destruction. A hierarchy was also included in these activities, represented by the blue arrow on the left. Based on the hierarchy of waste (Kirchherr et al., 2017), it indicates that some activities result in more circular value than others. This is because preventing resource use in the first place (by not using a product at all, sharing products or reducing resource use) is preferred over extending the lifetime of existing products and recycling or recovering energy from waste.

Third, the project scope is described. It is a sentence that described the objective of the circular project and it includes both the value destruction and the value adding circular activity. For example, "We want to reduce material use by €1 million through refurbishing old products." The circular project scope can then be added into the circular project selector.

CIRCULAR
PROJECT DESCRIPTION

SUSTAINABLE MINDS

What is the scope of your circular project?

1 Describe value destruction

Describe value destruction to focus on

Eg. €1 million worth of reusable products is wasted per year.

Valuable product parts are not reused.

2 Choose scope

Choose one or more circular activities to create value

Circular value

○ Refuse	**Make the product redundant** (eg. digitise)
○ Rethink	**Increase product use intensity** (eg. sharing)
○ Reduce	**Decrease material use** (eg. more efficient design)
○ Reuse	**Reuse a functioning product**
○ Repair	**Maintain and repair a product**
○ Refurbish	**Restore a product in its original state**
☑ Remanufacture	**Reuse product parts in their original function**
○ Repurpose	**Reuse a product or its parts in a new function**
○ Recycle	**Recycle materials**
○ Recover	**Burn materials to recover energy**

3 Describe scope

Describe the circular project scope

Eg. "We want to reduce material use by €1 million by refurbishing old products."

Reduce material cost by remanufacturing product parts

Image 32: Circular project description tool

CIRCULAR
PROJECT VALUE

SUSTAINABLE MINDS

What is the added value of the circular project?

1 **Describe project**

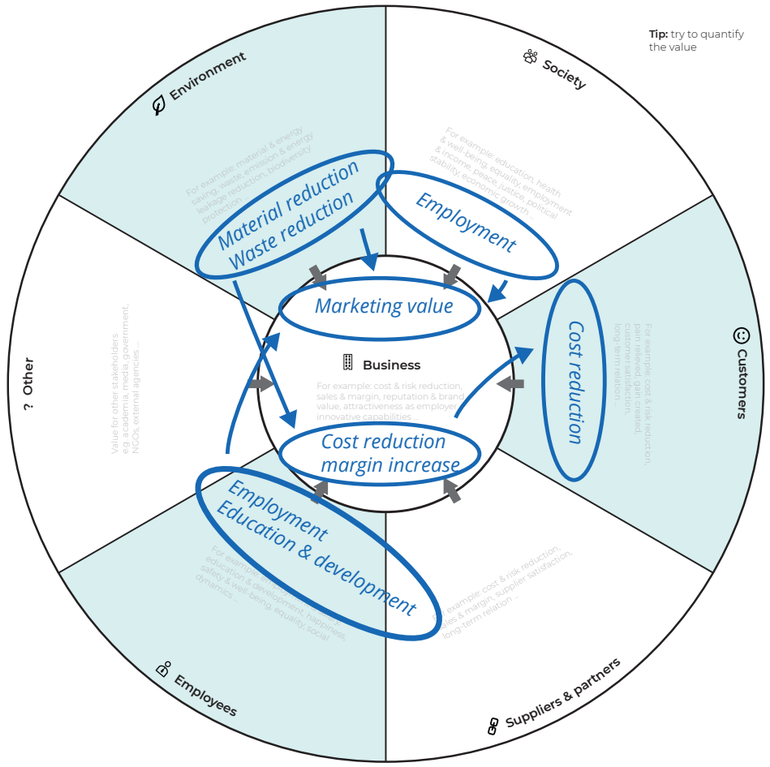
Circular project description

Eg. "We want to reduce material use by €1 million by refurbishing old products."

Reduce material cost by remanufacturing product parts

2 **Determine value creation**

Circular project value creation



Tip: try to quantify the value

Tip: show relations between types of value using lines and arrows.

Most important value created

Estimated return / saving

3 **Conclude**

What is the most important value created by the project for the company and its stakeholders?	
E: Waste & material reduction *S: Employment* *B: Cost reduction & margin*	€ *1.200.000*

Image 33: Circular project value tool

3. Circular project value

The circular project value tool is an add-in that can be used to determine the value that the project creates for business and for other stakeholders. It consists of three steps: writing down the circular project description, creating an overview of value creation per stakeholder and between stakeholders and selecting the most important value creation of the project.

First, project description is written down. This is taken from the circular project selector or circular project description tool. For example, We want to reduce material use by €1 million through refurbishing old products."

Second, the value that the project creates is assessed. A total of 6 stakeholders and one 'other' is included. A circular project can create value for many different stakeholders. The different types of value created by the project can be written down to create an overview. Relations between value for other stakeholders and value for business can also be made explicit. For example, waste prevention could be value for the environment, but also result in a cost reduction for business. Quantifying the value created by estimating the amount could also be an interesting step for companies, this way they can estimate which value created is biggest.

Third, the most important types and amounts of value creation are selected and written down. An important financial metric is also included: estimated project return or saving. This value creation can then be added back into the circular project canvas.

4. Circular project challenges

The circular project challenges tool is an add-in that can be used to determine the challenges of the circular project more in-depth. It consists of four steps: writing down the circular project description, determining required changes to business and related challenges, assessing relevant trends and developments and selecting the most important risks.

First, project description is written down. This is taken from the circular project selector or circular project description tool. For example, We want to reduce material use by €1 million through refurbishing old products."

Second, project challenges are assessed. The circular activity or activities that were selected in the scope tool of the project are selected once again. These circular activities will require changes to business. These changes to business could require research, development or investment. This could lead to potential challenges. These required changes and related challenges are filled in for each activity. Changes to business and challenges are also estimated on size using the +/++ box.

Third, relevant trends and developments are determined. This way, potential challenges from outside the company are included as well. Trends and developments can for example be changing laws and regulations from governments, changing customer demand asking for more sustainable business practices or rising resource prices.
Fourth, the most important challenges that were identified are written down, as well as the estimated required investment for the circular project. These challenges can then be added back into the circular project selector.

CIRCULAR
PROJECT CHALLENGES

SUSTAINABLE MINDS

What are the challenges of your circular project?

1 Describe project

Circular project description

Eg. "We want to reduce material use by €1 million by refurbishing old products."

Reduce material cost by remanufacturing product parts

2 Determine challenges

Activity		Required changes		Potential challenges
Refuse	+ ++		+ ++	
Rethink	+ ++		+ ++	
Reduce	+ ++		+ ++	
Reuse	+ ++		+ ++	
Repair	+ ++		+ ++	
Refurbish	+ ++		+ ++	
Remanufacture	+ ++	*Set up reman. line* *Separate reman. inventory*	+ ++	*Limited experience, limited storage & parts selection process*
Repurpose	+ ++		+ ++	
Recycle	+ ++		+ ++	
Recover	+ ++		+ ++	

Attention: also think about changes to business model and product design

3 Determine developments

Trends & developments

Eg. Changing laws and changing customer demand

Rising resource prices, rising prices of parts. Governments requesting circular products

4 Conclude

Most important challenges

What are the most important challenges of the circular project?

Limited experience in refurbishment
Setting up storage space for remanufactured parts

Estimated investment

€ *200.000*

Image 34: Circular project challenges tool

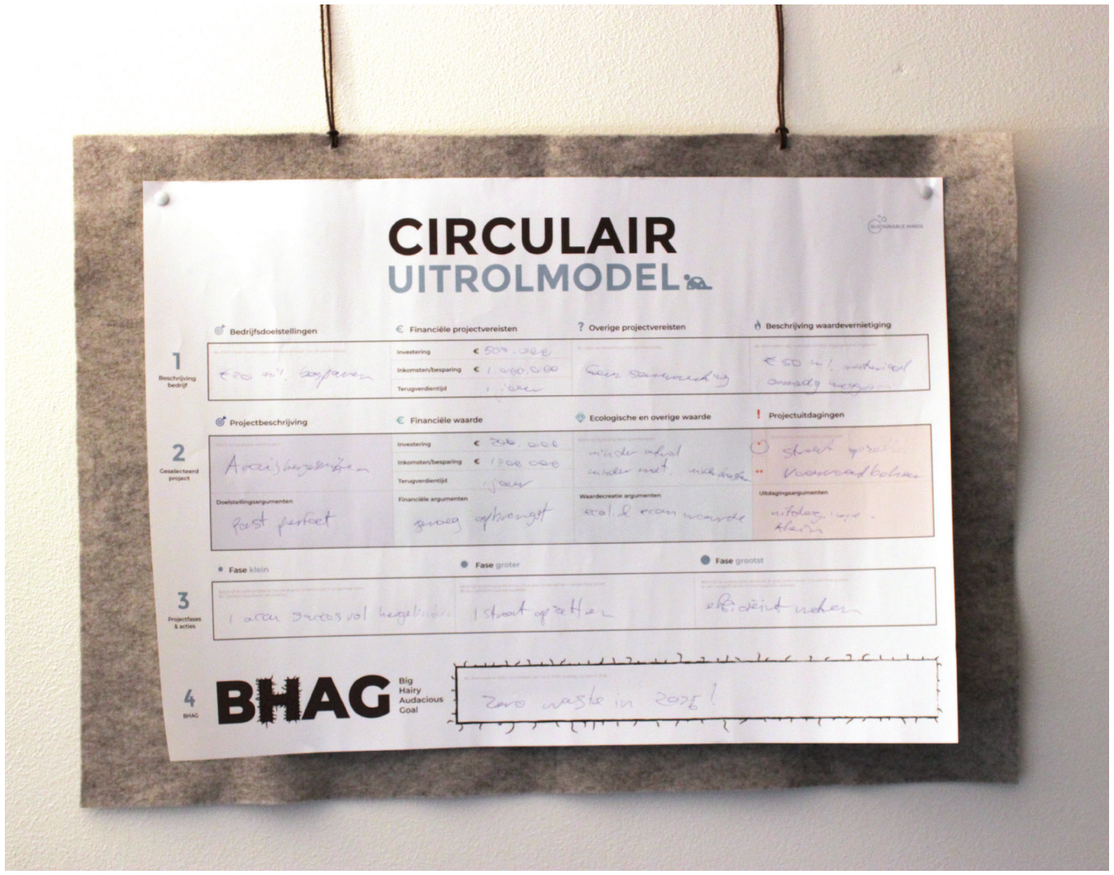


Image 35: Circular rollout presented on office wall

5. Circular rollout

The circular rollout tool is the last tool of the workshop. It is used to present the selected project, determine three project phases and actions per phase as well as create a Big Hairy Audacious Goal.

First, the selected project is proposed. It is described by repeating the project description, financial project value, ecological and other project value as well as project challenges.

Second, project phases and actions are determined. This is done by splitting up the project into three phases: phase small, phase bigger and phase biggest. For each phase, the duration, objective and actions are determined. This way, the client is triggered to take an experimental approach, starting small and scaling up later. This ensures initial successes can be achieved early and risks can be minimised.

Third, a BHAG is created. This Big Hairy Audacious Goal, forces the client to create a long-term sustainability ambition for his/her company. This way a long-term perspective is included in the mind of the client. This is done to make sure that even though the CBMI project may start small, the bigger picture (the fully circular economy of the future) is not forgotten.

After the workshop has been completed, the client can pin the circular rollout tool to the roll and hang it on their office wall to 'rollout their project' and present their proposal to colleagues.

CIRCULAR ROLLOUT

SUSTAINABLE MINDS

1 Proposed project

Project description	Financial value		Ecological & other value	Project challenges
Eg. save cost by €20 million, reduce customer churn by 5% ...	Investment	€ *200.000*	Eg. No collaborations with partners required ...	Eg. €50 million of material unnecessarily thrown away and bought again ...
Reduce material cost by remanufacturing product parts	Return / saving	€ *1.500.000*	*E: Waste & material reduction* *B: Cost reduction & margin* *S: Employment*	*Limited experience in refurbishment* *Setting up storage space for reman. parts* *Selecting which parts to remanufacture*
	Payback period	*1 year*		

2 Project phases & actions

Phase small	Phase bigger	Phase biggest
Duration *1 month*	Duration *3 months*	Duration *8 months*
Objective Eg. successfully refirbish 1 product *Successfully remanufacture 1 part*	Objective Eg. Set up a refurbishing line *Set up remanufacturing line & storage space for 1 part type*	Objective Eg. set up a highly efficient refurbishing line *Expand remanufacturing line to multiple parts*
Actions *- Create team* *- Choose part to focus on* *- Try remanufacturing 1 part*	Actions *- Set up dedicated remanufacturing line* *- Select valuable parts to focus on for remanufacturing* *- Find dedicated storage space for remanufactured parts* *- Train workshop employees for remanufacturing* *- Create display to count amount of parts remanufactured* *- Start remanufacturing parts* *- Keep track of material & cost saving* *- Keep track of storage to prevent overstocking parts*	Actions *- Select other valuable parts for remanufacturing* *- Expand dedicated storage space for remanufactured parts* *- Train workshop employees for remanufacturing other parts* *- Update display to count amount of parts remanufactured* *- Expand remanufacturing* *- Keep track of material & cost saving* *- Automate storage and remanufacturing request to prevent overstocking*

3 BHAG

BHAG Big Hairy Audacious Goal

Eg. Zero waste in 2025, CO2 emission of zero in 2030, fully circular in 2035 ...

Zero waste in 2025

Image 36: Circular rollout tool

8

Validation

8. Validation

This chapter describes the validation steps that were taken during this graduation project to test the circular rollout workshop and toolkit. It discusses both the validation that took place during the design sprints and the final usability tests that were performed with the Sustainable Minds team members at the end of the design phase.

8.1. Validation during design sprints

As discussed in chapter 6, an iterative approach was taken during the design phase of this graduation project. It was structured in a series of sprints (7 in total) to iteratively design, test and learn during each sprint. This way, initial assumptions could be tested quickly to learn and steer the design into the right direction. An experiment was performed during each sprint, in which the design that was created was tested. In total, 7 experiments were performed.

In total, the design was validated 7 times in various experiments with Sustainable Minds team members, a client and the supervisory team of this graduation project. Summed up, feedback on the design was gathered 18 times. All of this user, client and expert feedback was used to improve the design during the process and lead to the final result. The detailed experiment boards of each sprint can be found in the appendix.

Overview of experiments

Sprints	Experiment type	SM team	Client	Supervisory team
1	SM review	4		
2	SM review	4		
3	Client review		1	
4	Supervisory team review			2
5	Supervisory team review			3
6	Usability test	2		
7	Usability test	2		
Total		**12**	**1**	**5**

Table 2: Overview of experiments

Image 37: Usability test 1, featuring Kester & Henk.

8.2. Usability test

At the end of the design phase, two usability tests were performed with the Sustainable Minds team members. These usability tests were performed in sprints 6 and 7. The aim of these usability tests was to test the usability and applicability of the circular rollout toolkit. The design guidelines that were mentioned in chapter 5 were used as testing criteria. In order for the design to be usable by Sustainable Minds it should adhere to those guidelines. The guidelines are repeated once more below.

Design guidelines

Easy to understand and intuitive to use
The design should be easy to understand by both the Sustainable Minds team and their clients. The Sustainable Minds team members and their clients have limited knowledge of CE, so the design should be accessible to all. It should not be too time consuming, but quick and efficient. Clients can get lost in the daily hassle, so the design should make the CBMI implementation process as easy as possible. The design should be intuitive to use by the SM team and their clients. It should guide the user through the CBM implementation process to ensure the design-implementation gap can be crossed.

Practically applicable
The design should be practically applicable to the implementation projects that Sustainable Minds will perform. This means it should resonate with the needs of their clients during the CBMI implementation process. For example, the design could help relieve barriers or increase success factors.

No design skills required
Sustainable Minds has no design knowledge in-house. This is why the design should not require any design knowledge or skill, but be usable by someone with a business education or background. This also increases the usability by SM's clients.

Low-budget, quick to implement
Given the limited budget of the SM team and the startup phase they are in, the team requires a solution that is low-budget and quick to implement. Sustainable Minds cannot afford to invest a large amount of money into a long-term solution, because they need to get their consultancy service up and running.

Usability test

The usability test was split up into two separate sessions for practical reasons due to availability of the Sustainable Minds team members. 2 team members participated per session and sessions lasted 1.5 - 2 hours. The complete toolkit was printed on paper and an introductory presentation was prepared. The aim of the session was explained in the presentation and the case example was introduced. The case information consisted of generic company information, value destruction and CBMI opportunities. These were the actual conclusions from the quick scan research at Welzorg. The SM team members were asked to use the toolkit to turn this information into a circular project proposal. Observations were made during the process and written down on paper. The session was concluded with an evaluation.

Results

Overall, the Sustainable Minds team members were very positive and enthusiastic about the circular rollout toolkit. All of the team members were able to use the toolkit intuitively and independently and apply it do a real-life case. All of them see themselves apply it in a client project and cannot wait to start. Below, the usability and applicability aspects of the test are explained in more detail.

Usability

As mentioned above, the usability test yielded very positive results. The team liked the structure of the toolkit very much, with the selector as overview and 3 tools as depth analysis. They also liked the design, it is attractive, clear and the colour coding between the tools works intuitive. During both sessions, the team members intuitively cooperated and worked through the toolkit together, discussing each step of the toolkit before making a decision and moving along.

"What I think about the design? It is attractive, clear and the colour coding between the tools works really nice."

- Henk

An insight that turned up in both sessions was related to the need for the in-depth analysis tools (description, value and challenges). The in-depth analysis is most valuable the first time, when assessing the first project. In both validation sessions, the other 2 projects were assessed quicker, without using the in-depth tools. Improvements that were mentioned during the test were mainly minor improvements to the design, in changes in wording or in minor additions.

Applicability

The test also yielded very positive results in terms of applicability. The team members are enthusiastic about the toolkit and can't wait to start using it in their projects. They would like to use the toolkit in co-creation with their client. The toolkit could potentially be sold independently to a customer who could then use it him/herself, but a risk exists of misuse. The team members prefer to use the toolkit in a workshop setting, together with their client.

"I can't wait to start using this toolkit in my next project. "

- Kester

During both sessions the teams did require some time to fully understand the Welzorg case enough to be able to intuitively apply the toolkit. The value destruction and circular opportunities that are identified in the quick scan have to be clear. Since they were not personally involved in the Welzorg project, they required some time to properly understand it. However, this should not be a problem, since the team members would normally use this workshop together with their client after completing a quick scan or after completing a CIRCO track. Both they and their client should have reached an intuitive understanding of the project at that point.

"I don't think it is necessary to add an extra step to brainstorm on circular opportunities. You should already have done that at the end of your quick scan."

- Meike

Image 38: Usability test 2, featuring Meike & Bas.

9

Discussion & conclusion

9. Discussion & conclusion

This chapter contains the discussion and conclusion of this graduation project. It also contains the limitations, and contributions of this work and presents recommendations for future research. A personal reflection on the execution of this project is included at the end of this chapter..

9.1. Discussion

This graduation project offers a new method, workshop and set of tools for Sustainable Minds to help industrial manufacturing companies bridge the design-implementation gap in the circular business model innovation process. The limitations and contributions of this project are discussed below, as well as recommendations for future research and recommendations for further development at Sustainable Minds.

Limitations

As described in chapter 1.3, the approach that was taken during this graduation project was structured in 3 phases: research, synthesis and design with a set of activities in logical order. Although the result of this graduation project is presented in this logical order in this report, in reality, the process was much less linear and much more iterative. This is also suggested by the fuzzy grey line behind the process overview in chapter 1.3. More structure could have been applied to the project approach to achieve a higher degree of rigour.

In the literature review, literature from the fields of circular economy and business model innovation was combined. Both fields are extensive and it was not possible to perform an extensive systematic literature study within the timespan of this project. Thus, a possibility exists that information or insights were missed in the review. Also, the barriers and success factors that were identified in the literature review were not based on an extensive systematic literature study, but were identified in this project. Thus, their theoretical grounding is limited.

The research that was performed consisted of three studies: an internal analysis, external analysis and interview study. Focus was put on the interview study because of time constraints. This means the internal analysis and external analysis were performed with less depth and rigour. As a result, information or insights might have been missed. The interview study was performed with 12 participants of which 6 companies that completed a CIRCO track and aspired to implement a CBM, 3 companies that successfully implemented a CBM and 3 expert CE consultants. It is recognised that the validity of this study could have been improved if the three groups contained an equal number of participants. Also, the 6 companies of the aspirational group were interviewed in an informal setting and the interviews could not be recorded on audio. This limited the depth and rigour of these interviews and their analysis.
The research conclusions provided insight into the circular implementation process, success factors and barriers. However, these insights could not be validated rigorously during this graduation project. A possibility exists that information was missed or that the participant group is not fully representative of other companies. More research is needed to confirm and validate these insights in order for them to be generalised.

In chapter 5: Synthesis, a circular implementation framework is created based on the implementation process that was derived from the interview study. However, this framework was only based on 12 qualitative interviews and could not be validated during the course of this graduation project. This means it has limited grounding and is only descriptive of the implementation processes that the interview study participants mentioned during this research. Since it was not validated, it is not predictive of other circular implementation processes. This is a limitation.

The final design consists of a method, workshop and toolkit. A service blueprint was created to further enlighten the circular rollout method and its positioning in the Sustainable Mind service. This service blueprint was mainly based on the implementation framework that was created in chapter 5, based on the interview study. As mentioned above, this framework has limited grounding. Also, since Sustainable Minds is still in the startup phase, their service is still in development and is likely to change. As a result, the service blueprint could not be validated during the course of this graduation project. This means the service blueprint has limited grounding and should be seen as a design, an envisioned possibility. It cannot be seen as a predictive model of the Sustainable Minds service.

The design phase had an iterative approach, validating the design along the way. The usability tests in sprints 6 and 7 showed that the SM team members are able to use the toolkit independently and apply it to an existing case. However, the design was tested only once with a potential client in a stakeholder review. This is a limitation. Ideally, to prove the design functions in a real-life scenario, it should have been tested in a real implementation project with a real client to turn actual insights from a quick scan or CIRCO track into a circular project proposal. A quick scan was planned to start in March, but it was delayed. Therefore it was not possible to test the workshop in a client project during the course of this graduation project.

Contributions

This graduation project has delivered a new method, workshop and toolkit for Sustainable Minds. They can use it in their projects or sell it separately to clients. It provides them with a structured approach and set of tools to help their clients bridge the design-implementation gap in the CBMI process by helping them turn circular opportunities into an actionable circular project proposal. Potentially, this could increase the amount of CBM implementation projects that Sustainable Minds can help execute in the future, creating new business opportunities for Sustainable Minds.
This graduation project also provides an addition to the current knowledge and application of CBMI projects.
A request for more research into the circular design-implementation gap was expressed in literature. This thesis aimed to address this request, providing research insight into the implementation process and the barriers and success factors that companies experience along the way as well as providing a practical set of tools that can be used to help bridge this gap.

Recommendations

As mentioned above in the limitations of this research. Some elements could be investigated further by researchers and by Sustainable Minds.

Researchers could further investigate the design-implementation gap in the CBMI process. This research provided some insight, but these insights should be confirmed by others in order to be fully valid. A systematic literature study could be performed to dive deeper into the CBMI literature, a more extensive qualitative study could be performed to investigate if information or insights into the CBM implementation process were missed, the insights from the interview study in this research could be validated in a quantitative research to make them generalizable and the implementation framework could also be validated by future researchers in a qualitative or quantitative approach, comparing the findings from this study with new insights.

Sustainable Minds could further investigate the practical use of the circular implementation framework and of the service blueprint. Their implementation projects can be used to validate and iterate these frameworks. Sustainable Minds could also further investigate the practical use of the circular rollout method, workshop and toolkit by applying them in implementation projects and performing the workshops with clients. They could validate and iterate the method, workshop and toolkit further to increase their practical value.

9.2. Conclusion

The purpose of this graduation project was to research the gap between design and implementation in the circular business model innovation process and to develop a way for Sustainable Minds to help their clients cross this design-implementation gap. Research was set up and performed to investigate this design-implementation gap. An internal analysis was performed to research Sustainable Minds, an external analysis was performed to research the CE consultancy market and an interview study was performed with 12 participants to research the CBM implementation process. The participants included 6 companies that aspired to implement a CBM, 3 companies that successfully implemented a CBM and 3 CE experts. The research results were analysed and synthesised. An implementation strategy and framework were created as a general approach for Sustainable Minds. Next to this, a consultancy method, workshop and set of tools were developed and tested: Circular Rollout.

Circular Rollout allows Sustainable Minds to help their clients turn circular opportunities from a quick scan or CIRCO workshop into an actionable project proposal. The circular rollout method focuses on setting the right scope for the circular project and creating a project proposal. This proposal can then be pitched to the board and other stakeholders of the client company. The project proposal is created in a circular rollout workshop. Using the circular rollout toolkit, the workshop is focused on determining the desired scope of the project, comparing three projects, selecting one, determining project actions and creating a Big Hairy Audacious Goal.

The research and design results of this graduation project provide a contribution to academic and practical understanding of the circular business model innovation process and the design-implementation gap. It is a first step towards helping companies bridge this design-implementation gap and can serve as a starting point for future investigations and for the consultancy service of Sustainable Minds.

9.3. Personal reflection

Since the beginning of my design education at TU Delft, I was always looking for the added value of my designs. In projects I would ask myself: Why am I designing this? Do people actually need this product? Is it actually going to make the world a better place? I slowly felt more and more distanced from the design practices I was confronted with. I realised more and more that I didn't want to spend my life creating the next useless piece of plastic that nobody really needed.

During my master, I started meddling with business model innovation, service design, sustainable business models and circular economy. I felt intrigued by the possibility to create experiences instead of products and discovered the potential of the circular economy. But why did only so little companies use this potential? I convinced myself to dedicate my graduation project to the topic. Before I knew it, I was talking to Bas on a picknick bench next to the former town hall of Kamerik, a village in the middle of nowhere that I would never have been able to pinpoint on a map and one that was at least as difficult to reach by public transport. How on earth did I end up here? At a project management consultancy that works for industrial companies? Nevertheless, when I travelled back home I knew it was exactly what I was looking for.

At the start of my graduation project, I had a rough idea of what I wanted to work towards and what to aim for. But I didn't have a clue of how to get there? I felt lost and confused. Over the course of the project, this feeling never really went away. I guess graduation isn't something you can perfectly plan in detail from beginning to end and execute it exactly as planned. Rather, it just happens to you. Luckily, I never really believed in the added value of detailed planning. I prefer to say plans are made so you can deviate away from them. There is an indigenous culture in the Andes, called the Aymara people, who are the only known civilisation to view the future behind them and the past in front (Nuñez & Sweetser, 2006). I must be a distant descendant for I fully agree the past is the only thing that is truly visible. I guess walking backwards is a good metaphor for the way I felt during most of the project. The further I progressed, the more clear it became to me what I was actually doing and where it was taking me.

This graduation project was a valuable lesson in working on my own. I was used to work in teams for most of the projects in my education. It took some time to discover my own workflow and to readjust my expectations. Everything takes so much longer if you have to do it all yourself! Luckily, I had chosen a topic that personally interests me, which made the entire graduation project much easier.

I discovered once more that I'm not easily stressed, but that I do need a bit of pressure to be an efficient worker. For some reason, I'm completely incapable of planning ahead when I have plenty of time, but when time starts to become scarce, I enter some kind of survival mode and become a planning genius and efficient production machine. Maybe I have a tendency to overthink too much, and when time is short I make decisions quicker.

I was also lucky to be able to graduate at Critical Minds, in the Sustainable Minds team with Bas, Henk, Kester and Meike. The self-steering principles, entrepreneurial attitude and lack of hierarchy of the company made me feel at home straight away. The culture of openness and directness was an eye-opener and really contributed to my professional skills, especially in terms of communication. The way CM employees are involved in running the company was very inspiring and motivating as well. On day 1, Bas involved me as designer in the maritime CIRCO track, which provided a wealth of inspiration. I'm grateful for the opportunities that I was given and for the continuous enthusiasm from Bas and the team. I hope the results of this project may serve them well.

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