Strategizing organisational ambitions in infrastructure projects

A case study research on circularity within two Dutch infrastructure agencies

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MSc thesis

L.W.A. (Leidy) Kupers

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A case study research on circularity within two Dutch infrastructure agencies

AUTHOR
Name: L.W.A. (Leidy) Kupers
Student number: 4318811

THESIS
University: Delft University of Technology
Faculty: Civil Engineering and Geosciences
MSc: Construction Management and Engineering

GRADUATION COMMITTEE
Chair: Prof.dr.ir. M.H. (Marleen) Hermans
First supervisor: Dr. D.F.J. (Daan) Schraven
Second supervisor: Ir. L.P.I.M. (Leon) Hombergen
Company supervisor: Drs. ir. P.T. (Peter) Vermeij

COMPANY
Name: PricewaterhouseCoopers Advisory N.V.
Address: Thomas R. Malthusstraat 5, 1066 JR Amsterdam
Department: Capital Projects & Infrastructure

Preface

When thinking about a subject for my thesis, I was really motivated to explore a topic related to sustainability in the infrastructure industry. This motivation was based on a project I executed before starting my thesis. In 2020, I would actually go to the Himalayan area in India for a multi-disciplinary project. However, because of COVID-19, I was not able to make this journey. Nevertheless, I executed the research project online from home, which still gave me a fair impression of the people, culture, and environment. The project was focused on conducting research on the sustainability of vernacular building styles and constructions located in the Himalayan area. Currently, they are experiencing the issue that inhabitants are using more and more concrete in their construction which negatively impacts the most beautiful environment. Therefore, their vernacular building styles, which are far more sustainable, make place for modern concrete buildings. This change contributes negatively to their environment, and it is disturbing to see how the human population can pollute the most imposing nature. Being a vegetarian for almost 18 years, I care about our future environment, and I knew the subject circularity would give me a lot of energy. Doing a master in Civil Engineering, it is very interesting to explore how an industry with a significant contribution to C02 emissions and a high amount in using natural resources can become more sustainable and especially more circular. Therefore, this will definitely not be the last time for me to explore this subject, and I hope to learn more about the topic in my future career.

By writing this thesis, I am finishing my master Construction Management and Engineering, which did not really go according to plan. Due to a severe concussion, I was not able to study at full capacity for a long time. Instead of doing a double degree, I needed to rehabilitate for a long time and could not focus on study anymore. Therefore, starting my graduation was very exciting to continue my master at full capacity. Luckily, despite that the road towards my thesis was pretty bumpy, I was happy to study at full capacity again and graduate on a subject that is of high relevance to me.

I would like to thank my graduation committee for sharing their extensive knowledge and make this educational journey possible. I would not be able to perform this research without your knowledge of my subject. First of all, I would like to thank Marleen Hermans for being the chair of the committee. Your critical view on my work pushed me to sharpen my research and think twice about how to write the report. Afterwards, I would like to acknowledge my first supervisor, Daan Schraven, who guided me through the research and gave me helpful feedback on how to improve my research. You impressed me with your passion and knowledge of scientific theories and the many things you are involved in. Also, thanks to Leon Hombergen for being my second supervisor and his helpful involvement throughout the process. Lastly, I want to thank Peter Vermeij for the opportunity of doing my master thesis at PwC, helping me to find connections needed for this research and his enthusiastic guidance.

Furthermore, I would like to thank my family and friends. I would like to thank Thijs, Anand, Jesse and Daniel for their helpful feedback on my sometimes dunglish writing style. A special thanks to my roommates who supported me while writing my thesis and sometimes urged me to take a break. Writing a master thesis during COVID-19 times was not the most optimal situation, however, I am happy we were still able to enjoy ourselves at home. Hilde, besides giving me COVID-19 during my greenlight deadline and presentation, thank you for your tips on my report and abstracting me from my thesis when I needed it. Noor, many thanks for supporting me in free coffee and on my thesis. Ghiline, thank you for your high working motivation in the room next to me. Last but not least, Lotte, thank you for your support in my shopping behaviour. Eventually, it was an exciting journey that would not have been possible without the help of you all.

Hopefully, this research contributes to the available scientific knowledge on the subject and provides insights into current practice. I wish you all a pleasant reading.

Leidy Kupers
Rotterdam, September 2021

Abstract

Introduction: Worldwide, the human population uses an increasing amount of primary materials, which is related to the rising income and growing population. This means that the scarcity and costs of material resources are increasing, and a part of the materials might be lost for future use. The circular economy (CE) provides the opportunity to address this issue because CE is characterised by reducing the carbon footprint, using primary materials and protecting material resources. The infrastructure industry is an industry that causes a severe threat to sustainability as it consumes a large amount of energy, resources and materials. By recycling construction materials and use second-hand construction materials, it is possible to address this issue. Thus, CE can play a significant role in reducing the influence of infrastructure on our future environment.

High reaching ambitions on circularity are created by the government and public organisations for the infrastructure industry. However, these ambitions are challenging because the circular economy in the infrastructure industry is a relatively new concept, which is not (yet) fully exploited and still developing. Researchers explain that public procurement can contribute to achieve these circular ambitions. Especially in the infrastructure sector, public organisations have a large purchasing volume. They can stimulate and create demands for a product that contributes to CE by including it in their procurement. However, because of the developing character of circularity, circular public procurement is a new challenging field that lacks empirical research.

To achieve the circular ambitions of the government, circularity should be translated into criteria for the procurement process. However, it is challenging to define circularity and subsequently translate it into clear performance objectives. The number of sustainability objectives increases the complexity of the procurement and unclear performance results in which evaluation criteria can lead to conflicting and complicated outcomes.

Main research question: To realise circular procurement in practice, ambitions need to be clearly formulated for a project. This is not yet explored enough, and the question of how to deal with the challenging ambitions in projects is still unanswered. Knowledge on factors influencing the procurement process is limited, and insights are needed, especially when focused on circularity insights. If ambitions on circularity are insufficiently defined, they will remain unclear and the probability of achieving them decreases. Therefore, the following main research question has been defined:

How do public organisations strategize organisational ambitions on the project level for new initiatives during the preparation of procurement as exemplified by two projects with circularity as representation?

The point of attention for potential sustainability gain concerning procurement takes place during the specification of the project. The front-end planning phase is the phase before procurement in which the project is specified. Therefore, it is helpful to take a step back and look at this phase before specifications are written down during procurement. As this research aims to analyse organisational ambitions on a project level, project objectives are used as a leading characteristic of the front-end planning phase scope. Project objectives can play a significant role in defining circularity on the project level. Thus, the front-end planning phase is analysed to explore how the challenging ambitions of organisations are defined on a project level by analysing the translating process of organisational ambitions towards project objectives. In the conceptual framework (Figure 1) previously explained relations are visualised.

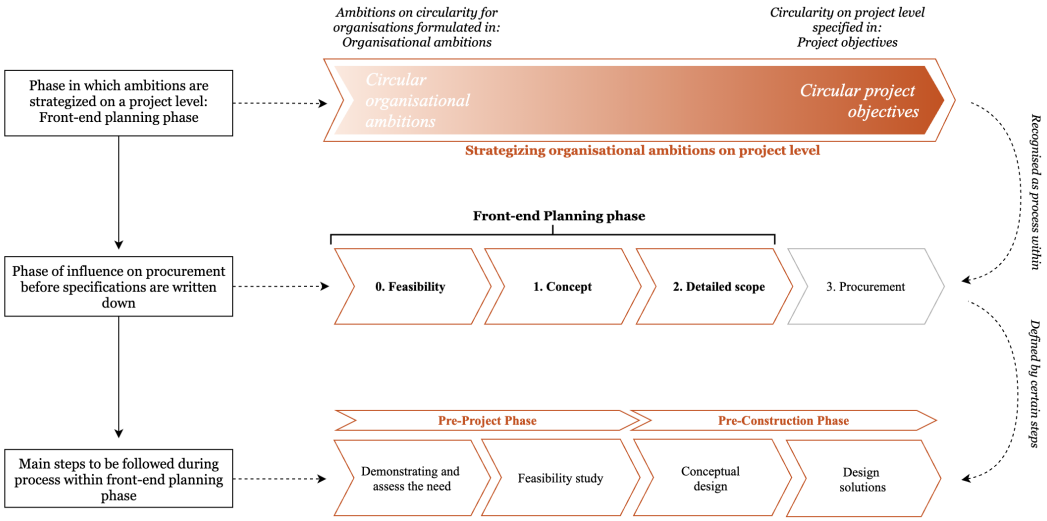

Figure 1: Conceptual framework (own illustration)

To show how these ambitions are used on a project level, strategies are required that can explain the underlying strategy. Because circularity has a developing character, it is interesting to include the framework of Whittington (2001) (see Figure 3) that considers exploring strategies. The framework of Whittington (2001) (that includes the theory of Mintzberg and Waters (1985)) shows deliberate versus emergent strategies and leaves space open to determine the strategy of complex processes. The primary difference between the deliberate and emergent strategy is that a deliberate strategy is focused on controlling and directing. In contrast, the emergent strategy is more focused on learning what works (willing to learn).

Methodology: As the strategizing of organisational ambitions on the project level is recognised as a process, it is useful to use process research. In addition, Van de Ven (2007) explains that process studies are typically treated in social sciences as *'a category of concepts of individual and organisational actions'* such as strategy formulation (Van de Ven, 2007, p.196). Therefore, the acknowledged event-driven process theory of Van de Ven (2007) is required to analyse how change develops concerning the underlying events and outcomes of the process. Furthermore, process research focuses on analysing events in practice and makes it possible to determine if findings discovered in the literature study apply for practice. Therefore, process research can be helpful to discover the applied strategies of processes in real-life projects. To make this analysis possible and understand how practitioners experience the process, an in-depth research is executed using interviews within two circular projects from two large infrastructure organisations: BBV Zeeland project (ProRail) and A1 phase 2 (RWS).

To analyse a process, it is essential to have an interview format that contributes to the analysis of a process. Therefore, with the help of MURAL (online whiteboard), the process as explained by the respondent was visualised during the interview. This resulted in individual process maps of all practitioners within both case studies. Afterwards, all events and including outcomes are systematically written down in an overview and combined on subjects to create two general processes of both case studies that include events of all individual process maps. Finally, by comparing the practical process (discovered in the case studies) with the standard process (as shown in Figure 1), it is possible the determine the applied strategy based on the framework of Whittington (2001) that uses the theory of Mintzberg and Waters (1985).

Results: Both organisations formulated circular ambitions on a higher level, and practitioners considered these ambitions in their projects. However, these organisational ambitions are defined on an abstract level, and a certain circularity baseline was missing. Nevertheless, both cases show how they strategized organisational ambitions on the project level, and the processes are written down as a narrative that tells the story:

ProRail: Circularity was included in the early phases of the project, and during the exploration phase it was an iterative process of events to define circular project objectives for the tender. There was a high demand from the management board on circularity from the start, and an increased focus on circularity was present. To

make the project realisable, upper management's commitment was important during the process as a backup for difficulties outside of the scope. In addition, market parties were needed earlier in the project than usual because it was difficult for the project team to come up with circular solutions. To make this collaboration possible, a substantial amount of space to innovate was needed for the contractor.

The boundaries in which this process is performed deviated from a standard procedure. By exploring in the BBV Zeeland project how a superstructure project could be executed in a circular way, it is the goal to define a way of working (realising own pattern) that could apply for future BBV projects. Therefore, there is deviated from standard regulations to make this possible, and the project shows a highly emergent strategy.

RWS: Within the RWS case, there was not a focus on or demand for circularity from the start. In the early phases of the project, the focus was on the main problem related to the decreasing accessibility of the road and possible solutions. Only during procurement there was a focus on circularity besides the focus on other aspects as spatial quality and mobility. During procurement, the process was highly iterative and there was no prescribed way on how the measures should be formulated. In addition, because of the developing character of circularity, there was space left for contractors to innovate on circularity. However, this was within the prescribed measures that explain the required minimal level of circularity. Therefore, one of the main characteristics of the process of the RWS case is that within prescribed borders of the official MIRT procedure (existence of formal guidelines that define boundaries), measures are developed in an emergent way. Despite that the cases are focused on different infrastructure constructions (highway vs railway) within other organisations, certain patterns are discovered in both processes which explain the difference in the processes:

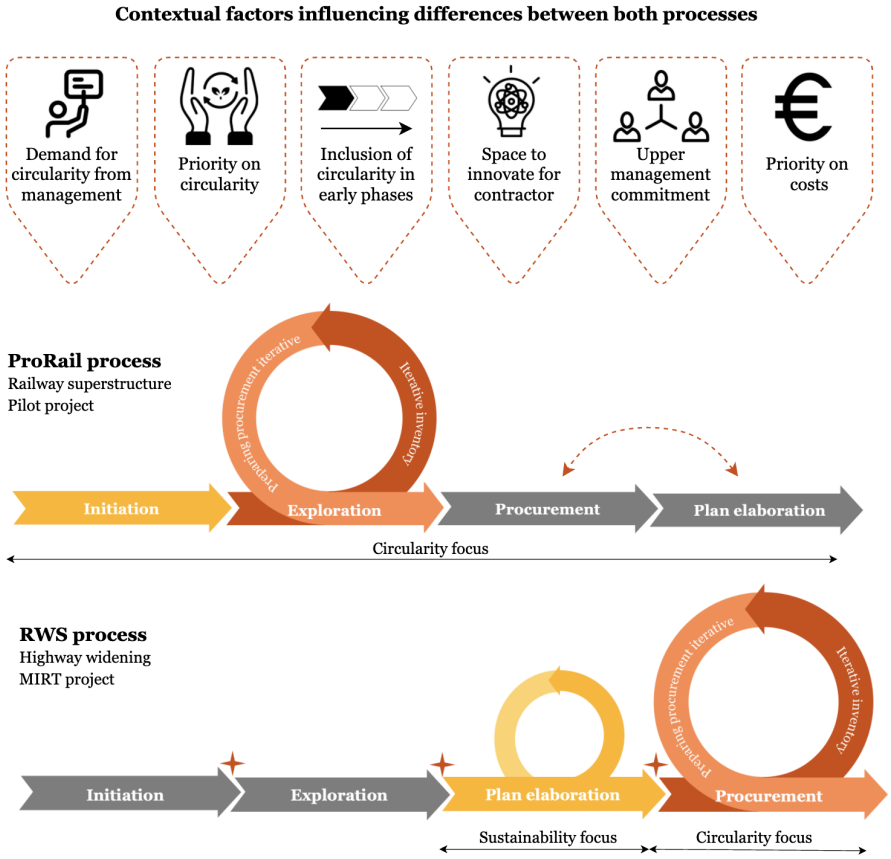

Figure 2: ProRail and RWS process visualised including contextual factors influencing the process (own illustration)

As shown in Figure 2, the sequence of events in both processes is significantly different. For the BBV Zeeland case, the process deviated from the standard process, and the sequence of the 'procurement phase' and 'plan elaboration' was switched because of the need to collaborate with a market party during the early phases. For the A1 phase 2 case, certain formal milestones like the 'start decision', 'preference decision' and 'project decision' are accomplished as sequential phases. Therefore, the A1 phase 2 case followed the stan-

dard sequence of phases in greater detail. Moreover, RWS and ProRail addressed the strategy translation of these ambitions differently: RWS defined general project objectives but specific measures on circularity during the procurement phase, while ProRail focused more on defining project objectives excluding too many measures in the exploration phase.

As shown in Figure 3 both processes do show a certain level of emergent strategy. However, the ProRail process of the BBV Zeeland case shows a higher level of emergent strategy than the RWS process of the A1 phase 2 case. In addition, the RWS case needed to follow a certain budget. During interviews, practitioners repeatedly mentioned the 'iron triangle', and circularity was frequently seen as an aspect that should fit within budget and time. Contrary to the ProRail case, which illustrates a situation in which the project costs will be determined after the plan elaboration together with the contractor. Circularity is the main goal in which budget (to a certain level) should not play the primary role. This makes the ProRail case more plural and the RWS case more profit-maximizing. As a result, the previously explained processes influenced by contextual factors are summarised in the framework of Whittington (2001):

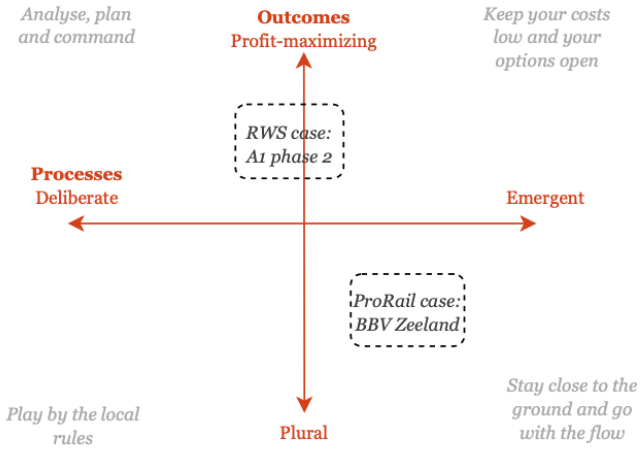

Figure 3: RWS case strategy and ProRail case strategy within the framework of Whittington (2001)

Discussing and concluding on findings: Furthermore, this research reveals several implications on strategizing organisational ambitions on project level.

The absence of a baseline which helps to specify a new initiative: In both cases, an absence of a circularity baseline, presenting a level of circularity that should be achieved, was discovered. The absence of this circularity baseline complicated the translation of the circular organisational ambitions of an abstract character into projects and caused a significant gap between the organisational ambitions and project objectives. Therefore, firstly, it would make sense to create a certain baseline on circularity that helps to define circularity in projects (using, for instance, the 9R Framework). The absence of a baseline can also be an issue for other new initiatives because of the insufficient information of new initiatives in early phases.

The need for emergent strategies when focusing on a new initiative: As circularity illustrated in this research, new initiatives seem to need a certain level of emergent strategy to ensure not to hinder innovation related to the new initiative. In addition, the need of releasing organisational boundaries plays a significant role. Therefore, it should be considered to which level organisations are willing to release boundaries considering the related contextual factors of the project. However, a less deliberate strategy means fewer safe outcomes, which is not always preferable and might complicate the situation. Therefore, this results in a challenging consideration in which the contextual factors, discovered in this research, might be helpful.

Varying moments when a market party can be included: Both cases include the market in different phases to give substance to circularity objectives. Therefore, both cases differ in the level of detail to prescribe circularity towards the market and both front-end planning phases show a different sequence of phases. Thus, when specifying a new initiative, the level of detail to prescribe this initiative on the project level can differ when approaching a market party. When market parties are included earlier or later in the project giving

substance to the initiative, this could also mean differences in the front-end planning phase. As shown in the research, it is not always preferable to involve market parties from early phases to give substance to the new initiative because other aspects play a significant role in the projects. However, this means that market parties are involved in a later stage and can no longer apply certain ideas to the new initiative because the project is more specified than in the early phases.

Eventually, the research results show us that two public organisations show two different approaches of how organisational ambitions can be strategized on the project level for a new initiative (in this case circularity) during the preparation of procurement before approaching market parties. In addition, previously explained strategies can be generalised for other new initiatives in several situations. Therefore, both strategies discovered in the case studies can be applied to how organisational ambitions can be strategized on a project level by public organisations in other situations.

On the one side, a highly emergent strategy is preferred when it is acceptable to release the organisational boundaries and restrictions. According to the results, this is possible when the contextual factors (focused on the new initiative instead of circularity as shown in Figure 6.1) are highly related, but costs are not a priority. This results in a strategy in which organisational ambitions are translated into project objectives leaving a substantial space open for the market to innovate on the new initiative. Finally, during procurement, a market party is primary selected on its contribution to the new initiative.

On the other side, a partly deliberate and partly emergent strategy is preferred when it is a situation in which organisational boundaries play a significant role in the process. This research shows that this strategy is preferred when the contextual factors (focused on the new initiative instead of circularity as shown in Figure 6.1) are not highly related, but costs have a higher priority. This approach results in the definition of more specific measures on the new initiative. This means that market parties are allowed to innovate within certain boundaries set by the organisation. They want to achieve the project focused as much as possible on the new initiative by creating a strong incentive on this initiative in procurement besides the existing mix of elements like time and costs.

Future research can be conducted within more case studies on established innovative themes that are exiting on the market for a longer period of time. Therefore, more information (on different projects) is gained on the relation between strategies and contextual factors which is helpful to learn what should be applied for the circularity theme and new initiatives in general. In addition, it would be of significant value to measure the achieved level of circularity when projects are realised. Currently, both projects are not yet in the execution phase, and therefore the impact of both processes on the results of the project can not be measured. However, it would be of value for this research to compare the achieved circularity level of both projects and determine the impact of the different processes related to the used strategies.

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List of abbreviations

BBV: BovenBouwVernieuwing (superstructure renewal)

BPKV: Beste Prijs Kwaliteit Verhouding (best price quality ratio)

CE: Circulaire Economie (circular economy)

CPP: Circular Public Procurement

CB'23: Circulair Bouwen in 2023 (circular building 2023)

GPP: Green Public Procurement

I&W: Ministerie van Infrastructuur en Water (Ministry of Infrastructure and Water)

KCI strategy: Klimaatneutrale en circulaire infrastructuur strategie (Climate neutral and circular strategy)

MIRT: Meerjarenprogramma Infrastructuur, Ruimte en Transport (Program Infrastructure, Space and Transport)

OTB: Ontwerp Trace Besluit

OVS: Ontwerpvoorschriften (Design regulations)

RWS: Rijkswaterstaat

SPP: Sustainable Public Procurement

TB: Tracebesluit

WVL: Water, Verkeer en Leefomgeving (Water, Traffic and Living environment)

If the abbreviation is in Dutch, the English translation is given in the brackets at the end

1
Introduction

In this chapter, an introduction is given to the subject of this research. Firstly, the bigger picture of the research is explained related to issues in circular economy experienced within the infrastructure industry globally and in the Netherlands (section 1.1). Afterwards, these issues are explored within the literature in section section 1.2. Literature shows that complexities arise within specifying on circularity during procurement, of which the front-end planning phase is of significant influence. Subsequently, the focus of the research is described based on this problem discovered in literature (section 1.3). Associated to this focus, research questions are formulated on which the research is divided step by step (section 1.4). The value of this research towards science, practice and social, is clarified in the subsection about relevance (section 1.5). section 1.6 shows the related subjects that are essential to include in order to make the boundaries and the focus of the research clear. Finally, the entire research strategy is clarified which shows how valuable results are achieved (section 1.7), and the thesis structure including research steps are described section 1.8.

1.1. The bigger picture: circular ambitions in the infrastructure industry

Worldwide, more and more natural resources are used by the human population in relation to the increasing income and growing population. This means that the scarcity and costs of material resources is increasing and a part of the materials might be lost for future use. The circular economy (CE) provides the opportunity to address this issue by reducing the carbon footprint, the use of natural resources and protecting material resources (Adams, Osmani, Thorpe, & Thornback, 2017). Thus, CE helps to keep materials in circulation and maintain their value in the long term (Hart, Adams, Giesekam, Tingley, & Pomponi, 2019). Therefore, an increment of attention is given to CE in policy agendas of many countries to solve these problems in patterns of consumption and unsustainable production (Alhola, Ryding, Salmenperä, & Busch, 2019).

The infrastructure industry is an industry that causes a serious threat to sustainability as it consumes a large amount of energy, resources and materials. Nevertheless, it is possible to address this issue by recycling construction materials and use second-hand construction materials. By re-using materials, there is less production of new materials needed and CO2 emissions are saved (Liu, Schraven, de Bruijne, de Jong, & Hertogh, 2019). So, CE could play a major role in reducing the influence of infrastructure on our future environment.

As the Netherlands is currently facing a big challenge to optimize and maintain its infrastructure network, the CE is a highly discussed theme. Minister van Nieuwenhuizen (2018) explains it is aimed to expand the infrastructural network, rejuvenate, renew, and preserve existing infrastructure. Therefore, there will be focused on the extension of the infrastructure asset's lifetime and the application of new techniques to renew the construction so that it meets the requirement of current and future use. Each year the government lays down their investments in the Dutch infrastructure network in a document called MIRT (Meerjarenprogramma Infrastructuur, ruimte en Transport). Since 2016, sustainability is part of all net researches, explorations and plan designs within the MIRT. There will be especially put effort into climate, circular economy, sustainable mobility and climate adaptation (Rijkswaterstaat, 2019a). As a result, there is another report called 'Preserving MIRT' (Ministerie van Infrastructuur en Waterstaat, 2020a) in addition to the MIRT. This report advises on applying sustainability measures into the MIRT-projects and achieve results on sustainability. The report highlights that the resources required for the construction of infrastructure consist of large amounts of stone, concrete and steel. In the report it is explained that the construction of infrastructures produces a substantial amount of pollution and waste during extraction, transport and operation of these constructions. Therefore, addressing the environmental impact of these projects is of great importance.

From the year 2030 onward, the Ministry of Infrastructure and Water (I&W) aims to work climate-neutral and circular. This means 100% C02 reduction, high-quality reuse of all materials, and 50 % less primary building materials. Therefore, I&W defined goals in cooperation with their executing organisations: Rijkswaterstaat (RWS) and ProRail. In the year 2030 RWS works circular and all their infrastructure projects are climate-neutral. Furthermore, in the year 2050, the infrastructure projects of ProRail are climate-neutral and circular (Ministerie van Infrastructuur en Waterstaat, 2020b). Aligned to this, the government aims to achieve a circular economy in the Netherlands for the year 2050. Such an urgent challenge of great magnitude provides major market potential because it offers many new opportunities. Considering the economic perspective; demand for new products, services, and new knowledge will emerge within all related parties (Transitieteam Circulaire Economie, 2018).

To achieve the goal of the Dutch Government related to circularity and prevent more impact on the environment, changes are needed in the infrastructure industry. This means that there is a higher pressure on public organisations to achieve a circular economy within their strategies and projects, such as replacing and renovating existing infrastructure. As a public procurer, like RWS and ProRail, it is possible to strongly influence the selection of components and materials related to the economic perspective. They can stimulate and create demands for a product that contributes to CE by including it in their procurement (Alhola et al., 2019). Witjes and Lozano (2016) agree and argue that CE addresses economic growth while considering the scarcity of energy and materials and initiating new businesses. For the public procurer, there is the opportunity to add more circular value to the market by challenging contractors to develop themselves in the area of CE. However, circular purchasing asks for a different view on asset management, where value creation is of higher priority. Therefore, a different mindset on how to handle the practical performance of a procurement question is needed. For instance, when the construction is designed modular and detachable, the elements and materials maintain a part of their value in the end phase due to re-usability. However, these designs can lead to high upfront investments costs which can be a barrier to create a circular design. In other words, other principles are becoming more relevant in procurement strategies that can add value to enable circular economy principles (Hart et al., 2019). However, because little knowledge is available on circular constructions, difficulties arise in implementing previously mentioned principles in procurement.

Nevertheless, as explained by the Secretary of State, procurers within the National Government can accelerate the development towards a sustainable transition by using their purchasing power (van Veldhoven-van der Meer, 2020). To achieve this, public organisations need the market to realise their own ambitions and goals. Public organisations can stimulate these innovations from the market by timely and precisely pointing out their view on the circular economy and how to address this (van Olst, Nagel, & Schut, 2020). However, because of the developing and changing character of circularity, challenges are experienced to realise these organisational ambitions in their projects and make formulate clearly towards markets what is required from them on challenging subjects as circularity.

1.2. Literature problem analysis

As explained in section 1.1, the infrastructure industry can have a strong influence on the increasing demand for natural resources when working towards a circular economy system. Therefore, besides the challenge to replace and renovate, it is the ambition that infrastructure projects also consider our future generations and work as sustainably as possible, including a circular way of working. To make this possible, market parties are needed to come up with innovative solutions. However, being clear about what is required from market parties concerning these circular innovations from a public procurer's point of view takes some challenges.

1.2.1. Public procurement to achieve circular ambitions

Previously described ambitions on making a more sustainable infrastructure sector have a high impact on constructing and maintaining the infrastructure. Therefore, the industry faces an enormous transition. CE plays a significant role in this transition towards sustainable working. According to the research of Alhola et al. (2019), there are opportunities in promoting CE in the construction industry through investments and public procurement. However, Alhola et al. (2019) highlight that despite public procurement has been playing an essential role in the CE transition; it is not yet fully exploited. For example, a lack of indicators can track progression on circularity, leading to misunderstandings and contradictions. This causes challenges in the formulation and implementation of strategies in the circular economy (Rincón-Moreno, Ormazábal, Álvarez, & Jaca, 2021).

These issues are important to address because public procurement is an economic activity of high im-

portance for the government (Brammer & Walker, 2011). Uyarra, Edler, Garcia-Estevez, Georghiou, and Yeow (2014) agree and add that public procurement can stimulate innovations in the private sector or add value to the initiation of new markets. This stimulation towards the market is needed to work towards a circular economy because public organisations have purchasing power. As a result, they can promote the demand for sustainable services and products (Walker & Brammer, 2012). Moreover, research by Amann, Roehrich, Eßig, and Harland (2014) on the contract awards shows that embedding social and environmental policy objectives has the outcome of bidders including these essential criteria in their offer. In other words, integrating social and environmental policy objectives, if integrated as requirements, can improve the quality and effectiveness of Circular Public Procurement (CPP) results. As argued in the report of PIANOo (2017), if it is aimed to be successful in achieving formulated ambitions, it is needed to take along the market, the environment and the organisation in these ambitions.

Elphi Nelissen, chairman of the transition team circular building economy, explains that a public procurer has an important responsibility to consider the circular principles during the procurement process. For public procurers, the task is to perform as 'launching customer' to challenge the market and to realise the upscale of circularity. The more circular questions arise on the market, the more advisors, contractors and suppliers focus on circular developments (Van Oppen & Bosch, 2020). In line with this, Sönnichsen and Clement (2020) argue that pressure from the government towards circularity is one of the most critical direct factors that can influence CPP results.

As shown in section 1.1, there is a certain pressure from the Dutch government considering the circular ambitions for the year 2030 and 2050. According to Van Oppen and Bosch (2020), it is important to be clear about these formulated ambitions and what is needed from market parties to realise them. Moreover, the ambitions of collaborating parties must correspond with each other to realise circular procurement successfully. This starts with a clear formulation of an organisation its ambitions for a project (Van Oppen & Bosch, 2020). Sönnichsen and Clement (2020) agree with this and add that to realise CPP, many parties are involved on which full engagement and a clear vision of all parties is required.

1.2.2. High influence on specifying procurement: the front-end planning phase

Taking a closer look at procurement and delving into the process of specifying clearly on circularity, circularity can be expressed in a way how the government's ambitions are finally translated into criteria and preconditions on which a public party can select a contractor. Therefore, during the procurement process, it is crucial to have a clear view of these criteria (Lenferink, Tillema, & Arts, 2013). In addition, they describe that one of the challenges to implement a strategy is the difficulty of defining sustainability, or circularity, and subsequently translating it into clear performance objectives. However, in practice, there might not always be a clear view of the situation. For example, it is sometimes unclear which innovations are highly needed in a certain period and which requirements align with these innovations when they are ready for the market (van Olst et al., 2020). When these requirements remain unclear, it is hard for involved parties, like contractors, to understand the requirements of a project.

The point of attention for potential sustainability gain in relation to procurement takes place during the specification of the project as shown in Figure 1.1. This figure shows the preparation phase's connection and importance of the first phase of the procurement process: 'specifying'. 'Specifying' is the phase in which the specification of the purchase is established and defined as 'what will be purchased'. Therefore, there is still flexibility in determining what is included within the purchase before the end of this phase. This makes the 'preparing phase' of procurement the phase with the highest sustainability gain and, therefore, the most critical phase for this research. This phase is also called the 'front-end planning phase', 'pre-project planning phase', and 'scope definition phase' within the literature focused on formulating the project characteristics (Construction Industry Institute (CII), 1995; Esnaashary Esfahani, Rausch, Haas, & Adey, 2020; Fageha & Aibinu, 2014; Too, Le, & Yap, 2017; Wang & Gibson, 2017). Thus, without formulating circularity clearly from the start, difficulties can arise in the next steps in the project and the probability of integrating circularity within procurement decreases.

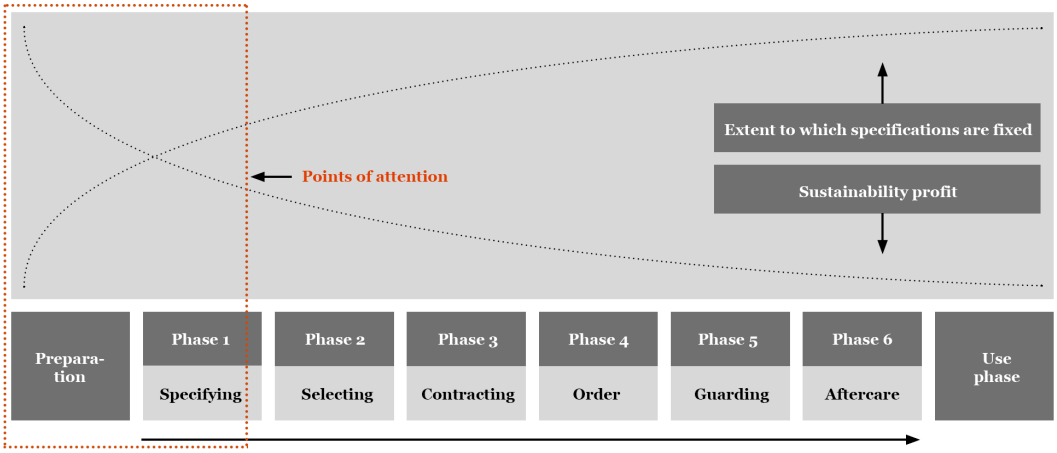


Figure 1.1: Potential sustainability gain in relation to the procurement process (adapted figure based on Ministerie van I&M and Ministerie van BZK (2013))

1.2.3. Problem statement

To summarise, the infrastructure sector is an industry that uses a significant number of material resources. Therefore, working towards a circular economy system can help decrease this number. High ambitions are defined by the Dutch government and public organisations in which procurement can play an essential role in achieving these ambitions. However, circularity in public procurement is a new challenging field in both practice and academia, and there is a lack of insights into these dynamics within the field. As a starting point, to realise circular procurement in practice, ambitions need to be clearly formulated for a project. However, this is not yet explored enough, and how to deal with the challenging ambitions in projects is still unanswered. Knowledge on factors influencing the procurement process is limited, and insights are needed, especially when focused on circularity insights.

The origin of these difficulties arises from the early starting phase in which the vision and ambitions of a project are formulated; the front-end planning phase. If ambitions on sustainability and circularity are insufficiently defined, they will remain unclear, and these ambitions will remain unanswered. Therefore, the problem statement of this research is: the lack of empirical insights into the dynamics of strategizing circular organisational ambitions on a project level disturbs the formulation of clear project requirements on circularity within a project that are used in procurement to achieve CPP successfully.

1.3. Research objective

Due to limited information and literature on circularity within the infrastructure industry and related to procurement, the research is of a descriptive and explorative character. As previously explained, public procurement can contribute to achieve ambitions on circularity in which the frond-end planning phase plays a significant role before circularity is specified. Therefore, this research aims to give empirical insights and extent knowledge in what the strategy is of public organisations when developing their circular ambitions towards a more concrete definition that can be used on real-life projects with respect to procurement. This means that the researcher wants to explore how this is experienced in daily practice by practitioners in real-life projects.

As explained by Kroll (2019), the process of translating ambitions on a high level (related to innovation policies) into practical actions and measures is seen as a complex process of interpretation and negotiation. Therefore, difficulties remain in the evaluation of transforming strategies focused on innovation if there is no improvement in our understanding of how far strategy ambitions result in practical implementation in reality and where this is failing (Kroll, 2019).

1.4. Research question

Based on the literature problem analysis and research objective, a main research question and related sub-questions are formulated. Every sub-question contributes to the main research question and for each question the goal of the question is explained.

Main research question: *How do public organisations strategize organisational ambitions on the project*

level for new initiatives during the preparation of procurement as exemplified by two projects with circularity as representation?

Sub-question 1: *What are important characteristics of strategizing organisational ambitions on the project level in relation to public procurement with circularity as representation?*

By answering this question, it is the goal to define which characteristics are discussed in the literature on strategizing circular organisational ambitions on the project level with respect to procurement. Information from the literature needs to be gathered to understand what is required to define circularity within procurement and have knowledge of leading strategy theories related to this research. Therefore, by answering this question, a theoretical background is created that presents the research's foundation and clarifies the scope before executing research.

Sub-question 2: *How to analyse the strategizing process of circular organisational ambitions on the project level in relation to procurement?*

As the first sub-question shows *what* characteristics represent strategizing of organisational ambitions on the project level. The second sub-question is related to *how* this should be analysed. The second sub-question aims to give an answer about the methodology of the research and how the research will be executed. By answering this question, the case study research method can be explained, which is required to analyse the process and how valuable data can be collected from case studies.

Sub-question 3: *How are circular organisational ambitions strategized on the project level in relation to procurement within the BBV Zeeland (ProRail) and A1 phase 2 (RWS) project?*

Following the methodology defined in sub-question 2, it is possible to analyse real-life projects in the next step of the research. This question is focused on conducting empirical research within two projects aiming to explore how the circular organisational ambitions are strategized on a project level in a daily practice experienced by practitioners. Therefore, this research question aims to show results that explain how circular organisational ambitions are used nowadays in real-life projects focused on circularity.

Sub-question 4: *What are the implications of findings when comparing the BBV Zeeland (ProRail) and A1 phase 2 (RWS) cases on how both cases strategize circular organisational ambitions on the project level?*

Eventually, it is possible to determine the most important findings within both case studies. With the help of this question, the implications of these findings are discussed based on its consistency with the literature and what these findings mean in relation to this research.

1.5. Relevance

1.5.1. Scientific relevance

In section 1.2, literature shows that the field of circular public procurement is complex and still developing. Several studies have been conducted on public procurement and the importance of including circularity to achieve circular ambitions. However, empirical research is still missing about what currently the strategy is to achieve circularity in this process. This issue is shown by one of the latest publications on circular public procurement by Sönnichsen and Clement (2020). Sönnichsen and Clement (2020) argue that empirical evidence and literature is limited on the public procurement process to enhance the circular economy. Better insights on the effective impact and dynamics in the processes can be gained by more empirical evidence on what influences the procurement process focused on including circular principles.

In addition, in the research of Stritch, Bretschneider, Darnall, Hsueh, and Chen (2020) it is argued that through procurement, more and more sustainability objectives, like circularity, are pursued these days. This increase in number of sustainability objectives makes the procurement process and tasks increasingly complex. Moreover, they highlight the difficulties in implementing sustainability objectives in the procurement

process because they involve unclear performance results and evaluation criteria that can lead to conflicting and complicated outcomes. Therefore, the scientific relevance of this research is that this study adds empirical evidence from real-life projects on what influences the procurement process and the defined performance requirements with circularity as representation.

1.5.2. Practical relevance

As highlighted by Platform CB'23 (2021), a group of experts that wants to define clear agreements on circular constructing, the construction sector needs to change. Public procurers should adapt their assignments given towards the market and consider circular principles in their procurement strategies. In one of their latest publications on circular procurement, it is argued that it is unclear how the transition towards a circular construction industry should look like and that this is still a quest. They argue that an important step is to merge ideas and define clear arrangements. These arrangements can include circular thinking in daily practices. This research can add valuable insight on how circularity is arranged in daily practice by analysing real-life projects and explore how circular organisational ambitions are strategized in these projects.

Circular ambitions for public organisations in the infrastructure industry

Considering the public organisations' point of view, it is a challenging task to replace and renovate a large part of the infrastructure as already highlighted in section 1.1. In addition, it is the goal to focus on sustainability while doing this, and in 2030 it is the goal to use 50% less primary materials. These ambitions are challenging, and the answer 'how' to achieve this in projects is not yet answered.

Parallel on this is I&W working on a strategy to achieve a circular and climate-neutral infrastructure (KCI strategy) (Ministerie van Infrastructuur en Waterstaat, 2020b). The two largest Dutch public organisations in the infrastructure industry, RWS and ProRail, are included in this strategy and defined their organisational ambitions in relation to the strategy. In this strategy, policy ambitions are translated into realisation and thus projects, as visualised in Figure 1.2. Because the C02 emissions differ for each type of infrastructure, transition routes are made that represent these different types of infrastructure. Eventually, these different types of infrastructure include different projects in which ambitions need to be realised. As highlighted by PIANOo (2017) this organizational commitment is essential. They explicitly mention that ambitions, like innovation and sustainability in the strategic policy, help to make the translation towards practice possible and achieve these ambitions in the projects. However, this strategy does not yet clearly explain how these organisational ambitions can be used in projects so that the requirements on circularity for the project can be easily defined and communicated towards the market. Therefore, this research is of practical relevance because two projects of both RWS and ProRail are analysed to explore how they defined circularity on the project level and what their underlying strategy is. Knowledge gained from these projects can add valuable insight from practice to the KCI strategy.

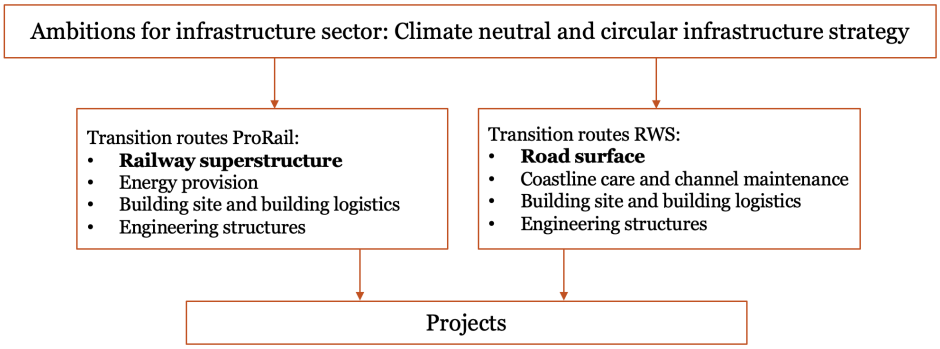


Figure 1.2: Transition routes of climate neutral and circular infrastructure strategy (own illustration based on Ministerie van Infrastructuur en Waterstaat (2020b)

1.5.3. Societal relevance

This research also contains a social aspect and contributes to social relevance because of the focus on strategizing circularity. As already highlighted, the carbon footprint and use of natural resources can be reduced by working towards a circular economy. Based on the report of Rijksoverheid (2019) it can be established that, as shown in external research on the impact of procurement, the infrastructure industry is a high impact

group for procurement (see Figure 1.3). Considering circularity, the infrastructure sector scores the highest on the impact with their use of materials. In other words, a substantial impact can be realised with the infrastructure industry. The segment of RWS-infrastructure is with ca. 612 kton C02 the biggest contributor to the C02-emission of I&W projects; within this part, the road network is the biggest contributor (especially road surface). The share of the ProRail-infrastructure contains ca. 115 kton C02, of which the superstructure contributes to most to the C02 emission (Ministerie van Infrastructuur en Waterstaat, 2020b).

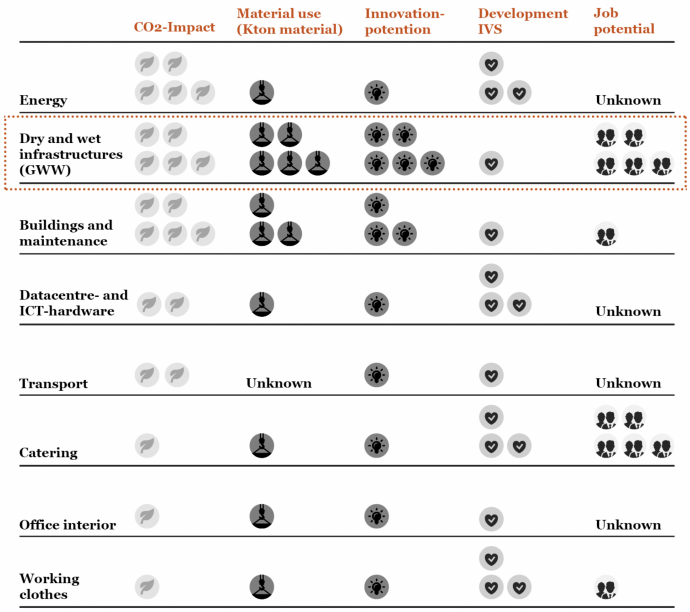


Figure 1.3: Impact of industries (Rijksoverheid, 2019)

The social impact that procurement can have by considering e.g. sustainability and circularity is explained in a strategy for public commissioning called 'Purchasing with Impact' (Rijksoverheid, 2019). The goal of this strategy is to positively influence the following social issues:

- Addressing the impact of climate change
- Accelerate the development towards circular (sustainable) economy
- Create job opportunities for people who are struggling with getting a job

Eventually, the research can not directly influence these social issues but it can contribute to one of the social issues (accelerate CE) by creating insights into how it is currently experienced within the practice and what can be crucial to focus on for future projects achieving a higher impact.

1.6. Research scope

In this section, the research scope is described to clarify the boundaries and focus of the research. As explained in the literature problem analysis, defining a project on circularity during the front-end planning phase can be complicated, which influences the specification during the procurement process. Therefore, this research focuses on the strategy used within public organisations to define circular organisational ambitions on a project level with respect to procurement. All related subjects are explained in the subsections below.

Furthermore, the research is conducted in cooperation with the Capital Projects & Infrastructure (CP&I) department (part of the Public Sector branch) of PricewaterhouseCoopers. Contacts from this department are used to search for appropriate projects that could be used in this research.

1.6.1. Dutch public commissioning

This research is written in the light of Dutch public commissioning because it is focused on the procurement of infrastructure projects within Dutch public organisations. The realisation of these infrastructure projects is mainly executed through public-private partnerships. In other words, the delivery of a project is most of

the time done through the collaboration of a public organisation with private market parties (Koops, Bosch-Rekveldt, Bakker, & Hertogh, 2017). Associated with this public-private partnership is public commissioning. Public commissioning is defined as how an organisation in the public sector shapes and executes their interaction with the internal and external market concerning their responsibilities in the building environment (Hermans, 2014). Public commissioning can be divided into three themes, including sub-themes, see Figure 1.4. The scope of this research is related to the theme 'Task' as the research aims to explore how, within real-life projects, circular ambitions from the organisation are steered (or strategized) towards the market on a project level task.

Figure 1.4: Themes of public commissioning (own illustration based on Hermans et al. (2018))

- **Organisation:** the degree in which an organisation has elaborated their strategy and policy in terms of public commissioning and approach towards the market, owns a culture that facilitates professionalism, innovation and renewing, knows how to organise leadership, steers in a specific direction and uses their Human Resources Management to professionalise this role.
- **Context:** the degree in which integral consideration about the market approach are central on portfolio level, the degree in which an organisation can show organisational developments to stakeholders and place them in an appropriate way in the process of commissioning, the degree in which an organisation achieves their social standards (culture, sustainability, social return, spatial quality) in their commissioning role and can understands how to handle their public play rules (integrity, transparency, effectiveness, legality).
- **Task:** the degree in which the commissioner knows the market, knows how to steer and collaborate with the market to achieve the best from the market and include the market effectively to realise own goals, the degree of competence to apply collaboration models in specific assignments and manage a project in an appropriate way.

National infrastructure projects: RWS and ProRail

Considering the infrastructure on a national level, two leading public organisations are functioning as the executive bodies of the Ministry of I&W. Therefore, the scope is related to projects in both organisations. As both organisations are included in the KCI strategy (Figure 1.2), circulars projects are existing within these organisations. This research focuses on a railway (ProRail) and road surface (RWS) project.

1.6.2. Circular economy

Besides the focus on infrastructure projects within the front-end planning phase with respect to procurement, the circular economy is the most challenging factor because of the unexplored field in the infrastructure industry and procurement field. The Ellen MacArthur Foundation defines the circular economy as *'one that is restorative and regenerative by design and aims to keep products, components, and materials at their highest utility and value at all times, distinguishing between technical and biological cycles'* (Ellen MacArthur Foundation, 2015, p.5). So, when purchasing in a circular manner, taking the project's life cycle into account during procurement is of great worth. Therefore, circular procurement requires several changes compared to 'regular' procurement. This change is partly required because circular solutions often require innovation and (chain) cooperation (Platform CB'23, 2021). However, as explained by Sönnichsen and Clement (2020), there is still a lack of insights related to dynamics that can enable the implementation of circularity within the procurement. Therefore, this research will only focus on projects that include circularity and take this of substantial value when approaching the market.

1.6.3. Strategy-as-practice

As this research has an explorative character and aims to discover how the circular ambitions of public organisations are strategized in projects in practice, strategy-as-practice theories can help to clarify an answer to this question. These theories can be conceived as close approaches to what is applied in practice and provide a tangible basis on which the research results can be laid down. Strategy-as-practice focuses on capturing an activity as it takes place in practice and can help understand how the organisational ambitions are strategized in projects. In addition, strategy-as-practice theories are focused on subjects related to an unstable environment. As circularity is characterised by an unstable environment, it is possible to determine the applied strategy in circular projects.

1.6.4. Front-end planning phase

In Figure 1.1 is shown that the 'preparing phase' of procurement is the phase with the highest sustainability gain and a critical phase for this research. Therefore, this research is focused on the front-end planning phase of a project. As shown in the research of Safa et al. (2013), see Figure 1.5, the front-end planning phase is related to the preparation of procurement. During the preparation of procurement, it is of significant value for practitioners to define what they want to achieve on the project level and formulate the project scope.

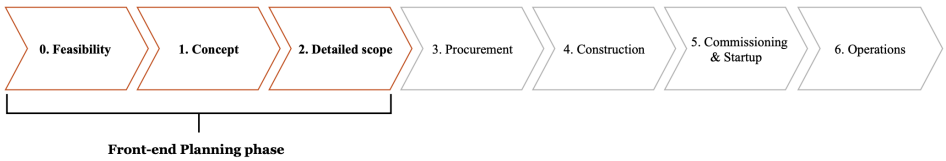


Figure 1.5: Focus front-end planning phase before procurement (own illustration based on Safa et al. (2013))

1.7. Research strategy

This section shows the approach of this research by explaining the main steps needed to execute the research and achieve valuable results. This strategy, besides the scope, is essential to define and achieve the research objectives. Because the research is empirical and of an explorative character focused on practical complexities, the research strategy aligns with these characteristics.

Literature study

The first step of the research strategy is to conduct a literature study on subjects related to 'infrastructure projects', 'circular economy', '(circular) public procurement', 'strategy-as-practice' and 'front-end planning phase'. The primary sources used for this literature study are Scopus, ProQuest Ebook Central and TU Delft repository. Parallel to this, an overview of literature will be created in Mendeley. Because CE in the infrastructure industry and procurement is currently developing, it is essential to focus on the most recent research and understand the latest developments in this field to determine what is important to focus on in this research. Moreover, in the end, a conceptual framework is created based on literature that shows the relations between the findings and clarifies the scope of the empirical research.

Research method: process research

This study makes use of the process research theory explained by Van de Ven (2007) within his book on 'Engaged scholarship'. This theory helps to analyse complex problems and create knowledge that contributes to both practice and science. With the help of his theory, it is possible to understand the problem and obtain advice and perspectives from multiple stakeholders. Because case studies combined with interviews are used in this research, the theory matches the characteristics of this research. The process research of Van de Ven (2007) is linked to the 'how' question used in this research and contributes to explore how a particular issue can develop over time. More information on why this method is applicable to this research can be found in chapter 3.

Empirical research: case studies

The research is of an explorative character and mainly consists out of qualitative methods. Explorative research means that the daily practice is aimed to explore and there is searched for patterns (Verschuren & Doorewaard, 2010). Qualitative research fits these features and focuses more on a comprehending approach

and explanatory character than quantitative research. In addition, the research questions of this research are related to practice-oriented issues, and a qualitative approach is beneficial to these issues in practice. A research strategy that fits this context is the strategy of case studies. By using case studies, it is possible to explore in great detail how methods are applied and executed in practice (Verschuren & Doorewaard, 2010). Data from these case studies are collected by document analysis and interviews.

Analysing results: cross-case comparison
Case study research is conducted on two case studies, of which one project within RWS and one project within ProRail are used as cases to execute in-depth research by doing interviews and case study analysis. Afterwards, both studies are compared to each other to explore and search for patterns with the help of a cross-case comparison. The cross-case comparison makes it possible to draw conclusions on the results of both case studies and generalise certain outcomes.

Research validation
As a final step in the research phase, the results of the research are validated. For this validation, two interviews are conducted; one interview with two infrastructure experts within PwC and one interview with an expert on infrastructure procurement within RWS.

1.8. Thesis outline

Firstly, chapter 2 presents a literature review on the characteristics of strategizing organisational ambitions on a project level within infrastructure projects with respect to procurement. Conducting a literature review helps to narrow down the research scope, which is shown in a conceptual framework at the end of the literature study chapter. Secondly, chapter 3 explains the underlying methodology of process research, including background information and provides information on how empirical research is executed with the help of interviews and case studies. Thirdly, chapter 4 shows the results of the case study research on both projects visualised in processes on which both case studies are compared to each other with a cross-case comparison. Afterwards, at the end of the chapter, the results of the research are validated by experts. Finally, the implications of the results are discussed in chapter 5, and conclusions are defined on the results in chapter 6. In the end, limitations of the research and recommendations for future research and practice are given. A summary of the chapters, including steps as described above, can be found in Figure 1.6.

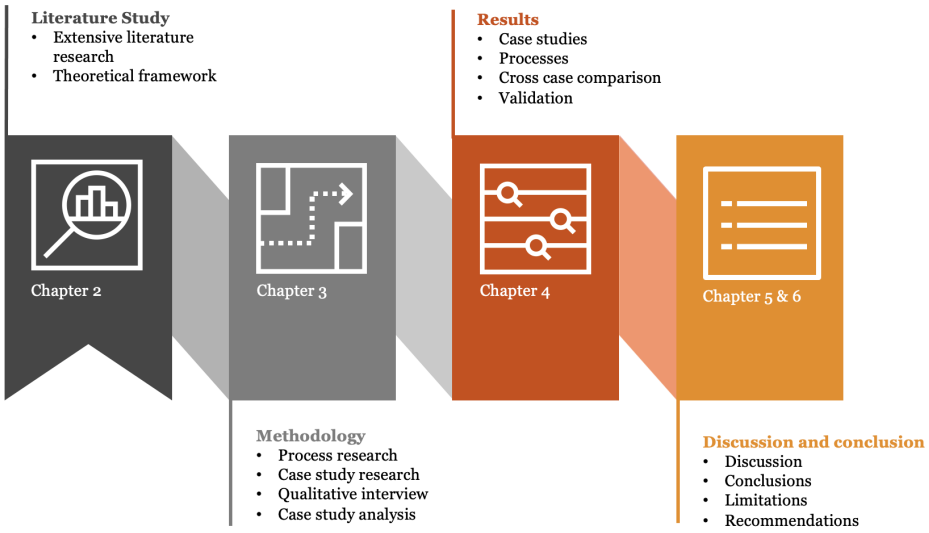


Figure 1.6: Thesis outline (own illustration)

2

Literature study

This chapter gives an answer to the first sub-question formulated in section 1.4: What are important characteristics of strategizing organisational ambitions on the project level in relation to public procurement with circularity as representation? An answer on this question is given by elaborating on the subjects included in this question. Firstly, the definitions and role of circular economy in the infrastructure industry are explained to understand the term CE on its own and applied in the infrastructure industry (section 2.1). Secondly, a view is given on the current challenges to include circularity within the public procurement process that plays a significant part in achieving organisational ambitions (section 2.2). Thirdly, an elaboration is given on defining project objectives during the front-end planning phase that can influence on specifying circularity during procurement (section 2.3). Fourthly, strategy theories are explored that shows the different ways of how circularity can be strategized on a project level (section 2.4). Afterwards, the features of the front-end planning phase are described to understand the main activities and steps of this phase. Finally, the conceptual framework summarises and connects the most important findings in the literature study (section 2.6).

2.1. Definition of circular economy in the infrastructure industry

As described by Kirchherr et al. (2017) many definitions are given in the literature, and the concept CE is for both practitioners as scholars of great interest. However, there is no widely accepted definition because of the developing character of the CE field (Adams et al., 2017; Kirchherr et al., 2017; Murray, Skene, & Haynes, 2017). In the research of Schraven, Bukvić, Di Maio, and Hertogh (2019) the definition of Kirchherr et al. (2017) is mentioned as the most encompassing definition to create an understanding on how to implement CE. Kirchherr et al. (2017, p.224) explain CE as *'an economic system that replaces the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes.'*

Most of the knowledge on CE has a broad focus, however, sectors differ from each other. The construction industry is characterised by a large number of materials and components that interact dynamically in time and space, extended lifespans and large numbers of stakeholders (Hart et al., 2019). In addition, the industry is not yet a well-developed market, including supporting systems for reuse and/or recycling if compared to industries that have more standard procedures as ICT, paper and metal products (Alhola et al., 2019). As this research is focused on the infrastructure industry, it is also of value to understand the commonly used definition of CE in the industry. I&W uses in their transition agenda CE for building- and infrastructure sector (Rijksoverheid, 2018) the definition of *circular building* defined by Platform CB'23. Platform CB'23 (2020) focuses on the creation of a straightforward transition towards a circular building economy and defines *circular building* as the following: development, use and reuse of buildings, areas and infrastructure without exhausting natural resources, pollute the natural environment and affecting ecosystems. So, building in an economically responsible way that adds value to the well-being of humans and animals.

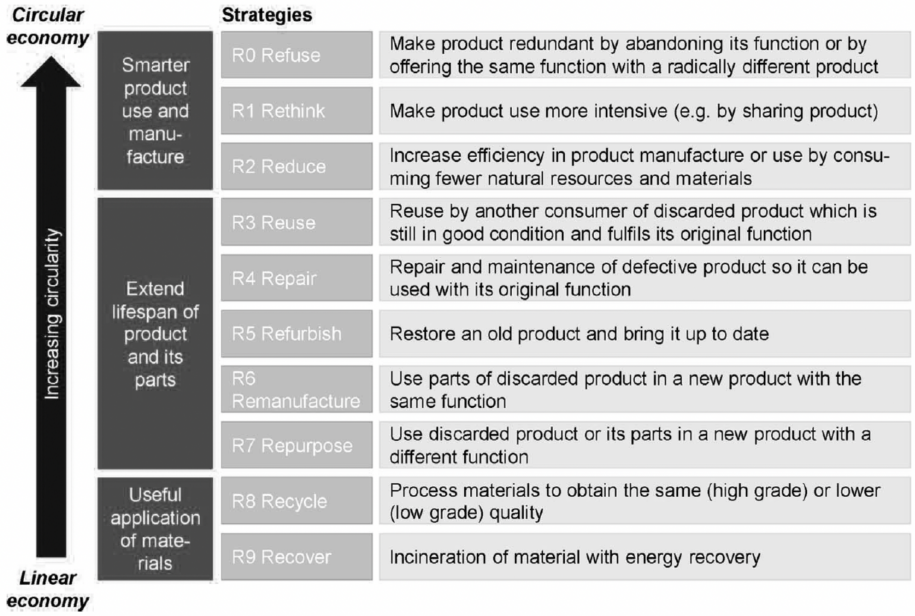


Figure 2.1: The 9R Framework on different circularity strategies (Kirchherr et al., 2017)

To measure the level of circularity, the 9R Framework explained in the article of Kirchherr et al. (2017) can be used. This framework is adapted from the framework of Potting, Hekkert, Worrell, and Hanemaaijer (2017). As Potting et al. (2017) explain in the report 'Circular economy: measuring innovation in the product chain', the framework is developed to determine the type of information and role of innovation that need to be gathered when measuring the CE transition progress within the chains of products. They explain that in a circular economy, materials keep their quality when recycled from a discarded product because the materials can be used again in a similar product. This means that natural sources are not needed anymore to produce materials, and discarded products can be reused and do not become waste. This avoidance of producing materials and extracting resources benefits the environment. The product chain is a closed-loop, and it is possible to apply materials over and over again, called the 'ultimate circularity' by Potting et al. (2017) on which the framework is based. However, this ultimate circularity by using a product repeatedly is the ideal situation and does not have a high probability of feasibility in practice.

Nevertheless, it is feasible to achieve a certain level of circularity. In the 9R framework there is a 'waste hierarchy' shared by all the varieties in which the first R is a priority to the second R and so on. This principle finds its basis looking at the writings of cradle-to-cradle (Kirchherr et al., 2017). As Potting et al. (2017) explain, the framework contains different circularity strategies that are focused on minimising waste production, reducing the level of consumption of materials and natural resources. These strategies are ordered on priority related to the circularity level, the 'waste hierarchy'.

2.2. Circularity in the field of procurement

As explained in subsection 1.2.1, procurement is an important instrument to realise circular ambitions in which, especially in the infrastructure sector, public organisations have a large purchasing volume (Platform CB'23, 2021). This section elaborates on the inclusion of circularity within the field of procurement, considering the latest research that shows the most remarkable characteristics.

The goal of circular procurement is deploying the procurement process to accelerate a transition to a CE (Platform CB'23, 2021). As explained in section 2.1 is CE in the construction industry a relatively new concept that is not (yet) fully exploited. Ritzén and Sandström (2017) explain that the change and adaptation of working towards a CE are developing. The same situation occurs for circular public procurement, which is in both practice and academia a new challenging field (Sönnichsen & Clement, 2020). Therefore, innovation is important because circular solutions are not (yet) standard. The innovation characteristic makes it essential for circular procurement to leave space open for innovative solutions or new initiatives (Platform CB'23, 2021).

However, there is a lack of considerable insights concerning institutional and managerial dynamics that

can enable circular procurement implementation and support. The research of Sönnichsen and Clement (2020) provides insight into the development and implementation of circular procurement processes. In their research they explain that empirical research on circular public procurement is still missing in the academic field. Nevertheless, the field of procurement related to sustainability is more developed and receives its status as it addresses social and environmental challenges by activities in public procurement. Therefore, research conducted on circular procurement is based on two other procurement types focused on sustainability, namely 'Green public procurement' and 'Sustainable public procurement'. Sönnichsen and Clement (2020) give in their article the definitions of all three procurement types based on the European Commission and United Nations definitions.

- **Sustainable public procurement (SPP)**: "a process whereby organisations meet their needs for goods, services, works and utilities in a way that achieves value for money on a whole life basis in terms of generating benefits not only for the organisation, but also for the society and the economy, whilst minimising damage to the environment" (United Nations Environment Programm, 2013, p.11).
- **Green public procurement (GPP)**: "a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured" (Commission of the European Communities, 2008, p.4).
- **Circular public procurement (CPP)**: "the process by which public authorities purchase works, goods or services that seek to contribute to closed energy and material loops within supply chains, whilst minimising, and in the best case avoiding, negative environmental impacts and waste creation across their whole life-cycle" (European commission, 2017, p.5).

These three procurement types increase the complexity level of public procurement compared to a procurement process that is only based on a purchase principle of the lowest upfront price. An increasing complexity causes a more difficult decision making in procurement. In addition, even without considering circularity, public procurement regulations have usually been typified by a considerable tension related to social, environmental and ethical aspects in practice. This tension is in many cases between the goal of other considerations about social and environmental objectives (like sustainability and circularity) and considerations in budget (Schebesta, 2018). When these tensions maintain, and objectives on sustainability remain vague, the other factors included in this tension obtain more attention (Lenferink et al., 2013). This might result in a lower focus on sustainability.

Haddadi, Mourabit, and Haddadi (2021) explain that wrong choices and insufficient decision making in the procurement process is higher when in-depth knowledge of the purpose and logic behind the prescriptions is missing. An efficient decision-making process is one of the main objectives during procurement for the government. An efficient decision making supports the provision of public services and goods in time and adds value to accomplish the related public commitments. Most of the time, efficiency is an element on which procurement is assessed which is related to the question of whether the process is creating the most out of available resources (Gunasekaran, Patel, & McGaughey, 2004; Tersine & Hummingbird, 1995). Moreover, Stritch et al. (2020) argue that the current knowledge on factors that are affecting the efficiency of the procurement process is limited. This is particularly when multiple policy objectives want to be achieved simultaneously.

2.2.1. Facilitating circularity in procurement strategies

According to Testa, Annunziata, Iraldo, and Frey (2016), the contribution of CPP to developments in sustainability depends on the path that local and public authorities take. This path can enable the integration of CPP goals into the organization by making changes at an operational, managerial and cultural level and creating awareness of strategies in CPP. One of the most critical factors that facilitate these CPP strategies is organised support in the top management based on their knowledge and corresponding influence. Brammer and Walker (2011) mention that leadership, for instance, is of great importance when implementing CPP in public sector organisations. The purchasing team has a higher chance of implementing circularity in public procurement if the top management supports CPP and integrates the complementary strategies and objectives. PIANOo (2017) agrees and adds that organizational commitment is essential and helpful if ambitions like circularity are explicitly mentioned in their policies. By doing this, organisations can make a step in their professionalising in circularity and applying ambitions in projects. Eventually, procurement is not a phase on its own but connected to managerial visions and strategies applied by the organisation.

Thus, from a practical and academic view, it is known that they are trying to specify and include circularity within procurement. In addition, there is a definition of including circularity within procurement; circular public procurement. This definition describes the relation between circularity and public organisations within procurement and is related to sustainable procurement. However, circularity in the field of procurement is not yet explored enough and the question of how to deal with the challenging ambitions in the process is still unanswered. From the literature on circular procurement, it can be concluded that the inclusion of circularity within procurement is not fully developed. Knowledge on factors influencing the procurement process and associated strategy is limited, so insights are needed.

2.3. Specifying on project level: project objectives

As already explained in subsection 1.2.1 and shown in Figure 1.1, the preparing phase towards specifying on procurement (in this research associated with the front-end planning phase) is crucial for the probability to include a circularity focus successfully before criteria are specified. However, when specifying a subject related to sustainability, complexities might arise. In the research of Stritch et al. (2020) it is argued that more and more sustainability objectives are pursued within procurement these days, which makes the procurement process and tasks increasingly complex. They explain that the number of sustainability objectives increases the complexity of the procurement process, leading to more time required to complete the tasks within the process. Besides, they highlight the difficulties of implementing sustainability objectives in the procurement process because they involve unclear performance results and evaluation criteria that can lead to conflicting and complicated outcomes.

When in-depth knowledge of the purpose and logic behind prescriptions is missing, the probability of making improper choices and insufficient decision making in the procurement process will be higher (Haddadi et al., 2021). Therefore, the phase before specifying on procurement, in which these project objectives are defined, is essential for clear definitions during procurement. This phase is referred to as the front-end planning phase in this research. In the front-end planning phase, the project's scope, including project objectives, is defined.

2.3.1. Project objectives within the project scope

As shown in the literature, project objectives are part of the project scope (Esnaashary Esfahani et al., 2020; Fageha & Aibinu, 2014; Mirza, Pourzolfaghar, & Shahnazari, 2013). Therefore, the project scope is important for this research to shortly discuss. The project scope consists out of major tasks, deliverables and objectives of the project. As Nicholas and Steyn (2017, p.43) explain, an objective is *'a more-detailed, usually quantifiable statement of purpose pertaining to some aspect of the system*' (or in this research; the project). By achieving this group of objectives, the overall goal can be met. Furthermore, these objectives can be broken down into requirements which are more specific and detailed objectives. The requirements can be seen as specific criteria on which the system needs to perform to meet the objectives and goals (Nicholas & Steyn, 2017).

2.3.2. Influence of defining project objectives in the front-end planning phase

Industry studies consistently correlate project performance with the quality of front-end planning (Construction Industry Institute (CII), 1995). The definition of project objectives takes place in this phase and is, according to Mirza et al. (2013), a critical activity for the project. Therefore, it is important to spend enough time in the starting phase of a project to achieve agreements on these critical activities before requirements are written down. The book of Morledge and Smith (2013) has the goal to give insights and establish factors that are influencing the procurement of construction projects. In this book, project objectives are defined as an influencing factor in the procurement process. In addition, the front-end planning phase is described as an essential phase for successful procurement. Moreover, future strategies and decisions are driven by the decisions taken in this phase. However, they argue that in many projects, insufficient thought and time is given to this phase, resulting in poorly defined project objectives.

Criteria as cost, time and quality play a prominent role in the traditional process of considering and defining project objectives because these three are known as the 'iron triangle' for decision making in projects (Atkinson, 1999; Papke-Shields, Beise, & Quan, 2010). In the article of Gilbert Silvius, Kampinga, Paniagua, and Mooi (2017) is explained that the 'Quality' of this triangle is the most important factor related to decisions made on sustainability. Therefore, circularity is mainly related to the criteria quality. However, it is challenging that a significant amount of other elements can play a role within this criteria, resulting in a lower level of attention given to circularity (this in addition next to the criteria time and cost).

It can be concluded that researchers have recognised the definition of project objectives as an activity that can influence the outcome of the procurement process. This recognition by researchers confirms the importance of defining project objectives in the front-end phase that is in relation with the figure shown in Figure 1.1. Eventually, the definition of these project objectives can be seen as a process that takes place during the front-end planning phase.

2.4. Strategizing new initiatives as circularity

In the previous sections, it became clear that circularity is a new concept that is still developing in the infrastructure industry and procurement field. In addition, besides circularity, other aspects also play a role that might overshadow circularity, especially when circularity is experienced as a complex aspect. This research aims to explore how organisational ambitions are strategized on a project level. As shown in previous section, this can be perceived as a process. In particular, about the process of organisational ambitions towards project objectives.

Existing theories explain strategies about how to handle complex and changing processes like these. In this section, these theories are explored to show which strategies that can be applied in practice. As this research seeks to answer how a certain process is developed in practice to discover patterns, it is of value to understand which existing strategies can be recognised in the case studies' practical processes. Knowing these theories makes it possible to determine what the applied strategy of practitioners within the project was when strategizing organisational ambition on the project level. Theories are of great value because they include the basic assumptions that can be made about relationships within business practices. A theory can tell what should be looked out for while executing research, what should be the first steps and what to expect (Whittington, 2001).

2.4.1. Strategy-as-practice

As highlighted by Venkateswaran and Prabhu (2010), strategy-as-practice focuses on finding a way to capture an activity as it takes place and on which it is required to *'go out and look'* to find this. In addition, the research can help to understand a complex phenomenon in process terms. Within the process of strategizing, it is required to map individual and organisational activities (Venkateswaran & Prabhu, 2010). Because real life projects of significant complexity are researched in this research due to circularity, using a strategy-of-practice theory can help understand these practical processes.

However, the theories related to strategy-as-practice are diverse. In the research of Golsorkhi, Rouleau, Seidl, and Vaara (2015) seven central themes within strategy-as-practice research are highlighted, of which the theme 'discursive aspects' is mainly related to this research as this theme concerns the reasoning and logic aspects of the research. Moreover, the discursive aspects of strategies are also divided into different theories. However, it is of value for this research to have a theory that can explain the reasoning behind the practical process.

2.4.2. Deliberate vs emergent strategy

Van de Ven (2007) explains that a process can be seen as a narrative that describes how things can develop and change. Exploring literature that explains the roles of narratives within the 'discursive aspects' theme of strategy-as-practice gives us the theory of Mintzberg and Waters (1985). This theory is focused on patterns within organisational actions that can be related to strategy (Fenton & Langley, 2011). Therefore, this makes the theory of Mintzberg and Waters (1985) one of the strategy-as-practice theories that give insights on how a strategy, focused on a process in practice, can be performed and explained. The theory of Mintzberg and Waters (1985) is of great value to determine the applied strategies because research in this study is conducted on a practical process realised within two organisations. Mintzberg and Waters (1985) explain that the formation of strategy is associated with an analytic process to establish goals in the long-term for an organisation. They argue that it is needed to view this process from a wider perspective to consider the diverse ways strategies can take in practice. By doing this, attention needs to be paid to the relation between the intentions and plans (intended strategy) and what is done by the organisation (realised strategy). By comparing these two strategies, the deliberate strategy (realised as intended) and the emergent strategy (pattern realised despite, or while missing, intentions) can be distinguished from each other (see Figure 2.2).

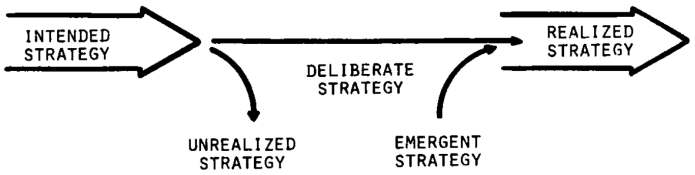


Figure 2.2: Types of strategies (Mintzberg & Waters, 1985)

Mintzberg and Waters (1985) highlight different strategies in their article, varying from strategies mostly related to deliberate towards strategies mostly related towards emergent. The primary difference between the deliberate and emergent strategy is that a deliberate strategy is focused on controlling and directing. In contrast, the emergent strategy is more focused on learning what works (willing to learn). Therefore, a deliberate strategy has the intention of setting certain intentions and not adapting them. This in contrast to the emergent strategy that is focused to search for a certain feasible pattern or consistency and to take one action at a time explained by Mintzberg and Waters (1985) as an *unintended order*. Therefore, an emergent strategy is more related to a complex or unstable environment in which it is essential to be flexible, open and responsive.

Because of these multiple varying strategies and focus on practice, this theory is appropriate for this research. Circularity shows characteristics that make it interesting to explore with this strategy. Currently, circularity is developing in the infrastructure industry and this developing character of circularity matches the emergent strategy. The emergent strategy shows a more unstable environment and complex to comprehend, which makes it possible to act before an aspect as circularity is fully understood (Mintzberg & Waters, 1985). However, the level of emergent strategy can still differ because the deliberate strategy can also be of influence. Based on the deliberate vs emergent strategies, Mintzberg and Waters (1985) explain eight different strategies, including different levels of deliberate and emergent strategies. In the figure below, these different strategies are shown in the sequence from most deliberate towards most emergent.

Strategy	Major features
Planned	Strategies originate in formal plans: precise intentions exist, formulated and articulated by central leadership, backed up by formal controls to ensure surprise-free implementation in benign, controllable or predictable environment; strategies most deliberate
Entrepreneurial	Strategies originate in central vision: intentions exist as personal, unarticulated vision of single leader, and so adaptable to new opportunities; organization under personal control of leader and located in protected niche in environment; strategies relatively deliberate but can emerge
Ideological	Strategies originate in shared beliefs: intentions exist as collective vision of all actors, in inspirational form and relatively immutable, controlled normatively through indoctrination and/or socialization; organization often proactive *vis-à-vis* environment; strategies rather deliberate
Umbrella	Strategies originate in constraints: leadership, in partial control of organizational actions, defines strategic boundaries or targets within which other actors respond to own forces or to complex, perhaps also unpredictable environment; strategies partly deliberate, partly emergent and deliberately emergent
Process	Strategies originate in process: leadership controls process aspects of strategy (hiring, structure, etc.), leaving content aspects to other actors; strategies partly deliberate, partly emergent (and, again, deliberately emergent)
Unconnected	Strategies originate in enclaves: actor(s) loosely coupled to rest of organization produce(s) patterns in own actions in absence of, or in direct contradiction to, central or common intentions; strategies organizationally emergent whether or not deliberate for actor(s)
Consensus	Strategies originate in consensus: through mutual adjustment, actors converge on patterns that become pervasive in absence of central or common intentions; strategies rather emergent
Imposed	Strategies originate in environment: environment dictates patterns in actions either through direct imposition or through implicitly pre-empting or bounding organizational choice; strategies most emergent, although may be internalized by organization and made deliberate

Figure 2.3: Summary description of types of strategies (Mintzberg & Waters, 1985)

Whittington (2001) continues on the theory of Mintzberg and Waters (1985) and adds two extra perspectives on the deliberate and emergent strategies (shown in Figure 2.4,). The two additional perspectives con-

tain the need for the profitability of the organisation. While 'profit-maximizing' strategies are more associated to profitability and markets that ensure the profit-maximizing outcomes, 'plural' strategies are less associated with this.

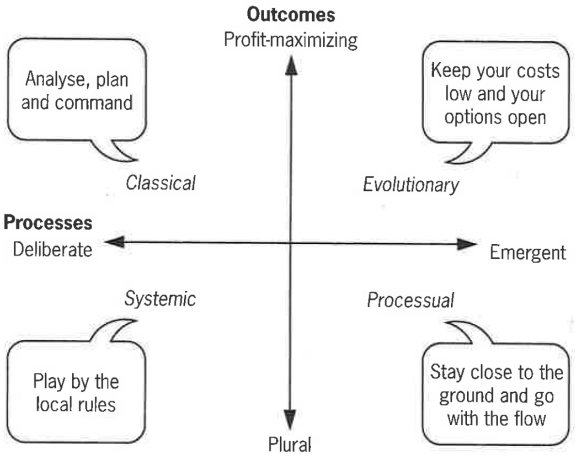


Figure 2.4: Four perspectives on strategy (Whittington, 2001)

Thus, because of the varying strategies and possible focus on a more unstable environment complex to comprehend, it is interesting to make use of the theory of Mintzberg and Waters (1985) and Whittington (2001) to analyse case studies related to circularity.

2.5. Characteristics front-end planning process

In the book of National Research Council (1999) it is explained that a major factor affecting the success of a project is the early project planning, which is referred in this research as the 'front-end planning phase'. Wang and Gibson (2017) agree and argue that the probability of achieving project success can be enhanced by improving the process of pre-project planning. Important decisions about the project are made in this early planning phase. Therefore, decisions made on circularity in this phase can influence the success of including circularity within a project. As explained in the article of Esnaashary Esfahani et al. (2020), a successful project can be achieved when all the expectations and goals are met, and stakeholders' requirements are satisfied. The front-end planning process is an early process of a project in which sufficient strategic information is collected about the scope of the project (Construction Industry Institute (CII), 1995) and therefore also called the project scope definition (Esnaashary Esfahani et al., 2020).

Since the front-end planning phase is important for the definition process of project objectives, this section will take a closer look at this phase. It is helpful to understand the main characteristics to analyse the front-end planning phase in practice using case study research. However, it is noteworthy that every project within the construction industry is different. Moreover, different project management models exist that explain which steps need to be followed to execute a project. As Noktehdan, Shahbazpour, Zare, and Wilkinson (2019) explain in their article, based on research of Junxiao, D., Jim, Michael, and R. (2015); Khang and Moe (2008); Pinto and Prescott (1988); PMBOK (2008); Slaughter (2000), many phases of the project life cycle are identified. This existing variety in project phases confirms the statement of PMBOK (2008). PMBOK (2008) describes that for the definition of an ideal project life cycle, there is not one specific and best way to do this. Nevertheless, they highlight that the project life cycle includes four generic phases: (1) project start, (2) prepare and organise, (3) execute the work and (4) close the project. Despite the phases are differently named, the sequence of phases and included activities are in line with the phases described by the construction institute (Construction Industry Institute (CII), 1995). The first two phases are in relation to the front-end planning phase:

- **Starting phase**: when starting up a project, this phase has the characteristics of a higher level of uncertainty and risk, a smaller size of project organisation and a more extensive influence of the stakeholders on the outcomes of the project. Critical activities included in this phase are assessing the project aims, feasibility studies and creating a concept design.

- **Organizing and preparing phase:** this phase is merely characterised by the organisation and preparing activities related to the construction of the project. Therefore, activities like creating a detailed design, preparing the planning and tender process, and selecting contractors are included in this phase. After this phase, the project can be executed. They argue the need for process principles that allow review and management across the construction industry's depth and breadth.

2.5.1. Main steps of the front-end planning phase

Previously explained phases are general phases corresponding to many projects, but these phases' interpretation can differ for each organisation and project. The two described phases, including activities as presented above, are also in line with the Process Protocol of Kagioglou et al. (2000) that explains the sequence of phases in a construction project, focusing on the 'fuzzy front-end'. In addition, the argument of Noktehdan et al. (2019) adds to the arguments of Kagioglou et al. (2000) as they argue that there is not one approach for all circumstances in projects and that different processes are available. In the research of Noktehdan et al. (2019) it is explained that the project life cycle can be divided into phases that are based on significant deliverables, which need to be transferred. For example, the shift from defining requirements to design, constructing toward operating and so on, and specialised people involved (for example, designers, architects and contractors).

Nevertheless, despite the different interpretations, it is helpful to define which steps are predominantly included in the front-end planning phase because this research if focused on a process that takes place in this phase. As the two phases before realisation are associated with the front-end planning phase, these two phases, including main activities, are shown in Figure 2.5 based on Kagioglou et al. (2000). Within the pre-project phase, the client's need is more and more precisely defined and assessed to determine the need for the project. Afterwards, the feasibility of these needs is tested in the feasibility study. In the pre-construction phase, these needs are developed into a design solution needed to receive financial authority, making it possible to proceed with procurement. Kagioglou et al. (2000) explain that according to existing models, clients already defined their needs when they approach the industry. However, they also argue that it is reasonable that information from consultants and construction developers during these early project phases can assist the client.

Figure 2.5: Front-end planning phases of Process Protocol (own illustration based on Kagioglou et al. (2000)

2.6. Conceptual framework

In this section, the conceptual framework shows the expected connections between the findings explored during the literature review. This framework summarises the most important findings from the literature study that helps to scope the research on a deeper level before executing research.

The conceptual framework (see Figure 2.6) shows the goal of this research: explore how circular organisational ambitions are strategized on the project level. Project objectives can play a significant role in defining circularity on the project level. Therefore, the case study research is scoped by the process of circular organisational ambitions towards circular project objectives. In this research, this is recognised as a process that takes place in the front-end planning phase. Because of the developing character of circularity within the infrastructure industry, challenges are experienced when specifying circularity during procurement. As previously explained, the front-end planning phase is a critical phase that influences the specification of circularity during procurement. Therefore, it is helpful to take a step back and look at the phase before specifications are written down during procurement, referred to in this research as the front-end planning phase. In the last step of the framework, the front-end planning phase's main steps in construction projects are presented.

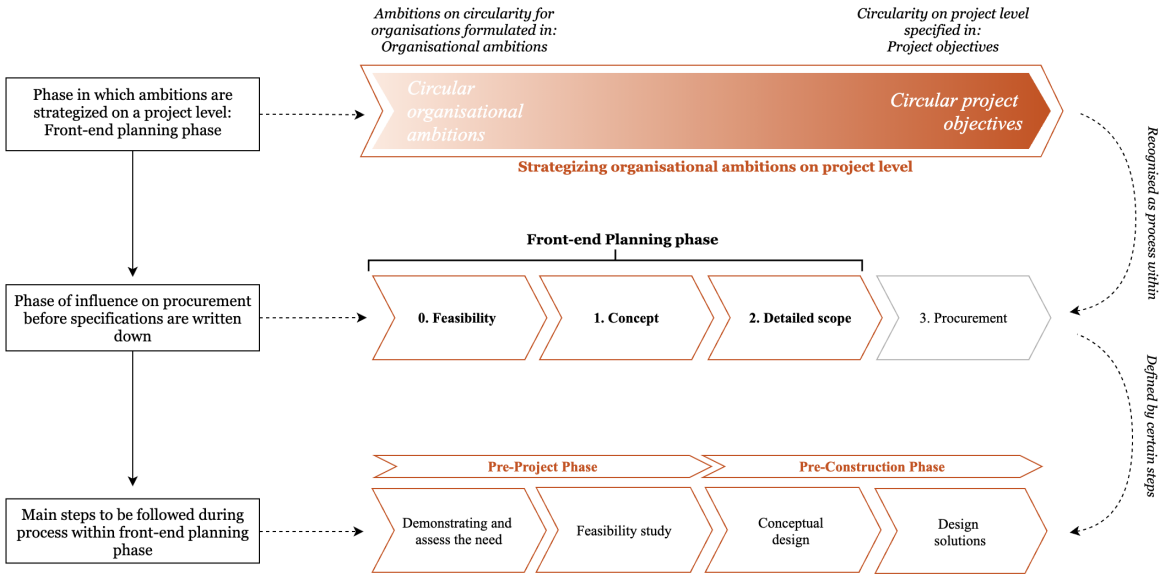


Figure 2.6: Conceptual framework (own illustration)

3

Methodology

In this chapter, the second sub-question is answered: How to analyse the strategizing process of circular organisational ambitions on the project level in relation to procurement? The research is a qualitative process-based research using knowledge and methods of the literature study, process theory and case studies. As explained in section 3.1, the process theory of Van de Ven (2007) is used in combination with an event-driven explanation to analyse the case studies. Afterwards, the case study research is explained, including the corresponding interview format (section 3.2, section 3.3). Finally, in the case study analysis (section 3.4), it is clarified how data is gathered from these interviews. This chapter aims to show how the literature study and process theory can be used to analyse the case studies with the help of interviews.

3.1. Process research

As discovered in the previous chapter, the strategizing of organisational ambitions on the project level is associated with a process. More specifically; the process of organisational ambitions towards project objectives. Therefore, it is helpful to make use of process research. In addition, Van de Ven (2007) describes that process studies are typically treated in social sciences as *'a category of concepts of individual and organisational actions'* such as strategy formulation (Van de Ven, 2007, p.196). So, Van de Ven (2007) continues on the strategy theories of Mintzberg and Waters (1985) and Whittington (2001) explained in section 2.4. Furthermore, process research focuses on analysing events in practice, making it possible to determine if findings discovered in the literature study apply to practice. Therefore, process research can be useful to discover the applied strategies in real-life projects.

To understand this underlying strategy, it is required to deep into the processes of defining project objectives. The aim of developing a process model is to understand how the developments occur, both in terms of the sequence of events as well as the stages in which they occur. Thus, a process study mainly focuses on how change develops concerning the process's underlying events, activities, and choices. In this research, this change can be associated with organisational ambitions developing into project objectives as shown in Figure 3.1.

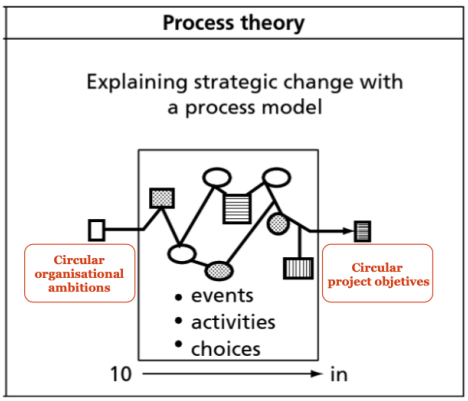


Figure 3.1: Process theory approach to explain strategic change (Van de Ven, 2007)

3.1.1. Event driven research

Because different definitions of a process are available, it is important to define the meaning of the research process. This research design is based on the process model associated with the 'how' question that explores how a certain issue can develop over time. According to Bruner (1991) a 'how' related question requires an event-driven explanation or process model which includes a set of events that is based on a narrative that caused certain events to happen in practice, see Figure 3.2. This research is associated with the translating process that develops over time causing certain events to translate ambitions towards project objectives. Therefore, the process in this research can be associated with the event-driven approach, which is related to the definition of a process as *'a narrative describing how things develop and change*' (Van de Ven, 2007). In addition, the main question focuses on exploring 'how' ambitions are translated towards project objectives. So, the event-driven method is most applicable. Another approach is the outcome-driven explanation. Because the event- and outcome driven research are associated to other definitions of processes it is crucial to make this distinction from the start.

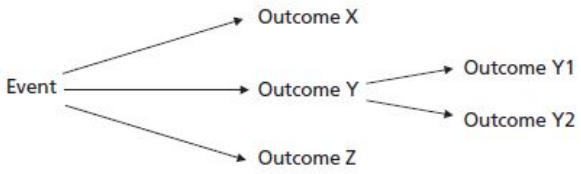


Figure 3.2: Event driven explanation (Van de Ven, 2007)

Eventually, a process study with document analysis and interviews of case studies can be used to explore the narrative that can describe how things develop and change. Using interviews makes it possible to gain insights into the process in practice and identify how practitioners performed the process considering their activities. Before the start of the research, the scope of the process is determined using the key issues, decisions, and suggestions using the decision table of Van de Ven (2007). The most critical issues and decisions, including reasoning, are explained in Table 3.1 below.

Issue (van de Ven, 2007)	Decisions (van de Ven, 2007)	Decisions in research	Explanation approach
1. Meaning of Process	A category of concepts or a developmental sequence?	Developmental sequence	This research aims to show the sequence of events in the practical process of two real life projects.
2. Theories of Process	Examine one or more models?	Two models	The strategy and process theory are examined to create a theoretical background and analyse the project processes.
3. Reflexivity	Whose viewpoint is featured	Public client point of view	As the research is focused on how the process develops within a public organisation, the public client of view is most crucial.
4. Mode of inquiry	Deductive, inductive or reproductive?	Inductive	With the help of two case studies, it is investigated how a process (on which a theory is not yet available within literature) is executed in two public organisations. Consequently, data is gathered and certain patterns are observed that can or cannot be generalised.
5. Observational method	Real-time or Historical Observation?	Historical Observation	Both the start and end event should be included in the research to analyse the process. Therefore, historical observations are used.
6. Source of change	Age, cohort or transient sources?	Diachronic	The research analyses how the process developed over time. Thus, how the start event develops into end outcomes over time.
7. Sample diversity	Homogeneous or heterogeneous?	Homogeneous	The focus of the research is on the infrastructure sector, however, the type of projects within the sector differ.
8. Sample size	Number of events and cases?	Two case studies	The process of two cases will be compared to each other. Both case studies are of value for this research, because both projects are one of the first projects in their organisations to be realised including a circular focus during procurement.
9. Process research designs	What data analysis methods to use?	Event driven	With the use of two cases, both analysed from the same start event until the same end event, an event driven approach is used between these two points in time.

Table 3.1: Issues and decisions of research design according to Van de Ven (2007)

3.1.2. Detail of event driven process: process levels

Taking a closer look at the event-driven process, the process can be divided in different levels according to the theory of Cooper et al. (2004). According to Cooper et al. (2004), the sub-processes in the upper level define the process in the lower level in which activities and tasks further define these sub-processes. For this research, the first level can be seen as the entire process of translating ambitions to project objectives divided into different sub-processes (phases) that are defined by activities and tasks (see Figure 3.3 for visualisation). This visualisation of the process is called a process map. The process and sub-processes can be associated with the main elements of the process as shown in section 2.5. Eventually, the goal is to define the main activities within the sub-processes and outcome tasks that practitioners perform.

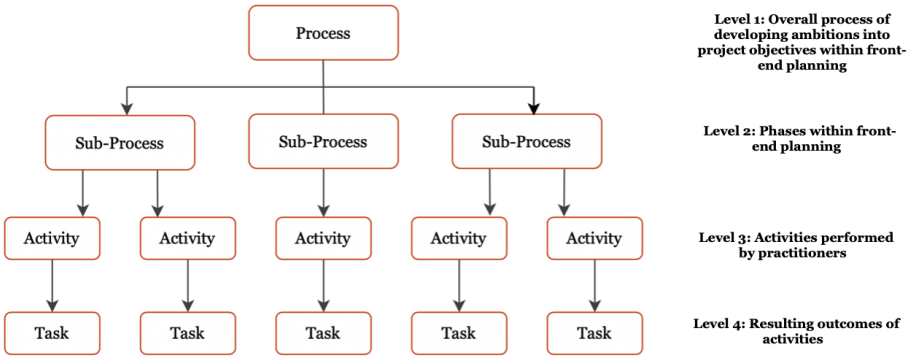


Figure 3.3: process levels (own illustration based on theory of Cooper et al. (2004))

3.1.3. Teleological type of process

As previously explained, process studies are used to find an answer to research questions that want to understand how things develop and change over time. However, multiple types of processes are linked to a theory or process that explains why and how the process develops over time. Before empirical research, it is often unclear what theory can be useful to explain field observations. Therefore, van de Ven and Poole (1995) propose four theories (Life cycle, Teleological, Dialectical, Evolutionary) that describe the change and development of the process in organisations. As shown in Figure 3.4, there is a difference in the progression of the change in events according to each theory. Keeping these models in mind, the researcher can focus and sharpen the collection of data and analysis during the research.

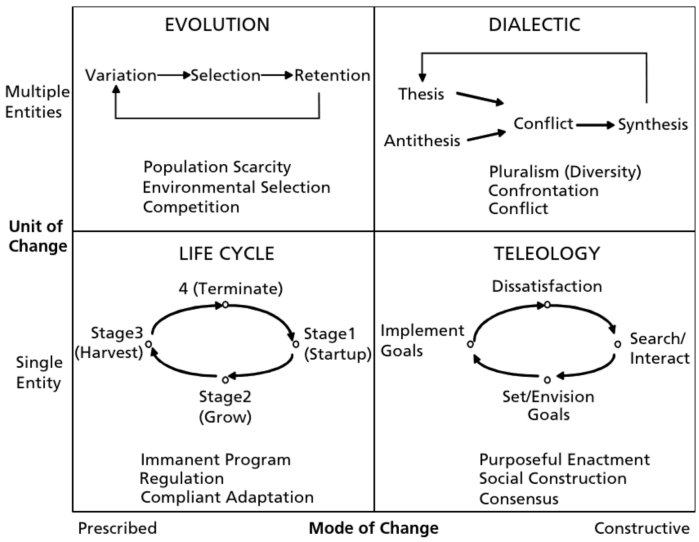


Figure 3.4: Process theories of organisational development and change (van de Ven & Poole, 1995)

This research focuses on a single entity during the case studies. In these case studies the mode of change

is not (yet) prescribed and is therefore still constructive. Previous characteristics fit the teleology model as this type of process is characterised by development. In a teleology model, the cycle of formulating, implementing, evaluating, and adjusting the goals and actions is considered based on what the entity intended or learned. Furthermore, development is seen as a movement towards achieving a specific goal, desired end state or purpose. As the research is focused on the process of developing certain goals associated with the desired end state of defining circularity, the teleological model is highly related.

During the case study research, the focus lies on the human constructive process (teleology). In other words, insight is created in how practitioners experienced the process in two real-life projects. More information on how this is analysed by using these two real-life cases (case studies) is explained in the next section. Despite focusing on a teleology process model, a prescribed process (life cycle model) is used as a baseline to execute the interviews. Thus, for the outcome of the research the focus lies on a human process. However, to understand as a researcher what certain events could be in this process, a prescribed process is used to make sure the practical process could easily be understood by the researcher. More information on the use of a prescribed process in this research can be found in section 3.3.

3.2. Case study research

As highlighted by van de Ven and Poole (1995), the reconstruction of field methods is difficult and rarely reported in detail. Therefore, it is impossible to understand and follow from hundreds of pages of documentation on field observations how the process is performed. This means that not enough information can be retrieved from documentation only and case studies including interviews are required. According to van de Ven and Poole (1995), Yin's comparative analysis of qualitative case studies design can be used when considering a process research design of few cases combined with many events. As Yin (2009) explains, a case study is preferred as a method when the following three characteristics are included in the research; (1) a 'how' or 'what' question is asked, (2) there is little control on the events by the researcher and (3) it is focused on a phenomenon experienced in real-life context nowadays. All these characteristics correspond to the characteristics of this research. A 'how question' is asked, the researcher has no control over the events that are explored, and the complexities that arise in defining objectives for circular projects is a real-life experienced complexity.

In addition, this research aims to gain insight into a more profound underlying process that requires an in-depth and extensive description. With case study research, it is relevant and possible to execute an in-depth research (Verschuren & Doorewaard, 2010; Yin, 2009). Yin (2009) describes the following definition of a case study: *'The essence of a case study, the tendency among all types of case study, is that it tries to illuminate a decision or set of decisions: why they were taken, how they were implemented and with what result'* (Schramm, 1971, p.6). This definition is closely related to this research as a process including the main activities are extensively examined.

Furthermore, both a single and multiple case study can be used in case study research. As this research aims to understand how the process of translating ambitions into project objectives is experienced in infrastructure practices, it is required to have at least two case studies in which patterns and differences can be recognized and cross-case conclusions can be defined.

3.2.1. Preliminary research

Before the case study selection, preliminary research is executed with the help of exploratory interviews about the research subject and discussing potential project case studies. Preliminary research was conducted next to literature research to specify the research perspective. As Verschuren and Doorewaard (2010) explain, this helps the researcher to fine-tune the theoretical insights that are obtained during the literature study and adapt these literature findings to the research at hand. Besides interviews, the preliminary research consisted of studying documents and exploring practical information on the research subject in public organisations. As explained by Yin (2009), the use of documents within case studies is essential to collect evidence from other sources. However, it is important to realise that documents can contain an unmitigated truth. Therefore, in this research, documents related to the case study are mainly used for research before conducting the interviews and checking some information afterwards. The exploratory interviews were held within the public organisations RWS, RVB, and ProRail with people that are related to the research subject (see argumentation for selection in Table 3.2). This information could not be received from documentation research. In addition, because the research was conducted in relation with PwC and TU Delft, connections need to be made within the public organisations to find appropriate projects that could be used as case studies. More

information about these case study selections can be found in the following subsection.

Date	Role interviewee	Argumentation selection
23 November 2020	Contract manager A6 RWS	The A6 has a sustainability focus and the contract manager has knowledge on how this will be included in the procurement process. Therefore, it was valuable to gain some practical insight on how this process develops in a project.
2 Frebruary 2021	Circular ambassador ProRail	The ambassador has knowledge on circularity within the railway infrastructure and within ProRail specifically. In addition, useful information on what the current developments are on circularity within ProRail and related challenges was received.
1 February 2021	Circular advisor RVB	Receiving more knowledge on how circularity is currently defined and explore what the experienced challenges are on circularity specifically.
16 February 2021	Senior advisor social responsible procurement RVB	Circularity is one of the aspects of social responsible procurement. Therefore, it was of value to explore the role of circularity within procurement and how this is experienced nowadays.

Table 3.2: Preliminary research interviewees

3.2.2. Case study selection

With the help of preliminary research, it became more clear which projects could be appropriate as case studies. The case studies analysed in chapter 4 are chosen on specific prescribed characteristics. As the research is focused on the infrastructure industry, public organisations with a strong influence on the infrastructure are chosen from which case studies could be used. ProRail and RWS, two public organisations with a large influence on the infrastructure sector, are focusing on developing their circularity strategy. Both organisations work with the Ministry of Infrastructure and Water Management on a 'climate-neutral and circular infrastructure strategy'. The Ministry of Infrastructure and Water Management aims to work circular and climate-neutral in 2030 with its executing organisations RWS and ProRail. In addition, on events such as 'InfraExperience', 'Week of the Circular Economy', 'Green Deal 2.0 seminar', it became clear that these organisations focus on circularity within their projects. With the help of existing and received contacts, a connection is sought with practitioners within the public organisations that are familiar with projects focused on circularity as shown in the subsection 3.2.1. Eventually, there is searched for a project with the following characteristics:

- **Infrastructure project**: it needs to be an infrastructure project with, preferably, a high impact on the C02 emissions and use of primary materials from origin. These projects are currently developed towards a more sustainable and circular procedure.
- **Focus on circularity**: the project needs to have a focus on circularity and include this in their tender description.
- **The project should have formulated project objectives, which means that the project should either be in the tender phase or has already completed the tender phase**: it is crucial to focus on projects that already developed their project objectives which are formulated in, for instance, a tender description. Many projects focused on circularity are currently not yet in the tender phase, so this is a challenging but important characteristic to consider. Without the project objectives defined, it is not possible to gain valuable insights.

Because the research is focused on a subject that plays a role nowadays, the project should not be executed too far in the past and should be a state-of-the-art project. However, because there are not that many infrastructure projects focused on circularity yet, it is more challenging to find a project that is already in the tender phase and wants to share their information before doing the tender and selecting a contractor.

Eventually, two projects are selected based on the previously described characteristics. In addition, both projects are related to the KCI strategy and project types described within the organisations' transition routes. Namely, the transition route of ProRail focuses on 'Railway superstructure', and the transition route of RWS focuses on 'Road surface' as shown in Figure 1.2. Both projects are shortly explained below (more detailed information is given in chapter 4):

Case study ProRail: Superstructure renewal Zeeland (BBV Zeeland)

On the Zeeland railway track, several tracks need to be renewed. ProRail wants to renew the railway superstructure on the Zeeland track at the locations Terneuzen, Sloe, Moerdijk, and Roosendaal (locations on which no persons are transported). Moreover, a superstructure renewal covers the bottom, ballast, railway sleepers and switches. The ambition of the project is to be the most sustainable and circular BBV project. In addition to this ambition, they argue that the project needs to function as an example project for future BBV projects. This means that measures explored in the BBV Zeeland project should be applicable in renewing future superstructure projects.

Case study RWS: A1 phase 2, part of the A1 East extension

The traffic on the entire A1 road is increasing, resulting in a lower safety level for the road. Therefore, the A1 needs to be extended. The extension of the A1 East is divided into two phases; phase 1 concerns the realisation of the road extension between 'Twello - Azelo' and phase 2 concerns the realisation of the highway between 'Apeldoorn - Twello'. Eventually, the second phase is more focused on circularity and, therefore, more related to this research than the first phase (in which the focus was mainly on sustainability). The goal is to make the A1 road the iconic project of the Cleantech Region that has a high ambition on sustainability. Therefore, themes such as energy reduction and generation, and developments in reusing products and natural resources are elaborated.

3.3. Qualitative interview

Van de Ven (2007) explains that a narrative can form the base of the sequence of events in the process. These narratives, or stories, are merely related to the human process, which can function as a valuable source to gain insights into how the process is experienced in both cases. According to Yin (2009), interviews are one of the most important resources when doing case studies. In most case studies, the interviewing method is open-ended and has a conversational set-up. When reviewing the different types of interview styles of Yin (2009), it is concluded that this research is merely related to the 'focused interview' style. With this type of interview, a person is interviewed for a short period (one hour). These kinds of interviews can still have a conversational manner and remain open-ended. Nevertheless, it is needed to have a specific set of questions to follow, which are derived from the case study protocol. In this research, the 'Interview Protocol' (see Appendix A) includes leading questions based on the case study protocol.

3.3.1. Data collection: Case study protocol

While a formal protocol can be followed during a case study, it is unpredictable which relevant information might become available. Therefore, an interrogative mind is required during the collection of data. Especially considering the process research and including events that are analysed, it is important to continually ask the question of why events appear as they do (Yin, 2009). As a result, as preparation for the cases, a case study protocol is essential when doing a multiple case study. It can guide the researcher in collecting data and increases the reliability of the case study research. According to Yin (2009) a case study protocol should contain the aspects shown in Table 3.3.

Aspect	Explanation	Explanation research approach
Overview of case study project	Relevant information of the project that is of value for the topic of this research	Besides information gathered during the interviews, additional information is asked before (via mail or phone) and during the interviews (see subsection 3.3.3 for this overview).
Field procedures	What are the sources of the data being used	Interviews in which process models are created.
Case study questions	What are the questions that the researcher should keep in mind while collecting the data	Based on literature study and methodology, an interview protocol is written that focuses on exploring the process.
Guide for the case study report	Giving an outline for the individual case studies	Information needed for both case studies: general project information, organisational ambitions, project objectives, process of translating organisational ambitions towards project objectives.

Table 3.3: Case study protocol aspects based on (Yin, 2009)

3.3.2. Data collection: Interview protocol

Based on the case study protocol, the interview protocol (see Appendix A) is created. In this protocol, the interview format is written down to be used as a guideline during the interviews. With the help of interviews, the process of developing project objectives is visualised by asking the respondents which steps they took to define circular project objectives. Moreover, all interviews were held individually to avoid group thinking. Because the research is focused on a process, it is helpful for the respondents to visualise the explained process during the interview. A visualisation of the process allows the respondents to check if the researcher's interpretation is correct. Because the research was executed during COVID-19 times, real-life meetings were not possible. Therefore, an online whiteboard called 'MURAL' has been used as an alternative showing the respondent the steps they explain that forms the process. MURAL is a digital workspace for visual collaboration which can be used to visualise these steps.

The protocol is divided into three parts. Firstly, an introduction and general information about the interview are given. Secondly, some general questions about the involvement within the project are asked. Finally, the process is visualised with the help of a MURAL. The interview was created and conducted in Dutch to make sure that the respondents (all of Dutch nationality) could do the interview as comfortable as possible and gain the information as clear as possible. Afterwards, this was translated into English for the results. An explanation of the protocol for each part is given below:

Part 1: General information

The first part of the interview is aimed to give a small introduction and tell some general information about the format of the interview. Background information, the focus and the goal of the research are explained. This background information is essential for the respondent to understand the baseline of the research and what valuable information is to be mentioned during the interview. This information was also sent to the respondents a week before the interview to prepare them for the interview. Because the interview is focused on a specific subject and has a different interview approach than a list of questions, it is helpful to already send some information about this and not overwhelm the respondent with this information during the interview (see Appendix B). Finally, after the interviewer explained the interview set-up, the MURAL was shown, in which a short explanation of the MURAL was given. It was decided that the interviewer wrote down the steps that the respondent explains to tell his/her story comfortably with as little interruption as possible. However, it is emphasised that if the respondents want to contribute to the MURAL, this would be possible

and appreciated.

Part 2: Involvement within the project

The second part is to understand the respondent's involvement within the project and gain insights about his/her start within the project. This part focused on pinpointing the moment the respondent got involved in the project by indicating in the MURAL in which stage he/she joined. Information was asked about the activities that took place before his/her involvement. This part of the interview is mainly to start the interview, understand the respondent's role within the project and know from which part in the process he/she was involved. This moment of involvement is essential information to continue with the third part; visualising the steps. The visualisation of the steps focuses on the actual steps the respondent took to develop ambitions towards objectives. Therefore, as a last question of the second part, a question was asked about these organisational ambitions focusing on the start of the process.

Part 3: Visualisation of steps

Finally, in the third part of the interview, the steps are visualised with the help of a MURAL. The basic idea behind the MURAL is showing the project process based on the generic phases explained in Figure 2.5. The titles of these phases are slightly adapted to regularly used phase titles, including certain familiar milestones (used by RWS and ProRail) to make sure the respondents recognised the project process (shown in Figure 3.5). With the help of a 'standard' and usual project procedure shown at the top of the MURAL, respondents were able to explain their steps in a structured way in which the researcher was able to understand the context.

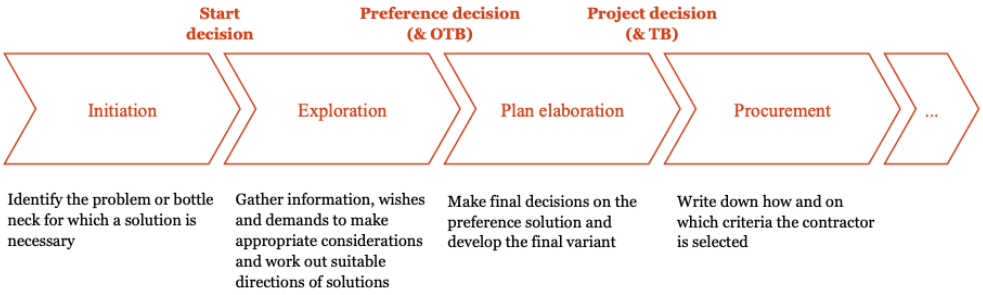


Figure 3.5: Project process MURAL (own illustration based on project procedures of ProRail and RWS)

In Figure 3.6 an example of the set up of a MURAL is shown, including the underlying event-driven theory and process levels. Firstly, in this MURAL, the research subject is highlighted to make sure the respondent gives a focused answer on this subject. Secondly, the generic project process that the organisation uses for their projects is shown. Thirdly, the orange sticky notes are used to visualise the steps (activities) that the respondent explains. Fourthly, the blue sticky notes represent the outcomes of these activities. Finally, the persons most critically responsible for executing certain activities were defined in the green sticky notes.

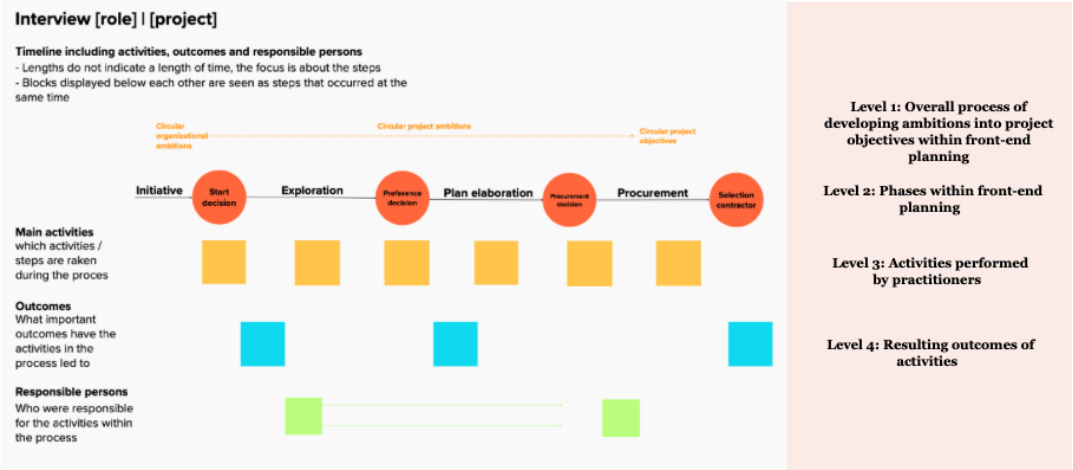


Figure 3.6: MURAL example including reference to event driven theory and process levels (own illustration)

The interviewer asked an open question to start the conversation and let the respondent tell their story. In this open question it is asked to explain the activities step by step from the moment the respondent got in touch with the circular ambitions of the project. This open question is in line with Van de Ven (2007) explaining that a process always begins with a particular narrative. Based on this story, different steps are visualised, and a process is created. Afterwards, the process is repeated by the interviewer to make sure that nothing is missed and everything is understood correctly. Finally, a few general questions about the process are asked related to specific resources or procedures used and who was mainly involved in making certain decisions about the steps taken (green sticky-notes).

If allowed, the interviews were recorded to check and complete the information in the MURAL. After the interviews, the MURALS and a short interview summary were sent to the respondents. As a result, all MURALS are verified by the respondents to make sure correct information is used in the research. All activities and outcomes from all interviews are included in two Excel documents as shown in Appendix E and Appendix F. The general questions about resources and procedures are shown in Appendix G and Appendix H.

Selection interviewees

Before the interviewees were selected, appropriate case studies were searched and selevted as explained in subsection 3.2.2. Afterwards, practitioners what are included in these projects were chosen. Furthermore, practitioners are selected on their knowledge and inclusion in the development of circularity in several phases. In Table 3.4 a short explanation is presented on which knowledge and from which associated phases interviewees were selected. With the help of preliminary research interviews, it was possible to make several connections and receive the information shown in the table.

As explained by Yin (2009), with a focused interview, it is possible to test the sequence of events by conducting interviews with persons that have different perspectives in the case study. Therefore, enough people need to be interviewed replicate the actual process, including correct events. With this approach, it is still possible to have accurate information if one of the respondents fails to comment. Because all interviewees were involved in different project phases, it was essential to ensure that information could be gathered from at least two interviewees in the same phase to avoid using wrong information or missing information. In Figure 3.7 and Figure 3.8, the phases are shown in which the interviewees were involved. Eventually, this resulted in interviews conducted with the practitioners as shown in Table 3.5.

Organisation	Role	Argumentation selection: Knowledge on
ProRail	Process leader sustainability (PL)	procurement and how the process of circularity developed from start to tender
ProRail	Circular ambassador (CA)	circularity within the project and ProRail
RWS	Project- and environment manager of plan studies RWS East (EM)	how sustainability developed during the plan elaboration
Prorail	Project manager (PM)	the entire project during the entire process and the overview
ProRail	Plan coordinator Zeeland en de-Peel & Asset Management team (AM)	technical details related to circularity during the entire process
RWS	Sustainability advisor (procurement) (SA)	circularity specifically and how circularity developed during procurement
RWS (WVL)	Sustainability advisor (plan elaboration) (SA WVL)	how sustainability developed during the plan elaboration
RWS	Project manager (PM)	knowledge on the entire project during the last phase of procurement and overview
RWS	Contract manager (CM)	how circularity developed during procurement
RWS	Technical manager (TM)	the technical circular details and how circularity developed during procurement

Table 3.4: Argumentation of selection interviewees

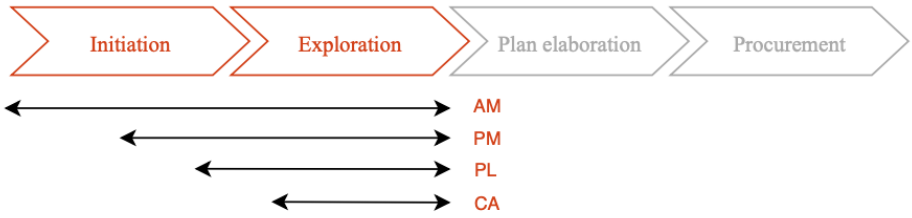


Figure 3.7: Phases that selected interviewees of ProRail were involved (own illustration)

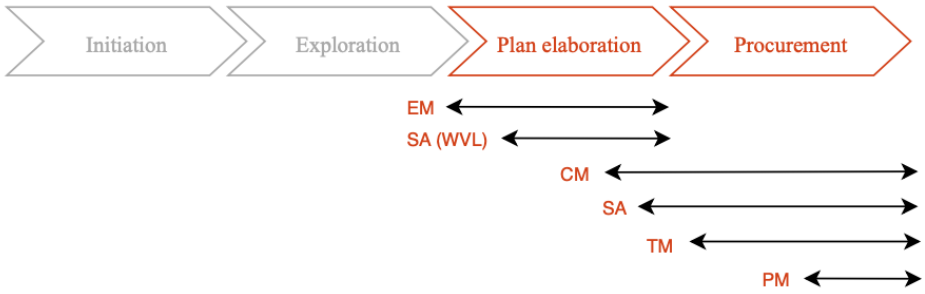


Figure 3.8: Phases that selected interviewees of RWS were involved (own illustration)

Date	Organisation	Function	Role within project
25 March 2021	ProRail	Process leader sustainability (PL)	Providing input on how procurement can stimulate and add value to maximise circularity. Thinking about how the project could be tendered in the most sustainable way.
29 March 2021	ProRail	Circular ambassador (CA)	Intern advisor in the field of circularity. Thinking along on circular chances and how to realise these chances within the tender and project.
07 April 2021	RWS	Project- and environment manager of plan studies RWS East (EM)	As environment manager gathering client demands from the environment who laid down a sustainability question. From the role as manager the goal to work towards a TB, but at the same time also trying to give sustainability a place within the project.
09 April 2021	Prorail	Project manager (PM)	The project manager has the end responsibility for the project. He makes sure that the project team can work and that the scope, time and money are clear. He takes care of the link between the one that gives the assignment and the team that executes the project. Choices to be made are prepared with the team and he takes action that these choices will be made.
12 April 2021	ProRail	Plan coordinator Zeeland en dePeel & Asset Management team (AM)	Defining what is needed for the project and what need to be renewed. Thus, giving the assignments that need to be executed within the project.
13 April 2021	RWS	Sustainability advisor (procurement) (SA)	Giving input and advise on how to realise sustainability opportunities on several projects of which A1 phase 2 is one of these projects. (Before this contract manager on phase 1)
07 May 2021	RWS (WVL)	Sustainability advisor (plan elaboration) (SA WVL)	Giving advise on sustainability and make its role clearer within the project. On a policy level from ministry and RWS there was a lot of attention on sustainability, however, there was a minimal level of knowledge. Therefore, contact was made with WVL.
18 May 2021	RWS	Project manager (PM)	The project manager has the end responsibility for the project and he is in contact with 'higher levels' (two clients, head engineer director and director general). In addition, leading the team based on the IPM role model and advising the other roles.
26 May 2021	RWS	Contract manager (CM)	Responsible for procurement and guiding the contract towards TB, realisation phase 1 and currently phase 2.
26 May 2021	RWS	Technical manager (TM)	The technical manager has the technical responsibility for phase 2 and is the first person to contact on this until the project is tendered (afterwards the TM of phase 1 takes over).

Table 3.5: Interview participants

3.3.3. Resources

According to Yin (2009), the use of multiple resources adds value to the validity of the research. Therefore, besides the interviews, is it useful to examine documentation. Yin (2009) explains that the use of an individual source is not recommended for case study research and he highlights that *triangulation* (the use of multiple sources) should be applied. In this research both *data triangulation* and *investigator triangulation* are applied. This means that the use of multiple sources and the use of multiple different respondents is used for gathering the evidence.

Furthermore, because in-depth research was conducted on two different case studies within two different organisations, it was of value to receive additional information and understand the project before conducting interviews. Therefore, before (and if needed during) the interviews, there is asked for additional documentation. It was of value to receive documents in which the project details and associated circular project objectives are described. In addition, valuable documents were received related to the translation process of ambitions towards objectives. However, some of this documentation contained sensitive information. Therefore, a part of the documentation was only read by the researcher to better understand the process. Below, the documents of which information is used in this research are explained.

- **Tender guideline BBV Zeeland and A1 phase 2:** shows how the official tender is executed including selection criteria and project objectives. This is of value to understand how the tender will be executed and how circularity is specified in the project.
- **Contracting plan BBV Zeeland:** explains the contracting process of the project. In this plan useful information as type of procurement, project specifics, scope and goals are explained. This plan is of value to understand the specifics of the project and what the role of circularity is within the project.
- **Requirements specification A1 phase 2:** this document explains the specifics of the project including the project objectives. The document is essential to understand the A1 phase 2 project.

3.4. Case study analysis

3.4.1. Analysis of events

Eventually, all individual processes need to be combined with each other for each case in a systematic way. This is done with the help of Event lists by using Excel. All the events written down in the MURAL are included in an Excel list as shown in Appendix E and Appendix F. This list is divided into several 'subjects' to create a readable overview of all the events which makes it possible to write the process as a narrative (shown in subsection 4.1.3 and subsection 4.2.3). Furthermore, an example in Appendix I is shown of the approach how events of individual process maps are included into the Excel list, which are related to the same subjects. Below an explanation of the different elements within this list is given including an example given in Figure 3.9.

- **Column 1 Process map**: The first column represents which process map is used and who was interviews.
- **Column 2 Event number**: In combination with the letter in the first column and the event number given in the second column it is possible to refer to the elements and make them traceable when explaining in the results. Moreover, because the interview was held with the help of a timeline above the events (project process), the events shown in the table are visualised in a sequential order.
  The following elements are of importance to combine the information of the process models into one model
- **Column 3 Phase**: Related to the project process and shown in the MURAL, the events are divided into different project phases.
- **Column 4 Event description**: To understand what the event is about and how it is described by the respondent.
- **Column 5 Outcome**: In the MURAL all events lead to certain outcomes. When combining the process maps, it is important to understand to which outcomes the noted events leaded and to secure that there is referred to the correct event with the same outcome.
- **Column 6 Subject**: All events and related outcomes of individual processes are combined to each other with the help of overlapping subjects. This subject is important when combining the processes, because the events and related outcomes differ from each other in explanation but are related to the same subject within the process. The subjects made it possible to connect events from individual processes

with each other and make sure no event is missed that might be explained in a different order within another interview. Eventually, in some cases, subjects are combined with each other because activities within these subjects are executed around the same moment (for example 'team' and 'sponsorgroup' in Figure 3.9).

Process map (MURAL)	Event number (sequential)	Phase	Event description	Outcome	Subject
B. Process leader sustainability	1	Initiation	Priority for circularity indicated from management	Motivation to see and discover whether a BBV project can achieve a higher level of circularity and sustainability than before: BBV Zeeland available for this challenge	Importance of management & initiating ambition of pilot project
	2	Initiation	Consultation with senior MT members in which circularity was discussed. Manager 'Regio Zuid' (from AM) indicated that he would be doing a BBV tender soon. He wanted to see if this BBV could become an iconic project in which circularity and sustainability are achieved on a maximum level. In addition, it would be prefereable to transfer the results to all BBV tenders in the future.		
	3	Initiation	Contact made with PM. In addition, project team gathered and first meeting was organised.	Enthusiastic team created from motivational PM	Team
	4	Initiation	Motivated to realise this ambition within procurement department		
	5	Exploration	Colleague(s) involved from LJV. Important for sustainability and circularity: use of 'Duurzaam GWW'	Supportive colleages involved	
	6	Exploration	Setting up a group that can think along and are in a position to say what we will and will not do	Creating sponsorgroup	Sponsorgroup

Figure 3.9: Example of several rows with column division of event list in Excel (own illustration)

Combining events of individual process maps to one process

To combine the events with each other and make it possible to define the process (as shown in subsection 4.1.3 and subsection 4.2.3), the Event list was of great importance. As explained above, in both Event lists, all events and related outcomes are combined on associated subjects. These subjects are essential because, during most of the interviews, practitioners emphasised that events were overlapping and could not be seen as separate sequential events related to the iterative character of the process. Thus, many events were taking place around the same time in an iterative way. Therefore, the events were grouped by subject (see an example of grouping activities in subjects in Appendix I). Because all interviewees were asked the same questions and some of the interviewees were included in the same project phases, there could be a high chance of overlapping events. In addition, if it was needed to narrow this down and place the events in the right position within the process, there is looked at the outcome. Each subject was given a colour to create a clear overview. This colour makes it easier to combine the different events from other processes with each other.

For the ProRail case, an additional interview was organised with the project manager (who had a complete overview of the project) to make sure that the correct sequence of events and related subjects were defined in the final process of all individual interviews summarised. This was of significant value because many events and outcomes were overlapping in the ProRail process.

3.4.2. Cross-case comparison

When the analysis of the individual case studies is completed, both case studies are compared. Executing a multiple case study often includes both an individual case study and a cross-case comparison. As explained by Yin (2009), when a case study contains at least two cases, the cross-case comparison is of relevance. In addition, he highlights that it is important to have an analytical technique on the previously described strategy on the case study research or else the research can continue with difficulties. The cross-case analysis is one of these analytical techniques described by Yin (2009). He explains that with the help of cross-case analysis, it is possible to draw generalised conclusions, which is of value for this research as two processes of two different projects within different public organisations are analysed.

These generalised conclusions are in this research related to the strategies applied in both case studies. The strategies are defined by comparing the standard process as shown in the previous section (standard process, seen as an intended strategy) with the process of defining circular objectives in the case study (process in practice, seen as the realised strategy). By comparing these two processes, the level of deliberate and emergent strategy (explained in section 2.4) can be determined on which conclusions can be drawn. Therefore, the cases are compared on three main subjects: (1) the process of circular organisational ambitions towards circular project objectives (concerning procurement), (2) how this translation process is experienced in case studies (compared to a standard process) and (3) the strategy behind this process as shown in Figure 3.10. More detailed information on the cross-case comparison is explained in section 4.3.

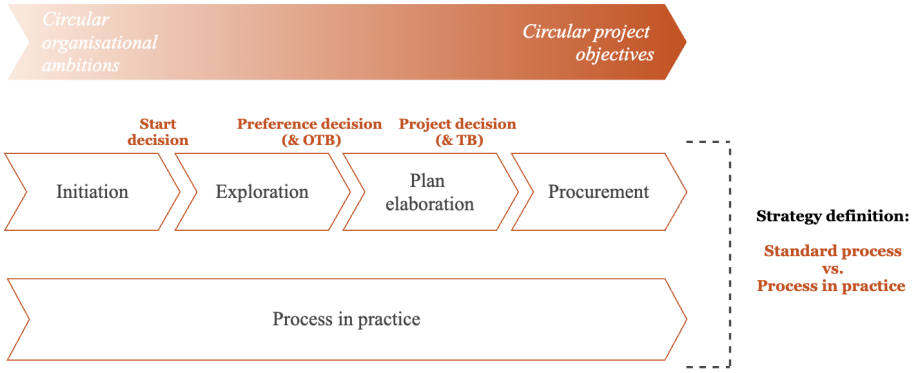


Figure 3.10: Subjects for cross-case comparison (own illustration)

Eventually, to summarise, all previous steps until the cross-case comparison are visualised in Figure 3.11. Based on the literature study, a conceptual framework is created to show the relations between the findings in the literature and define the research's scope more precisely. Afterwards, the case studies are selected, and a MURAL and interview protocol are created to conduct interviews. With the help of information gathered from the interviews, it was possible to analyse both case studies separately and define the narrative of the process. Eventually, two processes of all interviews are created with which a cross-case comparison can be executed.

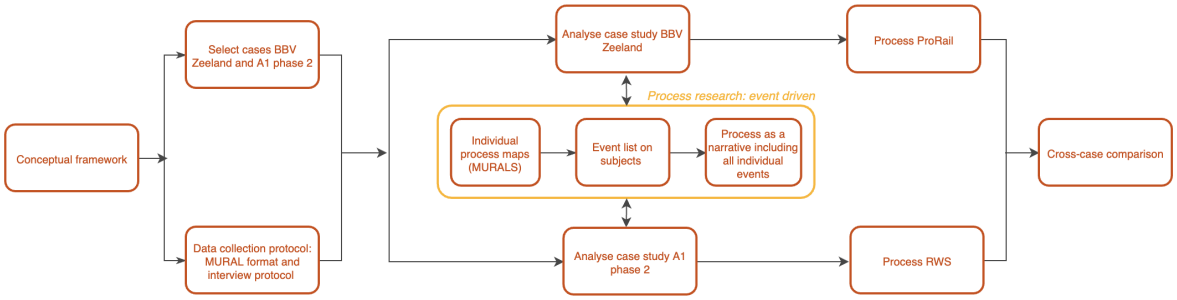


Figure 3.11: Methodology summarised (own illustration)

3.4.3. Validity

Internal validation: process validation

As explained before, during the interview events including outcomes are visualised in the MURAL and a process is created. However, due to time limited interviews it is not possible to create an extensively elaborated process. Therefore, after the interviews with the help of recordings the MURAL is written in a more detailed way. To make sure this information is processed in a correct way, the respondent was asked to check the MURAL and short summary of the interview afterwards. As a result, all MURALS are verified by the respondents.

External validation

Eventually, the results of the interviews (including cross-case comparison) and both processes are validated by two infrastructure experts within PwC and one infrastructure procurement expert within RWS. This external validation was of value to check to what extent the results from the research correspond to reality.

4
Results

In this chapter the results of the case studies are explained and an answer is given to the third sub-question: How are circular organisational ambitions strategized on the project level in relation to procurement within the BBV Zeeland (ProRail) and A1 phase 2 (RWS) project? The objective of this chapter is to show the empirical data and practical insights retrieved from several interviews on the process of translating circular organisational ambitions into project objectives. Both case studies are individually explained in section 4.1 and section 4.2. The structure of both section is as follows: firstly, the organisational ambitions of the organisation are explained. Secondly, the project details are presented to understand the case studies and its context. Thirdly, the narrative of the process and how the process unfolds (retrieved from all the interviews including process maps) is explained. Afterwards, in section 4.3 both processes are compared to find patterns and differences between the two case studies that enables the strategy definition behind the process in section 4.4. Finally, to validate the results, the discussion with experts about the results is described in section 4.5.

4.1. Case ProRail

ProRail is responsible for the railway network in the Netherlands. They make sure that travellers and goods arrive at their destination safely and on time. To realise this, they work together with carriers and recognised rail contractors (ProRail, n.d.). By giving more people the choice to travel by train, ProRail contributes to a more sustainable society. Therefore, as an organisation, they work on making the organisation itself more sustainable, as shown in the following subsection.

4.1.1. Circular organisational ambitions

ProRail has formulated objectives regarding the circularity of materials included in the multi-year program 2015-2030. They want to reuse their waste, use materials responsibly and stimulate the development of sustainable alternatives. In 2030, the maximum percentage of materials which can not be reused and need to be deposited is 5%. In addition, at least 10% of the materials becomes available for reuse after deposit. Furthermore, ProRail works according to the cradle-to-cradle method and considers the reuse of materials during the design. They explain it is the intention to steer on the sustainability goals by using tools as DuboCalc and the C02 performance ladder (ProRail, 2016).

In line with the Long Term Railway-agenda of I&W, ProRail wants the railway to keep its leading position as sustainable transport and stay ahead in sustainable innovations. To achieve this, transport with the train needs to gain a large part of the growth in all the transport options in the Netherlands. Therefore, they want to make the railway sector more sustainable, free from CO2 emissions in 2050 and reuse as much as possible materials. This is why sustainability is explicitly included in their three strategic ambitions called 'Connects, Improves, Preserves' (Dutch: Verbindt, Verbetert en Verduurzaamt). The ambition 'Preserves' contains the goal to create a more sustainable railway in which is focused on four subjects (ProRail, 2020):

- **Mobility:** By having more (inter)national trains instead of car- and plain traffic ProRail wants to contribute to the climate goals of Paris.
- **Energy:** A sustainable railway generates its own electricity. In 2030, this self-generated energy will fully meet their energy needs and contribute to the ambition to become energy neutral.
- **Materials**: Decrease the use of primary materials. A circular railway preserves scarcity in raw materials for future use and polluting materials need to be replaced.

- **Nature:** Connect nature areas and develop biodiversity. The soil should perform as a link between nature areas and as a breeding- and safe place for new nature.

Especially on the subject 'Materials' there is a strong focus on circularity. This subject is focused on smart (re)use of materials and putting a hold on using raw materials or replacing them by sustainable alternatives as shown in Figure 4.1.

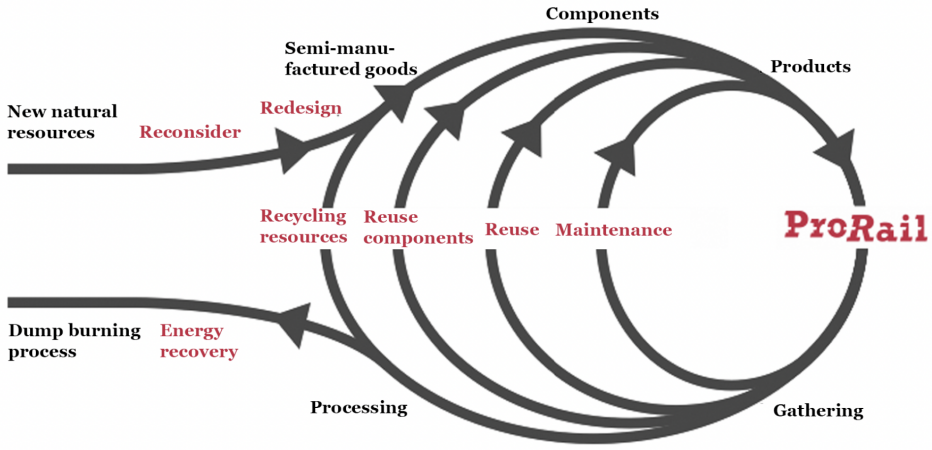


Figure 4.1: CE translated into ProRail (translated figure from ProRail (2016))

4.1.2. Project details BBV Zeeland

Several rail tracks need to be renewed on the Zeeland track because they are near the end of their technical lifetime. ProRail wants to renew the railway superstructure on the Zeeland track at the locations Terneuzen, Sloe, Moerdijk en Roosendaal. A superstructure renewal covers the bottom, ballast, railway sleepers and switches. The first three locations are (chemical) industry rail tracks, and the fourth is an emplacement. Therefore, no persons have been transported on this track, and the train intensity (on average between 10-15 train movements per day) of all tracks is lower than on tracks that transport persons.

Circularity as main project ambition

The ambition of the project is to be the most sustainable and circular BBV project. Within the BBV Zeeland project, ProRail strives for a maximal level of circularity and a new standard is created, including maximal support of all stakeholders. They want to achieve this by using reusable materials and high-quality value conservation of the materials for the future. By designing, installing, and documenting the superstructure to maximise the lifetime and minimise the maintenance, materials can be separated and reused. ProRail explains that this project needs to function as an example project in which they execute the renewal of a railway superstructure in a sustainable way. Therefore, the project should lead to generally applicable measures for future renewal superstructure projects.

Taking a closer look at the project's formulated ambitions, 'Circular Economic and Materials' in combination with the aspect 'Social Value' are recognised as the most important ambitions. As already highlighted, this needed to be an example project on sustainability whose vision other projects can follow. Therefore, the solutions explored in this project need to be suitable for scaling up in other projects. The aspect 'Social Value' is closely related to this and entails the communication on sustainability and corresponding value.

To realise these ambitions, they explain that they are willing to deviate from specific standard procedures within the organisation- and procurement form, selection criteria and contract. Therefore, ProRail is willing to differ from the standard contracting in BBV projects. In addition, because of the high circularity focus in the project, ProRail is willing to look at design solutions that are not (yet) included in the standard design regulations (Dutch: ontwerpvoorschriften, OVS) and possibly accept this through dispensation. Thus, there is a high focus on achieving circularity in the project, and they are open to possible changes (compared to the original way of working).

Project objectives:
Realising the renewal of the railway superstructure within determined planning and budget, safely driveable, with a minimal lifetime of 15 years including the least possible amount of waste (replace only the necessary) whereby:

1. Materials need to be applied as circular as possible by using;
   (a) The full capacity of reusable materials and raw materials, the least possible amount of new materials
   (b) New materials with the lowest level MKI-value possible
   (c) Discharge of materials
   (d) As much as possible reuse of materials at another location
   (e) Overviews and create insights on the destination of remaining materials
2. Using materials with the least amount of CO2 emission as possible
3. ProRail develops a working method and tool on which subsequent BBV projects can realise a maximal level of circularity with minimal effort

4.1.3. Interview results
With the help of five interviews (see Appendix E for references made in text), a narrative on the process is written to understand how practitioners of the BBV Zeeland project experienced the process of translating their ambitions into practice. Eventually, to create a short overview, the process is visualised (as shown in subsection 4.1.4). Because of the organic character of the process and the many overlapping events, the process is divided into several general parts, as shown by the titles in which activities and outcomes are included that are all related to the same part of the process. As was emphasised during the interviews, the process was (and still is) iterative and not experienced as structural activities that follow up on each other. Therefore, all activities that are divided under a particular part of the process were not predicted and seen as fixed activities. Furthermore, the process (explained below) is mainly related to the 'initiation' and 'exploration' phase (see Figure 4.2, because these phases contain the information in which circular ambitions are developed into project objectives before the tender started.

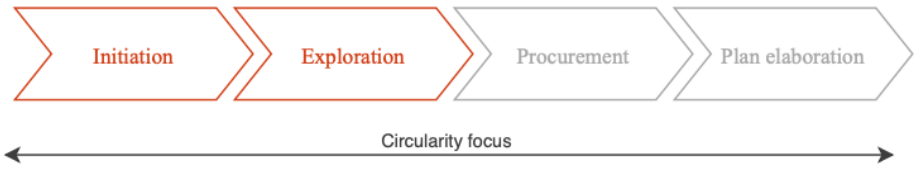


Figure 4.2: Phases investigated for ProRail case (own illustration)

Interest from management board and initiating the first circular superstructure project within ProRail
Before the project was initiated, a meeting was held to express the wish to make projects more sustainable on board level which was embraced by management (B1, C1, D1). During this meeting it was argued that projects could be realised in a more sustainable way (C1). Therefore, the BBV Zeeland project was offered (by the region manager) to be used as a project to explore if superstructure projects could be executed in a more sustainable and especially circular way (B2, D2) and with the assignment to make this project as sustainable and circular possible (C1, C2).

Start up project and bringing together a determined team & supporting people
After the project was offered to be used and the scope was transferred to the project manager (C2), it was determined that the project would be a pilot project in which the explored working method can be used for future superstructure projects. With the vision for this project, the ambition of realising a circular example project was defined for everybody involved (C1, C2, C3, D3). A project team was needed to realise the

ambitions and continue with the project. Because of the circularity challenge, it was essential to have an enthusiastic team which is brought together with the help of a motivating project manager (B3, B4). In addition, after identifying a project, the sustainability team is informed to think along with the project on sustainability (A2). Therefore, due to the circularity focus in this project, the circular ambassador was also involved. It is common for large projects to apply the 'Duurzaam GWW' approach and include people from within the organisation who know this approach and sustainability & circularity in general (B5).

Besides the project team, it was essential to have backup from the management level. Considering the challenging ambition of the project and related risks, it was important to have a supporting group (including people from management) that can function as backup and could help with choices that the project team could not make. These choices were outside the project scope, included unknown risks, and the project could thus deviate from the traditional way of realising a project (A1, B6, C4, D4). Eventually, it was important to have a joint ambition with the team and related specialists and management (supporting group) to ensure everybody knew what was going on and felt involved (A2).

Iterative inventory process searching for circularity solutions

An inventory on circularity could be started when the project and people were 'settled'. The main question during this period was: What is sustainable? Does circularity contribute to this, and if yes, in which level and how should it be designed? To try giving an answer to this, the period includes different activities and outcomes that are closely related to each other in time. As previously explained, the activities are divided into subjects and not into an exact order.

Start inventory on circularity: The research on sustainability and circularity was started in order to explore the sustainable and circularity renewal possibilities for superstructures (C5). A first step was to review the scope and explore which part of the superstructure should or should not (yet) be replaced (C6). It was decided to focus the project mainly on technique and the BBV project itself, so excluding the environment. This is due to the substantial amount and cost-intensive materials included in the project (D5).

Because there was a need to inventory what could be possible and feasible for the circularity goal of the project (B7, C6), a session and inspection was organised on the project location with people from multiple disciplines (A5, B8, C7, D6). To determine the recycling and regulatory possibilities for the project (A6, B10), visual inspection was executed and drawings were made on sustainable measures for separate objects on the railway track (e.g. switches and ballast) (C8). However, it was difficult to come up with specific ideas related to circularity (C8). Nevertheless, these activities previously explained made it possible to have a first look on the formulation of the project objectives (C9).

Parallel to these activities, the sustainability team started with 'Duurzaam GWW' to explore the sustainability possibilities and ambitions of the project (A3, A4, B9). It is determined that the project ambition is primarily focused on the reuse of materials and social value.

Agree with people responsible for regulation changes: A vital realisation during this period was that standard regulations for the design might be changed when considering circularity, or else it was impossible to make (circular) adjustments on the project. In other words, without adjustments, the same project as usual will be constructed (D5). This is not preferable considering the circular ambition. Because of the realisation that regulations might be changed, it was important to make this clear from the start for the persons responsible for changes within these regulations.

For the renewal of a track, ProRail has certain design regulations that ensure they know what needs to happen, making it easy to contract and communicate with market parties. Because there is a high probability that these standard regulations need to be adapted to gain maximal circularity out of the project, this is a change of significant influence. Therefore, people related to these design regulations (Dutch: Ontwerpvoorschriften (OVS)) must be included. Without the support of this group, there is a higher probability of failing to achieve a circular project. Therefore, communication was needed between the asset management department and the system managers. The latter are responsible for the design regulations and their authorising role during the exploration and creation of solutions needed to be discussed (D7).

Explore market and their ideas on circularity: Despite the inventory session and execution of inspections, it was not possible to answer the circularity questions in mind and to define circularity for the project without specific examples. On a higher level, it was impossible to determine what is feasible on circularity (C7, C8). Therefore, there were unanswered questions about the reuse of materials. There was the need for

practical examples (C10) and the contractor's point of view (B11, B12). Therefore, a market consultation was initiated and acknowledged contractors were asked (with the help of a questionnaire through email) about their vision on circularity within the project. Normally, this is a routine activity. However, informing about a circularity question is not usual (A7, B13).

Eventually, there was a preference to select a contractor that should take responsibility to execute the project while collaborating with ProRail. It is possible to think about many solutions. Still, it is difficult to make progress without communicating with contractors who can realise the project and not knowing what is feasible (C11). By having a market consultation, insights could be received on circularity ideas for the project and knowledge gained on what is important to ask for in the tender related to circularity (A8, C11).

Preparing procurement

Before elaborating on the next step, please note that the previous step was also of value for the preparation of procurement. In addition, similar to previous steps, this step is also described as an iterative process (and not a sequential process).

Explore on type of procurement: After the market consultation, there was a better understanding of the market's view about circularity. Therefore, it was possible to define an own point of view on circularity (B14). However, it was still challenging to come up with appropriate solutions for the situation. There was still insufficient knowledge on the ideas of market parties and the possibilities within the project for them. Therefore, the idea after the market consultation was to ask the unanswered questions to the contractor that needs to execute the project. Based on this, a contractor could be selected that can help to achieve circular ambitions (C12). Besides choosing a contractor to find the best circular option, the contractor should also fit the collaboration culture based on a relational contract in the first phase. The selected party should be intrinsically the most motivated contractor based on sustainability and circularity (C13). Eventually, the project objectives and related selection criteria were primarily focused on selecting a responsible contractor based on previously explained requirements (C14).

Meanwhile, a start was made on thinking about the contract. This was possible with the help of an external firm having knowledge of circularity and contracting (A9, D8, B15) and a tender manager having knowledge of tendering (B16). It was essential to not constrain the contractor in a way that would make certain solutions impossible to realise because of the contract design (D8).

Nevertheless, it was possible for certain parts to come up with more detailed circularity ideas, for instance, on sustainable switches. These ideas made it possible to create a conversation with the contractor and scope the discussion on a minimal level (D9). Furthermore, information and (technical) ideas are collected from other regions. However, it was concluded that not (yet) any region took the step of changing the design regulations to achieve maximal circularity and document this (D10).

Contract to stimulate collaboration with contractor: Thus, it was impossible to come up with appropriate solutions, and they wanted to challenge the contractor to achieve a maximal level in cooperation with ProRail. Therefore, the two-phase contract was a crucial element in approaching the market and selecting the right contractor.

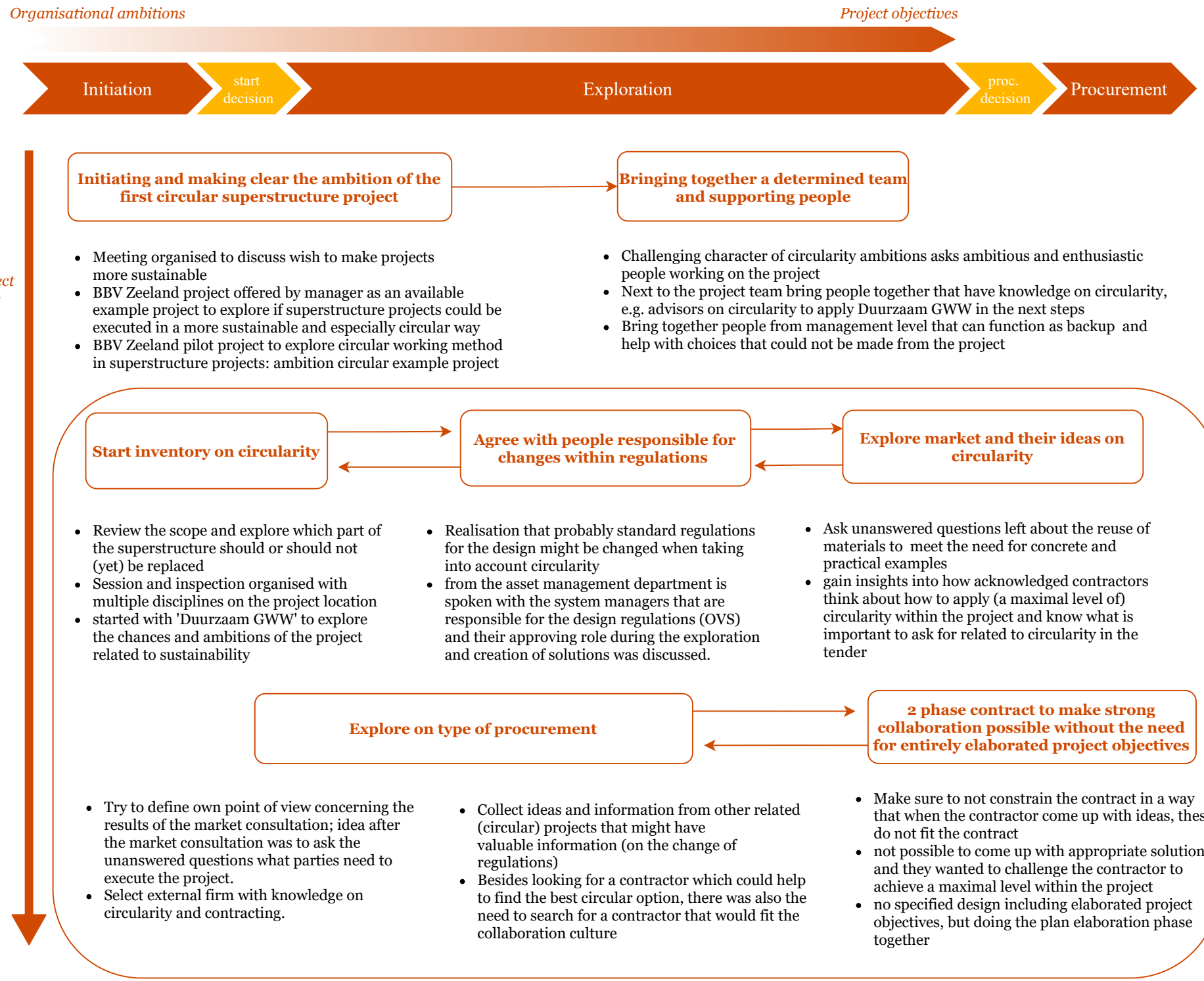
The main idea behind the two-phase contract was to make strong collaboration possible without the need for a detailed design including specific project objectives (which would be the case ordinarily). As a result, the plan elaboration phase will be executed with the contractor (C15, C16). Therefore, it is preferable to give the contractor the flexibility in the first phase and not demand specific measurements yet. It was required to give each other freedom to explore circular measurements together and determine possibilities that could be realised (C15). Alternatively, a traditional way of collaborating would be performed, which was not preferred.

Even though they tried to establish a traditional contract as a starting point, they could not figure it out (C16). Eventually, project objectives and selection criteria with a circular focus are defined, which played a substantial role in selecting a responsible contractor (B17, C13, C14). The contractor is selected for both phases to determine (together with the project team) the scope and relevant costs for the second phase (C17).

4.1.4. Process model

The links between the events are visualised in the Excel list by colour as show in Appendix E. Eventually, by combining events and outcomes related to the same subject this resulted in the process model shown in Figure 4.3 on the next page:

Figure 4.3: example process prorail



4.2. Case RWS

RWS is the executing organisation of the Ministry of Infrastructure and Water Management and works on a safe, liveable and accessible Netherlands. Together with others, they are working on a country that is protected against flooding and where you can get from A to B quickly and safely. They manage and develop the national highways, waterways and waters and aim for a sustainable living environment (Rijkswaterstaat, n.d.). More about the ambitions for this sustainable living environment is explained in subsection 4.2.1.

4.2.1. Circular organisational ambitions

In the year 2030, RWS wants to work circular which means working without producing waste. As a big client in the construction industry, they use a large amount of materials. To reduce this, they are working on high-quality reuse methods in which waste becomes a primary material creating a closed material loop. Eventually, RWS highlights two ambitions in their CE year report (Rijkswaterstaat, 2020):

- **National: a circular economy in 2050**. Primary materials and other materials will be produced in a sustainable way, reused and no waste is created anymore. This means to use 50% less primary materials by 2030 and have 49% less C02 emissions.
- **RWS: work circular and climate neutral in 2030**.
    1. Use the least amount of possible primary materials when constructing, renovating, maintaining the infrastructure and areas to result in C02 emission as low as possible.
    2. Steering on high quality reuse of all rest streams and releasing materials and maintain the natural capital.
    3. Purchase business operations for 100% circular and use all rest steams.

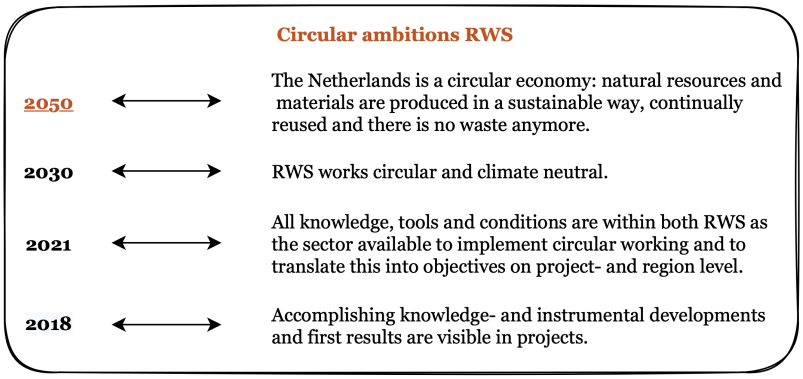


Figure 4.4: Timeline circular ambitions RWS (adapted figure from Rijkswaterstaat (2020))

4.2.2. Project details A1 phase 2

The national highway A1 is an important connection between economical areas inside and outside the Netherlands: de Randstad, Cleantech Regio, Twente and the Northern- and Eastern European hinterland. This highway connects the port of Rotterdam and Schiphol to Germany and on this way also to Poland and the Baltic states. This makes the highway A1 one of the most important corridors in the European Network for transport. A good traffic flow on this highway is of significant economical substance. The traffic of the A1 will increase in the coming years which results in more traffic jam and accidents. The side roads will be under pressure because drivers will take the short cut to avoid the traffic on the A1. Therefore, RWS needs to extend the A1 (Rijkswaterstaat, 2018).

The extension of the A1 East is divided in two phases; phase 1 concerns the realisation of the road extension between Twello - Azelo (of which a part is already realised) and phase 2 concerns the realisation of the highway between Apeldoorn - Twello. This part concerns 14 km of road extension and reconstruction supplemented with maintenance work and measures. In Figure 4.5 this division is shown; the orange part concerns phase 2 and the other parts are related to phase 1. Eventually, the project is focused on the following subjects:

- **Livability:** to avoid traffic jams, road users take shortcuts through regional and local roads. Because of a better traffic flow at the A1, the use of these shortcuts will decrease. This adds value to the livability of the cities and villages that are located along shortcuts.
- **Traffic safety:** at some locations the road design will be adapted. The new road design offers clearness and makes driving less complicate which increases the traffic safety.
- **Nuisance:** on parts of the track silent asphalt will be applied and sound screens constructed to live up to the laws of environmental Conservation.
- **Landscape:** the A1 road crosses an area that has nature, landscape and culture historical characteristics. This makes the road an ultimate parkway: a highway that crosses attractive land areas. This is a character that RWS wants to preserve and strengthen. Therefore, the design is adjusted to the natural landscape.
- **Nature:** damage to nature is not entirely avoidable as the extension requires trees need to be taken down. However, RWS takes care of the compensation of these trees and vegetation. The three surrounding Natura 2000 areas stay untouched and the effects on animals and vegetation of the project are small because it is only a road extension. In addition, there are wildlife crossings and fences to prevent that animals cross the road that are dangerous for both people and animals.
- **Sustainability:** as already explained the extended A1 is adjusted optimally within the existing landscape in which valuable elements of the landscape will be restored, developed and made visible. RWS want to apply the sustainability opportunities as much as possible.

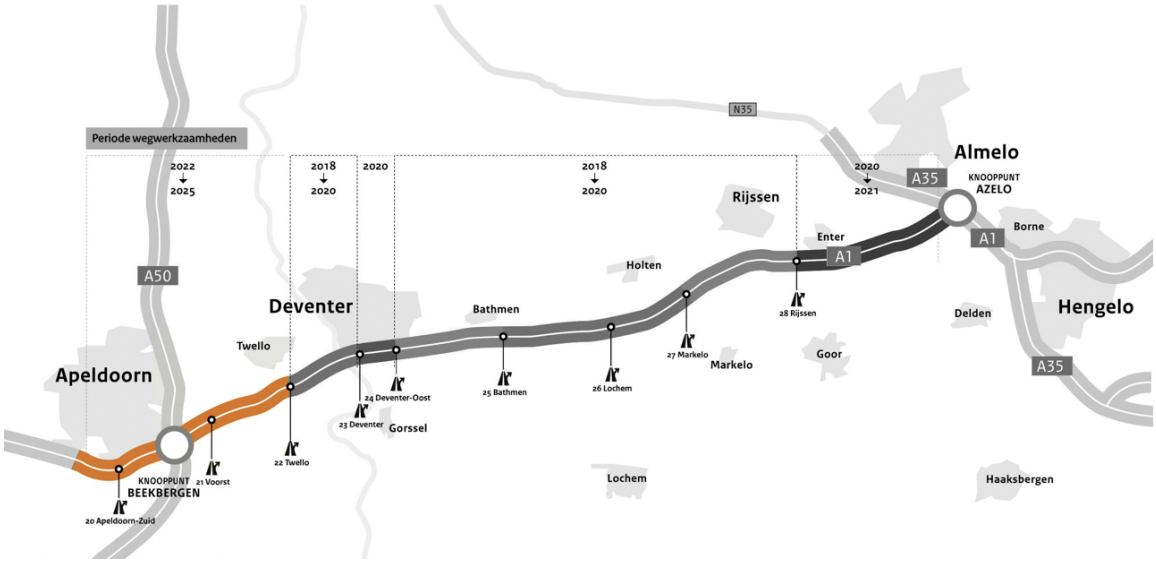


Figure 4.5: Division of phases in A1 East project (orange part concerns phase 2) (Rijkswaterstaat, 2019b)

Region: The provinces Overijssel en Gelderland, the Cleantech region and the state are working together to extend the A1. The Cleantech region consists out of the municipalities Apeldoorn, Brummen, Deventer, Epe, Heerde, Lochem, Voorst and Zutphen. These 8 municipalities together form a daily urban system meaning that it is a functional region around the cities Apeldoorn, Deventer and Zutphen in which the most important live- and work movements take place daily. These municipalities are responsible to maintain and strengthen the regional system and work together on a healthy and sustainable live- and work environment (Cleantech Regio, n.d.-a). Their objectives are subdivided in three themes, namely: human capital, circular economy and energy transition (Cleantech Regio, n.d.-b).

Sustainability (containing circularity) as project ambition:

For the A1 project they wanted to make sustainability measures possible and search (together with partners) the field of clean technologies for initiatives. For example energy reduction and generation, but also developments in the field of reusing products and raw materials, i.e. circular economy. They explain that it is important to maintain the green environment. Therefore, the Cleantech Region wants to experiment on the

energy transition in the area around the A1 which can make the A1 a symbol project of the region (Rijkswaterstaat, 2017). As described in the TB, all parties have the ambition to incorporate and preserve the surrounding landscape as well as increase smooth traffic flow (Rijkswaterstaat, 2018)

Project objectives:

The extension of the A1 between Appeldoorn and Twello (phase 2) follows from a board-agreement that RWS and partners from the region made to extend the entire A1 track between Apeldoorn and Azelo. The project objectives that apply hereby are:

1. **Traffic flow:** improving the traffic flow and road safety through increasing the road capacity, whereby the nuisance on the underlying road network during the work is limited as much as possible and the robustness of the network is improved
2. **Accessibility:** improving the accessibility and economic impulse for the region
3. **Spatial quality:** spatial quality whereby an optimal integration of the A1 in the existing environment is being pursued
4. **Sustainability:** sustainability in design, realisation and use

The project team of RWS wished a contractor who, within the limits of the contract, acts 'best for project' and contributes maximally to the formulated project objectives and working in line with the market vision. Because circularity was only included in the fourth objectives, this objective is more extensively explained below.

Project objective 4, sustainability: In the project objectives they refer back to towards the general ambition of RWS: *RWS has the ambition to be climate neutral by 2030 at the latest and to work in a circular way in line with the strategy "Towards climate neutral and circular governmental infrastructure projects". This means that we generate as much energy ourselves as we use and that we do not emit CO2 or other greenhouse gases. We reuse high-quality materials and produce as little waste as possible. This ambition applies to our own organization and our chain.*

The following spearheads apply to the implementation of this infrastructural work by:

- **Energy and climate:** the design, construction, use and management of the A1 must contribute to the RWS broad target of 'climate neutral by 2030', by realising as much as possible energy savings and reductions in environmental costs and CO2 emissions
- **Circular economy:** The realisation of the project should contribute to the RWS broad target 'working circularly in 2030' by limiting the use of primary raw materials, high-quality reuse of released materials, avoiding waste and minimising environmental costs over the lifetime of the realised objects.

4.2.3. Interview results

Five interviews are conducted resulting in five individual process models. All the activities explained by interviewees within these process models can be found in Appendix F. As explained before, the A1 project is divided into two phases. Because this research focuses on the second phase, the activities executed in phase 1 will be excluded from the analysis. However, the activities in the plan elaboration associated with both phases are taken into account because this was of influence on the second phase (see Figure 4.6). In addition, there was not yet a substantial focus on sustainability and circularity within the initiation and exploration phase. Therefore, these phases are excluded. The circularity focus started during the procurement phase and continued to develop starting from the sustainability focus within the plan elaboration phase. Thus, during the plan elaboration phase, the main focus was on sustainability and not circularity.

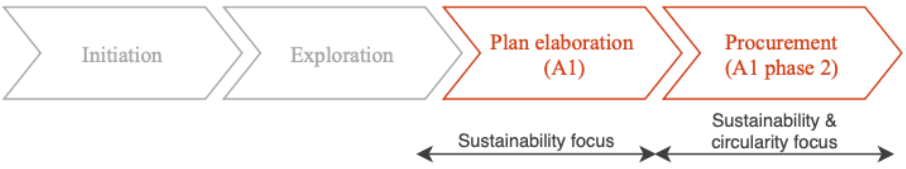


Figure 4.6: Phases investigated for RWS case (own illustration)

Plan elaboration to explore sustainable possibilities

From the start of the plan elaboration, there was the urge to do something with sustainability, and several ideas were created, and many ideas also faded away. Therefore, the process of defining sustainability during the plan elaboration phase was characterised as a less structured and unsystematic process.

Client demands and focus on sustainability: from the start during the initiation phase, sustainability and circularity did not play an essential role within the project (B0). The exploration afterwards was mainly executed by the province Overijssel (so not RWS or I&W), in which an agreement was made that RWS would do the plan elaboration phase. Consequently, after the starting point of the plan elaboration phase, more focus was given to sustainability (not yet a strong focus on circularity). The region had a strong demand to include sustainability within the project, and the environmental manager was motivated to address this demand (A2). The environment had a prominent role during the entire process. They were paying a significant part of the project, which means their requirements were important, and agreement on costs was needed on specific ideas (B2). In addition, RWS saw chances and had the ambition to focus on spatial quality and sustainability within this project considering the existing conditions, time and money that are given (A1). Thus, from the client's perspective, they were asked to focus on sustainability within the project. However, the specifics of this sustainability focus were given on an abstract level, and RWS needed to specify this. The assignment was to extend the road where no specific demand is included on sustainability (A2).

To receive insights on the sustainability ambitions of the project, the requirements of the environment were collected by practitioners, and a session was organised to make an inventory of their specific demands for sustainability (B1). However, these demands were still very abstract in the sense that they 'wanted to do something with sustainability (A4). During the plan elaboration, ambitions concerning sustainability were also developing within the RWS organisation itself, and RWS established ambitions on several subjects; energy & climate, circular economy and sustainable area development (B3). As a result, more attention was given to sustainability within the project and within RWS. Consequently, the scope of the project was changed, and sustainability was included within the scope. In addition, the project became a pilot project within I&W to make the MIRT program more sustainable and explore how to optimise the integration of sustainability within projects (Dutch: pilot verduurzaming MIRT) (B4, A5).

Feasibility and chances on sustainability to develop measures: RWS wanted to make internal ideas and external wishes clear (A6, A7, A8). Therefore, RWS started research on the chances of several ideas to investigate the chances of these ideas on different aspects (green-blue crossings, spatial quality, ecology, climate adaption and emission & hindrance). As a result, the feasibility of these ideas could be established, and it was possible to develop the ideas into more specific measures (looking forward towards the procurement phase) (A9). Three feasibility studies (on energy, climate and ecology & biomass) and an ambition web (guideline that defines ambitions) were accomplished to present the most promising ideas. Consequently, specific measures were defined on which the most extensive sustainability opportunities were determined: using locations for solar energy, biodiversity related to vegetation, rainwater depot, led lighting, green-blue crossings, and electrification for cooling vehicles (B5, B6). Eventually, the plan elaboration phase lasted six years, and they are currently investigating (in the second phase) how to include sustainability and circularity within the project (A8).

Internal agreement to (officially) determine focus on sustainability: within RWS previously explained measures were relatively new, uncommon to use and outside of the project scope. Especially, considering the risks and whether these new measurements would fit within the budget and time (A10). Therefore, an agreement was needed to include a part of these sustainability measurements within the official TB (A11, B7). However, this was still on an abstract level. It was explained that it is better (concerning market innovations)

to arrange more in a later phase. This situation gives market parties more opportunities to develop sustainable solutions that are more attractive for them concerning innovations and costs (A11). For the project and realising sustainability within the project, at this point, the sustainable ambitions were officially written down (E1). Eventually, sustainability was included as one of the three project objectives, and it was possible to start the procurement of phase 1 with a high focus on sustainability.

To summarise, this originated from the ministry and RWS to include sustainability within projects, the (clean tech) region that demanded for sustainability and the goal to make projects within the MIRT program more sustainable (B8).

Preparing procurement and specifying on circularity chances: which specifics need to be written down in demands for the contractor?

After the feasibility study and establishing certain measures for the entire A1 project, the procurement and realisation of the first phase started. As previously explained, the project is divided into two phases. This division concerns the realisation of both phases, meaning there is one TB for the entire A1 project. Because the second phase was more focused on circularity, this phase is used in this research, and the procurement & realisation of the first phase are excluded.

Review measurements phase 1: The first focus was on the procurement and realisation of the first phase. Nevertheless, the measures established during the plan elaboration were considered during the procurement preparation of phase 2 (C1, C2). Besides that in the first phase the focus was primarily on sustainability, in the second phase there was also a focus on circularity. To start preparing the contract and procurement plan general ambitions of RWS on sustainability and circularity were written down (E1). Furthermore, a general memo was written about points of interest to elaborate on when exploring on ideas (of which few were based on measures determined in the plan elaboration) (C3, E3). Several measures from the first phase seemed to be of value for the second phase. However, as techniques are continually developing, exploring what could be done more compared to the first phase (E3) was required.

Inventorise on chances to formulate project objectives and measures: The project objectives within RWS itself change over time; first sustainability was a more general concept and currently it is more focused on including circularity. The project objectives of A1 phase 2 are highly connected to the overall RWS objectives. The objectives of the project are a short summary of the overall RWS objectives. Moreover, the objectives are quite general and not explicitly created for the A1 phase 2 project (C7). The more specific measures were elaborated later and not yet finished when the interview was conducted. Therefore, these will be finalised during the tender process (dialogue). Despite that abstract objectives are formulated, they tried to formulate specifics by exploring possibilities and requirements to prescribe for the tender (with specialists together) (E4, C7).

Therefore, an inventory on sustainability chances within the project was started in which circularity was taken into account (C4). Sustainability and circularity were experienced as undefined aspects, and different ideas were available to specify both. Therefore, specific ideas needed to be filtered that were recognised as high potentials on the project (C5). During this period, there was also the idea of doing a competition based dialogue that could be assessed by more specific requirements (C6). Several specialists were asked how to specify the general and abstract ambition to write certain demands down in the contract eventually. In other words, they were asked where they saw opportunities and if they were able to write down specific demands for these opportunities. Several options that would be of value for the sustainability and circularity focus of the project were written down in a document. Continually, the options in this document were elaborated it was discussed if these options would be prescribed into demands for the procurement and contract (E5).

Define measures for procurement: The latter was a critical iterative decision process in which constantly choices needed to be made: what do you as RWS write down in demands, and what do you leave open to fulfil by market parties? On the one side, the choice was made to exclude particular demands consciously (between the technical and contract manager) to challenge the market on certain options and await their (innovative) ideas. However, on the other side, certain demands on circularity were included when RWS knew that market parties could not distinguish themselves from each other on these specifics. By leaving some space open for innovation and not writing everything down into specific demands, market parties can develop initiatives, and the highest profit can be gained according to market parties (E7). Eventually, the goal was to challenge market parties in the best price-quality ratio (Dutch: BPKV) and look which ideas market parties would have

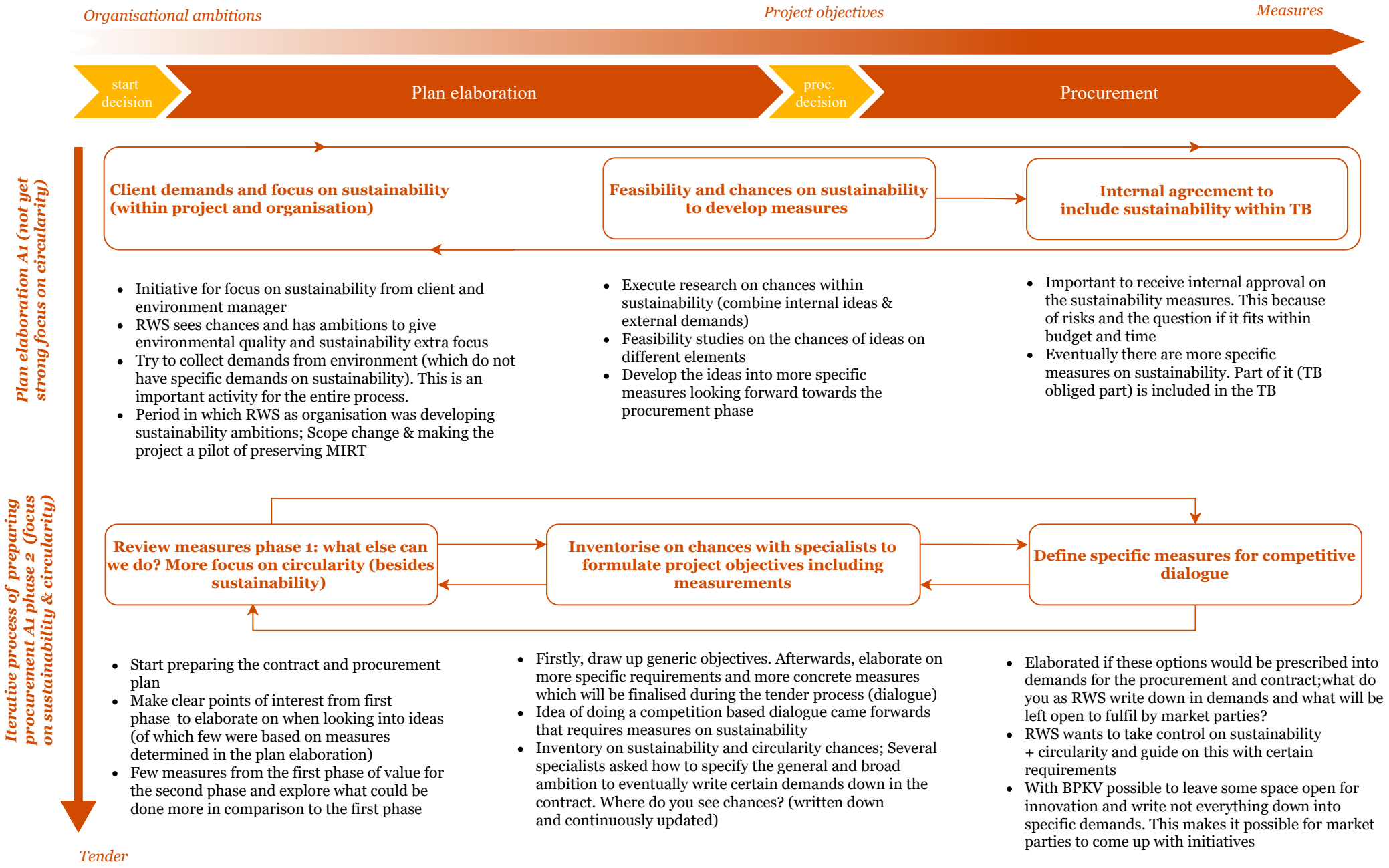
on sustainability and circularity. This BPKV is focused on six criteria; risk management, lost vehicle hours, MKI, circularity, plan of approach sustainability and CO2 (C8, C9).

With the help of first filter market parties and afterwards holding dialogue conversations, RWS wanted to search for solutions that could be of value to the needs of RWS (D3). Because sustainability was of great importance, three market parties will be selected from a total of five parties on sustainability (C10) by handing in a sustainability plan focused on emissions and an MKI calculation (C11, D4). There was established on which subject the highest profit could be made on sustainability (compared to the other subjects) (E9). Afterwards, during the competitive dialogue phase to select one contractor, there are three dialogues, of which one dialogue is focused on sustainability (C12, E10). As earlier explained, the procurement related to sustainability was mainly steered on BPKV, which was part of the dialogue rounds to select the most appropriate contractor (D5). These dialogue rounds will make it clear for RWS how market parties want to address sustainability and specific circularity (D6).

4.2.4. Process model

The links between the events are visualised in the Excel list by colour as show in Appendix F. Eventually, by combining events and outcomes related to the same subject this resulted in the process model shown in Figure 4.7 on the next page.

Figure 4.7: example process RWS



4.3. Analysing results: cross case comparison

By comparing two processes with each other, the level of deliberate and emergent strategy can be determined. This is done by comparing the standard process (standard process, seen as intended strategy) with the process of defining circular objectives in the case study (process in practice, seen as the realized strategy). Therefore, the cross-case comparison is focused on the three main subjects that play a role during the cross-case comparison: translating circular organisational ambitions into project objectives (the elements that shape the process), the process experienced in practice (using case studies) compared to the standard process (to determine strategy). Firstly, both cases are compared with the help of which role the ambitions and objectives played in both cases (subsection 4.3.1 and subsection 4.3.2). Afterwards, when the differences in both elements between the cases are clear, the processes of both cases are compared to each other based on the standard process (subsection 4.3.3). This cross-case comparison makes it possible to determine the underlying strategy in section 4.4.

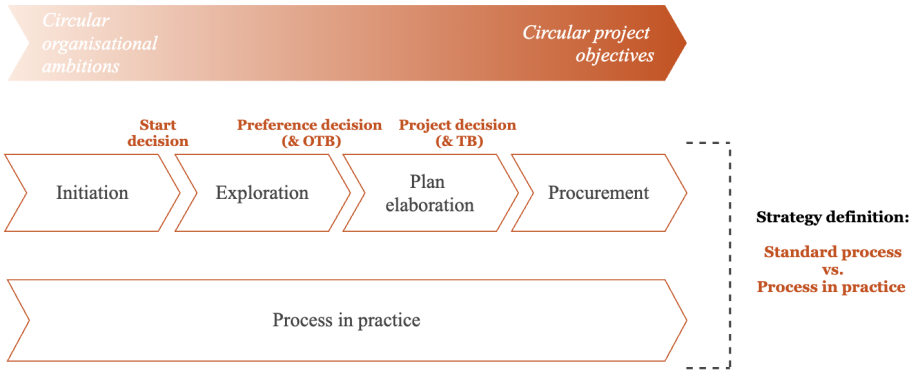


Figure 4.8: Focus cross-case comparison (own illustration)

4.3.1. Use of circular organisational ambitions

In section 2.1 and section 2.2, it was argued that public organisations have high ambitions on circularity. However, issues are experienced within both ProRail and RWS with achieving these ambitions in the projects and consequently including circularity in the procurement process. Because the researcher asked questions during the interview about the use of these organisational ambitions (besides the overall process), references are made to this part of the interview (see Appendix G and Appendix H for specific references).

ProRail case: Regarding the organisational ambitions described in subsection 4.1.1, these are highly connected with the ambition of the project. For the BBV Zeeland case, the 'materials' element of the entire sustainability vision is considered during the project. It is argued that because ProRail contains the aspect 'Sustainability' within their vision, this urged people to think about it and to take the initiative to realise it within a project (A, B, D). However, within the ProRail case, they experienced that it was impossible to figure out a specific way to achieve the circular ambitions within the project. Despite the extensive inventory on applying the circular ambitions, it was impossible to define circularity for the project specifically. Therefore, as explained during the interviews, they involved the market at an early stage and chose to do the plan elaboration of the project together with a market party.

RWS case: In the A1 phase 2 project, the organisational ambitions are considered and described in the documents to inform the market about the tender. Moreover, the project objectives are a short summary of these organisational ambitions. However, they explain that there is still a large undefined gap between the general ambitions and choices in what to do with these ambitions in design en execution (E). The ambition of RWS is to be CO2 neutral in 2030 and circular in 2050. Within the project team, they explain that currently, they do not see how this ambition should be approached and translated into the projects on a national level (D). Besides, while the client required the project to be sustainable, higher governmental agencies (e.g. The Hague or Ministry) gave no assignment on what to do with respect to sustainability. The assignment is to broaden the road considering the existing landscape in which no specific demand on sustainability or circularity is

included. Receiving an assignment without particular requirements related to sustainability is a well-known and recurring issue (A, D). This issue is challenging because it means that for sustainability, there is often no budget and/or time left (A).

Patterns and differences: As shown in subsection 4.1.1 and subsection 4.2.1, both organisations do have circular ambitions on a higher level and considered these ambitions in their projects. In addition, both ambitions on circularity are focused on the reuse of existing materials to decrease and finally exclude the use of natural resources. However, these organisational ambitions are defined on an abstract level. As shown in both case studies, having these ambitions does not mean that practitioners within the organisation know how to achieve these ambitions on a project level. Therefore, it is expected that market parties are needed to develop ideas for circular solutions, as explained in the following subsection.

4.3.2. The influence of procurement on defining circularity within project objectives

As explained in section 2.3, the specification of the project objectives in the front-end planning phase can be a critical activity for achieving circularity in the subsequent phases. Therefore, a project's procurement process and final success are often related to this front-end planning phase in which project objectives are defined. For both cases, the project objectives (based on the information in subsection 4.1.2 and subsection 4.2.2) and their relation to procurement (based on both interview results) are discussed.

ProRail case: All project objectives defined for the BBV Zeeland project are related to their ambition to achieve maximal circularity. In addition, these project objectives, in combination with selection criteria, are mainly focused on circularity. Consequently, the project objectives are used to find and select the most responsible contractor to do the plan elaboration together with ProRail and eventually execute the project. Therefore, these project objectives played a significant role in choosing a contractor during the procurement phase. They want to take up the circularity challenge and think about possible solutions together. Therefore, a specified execution design including specific project objectives is not required, and possible solutions are developed together with the contractor within the plan elaboration phase. This choice in procurement influenced the level of detail necessary for the project objectives.

RWS case: The project objectives of the A1 phase 2 RWS case are focused on four subjects; traffic flow, accessibility, spatial quality and sustainability. Thus, one out of the four project objectives focuses on sustainability and relates to the organisational sustainability ambition. This project objective is divided into two elements, namely 'Energy and climate' and 'Circular economy', which makes circular economy part of the project objective 'Sustainability'. Moreover, these project objectives, as shown in subsection 4.2.2, are very abstract and seen by respondents as a short summary of the circular organisational ambitions. Therefore, the project objectives did not play a prominent role during procurement and measures are developed to define circularity more specifically for market parties. These measures should give market parties a direction for their offer and develop innovative solutions on circularity to win the tender.

Patterns and differences: Both case studies are related to circular organisational ambitions formulated by the public organisation. However, they do differ in the level of detail on circularity and relation to procurement. Eventually, ProRail used its project objectives during the tender, and RWS defined more specific measures. Therefore, the big difference is that RWS used measures during procurement while ProRail defined project objectives excluding specific measures.

4.3.3. Process in practice compared to the standard process

According to literature in section 2.5, the process of the front-end phase has a specific standard sequence of events as shown in Figure 4.8. However, it is highlighted that there is not one particular process to be followed, and processes deviate from each other. In this subsection, both processes are elaborated upon while keeping the standard process in mind.

ProRail case: During the interviews of the ProRail case, interviewees already mentioned that the process is different from a superstructure project process. Generally, the process is straightforward, the scope is (mostly) clear from the start, and an implementation design can be drawn up relatively easily, including the necessary investigations. During the interviews was explained that due to the sustainability and circularity ambitions, this is not the case for the BBV Zeeland project. It was difficult for the team and related practitioners to

come up with circular solutions for the project themselves, and they had to involve the contractor in this iterative process. This collaboration makes it possible to investigate in cooperation on appropriate circularity solutions and determine which circular measures can be applied. As a result, it was required to let loose of the regular format. Therefore, the process deviated from the traditional and familiar process shown in Figure 4.8. Because it was required to do the plan elaboration phase together with a market party, a contractor was selected before the plan elaboration phase, which differs from the regular process (see Figure 4.9 for switch of these two phases).

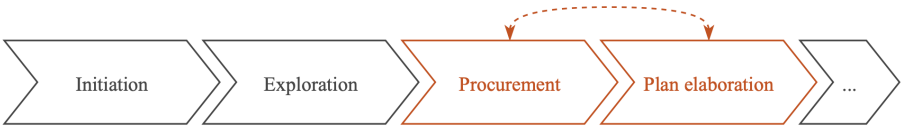


Figure 4.9: Deviating from standard process: switching plan elaboration and procurement phase (own illustration)

They usually know what to do precisely and work according to a standard process, including standard regulation. However, because this project is different, it is decided to take responsibility for the search and explore a working method of creating a circular project. There was no 'blueprint' of how a process of doing a circular superstructure project should look like.

RWS case: Because the A1 phase 2 is a project that is included within the MIRT, there are certain formal milestones like the start decision, preference decision and project decision related to sequential phases required to be accomplished. Having a closer look within the phases, an iterative process is recognised. During the plan elaboration phase, after a less structured exploration on sustainability, at some point an additional approval was needed to change the scope because of the sustainability focus of the project and to include sustainability within the TB. In addition, during the procurement phase, it is still an iterative process defining circularity and which measures should be included in the tender.

Patterns and differences: To compare both processes on patterns and differences, both processes (as explained in subsection 4.1.3 and subsection 4.2.3 and shown in Figure 4.3 and Figure 4.7) are visualised in more simplified characters in Figure 4.10 and Figure 4.11. Both show in their processes the main pattern of the iterative characteristic when specifying circularity. There was an interesting observation about both processes during the interviews when interviewees were asked to specify circularity into more comprehensive project objectives: almost all interviewees had difficulties explaining this in a clear process, including a logical sequence of events. Moreover, exact methods or tools were missing to define circularity. Therefore, in both process models, an iterative process is shown. However, the big difference between both is that this iterative process to specify the projects on circularity played a main role during the exploration phase for ProRail and during the procurement phase for RWS.

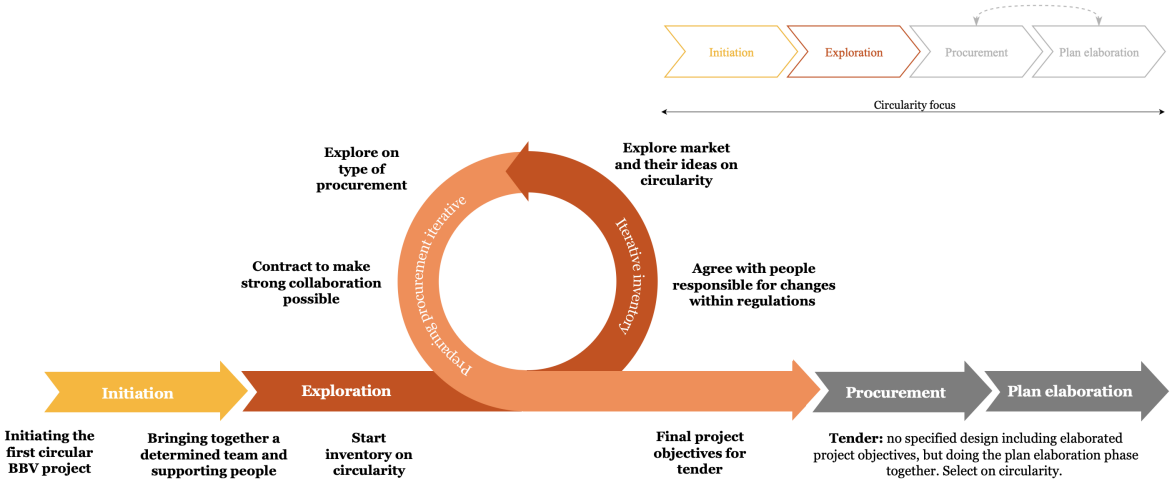


Figure 4.10: Process ProRail visualised (own illustration)

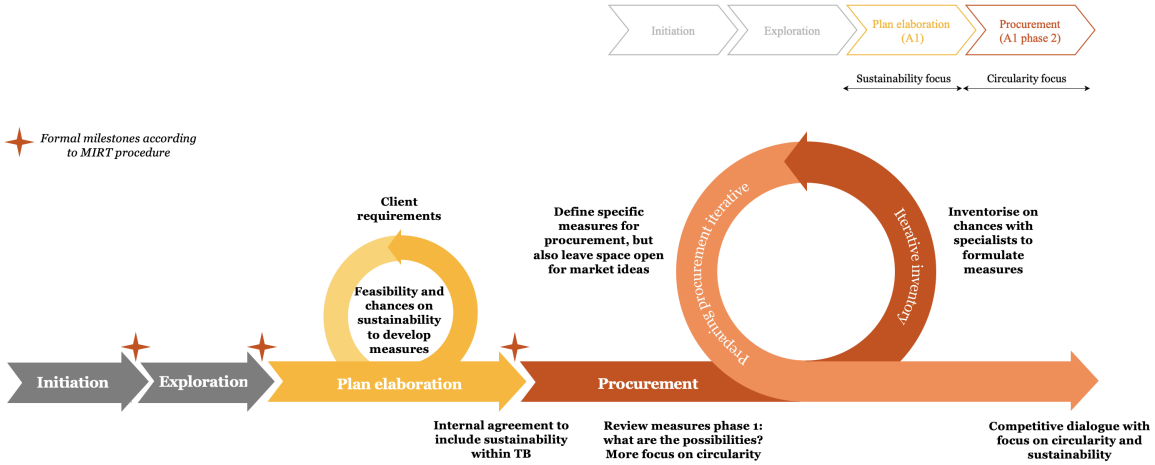


Figure 4.11: Process RWS visualised (own illustration)

Despite that the cases focus on different infrastructure constructions (highway versus railway) within different organisations, they show certain patterns in their processes in which they differ. Comparing the cases gives insights into what influences both processes, and apparently, the context seems to be decisive. Certain causative factors play a significant role within both processes and can explain why the processes are different; the contextual factors. It is known that both projects differ from each other as the ProRail case is about a railway pilot project and the RWS case is about a highway MIRT project. However, besides the fact that both projects are different types of projects, they show patterns in which they differ on a deeper level when analysing the process. These patterns can explain the difference between both processes. So, these factors show on which contextual factors both processes significantly differ. Therefore, all factors, except for *priority for costs*, score on a high level for ProRail. On the contrary to RWS, for this case all factors, except for *priority for costs*, score on a lower level. All contextual factors are presented in the text under the table (Table 4.1).

Influencing factors	ProRail process	RWS process
Demand for circularity from management	Top-down demand for circularity which results in a high demand for circularity from management	Bottom-up demand for circularity which results in a lower demand for circularity from management
Priority on circularity	Circularity as main project objective	Besides considering circularity, also other (e.g. spatial) aspects are playing a substantial role
Inclusion of circularity in early phases	Initiative and exploration (early phases)	Plan elaboration (sustainability) and procurement (later phases)
Space to innovate for contractor	A substantial amount of space is required to innovate because circular solutions want to be achieved in collaboration with contractor	The space to innovate is constrained because outcomes are required to achieve market competition and select contractor on circular solution
Upper management commitment	Having a support group as back-up	Receiving approval from upper management for certain ideas related to sustainability and circularity
Priority on costs	Circularity has main role and costs are (to a certain level) of less priority	Costs played a substantial role and the iron triangle was repeatedly mentioned

Table 4.1: Contextual factors influencing the process

- **Demand for circularity from management:** For the ProRail case, the circularity ask came from the management board at the beginning of the project (top-down). For the RWS case, there was also a circularity ask. However, this ask was initiated by practitioners in a later phase of the project (procurement). The request for circularity was largely initiated by practitioners within the project (bottom-up), like sustainability during the plan elaboration. Therefore, the demand for circularity seems to influence the process and the moment when circularity receives attention in the process.
- **Priority on circularity:** The priority for circularity seemed to differ for both cases during the process. Within the ProRail case, the focus was more extensive and more specifically on circularity as there was a substantial focus on reusing the railway materials. The RWS case focused on more aspects, such as spatial aspects, which caused less priority for circularity.
- **Inclusion of circularity in early phases:** Both cases do show an iterative process of defining circularity but within different infrastructure project phases. For the ProRail case, the focus on circularity was during the initiative and exploration phase (early phases) before selecting the contractor. This situation is contrary to the RWS case in which a sustainability focus was in the plan elaboration, and a focus on circularity was during the procurement phase (later phases) before selecting the contractor. The level of specifying circularity can depend on the phase in which the project is situated and procurement is initiated. For instance, observing the case studies, the ProRail case executed the procurement phase and thus the specification of circularity in an earlier phase than the RWS case. Therefore, this explains that ProRail has not (yet) defined specific measures for the project like RWS did.
- **Space to innovate for contractor:** Both RWS and ProRail left space for contractors to innovate on circularity played a significant role in their approach towards the market and definition of project objectives. To develop solutions on circularity, market parties were valuable, and both agencies gave market parties space for their ideas on circularity. The space to innovate played a major role in the level of detail of the project objectives. On the one side, ProRail defined more elaborated project objectives to select the contractor. On the other side, RWS defined general project objectives but formulated more specific measures to choose the contractor.
- **Upper management commitment:** Both cases needed management approval(s) to continue with their ideas on circularity. For the BBV Zeeland case of ProRail, an additional supporting group consisting out

of management was created to ensure backup during the entire project. A supporting group was not made for the RWS project, and practitioners asked for approval according to standard procedures.

- **Priority on costs:** The RWS case focuses more on the iron triangle and the role of costs within the project than the ProRail case. The RWS case needed to follow a specific budget. During interviews, interviewees repeatedly mentioned the' iron triangle', and circularity was frequently seen as an aspect that should fit within the budget. In contrast to the ProRail case, the project's costs will be determined after the plan elaboration together with the contractor. Circularity is the main goal in which the costs (to a certain level) should not play a leading role.

To conclude, both cases show the steps of the standard process, but in a different sequence related to other contextual factors as demonstrated in Figure 4.12. The processes differ because of contextual factors that influence the process. This information makes it possible to determine the strategy related to both processes in the next paragraph.

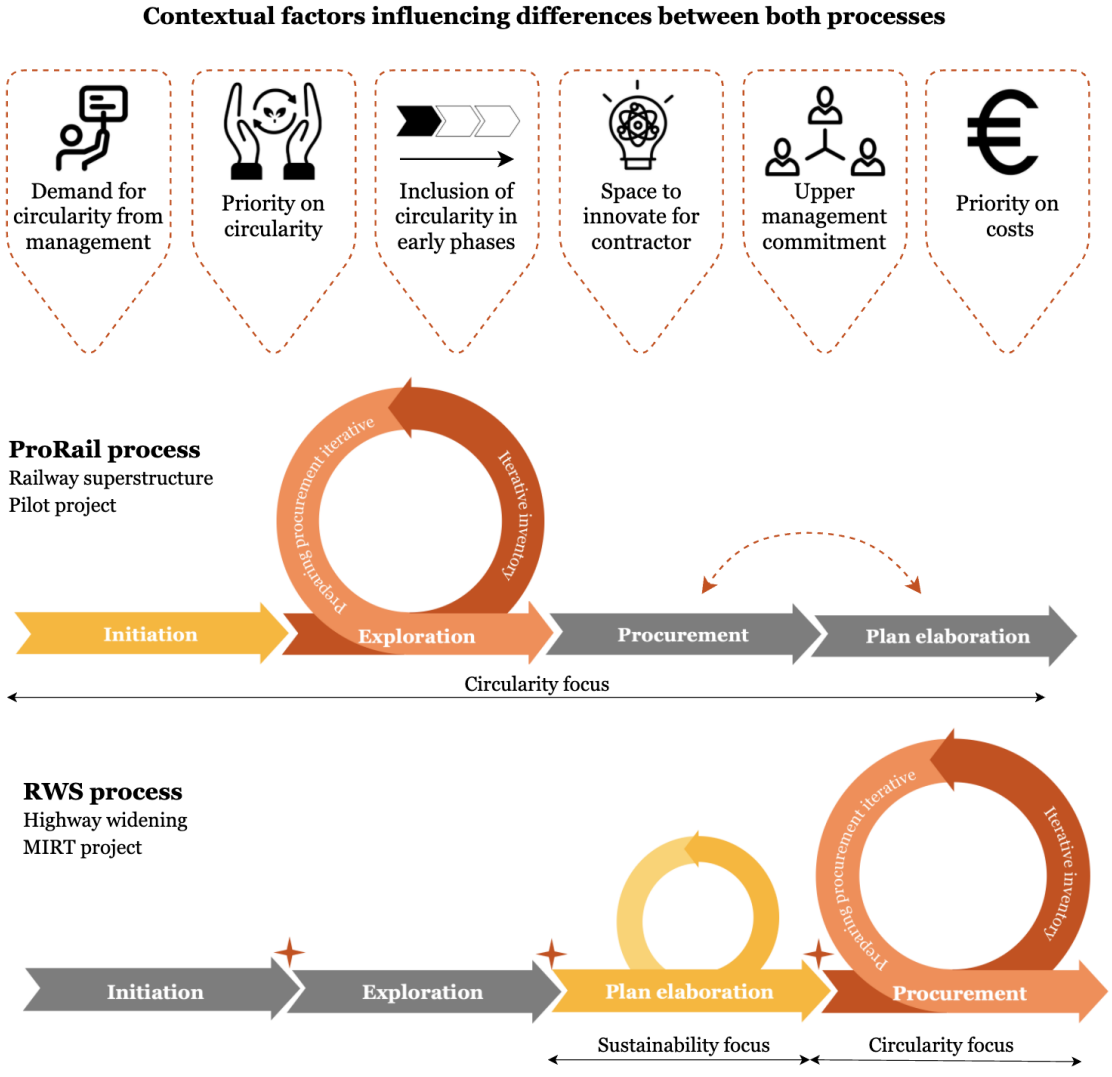


Figure 4.12: Contextual factors causing differences within the process (own illustration)

4.4. Process strategy definition

As explained in the previous subsections, both processes do have major differences and striking similarities at the same time. In the previous section, both processes are compared to understand why they are similar and different at the same time. Eventually, having both processes clarified, it is possible to determine the strategy

related to the processes. Therefore, it is required to take a closer look at both separately and their applied strategies based on the research of Mintzberg and Waters (1985). Afterwards, the strategies are determined with the help of previously explained differences in contextual factors (*referred to in italic style*). Lastly, the case studies strategies are included in the framework of Whittington (2001).

4.4.1. ProRail: Unconnected strategy

As explained by Mintzberg and Waters (1985), the unconnected strategy is characterised by a part of the organisation, e.g. 'sub-unit', that contains experts having an own strategy that can realise an own pattern concerning the stream of actions. In this case, this 'sub-unit' can be associated with the BBV Zeeland project that is part of a larger program within ProRail to maintain and renew the superstructure of the existing railway construction. By exploring in this project how a superstructure project could be executed in a circular way, it is the goal to explore a way of working (realising own pattern) that could be applied in future BBV projects. As explained during the interviews, before the project started there was not a certain process created having a sequence of activities as shown in subsection 4.1.4 and the primarily focus is on achieving maximal circularity. Therefore, this can be seen as the realisation of an own pattern associated with the unconnected strategy. As shown in Figure 4.13, the unconnected strategy can be divided into deliberate and emergent considering the perspective of the sub-unit, which is depending on the existing intentions. Regarding the intentions within the case, these actions developed in an emergent way leading towards an iterative process without an example of how project objectives should be defined.

From the start, it was decided by management (*Demand for circularity from management)* that the BBV Zeeland project would be different from other BBV projects and would function as a pilot project in which the explored way of circular working could be applied in future BBV projects (*Priority on circularity*). The ambition to realise a project with maximal circularity was made clear and related people were involved in this ambition, including a supporting group as back-up from management to make this possible (*Upper management commitment*). The emergent strategy matches the intention of 'figuring it out yourself with a motivated group' and having no 'blueprint' of how the process should be performed.

In addition, the unconnected strategy, as shown in Figure 4.13, shows that although it is represented within an umbrella strategy, a deviation from this is possible. This situation can also be associated with the fact that the BBV Zeeland did not follow the regular process as shown in Figure 3.5 due to circularity challenges (*Inclusion circularity in early phases*). As previously explained, because difficulties were experienced in defining circularity, they preferred to execute the plan elaboration phase in collaboration with the contractor. This approach deviates from standards. Therefore, a substantial amount of space is left open for the contractor from the start to innovate (*Space to innovate for contractor*). The phases of the regular process can be recognised within the case study processes. However, the sequence of phases deviates from the regular process (plan elaboration phase after procurement). These characteristics of realising own patterns and deviating from a traditional process correspond closely to the unconnected strategy to the BBV Zeeland case.

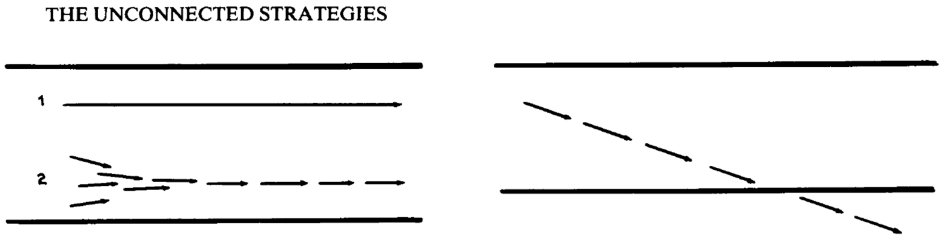


Figure 4.13: Unconnected strategy (Mintzberg & Waters, 1985)

4.4.2. RWS: Umbrella strategy

The umbrella strategy is characterised by general guidelines that define the boundaries in which actors can manoeuvre. Thus, a kind of umbrella is established under which the organisational actions (or in this case activities) are assumed to fall. It is not possible to set a pattern within these activities in a deliberate way. Therefore, boundaries are established to constrain them, as shown in Figure 4.14. These characteristics match the process of the A1 phase 2 RWS case. One of the main characteristics of the RWS process is that within prescribed borders of the official MIRT procedure (existence of general guidelines that define boundaries),

circularity measures are mainly developed in an emergent way. This emergent way of developing circularity measures is illustrated by the iterative process within the plan elaboration and procurement phase. The process shows the formal sequence of project phases, and circularity is included in the later phases (*Inclusion circularity in early phases*).

In addition, the match with the umbrella strategy can be explained with the help of several activities. During the first phases, there was not a high focus on circularity and, according to standard MIRT procedures, the primarily focus should be on a traffic related problem (*Priority on circularity*). Considering this traffic problem, circularity is not involved and within these early phases there is not asked for circularity from upper management (*Demand for circularity from management*). However, because of the sustainability ambition within the plan elaboration, the scope was changed. For this change in scope, approval from a higher level was needed and given to include sustainability within the TB (*Upper management commitment*) which makes the pattern of activities slightly different than usual. Nevertheless, the formal milestones or phases (e.g. boundaries) are not changed.

Furthermore, several options were investigated during procurement to make the project sustainable and circular due to sustainability ambitions. During procurement, the process was highly iterative, and there was no prescribed way the project objectives, including measures, should be formulated. Eventually, measures are added to steer the market parties in a certain way on (circular) solutions for the project (*Space to innovate for contractor*). By adding these measures, an 'umbrella' was created under which market parties could come up with circular ideas. Combining these iterative activities and prescribed boundaries, the A1 phase 2 case can be associated with the umbrella strategy.

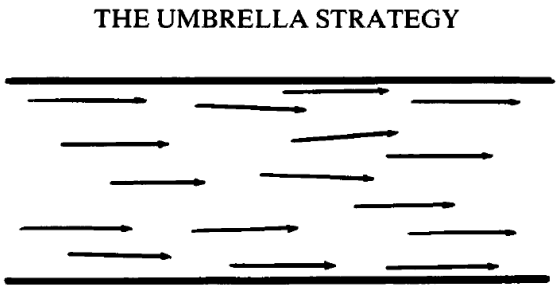


Figure 4.14: Visualisation of umbrella strategy (Mintzberg & Waters, 1985)

After explaining both strategies, it is possible to place them within the framework of Whittington (2001). Both processes show a certain level of emergent strategy, however, the ProRail process of the BBV Zeeland case is more emergent than the RWS process of the A1 phase 2 case. In addition, the RWS case was required to follow a specific budget and the iron triangle played a more prominent role within the RWS case than within the ProRail case (*Priority on costs*). For the ProRail case, circularity is the main goal in which the costs (to a certain level) plays a more minor role. This difference in the priority on costs makes the ProRail case more plural and the RWS case more profit-maximizing. Figure 4.15 shows the inclusion of both strategies within the framework.

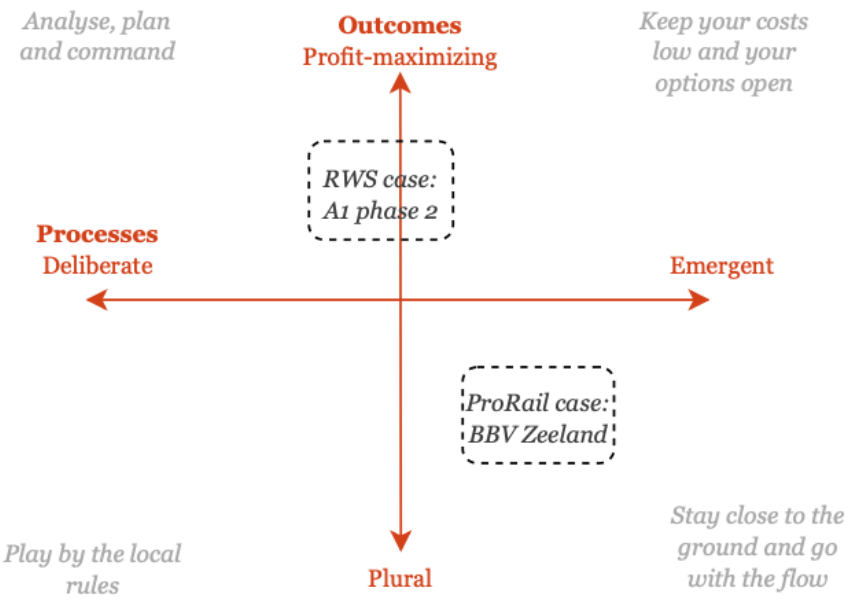


Figure 4.15: RWS case strategy and ProRail case strategy within the framework of Whittington (2001)

4.5. Validation

The main results of the cross-case comparison are discussed with two experts from PwC and one expert from RWS to validate the results (see for questions, **??**). All experts are selected on their extensive knowledge of the infrastructure sector. During the validation session, the research and primary research subjects were explained by showing the conceptual- and strategy framework. Afterwards, both case studies were explained after which results of the cross-case comparison were given in the same structure as the analysis of the results.

Use of organisational ambitions: As shown in the results, both projects experience difficulties when translating organisational ambitions into project objectives. During the PwC validation, this was recognised as they explained that there is not (yet) a certain policy available on how to define circularity and circularity goals within projects. Considering sustainability, tools as DuboCalc and the CO2 performance ladder are used. However, for circularity, tools as these are not yet available, and a certain 'baseline' for infrastructure projects (for example, DuboCalc) is missing. In addition, it is a big step for an organisation to force market parties towards circular solutions because limited knowledge is available on realisable circular solutions.

Furthermore, the project objectives of both cases differ in the level of detail on circularity. During the validation, it was found that it is understandable that organisations leave some space open for market parties. This makes innovative ideas possible, and when market parties are constrained with specific project objectives, these circular innovations might not be possible. Nevertheless, it is argued that it is possible to prescribe the project objectives in a more specific way in some cases. An example of this is the project of the 'Van Brienenoordbrug'. In this project, it is decided to recycle one part of the bridge. However, a public organisation takes over the contractor's role by thinking about a specific solution in this situation. This can be a risky step in terms of budget and time because it is questionable if the solution is realisable in many cases.

During the RWS validation it was highlighted that it depends on how specific the project objectives should be. It is explained that currently the KCI strategy is an important tool that helps to achieve the organisational ambitions with the help of 8 transition routes (also shown in Figure 1.2. Within the transition routes certain measures are defined for specific sectors, however the question how to purchase this is in development.

The relation between procurement and the definition of project objectives: From both literature and practical insights, a relation between project objectives and procurement was discovered. During the validation, this relationship was confirmed. It was explained that the choice for a particular type of procurement (independent of the organisation) could influence how and if specific project objectives should be defined. In other words, the type of procurement is dependent if project objectives are needed and on how specific these

project objectives should be defined.

The expert of RWS emphasised that it is not always needed to formulate project objectives for procurement. Project objectives are of value to make clear what is aimed with the project. When doing a classical public procedure, this can be based on MVI-criteria and measures. Thus, it depends on the type of procurement if project objectives are needed and for the RWS case, for instance, project objectives were not needed but are measures defined instead. The project objectives are more general on what they would like to achieve, the measures what they wanted as a minimal level, and the space in between contractors are able to fill in themselves. In addition, the ProRail case is earlier in the project definition phase when approaching the market than RWS which also results in a more specific project definition (with measures).

Process in practice compared to standard process: When translating organisational ambitions on a project level (with respect to procurement), both projects show an iterative (no exact sequence of activities) process as shown in Figure 4.10 and Figure 4.11. The respondents argue that an iterative working method could be seen as a way of working regularly used to achieve 'something new'. The idea behind this is to achieve progress in small steps and continually align for the best choice. If, in this situation, exact steps are required, this might obstruct the outcome of specific ideas. In addition, the respondent of RWS argues that the iterative character is a normal procedure for these complex phases and it is common that no existing route can be followed in many cases.

In addition, the characteristics of both processes are recognised. During the PwC validation, the process of ProRail is a process that is recognised in more pilot projects; it is unknown how the solution should look, but unquestionably, it should be circular. This approach contrasts RWS, who demanded the project as circular as possible but within time and budget. Usually, in MIRT projects, the initiation and exploration phase are mainly focused on solving a problem, and within the definition of this problem, circularity is not included. The first focus is on coming up with a solution to solve the problem (regardless of circularity or sustainability). In the end, they are an executing organisation required to solve a particular problem. Therefore, they cannot easily solve a particular problem in a circular way if there was not explicitly asked for (by I&W). Eventually, both processes, as shown in the figures, are related to the priority level that a project wants to achieve on circularity. Because of the substantial difference in the type of procurement and the role circularity played in this, it is advised not to compare both cases specifically and consequently generalise results.

Moreover, during the RWS validation it is recognised that both parties approach the market on different moments: for the RWS case the market is included in a later phase compared to the ProRail project. Besides, as in the PwC validation, it is explained that RWS projects are mainly focused on improving the accessibility and maintenance. The category of focusing primarily on circularity is not recognised. Therefore, when the project is transferred internally towards GPO or PPO, they include the aspect of sustainability. Sustainability was in many cases not included in the assignment from the ministry. However, this situation is currently changing. Thus, it is recognised that circularity is included in the latest phase towards procurement despite the fact that, as argued by the respondent, circular strategies on a higher level in the 9R Framework include decisions to be made in the asset management process.

Strategy behind process: In the end, all results for both cases show two different strategies in how ambitions are translated into project objectives. During the RWS validation the strategy explained for the RWS case was recognised and explained that during the preparation of procurement certain requirements are not (yet) included in the contract. Leaving space open in the contract was important for the dialogue phase to wait and see what ideas of contractors are.

Moreover, during the PwC validation there is asked for a possible explanation in the difference between both strategies. While asking for this explanation, it was emphasised that both cases are different types of projects including a different way of working towards circular project objectives. Therefore, the difference in strategies can not be related to the organisations. So, having the goal of a project to be a pilot on circularity is different from a project requiring circularity at the end of an ongoing project. Nevertheless, it is argued that both cases show valuable insight in how both strategies could complement each other in a final strategy. The pilot project should provide the solutions that could be applied within the standard projects, e.g. MIRT projects, that make it possible to formulate more specific project objectives. It is important to keep in mind that we are developing towards a circular economy in 2050 which means that we need to invent and meanwhile secure these innovations in regular projects.

5
Discussion

In the previous chapter (chapter 4), two case studies were analysed and compared in order to understand how organisational ambitions are strategized in two infrastructure projects. In this chapter, the results are (interpreted and) discussed while looking back on the literature and what was expected from the start. Therefore, the most important findings are discussed based on if it is consistent with the literature and what the implications of these findings are. These findings were unknown for the researcher before research was conducted. Finally, the last sub-question is answered: What are the implications of findings when comparing the BBV Zeeland (ProRail) and A1 phase 2 (RWS) cases on how both cases strategize circular organisational ambitions on the project level?

5.1. Implications

In this section, the most important findings are discussed considering findings in literature explained earlier in the report.

5.1.1. The challenge of using circular organisational ambitions in projects: absence of a circularity baseline

In both case studies, there was an absence of a circularity baseline. Therefore, a level of circularity that the contractor should achieve in the project was challenging to define. This absence of a baseline complicated the translation of the circular organisational ambitions (formulated abstractly) into projects. Both organisations do include ambitions on circularity. However, within both projects, difficulties are experienced in using circular ambitions in projects because of the abstract level of the organisational ambitions that causes a significant gap between the two.

As explained in section 2.1, high ambitions are defined for public organisations on circularity. These ambitions are challenging because circularity is a relatively new and developing concept for the infrastructure industry associated with change and adaption (Ritzén & Sandström, 2017) having no widely accepted definition (Adams et al., 2017; Kirchherr et al., 2017; Murray et al., 2017). In addition, Stritch et al. (2020) highlight the difficulties related to implement sustainability objectives in the procurement process because they involve unclear performance results and evaluation criteria that can lead to conflicting and complicated outcomes. Nevertheless, Kirchherr et al. (2017) show the 9R framework to measure the level of circularity that could help in defining circularity. During the case study research, it became clear that the developing character of circularity is a fundamental cause of difficulties currently experienced by public organisations when specifying circularity in their projects. Practitioners explained that it was hard to define circularity on a project level (including a certain minimal level of circularity) because of the still-developing techniques and innovations on circularity next to the abstract circular organisational ambitions. However, in none of the cases, the 9R framework was used to define the minimal level of circularity preferred for the project.

From an organisational point of view, it is challenging to define circularity for procurement without knowing what is possible for contractors and to make sure not to constrain them in their ideas. In order to make innovation from market parties possible, most of the time, it is not preferred to constrain market parties with highly specified requirements on circularity. Therefore, the balance between leaving space for innovations and defining circularity within projects is challenging to find. Sometimes it is possible to prescribe circularity in a more detailed way, for example, as shown within the project of the Van Brienenoordbrug as explained during the validation. Within this project, it was chosen to recycle one part of the bridge. However, in this

situation, a public organisation merely takes over the contractor's role by thinking about specific solutions. In many cases, it is not clear if the solution is realisable. Therefore, this can be a risky step in terms of budget and time.

In the end, taking into account the developing character of circularity, it is questionable whether circularity should and can be formulated in a specific way. It would make sense to create a certain baseline on circularity firstly. For instance, as shown in the literature study, the 9R Framework of Kirchherr et al. (2017) might be a potential tool that can help to create a baseline. For CO2 specification, a tool is currently used to determine the minimal level of CO2 for procurement called the 'CO2 performance ladder'. It would be helpful to have a similar tool to determine the minimal level (or percentage) of material reuse that the project should achieve. Platform CB'23 (2021) recommends the 9R Framework and argues in one of their latest reports (July 2021) that the action team of CB'23 sees the framework as a model that can be used in practice for circular procurement.

5.1.2. The influence of contextual factors on strategizing

When comparing the cases with each other, the cases show patterns in which differences can be observed, called the contextual factors. The strategies shown in the case studies are influenced by these contextual factors of a project such as the demand for circularity from management, priority on circularity, inclusion of circularity in early phases, space to innovate for contractor, upper management commitment and the priority on costs. Therefore, it seems that there is a relation between making choices in strategizing organisational ambitions on project level and the context of a project, as visualised in Figure 5.1. Stritch et al. (2020) argue that the current knowledge on factors that are of effect on the level of the procurement process efficiency is limited. This research continues on this insufficiency and explored several factors that influence the strategizing of specifying circularity in relation to procurement.

Considering the contextual factors associated with the processes (illustrated in theories of Whittington (2001) and Mintzberg and Waters (1985)), the results show that when a higher level is reached on the contextual factors it leads towards an more emergent, e.g. unconnected strategy (ProRail case). On the contrary, reaching a lower level causes a more connected and deliberate, e.g. umbrella strategy (RWS case). The umbrella strategy is a more connected strategy that prefers to maintain the relation with organisational boundaries on a higher level while the unconnected strategy shows a more unconnected relation because of the high score on contextual factors. Within the RWS case, the umbrella strategy shows that the connection with the (organisational) boundaries are strongly preserved. Innovation is possible within boundaries and no strong directions are given for specific demands. The ProRail case shows a step outside of the 'umbrella comfort zone' in which the unconnected strategy offers more possibilities to work outside of the boundaries. The release of boundaries gives the possibility to create an own environment in which the team and contractor are constrained as less as possible.

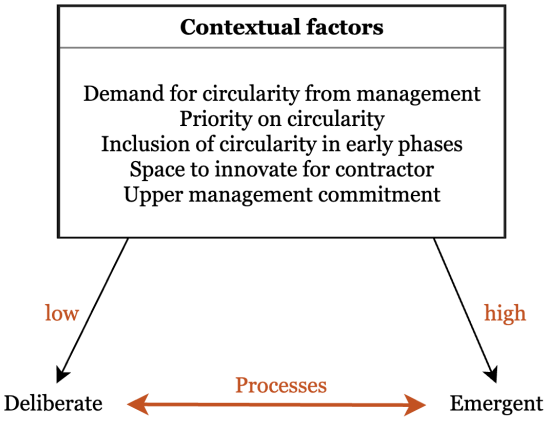


Figure 5.1: Relation between strategy and contextual factors (own illustration)

Normally, the framework of Whittington (2001) is used and designed for commercial, not public, business markets. Therefore, this case study research shows another interpretation of the Whittington (2001) framework and related theories of Mintzberg and Waters (1985) by using it for public organisations. This dif-

ferent interpretation of the framework results in contextual factors that are not explicitly mentioned by the researchers themselves. In addition, the theory is focused on four approaches to give advice on management while in this research the theory is used to analyse a process within a project (as shown in section 4.4). Because project processes are analysed from a strategy point of view and theory is used in a different way, a different approach is illustrated in this research on how project processes can be analysed. This approach gave insights in factors influencing the process of specifying on circularity. Currently, researchers explain that the inclusion of circularity within procurement is in both practice and academia a newly developing and challenging field (Cheng, Appolloni, D'Amato, & Zhu, 2018; Sönnichsen & Clement, 2020). Therefore, it might be helpful to use this approach in other research to explore more on the influences of the procurement process.

The need for emergent strategies when focusing on a new initiative like circularity

Despite both cases show different strategies due to the contextual factors, both cases do show a certain level of emergent strategy (but in a different level) which can be related to the developing characteristic of circularity within both projects. Thus, circular solutions are not yet defined and innovation should not be hindered. A higher level of deliberate strategy leads to more obstacles in the process which hinders innovations from the contractor's side. However, a less deliberate strategy of a process means less certain outcomes which are not always preferable.

Besides, the need of releasing organisational boundaries play a significant role in the emergent strategy. Therefore, it should be considered how much organisations are willing to release boundaries considering the related contextual factors of the project. As shown in the ProRail case (unconnected strategy), some contextual factors have a high influence leading towards releasing boundaries on a higher level compared to the RWS case (umbrella, connected strategy). These different strategies provide valuable insight how both strategies could complement each other in a final strategy: the pilot project should provide the solutions that could be applied within the standard projects, e.g. MIRT projects (validation).

It seems that a highly deliberate strategy is less applicable in a developing and changing environment. As explained in the literature (section 4.4), it was expected that the unstable environment of an emergent strategy would fit the characteristics of circularity. Using a deliberate strategy in the process would probably be preferable when more knowledge on circular solutions is available and a more stable environment is created. Considering sustainability, there already exists a tool that can determine a certain baseline on CO2, e.g. DuboCalc and the CO2 performance ladder. As previously highlighted, when integrating a similar tool, like for instance 9R Framework of Kirchherr et al. (2017), this could result in a more deliberate strategy for future circular infrastructure projects.

5.1.3. Varying moments when the market is involved

One of the most significant outcomes of the case studies is that both cases include the market in different phases to give substance to circularity objectives. This resulted in the situation that both cases differ in the level of detail to prescribe circularity towards the market and both front-end planning phases show a different sequence of phases.

The difference in level of detail to prescribe circularity on a project level

As Platform CB'23 (2021) explains, the level of detail to specify circularity within a project depends on the project phase. This case study research confirms this statement. For the ProRail case, the market was involved at an early stage which requires to leave the description of project objectives open and not prescribe circularity in extensive details. On the contrary, for the RWS case, the market was involved at the end of the project before realisation. Therefore, market parties are more constrained, and measures are formulated. In addition, both cases show different types of procurement in which a different level of detail is required to prescribe circularity. Therefore, the moment when a market party is involved can influence the level of detail to prescribe circularity.

Furthermore, the detail of the project objectives can differ for a type of procurement and formulating a great degree of specific project objectives might not apply for all types of procurement. An example of this can be found in the case studies. Within the ProRail case, it would not be beneficial if the project objectives included more specific measures like the RWS case. Because the plan elaboration was not yet started, it was of significant importance not to constrain the contractor in this phase. However, looking at the RWS case, the market parties will be selected to do the realisation of the project. Therefore, RWS needed to formulate more

specific measures on which market parties can be selected. The project objectives are general, however, the formulated measures contain a greater level of detail on circularity.

As explained by Morledge and Smith (2013) it is important to have clear project objectives that consequently contribute to the success of the project (Fageha & Aibinu, 2014). However, considering both case studies in this research, the interpretation of 'clear project objectives' can be different for each project. In the case studies, circularity (on a project level) is prescribed in two different ways related to procurement: within the ProRail case they tried to elaborate as much as possible on the projects objectives and within the RWS case they tried to do the same on measures. Thus, project objectives or specific measures can be used for procurement to prescribe circularity both including a different level of detail.

The differences in front-end planning phases

When market parties are included earlier or later in the project giving substance to the circularity objectives, the case studies show differences in how the front-end planning phase looks like. In the research, both cases applied the standard front-end planning phases as shown in Figure 2.5 in different ways.

Besides that market parties were included at different moments, the focus on circularity was also related to different moments. Looking into the ProRail case, the project was initiated as a pilot project with the goal to be as circular as possible, which made it more acceptable to deviate from standard procedures. For the RWS case, this was different, and the circularity focus was initiated during the procurement phase nearby the realisation of the project. Having these two different starting points to focus on circularity brings up the following question: what if the RWS project focused on circularity from the start? Currently, the initiation and exploration phase are mainly focused on solving a (traffic) problem, and circularity is not included within the definition of this problem. It is challenging to include circularity for executing organisations like ProRail and RWS when a circular solution is not explicitly asked from I&W.

Nevertheless, high ambitions are formulated on circularity (as shown in the KCI strategy (Ministerie van Infrastructuur en Waterstaat, 2020b)) which raises the question if circularity should be included during these early phases. The focus is nowadays mainly on solving a (traffic) problem without considering circularity. Therefore, it is questionable to what extent standard project processes, including the formal sequence of phases, are still usable if contextual factors change when new initiatives (like circularity) play a major role in a project.

In the literature study, a standard process (see Figure 2.5) was shown, including information related to infrastructure practices (Figure 3.5). Therefore, the expectation from the researcher was that both processes would comply with this standard process. Moreover, it was expected by the researcher that a particular sequence of activities would shape the translation process of organisational ambitions into project objectives. Therefore, a best-case scenario would be that from the initiative phase, the ambition would be made clear (related to the organisational ambitions) and step by step translated into specific project objectives to do the tender. However, the results show that the process was highly iterative, and no sequence of specific activities was familiar for practitioners to follow. Kroll (2019) already highlighted in his article that the process of translating ambitions into effective measures and action is experienced as a complex process of interpretation and negotiation. This argument is in line with the results of this research because of the iterative character of the process.

6
Conclusion

In this chapter an answer is given to the main research question of the research: How do public organisations strategize organisational ambitions on the project level for new initiatives during the preparation of procurement as exemplified by two projects with circularity as representation? Afterwards, the corresponding limitations of the research are presented considering the applied methodology, received data and gained results. Finally, the recommendations for practitioners and future research are given.

6.1. Answer to the main research question

Main research question: How do public organisations strategize organisational ambitions on the project level for new initiatives during the preparation of procurement as exemplified by two projects with circularity as representation?

As shown by the results in this case study research on circularity, public organisations strategize organisational ambitions on project level for new initiatives during the preparation of procurement in different ways. Because of the developing and unexplored character of a new initiative, they include a certain level of emergent strategy. This level of emergent strategy depends on the contextual factors in which costs can or cannot be a high priority.

As exemplified in the research, both case studies addressed the strategy translation of organisational ambitions differently (as shown in Figure 6.1). The ProRail case illustrates that circular organisational ambitions can be strategized on a project level in a more emergent way, releasing the organisational boundaries and restrictions to a certain level. This choice for strategy was related to the contextual factors of the project. There was a high demand from the management board on circularity from the start, which made an increased focus on circularity possible. Commitment from upper management as a backup for difficulties outside of the scope and inclusion of market parties at an early stage helped to continue the project despite the challenging circularity ambitions. Eventually, to make this collaboration with a contractor possible, the contractor should not be constrained on its ideas on new initiatives related to circularity. Therefore, the definition of organisational ambitions on the project level is primarily focused on finding the most appropriate contractor to collaborate with and develop an optimal circular solution. Because there was the need to define a solution on a new initiative together with the contractor from the start, a highly emergent strategy was required to keep options open for both parties, and specific measures were excluded.

Moreover, the RWS case shows that a less emergent strategy is possible in which the prescribed organisational boundaries are playing a larger role. Within prescribed borders of the official MIRT procedure (existence of formal guidelines that define boundaries), measures are developed in an emergent way, making the strategy less emergent but not entirely deliberate. Also, this choice in strategy is related to contextual factors. There was not a focus on or demand for circularity from the start. In the early phases of the project, the focus was on the primary (traffic) problem related to the decreasing accessibility of the road and possible solutions. Therefore, the focus on circularity initiated in a later project phase during procurement besides a high focus on other aspects as spatial quality and mobility. Also, during procurement, the contractor was involved. The contractor's involvement was in a later phase than the ProRail case, which means that the project was more specified and more specific measures were required to define circularity when approaching market parties. During procurement, the process was highly iterative, and there was no prescribed way how practitioners should formulate the measures on circularity. In addition, because of the developing character of circularity, there was space left for contractors to innovate on circularity within the prescribed measures that explain the

required minimal level on circularity. Thus, a certain circularity level is created for market parties to achieve market competition in finding the optimal circular solution and select a contractor on this. Therefore, there is not forced for a specific solution.

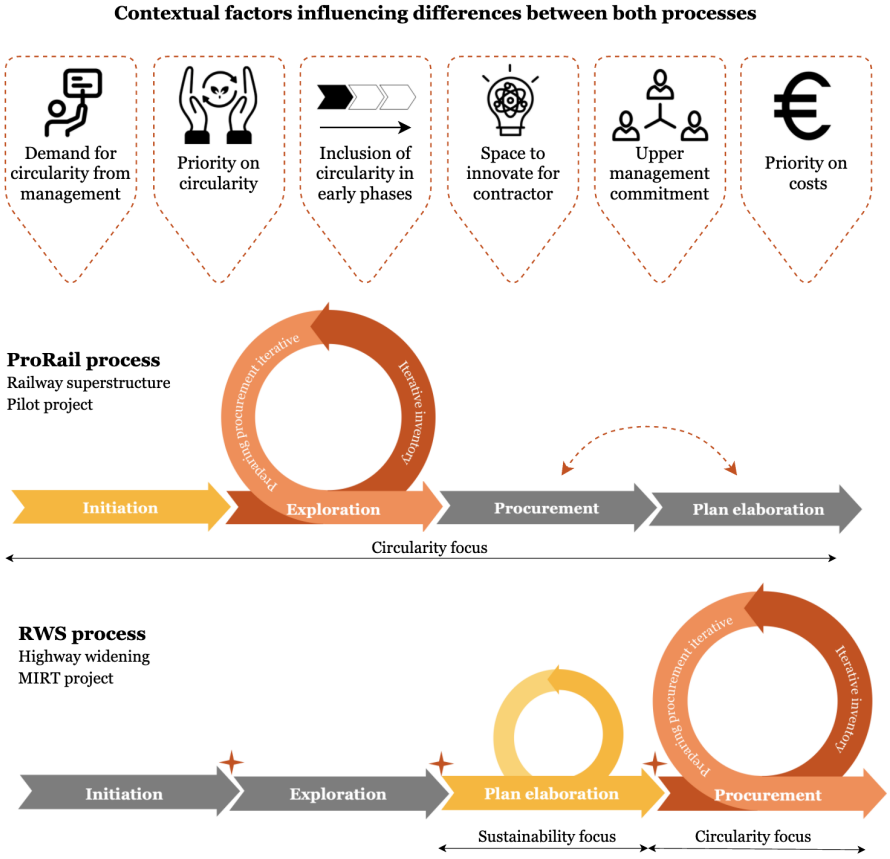


Figure 6.1: Contextual factors causing differences within the process (own illustration)

Furthermore, several implications on strategizing organisational ambitions on project level are revealed in this research.

The absence of a baseline which helps to specify a new initiative: In both cases, an absence of a circularity baseline, presenting a level of circularity that should be achieved, was discovered. The absence of this circularity baseline complicated the translation of the circular organisational ambitions of an abstract character into projects and caused a significant gap between the organisational ambitions and project objectives. Therefore, firstly, it would make sense to create a certain baseline on circularity that helps to define circularity in projects (using, for instance, the 9R Framework). The absence of a baseline can also be an issue for other new initiatives because of the insufficient information of new initiatives in early phases.

The need for emergent strategies when focusing on a new initiative: As circularity illustrated in this research, new initiatives seem to need a certain level of emergent strategy to ensure not to hinder innovation related to the new initiative. In addition, the need of releasing organisational boundaries plays a significant role. Therefore, it should be considered to which level organisations are willing to release boundaries considering the related contextual factors of the project. However, a less deliberate strategy means fewer safe outcomes, which is not always preferable and might complicate the situation. Therefore, this results in a challenging consideration in which the contextual factors, discovered in this research, might be helpful.

Varying moments when a market party can be included: Both cases include the market in different phases to give substance to circularity objectives. Therefore, both cases differ in the level of detail to prescribe circularity towards the market and both front-end planning phases show a different sequence of phases. Thus,

when specifying a new initiative, the level of detail to prescribe this initiative on the project level can differ when approaching a market party. When market parties are included earlier or later in the project giving substance to the initiative, this could also mean differences in the front-end planning phase. As shown in the research, it is not always preferable to involve market parties from early phases to give substance to the new initiative because other aspects play a significant role in the projects. However, this means that market parties are involved in a later stage and can no longer apply certain ideas to the new initiative because the project is more specified than in the early phases.

Eventually, the research results show us that two public organisations show two different approaches of how organisational ambitions can be strategized on the project level for a new initiative (in this case circularity) during the preparation of procurement before approaching market parties. In addition, previously explained strategies can be generalised for other new initiatives in several situations. Therefore, both strategies discovered in the case studies can be applied to how organisational ambitions can be strategized on a project level by public organisations in other situations.

On the one side, a highly emergent strategy is preferred when it is acceptable to release the organisational boundaries and restrictions. According to the results, this is possible when the contextual factors (focused on the new initiative instead of circularity as shown in Figure 6.1) are highly related, but costs are not a priority. This results in a strategy in which organisational ambitions are translated into project objectives leaving a substantial space open for the market to innovate on the new initiative. Finally, during procurement, a market party is primary selected on its contribution to the new initiative.

On the other side, a partly deliberate and partly emergent strategy is preferred when it is a situation in which organisational boundaries play a significant role in the process. This research shows that this strategy is preferred when the contextual factors (focused on the new initiative instead of circularity as shown in Figure 6.1) are not highly related, but costs have a higher priority. This approach results in the definition of more specific measures on the new initiative. This means that market parties are allowed to innovate within certain boundaries set by the organisation. They want to achieve the project focused as much as possible on the new initiative by creating a strong incentive on this initiative in procurement besides the existing mix of elements like time and costs.

6.2. Limitations

To interpreter the results of this research, there are several limitations that should be considered. In the upcoming sub-sections these limitations are discussed.

6.2.1. Methodology

Event-driven approach: The event-driven approach was sometimes in contrast with the fact that the process was iterative. The event-driven process is of a mainly straightforward character while the iterative process is more of a repeatedly character. Therefore, a straightforward process including activities leading to certain outcomes was the main focus from the start and also the basis of the MURAL to visualise the processes. This approach might have led towards some limitations in the visualisation of the processes.

Amount of case studies: In the research two case studies are used and more case studies would have provided more insights to generalise certain results. However, due to the limited time of the research, more case studies would not be feasible. Understanding both projects and execute in-depth research requires a significant amount of time. So, when more than two case studies would have been analysed in the same period of time, a lower level of in-depth analysis was executed.

Type of case studies: Searching for an infrastructure project that includes circularity, is in the procurement phase (or already selected a contractor) and, especially important, wants to share their information for research was challenging. Nevertheless, two circular infrastructure projects were found. However, because of the significant difference between both case studies and the limited amount of case studies, some information could not be generalised.

6.2.2. Data received from interviews

Method of interviewing: Because the explained activities are asked with the help of an open question and took place back in time, it is possible that certain activities have not been mentioned. However, in order to

make sure this was avoided as much as possible, at least two practitioners were interviewed that were involved within the same phase of the process. Especially the plan elaboration phase of the RWS A1 phase 2 case study was for respondents a long time ago. Therefore information from this phase is less viable than information from the procurement phase. However, the plan elaboration phase contained information of less value for this research.

Use of MURAL: Because of the COVID-19 measures during the entire period of this research, it was not possible to physically meet with the respondents. Making use of an online whiteboard called 'MURAL' made it more easy to conduct an interview about the process. By using MURAL, it was possible to show respondents the events they explain leading towards a process. However, there it is conceivable that more reliable data was received when the interviews were conducted in real life. Real life interviews would have made the interview more interactive by using a physical whiteboard as almost none of the respondents actively used the MURAL. Probably the level of interaction would have been higher, because a physical whiteboard is more familiar to use than the online MURAL whiteboard.

Data used from projects in development: Both projects used in the case studies are not yet executed. Therefore, it is not possible to define conclusions on which strategy contributes mostly to circularity. Both strategies show the inclusion of circularity, however, the end result if circularity is really included (and on which level) is missing in this research.

6.2.3. Results

I&W and contractor's point of view: The research is executed within public organisations that are the executing organisations of the ministry of I&W. However, both the contractor and I&W point of view are missing in the research. Considering the transfer of the assignment from I&W, it is interesting how they would think about taking into account circularity within the assignment and integrate it from this point. In addition, the contractors has also a significant role in this research. Therefore, it would be of additional value to understand the contractor's point of view and how they think about the definition of circular organisational ambitions on a project level that subsequently is communicated to them.

Contextual factors: In this research several contextual factors are defined based on the case studies. Therefore, these factors are limited and by using more case studies it is possible to explore more contextual factors.

6.3. Recommendations for practitioners

Create a baseline for circularity: There is not yet a certain baseline to determine the level of circularity on which projects need to comply. The absence of this baseline and thus minimal level of circularity that should be achieved, makes it difficult to make use of abstract circular organisational ambitions. Therefore, it would make sense for public organisations to create a certain baseline on circularity that can be applied on several infrastructure project.

Consider the contextual factors of a project to determine the appropriate strategy for a project: As shown in this research, the contextual factors of a project are of influence on the applied strategy. Therefore, when starting a project, it is useful to explore these factors from the start which can help finding the most appropriate strategy to define organisational ambitions on a project level that is related to a certain type of procurement. This can help to understand what wants to be achieved considering the circularity on a project level, which strategy can be applied and facilitate the approach towards market parties.

Make sure that the moment when a contractor is approached matches the level of detail to prescribe circularity and procurement type: As shown in this research is besides the project phase also the chosen type of procurement related to the level of detail that is required to prescribe circularity within project objectives. So, besides the developing characteristics of circularity within procurement, different ways of prescribing circularity within a project can be used related to different contextual factors. Therefore, it is important to make sure the appropriate level of detail is used to prescribe circularity on a project level related to the project phase in which market parties are approached and procurement type used.

Create organisational learning in circularity projects: Eventually, both strategies shown in the case studies could complement each other in a final strategy when developing circular infrastructure projects. The pilot project should provide the solutions that could be applied within the standard projects, e.g. MIRT projects, that make it possible to formulate more specific project objectives. It is important to keep in mind that we are developing towards a circular economy in 2050 which means that we need to invent and meanwhile secure these innovations in regular projects.

6.4. Recommendations for future research

- Execute the same research within more case studies on established innovative themes that are exiting for a longer period of time on the market. By doing more case studies on established themes, the contextual factors and related strategies can be completed as much as possible. Therefore, more information (on different projects) is gained on the relation between strategies and contextual factors which is helpful to learn what should be applied for the circularity theme. In addition, it is possible to generalise the results on a higher level and consequently use this information in other projects to determine the most appropriate strategy.

- As in the RWS case study is shown, sustainability and circularity are not included included in the initiation and exploration phases of the project. Therefore, research can be executed in a similar MIRT project on the added value if circularity would be included in these phases.

- Research on how organisational learning should be applied considering circular innovations in the future. It would be of value for future project to understand how this information should be transferred. This can be explored by analysing how information is transferred from a pilot project towards a 'regular' project that integrated innovative solutions from the pilot project. How did they learn from each other and towards what are the results?

- As shown in the research, there is not yet a certain tool that can help to define circularity in relation to procurement. Therefore, it is of value to execute research on a procurement tool in which circularity is integrated. For example, research could be conducted on how the 9R Framework can be integrated into procurement resulting in an usable tool.

- Measure the level of circularity within both case studies when the projects are realised. Currently, both projects are not yet in the execution phase, and therefore the impact of both processes on the result of the project can not be measured. However, it would be of value for this research to compare the final circularity level of both projects and determine the impact of the different processes related to the used strategies.

- Investigate what is essential from a contractor's point of view to make the definition of circularity usable within the procurement process. This other side of the story would be of value for this research as the research mainly explains the public client point of view.

- In this study research is conducted on a project level, however, it is also valuable to consider this research on a policy level. Therefore, research can be conducted on including circularity in relation to portfolio program management. It would be interesting to understand what the vision and policy is on how circular organisational ambitions should be translated into the several projects (included in the programs of the organisations). As there is an overview of all projects that need to be executed, research could be conducted if it is possible to include circular organisational ambitions in these projects.

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A

Appendix A: Interview protocol

Interview Protocol (60 minuten interview)

Datum: …
Case: …
Geïnterviewde: …
Interviewer: Leidy Kupers
Locatie: Thuislocatie via Teams

Allereerst bedankt voor uw tijd en medewerking voor mijn onderzoek!

Interview deel 1 – Algemeen (5 min)

Dit deel is uitgebreider opgeschreven dan het verwoord wordt in het interview. Van tevoren wordt namelijk deze informatie ook opgestuurd naar de geïnterviewde.

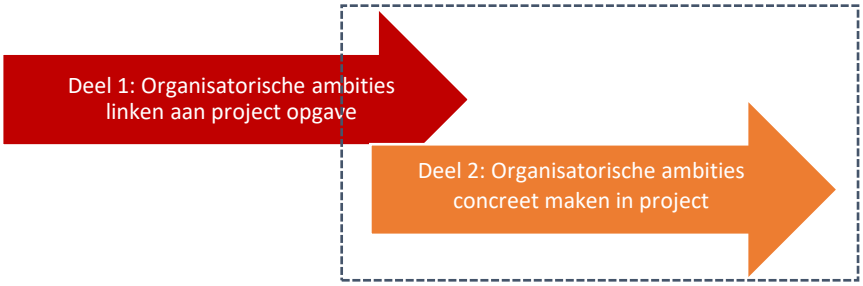
Voorstelrondje (mocht dit nog nodig zijn)

Introductie (mocht dit nog nodig zijn)

- Master Construction Management & Engineering TU Delft (Faculteit Civiele Techniek)
- In samenwerking met CP&I afdeling op PwC, begeleider Peter Vermeij
- Gedurende mijn studie meer interesse gekregen voor duurzaamheid en specifiek circulariteit door onder andere MDP India - duurzaamheid van traditionele bouwcultuur (kath-kuni) in Himalaya analyseren

Achtergrondinformatie
In mijn afstudeeronderzoek ben ik bezig met het onderzoeken van **het proces hoe publieke organisaties circulaire ambities op organisatieniveau vertalen naar doelstellingen op projectniveau**, dus eigenlijk de vertaalslag van ambities naar gerichte doelen uit te voeren in projecten. Het doel van deze interviews is om dit inzichtelijk te maken vanuit praktijkvoorbeelden (dus projecten) in verschillende publieke organisaties. Het proces bekijk ik vanuit een inkoopperspectief waarin de voorbereidingsfase van de inkoop wordt meegenomen voordat de daadwerkelijke inkoop start (dus niet de inkoop zelf).

Dit gehele proces bestaat eigenlijk uit twee delen die in elkaar overlopen, zie onderstaand figuur. Het eerste deel is hoe de ambities vanuit de organisatie terecht komen bij een bepaalde projectopgave. Het tweede deel (meer gericht op het project) is hoe in projecten deze ambities worden meegenomen en uiteindelijk worden omgevormd tot concrete doelstellingen. Dit interview zal voornamelijk gericht zijn op de het tweede deel. Dit houdt in dat ik in dit interview kijk welke stappen nodig zijn om een circulaire ambitie te vertalen naar een doelstelling in een project van *de startbeslissing project* tot aan *de start van de aanbesteding.* Het is dus uiteindelijk van belang dat er wordt gekeken naar het doorlopen van deze stappen gefocust op hoe jullie circulariteit hierin verder hebben gebracht. Mocht u echter als geïnterviewde ook kennis hebben van een aantal stappen voor de startbeslissing (deel 1), neem ik deze ook graag mee in het interview.



Om dit alles inzichtelijk te krijgen, is het nodig om meerdere interviews te houden per project van een publieke organisatie en te visualiseren hoe dit proces zich heeft ontwikkeld.

Opbouw interview
Eerst zal ik een aantal algemene vragen over uw betrokkenheid bij het project en of dit eventueel al voor de start van het project zelf was. Hierna gaan we door naar het in zicht krijgen en visualiseren van de verschillende stappen van het proces in de voorbereidingsfase van het project (zoals net uitgelegd, deel 2). Hierbij maak ik gebruik van een MURAL* om deze stappen online te kunnen visualiseren terwijl u uw verhaal vertelt. Een aantal belangrijke beslismomenten (start- en eindpunten van fases) heb ik al toegevoegd om hierbinnen de stappen te gaan toevoegen en makkelijker toe te werken naar een bepaald eindpunt.

Deze stappen zal ik terwijl u aan het woord bent gaan noteren zodat u zo goed mogelijk uw verhaal kunt uitleggen, maar voel u zeker vrij om aan de MURAL* deel te nemen. Ik maak er graag een interactief interview van mocht u zich hier comfortabel bij voelen.
Om eerst een beeld te krijgen van het gehele proces zal ik u het woord geven om dit proces uit te leggen waarbij ik tegelijkertijd zal proberen de hoofdactiviteiten / stappen op de MURAL* vast te leggen. Om een complete beschrijving van deze stappen te krijgen zijn er ook nog vragen opgesteld om de stappen uit het proces gedetailleerder te bekijken nadat het gehele proces gevisualiseerd is. Dit om te begrijpen hoe (inclusief met welke methodes) een bepaalde stap heeft geleid tot een bepaalde uitkomst waarop een vervolgstap weer kon worden genomen en wie van invloed was op deze beslissing.

Doel interview
Inzichtelijk maken van stappen die u heeft doorlopen om de organisatorische circulaire ambities van [Organisatienaam] te vertalen naar projectdoelstellingen in het [projectnaam].

Vertrouwelijk
Hoe wilt u geciteerd worden?

- Functie en/of organisatie en/of project
- Geheel anoniem

Mag ik de meeting opnemen? Ja / Nee

Tot slot
Ik wil graag benadrukken dat er tijdens het interview geen goede of foute antwoorden zijn. Het gaat om uw beeld en perspectief hoe het in het project is verlopen en ik wil dit graag in kaart brengen. Mocht u hierbij bepaalde vragen oncomfortabel vinden om te beantwoorden en graag niet beantwoorden, dan mag dit natuurlijk. Ook als vragen onduidelijk zijn, schroom niet om mij om verduidelijking en verdere uitleg te vragen tijdens het interview.

MURAL OPENEN – doornemen fases. *Focus wordt voornamelijk gelegd op de stappen (inclusief methodes, uitkomsten en verantwoordelijkheden) die hebben geleid tot een ontwikkeling van circulaire ambities tot circulaire projectdoelstellingen*

MURAL uitleg:

- *Rechtsonder vakje waarmee genavigeerd kan worden over het 'whiteboard', handig als het gehele proces in beeld is*
- *Notitie toevoegen door dubbel te klikken ergens in het veld*
- *Willekeurig aantal 'sticky-notes' alvast toegevoegd, kunnen er natuurlijk minder of meer worden*

Interview deel 2 – Betrokkenheid voor start project

In dit deel van het interview zullen we even kort gaan kijken naar uw betrokkenheid bij de start van het project en een stuk fase hiervoor

1. Wanneer is het project gestart en in welke fase zit het nu?
    a.
2. Gekeken naar het MURAL, wanneer bent u betrokken bij het project?
    a. –
3. Welke activiteiten hebben er voordat u betrokken was nog plaatsgevonden?
    a.
4. Wat was uw rol tijdens het project en kunt u dit kort even toelichten?
    a.
5. Gekeken naar de organisatorische circulaire ambities van [Organisatienaam], welke organisatorische ambities zijn meegenomen tijdens de start van dit project?
    a. Hoe hebben deze ambities zich ontwikkelt tot een projectbeslissing? (initiatief fase [Organisatienaam],) Hoe is de overname van deze ambities tijdens de start verlopen en door wie?

Nu gaan we verder naar de stappen vanaf de start van het project

Interview deel 3 – stappen visualiseren

Visualiseren van de stappen m.b.v. MURAL waarin start + eindpunt staan aangegeven. Focus wordt voornamelijk gelegd op de stappen (inclusief methodes, uitkomsten en verantwoordelijkheden) die hebben geleid tot een ontwikkeling van circulaire ambities tot circulaire projectdoelstellingen.

1. *Open vraag om gehele proces in beeld te krijgen: Ik zou graag met u het proces in kaart brengen. Ik wil u daarbij vooral uw verhaal laten vertellen en hieruit stappen in het proces in kaart brengen.*

    a. Kunt u uw verhaal vertellen en mij stap voor stap meenemen vanaf het moment waarbij u voor het eerst bij dit project in aanraking kwam met de gestelde circulaire ambities? Wat moest u er mee doen, of wat deed u ermee? [hoofdactiviteit duidelijk krijgen] Waar moest u naartoe werken? [uitkomst van deze hoofdactiviteiten duidelijk krijgen]

2. Herhaal proces en laat respondent bevestigen of de stappen (hoofdactiviteiten) en uitkomsten kloppen.

3. Gekeken naar dit proces in zijn geheel:
    a. Zijn er per fase **bepaalde hulpmiddelen / zaken** gebruikt die hebben geholpen om de circulaire ambities in dit proces concreter te krijgen en uit te werken? *Bijvoorbeeld instrumentarium, documenten, bepaalde communicatie, meetings etc. Bepaalde documenten waarmee ambities zijn geformuleerd en leidend waren in verdere besluitvorming.*
        i.
    b. Zo ja, waren dit **nieuwe hulpmiddelen** om circulariteit te bereiken in de projectdoelstellingen? Kan me voorstellen dat het originele stappenplan en hulpmiddelen namelijk geen volledig antwoord geven op een project gefocust op circulariteit, hoe bent u hier mee omgegaan?
        i.

    c. **Wie** waren **van grote invloed op de beslisvorming** in deze stap? Hadden deze personen **kennis in en een focus op circulariteit/duurzaamheid?**
        i.

B

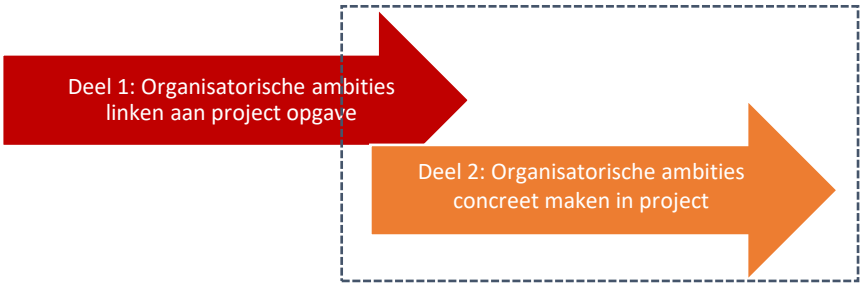
Appendix B: Interview information

Informatie interview | Afstudeeronderzoek Leidy Kupers TUDelft

Allereerst bedankt voor uw tijd en medewerking aan mijn onderzoek! Hieronder vindt u een korte toelichting op het interview inclusief achtergrondinformatie. Ook hoor ik graag in hoeverre u het interview vertrouwelijk wilt houden.

Achtergrondinformatie
In mijn afstudeeronderzoek ben ik bezig met het onderzoeken van **het proces hoe publieke organisaties circulaire ambities op organisatieniveau vertalen naar doelstellingen op projectniveau**, dus eigenlijk de vertaalslag van ambities naar gerichte doelen uit te voeren in projecten. Het doel van deze interviews is om dit inzichtelijk te maken vanuit praktijkvoorbeelden (dus projecten) in verschillende publieke organisaties. Het proces bekijk ik vanuit een inkoopperspectief waarin de voorbereidingsfase van de inkoop wordt meegenomen voordat de daadwerkelijke inkoop start (dus niet de inkoop zelf).

In mijn onderzoek bestaat dit gehele proces eigenlijk uit twee delen die in elkaar overlopen, zie onderstaand figuur. Het eerste deel is hoe de ambities vanuit de organisatie terecht komen bij een bepaalde projectopgave. Het tweede deel (meer gericht op het project) is hoe in projecten deze ambities worden meegenomen en uiteindelijk worden omgevormd tot concrete doelstellingen. Dit interview zal voornamelijk gericht zijn op de het tweede deel. Dit houdt in dat ik in dit interview kijk welke stappen nodig zijn om een circulaire ambitie te vertalen naar een doelstelling in een project van *de startbeslissing project* tot aan *de start van de aanbesteding.* Het is dus uiteindelijk van belang dat er wordt gekeken naar het doorlopen van deze stappen gefocust op hoe jullie circulariteit hierin verder hebben gebracht.



Om dit alles inzichtelijk te krijgen, is het nodig om meerdere interviews te houden per project van een publieke organisatie en te visualiseren hoe dit proces zich heeft ontwikkeld.

Opbouw interview
Eerst zal ik een aantal algemene vragen over uw betrokkenheid bij het project en of dit eventueel al voor de start van het project zelf was. Hierna gaan we door naar het in zicht krijgen en visualiseren van de verschillende stappen van het proces in de voorbereidingsfase van het project (zoals net uitgelegd, deel 2). Hierbij maak ik gebruik van een MURAL* om deze stappen online te kunnen visualiseren terwijl u uw verhaal vertelt. Een aantal belangrijke beslismomenten (start- en eindpunten van fases) heb ik al toegevoegd om hierbinnen de stappen te gaan toevoegen en makkelijker toe te werken naar een bepaald eindpunt.

Deze stappen zal ik terwijl u aan het woord bent gaan noteren zodat u zo goed mogelijk uw verhaal kunt uitleggen, maar voel u zeker vrij om aan de MURAL* deel te nemen. Ik maak er graag een interactief interview van mocht u zich hier comfortabel bij voelen.

* MURAL is een digitale werkplaats voor visuele samenwerking. In dit interview zal het fungeren als een online whiteboard.

Om eerst een beeld te krijgen van het gehele proces zal ik u het woord geven om dit proces uit te leggen waarbij ik tegelijkertijd zal proberen de hoofdactiviteiten / stappen op de MURAL* vast te leggen. Om een complete beschrijving van deze stappen te krijgen zijn er ook nog vragen opgesteld om de stappen uit het proces gedetailleerder te bekijken nadat het gehele proces gevisualiseerd is. Dit om te begrijpen hoe (inclusief met welke methodes) een bepaalde stap heeft geleid tot een bepaalde uitkomst waarop een vervolgstap weer kon worden genomen en wie van invloed was op deze beslissing.

Doel interview
Inzichtelijk maken van stappen die u heeft doorlopen om de organisatorische circulaire ambities van [organisatie] te vertalen naar projectdoelstellingen in het A1 fase 2 project.

Vertrouwelijk
Hoe wilt u geciteerd worden?

- Naam en/of functie en/of organisatie
- Geheel anoniem

Mag ik de meeting opnemen? Ja / Nee

Tot slot
Ik wil graag benadrukken dat er tijdens het interview geen goede of foute antwoorden zijn. Het gaat om uw beeld en perspectief hoe het in het project is verlopen en ik wil dit graag in kaart brengen. Mocht u hierbij bepaalde vragen oncomfortabel vinden om te beantwoorden en graag niet beantwoorden, dan mag dit natuurlijk. Ook als vragen onduidelijk zijn, schroom niet om mij om verduidelijking en verdere uitleg te vragen tijdens het interview.

Mochten er vragen zijn over het interview van tevoren, dan hoor ik dit graag!

* MURAL is een digitale werkplaats voor visuele samenwerking. In dit interview zal het fungeren als een online whiteboard.

C

Appendix C: Process maps ProRail

Readable versions are restricted for the public version

D

Appendix D: Process maps RWS

Readable versions are restricted for the public version

E

Appendix E: Event list (Excel sheet) ProRail

Process map (MURAL)	Event number (sequential)	Phase	Event description	Outcome	Subject
A. Circular ambassador	1	Initiatief/verkenning	Draagvlak verkrijgen vanuit supportgroep gezien hoger risicoprofiel	Draagvlak sponsorgroep	Sponsorgroep
	2	Verkenning	Na vaststellen project, signaal voor supportteam duurzaam om mee te denken aan duurzaamheid aspect.	Team duurzaamheid (IJV ProRail) betrokken	Team
	3	Verkenning	Met behulp van Duurzaam GWW. kansen zichtbaar maken: proces aanpak met projectteam en aan de slag om ambities vast te stellen.	Gezamenlijke ambitie neergezet	(start) Inventarisatie
	4	Verkenning	Door ambitieweb (ambities vaststellen) en omgevingswijzer weet je waar de kansen zitten, hierdoor wordt het gezamenlijk ambitie.		
	5	Verkenning	Verder verdiepen in kansen en inventariseren wat haalbaar is op technische niveau (Casussen duurzame vernieuwings voorstellen gericht op OVS). Intern sessie gehad in Zeeland. Per object gekeken in elk gebied op hergebruik. Hoe het beste hergebruiken voor optimale inzet	Inventarisatie van technische mogelijkheden	
	6	Verkenning	Proberen vast te stellen wat te hergebruiken en vervangen is + welke OVS belemmerend zijn	Aanpassingen technische regelgeving mogelijk maken voor maximalisatie circulariteit	
	7	Verkenning	Vragenlijst met aannemers over circulariteit idee en verkrijgen van hun kijk erop. Erkende spooraannemers vragen naar hun kijk en informatie over hergebruik.	Beeld van erkende aannemers over circulariteit	Verkenning markt
	8	Verkenning	Inzicht krijgen in wat belangrijk is om uit te vragen		
	9	Verkenning	Omvormen van ambities naar doelstellingen voor aanbesteding mbv extern bureau. Aantal sessies mee gedaan om externe kennis te verkrijgen en ambities scherp te hebben en houden voor om te vormen in aanbesteding.	Doelstellingen opstellen	Aanbesteding vormgeven
B. Process leader sustainability	1	Initiatief	Belang voor circulariteit aangegeven vanuit directie	Drijf om te kijken en ontdekken of een BBV project veel circulairder en duurzamer kan dan tot nu toe: BBV Zeeland beschikbaar gesteld	Belang directie & initieren ambitie pilot project
	2	Initiatief	Overleg hoge MT leden waarin circulariteit werd besproken. Manager regio zuid (vanuit AM) gaf aan binnenkort een BBV aanbesteding te doen en wilde graag gaan kijken of deze BBV een icoon project kon worden waarin circulariteit en duurzaamheid max. worden ingezet. Dit waarbij de resultaten daarvan evt. door kunnen worden gezet naar alle BBV aanbestedingen in de toekomst.		
	3	Initiatief	In contact gekomen met PM. Daarnaast werd projectteam samengevoegd en eerste meeting georganiseerd.	Enthousiast team ontstaan vanuit motiverende PM	Team
	4	Initiatief	Ook procurement gedreven om vanuit inkoop deze ambitie te realiseren.		
	5	Verkenning	Collega(s) vanuit IJV aangesloten. Van belang voor duurzaamheid en circulariteit: toepassing Duurzaam GWW	Ondersteunende collega's aangesloten	
	6	Verkenning	Groep inrichten die kunnen meedenken en in de positie zijn om te zeggen wat we wel en niet gaan doen.	Sponsorgroep ingericht	Sponsorgroep
	7	Verkenning	Inventariseren wat haalbaar is op technische niveau (Casussen duurzame verniewings- voorstellen gericht op OVS).	Ambitieweb opgesteld van project + ambities duidelijk	(start) Inventarisatie
	8	Verkenning	Intern sessie gehad in Zeeland. Per object gekeken of het herbruikbaar was en evt. aanpassingen van de specificaties daarbij nodig.		
	9	Verkenning	Ambities vaststellen (ambitiesessie)		
	10	Verkenning	Vaststellen wat te hergebruiken + vervangen + welke OVS belemmerend	Inventarisatie hergebruik + OVS	
	11	Verkenning	Behoefte om te weten hoe verschillende aannemers erin staan gezien circulariteit. Idee om vragenlijst uit te sturen aan erkende aannemers	Erkende spoor aannemers geïnformeerd en kijk erop verkrijgen hoe ze circulariteit in project zouden aanpakken	Verkenning markt
	12	Verkenning	Akkoord gekregen om erkende aannemers te consulteren.		
	13	Verkenning	Erkende aannemers van BBV project vragen om idee naar circulariteit in dit project en informeren over hergebruik: vragenlijst.		
	14	Verkenning	Eigen standpunt vanuit ProRail (mbt materiaalgebruik) bepalen gezien verschillende externe reacties	Eigen standpunt	Aanbesteding vormgeven
	15	Verkenning	Selecteren extern bureau voor hulp bij voorbereiding aanbesteding om circulariteit boven water te krijgen en doelstellingen te formuleren	betrekken gerelateerde personen / organisaties	
	16	Verkenning	Tijdens voorbereiding aanbesteding sloot ook Tendermanager BBV aan. Brengt deskundigheid (hoe BBV aanbesteden), maar ook trekker van het gehele tender traject.		
	17	Verkenning	Omvormen van project specifieke ambities naar doelstellingen voor aanbesteding	Project specifieke doelstellingen voor aanbesteding op papier	

C. Project Manager	1	Initiatief	Tijdens bijeenkomst wens/gedachte om projecten duurzamer te maken uitgesproken op directieniveau wat vervolgens werd omarmd door management. BBV Zeeland project door manager regio zuid (vanuit AM) overgedragen om zo duurzaam en circulair mogelijk te maken.	BBV Zeeland als pilotproject aangewezen	Belang directie & initieren ambitie Pilot project
	2	Verkenning	Half 2019 reguliere BBV-scope (projectscope) overgedragen gekregen met de opdracht deze maximaal duurzaam te maken/uit te voeren waarbij de focus op circulariteit moet liggen.	voorbeeldproject op de kaart gezet	Opstarten project
	3	Verkenning	Andere manier van werken opstellen ahv dit project: het pilotproject moet leiden tot een integratie van duurzaamheid en circulariteit in de werkwijze die generiek wordt toegepast voor (BBV-) projecten.		
	4	Verkenning	Groep nodig om op terug te vallen bij hulp met keuzes die vanuit het project niet kunnen worden gemaakt omdat deze de projectscope overstijgt of onbekende risico's met zich meebrengt. Daarnaast is ondersteuning vanuit het management nodig omdat van gebaande paden afwijkt kan worden.	Sponsorgroep opgericht vanuit management	Sponsorgroep
	5	Verkenning	zoektocht naar duurzaam en circulariteit bij functiehandhaving project. (Belangrijke vragen hierbij waren en zijn: wat is duurzaam? Draagt circulariteit daaraan bij en zo ja in welke mate en hoe kunnen we dat inrichten?)	Zoektocht gestart naar de manier waarop BBV maximaal duurzaam en circulair kan worden uitgevoerd	(start) Inventarisatie
	6	Verkenning	Herijking van de scope: buiten gekeken welk deel van de bovenbouw zou kunnen blijven liggen of welk deel echt vervangen zou moeten worden.	Inventarisatie over hergebruik	
	7	Verkenning	Sessie gehad met meerdere disciplines in Goes om te inventariseren. De behoefte voor een project is een concreet handvat: wat wordt er gebouwd en wat mag er in het kader van hergebruik en duurzaamheid? Daar kwamen we in de sessie in Goes niet uit.		
	8	Verkenning	Inventariseren duurzame maatregelen; balast, wissels etc. Visueel inspectie uitgevoerd. Op tekening gezet. Wel gebruikelijke onderzoeken gestart mocht duurzaamheid niet haalbaar zijn	Tot conclusie gekomen: het is lastig om zonder concrete voorbeelden duurzaamheid en circulariteit voor BBV te definiëren. Op een hoger abstractieniveau blijft alles mogelijk en onmogelijk afhankelijk van je gezichtspunt.	
	9	Verkenning	Zijdelings gekeken naar formulering van doelstellingen		
	10	Verkenning	Er waren openstaande vragen over hergebruik van materialen. Daarmee was er behoefte aan concrete voorbeelden.	Schriftelijke marktconsultatie met erkende spooraannemers opzetten	Verkenning markt
	11	Verkenning	Marktconsultatie schriftelijk a.h.v. vragenlijst gehouden. We wilden graag een aannemer die ervoor verantwoordelijk is om het te doen en hierin een bepaalde samenwerking met ProRail wilde aangaan. We kunnen namelijk veel plannen bedenken, maar als het niet uitgevoerd kan worden, kom je nergens.	Beter beeld van wat de markt denkt op het gebied van circulariteit voor dit project. Echter was het nog steeds niet goed mogelijk om eruit te komen en was er nog niet voldoende kennis van wat een aannemer wel of niet kan realiseren en welke ideeën er in de markt leven.	
	12	Verkenning	Idee na marktconsultatie: vragen die we hebben aan partijen voorleggen die het moeten uitvoeren. Aannemer hier vervolgens voor contacteren die erbij kan helpen om maximaal circulariteit te verkrijgen.		Aanbesteding vormgeven
	13	Verkenning	Daarnaast waren we op zoek naar een partij die wat betreft samenwerkingscultuur het beste zou aansluiten bij onze wens om in de eerste fase op basis van een relationeel contract samen te werken. Daarbij wilden we graag de intrinsiek meest gemotiveerde aannemer op het gebied van duurzaamheid en circulariteit selecteren.	Doelstellingen en gunningscriteria met focus op circulariteit om passende verantwoordelijke aannemer te selecteren	
	14	Aanbesteding	Formulering van doelstellingen gericht op aanbesteding. Met name gunningscriteria waren van belang ook hierbij (waar ben je naar op zoek in een aannemer). Zowel doelstellingen als gunningscriteria gericht op circulariteit om passende verantwoordelijke aannemer te selecteren.	Niet aanbesteden met een al geconcretiseerd uitvoeringsontwerp inclusief specifiek uitgewerkte doelstellingen (zoals normaal situatie zou zijn), maar gekozen om samen met aannemer deze planuitwerking te gaan doen.	
	15		Het 2 fase contract was de sleutel om markt te kunnen benaderen aangezien we er zelf niet uit kwamen en wel de aannemer wilden uitdagen om het maximale uit het project te halen.		
	16		We hebben geprobeerd een traditioneel contract op te stellen. Dat hebben we als vertrekpunt gebruikt, echter kwamen we daar niet uit. We hebben niet geprobeerd een dergelijk contract ook echt op de markt te zetten.		
	17	Aanbesteding	Start selecteren aannemer voor fase 1 en fase 2. Samen met de aannemer bepalen in fase 1 welke scope tegen welke kosten in fase 2 zal worden gerealiseerd.		selectie aannemer

D. Asset Management and plan coordinator	1	initiatief	Manager respondent was betrokken bij een soort workshop binnen ProRail waarbij werd nagedacht wat ze voor een circulaire / duurzame activiteiten konden doen.	Drijfveer van hogeraf binnen ProRail om duurzamer te werken	Belang directie & Initieren ambitie pilot project
	2	initiatief	Manager regio zuid BBV Zeeland voorgedragen als project om te kijken of BBV projecten duurzamer kunnen		
	3	initiatief	BBV Zeeland definitief als Pilot project voor duurzaamheid en in bovenbouw iets te gaan doen	BBV Zeeland op de kaart als pilot voor duurzaamheid / circulariteit	
	4	initiatief/verkenning	Voor als we er niet meer uitkomen, van belang dat er een groep als backup staat: Stuurgroep	Sponsorgroep ingericht	Sponsorgroep
	5	Verkenning	Idee om iets te doen aan de OVS gekeken naar focus duurzaamheid. Anders bouwen we hetzelfde als altijd	Uitgangspunt dat OVS moet worden aangepast	OVS
	6	Verkenning	Sessie in Goes met verschillende disciplines. Buiten ook gaan kijken naar spoor. Eerste stap gezet met wat gedaan kan worden met in het achterhoofd randvoorwaarden die we hebben. Uitgewerkt en gekeken welke mogelijkheden er zijn.	Inventarisatie van mogelijkheden op gebied van circulariteit	Inventarisatie
	7	Verkenning	Gesproken met systeemmanager, verantwoordelijk voor OVS. Rol besproken voor goedkeuring voor oplossingen die worden verzonnen.	Vanuit AM rol systeemmanagers duidelijk voor belang van evt. aanpassen OVS en veiligheid oplossingen	OVS
	8	Verkenning	Parallel traject gestart voor vormgeven van contract (ondersteuning vanuit extern bedrijf). Straks oplossingen bedacht die niet betaalbaar, uitvoerbaar of beschikbaar zijn in de markt. Misschien heeft een aannemer betere ideeën en hebben wij het straks al dichtgetimmerd. Oplossing hiervoor nodig in contract.	Start inventarisatie contract vormgeving	Aanbesteding vormgeven
	9	Verkenning	Aantal ideeën op gebied van circulariteit over bepaalde onderdelen van het traject ook al op papier gezet (bv. wat kunnen we duurzaam doen met de wissels). Aantal eigen voorstellen gemaakt om het ook beetje af te bakenen aangezien het ook vaak alle kanten kan op gaan.	Aantal eigen ideeën intern uitgewerkt waarmee in gesprek kan worden gegaan met aannemer	
	10	Verkenning	Opgehaald wat in andere regio's is gedaan en gekeken naar andere initiatieven. Tot conclusie gekomen dat nog nergens concrete stap is gezet om OVS aan te passen en dit formeel allemaal vast te leggen. Technische ideeën wel opgedaan	Inventarisatie OVS aan te passen	
	11	Aanbesteding	Aanbesteden aannemer voor fase 1	Selectie aannemer fase 1	Selectie aannemer

F

Appendix F: Event list (Excel sheet) RWS

A. Environment and project manager | Plan Elaboration phase	1	Verkenning	Verkenning getrokken door provincie Overrijsel (dus niet RWS of I&W). Vervolgens afgesproken dat RWS planuitwerking ging doen. Pas na start planuitwerking duurzaamheid een plek gekregen in het project zelf.	Beslissing om A1 te verbreden	Verkenning
	2	planuitwerking	Initiatief voor focus op duurzaamheid vanuit omgeving die erom vroeg en omgevingsmanager.	Eisen klant op gebied van duurzaamheid vast stellen. (Abstracte en niet concrete wensen).	Klanteneisen duurzaamheid
	3	planuitwerking	Naast reguliere opdracht ziet RWS kansen en hebben ze ambitie om ruimtelijke kwaliteit & duurzaamheid extra focus te geven		
	4	planuitwerking	Begonnen met klanteisen in omgeving ophalen. Aantal kwamen met abstracte wensen dat ze 'iets wilden met duurzaamheid'.		
	5	planuitwerking	Binnen I&W Pilot geworden van verduurzaming MIRT	Duurzaamheid focus op de kaart gezet	Duurzaamheidsfocus
	6	planuitwerking	Zelf ook opzoek gegaan naar extra kansen intern (RWS)	Kansen op gebied van duurzaamheid voor project in zicht krijgen	Kansen + haalbaarheid
	7	planuitwerking	Intern omgevingswijzer sessie gehad om duurzaamheid inzichtelijk te maken. Hieruit aantal zaken gekomen.		
	8	planuitwerking	Externe wensen en internen ideeën vanuit RWS samenbrengen.	Externe en interne wensen duidelijk	
	9	planuitwerking	Onderzoek gedaan naar de kansen van aantal ideeën op verschillende vlakken.	Haalbaarheid van ideeën duidelijk. Start uitwerking van deze ideeën tot maatregelen.	
	10	planuitwerking	5 maatregelen op gebied van duurzaamheid. Waar nog weinig circulariteit in zat. Hiervan een deel (deel wat TB plichtig is) terecht gekomen in TB voor geheel (fase 1 en fase 2).	5 concretere maatregelen voor TB en uiteindelijk aanbesteding	maatregelen uit kansen + haalbaarheid
	11	planuitwerking	Intern akkoord verkrijgen op extra maatregelen. Lastig traject gekeken naar risico's en de vraag of het wel binnen tijd en geld past.	Akkoord vanuit organisatie en beleidsdirectie voor duurzame maatregelen in TB	Akkoord duurzaamheid
	12	Aanbesteding	Bij opstellen contract fase 1 en zeker fase 2 meer met circulariteit aan de orde gekomen.		
	0	Initiatief	In begin vanuit ministerie was duurzaamheid nog niet van belang. Duurzaamheid pas in planuitwerking in de scope van het project gekomen		
B. Advisor sustainability | Plan elaboration phase	1	Planuitwerking	Omgevingswijzer sessie (2015)	Duurzaamheid van project in kaart gebracht	Duurzaamheid in kaart
	2	Planuitwerking	Als eerste sterke vraag vanuit omgeving om met duurzaamheid aan de slag te gaan waarbij omgevingsmanager ook intrinsieke motivatie had om dit aan te pakken. Binnen RWS rond deze tijd ook meer duurzaamheidsfocus (verduurzaming MIRT).	(Duurzaamheid) Eisen opdrachtgever vaststellen	Klanteneisen duurzaamheid
	3	Planuitwerking	RWS heeft rond deze periode ambities rondom duurzaamheid vastgesteld; energie & klimaat, circulaire economie en duurzame gebiedsontwikkeling die allemaal in project werden meegenomen	Officieel toestemming gekregen vanuit ministerie dat A1 een pilot is voor verduurzaming MIRT en duurzaamheid in de scope wordt opgenomen	Duurzaamheidsfocus
	4	Planuitwerking	Vanwege belang duurzaamheid binnen project, maar ook binnen RWS was er een scope wijziging net voor haalbaarheids onderzoeken. (eind 2016).		
	5	Planuitwerking	Drie haalbaarheidsstudies naar meest kansrijke maatregelen uitgevoerd (2017)	Kansen die uit haalbaarheidsstudies kwamen: 6 locaties voor zonne energie, bermvegetatie kansen (maaisel etc.), water regenwater en hemelwater (bermen benutten voor water), Koelwagens elektrificeren	Kansen + haalbaarheid (A1)
	6	Planuitwerking	Ambitieweb intern gebruikt als hulpmiddel toen er aan de slag werd gegaan met haalbaarheidsstudies		
	7	Planuitwerking	Nog specifiek akkoord verkrijgen voor onderwerp zon energie aangezien RWS had besloten om niet per project ontwerpen te maken voor zonne-energie, maar in groter geheel en aantal pilot projecten	Akkoord	Akkoord duurzaamheid
	8	Planuitwerking	Uiteindelijk is duurzaamheid ook 1 van de 3 projectdoelen geworden. Dit is meer ontstaan vanuit het belang vanuit ministerie en RWS om duurzaamheid mee te nemen in projecten + cleantech regio die om duurzaamheid vroeg + verduurzaming MIRT. Zat een beetje in de tijdsgeest waarbij A1 een voorloper was hierop.	Starten aanbesteding fase 1 mogelijk met focus op duurzaamheid	Duurzaamheid projectdoel

C. Advisor sustainability | Procurement phase	1	Planuitwerking	Begin van project ambitie geweest om er een duurzaam project van te maken, was eerst vanuit RWS alleen een begrip 'duurzaam'. Begin planstudie omgevingswijzer waar ideeën zijn uitgekomen: 5 maatregelen	5 duurzame maatregelen	Maatregelen fase 1
	2	Aanbesteding	Aanbesteding A1 fase 1		
	3	Aanbesteding	Voorbereiding contract opstarten, opstellen inkoopplan: Opstellen duurzaamheid kansen en aantal voorstellen gebaseerd op fase 1 (5 maatregelen)	Algemene memo met aandachtspunten voor het uitwerken van aantal voorstellen	Kansen en bijbehorende eisen (fase 2)
	4	Aanbesteding	Inventariseren kansen van voorstellen	Kansen op het project en filteren van aantal voorstellen die meegenomen moeten worden	
	5	Aanbesteding	Idee om concreter te worden voor contract en voorstellen doen		
	6	Aanbesteding	Idee om concurrentie gerichte dialoog te gaan doen dat beoordeeld moet worden met specifiekere eisen	Aanbesteden met concurrentie gerichte dialoog komt nadrukkelijk naar voren	
	7	Aanbesteding	Project doelstellingen formuleren: Doelstellingen van project hebben grote relatie met algemene doelstellingen van RWS waar het korte vertaling van is. In dit geval zijn ze dan dus niet heel specifiek gemaakt voor de A1.	Specifiekere eisen bovenop project doelstellingen : MKI inrichten	
	8	Aanbesteding	MKI inrichting nagedacht hoe dit te doen in uitvraag. Hoe neem je duurzaamheid op in de eisen. Waavoor kunnen minimum eisen worden opgenomen ?	Eisen	
	9	Aanbesteding	Eisen opstellen: Eisen duurzaam asfalt, duurzaam beton + hiernaast emissieloos transport bouwplaats en logistiek (plan duurzaamheid, geen eis).		
	10	Aanbesteding	Concurrentie gerichte dialoog met 5 aannemers niet mogelijk, dus filteren tot 3. Duurzaamheid van groot belang in gunning, dus moeten gaan trechteren op duurzaamheid.	Opstellen selectie procedure en eisen partijen	Trechtering
	11	Aanbesteding	Trechtering: Markt uitgedaagd om voorstel te doen voor emmissieloze bouwplaats (plan duurzaamheid) en daarnaast MKI berekening van de casus (trechterings product)	selectie 3 partijen ahv trechtering	
	12	Aanbesteding	3 dialoogrondes waarvan 1 specifiek op duurzaamheid. Inschrijving: circulariteit berekening asfalt, Plan van Aanpak Duurzaamheid en MKI berekening	Selectie aannemer, begin realisatie	Dialoog
D. Project manager | procurement phase (end)	1	Aanbesteding	Aanbestedingsleidraad opstellen	Op papier gezet wat er van de markt wanneer gevraagd wordt	Voorbereiding aanbesteding
	2	Aanbesteding	Voorbereiding aanbesteding en uiteindelijk plaatsen op tendernet	5 partijen gereageerd en beoordeeld op basis van trechterings product. 3 partijen die doorgaan naar dialoog fase.	Trechtering
	3	Aanbesteding	Start dialoogfase met trechtering en dialoog gesprekken om oplossingen te zoeken die aan behoefte van RWS beantwoorden		
	4	Aanbesteding	Trechtering op basis van aanbestedingsleidraad, plan van aanpak en MKI berekening		
	5	Aanbesteding	Dialoog gesprekken 3 rondes waarvan 1 op duurzaamheid. Inkoop duurzaamheid voornamelijk op BPKV gestuurd. Vanuit aanbestedings leidraad: Risico beheersing plan, faseringsplan, duurzaamheid (waaronder circulair asfalt) en CO2 ambitieniveau.	Inzichtelijk krijgen welke onduidelijkheden, belemmeringen en oplossingen marktpartijen zien	Dialoog
	6	Aanbesteding	Drie marktpartijen maken aanbieding	Duidelijk per partij hoe ze duurzaamheid, en ook specifiek circulariteit concreet willen aanpakken in het project	
	7	Aanbesteding		Beoordeling en gunning aannemer	
E. Technical manager | procurement phase & Contract manager | plan elaboration phase	1	Planuitwerking	Het allereerste begint het eigenlijk met het projectplan (voor project beslissing) waarin duurzame ambitie naar voren wordt gehaald. In de ambitie die we voor het gehele project hebben, is duurzaamheid (met circulariteit als onderdeel) een van de delen.	Ambitie om duurzaamheid als onderdeel mee te nemen in gehele A1 project en meerwaarde te creëeren. Circulariteit is hierbij een van de onderdelen van duurzaamheid	
	2	Aanbesteding	Aanbesteding, contractering, start realiseren A1 fase 1	Fase 1 in uitvoering	
	3	Aanbesteding	Begint met opschrijven generieke RWS ambitie waar duurzaamheid en circulariteit onderdeel van zijn (ambities richting 2030 en 2050). Duurzaamheid gezien als belangrijk onderdeel van project. Ervaring opgedaan vanuit fase 1 (waar ook een duurzaamheids ambitie lag)	Aantal duurzaamheid maatregelen uit fase 1 overgenomen; circulair asfalt, bamboebordjes (bio based materiaal) en vraag gesteld; wat kunnen we nog meer doen? Techniek staat namelijk niet stil	Maatregelen fase 1
	4	Aanbesteding	Brede doelstelling geformuleerd, maar wel proberen om hier op een goede manier concreter invulling aan te geven door te kijken wat er mogelijk is en wat je vervolgens wel/niet gaat voorschrijven (met specialisten).	doelstellingen aanvullen	Kansen en bijbehorende eisen (fase 2)
	5	Aanbesteding	Verschillende specialisten gevraagd hoe concreet invulling geven op de brede ambitie en hier vervolgens eisen op uitschrijven: waar zie je kansen en kun je eisen op leggen? Hieruit is een document gekomen met verschillende opties die eventueel worden meegenomen in de inkoop + contract.	Uitdagen in BPKV en kijken waarmee de markt komt op duurzaamheid en circulariteit. Ze kunnen alsnog met met verschillende initiatieven komen, waarbij het mogelijk is om te zien waar markt de grootste winst in zit en waarin kunnen zij ook iets doen.	
	6	Aanbesteding	Ook tegelijkertijd dan kijken bij collega's wat er mogelijk is op verschillende gebieden van duurzaamheid (die overeen komen met wat nodig is in dit project)		
	7	Aanbesteding	Keuzes maken: Wat schrijf je vervolgens voor en wat schrijf je niet voor en laat je open aan de markt. Keuze bewust maken (in overleg tussen techniek en contract) om een aantal eisen niet op te nemen in de vraagspecificatie, omdat de gedachte is om de markt momenteel eerst zelf uit te dagen en te kijken waarmee ze komen. Schrijft ook dingen voor die voor opdrachtnemer niet onderscheidend zijn.		
	8	Aanbesteding	Aanbesteding op Tendernet geplaatst		
	9	Aanbesteding	5 naar 3 partijen trechteren: trechtering qua duurzaamheid meeste gericht op emissie bouwplaats en bouwlogistiek omdat dit een redelijk groot afgekaderd onderwerp is waarvan we denken dat de grootste winst op zit qua duurzaamheid.	Selectie van 3 partijen	trechtering
	10	Aanbesteding	Dialoog fase: duurzaamheid in volle breedte meegenomen voortborduren op bouwplaats & logistiek. Ook duurzamere bouw initiatieven zoals beton, asfalt, geleiderails, geluidsschermen waarop de markt zich vervolgens mag gaan uitleven qua duurzame en circulaire creativiteit.	Selecteren aannemer met m.b.v. dialoog	dialoog

G

Appendix G: Additional questions interview ProRail

Additional questions ProRail

	Organisatorische ambities		Eventuele Hulpmiddelen voor process
A. Circular ambassador	Verbindt verbeter verduurzaamt is de missie en slogan van ProRail, zoveel mogelijk proberen om deze elementen terug te laten komen. Dit project heeft op duurzaamheid een intrinsieke motivatie en ook gekeken vanuit kansen een geschikt project om duurzaamheid maximaal toe te passen voor eerste keer in BBV omdat dit een stuk spoor betreft zonder personen vervoer.		1:Extern bedrijf dat meedacht aan circulariteit voor de voorbereiding van aanbesteding nieuwe methode, dus het toepassen van externe expertise. Externe bedrijf heeft geholpen om ambities uit te werken tot doelstellingen. 2:Ambitie web was basis, dit is verder uitgediept en gekeken wat gedaan moest worden om ambitie te behalen. Bij iedere stap stil staan wat wilde we ook alweer en hoe bereiken we dit.
B. Process leader sustainability	Dit project haakt voornamelijk in op de ambities over 'materialen' spoor. ProRail heeft 4 sporen op gebied van duurzaamheid waarbinnen 'materialen' een spoor is. Uiteindelijk zo breed mogelijk begonnen hiermee, zodanig dat we het mogelijk kunnen toepassen.		i.Projectmanager die er enorm op heeft aangestuurd en doorgezet om mensen mee te krijgen. Hij wist 'negatieve zaken' zaken om te draaien en gaf het een positief beeld (als bijvoorbeeld mensen er wat negatiever in stonden) ii.In het team zaten veel deskundige en gemotiveerde mensen iii.Diepere inventarisatie vanuit ProRail zelf wat er mogelijk is iv.De organisatie al voorbereid op het feit dat 'we dingen anders gaan doen' v.Sponsorgroep ook belangrijk geweest om akkoorden erdoorheen te krijgen vi.Bijzondere is 2 fase aanbesteding en contract vii.In aanbesteding veel meer nadruk leggen op duurzaamheid dan op prijs
C. Project Manager	De vraag aan het project is en was om het project maximaal duurzaam en circulair te maken. Gaandeweg is dit meer concreet gemaakt in de doelstellingen van het project en is aan deze ambitie toegevoegd dat we inzichtelijk willen hebben welke belemmeringen we tegenkomen op weg naar duurzaam en circulair werken bij functiehandhavingsprojecten. Daarnaast willen we een nieuwe gestandaardiseerde werkwijze opstellen voor duurzame functiehandhavingsprojecten.		Planning gehanteerd, meer werkplanning en aanbestedingsmoment. Proces voornamelijk zelf gedaan en vormgegeven aangezien er geen blauwdruk BBV op duurzame manier ligt. Dit was een heel iteratief proces en nog steeds. Wel dus aanbestedingsplanning + voorbereidingstijd bedacht, maar er is geen kernproces duurzame BBV. Normale manier qua format echt moeten loslaten.
D. Asset Management and plan coordinator	Het feit dat ProRail duurzaamheid in missie heeft staan heeft bepaalde mensen gedwongen om er eens over na te gaan denken. Dat mensen uitgedaagd worden om erover na te denken en iemand zijn hand op steekt om het toe te passen in project. Dit is ook eigenlijk individueel enthousiasme wat heel belangrijk is. Vooral belangrijk aangezien het lastig in als je in een organisatie zit die zo gestandaardiseerd werkt en dit te doorbreken waar je mensen voor nodig hebt die dit willen doorbreken en er extra energie in willen steken. En die het risico durven nemen.		i.Nee niet echt, we hebben het redelijk zelf uitgezocht allemaal met aan einde hulp van extern bedrijf richting voorbereiding aanbesteding. Het is een beetje zoeken allemaal geweest en aangezien het heel specifiek is, is hier dus niks voor beschikbaar. Wel veel interesse vanuit organisatie en duurzaamheids award gewonnen vanaf het begin. Ook stukje in Volkskrant gekomen, directieleden blog uitgesproken. Mensen zien het project ook wel als een project om een stapje verder te kunnen op het gebied van duurzaamheid.
	Mensen roepen dingen als circulair en duurzaam en wij wisten dit ook niet precies in te vullen, dit is nog steeds een zoektocht. We hebben al heel snel voor ons zelf gezegd om te kijken hoe we de standaardprocessen die we normaal volgen (inclusief regelgeving hieromheen) een stap duurzamer kunnen krijgen. Hier ook sponsorgroep omheen (van verschillende disciplines) die deze ambitie hebben overgenomen.		

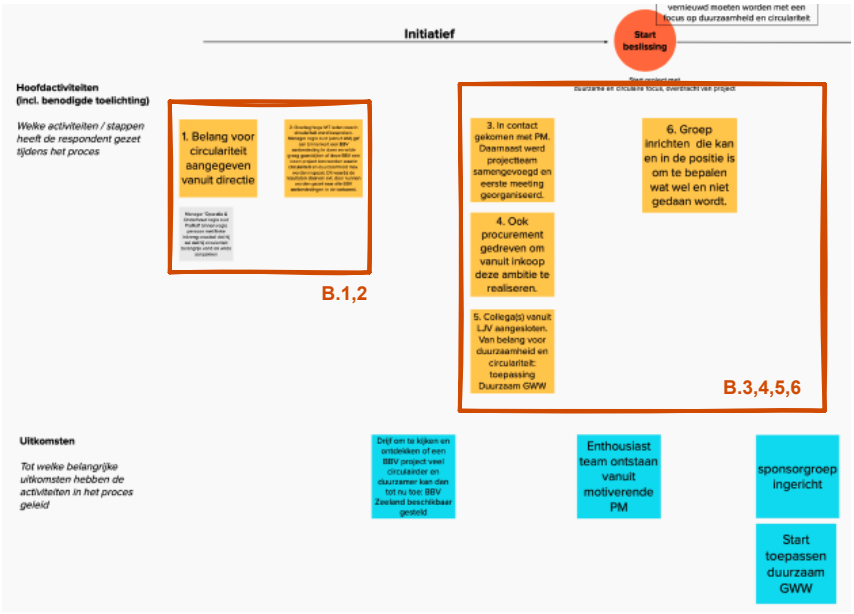
H

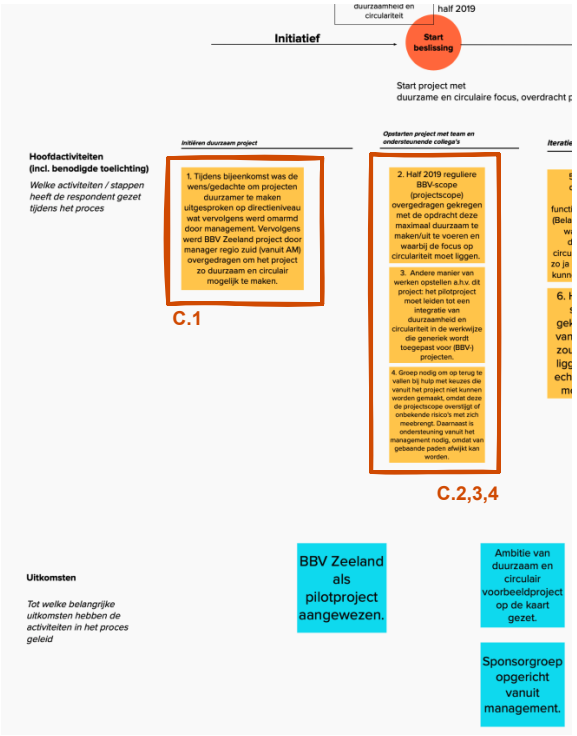
Appendix H: Additional questions interview RWS

Additional questions RWS

	Organisatorische ambities (X)	Hulpmiddelen
A. Environment and project manager | Plan Elaboration phase	Waar binnen RWS projecten nog steeds tegenaan wordt gelopen is dat in de opdracht geen opdracht zit om bepaald iets te doen met duurzaamheid / circulariteit. Opdracht is puur verbreed weg bijvoorbeeld en zit geen concrete opgave gekeken naar duurzaamheid in. Daardoor in budget en tijd vaak geen ruimte om hier iets mee te doen.	Voornamelijk zelf gegaan, maar ook omgevingswijzer gebruikt en aantal sessies gehouden met LEF (LEF, Future Center RWS om creatieve dingen te genereren). Verder geen specifieke methode of iets dergelijks toegepast. Eigenlijk wat minder gestructureerd en ad hoc manier waarop maatregelen tot stand zijn gekomen. Willen iets met duurzaamheid, maar kunnen nu niet meer bedenken dan dit.
B. Advisor sustainability | Plan elaboration phase	Alle drie de ambities die RWS rondom duurzaamheid had vastgesteld zijn meegenomen in dit project; energie & klimaat, circulaire economie en duurzame gebiedsontwikkeling. Voor A1 zijn deze ambities vertaald naar doelstellingen.	Het werd steeds gebruikelijker om gebruik te maken van Duurzaam GWW, dus het was geen nieuw hulpmiddel. RWS is ook partner in Duurzaam GWW.
C. Advisor sustainability | Procurement phase	Begin van project ambitie geweest om er een duurzaam project van te maken, was eerst vanuit RWS alleen een begrip 'duurzaam'. Begin planstudie omgevingswijzer waar ideeën zijn uitgekomen, gekeken wat allemaal belangrijk is waar 5 maatregelen zijn uitgekomen.	Om deze stappen zo te doorlopen is niet een bepaald hulpmiddel gebruikt. Dus nee niet echt, maar wel instrumentarium om duurzaamheid concreter te maken in aanbesteding: MKI, CO2 prestatie-ladder, maar dit zijn standaard eisen in contract.
D. Project manager | procurement phase (end)	1.Landelijk hebben we ambities, maar deze ambities zijn niet heel zwaar naar dit project geduwd. Tijdens selectie op BPKV, waar een aantal duurzaamheid elementen in zitten, hebben we met name gericht op duurzaamheid op bouwplaats en niet zo zeer op het bouwen van een circulaire weg. De hoofdambitie van RWS is in 2030 CO2 neutraal en in 2050 circulair, maar daar zie je nog niks van terug hoe we dit landelijk moeten oppakken en vertalen in onze projecten. 2.Gekeken naar de scope, en dus de opdrachtbrief die we krijgen, staat duurzaamheid niet breed in vernoemd en is met name ingericht op de verbreding van de weg, bouwplaats verduurzaming en het inpassen in de landschappelijke omgeving. De scope is in de basis wegverbreding met landschappelijk inpassing. Met BPKV gericht op 6 criteria dagen we de markt uit deze items mee te nemen/aan te bieden in hun bieding. Deze 6 items zijn in MURAL weergegeven; Risicobeheer, VVU, MKI, Circulair, PvA Duurzaamheid en CO2 3.Ik kom zelf van een ander project (Innova58) waar ik ook merkte dat we het wel sterk beleven in woord, maar dat we er als project geen geld vervolgens voor krijgen en duurzaamheid en/of circulariteit ook niet in de doelstellingen SMART geformuleerd staat.	Aantal deskundigen in het team en specialistische afdelingen zoals adviseur duurzaamheid of specialisten in MKI berekeningen die in het project meehelpen op het gebied van duurzaamheid. Dingen die we zelf niet weten hebben we vaak wel budget genoeg voor om op de markt te zetten bij onze backoffice, wat anders is dan vroeger toen RWS alles zelf deed. Dit wordt momenteel niet meer gedaan en hebben daarom ook veel ingenieursbureaus voor ons werken waarbij we bepaalde dingen kunnen uitvragen.

Appendix I: Example combining events





Process map (MURAL)	Event number (sequential)	Phase	Event description	Outcome	Subject	
B. Process leader sustainability	1	Initiatief	Belang voor circulariteit aangegeven vanuit directie	Drijf om te kijken en ontdekken of een BBV project veel circulairder en duurzamer kan dan tot nu toe: BBV Zeeland beschikbaar gesteld	Belang directie & initieren ambitie pilot project	B.1,2
	2	Initiatief	Overleg hoge MT leden waarin circulariteit werd besproken. Manager regio zuid (vanuit AM) gaf aan binnenkort een BBV aanbesteding te doen en wilde graag gaan kijken of deze BBV een icoon project kon worden waarin circulariteit en duurzaamheid max. worden ingezet. Dit waarbij de resultaten daarvan evt. door kunnen worden gezet naar alle BBV aanbestedingen in de toekomst.			
	3	Initiatief	In contact gekomen met PM. Daarnaast werd projectteam samengevoegd en eerste meeting georganiseerd.	Enthousiast team ontstaan vanuit motiverende PM	Team	B.3,4,5,6
	4	Initiatief	Ook procurement gedreven om vanuit inkoop deze ambitie te realiseren.			
	5	Verkenning	Collega(s) vanuit LJV aangesloten. Van belang voor duurzaamheid en circulariteit: toepassing Duurzaam GWW	Ondersteunende collega's aangesloten		
	6	Verkenning	Groep inrichten die kunnen meedenken en in de positie zijn om te zeggen wat we wel en niet gaan doen.	Sponsorgroep ingericht	Sponsorgroep	

C. Project Manager	1	Initiatief	Tijdens bijeenkomst wens/gedachte om projecten duurzamer te maken uitgesproken op directieniveau wat vervolgens werd omarmd door management. BBV Zeeland project door manager regio zuid (vanuit AM) overgedragen om zo duurzaam en circulair mogelijk te maken.	BBV Zeeland als pilotproject aangewezen	Belang directie & initieren ambitie Pilot project	C.1
	2	Verkenning	Half 2019 reguliere BBV-scope (projectscope) overgedragen gekregen met de opdracht deze maximaal duurzaam te maken/uit te voeren waarbij de focus op circulariteit moet liggen.	voorbeeldproject op de kaart gezet	Opstarten project	C.2,3,4
	3	Verkenning	Andere manier van werken opstellen ahv dit project: het pilotproject moet leiden tot een integratie van duurzaamheid en circulariteit in de werkwijze die generiek wordt toegepast voor (BBV-) projecten.			
	4	Verkenning	Groep nodig om op terug te vallen bij hulp met keuzes die vanuit het project niet kunnen worden gemaakt omdat deze de projectscope overstijgt of onbekende risico's met zich meebrengt. Daarnaast is ondersteuning vanuit het management nodig omdat van gebaande paden afwijkt kan worden.	Sponsorgroep opgericht vanuit management	Sponsorgroep	

B.1,2 + C.1 are all related to the subject of 'direction interest and initiating pilot project'

B.3,4,5,6 + C.4 are all related to start the project and gathering the team & related people

J

Appendix J: Validation protocol

Validatie protocol

Achtergrondinformatie
In mijn onderzoek ben ik op zoek geweest om de volgende vraag te beantwoorden:

Hoe strategiseren publieke organisaties hun organisatorische ambities op projectniveau voor nieuwe initiatieven tijdens de voorbereiding van de inkoop gegeven met als voorbeeld twee projecten met circulariteit als domein?

Om deze vraag te beantwoorden heb ik naar 2 case studies gekeken:

RWS: wegverbreding A1 fase 2
- MIRT Project
- Wegverbreding
- Locatie: Apeldoorn – Twello (deel van gehele verbreding A1 Apeldoorn – Azelo)
- 4 doelstellingen waarvan 1 op duurzaamheid

ProRail: bovenbouwvernieuwing Zeeland
- Pilotproject
- Vernieuwing ballast, dwarsliggers, wissels
- Locatie: Zeeland spoor op locaties Terneuzen, Sloe, Moerdijk en Roosendaal → Geen mensen vervoer op dit deel
- Alle doelstellingen gefocust op circulariteit

Uitleg geven van projecten, onderzoek en resultaten aan de hand van slides

Deel 1: algemene informatie en introductie

Algemene informatie
1. Wat is uw functie en kunt u deze kort even toelichten?

2. Heeft u ervaring met circulaire projecten?

Deel 2: bevindingen onderzoek

3. De kloof tussen de opgestelde organisatorische ambities en het daadwerkelijk omvormen van deze ambities tot concrete doelstellingen voor in de projecten, lijkt voor beiden projecten een uitdaging te zijn en een proces wat nog niet is gedefinieerd. Herkent u dit uit de praktijk?

4. Uit literatuuronderzoek bleek dat het concreet definiëren van projectdoelstellingen van belang is voor succes in een project en dat het belangrijk is om concreet aan te geven wat van een aannemer wordt verwacht. Echter is bij beiden projecten ruimte overgelaten voor marktpartij om circulariteit zelf (deels) in te vullen. Is dit iets wat u herkent uit de praktijk?

5. Bij de RWS case (Concurrentie gerichte dialoog) waren doelstellingen vrij breed en aangevuld met eisen om de markt te benaderen. Terwijl bij de ProRail case (twee fase aanbesteden) er meer is gefocust op de doelstellingen om de markt te benaderen. Herkent u deze 2 verschillende aanbestedingen en manier waarop doelstellingen zijn gebruikt?

Verschillen tussen projecten in wanneer focus op circulariteit is ontstaan

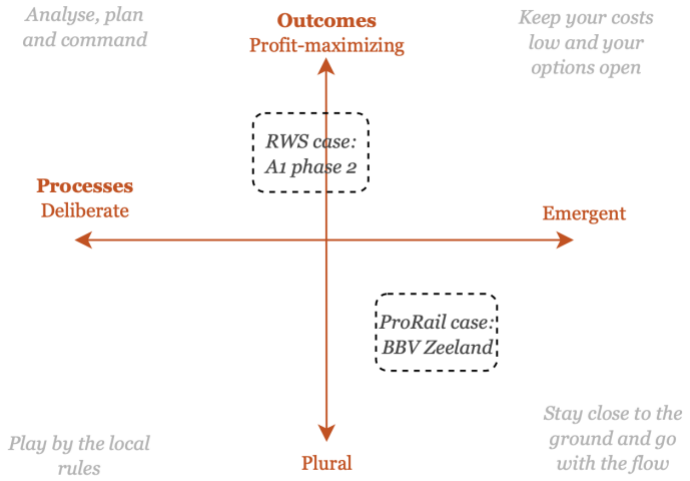
6. **ProRail:** circulariteit vanaf begin een grote focus geweest en vervolgens is ervoor gekozen om planuitwerking samen met aannemer te gaan doen. Is dit een methode die vaker terugkomt bij projecten gefocust op circulariteit?

7. **RWS:** circulariteit is pas in aanbesteding aan bod gekomen en stond nog niet verwerkt in TB. Ziet u vaker in project terugkomen dat vanaf begin niet veel aandacht wordt gegeven om circulariteit concreter te maken?

8. Is het dan vaker de situatie dat circulariteit in de laatste fase richting aanbesteding pas naar voren komt?

9. In het ProRail proces is het opstellen van circulaire projectdoelstellingen iteratief gegaan en bij RWS is het opstellen van circulaire eisen ook iteratief gegaan. Gekeken naar dit iteratieve proces, komt dit proces overeen met wat u ziet in andere projecten die een focus hebben op circulariteit?

Strategie van circulariteit definiëren in eisen



10. Zoals op de figuur hierboven is te zien is de RWS case geplaatst in het framework als deels deliberate en deels emergent strategie in het vormgeven van circulaire eisen. RWS heeft daarbij meer binnen standaard procedures redelijk iteratief circulaire eisen vormgegeven. Hierbij is ook meer rekening gehouden met het budget en is de RWS case daarom bovenin de verticale as geplaatst (richting profit-maximizing). Voor ProRail waren deze standaarden minder van belang en zijn ze meer losgelaten (en hierbij ook budget). Kunt u zich vinden in deze plaatsing van RWS en ProRail in het raamwerk?