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# The role of boundary spanning in integral dike reinforcement projects

Master thesis

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## Summary

Climate change forces flood-prone areas, such as the Netherlands, to reinforce their dikes. As a result, the National Flood Protection Programme (NFPP) must ensure that by 2050, all primary defences meet the revised standards outlined in the 2017 Delta Programme. However, dikes are space-consuming structures that can take up valuable land in areas where other sectors may face challenges as well, particularly in densely populated areas like the Netherlands. Integral Dike Reinforcement (IDR), a process in which opportunities from sectors and/or domains outside the dike reinforcement domain are integrated within the project and jointly approached, may provide a solution to both the required dike reinforcements and the limited availability of physical space. However, Regional Water Authorities (RWAs), responsible for reinforcing these dikes, struggle to effectively integrate and capitalise on the so-called 'linking opportunities', which are opportunities from other sectors that arise from societal challenges and can be integrated in their dike reinforcement projects.

Research shows that actors draw boundary judgements to handle the complexity of all the interdependencies between sectors, but also emphasises that boundary judgements can contribute to the obstruction of integrating other sectors' challenges within a dike reinforcement project. Boundary judgements are the demarcations regarding project elements about what should be considered and what should be excluded, made by key actors. Further research indicates that boundary judgements can change during a project, ranging from tight to wide, and suggests that wider boundary judgements can support more integrative outcomes, referred to as IDR in this study. Wider boundary judgements are stimulated by boundary spanning activities (BSAs), which are activities that key actors involved in dike reinforcement projects can execute to widen boundary judgements, facilitating the integration of linking opportunities into these projects. The literature describes various types of boundary spanning activities. This study provides an overview of these and compiles them into four categories: Relationships, Networking, Negotiation, and Managing.

This study aims to provide insights into potentially changing boundary judgements in dike reinforcement projects, whether and how BSAs contribute to these changes, and, if so, which BSAs encourage these changes fostering IDR. These boundary judgements and BSAs are studied and compared in four NFPP projects: Ravenstein-Lith, Koehool-Lauwersmeer, Sint-Annaland and Wolferen-Sprok. Cases were selected to be similar in terms of integrative potential (all linking opportunities that arise in a project area) and to vary on the extent to which the projects achieved an integrative outcome. Two projects were successful examples of IDR, two were unsuccessful examples. Data were collected through semi-structured interviews with the key actors involved in these projects.

The results show that successful IDR cases include more wide and wider boundary judgements. Involved actors employed significantly more BSAs compared to actors in the unsuccessful IDR cases. The most successful IDR case demonstrates the widest boundary judgements and includes the most BSAs. The most unsuccessful IDR case shows the exact opposite, with primarily tight boundary judgements and almost no BSAs. Boundary judgements regarding domains and sectors appeared to be the most critical to be wide in order to support IDR, followed by the scale, planning and stakeholder judgements. Relationships, Negotiation, and Managing are the most contributing BSA categories, with 'Connecting different people and processes on both sides of the boundary' and 'Lateral, analytical, and strategic thinking' being the most prominent activities from these categories. For RWAs pursuing IDR, it is recommended to always approach dike reinforcement projects holistically, striving for wide domain and sector boundary judgements by implementing BSAs that can contribute to widen them. These BSAs include having an analytical and holistic view, bringing actors together and jointly executing cross-boundary tasks. Executing these BSAs may contribute to wider boundary judgements in dike reinforcement projects and eventually support IDR, which benefits all actors involved in the projects.

## Samenvatting

Klimaatverandering dwingt overstromingsgevoelige gebieden zoals Nederland hun dijken te versterken. Het Hoogwaterbeschermingsprogramma (HWBP) moet ervoor zorgen dat in 2050 alle primaire waterkeringen voldoen aan de gewijzigde normen uit het Deltaprogramma 2017. Dijken zijn echter grote constructies die kostbare grond kunnen innemen in gebieden waar ook andere sectoren hun uitdagingen hebben. Integrale dijkversterking (IDR), een proces waarbij kansen vanuit sectoren en/of domeinen buiten het dijkversterkingsdomein worden geïntegreerd binnen het project en gezamenlijk worden aangepakt, kan een oplossing bieden voor zowel de benodigde dijkversterkingen als de beperkt beschikbare fysieke ruimte. Regionale Waterschappen (RWAs), verantwoordelijk voor het versterken van deze dijken, worstelen echter met het effectief integreren en verzilveren van de zogenaamde 'meekoppelkansen', oftewel kansen uit andere sectoren die voortkomen uit maatschappelijke opgaven en geïntegreerd kunnen worden in hun dijkversterkingsprojecten.

Onderzoek toont aan dat actoren boundary judgements maken om de complexiteit van alle onderlinge afhankelijkheden tussen sectoren te hanteren, maar benadrukt ook dat boundary judgements kunnen bijdragen aan het belemmeren van de integratie van uitdagingen van andere sectoren binnen een dijkversterkingsproject. Boundary judgements zijn de afbakeningen met betrekking tot projectonderdelen over wat wel en wat niet meegenomen moet worden, gemaakt door de belangrijkste actoren. Verder onderzoek geeft aan dat boundary judgements tijdens een project kunnen veranderen, variërend van krap tot breed, en suggereert dat bredere boundary judgements meer integratieve uitkomsten kunnen ondersteunen, in dit onderzoek IDR genoemd. Bredere boundary judgements worden gestimuleerd door boundary-spanning activiteiten (BSAs). Dit zijn activiteiten die sleutelactoren in dijkversterkingsprojecten kunnen uitvoeren om hun boundary judgements te verbreden, wat de integratie van meekoppelkansen in deze projecten vergemakkelijkt. Dit onderzoek geeft een overzicht van de verschillende soorten BSAs en brengt ze samen in vier categorieën: Relaties, Netwerken, Onderhandelen en Managen.

Dit onderzoek heeft als doel inzicht te geven in mogelijk veranderende boundary judgements in dijkversterkingsprojecten, of en hoe BSAs bijdragen aan deze veranderingen, en zo ja, welke BSAs deze veranderingen stimuleren en IDR bevorderen. Deze boundary judgements en BSAs worden bestudeerd en vergeleken in vier NFPP-projecten: Ravenstein-Lith, Koehool-Lauwersmeer, Sint-Annaland en Wolferen-Sprok. De casussen zijn geselecteerd op basis van een vergelijkbaar integratiepotentieel (alle meekoppelkansen die zich voordoen in een projectgebied) en verschillende mate waarin de projecten een integraal resultaat behaalden. Twee projecten zijn succesvolle voorbeelden van IDR, twee zijn geen succesvolle voorbeelden. De gegevens zijn verzameld door middel van semigestructureerde interviews met de sleutelactoren die bij deze projecten betrokken waren.

De resultaten laten zien dat succesvolle IDR-casussen meer brede en bredere boundary judgements bevatten. Betrokken actoren gebruikten significant meer BSAs in vergelijking met actoren in de onsuccesvolle IDR-casussen. De meest succesvolle IDR-casus vertoont de breedste boundary judgements en bevat de meeste BSAs. De meest onsuccesvolle IDR-casus laat precies het tegenovergestelde zien, met vooral krappe boundary judgements en bijna geen BSAs. De boundary judgements met betrekking tot domeinen en sectoren bleken het meest cruciaal om breed te zijn om IDR te ondersteunen, gevolgd door de schaal, planning en stakeholder judgements. Relaties, Onderhandelen en Managen zijn de meest bijdragende BSA-categorieën, met 'Verbinden van verschillende mensen en processen aan beide zijden van de *boundary*' en 'Lateraal, analytisch en strategisch denken' als meest prominente activiteiten uit deze categorieën. Voor RWAs die IDR nastreven, wordt aanbevolen om dijkversterkingsprojecten altijd holistisch te benaderen en te streven naar brede domein- en sectorgrensoordelen door BSAs te implementeren die kunnen bijdragen aan de verbreding hiervan. Deze BSAs zijn het hebben van een analytische en holistische blik, het samenbrengen van actoren en het gezamenlijk uitvoeren van sector overschrijdende taken. Het uitvoeren van deze BSAs kan bijdragen aan bredere boundary judgements in dijkversterkingsprojecten en zo uiteindelijk bijdragen aan IDR, wat ten goede komt van alle actoren die betrokken zijn bij de projecten.

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## List of acronyms

<b>RWS</b>	National Department of Waterways and Public Works
<b>NFPP</b>	National Flood Protection Programme (HWBP)
<b>FRM</b>	Flood risk management
<b>RWA</b>	Regional water authority
<b>IDR</b>	Integral dike reinforcement
<b>BSA</b>	Boundary spanning activity
<b>BJ</b>	Boundary judgement

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# 1 Introduction

This section introduces the study's background, followed by the problem statement that is addressed in this research. To address the problem statement, a framework of research objectives and questions is devised, all of which are detailed within this section. Subsequently, the section proceeds to elucidate the study's relevance and define the scope of the research.

## 1.1 Background

The Dutch are known for their long-standing expertise in water safety, yet the Netherlands may be at risk due to its geographical position in the Rhine, Scheldt, and Meuse river deltas. As a result of rising temperatures caused by climate change, sea levels rose by 19 cm during the twentieth century. These temperature changes cause seawater to expand, glaciers to melt, and large ice sheets at the poles to gradually shrink. The International Panel on Climate Change predicts a global sea level rise of 26 to 82 cm by the end of the twenty-first century (KNMI, 2019). Given that 55% of the Netherlands is prone to flooding, 26% lies below sea level and 29% is prone to river flooding, the Dutch government introduced the National Flood Protection Programme (NFPP, part of the overarching Delta Programme) (NL: *Hoogwaterbeschermingsprogramma HWBP*). This programme, a collaboration between all 21 Regional Water Authorities (RWAs) and the national Directorate-General for Public Works and Water Management (Rijkswaterstaat), must ensure that all primary defences meet the new standards by 2050. Therefore, Dutch RWAs will need to reinforce 1500 km of dikes over the next few years. The majority of these NFPP projects are rather narrow in scope, meaning they aim to improve primary defences in the most efficient and effective manner. Along rivers, this generally involves that existing dikes are just heightened and/or strengthened without considering other challenges.

However, there are cases where dike reinforcement projects were combined with other sectors, such as energy production, biodiversity or mobility (HWBP, 2022). These integrative projects are considered crucial in a densely populated country like the Netherlands. In this relatively small country, integrative approaches are sometimes considered essential from a spatial perspective since there are many more challenges that also have a spatial impact. For example, the reinforcement project of Zwolle's inner city dikes (*stadsdijken Zwolle*), an 8,7-kilometer-long dike section that crosses urban, industrial and Natura 2000-areas, leaving limited space for the dike reinforcement, not to mention other nearby challenges. Another example can be found between Zwolle and Olst (*IJsselwerken*), where a 29-kilometer stretch of dike crosses multiple villages and natural areas, each with its own set of challenges requiring space. Both of these projects attempted to integrate challenges from sectors other than dike reinforcement, such as floodplain redevelopment, recreational infrastructure and river diversion. These examples demonstrate that in a country with these spatial characteristics, an integrative approach is almost unavoidable.

Nonetheless, RWAs struggle to effectively address dike reinforcement projects with an integral approach, often failing to include challenges from other sectors. The explicit and implicit decisions that actors make during this process, about who and what is relevant to include, are known as boundary judgements (de Loë & Patterson, 2017; Van Meerkerk et al., 2013). These boundary judgements are made by actors to handle the complexity of their challenges, but they also contribute to different sectors being unaware of each other's challenges that are therefore not addressed jointly (Helfgott, 2018). A promising development is that flood defence policies are increasingly shifting away from a sectoral and technical approach towards a more holistic and integrated flood risk management (FRM) approach, including dike reinforcement. Integrated FRM is being promoted to solve complex problems because FRM projects primarily involve a variety of actors with often diverging interests. Previous research indicates that addressing all sectors' challenges in isolation is too complex, necessitating an integrative approach in order to achieve successful integral project outcomes (Cumiskey et al., 2019).

In the context of this research, integral dike reinforcement (IDR) is defined as the implementation of dike reinforcement projects that actively include one or more sectors and/or domains outside the dike reinforcement domain where joint challenges are addressed. Sector refers to a broad category of related industries or businesses, whereas domain refers to a more specific area of expertise within a sector (Manaher, 2023). This implies that domains other than the dike reinforcement domain can be considered to address joint challenges. These joint challenges with other sectors and/or domains are referred to as 'linking opportunities' (NL: meekoppelkansen) and indicate potential challenges on which a project could capitalise.

The core assumption of this study is that boundary spanning activities play a critical role in influencing boundary judgements and thus in integrative dike reinforcement projects. Achieving goals requires collaborations with actors from other policy areas, which can be accomplished through 'boundary spanning' (Warner et al., 2010). In this study, boundary spanning is defined as the process of widening boundary judgements between actors through boundary spanning activities (Van Meerkerk & Edelenbos, 2014). Boundary spanning activities are defined as activities in which boundary spanners develop coordination and collaborations across organisational, sectoral, and disciplinary boundaries (van den Brink et al., 2019). As a result of boundary spanning in dike reinforcement, other sectors and domains can be involved and potentially benefit from the advantages IDR offers. Previous research indicates that implementing IDR can result in significant cost savings, sustainable opportunities and social benefits without creating trade-offs (e.g., dike reinforcement taking away space for housing) (Brouwer & Van Ek, 2004). Moreover, IDR can generate synergies for climate resilient measures in FRM (Driessen et al., 2016). Besides, combining challenges may result in broader acceptance from society because an integrated approach may ensure that less pressing societal challenges are also addressed (Warbroek et al., 2023). Multiple goals that add economic, ecological, and social value can be achieved by approaching projects collaboratively with a more integrative approach and thus conducting boundary spanning activities. A previous study on this topic expressed this most comprehensively by stating the following:

*Collaboration as hegemony embraces the view that interorganisational working is the only way for dealing with complex and interrelated problems that cross artificially created administrative and jurisdictional boundaries. It is the most effective and efficient way of using an organisation's resources, avoids duplication and overlaps, and can produce synergistic outcomes that can only be achieved through 'whole-systems' approaches. (Williams, 2002, p. 120)*

The above demonstrates the importance of IDR, for which boundary spanning is seen as unavoidable in future dike reinforcement projects. This has resulted in this study, which attempts to address how boundary spanning activities can widen boundary judgements and how wide boundary judgements through active boundary spanning can lead to the realisation of IDR projects.

## 1.2 Problem statement

Dikes are critical for flood protection, but they are also large structures that take up valuable land. RWAs struggle to effectively address dike reinforcement projects with an integral approach, often failing to include challenges from other sectors, despite the fact that in a relatively densely populated country like the Netherlands, many other challenges require space as well. As a result, IDR may be desirable, and in some cases, even necessary, from a spatial perspective. The issue that Dutch RWAs are currently facing is a lack of knowledge about how to properly implement IDR in their NFPP projects.

Given the inextricable link between boundary spanning and IDR, the problem statement appears to be related to RWAs being unaware of the importance of boundary judgements and how to apply



boundary spanning activities to realise IDR. The traditional sectoral orientation of different governing authorities, as well as the boundary judgements each actor makes to deal with the complexity of their challenges, can be a barrier that complicates IDR projects. As a result, authorities are unaware of each other's challenges and eventually fail to integrate these challenges within the dike reinforcement projects. Due to a lack of knowledge about boundary spanning, RWAs fall short of accomplishing IDR projects and fail to capitalise on the benefits of IDR.

This problem was brought up by representatives of a RWA in the Netherlands, who indicated a lack of knowledge and a desire to investigate the possibilities of boundary spanning in dike reinforcement projects. These representatives mentioned that, while they are willing to apply boundary spanning, they are unsure how to best address this. Therefore, they requested assistance in researching the possibilities of boundary spanning in dike reinforcement projects and developing recommendations that can be followed and consulted in their future NFPP projects.

### 1.3 Research aim and questions

The goal of this research is to gain insights into if and how boundary judgements of key actors involved in integral dike reinforcement projects change during the project, to what extent which type of boundary spanning activities contribute to this change, and if these boundary spanning activities contribute to integral dike reinforcement. The following main research question is formulated to achieve this research goal:

- How do key actors' boundary judgements change during integral dike reinforcement projects, and to what extent and how do boundary spanning activities contribute to this change and the realisation of integral dike reinforcement projects?

The following sub-questions are generated to assist in answering this question:

1. According to literature, how to conceptualise the integrative potential of IDR projects, boundary judgements and boundary spanning activities, and the role they play in achieving IDR in projects?
2. What are the boundary judgements made by RWAs and other key actors in IDR projects and why and how do they change or remain throughout the process?
3. In the selected dike reinforcement projects, which boundary spanning activities supported wide boundary judgements fostering IDR, and what other (external) factors influenced this?
4. What recommendations can be made to RWAs with regard to the employment of boundary spanning activities to encourage the exploitation of the integrative potential of dike reinforcement projects?

By answering the sub-questions, recommendations can be made for RWAs that advise how boundary spanning activities can support IDR. These recommendations refer to various activities that actors can engage in to approach and respond to challenges and opportunities in their environment. The recommendations can influence the way RWAs analyse situations, prioritise tasks and allocate resources, thereby shaping the outcomes of their actions. These can serve as a guideline for RWAs, suggesting boundary spanning activities for future projects, in order to ensure a successful IDR project, offering synergies, co-benefits and increased overall support and acceptance.

### 1.4 Study relevance

While various studies have looked into, on the one hand, factors that influence boundary judgements in FRM (Bressers & Lulofs, 2010; Groefsema, 2022; van Meerkerk et al., 2013; Vinke-de Kruijf et al., in review) and, on the other hand, actors executing boundary spanning activities supporting integrative outcomes in projects (Brouwer & Van Ek, 2004; Cumiskey, 2020; Warner et al., 2010; Williams, 2002),

more research into the relationship between boundary judgements and boundary spanning activities is required. This research addresses this knowledge gap by studying the relationship between boundary judgements and boundary spanning activities that contribute to IDR in dike reinforcement projects. There has been no research on this topic, and it has certainly not been applied to the situation of IDR, making this study scientifically relevant.

From a practical point of view, an answer is desired because densely populated and flood-prone countries like the Netherlands may otherwise become too cramped to facilitate all the needed facilities separately. It affects people not only in terms of flood protection but also those who use the other facilities included. The solution may already exist by approaching challenges collaboratively through wide boundary judgements, but how to achieve this through active boundary spanning is unknown. Boundary spanning is expected to play a crucial role in widening these boundaries or maintaining wide boundary judgements, both of which appear to be critical to realise IDR. This makes it crucial to understand the role of boundary spanning in these projects, both theoretically and practically, for science in general as well as RWAs in the Netherlands.

The Netherlands is divided into 21 RWAs, each of which is responsible for water safety by testing flood defences, determining whether they meet safety criteria, and reinforcing them. Additionally, RWAs apply for a grant from the NFPP, which assesses whether a dike reinforcement project should be designated as an NFPP project (Rijkswaterstaat, 2021). The NFPP is primarily responsible for ensuring that all primary defences meet the new standards by 2050 (HWBP, 2022). The potential consequences of a flood defence structure failing influence the projects' urgency. Such projects are divided into three stages: exploration, elaboration, and realisation. Especially at the first two stages, there is a need for additional knowledge about IDR. Firstly, the results of this study may have implications for all of these RWAs and all other actors involved in NFPP projects in terms of IDR, such as increased efficiency, lower costs, and additional public value through synergies. Secondly, similar projects in other dense countries may benefit from the results as well, as they are expected to face similar challenges. As a result, finding a solution to the problem may be essential to many people worldwide who live near dikes.

## 1.5 Research scope and overview

The general purpose of this study is to identify boundary spanning activities that contribute to the realisation of IDR. These findings will be translated into recommendations, which can be applied in future dike reinforcement projects at RWAs. The study only considers substantial dike reinforcement projects that are mentioned in the NFPP project book (HWBP, 2022). This book contains a compilation of all current NFPP projects. Projects outside the NFPP programme are excluded from the research, which means that projects like regular dike maintenance are not considered. In addition, regional embankments along smaller water bodies are not eligible under the NFPP qualifications and thus are not included in this research (Rijkswaterstaat, 2022). By only selecting NFPP projects, cases are solely selected from RWAs in the Netherlands. These NFPP cases will be used to consider both one-dimensional and two-dimensional dike reinforcement projects, which involves dikes that are reinforced and/or raised, as well as dike reinforcement cases where dike segments are relocated. From these cases, key actors regarding boundary spanning are studied by interviewing them.

The theories discussed and methods used are further explained in the sections that follow. To begin, the following chapter discusses the theoretical framework that was developed for this study. Following that, Chapter 3 describes the methods employed, as well as the case studies selected and the data gathered for this research. The outcomes of these comparisons, as well as other general results, are then discussed in Chapter 5. Finally, in Chapter 6, the research is summarised and recommendations for IDR in future dike reinforcement projects are made.

## 2 Theoretical framework

This chapter presents the concepts that were used to develop the theoretical framework for this research. It starts with defining integration and how it can be measured. Thereafter, linking opportunities and an integrative process involving boundary spanning is elaborated on. Then, this chapter explains the terms boundary judgements and boundary spanning activities. If the process of boundary spanning is followed correctly, it may result in integrative outcomes such as synergies and co-benefits, which definitions can be found in the sections that follow. The most important terms for this research are eventually presented in the framework.

### 2.1 Conceptualising integration

Integration in general can be defined as the process of combining multiple components or subsystems into a cohesive whole, to ensure that they work together seamlessly and efficiently to produce desired results. This involves the alignment of processes, procedures, and systems to optimise the flow of information, resources, and tasks between various units and departments, thereby reducing inefficiency and improving overall performance (Rajabalinejad et al., 2020). Integration as a result can include a number of positive outcomes, such as synergies, co-benefits, and increased efficiency (Cumiskey et al., 2019). In other words, integration is the way by which actors balance their multiple overlapping interests to achieve a desired outcome in an efficient way (Williams, 2002). When applied to dike reinforcement, integration implies that integral solutions include not only flood protection but also other environmental and societal challenges (Jorissen et al., 2016). This study refers to integration as the results of physically including societal challenges outside the dike reinforcement domain into the dike reinforcement project. Consequently, dike reinforcement projects including societal challenges from sectors outside the dike reinforcement domain are referred to as integral dike reinforcement (IDR). According to a study by Van der Heijden (2006), integration in construction projects, such as IDR, can lead to improved communication and coordination among team members, resulting in more efficient realisation of project objectives. On the other hand, integration can also lead to increased complexity and coordination challenges, as well as potential conflicts among different stakeholders involved in the project. However, given the challenges of reinforcing dikes in the Netherlands and the limited space available, IDR may be unavoidable in future dike reinforcement projects, emphasising the importance of this process.

An integrative approach results from integration and refers in this study to an interdisciplinary process that considers a project holistically, from planning to construction to use, where it is attempted to include challenges from actors other than those involved in dike reinforcement (Fewings & Henjewe, 2019). As a result, this research considers that an integrative approach could serve as the basis for IDR projects. Research indicates that an integrative approach in dike reinforcement projects can result in actors actively joining in decision making and developing shared interests, aims and ambitions (Fewings & Henjewe, 2019). Moreover, an integrative approach in dike reinforcement projects can contribute to creating flood-resilient urban areas when relevant stakeholders achieve their shared goals (van Herk et al., 2011). Ultimately, the success of integration in dike reinforcement depends on the ability to effectively balance these competing factors and manage the trade-offs involved.

To clarify the positive results that an integrative approach can produce, such as co-benefits and synergies, explanations and examples are provided that might result from these terms. Co-benefits refer to the results from a win-win strategy that aims to capture multiple benefits from a single measure, also known as the intended positive side effects (Miyatsuka & Zusman, 2009). In this study, co-benefits in dike reinforcement projects are understood as the additional positive outcomes that result from implementing IDR beyond just reducing flood risk (Alves et al., 2019). The co-benefits in IDR can include economic, social, and environmental aspects, whereas the economic aspect simply

includes cost reductions for the sectors involved separately (Vorhies & Wilkinson, 2016). Unlike co-benefits, synergies occur when interactions between adaptation and/or mitigation measures result in benefits greater than the sum of their parts when implemented separately (Sharifi, 2021). Synergies as a project outcome are considered as a more integrative and desired outcome than co-benefits. In this study, synergies in IDR projects refer to the combined effect greater than the sum of their separate effects, which can be gained by combining dike reinforcement projects with current and future challenges of other actors (Sayers et al., 2013). The realisation of IDR can lead to more integrative outcomes, understood as co-benefits or synergies. The focus of this study is, however, on IDR, in which an eye is kept out for the integrative outcomes to identify and assess IDR projects.

Measuring integrative outcomes is important to determine whether or not integration was successful. Cumiskey et al. (2019) explain a possible way to measure integrative outcomes by categorising them into four degrees of integration; High, Intermediate, Low and Minimal integration. In their measurement scale, high integration results in multiple co-benefits and synergies, such as managed trade-offs, maximised efficiencies and sector specific interventions, whereas minimal integration leads to unsuccessful, time-consuming, and costly separate interventions (Cumiskey et al., 2019). In another method, the NFPP developed their own integral scope determination method, which indicates which sectors were integrated into a dike reinforcement project and to what extent. This method distinguishes three levels of integrative outcomes from high to low, namely area development, multi-purpose environment design and embedding (Rijkswaterstaat, 2020). For this study, the above definitions are combined. Integrative outcomes are measured in terms of the number of challenges from sectors and/or domains other than dike reinforcement that are addressed jointly with the dike reinforcement project. When the majority of the identified joint challenges (i.e. linking opportunities) are discarded, the case is labelled as unsuccessful IDR. When more than half of the initial challenges remain or become more during the project, the case is labelled as successful IDR.

### *2.1.1 Linking opportunities*

An integrative approach starts with identifying joint challenges, which in Dutch dike reinforcement projects are generally referred to as 'linking opportunities' (NL: meekoppelkansen). Linking opportunities in this study refer to potential joint challenges with other sectors and/or domains that a dike reinforcement project could capitalise on. According to Bekhuis et al. (2021), who analysed linking opportunities, an integrative approach is crucial for finding linking opportunities with other challenges. Communicating with other with actors from different sectors can bring about their challenges and demands, which can then be integrated into dike reinforcement projects (Bekhuis et al., 2021). Knowing the relevant sectors and their challenges can thus be extremely beneficial in developing common goals and thus identifying linking opportunities.

Van Meerkerk et al. (2015) describe potential sectors and domains offering linking opportunities for IDR projects, which include infrastructure, housing, water management, nature development, and agriculture. Cumiskey et al. (2019) also describe sectors that offer linking opportunities, such as the environment, water (resources, wastewater, drainage), emergency management, housing, economic growth, infrastructure, recreation, and agricultural sectors. A list is developed for this research based on a combination of the above sources, which includes the following areas for integration between dike reinforcement and other specific sectors: (1) Infrastructure and transportation, (2) Water (safety, supply, waste, drainage), (3) Environment, (4) Emergency management, (5) Housing and economic development, (6) Spatial planning, (7) Agriculture, and (8) Culture and recreation.

According to Frijns et al. (2020), linking opportunities arise when sectoral challenges (sub-interests) are broadly linked. In their research, starting from a water management perspective, projects are assessed on their linking opportunities with common cross-sectoral challenges. Subsequently, they

calculated how many linking opportunities a project had and how many were truly integrated (Frijns et al., 2020). The method is embraced in this study to determine the number of linking opportunities that were initially identified and the number of linking opportunities that were effectively integrated into dike reinforcement projects. Hence, this study employs linking opportunities to identify joint challenges with other sectors and/or domains from project descriptions and documents and therefore serves to determine the integrative potential of a project. This implies that the integrative potential is seen as all the linking opportunities of a dike reinforcement project with present challenges across sectoral boundaries combined, which could have been capitalised on.

## 2.2 Boundary judgements and boundary spanning

Capitalising on the linking opportunities IDR offers does not come naturally. Several factors can influence this process, but this study focuses on the impact of boundary judgements and BSAs on IDR. This is because theory suggests that boundary spanning plays a crucial role in regular dike reinforcement projects becoming integral projects (Bressers & Lulofs, 2010; Cumiskey et al., 2019; Edelenbos & Van Meerkerk, 2015). Boundary judgements are expected to have an important role in boundary spanning because these demarcations define what is relevant to a dike reinforcement project and what is not (De Loë & Patterson, 2017; De Loë & Patterson, 2017). As a result, this section first elaborates on these concepts before explaining how they relate to one another.

### 2.2.1 Defining boundary judgements

In entire systems with interconnectedness of all things, each sector or domain has generated its own boundaries to handle the endless complexity all the interrelated issues offer (Helfgott, 2018). While boundary judgments are very useful in handling this complexity, boundary judgements are expected to be one of the causes of inter-sectoral demarcations, complicating integration (Warner et al., 2010). These demarcations refer to the evaluation and determination of the limits or boundaries of a particular area, concept, or project (Van Meerkerk et al., 2013). To put it another way, decisions about which concerns are relevant to the context in which certain actors operate (De Loë & Patterson, 2017). Making boundary judgements can include determining the physical or conceptual boundaries of a project scope, determining the limits of legal jurisdiction, or determining the boundaries of a specific field of study or research. These judgments may be based on a number of factors, including legal precedents, sectoral approach, or cultural or societal norms (Bressers & Lulofs, 2010). In the water management sector, this includes that actors determine system boundaries for themselves to cope with complex flood risk governance issues (De Loë & Patterson, 2017). According to De Loë & Patterson (2017), drawing boundary judgements may even be necessary to restrict the scope of water management and governance.

Given that actors create their own boundary judgements on a wide range of topics, different categories of boundary judgements have developed. To analyse all of these judgements, a boundary judgement categorization is created which distinguishes four types of boundary judgements, namely substantive, participation, structural and contextual. Respectively, these include the aspects and domains to consider; the actors to include and when; how to organise and structure the policy process; and the external developments that are included or excluded (van Meerkerk et al., 2013). Earlier researches into boundary judgements in flood risk governance discovered and created multiple boundary judgement elements per category in order to assess the boundary judgements of RWAs, based on multiple sources (Vinke-de Kruijf et al., in review; Groefsema, 2022). Groefsema's (2022) method used these elements to assess how actors in governance networks deal with complex adaptive flood risk measures, as well as how boundary judgements can change during a decision-making process over various flood risk measures. However, Vinke-de Kruijf et al. (in review) introduced slightly different elements that are more applicable to this study, which include scale, domains, time horizon, solutions,

responsibilities, financing, planning, decision-making, stakeholders, timing and intensity. Each of these boundary judgement elements specifies what and who is included in relation to that particular element. In Vinke-de Kruijf et al. (in review), the changing of the 11 boundary judgements is assessed at two moments during a project's phase, namely at the start and towards the end.

Boundary judgements can be classified as wide, moderate and tight according to Van Meerkerk et al. (2013). Wide boundary judgements can help achieve coordinated action and agreement between conflicting strategies. This is a result of the interdependencies of issues, actors, processes, and structures that are emphasised in their research, in addition to the more comprehensive system approach they suggest (van Meerkerk et al., 2013). This demonstrates flexibility and a certain level of acceptance of uncertainty, which can be useful when dealing with complex issues. However, too wide boundaries can provide too many possibilities, making a complex system confusing and hard to grasp (Bressers & Lulofs, 2010).

Therefore, tight boundary judgements can be used, for example, to minimise complexity by first focusing on solving small subsets of the problem before integrating those solutions with other problem fields (van Meerkerk et al., 2013). However, this can lead to multiple actors being prevented from having the opportunity to learn from one another and generate collective knowledge, which can in its turn help in navigating complexity and uncertainty (van Meerkerk et al., 2013).

Given that boundary judgements are one of the causes that may impede IDR, it can be important to assess the boundary judgements RWAs make and analyse if they change during a dike reinforcement project. As a result, this study incorporates a combination of Groefsema's (2022) and Vinke-de Kruijf et al.'s (in review) framework to assess the impact of boundary judgements on IDR. In the context of this research, boundary judgements are therefore understood as the flexible inter-subjective boundaries of a dike reinforcement project drawn by key actors, indicating project demarcations based on multiple boundary judgement, including the elements scale, domains, time horizon, solutions, responsibilities, financing, planning, decision-making, stakeholders, timing and intensity.

### *2.2.2 Defining boundary spanning*

According to Van Meerkerk & Edelenbos (2014) and Bressers & Lulofs (2010), boundary spanning is inseparably associated with stretching boundary judgements. In the context of dike reinforcement, boundary spanning refers to the management process of a project in which actors aim for an integrative approach by combining shared goals across boundaries, such as sectors or disciplines outside dike reinforcement (Cumiskey, 2020). Van Meerkerk & Edelenbos (2014) suggest that boundary spanning is the process in which key actors in a network practice boundary spanning activities on the borders of their home organisation. As a result, this study defines boundary spanning as a project management process that involves widening boundary judgements between key actors with linking opportunities through the execution of boundary spanning activities. This can include activities like building and maintaining relationships, discussing common goals, and resolving conflicts, about which more will follow. It is an important process that helps actors remain connected to their external environment, as well as understanding and responding to the needs and expectations of key actors (Bressers & Lulofs, 2010). Hence, boundary spanning is expected to be inseparably linked with the realisation of IDR.

Research shows that implementing boundary spanning may not be as simple as the previously mentioned studies suggest. Bringing together diverse opinions, values, and interests proved more difficult than expected during an analysis of a boundary-spanning process of landscape architects in FRM. Significant factors that hindered this were organisational support, positive feedback, clear role definitions and social-emotional skills and competencies (van den Brink et al., 2019). Additionally,

boundary spanning can introduce risks in dike reinforcement projects. Although multiple domain and sector involvement would suggest that a larger budget is available, it is not self-evident that the needed support is present and the necessary cooperation between different disciplines can join forces and funds (Brouwer & Van Ek, 2004). In addition, the involvement of multiple parties entails additional risks. For example, the delay of one component slowing down the entire project, leading to the failure of a project in its entirety (Warbroek et al., 2022). Moreover, the project could fail if actors in the project refuse to play along with the boundary spanning process. Actors who are less attached to the boundaries may form a risk by showing resistance, leading to a failed project (Williams, 2002). This would not be an issue when both sectors executed their projects separately. At the same time, researchers argue that such risks can be largely mitigated by opening up about the strategy and involving relevant actors early on (Warner et al., 2010). In fact, research shows that projects with a high level of interdependence and low environmental uncertainty were able to facilitate boundary spanning better (van den Brink et al., 2019). In general, the consensus is that boundary spanning is considered as an important process for projects to encourage integration and, in this study, IDR (Bressers & Lulofs, 2010; Cumiskey, 2020; Van Meerkerk et al., 2015).

### *2.2.3 Boundary spanning activities*

Van Meerkerk & Edelenbos (2014) suggest that boundary spanning entails the execution of boundary spanning activities (BSAs) by individuals, which can eventually lead to wider boundary judgements. Therefore, BSAs are expected to encourage integration in dike reinforcement projects. As a result, this study considers BSAs as process factors since they can influence the process of integration. Research by Cumiskey (2020) into BSAs in dike reinforcement emphasises the importance of these activities to realise integration in dike reinforcement projects even more.

Boundary spanning activities can be executed by actors, such as organisations, as well as individuals, which are referred to as boundary spanners. The existing literature on these activities focuses on the organisational level, and comparatively little attention is accorded to the pivotal role of individual actors in the management of inter-organisational relationships (Williams, 2002). Williams (2002) mentions in his research that some activities are better performed by individuals within an organisation, but also that some activities, such as gaining trust, can be conducted by both an organisation and an individual. As a result, this study considers BSAs as process activities executed by key actors involved in dike reinforcement projects to facilitate boundary spanning. This means that key actors can be individuals as well as organisations, but this study focuses on the activities rather than the actors executing them.

BSAs are classified into various types and categories according to literature, each with its own purpose. To start, BSAs are known for their ability to link an organisation with its environment and thus other actors, which could eventually lead to improved integrative performance. In order to accomplish this higher degree of integration, boundary spanners are engaged in three main boundary spanning activities according to Van Meerkerk & Edelenbos (2014). These activities include Connecting or linking different people and processes at both sides of the boundary; Selecting relevant information on both sides of the boundary; and Translating information to the other side of the boundary (Van Meerkerk & Edelenbos, 2014).

Williams (2002) emphasises that realising connections is about building and maintaining sustainable relationships. Furthermore, the emphasis on information exchange is a recurrent theme in the early organisational boundary spanning literature (Van Meerkerk & Edelenbos, 2014). According to Williams (2002), the key factors in boundary spanning distinguish the use of particular skills, abilities, experience and personal characteristics. These factors are actions, personal characteristics or qualities which can be translated into actions for the benefit of this research. Since these factors are described by

boundary spanners as desirable to become the 'best' boundary spanner, it was essential to include them and thus translate some 'qualities' into activities for this research. These include, among other activities, communicating, gaining trust, building relationships, networking, influencing, negotiating, convincing people and lateral and strategic thinking.

Cumiskey (2020) questions whether integrative outcomes in FRM projects continue to rely on proactive actors who strengthen actor relationships and navigate governance mechanisms towards shared goals across boundaries. She suggests that these boundaries can be spanned by actors engaging in five different roles, each including its own activities. The Reticulist main activities include identifying opportunities with other actors' challenges and building relationships with actors from different sectors. An Entrepreneur engages in capturing the identified opportunities and tries to align mutual goals with other sectors. The third role is that of an Interpreter, which is executed by individuals who act on the interface across specific boundaries. They specialise in relationship building by listening to and understanding one's priorities, as well as framing challenges across disciplines. Organisers are individuals who are known for their extensive cross-boundary work on administrative tasks like planning and coordinating. The final role is that of the Specialist, who is known for performing technical and specialistic tasks as well as thinking laterally across sectoral boundaries (Cumiskey, 2020). Given that the focus of this study is on the activities rather than the corresponding roles, only the activities are considered.

Additionally, Goodrich et al. (2020) discovered functions of boundary spanners that contribute to approaching complex problems across disciplines in a comprehensive literature review. One component of this research resulted in a list of BSAs, the majority of which were derived from Jesiek et al. (2018). These activities, which largely overlap with the BSAs mentioned by Williams (2002), include translating and transforming, filtering information, cross-boundary organising, building relationships, networking, and political activity execution (Goodrich et al., 2020). Based on the BSAs obtained from the aforementioned sources, this study considers these activities to be activities that an actor may execute to encourage wider boundary judgements.

#### *2.2.4 Categorising BSAs*

BSAs are classified into four categories in Williams' (2002) research, each of which includes multiple BSAs that a competent boundary spanner can execute. Because of their comprehensiveness, these categories serve as the foundation for the operationalization of BSAs in this study. When these activities are combined with those from Van Meerkerk and Edelenbos (2014), Cumiskey (2020), and Goodrich et al. (2020), they form a list of BSAs divided into four categories, which are considered the BSAs that contribute to IDR in this study.

The first category includes 'Building and sustaining effective personal relationships'. This category includes assembling actors from different organisations, groups and backgrounds, who are all involved in dike reinforcement. This gathering is intended to foster relationships in which the actors involved have strong mutual connections that can benefit each other. The sub-activities mentioned in this category are all intended to build strong relationships with the actors they know or they have something in common with, and to sustain these relationships. These include communicating, connecting, understanding, acting reliable, and building and maintaining relationships and trust.

Linked to this category is the second one, 'Networking'. Networking focuses on broadening an actors' network by implementing sub-activities, such as being in the loop for information and emerging opportunities and being active at a strategic level. These activities are inseparably linked with building and sustaining relationships since one enhances the other. Networking is essential for boundary



spanners to identify emerging resource opportunities from other parties and execute these activities, which are typically carried out outside of formal organisational structures.

Another important category of BSAs is 'Managing through influencing and negotiation'. To get things done or jointly address challenges, deals must be made between actors to create a balance between the benefits and disbenefits for them and others. Therefore, this BSAs category involves the ability to empathise with another actor. This category includes activities such as convincing actors, compromising, understanding interdependencies, influencing, negotiating, brokering solutions and capturing opportunities.

Lastly, 'Managing complexity and interdependencies' deals with the complexity between involved actors, the challenge itself and the interests of others. One who can see the bigger picture of the joint challenge must sometimes put their self-interests second, in order to achieve a greater goal. Therefore, the interdependencies between relationships and the complex project structure can be managed by implementing activities, such as lateral and strategic thinking, taking a holistic view, selecting and filtering information, translating information across boundaries, aligning mutual goals and coordinating and organising mutual tasks.

Together, these four categories, which include multiple BSAs, serve as the framework for this study's identification of BSAs. Given that the literature does not provide a complete list of BSAs, but activities were found that largely overlap, this list is considered as a complete as possible framework suitable for identifying BSAs. The list with categorised activities is presented in Table 1.

### 2.3 External factors

Aside from BSAs, other factors or activities may influence the boundary judgements of dike reinforcement projects and thus IDR. Bressers & Lulofs (2010) suggest that the environment and the dynamics of the interaction process may have an impact on the actors and their characteristics. Van den Brink et al. (2019) argue that projects with a low environmental uncertainty were able to facilitate boundary spanning activities better, indicating the importance of environmental factors. Therefore, when external events or characteristics have an impact on participating actors, such as their cognitions, motives, and resources, they have the potential to alter the boundary judgements (Bressers and Lulofs, 2010). This implies that, in addition to boundary spanning, external factors may be able to influence boundary judgements. Boundary spanners can actively intervene in these situations, but they can also be uncontrollable, such as an economic crisis, pandemic, or war. Regardless of the BSAs executed, the latter may result in boundary judgements not being widened, impeding IDR.

However, it is also possible that external factors cause the widening of boundary judgements, for example through money or other incentives. Research by Mitropoulos & Tatum (2000) shows that one of the aspects influencing integration in projects is the form of the contract that is applied in the dike reinforcement projects. For example, a design and build contract allows the highest integration potential because the early involvement of the contractor can bring about unknown future challenges that might want to be included (Mitropoulos & Tatum, 2000). This section is intended to demonstrate that this study is aware of the external factors that may influence IDR. Considering both the positive and negative impact external factors can have on IDR, this study assesses external factors separately from BSAs. As a result, all factors or activities that are not BSAs and contributed to boundary judgement changes are considered as external factors in this study.

Table 1 List of Boundary Spanning Activities grouped into 4 categories based on Williams (2002).

BSA category	No.	Boundary spanning activity	References
<b>Building and sustaining effective personal relationships</b>	1.1	- Communicating and receiving information in a two-way process, where listening is considered as important as information giving;	[1],[4],[5]
	1.2	- Connecting or linking different people and processes at both sides of the boundary;	[2],[3]
	1.3	- Understanding, empathising and resolving conflicts;	[1]
	1.4	- Acting respectful, honest, open, tolerant, approachable, reliable and sensitive;	[1]
	1.5	- Build and maintain strong relationships through cooperation;	[1],[2],[5],[6]
	1.6	- Build, gain and sustain trust between individuals and organisations.	[1],[4],[5]
<b>Networking</b>	2.1	- 'Being in the loop' for information of all sorts, such as identifying emerging resource opportunities;	[1],[4]
	2.2	- Being active at a strategic level, representing different agencies and organisations who are referred to as 'the usual suspects' because of their appearance on many different partnerships.	[1]
<b>Managing through influencing and negotiation</b>	3.1	- Persuade and convince other people and organisations by acting diplomatic, constructive and non-judgemental, sometimes on a political level;	[1],[5]
	3.2	- Compromise and make careful judgements about the balance between benefits and disbenefits for themselves and other organisations;	[1],[2]
	3.3	- Understand interdependencies between problems, solutions and organisations;	[1],[2]
	3.4	- Influence and negotiate between people and organisations whilst acting transformable and flexible;	[1],[4]
	3.5	- Broker solutions or deals between different parties;	[1],[2],[3]
	3.6	- Identify and capture arising opportunities.	[2],[6]
<b>Managing complexity and inter-dependencies</b>	4.1	- Lateral, analytical and strategic thinking. Taking a holistic view and understanding the bigger picture;	[1],[6]
	4.2	- Selecting (and filtering) relevant information on both sides of the boundary;	[2],[5],[6]
	4.3	- Translating (and transforming) information to the other side of the boundary;	[2],[5],[6]
	4.4	- Frame challenges across disciplines and align mutual goals;	[4],[6]
	4.5	- Coordinating, planning and organising cross-boundary tasks.	[4],[5],[6]

*Legend references:* [1]: Williams (2002), [2]: Van Meerkerk & Edelenbos (2014), [3]: Van Meerkerk et al. (2015), [4]: Jesiek et al. (2018), [5]: Goodrich et al. (2020), [6]: Cumiskey (2020).

## 2.4 Synthesis and framework

The goal of this research is to gain insights into if and how boundary judgements of key actors involved in IDR projects change during the process, to what extent boundary spanning activities contribute to this, and, if so, which types of boundary spanning activities contribute to IDR. Previous research indicates that process factors like boundary spanning activities are strongly linked with widening boundary judgements and realising an integrative project outcome (Cumiskey, 2020; Van Meerkerk & Edelenbos, 2014; Williams, 2002). Drawing from previous research, this study asserts that executing more BSAs is associated with wider boundary judgements in dike reinforcement projects, leading to IDR in the end. Studying this could prove that the more boundary spanning activities are observed in a project, the wider the boundary judgements are and the more integrative outcomes result from a dike reinforcement project. Therefore, it is crucial to understand which BSAs contribute to which boundary judgements becoming wider. The influence of BSAs on boundary judgements depends on the external factors influencing the starting boundary judgements and the process of widening boundary judgements. How these concepts relate to one another is shown in the visualisation of the theoretical framework in Figure 1. The plus and minus symbols located above the process arrows indicate the positive or negative effect a concept can have on the concept to which it points.

As might be clear from the previous cited studies, there has been considerable research on BSAs in different fields of work. However, a complete list of boundary spanning activities is lacking from literature for the specific field of study of FRM and dike reinforcement projects. As a result, different sources are merged into a list of BSAs considered in this research, based on the four categories described by Williams (2002). A fifth category is mentioned in his research as being important for boundary spanning but is not addressed because it involves the roles of boundary spanners. This category is beyond the scope of this study because it addresses the roles of boundary spanners and this study focusses on process management activities.

The list with BSAs created for this research is shown in Table 1. The list provides a comprehensive as possible overview of BSAs, considering that findings from different studies support each other. These activities can be traced back to executed dike reinforcement projects to assess what boundary spanning tasks were performed and which were not and check whether they contributed to wide boundary judgements. For the latter, boundary judgements are assessed at the beginning and towards the end of a dike reinforcement project using a combination of Groefsema's (2022) and Vinke-de Kruijf et al.'s (in review) methods. If there is a link between BSAs and changing boundary judgements, it could demonstrate the influence BSAs have on wider boundary judgements, and thus eventually on IDR.

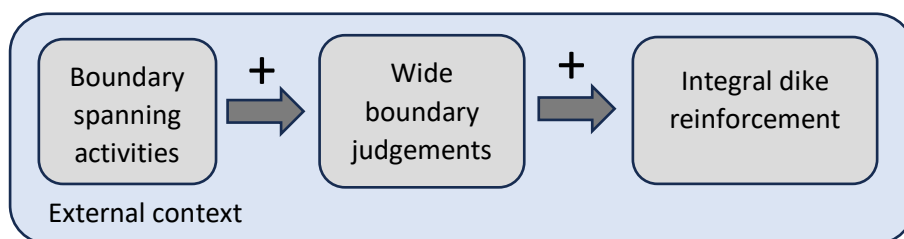


Figure 1 Visualisation of the theoretical framework of the research

### 3 Methodology

This chapter introduces the research methods by first explaining the case study design and case selection. The case studies are then discussed, and it is explained what characterises them. The sections that follow elaborate on the data that were analysed and the process that was followed to do so. Lastly, there is an operationalisation of how the key concepts were evaluated, as well as a summary of the data that were used in this study.

#### 3.1 Case study approach

To answer the research questions, a qualitative and comparative case study research is employed by doing interviews and analysing case documents. The cases that are analysed concern four dike reinforcement projects implemented by four different RWAs across the Netherlands. This comparative case study includes the systematic comparison of these cases for similarities, differences and patterns by employing the case study method (Kaarbo & Beasley, 1999). The case selection is based on the most similar cases selection method by Seawright & Gerring (2008), which requires a minimum of two cases. This method is considered as most suitable for this research, considering its primary objective is to analyse cases that are similar across background conditions (integrative potential) but differ on one dimension (execution of BSAs) and on the outcome (successful or unsuccessful IDR). On this pattern of covariation across cases, this method presumes that the presence or absence of BSAs being executed causes variation in the outcome, which is (un)successful IDR in this study (Seawright & Gerring, 2008). This makes the most similar case selection method most suitable for this research and is therefore employed. Therefore, two successful IDR projects and two unsuccessful IDR projects were selected. The decision to pick two projects from two groups was made to increase the validity of this study but is also based on the feasibility within the available time for this research.

However, it would not be fair to assess every dike reinforcement project on its integrative potential in the same way because different dike reinforcement projects may differ in nature of the challenge it addresses and, therefore, have varying characteristics. This means that if a project shows few linking opportunities with nearby challenges, its environmental context dependency is taken into account in the case selection. In other words, dike reinforcement projects with as much similar integrative potential (i.e. total number of linking opportunities) are selected, where relevant situations that influence the projects are considered and taken into account.

The selected cases include projects differing in IDR outcome (integrative outcome) and are selected based on having a similar integrative potential. The cases are found whilst scrutinising the NFPP book, reading project documents and contacting representatives of the NFPP who indicated relevant cases. The NFPP book contains solely ongoing projects, which should improve the amount and reliability of the available information. A disadvantage is that it also contains projects that have not finished the relevant phases and are therefore not suitable. Namely, the projects must have completed the elaboration phase since this is where most of the boundary spanning activities take place (van den Brink et al., 2019). The search aimed to identify projects that all started with the same integrative potential but ended up different in terms of IDR. This resulted in the selection of two successful IDR projects, **Ravenstein-Lith** (Case 1) and **Koehool-Lauwersmeer** (Case 2), and two projects where IDR largely failed, namely **Sint-Annaland** (Case 3) and **Wolferen-Sprok** (Case 4). All four cases are suitable for studying boundary judgements and BSAs in the process of dike reinforcement and can be compared quite well because all cases had largely the same integrative potential and their goal is to reinforce the dikes in accordance with the 2050 norms. Additionally, the four selected cases all completed the phases up to the elaboration phase. A conscious decision was made to select projects based on discussions with NFPP representatives about the suitability of the cases and regarding the aim of this research. The locations of the four selected case studies are shown in Figure 2.

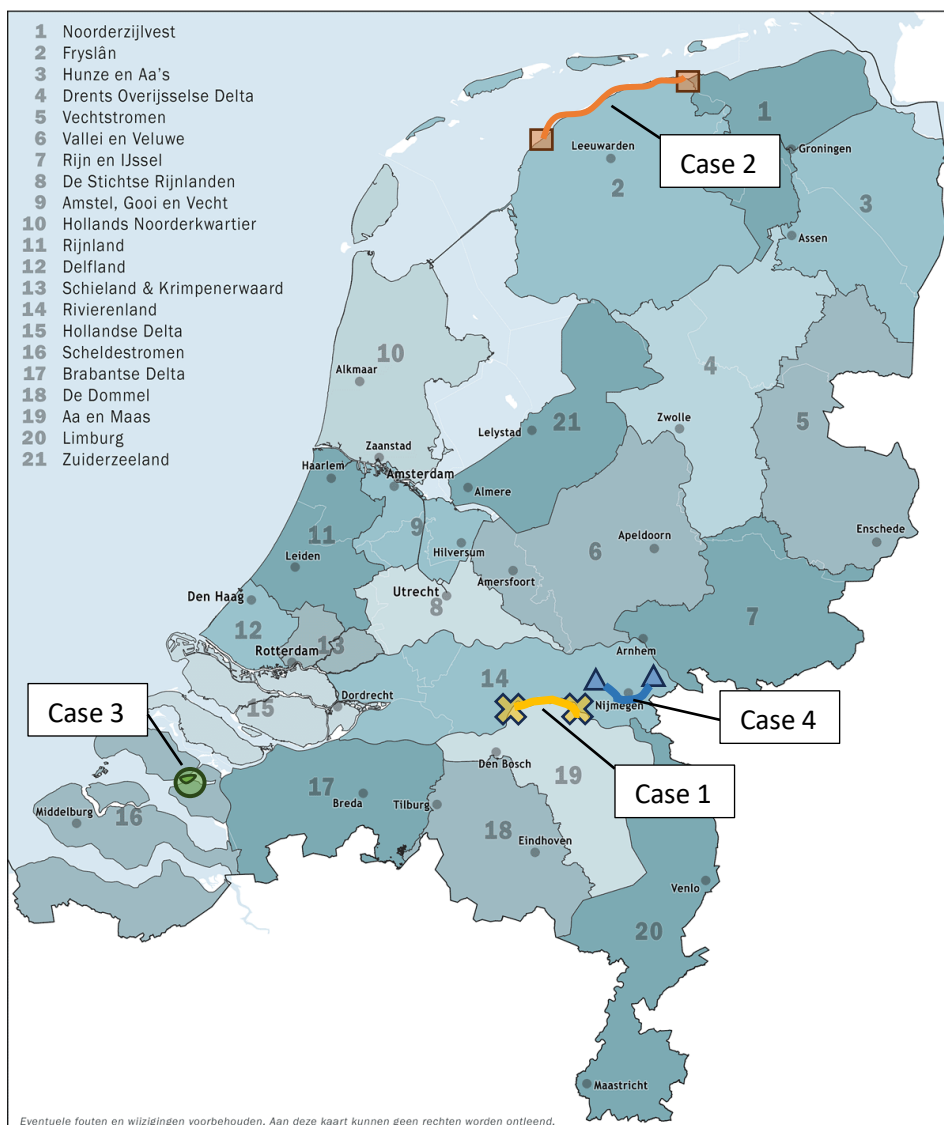


Figure 2 Overview of the case study locations and the RWAs

## 3.2 Case explanation

In this section, the four cases are introduced in terms of their key characteristics such as their environment, failure mechanisms and integrative potential. A summary of all the case studies is given in Table 2.

### 3.2.1 Case study 1: Ravenstein-Lith (Meanderende Maas)

The dike reinforcement between Ravenstein and Lith (RSL) is part of the Meandering Meuse project and focuses on both provincial sides of the Meuse, between the A50 and the lock at Lith. The dike is being reinforced because there are problems with the height, stability and piping. The Meandering Meuse project combines the need for water safety with the opportunities for area developments. RSL is organised by ten project partners who are cooperating with residents, entrepreneurs and stakeholders on the future of the characteristic area around the Meuse River, with an eye for the existing qualities. Therefore, the project is not considered as a dike reinforcement from its responsible RWA, but as an area development where RWA Aa en Maas is one of the ten project partners, already since the start of the project. This means RSL is considered as a successful IDR project.

The project entails 26.6 kilometres of dike reinforcement where the solution is not only from a constructive perspective but also from a river widening perspective, which is the main goal of the Meandering Meuse project. Therefore, the scope includes the dike, river, adjacent floodplains and neighbouring municipalities. The project has finished its elaboration phase and is scheduled to be implemented in 2024. In the development of the plan, the RWA is working together with contractor Boskalis and consultant Royal HaskoningDHV on the design and the permits.

### *3.2.2 Case study 2: Koehool-Lauwersmeer (1DYK)*

Parts of the dike trajectory Koehool-Lauwersmeer (KLM) do not meet the current legal requirements for various failure mechanisms. For example, the dike covering is insufficient, there is a stability problem and a height deficit at certain parts. The aim of the reinforcement project is a future-proof design, taking into account rising sea levels and soil subsidence. An environmental approach is applied where the project integrates challenges from water management, nature, recreation, infrastructure and agriculture. Therefore, this project is regarded as a successful IDR project.

The project addresses 47 kilometres of dike reinforcement and is located on the North coast of the province of Friesland, protecting it from the Wadden Sea. Integration with the environment is almost unavoidable since the Wadden Sea is a Natura-2000 area as well as UNESCO World Heritage, and the land side consists mainly of agricultural grounds. Remarkable is that two different designs are created; one with a green and vegetated cover, and one solid paved cover. Both designs can be implemented depending on the surrounding area of a certain section, ensuring optimal integration in its environment. The project and the environmental approach are led by RWA Wetterskip Fryslân. Currently, they find themselves in the elaboration phase but have paused the project to include the previously failed integration of other sectors, which makes this a particularly interesting project.

### *3.2.3 Case study 3: Sint-Annaland*

The relatively small project located in Sint-Annaland (SAL) is a 500-meter-long dike reinforcement project because the stretch of the dike is rejected for inward stability. The stretch has a significant strength deficit and needs therefore to be reinforced. Remarkable about this project, located on the island of Tholen in the province of Zeeland, is its small scope. The small trajectory has been brought forward in the planning to jointly address the challenges of the municipality of Tholen around the dike and the dike reinforcement problem RWA Scheldestromen faces. Initially, the goal was to reinforce the dike alongside the development of the yacht harbour area at the dike's sea side and the housing development at the land side. Various factors made this cooperation fail, which made it a highly interesting case to analyse in this research and is therefore regarded as an unsuccessful IDR project. This failure was brought to light during a conversation with a district NFPP employee.

The project is currently in the elaboration phase and aims to start with the implementation at the start of 2024. During the activities, the focus is on the dike reinforcement and small preparatory activities are executed for the municipality to facilitate their works. However, the initial goal for a joint execution of shared challenges has failed.

### *3.2.4 Case study 4: Wolferen-Sprok*

The dike section Wolferen-Sprok (WFS) is located north of the river Waal within the municipalities of Nijmegen and Overbetuwe and has a length of 13,3 kilometres. The dike was rejected for stability, height and piping and will therefore be reinforced. A Part of this trajectory was selected as dike relocation for the program 'Room for the River', but failed for various reasons. What will be integrated into the project is a housing opportunity and an area-wide infrastructure combined with the dike reinforcement. The failure of this large integration opportunity and missing out on numerous linking opportunities make this case an unsuccessful IDR project in this study.

The project has finalised the elaboration phase in 2021 and is currently in the realization phase. It is led by RWA Rivierenland and the work is expected to last until the end of 2025. The project came to the attention of this research through one of the program managers of the NFPP, who mentioned the missed opportunities. This in combination with the high integrative potential of the area makes it even more interesting.

Table 2 Overview of the four selected NFPP projects

	Ravenstein-Lith	Koehool-Lauwersmeer	St. Annaland	Wolferen-Sprok
<b>Lead actor(s)</b>	RWA Aa & Maas + 9 project partners	RWA Wetterskip Fryslân	RWA Scheldestromen	RWA Rivierenland
<b>Organisations involved</b>	RWAs Aa en Maas and Rivierenland, Provinces of Noord-Brabant and Gelderland, Municipalities of Oss, West Maas en Waal and Wijchen, Natuurmonumenten, RWS (MIRT) and NFPP	RWA Wetterskip Fryslân, Province of Friesland, RWS, Municipalities of Noardeast-Fryslân and Waadhoeke, and agricultural and land management organisations (LTO) and NFPP	Municipality of Tholen, NFPP, RWA Scheldestromen and a project developer	RWA Rivierenland, RWS and Municipalities of Overbetuwe and Nijmegen
<b>Current NFPP phase</b>	Elaboration phase/ start realization	Elaboration phase (paused to improve design)	Elaboration phase/ start realization	Realization phase
<b>Problem definition</b>	26,6 km dike trajectory does not meet new standards (height, stability and piping)	47 km dike trajectory does not meet new standards (height, stability and covering)	500-meter dike trajectory does not meet new standards (stability and covering)	13,3 km dike trajectory does not meet new standards (height, stability and piping)
<b>Involved domains and sectors</b>	Nature and environment, Spatial planning, Culture and recreation and water management	Nature and environment, Water management, Infrastructure, Culture and Recreation and Agriculture	Housing development, Infrastructure and Spatial planning	Housing development, Infrastructure, Water management and Culture and recreation.
<b>Integrative potential</b>	High integrative potential with river widening and linking opp.	High integrative potential with unusual bordering areas	High integrative potential with surrounding urban area	High integrative potential with dike relocation and linking opp.
<b>Integrative outcomes</b>	<b>Successful IDR</b> with area development approach	<b>Successful IDR</b> including ± 6 linking opp. eventually	<b>Unsuccessful IDR</b> including 0 linking opportunities	<b>Unsuccessful IDR</b> including 2 linking opportunities

### 3.3 Operationalisation

Both boundary judgements and boundary spanning activities are operationalised to explain how the key concepts in this study were analysed. As a result, the operationalisation of the boundary judgements is given first, followed by the BSAs.

#### 3.3.1 Operationalisation of the boundary judgements

To get a clear picture of how BSAs contribute to more integrative dike reinforcement, it is first important to get a picture of the boundary judgments of the cases. For this purpose, this research draws from the MSc thesis of Groefsema (2022) and the method she applied to operationalise boundary judgements. This method was modified for the purposes of this study, partly based on Vinke-de Kruijf et al. (in review), primarily by making slight textual changes to the assessment criteria. The boundary judgement categories addressed in both studies are considered in this research in terms of grouping the boundary judgement elements. However, the category names are not mentioned further on in this research since the focus is less on assessing boundary judgements and more on BSAs, making them less relevant. Furthermore, the changing of the 11 boundary judgements is measured at two moments during the project, namely at the start of the exploration phase and towards the end of the elaboration phase. Applying this method provides a clear overview of the boundary judgements of the selected cases and how they have changed over time. Therefore, this method fits the aim of this research.

After small adjustments to the method from Groefsema (2022) and Vinke-de Kruijf et al. (in review), the operationalization of the boundary judgement is created for this research and is shown in Table 3. These adjustments include leaving out the 'very wide' and 'very tight' boundary judgement levels, resulting in the method by Van Meerkerk et al. (2013), in which boundary judgements can be tight, moderate or wide. Because this study focuses on BSAs rather than boundary judgements in depth, only explanations of the wide, moderate, and tight categories are provided, but no exact scoring system is included. In the interviews, the 11 elements (see Table 3) are assessed to see if and how they changed. The other adjustments include small textual adjustments to the assessment criteria to put more focus on dike reinforcement projects in particular instead of FRM.

However, this research selected projects based on their integrative potential and the actual integrated linking opportunities leading to successful IDR or not. To confirm this assumption made in the case selection, the domain/sector boundary judgements are brought forward in Groefsema's (2022) method to identify if and how linking opportunities from other sectors and/or domains were eventually integrated into the project. By assessing this boundary judgement first, it becomes immediately clear whether linking opportunities dropped off and if IDR was successful, similar to the approach in Frijns et al. (2020). As a result, all elements are assessed in the same manner but in a different order. In doing so, the 8 sectors by Van Meerkerk et al. (2015) are sought to be identified, as mentioned in the previous chapter.



Table 3 Assessment of the boundary judgements (adapted from Vinke-de Kruijf et al., in review; Groefsema, 2022)

Element	Wide boundary judgement	Moderate boundary judgement	Tight boundary judgement
<b>Domains/ Sectors</b>	Multiple diverse sectors and/or domains outside the water safety domain.	One or two domains and/or sectors from other sectors involved.	Only the water safety domain.
<b>Scale</b>	Focus on entire catchment area from an environmental-based approach.	Focus on dike trajectory and surrounding (regional) areas.	Focus on (part of) specific dike trajectory.
<b>Time horizon</b>	Minimum 50-100 years due to climate resilience. Longer or shorter if including other objectives.	In between minimum requirement and water authority standard: 25-50 years.	Meeting the set minimum requirement of the HWBP: 2050.
<b>Solutions</b>	Measure that integrates challenges from sectors outside the water sector.	Variations of structural and non-structural measures in the water sector.	Structural measures only from a water-oriented perspective.
<b>Responsibilities</b>	Co-responsibility of multiple stakeholders. Joint risk management.	Arrangements for the intention to cooperate, steering only.	Responsibility only with the water board. Sole risk responsibility.
<b>Financing</b>	A flexible budget for which multiple parties are jointly responsible.	Increased budget for the benefit of integration, arranged by different parties.	Fixed budget funded by the HWBP and the water authority.
<b>Planning</b>	Joint planning with all parties involved with coordination of tasks. Wider planning if multiple parties are involved.	Partially shared planning with the implementation of joint activities. Small room for adjustments.	Planning focused solely on dike reinforcement with no involvement of external parties and no room for adjustments.
<b>Decision-making</b>	Joint decision-making with all involved stakeholders.	Decision-making with only main (funding) parties involved.	Decision-making only by HWBP and water authority.
<b>Stakeholders</b>	All interests of relevant stakeholders in the environment are taken into account (professional stakeholders and local residents).	Stakeholder interests are considered from a select group of stakeholders (only professional stakeholders).	No stakeholder interests are considered.
<b>Timing</b>	Stakeholders are involved from the first to the last stage, including the design phase.	Stakeholders are involved during the project, but after the rough design has been made.	Stakeholders are not informed or informed at a late stage when decisions have already been made.
<b>Intensity</b>	Giving all stakeholders involved an equal opportunity to influence the project drastically, and coproduction.	Giving stakeholders the opportunity to influence the project within the set borders and take input into account.	Giving relevant stakeholders no or little opportunity to influence the project.

### 3.3.2 *Operationalisation of the boundary spanning activities*

Following the assessment of boundary judgements at two different points in time, the second step is to examine whether BSAs contributed to a changing or remaining boundary judgements, and if so, which specific BSA supported this. To determine whether this change occurred as a result of the active implementation of BSAs or if it can be attributed to external factors, the operationalization of BSAs that is presented in Table 1 in Chapter 2 is used. This list of BSAs is based on Williams' (2002) four categories and BSAs and is then supplemented with BSAs from other sources in the field of boundary spanning. These sub-activities aim to identify BSAs that fostered remaining or changing boundary judgements, which can now be labelled with the corresponding BSA number. While all four BSA categories were studied separately, the results chapter only presents the simplified names, which include: Relationships; Networking; Negotiation; and Managing.

### 3.4 Data collection

For all four cases information was gathered through document analysis and semi-structured interviews. In each case, interviews were conducted individually with actors from different roles as well as actors who engaged in the same role. As a result, data from multiple interviews and documents came from various sources, ensuring triangulation as a validation strategy for the collected data (Flick et al., 2004). In this way, the answers of each interviewee can be compared to each other and with the case documents, increasing the reliability of the results.

After the case selection, project documents were gathered by scrutinising the internet and consulting the case's websites, which are available for most of the NFPP projects. The case documents were mostly used to identify the boundary judgements of the sector/domain boundaries. Additionally, the case documents were useful in determining the amount of linking opportunities (integrative potential) from different domains that were identified and eventually integrated into the cases. Moreover, this was crucial to determine whether a case met the case selection criteria.

Following that, the NFPP contacts and this study's RWA supervisors were consulted about which roles in dike reinforcement projects they believe engage the most in boundary spanning. According to their responses, environmental and project managers are the most involved in BSAs in dike reinforcement projects, which is supported by the findings of Van den Brink et al. (2019). During the first scheduled interviews with key actors of the cases, the interviewees were asked for missing contact details or names of other important actors that engaged in boundary spanning in the case. In this way, all the interviews could be scheduled, some of which in person but most online through MS Teams, depending on their preference.

The initial idea was to only interview environmental and project managers from the RWAs. During the interviews, it became clear that to get a complete overview of the boundary judgements and the BSAs that were employed, boundary spanners from involved parties outside the water authority should be interviewed as well. Considering that boundary spanning is a process between two or more actors, the key actors who engaged in boundary spanning from external parties should also be interviewed to analyse their side of the story. Therefore, during the interview process, it was decided to extend the number of interviews by including key actors from organisations outside the water authority, that were involved in the boundary spanning process. These actors were selected by means of snowballing; RWA interviewees were asked for the most relevant actors in their case. However, this was not possible in all four cases since some had less interesting processes with other parties or certain actors were not available. As a result, Case study 2 is the only case where interviews were conducted with solely RWA employees. Eventually, this resulted in a total of 15 interviews of which a summary is given in Table 4,

together with the consulted documents per case. Here, each interviewee is labelled with a code, which is explained in the legend.

The interviews were used to fill in the gaps that could not be found in the documents, but mostly to provide better insights into the changing boundary judgements and the BSAs that were executed to widen or keep them wide. The people being interviewed were seen as respondents because this research required information on how they perceived the boundary spanning process. At the start of the interviews, the respondents were asked for permission to conduct and record the interview, after which their oral consent was taken and recorded. Each interviewee agreed to the use of their anonymised answers and specific quotations for this research, as well as the confidentiality of their personal information. Interview questions were semi-structured, so the interview could be adapted depending on the success of IDR in the different cases, requiring different questions. Open questions were designed in an interview structure, which can be found in [Appendix I](#). A schematic overview of the interview is shown in Figure 3. The central thread of the interviews and document analysis was to first identify the boundary judgements at the beginning of the project and then to see if these changed as the project progressed. Following that, it was inquired as to why they changed and how this occurred. The goal of the questions about how these changes occurred was to identify any BSAs. When an interviewee was unable to properly answer the question, probing questions about BSAs were asked to clarify the answers.

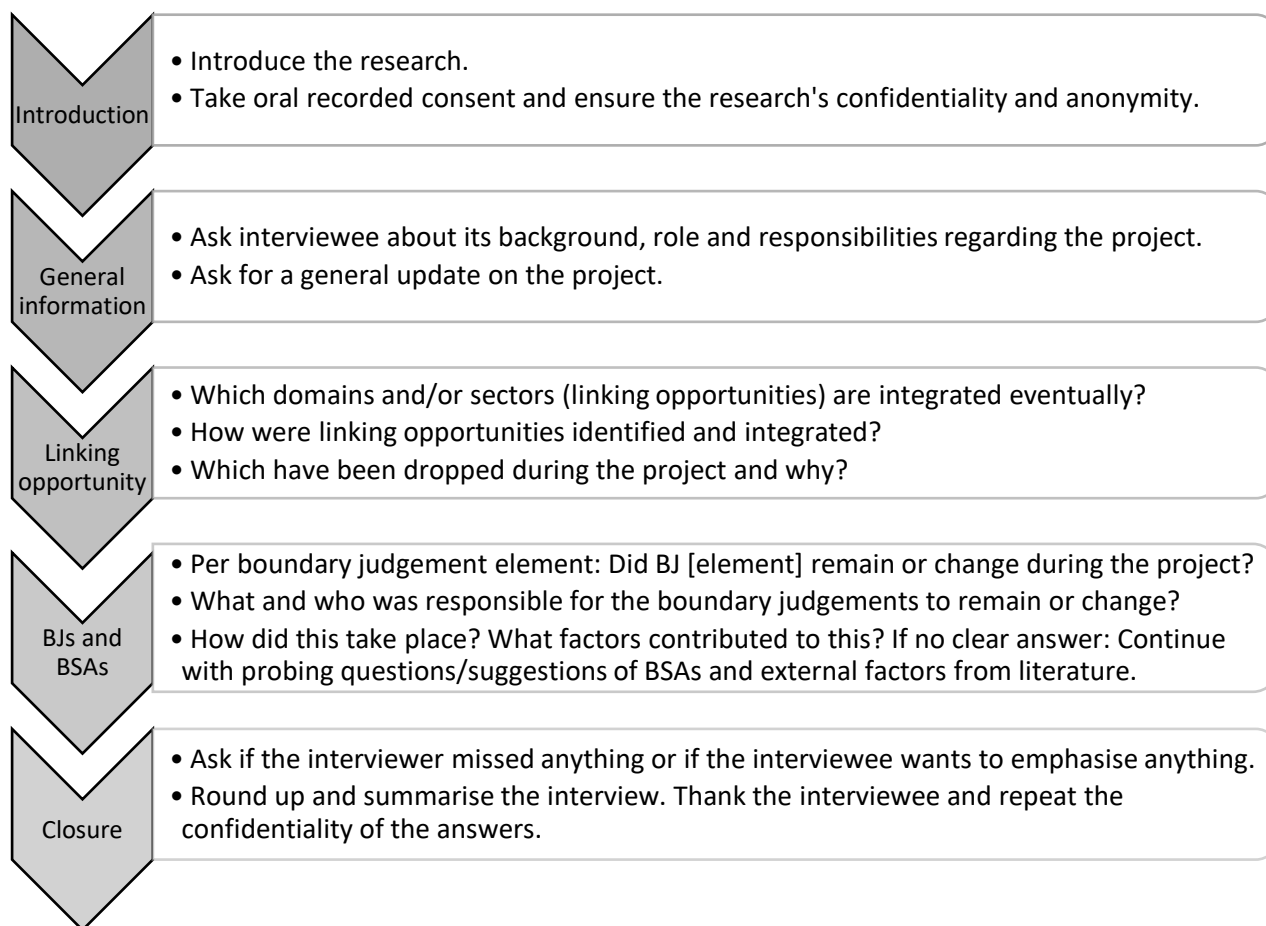


Figure 3 Schematic overview of the interview and questions asked

After each interview, the recordings were re-listened and automatic transcripts were reviewed to create a summary of the respondent's answers per boundary judgement element. These are all created by writing down the changes in boundary judgements, followed by their explanation of why and how

they changed. These summarised interviews are considered as the key data of this study. The summaries were then sent to the interviewees so they could read them and give feedback on their summarised answers. Three respondents gave small corrections, which have been adjusted in the final versions. Not all of the interviewees used the opportunity to check if the summarised answers matched their opinions, or they simply agreed immediately.

Table 4 Overview of data sources. *Legend:* WA = Water Authority, M = Municipality, O = Other, C = Case

Data	Interviews	Documents
<b>Case study 1</b>	<ul style="list-style-type: none"> <li>• Environmental manager RWA [WAC1.1]</li> <li>• Strategic Environmental Manager RWA [WAC1.2]</li> <li>• Policy Advisor Water Management RWA [WAC1.3]</li> <li>• Environmental manager contractor Boskalis [OC1.4]</li> </ul>	<ul style="list-style-type: none"> <li>• Bestuursovereenkomst + aanvulling PAGW planuitwerking Meanderende Maas</li> <li>• Participatieverslag Meanderende Maas</li> <li>• Project MER</li> <li>• Ontwerp-Projectplan-Waterwet-Dijkversterking-Ravenstein-Lith</li> </ul>
<b>Case study 2</b>	<ul style="list-style-type: none"> <li>• Project manager RWA [WAC2.1]</li> <li>• Environmental manager RWA (trajectory 1) [WAC2.2]</li> <li>• Environmental manager RWA (trajectory 2) [WAC2.3]</li> </ul>	<ul style="list-style-type: none"> <li>• Gebiedsdocument Koehool – Lauwersmeer</li> <li>• MER Koehool – Lauwersmeer</li> <li>• H2O WM Voorlanden</li> </ul>
<b>Case study 3</b>	<ul style="list-style-type: none"> <li>• Environmental manager RWA [WAC3.1]</li> <li>• Manager project control RWA [WAC3.2]</li> <li>• Project manager municipality of Tholen [MC3.3]</li> </ul>	<ul style="list-style-type: none"> <li>• Presentatie Dijkversterking Sint-Annaland</li> <li>• Integrale Voorkeursstrategie Zuidwestelijke Delta 2021</li> <li>• Beleidsplan beheer en onderhoud Havens</li> </ul>
<b>Case study 4</b>	<ul style="list-style-type: none"> <li>• Project manager RWA [WAC4.1]</li> <li>• Environmental manager RWA (stakeholders) [WAC4.2]</li> <li>• Environmental manager RWA (local residents) [WAC4.3]</li> <li>• Project and Policy Manager Municipality of Overbetuwe [MC4.4]</li> <li>• Project developer municipality of Nijmegen [MC4.5]</li> </ul>	<ul style="list-style-type: none"> <li>• MER Verkenningfase + MKKs</li> <li>• Lokale maatregelen GVWD</li> <li>• Participatieverslag</li> <li>• Notitie VKA + definitieve MKKs</li> </ul>

### 3.5 Data analysis

The gathered data were used to answer the research questions, with the focus on finding BSAs that fostered the maintaining and/or widening of boundary judgements and thus encouraged integration in dike reinforcement projects. To find out these activities, special attention was given to the interviewees' answers regarding the reasons behind the widening of or already wide boundary judgements. Moreover, attention was given to factors that led to the failed or successful integration of potential linking opportunities.

The data were coded by highlighting different types of BSAs in the interview summaries. If a BSA was discovered that contributed to the widening of a boundary judgement or an already wide boundary judgement, it was coded with a number from Table 1. Widening means in this analysis going from tight to moderate/wide or from moderate to wide. All other activities or factors that contributed to wider boundary judgements were labelled with a number indicating external factors. Conversely, activities

that encouraged tightening or the remaining of a tight boundary judgement were labelled with a number that indicates either an external factor or the opposite of a BSA, depending on the cause. After analysing all the interviews separately, a comparison was made to identify differences and similarities of the BSAs in the four cases. In this comparison, the BSAs mentioned in successful IDR cases are first compared to one another, followed by the unsuccessful IDR cases (see Figure 4). Following that, the successful and unsuccessful cases were compared to one another. By first comparing successful cases, then unsuccessful cases, and then successful and unsuccessful cases, it was possible to identify whether BSAs contribute to IDR, and, if so, which BSAs specifically contribute to IDR. Since the successful IDR cases can also include tight boundary judgements and the unsuccessful cases also include wide boundary judgements, the presentation of the results might sometimes differ from this structure. However, the comparison structure is then still followed, by first comparing wide judgements against each other, then tight judgements and finally to one another.

To make a good comparison and ensure that the results are traceable and valid, all results were combined in an Excel matrix, where each boundary judgement element is split into the 19 BSAs in the rows. In the columns, every interviewee is placed per case, where the matrix shows whether they indicated if a certain BSA led to the widening of a certain boundary judgement (1 or 0). The results were then summed per case and boundary judgement to show the total number of BSAs mentioned for a specific boundary judgement, as well as the total number of BSAs per category. Finally, the total number of BSAs per case was compared between successful and unsuccessful IDR cases to see if BSAs encourage IDR. Furthermore, the numbers were compared across cases and used to identify similarities and differences between cases and the boundary judgements they contributed to. It is included in the results when a specific BSA was held responsible for a wide or widened boundary judgement and was not mentioned at a boundary judgement that remained moderate/tight or tightened. These BSAs outline the most important BSAs that contribute to IDR.



*Figure 4 Schematization of the comparison steps*

Recommendations were made based on the summarised results. This summary includes a list of BSAs per boundary judgement element that contributed to the judgement remaining or becoming wide. This list was first validated internally by determining whether respondents from the same case with the same role mentioned the same BSA contributing to wide boundary judgements, if available. Following that, external validity was assessed by comparing respondents' responses across cases. Furthermore, the results were validated through discussion with the research supervisors, who are RWA employees and experts in similar processes. Following that, it was discussed how these results can be best translated into recommendations for RWAs, which has eventually been done through validating the results with RWA experts.

## 4 Results

The findings from the four case studies are presented in this chapter. First, the boundary judgements for each of the four cases are elaborated on separately. Following that, the outcomes of each case involving BSAs are presented. This is done per BSA category, first by comparing successful IDR cases and wide boundary judgements and then unsuccessful IDR cases with tight boundary judgements. In addition, clear visualisations of the results of both the boundary judgements and the BSAs are provided. The chapter ends with the findings in terms of external factors influencing integration.

### 4.1 Boundary judgements

This subsection presents the boundary judgements, including the changes and noticeable differences per case. Additionally, more detail regarding the integrated sectors is provided.

#### 4.1.1 Case study 1

Remarkably for the first case study are the very wide boundary judgements, which are linked to the area development approach, according to the respondents. As can be seen in Figure 5, almost all boundaries are wide, except for the time horizon, solutions and decision-making. However, towards the end of the project, the judgements regarding solutions and decision-making also became wide. Only time horizon remained moderate during the entire project. The key distinction is that when a dike reinforcement project integrates linking opportunities, the main focus is on the dike. When an area development approach is applied, as in this case, the focus is on the environment of which the dike is a part. This difference in approach proved critical for the project's success because it included multiple sectors such as water management, environment, spatial planning, and culture and recreation. Opportunities in these sectors include river diversion and widening, floodplain excavation and development, decreasing water levels resulting in less dike reinforcement, clay extraction for dike reinforcement, nature development, highlighting cultural sightings, and facilitating recreational opportunities. According to the respondents, the successful integration of these opportunities is related to how the project approached all of the involved sectors equally. Not the dike is the most important, but the environment. This starting-point allowed all of the domains involved to work together. The RWA was not the only initiator, but all parties involved signed a cooperation agreement. The interviews revealed that domain and scale boundaries were deliberately set wide in order to foster an area development approach and stimulate an integral project. Furthermore, respondents stated that the other boundaries were wide from the beginning due to the area development approach. They explained that a project with this many actors involved could only be successful if the approach is correct from the start. As a result, the majority of the boundary judgements were set wide from the start of the project.

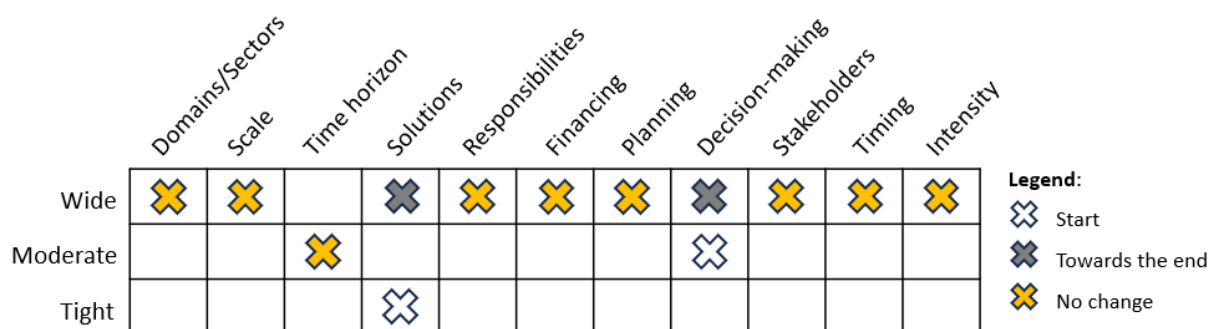


Figure 5 Overview of the boundary judgements of Case Study 1

#### 4.1.2 Case study 2

The second case study distinguishes itself from the first case because multiple boundary judgements became wider during the project (see Figure 6). Most of the judgements started tight at the start of the project and ended up being either moderate or wide. The only boundary judgements that stayed tight were those concerning financing and decision-making. Remarkably are stakeholder boundary judgements: all three became less wide during the project. A characteristic of the case is that it started as a traditional sectoral dike reinforcement project. Yet, as soon as it became clear that the area included multiple linking opportunities, the project took a turn and focussed more on the surrounding area. In this process, the RWA included opportunities from different sectors, such as a cycle route along the dike (infrastructure & recreation), the restoration of bunker Koehool (culture), the realisation of a fish passage and a fish-friendly pump (nature), the reduction of salt intrusion (agriculture) and the creation of more biodiversity (nature). Linking opportunities that were discarded in this process include the realisation of tidal pools, a vegetated hard covering on the dike's sea side and a waterway on the land side. The RWA had a significant impact on this process, both facilitating and impeding. Multiple respondents mentioned that they deliberately tried to widen some of the boundary judgements that were addressed during the interviews. Yet, the RWA was also impeded in the widening process by differing factors, such as unclear ownership and insufficient time. Furthermore, respondents indicated that their RWA's standard approach in dike reinforcement projects includes tight boundary judgements, except for the stakeholder boundaries in this case. Stakeholder demands were widely and intensively identified during the project and resulted in a list of about 400 opportunities. However, this reduced significantly during the project. The only stakeholder opportunity that was eventually included was the restoration of the bunker.

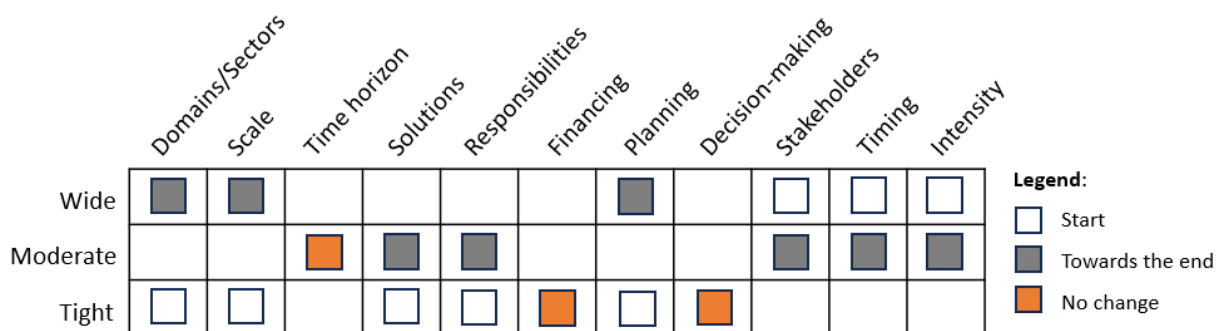


Figure 6 Overview of the boundary judgements of Case Study 2

#### 4.1.3 Case study 3

Remarkably in the third case study is the tightening of almost all boundary judgements during the project. Only the solutions and timing of the stakeholder involvement stayed at the initial level, namely tight and moderate. However, Case Study 3 is the only case where the time horizon judgements widened during the project. These results are shown in Figure 7. Exceptional in this case was that the municipality wanted to take the lead over the entire project at a certain phase, in which the dike reinforcement would be integrated with the development of the harbour area. The RWA would then have become a linking opportunity for the municipality, which is unusual for them. This joint approach included the sectors of housing development, infrastructure, and spatial planning, all of which would be used to develop the harbour platform. Opportunities from these sectors included developing housing on both sides of the dike, rearranging the harbour platform, and constructing a road on top of the dike. During the interviews, it became clear that as the domain and scale judgements were tightened, the other elements changed accordingly. Respondents indicated that changing one element affected the other, so tightening one element resulted in the tightening of more elements. This was primarily due to both parties involved, the RWA and the municipality, experiencing delays at various

points throughout the project. This prevented them from working together, and tasks had to be separated, resulting in an unsuccessful IDR project. Despite this, they made an effort to consider each other's activities and take steps to ensure proper incorporation of the other parties' goals. However, this does not outweigh the synergies that could have been realised if both challenges were implemented together.

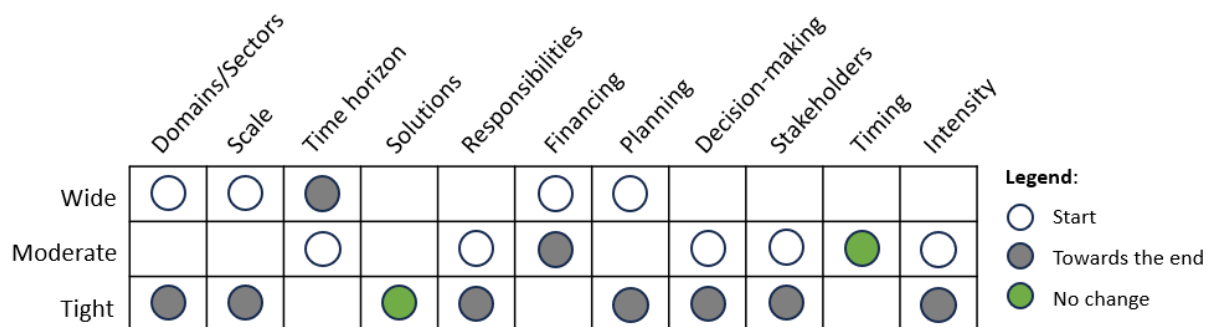


Figure 7 Overview of the boundary judgements of Case Study 3

#### 4.1.4 Case study 4

Lastly, the fourth case study is a prime example of an unsuccessful IDR project that, despite working with other domains to address challenges, largely failed as an integral dike reinforcement. Multiple boundary judgements remained tight throughout the project, as shown in Figure 8. Other boundary judgements that started wide ended up being tight. The RWA deliberately attempted to approach stakeholders widely and intensively, but this diminished during the project, resulting in moderate or tight boundary judgements. What stood out during the interviews was the RWA's traditional approach to incorporating other challenges and jointly addressing them. This included that opportunities from other sectors should have clear ownership, entirely fund their own opportunity and align their planning with the one of the RWA. Their traditional approach primarily prevented other boundary judgements from becoming as wide as the domain, scale, and stakeholder boundaries. During the identification of challenges in the exploration phase, they found numerous opportunities that could be linked to the dike reinforcement. This identification resulted in a list of 30 opportunities, only two of which were ultimately implemented due to several factors discussed later. These challenges include housing development on and in the dike and a road on top of the dike (infrastructure). Additionally, a dike relocation in combination with an area development and redesign of the environment also failed but for other various reasons. As a result, despite the two integrated challenges with dike reinforcement, IDR in this case is considered as unsuccessful due to the numerous opportunities missed.

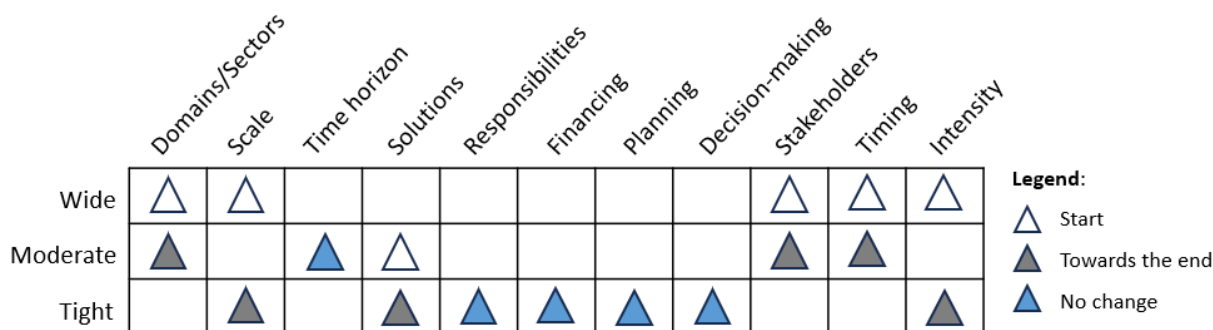


Figure 8 Overview of the boundary judgements of Case Study 4



## 4.2 Boundary spanning activities

This section presents the results of the BSAs that might have contributed to the changing boundary judgements and the role they had in realising IDR. A summary of the results is shown in Table 5, where analysed answers of the respondents have been listed regarding executed BSAs that contributed to wide boundary judgements or prevented boundary judgements from becoming tight. In this table, the BSAs are categorised per BSA category that contributed to the widening of the boundary judgements that is shown in the first column. The rows in Table 5 show the relevant results of the case studies 1 to 4. In these rows, the number indicates how many times a BSA category was mentioned in that case, normalised per interviewee. A more detailed overview of all respondents' answers can be found in [Appendix II](#). Whilst processing the results, it became clear that when a boundary judgements becomes tight or tighter, this does not necessarily mean that there were no BSAs executed at all. Actors may still carry out a BSA with the goal of maximising the integrative potential, but when this effort is insufficient or negative factors obstruct the process, the project ends up with tight boundary judgements and misses out on IDR. This makes it difficult to determine whether a BSA contributed to the prevention of a boundary judgement becoming tighter sooner. Therefore, in combination with the goal of the research to find BSAs that contribute to wide boundary judgements, the few BSAs that led to tight boundary judgements are excluded from the results in Table 5 (therefore, see [Appendix II](#)).

Table 5 Overview of the BSAs conducted at each of the four case studies, categorised per BSA category

Boundary judgement	Case	Boundary judgements	Relation- ships	BSA categories			#BSA per BJ
				Networking	Negotiation	Managing	
Domains/ Sectors	Case 1	Wide	6	4	5	3	18
	Case 2	Tight → Wide	4	1	4	4	13
	Case 4	Moderate → Wide	7	1	5	2	15
Scale	Case 1	Wide	-	-	1	3	4
	Case 2	Tight → Wide	-	-	5	1	6
Time horizon	Case 1	Moderate	-	-	2	1	3
	Case 3	Moderate → Wide	-	-	2	2	4
	Case 4	Moderate	-	-	3	1	4
Solutions	Case 1	Tight → Wide	-	1	1	1	3
	Case 2	Tight → Moderate	-	-	2	3	5
Responsibil ities	Case 1	Wide	6	-	-	2	8
	Case 2	Tight → Moderate	2	1	3	1	7
Financing	Case 1	Wide	2	-	2	-	4
	Case 3	Wide → Moderate	-	-	2	-	2
Planning	Case 1	Wide	1	-	1	6	8
	Case 2	Tight → Wide	3	-	1	1	5
Decision- making	Case 1	Moderate → Wide	2	-	-	2	4
Stake- holders	Case 1	Wide	1	-	1	2	4
	Case 2	Wide → Moderate	3	-	1	4	8
	Case 4	Wide → Moderate	3	-	1	2	6
Timing	Case 1	Wide	2	-	2	2	6
	Case 2	Wide → Moderate	1	-	1	2	4
Intensity	Case 1	Wide	2	-	2	3	7
	Case 2	Wide → Moderate	-	-	3	1	4
<b>#BSAs per BSA category</b>			<b>45</b>	<b>8</b>	<b>50</b>	<b>49</b>	<b>152</b>

### 4.3 The four BSA categories

To provide more details about the results, the sections that follow textually explain which BSA contributed most to a specific boundary judgement, presented per BSA category. Furthermore, it explains how a specific BSA contributed to wide boundary judgements, as well as how its absence hampered this. Other significant results concerning BSAs are also mentioned here. The numbers in square brackets represent the BSA numbers as shown in Table 1. The codes after each interview quotation correspond with the numbers in Table 4. At the end of this section, Table 6 provides a summary of the exact BSAs that contributed to the widening of which boundary judgement element. This shows at a glance where the focus should be regarding BSAs.

#### 4.3.1 Relationships

Activities from the Relationship category have been highlighted by different respondents, mostly when it came to widening the domain and responsibility judgements. From this category, **connecting or linking different people and processes at both sides of the boundary** [1.2] was one of the most important activities mentioned for the wide responsibilities judgements. The respondents emphasised the importance of this activity to establish a shared responsibility of the project, by simply bringing parties together. This was mentioned by at least one respondent in each case. For example in case 1, this has led to the involved parties setting up a cooperation agreement in which every actor's responsibilities are assigned. In case study 2, this BSA was used to make it clear to other parties that they all have a shared challenge in the area, which can be addressed best when working together. According to respondent WAC2.2, connecting them went as follows: *"The steering committee was created by the environment team of the RWA that started working with an area approach and looking for partners with similar goals."* However, despite being mentioned, this BSA did not ensure wide judgements in the unsuccessful IDR cases as much as it did in the successful IDR cases. This BSA was also applied to widen the domain judgements of case 2 since the goal of the RWA was to involve more domains and sectors in the project. Furthermore, respondents mentioned that **building and maintaining strong relationships through cooperation** [1.5] contributed to the widening of the responsibility judgements because actors are willing to work together with parties they have a strong relationship with. This was mostly due to the fact that bringing different parties together led to stronger interrelationships, making every party willing to share the responsibilities and risks. This was emphasised in one of the interviews by saying: *"To avoid integration breaking down and everyone pulling out sectorally, it was decided to rely on the good mutual relations and ties that parties have with each other for the sharing of responsibilities."*[WAC1.3].

The other important activity in this category that ensured widening of the domain judgements, is **building and maintaining strong relationships through cooperation** [1.5]. This activity ensured that the parties who came together also stayed together during the project. Moreover, the already existing effective relationships between actors ensured that different parties were more willing to cooperate and that they joined each other in an early phase of the project. This became evident during the interviews for case 1, where it was mentioned that because of the strong interrelationships between actors in the area, they found each other even before the project started. Because of their strong interrelationships, they came together naturally and were willing to work together since they had positive previous experiences with each other [WAC1.3]. This also ensured that the domain boundary judgements could be wide at the start of the project since this BSA can always be executed, independent of dike reinforcement projects being executed. Moreover, the importance of this BSA is highlighted by all other four cases where at least one respondent mentioned that building and maintaining strong relationships through cooperation ensured wider domain judgements. This BSA was found in case 1 to keep the domain/sector judgements wide, but also in case 4 to prevent them from going tight. Especially case 4 showed that this BSA is crucial for organisations that frequently

cooperate with the RWA, such as the municipality of Nijmegen. Both parties mentioned that because of their strong relationship, which resulted from earlier cooperations, they found each other. This relationship went through the account manager of Nijmegen (boundary spanner) *“Who was actively searching for the link between them and the RWA, leading to interconnectedness.”*[WAC4.3]. This resulted in the integration of the housing development challenge of the municipality with the dike reinforcement task of the RWA.

Only Case Study 4 showed the relevance of **communicating and receiving information** [1.1]. This BSA has contributed to the implementation of housing construction on and near the dike and thus prevents tightening of the sector boundaries. Regarding that these are complex challenges to implement integrally, good and frequent communication ensured that these two challenges could be successfully implemented according to the RWA and Municipality of Nijmegen. A complex cooperation like this requires good communication to ensure well-defined agreements about the cooperation and make clear how both parties can benefit from this. Additionally, receiving all relevant information is important for the other party to assess the risks and benefits before they agree on cooperation.

For case study 2, building and sustaining effective personal relationships also turned out to be important for the planning boundary judgements going from tight to wide. Especially **acting respectful, open and reliable** [1.4] was important because it ensured widening of the planning boundary. Respondents of the RWA mentioned that they wanted to be a reliable partner towards actors from other domains and they needed to be open about their planning towards them. Doing so ensured openness about their activities and so, the RWA could create a shared planning with the main actors involved from other domains. In case 3, where the planning judgements went from wide to tight, none of these BSAs were found.

Lastly, **connecting or linking different people and processes at both sides of the boundary** [1.2] was mentioned as important for wide stakeholder judgements at the start of the projects, determining what stakeholder parties were involved. Particularly cases 2 and 4, where a wide range of (non-) professional stakeholders have been tried to link to the dike reinforcement, showed that this BSA was important. This result was expected because it connects other stakeholders to the project. It was mentioned by more than half of the respondents as being important to widen stakeholder engagement. The connecting and linking can be arranged in many different ways. In case study 2, for example, the RWA organised cycling tours around the dike to ensure a low-threshold for residents to get involved in the project. During these tours, stakeholders were able to share their concerns, wishes and possible linking opportunities the area offers. In an earlier phase, this identification of stakeholder demands happened through MS Teams because of the Covid-19 situation, *“in which was actively asked for input on what challenges could be linked to the dike.”*[WAC2.2]. In case study 4 the identification of challenges in the area was organised by visiting stakeholders at their houses and actively asking them what they think could be linked with the dike reinforcement. By applying this BSA, the dike reinforcement process on one side of the boundary could be linked to different stakeholders at the other side of the boundary, in both cases. However, interestingly both cases ended up with moderate stakeholder judgements towards the end. Moreover, this BSA was not found in case 1, which kept wide stakeholder judgements towards the end.

Case study 3 offers good examples of the opposite execution of BSAs, leading to tighter boundary judgements, for example for the planning boundary judgements. Respondents of the RWA mentioned that they deliberately not integrated their planning with the planning of the municipality because: *“Bad feeling about the municipality given previous collaborations and turning out to be an unreliable partner. To avoid risks from the start, the choice was made to keep planning separate.”*[WAC3.2]. The municipality built, gained and sustained too little trust between them and the RWA for the RWA to

trust them and combine their plans. This is exactly the opposite of BSA [1.6] which could lead to wider planning judgements. In these earlier cooperations, the municipality acted closed and unreliable, which are the exact opposites of BSA [1.4] that led to wide boundary judgements in case 2. In case study 4 it was mentioned that acting closed and unapproachable towards other parties caused the tight financing judgements. This is because the RWA is open to linking opportunities but only if other parties bring the needed funding. Therefore, this opposite BSA ensured that these boundaries stayed tight during the project. If they acted more open and approachable regarding financing, they could investigate the possibilities with other parties and see if there are opportunities to co-fund their shared challenges.

#### 4.3.2 Networking

Networking is seen as highly important in boundary spanning, which was confirmed during the interviews by actors who identified themselves as boundary spanners or knew people in their organisation who do. Networking activities can contribute to identifying joint challenges within the networks of usual suspects, where organisations regularly meet with each other. These meetings can either be scheduled or spontaneous when actors meet by chance for other activities. In both situations, parties share what is happening in their organisation and take the information back to their home organisations, according to respondents. Interesting opportunities are tried to capitalise upon.

Networking activities were widely executed by the RWA of case study 1. The responsible RWA works with environment managers who act as department heads of a certain district in their RWA area. In their project, they had frequent meetings with a district called the Diked Meuse, in which all municipalities alongside the Meuse River are included. This is identified as performing BSA **Being active at a strategic level, representing different agencies and organisations who are referred to as 'the usual suspects' because of their appearance on many different partnerships** [2.2]. During these meetings, each party could share the recent developments in their area, upon which it was then discussed if these could be addressed jointly. This is seen as the performance of BSA **'Being in the loop' for information of all sorts, such as identifying emerging resource opportunities** [2.1]. Both activities were mentioned in three of the four interviews of case 1. The respondents highlighted the importance of this BSA by stating the following: *"The area manager is the department head of the district and looks at what is going on in the area and is always looking for where they can join forces?"* [WAC1.2] and *"An important factor was that the RWA board is active in networks and therefore a known partner for other governments."* [WAC1.3]. This might suggest why the domain and sector boundaries were already at a wide level at the beginning of the project since these activities already took place before the project was initiated. In every other case study, the networking BSAs are mentioned as being important for widening the domain and sector boundary judgements. For example in case study 3, a respondent mentioned something similar to the respondents from case study 1, that Zeeland governments, province and RWA are in touch about developments in the area and have accordingly come together to tackle the challenges jointly. However, this BSA had less impact on the unsuccessful IDR cases because these domain/sector judgements became tighter whereas the successful IDR cases ended up wide.

Apart from widening the domain and sector judgements, networking was seldom mentioned for the widening of other boundary judgement elements. This was expected since the main goal of networking is linking with other domains, which leads to wider sector/domain judgements. However, the only contractor interviewed for case study 1 mentioned that **'Being in the loop' for information of all sorts, such as identifying emerging resource opportunities** [2.1], contributed to the widening of the solution boundary judgements. The respondent mentioned that *"Early involvement in the process and activities in various networks led to progressive insights that caused identifying the emerging resource*

*opportunities*”[OC1.4]. He highlighted that they would not have been able to implement the current solutions if they were not active in the network of the RWA and other involved parties. This BSA could only be mentioned once by the only contractor interviewed but is regarded as an interesting result because of its impact on IDR in that case.

#### 4.3.3 Negotiation

The BSAs in the negotiation category are widely applied, and distributed across a variety of boundary judgement elements across all four case studies. Activities from this category were mentioned most when it concerned convincing other actors in the process. In order to get certain projects started, some influencing is needed to persuade the other actor. Actors who needed to be convinced eventually were persuaded after the benefits and advantages of a joint approach were explained to them.

To start, the BSA **persuade and convince other people and organisations by acting diplomatic, constructive and non-judgemental, sometimes on a political level** [3.1] was mentioned to be important for the widening of the domain/sector judgements in case study 2. Two out of three respondents mentioned an actor in the RWA carrying out this particular activity. More specifically, a program manager of the RWA convinced the board that they should apply an environmental approach in their dike reinforcement task, according to respondent [WAC2.3], leading to wider judgements and thus other domains and/or sectors being involved. This BSA was not found at unsuccessful IDR case 4, which could have contributed to their domain/scale judgements remaining wide.

In line with this, BSA 3.1 is frequently applied to widen the financial boundaries, or at least to attempt to do so by convincing the NFPP that their project requires more or more flexible financing. Especially in cases 2, 3 and 4 where linked parties primarily needed to bring their own financing, respondents mentioned that they tried to convince the NFPP of co-financing for linking opportunities. Despite, them being aware of the austere and efficient approach the NFPP applies. Nonetheless, this has been tried by RWAs convincing the NFPP that a linking opportunity adds value to the dike (acting constructive) or that combining them results in other (financial) benefits for the NFPP and involved parties. Important for this activity, according to respondents, is persuasion, transparency and making steps traceable, in order to convince the NFPP and widen the financial boundaries. This is emphasised by an interviewee mentioning: *“There is something to be gained and there is room for manoeuvre at the NFPP, provided you can convince them with good arguments”* [WAC2.2].

Case study 2 showed the importance of this BSA category to widen their scale boundary judgements. Two respondents mentioned having carried out BSA **compromise and make careful judgements about the balance between benefits and disbenefits for themselves and other organisations** [3.2] to do so. During the exploration phase, it became clear that *“Dike reinforcement cannot be separated from the area process...”* [WAC2.3], and an area approach was necessary to implement the dike reinforcement. In other words, without the environment it was simply not feasible, *“...so a wide scale is applied to the whole area.”*[WAC2.3]. In this process, they made careful judgements about the impact of the dike reinforcement on others and saw significant disbenefits. Therefore, they made compromises by including the environment in the dike reinforcement to create benefits for other parties, which widened the scale of the project. For example, meet farmers whose land needs to be expropriated (disbenefit) with measures against salinisation (benefit). Eventually, this benefited the RWA because it created more local support and made the project more permissible. This was not found in case 1, probably because there were already wide scale judgements with an area development approach, and therefore not needed. Interestingly, this was also not found in case 4 which scale judgements ended up being tight but should have been wide to implement the desired area development approach. Therefore, executing BSA 3.2 might have facilitated this.

Additionally, BSA 3.2 was mentioned by various respondents to enlarge the boundary judgements of solutions and time horizon of the project. In all cases, the careful judgements regarded the height and solutions of the dike impacting the residents living nearby. At specific locations, modifications have been made to the height or standard solution (compromises), so it would have less impact on the residents but at the same time create more local support. Examples mentioned were less height raise to prevent view pollution (in combination with eased future expandability) and sheet piling (requires less space) to prevent land expropriations. In cases 2 and 4 this activity also contributed to a widening of the stakeholder intensity boundary judgements because some design adjustments for the benefit of stakeholders required intensive involvement.

In line with the previous activity is BSA **understanding interdependencies between problems, solutions and organisations** [3.3], which was also mentioned to have been carried out by two respondents of case study 2 to widen the scale judgements. Understanding the interdependencies is an important activity needed before BSA 3.2 could be executed, in order to see how the dike reinforcement from their RWA relates to other actors and causes problems. For example, the problems farmers face with the salination of their fields and the ground that the RWA needs for their dike reinforcement (problem), which can be solved by implementing anti-salination screens into the dike (solution). By understanding these interdependencies, the scale boundary judgements of the project were significantly widened. Neither of these BSAs were found in cases 3 and 4, where the scale judgements shifted from wide to tight. Additionally, the stakeholder intensity boundary judgements can also be widened by this BSA [3.3], in the situation when a dike design interferes with local residents' properties. By understanding the interdependencies between their problems, the dike reinforcement and the actors involved, solutions can be forced through intensive stakeholder engagement. As mentioned by a respondent: *"Trying to understand and link stakeholders' demands to challenges from e.g. the RWA or province for an increased feasibility of the opportunity and generate more local support."* [WAC2.1].

Next, BSA **broker solutions or deals between different parties** [3.5] was mentioned by three respondents of case study 4 as an activity to prevent the domain/sector judgements going from wide to tight and thus keep other domains involved. The RWA had to broker a deal with the municipality that wanted to implement housing construction because this linking opportunity caused a lot of effort regarding costs, design and implementation. However, the RWA was not able to perform this activity themselves, so they hired a third party who brokered a deal between them and the municipality. This was eventually possible by making clear and solid agreements between both parties. The respondents mentioned that without carrying out this activity the mutual challenge would not have been addressed jointly, leading to tight domain judgements. Given that case study 3 encountered largely the same problems with housing development of the local municipality, it is interesting to see that this BSA was not mentioned. Executing this BSA in the same way as in case 4 might have prevented their domain/scale judgements going from wide to tight. This BSA, however, was not mentioned in the successful IDR cases 1 and 2, most likely because deals did not need to be brokered but came together naturally.

Lastly, BSA **identify and capture arising opportunities** [3.6] was mentioned by half of the respondents of case study 1, as being important for the wide domain judgements. During their interviews, they mentioned the importance of identifying an arising opportunity and then capturing it as well. This mostly happened in continuation of the networking BSAs, where the possibility was offered to identify the opportunities. Applying managing through influencing and negotiation eventually helped them to take away possible doubts and uncertainties from the other party, so they could eventually capture the linking opportunity. Interestingly, these were not mentioned in case 2, but also not in cases 3 and

4. Therefore, this BSA might be linked to the wide domain/sector judgements from the beginning of the project and need to be executed in an early stage.

In case study 3, activity 3.1 was executed by the RWA to convince the NFPP to bring their project forward in priority and planning to combine it with other domains, but they still failed to do so. In case study 4, respondents mentioned that BSA 3.1 could have been useful to convince the NFPP of the urgency and benefits of the linking opportunities in combination with their dike reinforcement project. However, this BSA could not be executed because there was too little time available, resulting in the linking opportunity being wasted. The owner of the linking opportunity still tried to convince the NFPP by doing presentations but to no avail. This actor mentioned the failure was also due to the rigid and inflexible attitude of the NFPP during the negotiations, which is exactly the opposite of BSA 3.4.

Finally, several respondents from cases 3 and 4, the unsuccessful IDR cases, both mentioned a lack of managing through influencing and negotiation when board members need to decide on a linking opportunity or area development project. Something that has been heard a lot is that members of governing bodies, such as board members, are not daring or able to broker a deal to foster the integration. For example, *“Almost none of them [board members] are daring to tie the knot or stand up to make it happen.”* [WAC4.3]. *“They fail to actually realise what they claim to support”* [MC4.4], often to the frustration of the executive organisation [WAC4.1]. These respondents confirmed this as being the opposite of BSAs 3.1 and 3.5. Interestingly, respondents of cases 1 and 2 mentioned that their board members did exactly the opposite, thus tying the knot and making deals and decisions. According to the respondents of these cases, this was a crucial BSA that made the difference between successful and unsuccessful IDR in their cases.

#### 4.3.4 Managing

Managing complexity and interdependencies is effecting multiple boundary judgements in multiple cases. This category was mentioned as being particularly significant for the direct integration of linking opportunities, considering the nature of the activities included in it. These mostly handle the complexity of the integral dike reinforcement projects, which become more complex when more sectors and/or domains and their challenges are involved. Also, they deal with how actors who are involved in the project can be managed and involved in the best way possible

To start, BSA **lateral, analytical and strategic thinking, taking a holistic view and understanding the bigger picture** [4.1] was mentioned by six respondents as being an important activity to widen the domain boundary judgments. One respondent of case 1 mentioned that the head of their RWA executed this activity himself by addressing the project area as a whole, seeing the connections and benefits that could be capitalised on, leading to an area development project. Because this person saw the bigger picture and took a holistic view of the present challenges in the area, the environment has been put centrally instead of the dike. Moreover, 3 out of 3 respondents of case 2 mentioned it as being important in their case. Similar answers were given, but in case 2, the board of the RWA insisted on creating added value for the environment and addressing environmental challenges holistically. One of the respondents addressed the problem statement of this research perfectly by explaining why they executed BSA 4.1 in the following way: *“Start making a plan together where you are going to allocate the same square metres for different functions instead of each individual having their own square metres. We cannot avoid that anymore. You have to think about various functions that you are going to allocate to the same square metre.”* [WAC2.2].

In case 4, the board of the RWA applied the same BSA and encouraged their employees to actively search for linking opportunities and capture them. Their approach is stated by one of the respondents as follows: *“Here we are planning something [dike reinforcement]. We don't know exactly how yet, but*

*if you have a good idea or there is a challenge or task near us, let us know. Then we can see if we can link that together.*" [WAC4.1]. However, this became the main goal of their project, which caused them to identify a list of 30 opportunities without clarity about planning, scale financing ownership or permissibility. The respondents mentioned their RWA overdid this BSA in their project, which caused a tightening of the domain and stakeholder boundary judgements because only one of the identified opportunities was implemented in the end.

The same BSA [4.1] was mentioned by all but one of the respondents in case study 1, causing the wide scale boundary judgements. This was inherent to the implemented area development, which was due to the lateral and analytical thinking of the RWA head. One of the respondents mentioned why it was so important for their project to start with wide scale judgements instead of widening them during the project. In his answer, he emphasised taking the holistic view and analytical thinking and stated the following: *"A conscious decision was made to start widely from an area-based approach because it is easier to narrow down to become more specific from a big picture than to start small and keep getting more and more organisations involved. Jumping on a moving train is more difficult than getting on at the start."* [WAC1.3]. This is perfectly in line with the aim of this research, namely to find specific actions (BSAs) that lead to increased integration (IDR). Additionally, another respondent from case 1 emphasised their focus on the bigger picture and thus their wide scale by saying: *"Our RWA head is always focussing on how can we include other challenges because he understands we are not alone in the world and there is meaningful win-win to be created"*. Therefore, BSA 4.1 contributed to the wide scale judgements and the successful IDR of the project.

Interestingly, in case 3, BSA 4.1 was mentioned as responsible action for the widening of the time horizon boundaries by two of the respondents. Case 3 is the only case where the time horizon judgements did not remain moderate, but actually became wide. Strategic thinking and understanding the bigger picture helped them to realise it was not smart to apply the standard design life span, regarding the implementation of housing flats near the dike. Reinforcing the dike to double the required height is now easier and cheaper than when this is done 50 years from now when the housing is already implemented. This way of thinking and understanding also ensured that the NFPP financed this more durable but also more expensive solution. The desire for a more durable design with a longer design life was frequently heard across the other three cases, but none of them succeeded in this. Case 3 appears to have found a solution contributing to this by conducting BSA 4.1.

Another interesting result is found for the widening of the solution judgements where BSA 4.1 once again was held responsible. All of the respondents of case 2 mentioned this activity but it was also found in case 1. In case 2, the responsible RWA insisted on a future-proof and biodiverse design for the dike, which integrates with the environment and is easy to expand [WAC2.3]. Respondents mentioned that this was mainly due to their RWA thinking analytically and strategically because this design would help increase the feasibility and licensability of the project. Therefore, the design accommodates the demands of the involved parties, making this a good example of managing complexity and interdependencies between actors. Not surprisingly, this BSA was not mentioned by RWA respondents in cases 3 and 4. Doing so might have led to wider solution judgements, resulting in finding a solution that combined the dike reinforcement with the challenges from the other actors.

Furthermore, both BSAs **frame challenges across disciplines and align mutual goals and interests** [4.4] as well as **coordinating, planning and organising cross-boundary tasks** [4.5] were mentioned 5 times for the wide planning boundary judgements in case 1. Respondent OC1.4 mentioned that creating an integral project planning where cross-boundary tasks are coordinated assured that a complex project like case 1 could be implemented, which is exactly what BSA 4.5 entails. He emphasises that it is important to understand each other's interests [4.4] and that it is a highly intense process, but needed



to handle the complexity. Respondent WAC1.3 emphasised this by stating: *“It is important to organise and coordinate planning at the beginning to avoid delays later on.”* [WAC1.3]. This explains why the planning boundary judgements were wide at the beginning and were not widened. In the other cases, all having tight planning judgements, almost none of these BSAs were identified.

In case studies 1 and 4, respondents mentioned the importance of BSA **translating (and transforming) information to the other side of the boundary** [4.3] as activities they executed to widen the stakeholder and intensity boundary judgements. The respondents mentioned how important it was to translate the information and speak the language of the environment, by which they meant translating the technical aspects of the projects into layman's language so every possible stakeholder could become involved. This translation took place during various types of stakeholder involvement methods, such as newsletters, kitchen table talks, workshops, dike tables and information evenings. However, executing this BSA was not enough for Case 4 to prevent their stakeholder intensity judgements from becoming tight. Widening the stakeholder and timing boundary judgements was in case 2 mostly linked to the execution of BSA 4.1. Respondents mentioned that an early as possible and thorough identification of the stakeholders in the surrounding area was only possible because they had a holistic view and were thinking strategically about who and when they needed to involve the stakeholders to foster the integration success of their project [WAC2.1 & WAC2.2].

Opposite from respondents mentioning managing complexity and interdependencies as being important for integration are respondents who mentioned that a lack of this resulted in tighter boundary judgements and unsuccessful IDR. Interestingly, the lack of execution of the activities from this category was mentioned most of all activities for ensuring tight boundary judgements. Mainly lacking of execution of BSA 4.1 was mentioned many times in cases 3 and 4. All three respondents from case study 3 mentioned that this lack of taking a holistic view and understanding the bigger picture was one of the reasons their project failed on integration because their RWA could not see the benefits an integrative approach could bring about. However, one of the respondents warned of a pitfall of applying this activity too much, by mentioning: *“Some projects only become more and more complex by taking a holistic view and widen the approach and then it becomes real challenging to get it all done. Just adding complexity by making it so broad and then it is really challenging to get it all done. Where you can link opportunities definitely do it, but don't make it any crazier than necessary.”* [WAC3.2]. According to respondents from cases 2 and 4, earlier execution of this BSA could have ensured that their projects applied an area development approach instead of integrating linking opportunities, just as in case study 1, which would have facilitated IDR even more.

Additionally, respondents of case study 4 mentioned that they deliberately did not widen the scale of their project to prevent the RWA from becoming the owner of a linking opportunity. One mentioned: *“The starting point was not to increase the scale of the project for linking opportunities, because if you do this you might become its owner. You need to make the boundaries clear to other actors”* [WAC4.2]. Therefore, they consciously set the boundaries tight and then checked whether a linking opportunity fits within the dike reinforcement challenge. This sectoral view is the opposite of taking a holistic view and seeing the benefits a joint approach can bring about [4.1]. Also, this can be seen as the opposite of aligning mutual goals and interests [4.4], which was also mentioned by the respondents as a lacking activity. Exactly the opposite was identified in cases 1 and 2, in which IDR was successful. Respondents from case studies 3 and 4 mentioned that having different interests in the project between parties makes a joint approach run into difficulties or that the integration of an opportunity fails completely. They claim that other organisations might be more focused on making a profit or finishing the project sooner or later than the RWA.

Element	No.	BSA
<b>Domains/ Sectors</b>	1.1	Communicating and receiving information in a two-way process, where listening is considered as important as information giving;
	1.2	Connecting or linking different people and processes at both sides of the boundary;
	1.5	Build and maintain strong relationships through cooperation;
	2.1	'Being in the loop' for information of all sorts, such as identifying emerging resource opportunities;
	2.2	Being active at a strategic level, representing different agencies and organisations who are referred to as 'the usual suspects' because of their appearance on many different partnerships.
	3.1	Persuade and convince other people and organisations by acting diplomatic, constructive and non-judgemental, sometimes on a political level;
	3.5	Broker solutions or deals between different parties;
	3.6	Identify and capture arising opportunities.
	4.1	Lateral, analytical and strategic thinking. Taking a holistic view and understanding the bigger picture;
<b>Scale</b>	3.2	Compromise and make careful judgements about the balance between benefits and disbenefits for themselves and other organisations;
	3.3	Understand interdependencies between problems, solutions and organisations;
	4.1	Lateral, analytical and strategic thinking. Taking a holistic view and understanding the bigger picture;
<b>Time horizon</b>	3.2	Compromise and make careful judgements about the balance between benefits and disbenefits for themselves and other organisations;
	4.1	Lateral, analytical and strategic thinking. Taking a holistic view and understanding the bigger picture;
<b>Solutions</b>	2.1	'Being in the loop' for information of all sorts, such as identifying emerging resource opportunities;
	4.1	Lateral, analytical and strategic thinking. Taking a holistic view and understanding the bigger picture;
<b>Responsibilities</b>	1.2	Connecting or linking different people and processes at both sides of the boundary;
	1.5	Build and maintain strong relationships through cooperation;
<b>Financing</b>	3.1	Persuade and convince other people and organisations by acting diplomatic, constructive and non-judgemental, sometimes on a political level;
<b>Planning</b>	1.4	Acting respectful, honest, open, tolerant, approachable, reliable and sensitive;
	4.4	Frame challenges across disciplines and align mutual goals and interests;
	4.5	Coordinating, planning and organising cross-boundary tasks.
<b>Decision-making</b>	1.2	Connecting or linking different people and processes at both sides of the boundary;
<b>Stakeholders</b>	1.2	Connecting or linking different people and processes at both sides of the boundary;
	4.1	Lateral, analytical and strategic thinking. Taking a holistic view and understanding the bigger picture;
	4.3	Translating (and transforming) information to the other side of the boundary;
<b>Timing</b>	1.3	Understanding, empathising and resolving conflicts;
	4.1	Lateral, analytical and strategic thinking. Taking a holistic view and understanding the bigger picture;
<b>Intensity</b>	3.3	Understand interdependencies between problems, solutions and organisations;
	4.3	Translating (and transforming) information to the other side of the boundary;

Table 6 Summary of the BSAs conducted for widening the boundary judgements

#### 4.3.5 *Relative importance of BSAs in relation to boundary judgements*

Having elaborated on the general results, a more detailed analysis can be made of the most important BSA categories contributing to IDR. The first category, 'Relationships', was mentioned to be important at various boundary judgements, and in particular, focused on responsibilities. Activities from this category were mentioned 45 times, most of them in successful IDR cases 1 and 2, but also in case 4 to prevent the domain/scale boundaries from becoming tight. This category was mentioned in cases 1 and 2 for causing similar wide boundary judgements, and can therefore be seen as versatile and important for a wide range of boundary judgements. Both 'Networking' activities were mentioned to be important for the widening of the domain/sector boundaries in the successful IDR cases. However, apart from this element, BSA category 2 was hardly mentioned (8 times), thus being a less dominant BSA category for IDR. Although, the absence of this BSA category was mentioned as a reason for not widening or tightening the boundary judgements in the unsuccessful IDR cases. It appears to be a somewhat more context-level BSA that one can perform continuously alongside projects. On the contrary, BSA category 'Negotiation' was mentioned frequently considering the widening of the domain/sector and scale boundaries. Almost all BSAs from this category contributed to this and are mentioned 50 times in total. Additionally, this category was held solely responsible for the widening of the financial boundary judgements. It has a dominant function in convincing actors to a joint approach of the shared challenges, leading to IDR, and was predominantly found in successful IDR cases. Respondents from unsuccessful IDR cases mentioned 7 times that a lack of these BSAs was responsible for the tight boundary judgements in their case. Lastly, 'Managing complexity and interdependencies' is considered the most dominant BSA category since it is held responsible for widening almost every boundary judgement. Activities from this category are mentioned 49 times, almost equal to 'Negotiation'. Additionally, the absence of BSAs from this category was mentioned 12 times for being responsible for the tight boundary judgements in the unsuccessful IDR cases. Since this category mainly involves activities that manage large interrelated systems and finds ways to jointly approach challenges, it can be considered as the most dominant category contributing to IDR.

#### 4.4 *External factors and other activities*

In this section, the results are addressed that are external factors or non-BSA activities impeding or fostering integration. For example, this can be factors from the environment which respondents mentioned as contributing to integration or factors from other actors that hampered integration. Also, activities that were executed which are not BSAs are addressed in this section if they influenced the boundary judgements and thus integration. First, factors and activities that impede integration are addressed, and then factors and activities are mentioned that fostered integration.

##### 4.4.1 *Impeding integration*

The first external factor mentioned by the respondents are the characteristics of the environment in which the project is located. Respondents from cases 1 and 3 mentioned that their project environment was relatively secluded and quiet and lacked a plethora of linking opportunities. However, Case Study 1 linked almost all of them, whereas Case Study 3 failed to link the few present opportunities. These environmental characteristics were also used as an argument as to why the stakeholders were not involved intensively in case 3 because the design allegedly had little impact on the environment. By contrast, respondents from cases 1 and 2 mentioned that this factor could also foster integration since it makes the environment less complex and easier to implement solutions.

Another identified factor is the lack of internal flexibility about program scheduling, meaning switching projects in planning over time. Moving a project forward or backward in an RWA's planning is mentioned as being important to link it with arising opportunities. If an interesting opportunity occurs which can be integrated into the dike reinforcement leading to significant benefits, respondents from

cases 3 and 4 mentioned that it should be possible to change the internal planning. One mentioned: *"By being more flexible internally about programme programming, you have the opportunity to pick up these kinds of major challenges together."* [WAC4.1]. Possible integral cases should be moved forward to capture the arising opportunity and less urgent projects should then be moved backwards.

A frequently mentioned factor in case 3 is the RWA and involved organisations having different agendas combined with the rigidity of the NFPP. This problem arises when actors outside the water management domain with a challenge want to cooperate with the dike reinforcement, but the dike reinforcement has too little priority at the moment. Respondents from organisations other than RWAs mentioned this problem and added that the NFPP focuses too much on water safety and too less on integration opportunities. To emphasise this problem, every respondent from a non-RWA organisation mentioned the rigidity of the NFPP. One emphasised this by stating: *"Nothing could be achieved with RWS because of their rigid attitude. They are too inflexible to get anything done with an organisation like that."* [MC4.4]. This results in that a joint approach does not take place soon and the rigidity causes that there is no room to pull this forward on the agenda. Therefore, linking opportunities are missed out on and challenges are addressed separately.

Furthermore, announcing a dike reinforcement project too late makes it harder to approach integrally, according to respondents from case study 4. They mentioned that if they knew sooner about the project, they had more time to investigate the linking opportunities with the room for the river program and stress the importance. This is allegedly caused by the deadlines the NFPP imposes on the RWAs. When the NFPP provides funding to an RWA, the dike reinforcement project needs to take place within a certain period, which was emphasised by a respondent as follows: *"The problem is that you are stuck with subsidy rules from the NFPP, so it has to be implemented within a certain period of time. Thereby, as RWA, you incur a lot of costs if you pause the project."* [WAC4.3]. It turned out in cases 3 and 4 that this period can be too small, which makes it hard for owners of linking opportunities to keep up with the project. They cannot arrange their planning and financing in this short period, mostly because their small organisations have few resources. Therefore, this is a major reason for other domains to drop off. The same occurred in case study 2, where the project team had to finish their preferred alternative under high time pressure. According to a respondent: *"Other parties failed to get on board in the exploration phase because they do not have the resources to make it happen in time and the RWA sticks too much to their schedule that other parties cannot keep up."* [WAC2.2]. This was at the expense of integration in their design.

In line with the previous factor is another factor linked to the rules of the NFPP. Their motto reads as follows: In principle, an austere and efficient approach is applied in all NFPP projects (HWBP, 2021). This gives projects little financial room to implement the dike reinforcement combined with other challenges in the area. The motto is not considered as the problem since actors are aware of this and respect the budget the NFPP receives from the national government. However, there is some room to manoeuvre with these funds. As mentioned before, it is considered important to be persuasive and convince the NFPP of the added value a joint approach can bring about. The results show that boundary spanners who are aware of this financial room to manoeuvre can receive higher funding, as respondents from cases 1 and 2 indicated. For example, *"Try to persuade the NFPP by explicitly stating what has been done, what agreements have been reached, and what plans are in place. Make the steps traceable so that additional funding can be arranged at the NFPP."* [WAC2.2].

Another recurring phenomenon observed in numerous cases is that working with another government body usually goes better than working with a private party. According to the findings, joint challenges with other governing bodies are mostly implemented after identification, whereas joint opportunities with private sector parties are significantly less frequently integrated. Factors from private sector

parties that contribute to this include having different goals and interests, varying planning and time availability, include often more complex projects, and are found less reliable than government bodies.

Moreover, in cases 2 and 4 respondents mentioned multiple times the effort they put into identifying stakeholders, eventually going wasted for most of the time. The goal of the board of their RWA was to identify as many opportunities in the environment as possible, which led to a longlist of linking opportunities for both projects. However, in the end (almost) none of these ideas were integrated. In case study 2 this was due to employees of the RWA who did not keep track of the ownership of each idea. Afterwards, they put a lot of effort into tracing them back. Similar findings resulted from case 4, where linking opportunities are assessed on their ownership, funding and planning. If one of these three criteria does not align with the dike reinforcement project, it will most likely drop out. However, it is very common for linking opportunities proposed by local residents (non-professional stakeholders) that they lack funding or clear ownership. As a result, almost all linking opportunities addressed by local residents are not implemented. This resulted from almost all case studies that were analysed. Little influence can be exerted on the design of the dike, but actually implementing opportunities or addressing challenges the non-professional stakeholders mention are seldom integrated. This made respondents of case 4 wonder why they put so much effort into identifying stakeholder ideas, without having a clear project goal. However, it must be mentioned that not all stakeholders understand the limitations of what they can suggest or not (not contributing to the efficient use of space or no linkage with the dike reinforcement).

The remaining external factors that are mentioned frequently as the cause of failed integration are mostly linked to rising costs or delayed schedules. These factors include the coronavirus crisis, the war in Ukraine, the economic crisis, inflation, higher material prices, delayed building permits and the nitrogen crisis. These impeding factors might heavily impact a project and therefore IDR, despite the BSAs that are performed.

#### 4.4.2 *Fostering integration*

An action that was taken in case study 2 was an interesting one because it contradicts with the BSAs and theory as suggested in this research. In their situation, the project deliberately chose for a separate planning, financing scheme, responsibilities and decision-making. Respondents mentioned that for the present linking opportunities a separation of these elements works better in their opinion. In this process, they made sure to clarify the framework conditions very well to the involved parties. This approach ensured that everybody knew what was expected from them and what they needed to do to stay involved in the project. In their case, it worked out and the domains involved stayed involved. However, note that these integrated sectors are mainly governing bodies. The opportunities themselves are linked to the dike but mostly do not physically overlap, making it easier to implement separately.

Another contradictory activity was found in case study 1, where they deliberately excluded challenges from certain domains to prevent the project from becoming too complex. Respondents mentioned that *“If more sectors joined, the project would become too complex to handle and eventually fail on integration.”* [WAC1.3]. Therefore, they put a certain boundary on the challenges they wanted to involve to make sure that what they had in mind could be implemented. Similar to this, is that they deliberately involved stakeholders in a later stage when there was already a broad plan or design present about the aim of the area. One answer reads: *“Don't start too intensively in the early stages. First talk to the professional stakeholders, with whom you make a preliminary design, and then see how to involve the environment.”* [WAC1.3]. On the contrary, respondents mentioned that involving stakeholders earlier might make it too complex because they could come up with suggestions not relevant to the dike. For example: *“I think we did that at a too early stage where you don't have things*

*very concrete yet, so a lot of great ideas can be mentioned which are not feasible.*" [WAC4.1]. This result is strengthened in case study 4 where the RWA exactly did the opposite and involved stakeholders too early, leading to a longlist of suggestions not related to the dike, making integration too complex.

An interesting activity took place in case study 2, where the planning was paused by the board of the RWA because in their opinion the preliminary design was not integral enough. Pausing the project was mainly due to their strategic and holistic thinking [4.1], but pausing the project was an interesting non-BSA activity they executed for the benefit of integration. Due to the board's hard deadline set for the preliminary design, the respondents mentioned that they did not have sufficient time to create an integral design for the dike reinforcement. The RWA board became aware of this and decided to pause the project. This time is now used to discover the opportunities from other sectors they can integrate into the design, according to a respondent: *"At the insistence of the water board, the project is put on hold to get the linking opportunities more specific for the purpose of integration."* [WAC2.2]. Therefore, pausing a project can be a good activity to foster integration.

An unavoidable factor that fosters integration is the availability of a financial incentive. In case 1, The Ministry of Transport, Public Works and Water Management had made €100 million available for river Meuse developments, of which €23.5 million was available for Ravenstein-Lith. With the incentive, they got the following assignment: look at the floodplains to create room for the river combined with other challenges in this area. It turned out that this task combined well with nature development and recreation, contributing to the integrative success of case study 1. In case study 2, a financial incentive of €37 million became available from the state for the development of the environment of the dike (Wadden Sea region). The water authority and its directors actively responded to this, making sure this incentive would efficiently be used to foster the integration of their project.

Respondents of the RWA and contractor of case study 1, mentioned an important factor was the early involvement of the contractor in the project. In the optimisation design, for example, fewer sheet pile walls were used and reinforcement was done on the dike's river side instead of the standard land side of the dike. According to one of the respondents: *"This was accomplished by involving the contractor early in the process and employing a two-phase project, which allowed the contractor to think along with the project. This utilised the knowledge available within a market party such as Boskalis and RHDHV, experience with previous projects and innovative ideas regarding river widening in combination with dike reinforcement."* [WAC1.3] Water authorities are less involved in these kinds of projects on a daily basis. This activity ensured wider stakeholder, solution and scale judgements in the end, thus fostering integration.

Finally, an interesting factor found in case 3 is the history of the province of Zeeland and the flooding events that took place there. Respondents mentioned that because of local residents' history with the flood disaster in 1953 or their relatives who have experienced this, *"They offered less resistance to any measures in their region"* [WAC3.1]. Compared to people in other provinces of the Netherlands, people were way more reluctant to dike reinforcement projects affecting their environment. *"The residents of Zeeland know how bad it can be, or their ancestors taught them so"* [WAC3.1], so they were much more open to solutions, even if their environment gets affected.

#### 4.5 Overview of the results

An overview of all previously mentioned results is provided in this section in which the successful and unsuccessful IDR cases are compared with and against one another. An overview of all the results regarding boundary judgements and BSAs is shown in Table 7, which provides a clear overview of the differences per case.

Table 7 Overview and summary of the research results

	Starting BJs	BJs towards the end	Average #BSAs per interviewee	Integrative outcome
<b>Case 1</b>	<ul style="list-style-type: none"> <li>• 8 wide</li> <li>• 2 moderate</li> <li>• 1 tight</li> </ul>	<ul style="list-style-type: none"> <li>• 10 wide</li> <li>• 1 moderate</li> <li>• 0 tight</li> </ul>	17	Successful IDR including area development
<b>Case 2</b>	<ul style="list-style-type: none"> <li>• 3 wide</li> <li>• 1 moderate</li> <li>• 7 tight</li> </ul>	<ul style="list-style-type: none"> <li>• 3 wide</li> <li>• 6 moderate</li> <li>• 2 tight</li> </ul>	17	Successful IDR including ± 6 linking opp. eventually
<b>Case 3</b>	<ul style="list-style-type: none"> <li>• 4 wide</li> <li>• 6 moderate</li> <li>• 1 tight</li> </ul>	<ul style="list-style-type: none"> <li>• 1 wide</li> <li>• 2 moderate</li> <li>• 8 tight</li> </ul>	2	Unsuccessful IDR including 0 linking opportunities
<b>Case 4</b>	<ul style="list-style-type: none"> <li>• 5 wide</li> <li>• 2 moderate</li> <li>• 4 tight</li> </ul>	<ul style="list-style-type: none"> <li>• 0 wide</li> <li>• 4 moderate</li> <li>• 7 tight</li> </ul>	5	Unsuccessful IDR including 2 linking opportunities

#### 4.5.1 Overview of boundary judgements and BSAs

A significant number of BSAs was found that contributed to wide boundary judgements or prevented them from becoming tight: **Case 1 and Case 2 both contain 17 BSAs on average per interview.** Comparing the successful IDR cases first shows no surprises because both cases show the exact same number of BSAs. This is an interesting result regarding the differences in boundary judgements between case 1 and case 2, namely 10 wide and 1 moderate versus 3 wide and 6 moderate. A logical connection appears to be present between the number of wide boundary judgements and the number of BSAs executed. Comparing the unsuccessful IDR cases, a difference in the number of BSAs is found: **Case 3 contains 2 BSAs and Case 4 contains 5 BSAs on average per interview.** Case 3 shows a low number of BSAs, whereas case 4 shows significantly more BSAs than case 3, but is still nowhere near the number of BSAs in the successful IDR cases. The difference between cases 3 and 4 is expected to be caused by the high number of BSAs case 4 employed on preventing the domain/sector and stakeholder judgements from going tight, which is in line with the identified strategy they applied. Additionally, the BSAs found in case 3 can almost all be assigned to the wide time horizon judgements of that case. When comparing successful and unsuccessful IDR cases, the difference in the number of BSAs found between these case groups becomes immediately noticeable, with the successful IDR cases showing significantly more BSAs as the unsuccessful IDR cases. This is consistent with the boundary judgements in these cases, which are almost all moderate or wide versus almost all tight.

The results show that Case 1 had 10 wide boundary judgements towards the end, having the most wide boundary judgements of all cases. The boundaries were mostly wide at the beginning, and the ones that were not were widened during the project. In case study 2, almost all of the boundaries started tight and were widened during the project, resulting in 3 wide and 6 moderate boundary judgements. This low number of wide boundary judgements is a notable difference between cases 1 and 2 and is most likely a consequence of the RWAs' different approach. Case 1 began with area development in collaboration with project partners as soon as possible, whereas Case 2 began sectorally and included linking opportunities along the project's cause. The results regarding BSAs show that case study 1 includes 17 BSAs per interviewee, and was the most successful case in terms of the linking opportunities included and thus IDR. Compared to case 2, also 17 BSAs were identified per interviewee. Case 2 included three interviews instead of four. Yet, both cases showed exactly the same amount of BSAs identified per interviewee. Both cases resulted in successful IDR projects because of the opportunities that were integrated with the dike reinforcement project, despite case 2 having

slightly fewer linking opportunities integrated. Interestingly, BSA categories Relationships and Managing were both equally dominant in case 1, whereas Negotiating and Managing were equally dominant in case 2. In both cases, an external factor that contributed to successful IDR is the financial incentive provided by the Dutch government to include the river and its environment. However, respondents in both cases emphasised that while this incentive supported IDR, the active way their RWA responded to it was more important. Some of the activities from Case 2 are in contrast with the BSAs because a deliberate decision was made to separate planning, financing, and decision-making from other actors. Also, case 2 is paused at the moment to include an environmental approach to explore further linking opportunities, which could foster IDR even more. Therefore, both cases differ significantly in their approach and the level of their boundary judgements but are similar in terms of BSAs executed and the outcome of IDR.

#### 4.5.2 *Comparison of the results*

When comparing the unsuccessful IDR cases, case study 3 employed the fewest BSAs. Case 3 includes two BSAs on average per interview, while case 4 includes five. Case 3 eventually failed to integrate any linking opportunities, despite having a lot of potential. Case 4 had even more potential, but only two of the opportunities were integrated with the dike reinforcement. As a result, case 3 is the least successful in terms of IDR, and case 4 is the second least successful. Almost all boundary judgments of case 3 were tightened during the project, with a few ending up moderate. Different to case 4, where almost all boundary judgements stayed tight. Additionally to the low number of BSAs being employed in case 3, numerous external factors were mentioned that caused a tightening of their boundary judgements. Their struggles with other actors and the NFPP were held responsible for the tightening of the boundaries, combined with external factors such as the coronavirus crisis and war in Ukraine leading to higher material prices. Case study 4 showed deviating results compared to the other cases because 25 BSAs were employed, but despite the effort they took to employ BSAs, external factors were also held responsible for the failed IDR. Cases 3 and 4 differ in this regard because they both suffered from external factors, but case 4 had significantly more BSAs identified. Additionally, for case 4, the too extensive stakeholder involvement strategy that was applied has caused exactly the opposite of their goal. This might explain the difference in the number of BSAs between cases 3 and 4, where case 4 executed numerous BSAs to keep their stakeholder and domain/sector judgements wide, but ended up moderate or even tight. In this process, the categories Relationships and Negotiation were the most important ones regarding BSAs. However, either the way they employed these BSAs was not sufficient or the external factors prevented this case from implementing IDR.

When successful and unsuccessful IDR cases are compared, the successful IDR cases have significantly more wide and wider boundary judgments than the unsuccessful cases. Also, respondents from these cases mentioned significantly more BSAs, up to 4 times as much as respondents from cases 3 and 4. BSA categories that were dominant across all wide boundary judgements are the Negotiation and Managing categories. No specific category was identified that solely contributed to the widening of a boundary judgement, apart from Relationships for contributing to wider responsibilities and decision-making judgements and Negotiation for wider financing judgements. Additionally, BSAs from all categories appear to enable wide domain/sector judgements. Networking activities only contribute to wide domain/sector and solution judgements and appear to be less relevant for IDR. BSAs from the Managing category are found the most dominant for wide boundary judgements, from which 'Lateral, analytical and strategic thinking' is the most important BSA. Another interesting difference between the successful and unsuccessful cases is the financial incentive that was received by only the successful IDR cases. External factors that caused tighter boundary judgements were mainly identified in the unsuccessful IDR cases, whereas fostering external factors were identified in the successful IDR cases.



## 5 Discussion

This section reflects on the interpretation of the results in relation to the theoretical framework and the method that is applied in this research. The goal of this study was to assess changes in key actors' boundary judgements, determine whether BSAs contributed to these changes, and, if so, which BSAs did so. These results and a reflection on the methodology are discussed in this chapter.

### 5.1 Boundary judgements and boundary spanning activities

A key finding is that wide boundary judgements are redundant in the successful IDR cases and tight boundary judgements in the unsuccessful IDR cases. Also, BSAs were significantly more present in the successful IDR cases than in the unsuccessful IDR cases. These results correspond with the expectations resulting from the theory. The theory showed possible BSAs that could be executed to widen boundary judgements and thus foster IDR (Van Meerkerk & Edelenbos, 2014; Williams, 2002). First of all, the boundary judgements became more supportive of IDR in the successful IDR cases and less supportive in the unsuccessful cases, apart from a single judgement. The results show that the successful IDR cases have more wide and wider boundary judgements than the unsuccessful IDR cases. Moreover, for the wider boundary judgements, significantly more BSAs were identified than tighter boundary judgements. This is consistent with the assumption that the execution of BSAs contributes to wider boundary judgements in dike reinforcement projects and that projects with wider boundary judgements are more likely to result in IDR. Implications of these findings may prompt more general research into BSAs leading to IDR, resulting in more robust results. Case 4 shows slightly deviating results from the other cases; while a larger amount of BSAs were identified, the project resulted in tight boundary judgements and unsuccessful IDR. This could indicate that BSAs on their own are insufficient to contribute to IDR and that wide boundary judgements are essential to accomplish IDR.

One major finding is that for spanning the domain/sector boundaries, BSAs from all four categories were executed. This could mean that this boundary judgement is hard to widen and that all possible ways of boundary spanning are needed to do this. On the contrary, it could also mean that this boundary judgement lends itself well to be widened by a variety of BSAs. Also, it can be that actors think these are the most important boundary judgements regarding their desire to integrate linking opportunities and, therefore, focus on the domain and sector boundaries. After focussing on these boundary judgements, only then they may focus on the other judgements. This resonates with the research of Frijns et al. (2020), which emphasised the importance of the domain and sector boundaries being widened to foster integration. A combination of these seems to be true since in every case, a combination of multiple BSAs were indicated as being responsible for the widening. However, not in every case the same BSAs were held responsible for the widening of the domain and sector boundary judgements, which suggests that different case characteristics require different BSAs.

Another strong finding is the presence of BSAs from the category Managing at eight of the boundary judgement elements. This could indicate the importance of this boundary spanning category to widen various boundary judgements in dike reinforcement projects. On the contrary, it could also mean that this category includes activities that are relatively easy to execute in multiple projects with varying characteristics. BSA 'Lateral, analytical, and strategic thinking' was mentioned frequently, even accounting for half of all boundary judgement elements. Moreover, it is the most frequently mentioned BSA that respondents from unsuccessful IDR cases mentioned being absent, or that the exact opposite was executed. This indicates the importance of this BSA and might therefore even be a necessary BSA. As a result, focussing on and executing this BSA is expected to foster IDR. Additionally, activities from this BSA category were held responsible for the widening of all three stakeholder related boundaries. This makes sense regarding that the goal of this category is to make agreements and include other actors, such as stakeholders (Williams, 2002).

In line with the previous finding is that all the BSAs from the category Negotiation, except for BSA 'Influence between people and organisations whilst acting flexible', contributed to the widening of the sector/domain and scale boundary judgements. Respondents held these activities mainly responsible because these engage in understanding dependencies and making compromises between actors, leading to wider scales and challenges from other domains being captured in the project. This is in line with the research of Van Meerkerk & Edelenbos (2014) regarding that these BSAs should lead to wider sector/domain boundaries, which contributes to the inclusion of challenges from other sectors.

Furthermore, it turned out that for some boundary judgement elements only one or two BSAs contributed to their widening. Financing and Decision-making are the only boundary judgement elements where only one BSA was held responsible for contributing to wider judgements. Time horizon, Solutions, Responsibilities, Timing and Intensity are the elements for which only two BSAs were highlighted as being important (see Table 6). This could either mean that these boundary judgement elements are hard to widen or that other activities or factors are needed to widen these boundary judgements. However, it could also mean that these elements are less important to realise IDR and therefore there is less necessity to widen them. The latter is believed to be true, resulting from the impression of the respondents. However, no confirmation of this is found in the literature.

Coming back to Case 4 where 25 BSAs were identified, half of the BSAs of Case 2, but resulted far further from IDR than Case 2. Similar BSAs have been employed to widen similar boundary judgements, but this did not result in the same widening of the boundary judgements. This is expected to be caused by external activities (no financial incentive) and the vision of Case 4's RWA including an extensive stakeholder strategy, which required numerous BSAs but ended up with moderate results. This could suggest that BSAs are necessary but are not sufficient to accomplish IDR. Therefore, also wide boundary judgements seems to be critical. If the factors in Case 4 were more similar to Case 2, an outcome closer to IDR is more likely. Additionally, a difference in mastering BSAs is regarded as a cause of the tight boundaries because the RWA board's vision in Case 2 was initially the same as in Case 4, but was altered due to BSAs. This would imply that one person could achieve better results than another person because he/she is more skilled in executing the tasks (Williams, 2002). An example of this is convincing other people or actors, where the result depends on the level of mastering the activity. This confirms the assumption that the results of boundary spanning depend on the extent of one mastering the activity, or in other words, how well an actor is able to execute a BSA. However, assessing actors' effort and ability to carry out BSA was outside the scope of this study because this could be an entirely separate study.

## 5.2 Other activities and external factors

Few other activities supporting wide boundary judgements not being BSAs were identified during the interviews. These few include deliberately choosing separate project tasks and responsibilities, excluding challenges from certain domains to reduce complexity and pausing the project planning. Deliberately keeping project tasks and responsibilities separated from the integrated sectors is an activity identified in Case 2, and is expected to be executed because of the characteristics of the linked sectors/domains, whose challenges minimal overlap with the dike reinforcement and can therefore be separated. Excluding challenges to reduce complexity seems like a contradictory activity, but it fostered IDR in Case 1 according to the respondents. If the project included more sectors/domains and their challenges, the project would become too complex. This finding resonates with Helfgott (2018), in which it is explained that successful integration can be achieved by managing complexity. Pausing a project planning for the benefit of IDR was identified in Case 2, but is only expected to be an encouraging activity when integration initially failed in the preliminary design. It can be argued that these activities are also BSAs, for example, the managing of complexity, which has similarities with the

fourth BSA category. The other two can also be linked to some BSAs from the list or show opposing characteristics. However, it is expected that these activities are executed as a response to the specific characteristics of those cases. Therefore, it is too uncertain to take conclusions from these findings.

External factors influencing the boundary judgements were mentioned more often, which resonates with the literature about external factors (Bressers and Lulofs, 2010). These factors were primarily visible in the cases where IDR was unsuccessful and indicated what caused this failure. In case 3, external factors caused the tightening of the boundary judgements over the course of the project. The case made clear that despite the few BSAs being executed, external factors can still ensure a tightening of the boundaries. Moreover, the respondents made clear that because of these external factors influencing the project, there was less need or motivation to execute BSAs and implement IDR. This could also declare the low number of BSAs carried out.

Another fostering external factor that must be mentioned are financial incentives from governing bodies present in cases 1 and 2. Both cases received a significant amount of money meant for the development of the dike and its adjacent areas. At first glance, there is a strong connection between this incentive and the successful implementation of IDR. Respondents mentioned that this definitely contributed to IDR but also mentioned that this was certainly not the only factor. They mentioned that because of this incentive, they noticed that employees of their and others' organisations started working harder and were more engaged with the integration of the project and its environment. In doing so, more BSAs were executed, which suggests a linkage between BSAs and a financial incentive. As a result, it would be too straightforward to conclude that a financial incentive leads to IDR. However, it would have been interesting to see what would have happened if Cases 3 and 4 received a similar financial incentive.

### 5.3 Reflection on methodology

The methodology applied in this research is considered as an adequate method, regarding that the results largely answer the research questions and meet the aim of the research. The boundary judgement assessment provided the desired insights in the changing boundary judgements of key actors in dike reinforcement projects, although small adjustments are suggested. This is mainly because Case 4 showed slightly deviating results, in which 'moderate' boundary judgements were tighter than the 'moderate' boundary judgements of other cases, but not tight enough to be assessed as completely tight. Therefore, the boundary judgement assessment method was not completely adequate for this research. This could have been prevented by applying the exact same research method as in Groefsema (2022) and Vinke-de Kruijf et al. (in review), which included the 'very wide' and 'very tight' levels of boundary judgements, so a 5-points scale. Certain boundary judgements of Case 4 would then probably be tighter assessed, resulting in less BSAs ending up in the results.

Furthermore, the methodology applied in this research to identify BSAs is considered as suitable. The created list with BSAs created for this research appeared to be complete because every BSA was eventually mentioned by the respondents at least once, which is shown in [Appendix II](#). Some of which more than others, indicating the influence certain BSAs have on boundary judgements and on IDR in general. One area for improvement is that other types of activities should be more consciously included in the assessment of activities next time. This could give a more accurate understanding of activities performed which are not BSAs. The comparative case study method turned out to be suitable for this research because clear differences and similarities could be identified between successful IDR cases, unsuccessful IDR cases and between each other. This indicated the relationship between successful IDR cases, wide boundary judgements and the execution of BSAs on the one hand, and on the other hand the link between unsuccessful IDR cases, tight boundary judgements and a low number

of BSAs being executed. These results indicate a positive effect that BSAs can have on IDR, which confirms the assumption made for this research. The slightly different results of case 4 are not expected to have a significant impact on this relationship because this deviation could have been prevented by applying slight changes to the methodology. Knowing this can have implications for future dike reinforcement projects, for example by focussing on drawing wide boundary judgements at the start through the execution of BSAs.

It is expected that the same general results will be found if the research was repeated in the same way. A few BSAs may be mentioned more or less due to respondents' memory, but broadly speaking, it can be expected that the research would still identify the importance of wide boundary judgements and BSAs to contribute to IDR. Regarding that the interviewees' answers from the same role mostly corresponded within and between cases, internal validity was present in most of the cases, but less in cases where varying roles were interviewed, such as cases 1 and 3. Each role carries out their corresponding activities, which could have caused the less matching results between different roles. Interviews with respondents of the same role showed more similar results. Corresponding results between cases were visible, leading to some strong results and external validity, but not as much as internal corresponding answers. This is expected to be caused by the variety of cases with very varying characteristics. Different characteristics require different BSAs, which ensured a lower external validity. However, boundary judgement elements with corresponding characteristics between cases showed similar results in terms of BSAs, indicating reliable answers from respondents. This suggests that the results can be generalised over projects with similar characteristics and corresponding boundary judgements. However, this study 'only' analysed four cases, making the claims difficult to generalise over other projects, but it does provide insights into the mechanisms potentially relevant to IDR.

Some small differences between respondents' answers were identified, mostly regarding the width of the boundary judgements. Actors from RWAs who seemed to be proud of the degree of integration in 'their' project generally indicated wider boundary judgements compared to respondents who were less committed. Moreover, respondents from organisations other than RWAs that were more challenging to integrate or not integrated at all, generally indicated tighter boundary judgements. However, this has been dealt with in the determination of the boundary judgements by employing multiple interviews and taking the average of all respondents' answers per boundary judgements.

This research also includes certain limitations, which one should bear in mind. One limitation is that some of the selected case studies differed in the available funding. For example, the financial incentives that were only present at cases 1 and 2, which could impact the reliability of the results. It was not taken into account beforehand that these factors could be present and have an impact on the outcome of the study. Therefore, for future studies it is advised to have certain variabilities in mind and select cases with less varying financial incentives to ensure stronger research results. These are generally easy to identify from the case documents beforehand, and is a limitation of the case selection method in this research. Furthermore, it was found that the answers of respondents from the same roles resulted in stronger results. However, in this research not all respondents of the same role were available or could be interviewed, which caused more varying results. On the contrary, it provided a more complete overview of BSAs that were executed by all key actors involved.

During the research, the NFPP was mentioned by several respondents as an actor who contributed to the prevention of IDR in projects. Therefore, including the opinion of the NFPP by interviewing their employees could have offered a different perspective and perhaps more comprehensive results. In these interviews, the question of whether it is the NFPP or the perception of RWAs and other key actors that appears to be impeding IDR should have been addressed. The semi-structured interview

setup designed for RWA employees caused that the interview was not applicable for employees of the NFPP, so these were hard to include in the research. A different interview setup focused on their processes would therefore be needed, which could have been important in hindsight. Actors from organisations other than RWAs were included in some cases, but including them only required slight changes to the interview setup. However, these changes were based on answers from earlier interviewed respondents, making these results probably less reliable. Realising that actors from other organisations are important in IDR could have prevented having this problem.

For a follow up study it is therefore recommended to structurally include the opinion of actors from organisations outside the RWAs more, together with actors from the NFPP. Furthermore, it would be interesting to study how the results of this study can be translated into a guideline for RWAs that can be applied at various dike reinforcement projects, regardless of its environment. A certainty is that the assessment levels of boundary judgements should be expanded to ensure more comprehensive results in a future research.

## 6 Conclusion and recommendations

This research concludes with answers to the research questions and provides recommendations for RWAs based on the findings. Therefore, the research questions will be repeated first, followed by a conclusion. The recommendations suggest how these findings can be employed most effectively.

### 6.1 Concluding answers to the research questions

The aim of this research was to gain insights into the changes in boundary judgements of key actors involved in dike reinforcement projects, find out if and to what extent BSAs contributed to these changes, and which exact BSAs supported these changes and encouraged IDR. Therefore, it was first important to conceptualise the integration potential, assess the boundary judgements and create a framework to identify BSAs, for which the following sub-question was formulated:

1. *According to literature, how to conceptualise the integrative potential of IDR projects, boundary judgements and boundary spanning activities, and the role they play in achieving IDR in projects?*

It turned out that in Dutch dike reinforcement projects, linking opportunities are commonly used to indicate the integrative potential of a project. Therefore, linking opportunities became the focus for the case selection, where 4 cases are selected that are similar on their integrative potential but differ in their outcome regarding IDR. Literature suggested that key actors involved in dike reinforcement projects create their own boundary judgements to handle the complexity of all the interdependencies between sectors, but also emphasises that boundary judgements can contribute to the obstruction of integrating other sectors' challenges within a dike reinforcement project. Boundary judgements are the demarcations regarding project elements about what should be considered and what should be excluded, made by key actors. Boundary judgements can change during a project, ranging from tight to wide, and suggests that wider boundary judgements can support more integrative outcomes, referred to as IDR in this study. To assess a project's boundary judgements, this study used the method developed by Groefsema (2022) and Vinke-de Kruijf et al. (in review). This method assesses 11 elements of boundary judgements on being tight, moderate or wide, based on an assessment scale. These are scale, domains, time horizon, solutions, responsibilities, financing, planning, decision-making, stakeholders, timing and intensity. This assessment method identified changes of different boundary judgement elements over the course of the selected dike reinforcement projects.

Research suggests that wider boundary judgements are stimulated by boundary spanning activities (BSAs), which are activities that key actors involved in dike reinforcement projects can execute to widen boundary judgements, facilitating the integration of linking opportunities into these projects. Literature describes 19 types of BSAs, which are compiled into four categories for this study: Relationships, Networking, Negotiation, and Managing. This conceptualisation of BSAs successfully identified activities from interviews with respondents involved in dike reinforcement projects, to determine whether they executed a BSAs, whether a changing boundary judgement could be linked to these BSAs and whether it contributed to IDR.

2. *What are the boundary judgements made by RWAs and other key actors in IDR projects and why and how do they change or remain throughout the process?*

Four IDR projects were studied in this research. In Case 1 eight boundary judgements were wide from the beginning, and two out of three tight ones were widened during the project. The boundary judgements of case 2 started tight, apart from the stakeholder judgements. During the project, 5 boundary judgements were widened to a moderate and wide level, three remained the same and the three judgements involving stakeholders became moderate. Case 3 included ten wide and moderate

boundary judgements in the beginning, but multiple changes ensured that eight boundaries ended up being tight, only two remained moderate and one wide. Similar changes were identified in Case 4, which started with five wide and four tight judgements, but ended up with seven tight and four moderate judgements. Starting with wide boundary judgements from the beginning of a project seems to be highly important to realise IDR, considering that the most successful IDR Case 1 did the same and both the unsuccessful cases showed the opposite. Based on these case studies, it can be concluded that successful IDR cases resulted in primarily wide or wider boundary judgements, whereas unsuccessful IDR cases resulted in tight or tighter boundary judgements. This appears to indicate that wider boundary judgements contribute to successful IDR implementation in projects and that tighter boundary judgements contribute to unsuccessful IDR implementation in projects.

3. *In the selected dike reinforcement projects, which boundary spanning activities supported wide boundary judgements fostering IDR, and what other (external) factors influenced this?*

Using the compiled BSA list, BSAs that contributed to wide boundary judgements and supported IDR were identified from the interviews. This revealed that significantly more BSAs were identified in successful IDR cases as in unsuccessful IDR cases, indicating the influence BSAs can have on IDR. The successful IDR cases included both 17 BSAs per interviewee, whereas unsuccessful IDR Case 3 showed only two BSAs per interviewee. Case 4 showed slight deviations from the other cases regarding that five BSAs were identified per interviewee and resulted in largely tight boundary judgements. This is expected to be caused by external activities, BSAs not being executed to their fullest potential and an extensive stakeholder strategy, which partially mitigates these deviating results. This showed that only executing BSAs might not be sufficient, and that wide boundary judgements are a critical requirement to achieve IDR. However, it can be concluded that successful IDR cases show significantly more BSAs contributing to wider boundary judgements than unsuccessful IDR cases, implying that BSAs positively contribute to wider boundary judgements and IDR.

Furthermore, the results indicate that wider domain/sector judgements were encouraged by various BSAs from all four categories. BSA categories that were dominant across all wide boundary judgements are the Negotiation and Managing categories, indicating their importance. Relationship activities were important for wide Domain/Sector and Stakeholder boundary judgements, but can be counterproductive for the Stakeholder judgements when executed too soon in the project. Networking activities only contribute to wide domain/sector and solution judgements. BSAs from the Managing category are found the most dominant for enabling wide boundary judgements, from which 'Lateral, analytical and strategic thinking' is the most important BSA. Furthermore, external factors turned out to play a crucial role in boundary spanning, both positively and negatively. Factors such as favourable characteristics of the environment and financial incentives affected cases positively and fostered wide boundary judgements. Negative factors affected mainly the less successful IDR cases, of which differing agendas, the attitude of the NFPP and internal rigidity are the most important ones.

## 6.2 Main conclusion

The preceding conclusions lead to the goal of this research, which is identifying changes in the boundary judgements, determining how much BSAs contributed to these changes and to IDR, and if so, which BSAs were most important in this regard. Therefore, the following main research question was formulated:

*How do key actors' boundary judgements change during integral dike reinforcement projects, and to what extent and how do boundary spanning activities contribute to this change and to the realisation of integral dike reinforcement projects?*

From the results, it can be concluded that the boundary judgements of key actors involved in dike reinforcement projects remain wide or become wider if the projects results in IDR. Unsuccessful IDR cases showed more changes towards tighter or remaining tight boundary judgements. In general it can be concluded that successful IDR cases include significantly more and wider boundary judgements than unsuccessful IDR cases. Moreover, it can be concluded that BSAs contribute to boundary judgements staying wide and widening them, and therefore can encourage IDR. The domain/sector boundary judgements appear to be the most important to be wide, based on the number and variety of BSAs respondents executed to keep or widen them. The interviews revealed that actors believe that this boundary judgement is an important one to realise IDR, and therefore focus on widening this, which explains the high number of BSAs. Boundary judgements where only one or two BSAs were identified are Time horizon, Solution, Responsibilities, Financing, Decision-making, Timing and Intensity. These boundary judgements may either be harder to widen, or actors gave less attention to these boundary judgements because they consider them as less important. The latter is believed to be true regarding that both respondents from the successful as well as the unsuccessful cases paid few attention to these boundary judgements. Wide Stakeholder, Planning and Scale judgements seem more important regarding the variety of BSAs that encourage this and the impression resulting from the interviews. This is emphasised by these boundary judgements being wide in the successful IDR cases and tight in the unsuccessful IDR cases, indicating the importance of these judgements being wide to realise IDR. Striving for the most important boundary judgements to be wide from the start of the project appears to be important to foster the realisation of IDR.

Concluding on the BSAs, the following conclusions can be made per BSA category:

- **Relationships** activities were mentioned to be important for various boundary judgements, with one BSA in particular; *'Connecting or linking different people and processes at both sides of the boundary'*. This versatile BSA can be seen as important for a select range of boundary judgements, solely for the widening of the responsibility judgements but primarily for wider domain/sector and stakeholder boundary judgements. Executing this BSA at an early stage fosters the domain/sector judgements, but only fosters the stakeholder judgements when executed at a later stage.
- **Networking** activities were primarily mentioned to be important for the widening of the domain/sector and solution boundaries. Apart from these elements, the activities were not often mentioned, but respondents from successful IDR cases emphasised the importance of this activity to identify occurring linking opportunities from other sectors at an early stage. This appears to be a somewhat more context-level BSA that one can perform continuously alongside projects.
- **Negotiation** activities contributed the most to the widening of the domain/sector and scale judgements, where almost all activities are found important. Particularly *'Persuading actors, making compromises and broker deals or solutions between actors'* are mentioned the most for contributing to wider boundary judgements. Additionally, this category was held solely responsible for the widening of the financing boundary judgements.
- **Managing** activities are considered as the most dominant BSA category since it is held responsible for widening almost every boundary judgement. *'Lateral and strategical thinking and understanding the bigger picture'* is the most identified BSA. Managing turned out to be mainly responsible for the widening of the stakeholder and scale boundaries. Furthermore, the absence of Managing in the unsuccessful IDR cases appears to contribute to why these projects failed. BSAs from this category are mentioned about as much as the Negotiation BSAs. Combining these findings makes that this category is considered as the most dominant category contributing to wider boundary judgements and IDR.



Taking the results in mind, it appears that BSAs actually contribute to wider boundary judgements and therefore to IDR, at least for the cases selected in this research. Significantly more BSAs were identified at wide boundary judgements or boundary judgements that were widened. Significantly less boundary judgements were executed when the boundary judgements resulted in being tight. Moreover, significantly more BSAs were identified in the successful IDR cases than in the unsuccessful IDR cases. However, it is unsure if these results can be generalised for other dike reinforcement projects. The extent to which BSAs contribute to IDR seems to be supportive in terms of widening boundary judgements. The results of Case 4 indicate that simply executing BSAs is insufficient, and that wide boundary judgements are also required to successfully realise IDR. However, the results show that BSAs have an important role in boundary judgements remaining wide or being widened, and are therefore considered to be fostering activities for IDR. This depends on employing the right BSA from a certain category to widen a certain boundary judgement. Additionally, external factors, such as a financial incentives, a project's environment or the ability of a boundary spanner to perform a BSA effectively, seems to influence the extent to which a BSA can support a boundary judgement. These external factors were negatively impacting the unsuccessful IDR cases and significantly supported the successful IDR cases in some situations. Some hints were found that these external factors contributed to the integrative failure of the unsuccessful IDR cases, but no conclusive evidence was found to support this.

### 6.3 Recommendations

The final sub-question of this research is:

4. *What recommendations can be made to RWAs with regard to the employment of boundary spanning activities to encourage the exploitation of integrative potential of dike reinforcement projects?*

Given the density of the public space and the challenges that the Netherlands faces, as well as the length of dikes that need to be reinforced, it is highly plausible that every future dike reinforcement project offers opportunities for IDR. Therefore, RWAs must be aware that all key actors involved in dike reinforcement projects draw boundary judgements to handle the complexity that exists between them and other sectors. Wider boundary judgements appear to foster IDR more than tight boundaries. The Domain/Sector boundary judgements are the most important to be wide, followed by the Stakeholder, Planning and Scale boundary judgements. Fostering wider boundary judgements by executing BSAs is necessary but not always sufficient to realise IDR. For that, it is also crucial that the boundary judgements result in wide or wider judgements. As a result, BSAs are regarded as activities that foster wide boundary judgements, and therefore supports IDR, which is something to strive for given the benefits that IDR could provide.

Furthermore, it is recommended to always strive for wide boundary judgements at the start of a dike reinforcement project, particularly wide domain/sector boundary judgements. Thereafter, it is recommended to strive for wide Stakeholder, Planning and Scale boundary judgements, as these are the second most important boundary judgements to be wide. To encourage wide domain/sector boundary judgements at the beginning of a project, it is important to announce the plans for IDR as soon as possible to actors in the environment to facilitate the integration of linking opportunities as efficient as possible. Vice versa it is important for RWAs to be aware of developments in the environment, which could offer opportunities to jointly address a shared challenge with other actors. Early involvement of linking opportunities, and therefore wide domain/sector boundary judgements, can be achieved through both Networking BSAs; '*Being in the loop for information of all sorts*' and '*Being active at a strategic level*'. These activities are mainly executed in gatherings with other

governing bodies, by actors who represent their RWA, for example, account managers from a RWA that participates in regional meetings can be performed continuously alongside projects.

To encourage wide Domain/Sector and Stakeholder boundary judgements, it is recommended to focus on executing Relationship BSAs, in particular *'Connecting or linking different people and processes at both sides of the boundary'*. This can foster the integration of linking opportunities and encourage the cooperation between actors and stakeholders. However, it is recommended to execute this activity at an early stage to encourage wide Domain/Sector boundary judgement, and to execute this BSA after a draft design has been created to encourage wide Stakeholder judgements. The latter can be done, for example, through participation meetings and work groups with the stakeholders, which creates more overall support in the end.

It is also recommended to focus on Negotiation BSAs for supporting wide Domain/Sector and Scale boundary judgements because all BSAs in this category contribute to these boundary judgements. The integration of linking opportunities from other sectors, and thus wider Domain/Sector and Scale boundary judgements, is encouraged by 'Persuading actors, making compromises, and brokering deals or solutions between actors'. Executing this BSA, for example, can persuade the board of a RWA of the benefits of IDR and convince other actors to join the project.

Fostering the important Domain/Sector, Scale, Planning and Stakeholder boundary judgements to be wide, is best accomplished by executing Managing BSAs, and in particular *'Lateral and strategical thinking and understanding the bigger picture'*. Taking a holistic view and understanding the bigger picture can help to see the importance of integration in various situations and is considered as an essential BSA to widen these boundary judgements and encourage IDR.

#### 6.4 Research outlook and implications

As a result, this research could have considerable implications for the future of IDR. Regarding the length of dikes that still needs to be reinforced in the Netherlands before 2050, there are plenty of opportunities to widen boundary judgements, execute BSAs in these projects, and encourage IDR. The results of this study indicate that focussing on the suggested BSAs for the widening of certain boundary judgements is a good strategy for projects similar to the ones analysed in this research, regarding the positive effect BSAs have on IDR. Therefore, RWAs across the Netherlands should be made aware of the importance of wide boundary judgements, the supporting role of BSAs towards wide boundary judgements, and how this contributes to IDR. Significant benefits could be capitalised on resulting in more efficient use of resources and available space from which the public space as a whole benefits. If not, then numerous of linking opportunities could be missed out on, resulting in sectoral dike reinforcement projects where potential benefits are ignored and available resources and space are going wasted.

Finally, recommendations for future research can be made as a result of several issues raised by this research. Firstly, this qualitative study thoroughly analysed four dike reinforcement case studies in depth. This resulted in robust insights in the processes regarding boundary judgements and BSAs contributing to IDR in these specific cases. However, for future research it would be interesting to gain more insights whether these findings also apply to other dike reinforcement projects. To answer this question, quantitative research analysing a large number of cases is desired to make stronger claims about whether BSAs contribute to wider boundary judgements and, eventually, IDR. Lastly, it would be interesting to study the extent to which external factors influence the effect BSAs have on boundary judgements and whether it is necessary for multiple boundary judgements elements to be wide for IDR. This requires a more in depth research into these factors. Executing the recommended researches could provide stronger results into the effects of BSAs on boundary judgements and IDR in the future.

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## Appendix I: Interview protocol (in Dutch)

### Inleiding (5 minuten)

- Bedankt voor uw tijd en dat u mij wilt helpen met mijn onderzoek. Allereerst zal ik wat meer over mezelf vertellen en mijn onderzoek verder toelichten.
- Dit afstudeeronderzoek is onderdeel van mijn Master Civil Engineering & Management aan de Universiteit van Twente. Ik doe mijn onderzoek bij Waterschap Drents Overijsselse Delta in Zwolle.
- In mijn onderzoek richt ik mij op integraliteit binnen HWBP dijkversterkingsprojecten. Hierbij kijk ik specifiek naar de impliciete en expliciete keuzes die gemaakt worden over wat binnen en buiten een project valt. Deze keuzes over de “grenzen van een project” worden ook wel “boundary judgements” genoemd. Deze keuzes kunnen betrekking hebben op waar het project over gaat, wie mee mag praten of hoe besluitvorming georganiseerd is. Een voorbeeld hiervan is: worden uitdagingen van woningbouw, infrastructuur of recreatie wel of niet meegenomen in het dijkversterkingsproject?
- Het meenemen van andere domeinen en hun uitdagingen, wat in de praktijk bekend staat als *meekoppelkansen*, kan dan zorgen voor het breder worden van de projectgrenzen.
- Activiteiten die erop gericht zijn om de grenzen van een project op te rekken worden ook wel “boundary spanning activities” genoemd.
- Onderzoek toont aan dat het implementeren van meekoppelkansen in een project vaak gepaard gaat met het oprekken van andere projectgrenzen zoals het aanboren van andere financieringsbronnen, de schaal van het project veranderen (zoals opschalen van het project), aanpassingen in de planning en veranderingen in de verantwoordelijkheden van partijen.
- Het doel van dit interview is om inzicht te krijgen in dit soort processen. In het interview gaan we het daarom hebben over de dynamiek rondom de projectgrenzen van dijkversterkingsproject (*projectnaam*). Ter voorbereiding van het interview heb ik verschillende (beleids-)documenten gelezen/vooronderzoek gedaan naar het project.
- Met dit onderzoek hoop ik waterschappen te adviseren over een integrale aanpak in toekomstige dijkversterkingsprojecten.
- Wilt u in uw antwoorden het standpunt van uw organisatie verwoorden en niet uw persoonlijke mening.
- Ik hoor graag als ik te snel praat of als mijn vragen niet duidelijk zijn.
- Ik wil het interview graag opnemen zodat ik er een goed verslag van kan maken. Hierbij garandeer ik de vertrouwelijkheid en anonimiteit. Stemt u daarmee in? (*Opname starten*)
- Ik wil u erop wijzen dat uw antwoorden anoniem en vertrouwelijk worden behandeld en dat de gegevens uit dit onderzoek niet openbaar worden gemaakt of aan derden worden verstrekt. Verklaart u dat u op een duidelijke wijze bent geïnformeerd over de aard en de methode van het onderzoek en stemt uit vrije wil in met deelname aan dit interview?

### Deel 1: Algemene informatie over u en het project (5 minuten)

We beginnen met een aantal vragen over uw betrokkenheid bij het project.

- Wat is uw achtergrond? Wat is uw positie in de organisatie en hoelang bent u hier al werkzaam?
- Wat is/was uw rol binnen het project? En voor welke taken bent u verantwoordelijk?

- Kunt u een algemene update geven over de huidige stand van zaken van het project, wat betreft de voortgang en of het project verloopt zoals gewenst? Zijn er nog bijzonderheden?

## Deel 2: Verandering in domein- en sectorgrenzen (15 minuten)

De beleidsdocumenten hebben/Mijn vooronderzoek gaf mij een eerste indruk gegeven over de domeinen en sectoren die al dan niet zijn mee gekoppeld in het project. Met de volgende vragen wil ik hier wat meer inzicht in krijgen.

- Tijdens mijn vooronderzoek zag ik dat gaandeweg het project enkele meekoppelkansen zijn afgevallen/veel meekoppelkansen zijn geïmplementeerd. Kunt u mij vertellen welke domeinen en/of sectoren (meekoppelkansen) er uiteindelijk meegenomen zijn in de planuitwerking of realisatie? Hierbij gaat het om meekoppelkansen van domeinen buiten het waterveiligheidsdomein (zoals waterkwaliteit) of andere sectoren zoals woningbouw, infrastructuur of recreatie.
- Kunt u me uitleggen wat de aanleiding was van deze verandering?
  - *Indien minder*: Wat was de reden dat bepaalde meekoppelkansen zijn afgevallen?
  - *Indien meer*: Hoe zijn deze extra meekoppelkansen geïdentificeerd en meegekoppeld?

## Deel 3: Veranderingen in andere projectgrenzen (30 minuten)

- In mijn onderzoek kijk ik niet alleen naar veranderingen in domein- en sectorgrenzen maar ook naar veranderingen in tien andere projectgrenzen. Deze tien heb ik hier weergegeven inclusief de betekenis en een voorbeeld van een brede of smalle grens (*laat lijst met elementen zien (Tabel 1)*). We gaan ze één voor één langs om te kijken of de grenzen breder of smaller zijn geworden of hetzelfde zijn gebleven in het project. Kunt u mij per element zeggen of er veranderingen hebben plaatsgevonden? Indien een element veranderd is zal ik doorvragen naar waarom en hoe dit is gebeurd.
- Wat betreft de (Projectgrens element) grens, kunt u mij vertellen **waarom** u denkt dat deze breder/smaller is geworden?
  - Wat heeft ervoor gezorgd dat dit element breder/smaller is geworden?
  - Wie is daar verantwoordelijk voor geweest?
- En kunt u mij vertellen **hoe** deze verandering exact heeft plaatsgevonden?
  - Welke factoren hebben hieraan bijgedragen?
  - *Eventueel doorvragen op activiteiten of externe factoren (hypothese)*:
    - Komt deze verandering doordat een/meerdere actoren hier bewust een van de projectgrenzen hebben veranderd?
    - Zo nee, wat heeft dan gezorgd voor de verandering in de projectgrens? Kwam dit van buitenaf?
    - In hoeverre heeft intensieve/weinige samenwerking tussen het waterschap en de betrokken partij van de meekoppelkans bijgedragen aan het verbreden/versmallen van de projectgrenzen?
    - In hoeverre hebben overeenkomsten/verschillen tussen de doelen die partijen hebben bijgedragen aan het verbreden/versmallen van de projectgrenzen?
    - In hoeverre heeft het vroeg/laat betrekken van de andere domeinen bijgedragen aan het verbreden/versmallen van de projectgrenzen?



- In hoeverre heeft het hebben/ontbreken van een gezamenlijk planning en coördinatie bijgedragen aan het verbreden/versmallen van de projectgrenzen?
- In hoeverre heeft (weinig) steun vanuit het bestuur, en zo ook het flexibel omgaan met normen, regels en richtlijnen, bijgedragen aan het verbreden/versmallen van de projectgrenzen?
- In hoeverre heeft het ontbreken/hebben van een gezamenlijk financieringsregeling bijgedragen aan het verbreden/versmallen van de projectgrenzen?

#### **Afsluiting** (5 minuten)

- Dat waren mijn vragen. Hartelijk bedankt voor uw antwoorden. Ik wil nogmaals benadrukken dat uw informatie in dit interview vertrouwelijk zal worden behandeld. Dan rest mij enkel nog de vraag of er iets specifiek tijdens dit gesprek niet naar voren is gekomen wat u belangrijk vindt of u nog wil benadrukken in het kader van het verbreden/versmallen van projectgrenzen? Zijn er nog bepaalde dingen die ik heb gemist?
- Dan wil ik u hartelijk bedanken voor uw tijd en moeite. Ben u geïnteresseerd om op de hoogte te worden gehouden van de resultaten van mijn onderzoek? (*Stop de opname*)

## Appendix II: Overview of all results per case

[Return to results](#)

Element	No.	Case 1				Case 2				Case 3				Case 4								
		WAC1.1	WAC1.2	WAC1.3	OC1.4	Tot. Case 1	WAC2.1	WAC2.2	WAC2.3	Tot. Case 2	WAC3.1	WAC3.2	MC3.3	Tot. Case 3	WAC4.1	WAC4.2	WAC4.3	MC4.4	MC4.5	Tot. Case 4		
Domains/Sectors	1.1	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	2		
	1.2	1	0	0	0	1	1	0	1	2	0	0	0	0	0	0	0	1	0	1		
	1.3	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	1.4	0	0	1	0	1	0	0	1	1	0	0	0	0	0	0	0	0	1	1		
	1.5	0	1	1	0	2	0	0	1	1	1	0	0	1	0	0	1	0	1	2		
	1.6	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1		
	<b>Total BSAs Categorie 1</b>					<b>6</b>					<b>4</b>					<b>2</b>						<b>7</b>
	2.1	0	0	1	1	2	1	0	0	1	0	1	0	1	0	0	0	0	1	1		
	2.2	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	<b>Total BSAs Categorie 2</b>					<b>4</b>					<b>1</b>					<b>1</b>						<b>1</b>
	3.1	0	0	0	1	1	0	1	1	2	0	1	0	1	0	0	0	0	0	0		
	3.2	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	1		
	3.3	0	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	1	1		
	3.4	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	3		
	3.6	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	<b>Total BSAs Categorie 3</b>					<b>5</b>					<b>4</b>					<b>1</b>						<b>5</b>
	4.1	0	0	1	0	1	1	1	1	3	0	0	0	0	1	0	0	0	1	2		
	4.2	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4.4	0	0	1	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0			
4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
<b>Total BSAs Categorie 4</b>					<b>3</b>					<b>4</b>					<b>0</b>						<b>2</b>	
Scale	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	1.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	<b>Total BSAs Categorie 1</b>					<b>0</b>					<b>0</b>					<b>0</b>						<b>0</b>
	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	2.2	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0		
	<b>Total BSAs Categorie 2</b>					<b>0</b>					<b>0</b>					<b>1</b>						<b>0</b>
	3.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	3.2	0	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0		
	3.3	0	0	0	1	1	1	1	0	2	0	0	0	0	0	0	0	0	0	0		
	3.4	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0		
	3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	3.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	<b>Total BSAs Categorie 3</b>					<b>1</b>					<b>5</b>					<b>0</b>						<b>0</b>
	4.1	1	1	1	0	3	0	0	1	1	0	0	0	0	0	0	0	0	0	0		
	4.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1			
4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
<b>Total BSAs Categorie 4</b>					<b>3</b>					<b>1</b>					<b>0</b>						<b>1</b>	

Time horizon	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Total BSAs Categorie 1</b>					<b>0</b>					<b>0</b>					<b>0</b>			
	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Total BSAs Categorie 2</b>					<b>0</b>					<b>0</b>					<b>0</b>			
	3.1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
	3.2	0	1	1	0	2	0	0	0	0	0	0	1	1	0	0	0	0	1
	3.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	3.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Total BSAs Categorie 3</b>					<b>2</b>					<b>0</b>					<b>2</b>			
	4.1	0	1	0	0	1	1	0	0	1	1	1	0	2	0	1	0	0	0
	4.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<b>Total BSAs Categorie 4</b>					<b>1</b>					<b>1</b>					<b>2</b>				
Solutions	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Total BSAs Categorie 1</b>					<b>0</b>					<b>0</b>					<b>0</b>			
	2.1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Total BSAs Categorie 2</b>					<b>1</b>					<b>0</b>					<b>0</b>			
	3.1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
	3.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3.3	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
	3.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3.5	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	3.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Total BSAs Categorie 3</b>					<b>1</b>					<b>2</b>					<b>0</b>			
	4.1	0	1	0	0	1	1	1	1	3	0	0	0	0	0	0	0	0	1
	4.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<b>Total BSAs Categorie 4</b>					<b>1</b>					<b>3</b>					<b>0</b>				

Responsibilities	1.1	1	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	
	1.2	1	1	0	0	2	0	1	0	1	0	0	1	1	0	0	1	0	0	1	
	1.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	1.5	0	0	1	1	2	0	0	0	0	0	1	0	1	0	0	0	0	0	0	
	1.6	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Total BSAs Categorie 1</b>					<b>6</b>					<b>2</b>					<b>2</b>					<b>1</b>
	2.1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	
	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	<b>Total BSAs Categorie 2</b>					<b>0</b>					<b>1</b>					<b>0</b>					<b>0</b>
	3.1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	
	3.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	3.3	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	
	3.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	3.5	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	1	2	
	3.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	<b>Total BSAs Categorie 3</b>					<b>0</b>					<b>3</b>					<b>0</b>					<b>2</b>
	4.1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	4.2	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4.4	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0		
4.5	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0		
<b>Total BSAs Categorie 4</b>					<b>2</b>					<b>1</b>					<b>1</b>					<b>0</b>	
Financing	1.1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0		
	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	1.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	1.4	1	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	1		
	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
	<b>Total BSAs Categorie 1</b>					<b>2</b>					<b>1</b>					<b>0</b>					<b>2</b>
	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	<b>Total BSAs Categorie 2</b>					<b>0</b>					<b>0</b>					<b>0</b>					<b>0</b>
	3.1	0	0	0	0	0	0	1	0	1	0	1	0	1	0	0	0	1	1	2	
	3.2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0		
	3.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	3.4	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0		
	3.5	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0		
	3.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	<b>Total BSAs Categorie 3</b>					<b>2</b>					<b>1</b>					<b>2</b>					<b>2</b>
	4.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	4.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
<b>Total BSAs Categorie 4</b>					<b>0</b>					<b>0</b>					<b>0</b>					<b>0</b>	

Planning	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	1.2	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	
	1.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	1.4	0	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	
	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	1.6	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Total BSAs Categorie 1					1					3					0				
	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Total BSAs Categorie 2					0					0					0				
	3.1	0	0	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	
	3.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	3.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	3.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	
	3.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Total BSAs Categorie 3					1					1					0				
	4.1	0	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	
	4.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4.4	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0		
4.5	1	1	0	1	3	0	0	0	0	0	0	0	0	1	0	0	1	2		
Total BSAs Categorie 4					6					1					0					
Decision-making	1.1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0		
	1.2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0		
	1.3	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0		
	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Total BSAs Categorie 1					2					0					1				
	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Total BSAs Categorie 2					0					0					0				
	3.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
	3.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	3.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	3.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
	3.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total BSAs Categorie 3					0					0					0					
4.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
4.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
4.4	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0			
4.5	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0			
Total BSAs Categorie 4					2					0					0					

Stakeholders	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.2	0	0	0	0	0	1	1	1	3	0	1	0	1	0	1	0	0	1
	1.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	1.4	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Total BSAs Categorie 1</b>					<b>1</b>				<b>3</b>				<b>1</b>				<b>3</b>	
	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Total BSAs Categorie 2</b>					<b>0</b>				<b>0</b>				<b>0</b>				<b>0</b>	
	3.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3.5	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	3.6	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0
	<b>Total BSAs Categorie 3</b>					<b>1</b>				<b>1</b>				<b>0</b>				<b>1</b>	
	4.1	0	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	1	0
	4.2	0	0	0	0	0	0	1	0	1	1	0	0	1	0	0	0	0	0
	4.3	1	0	0	1	2	0	0	0	0	0	0	0	0	0	1	0	0	0
4.4	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	
4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<b>Total BSAs Categorie 4</b>					<b>2</b>				<b>4</b>				<b>1</b>				<b>2</b>		
Timing	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.2	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0
	1.3	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Total BSAs Categorie 1</b>					<b>2</b>				<b>1</b>				<b>0</b>				<b>1</b>	
	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Total BSAs Categorie 2</b>					<b>0</b>				<b>0</b>				<b>0</b>				<b>0</b>	
	3.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3.2	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
	3.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3.4	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3.6	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Total BSAs Categorie 3</b>					<b>2</b>				<b>1</b>				<b>0</b>				<b>0</b>	
	4.1	0	0	0	1	1	0	1	1	2	0	0	0	0	0	0	0	0	0
	4.2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<b>Total BSAs Categorie 4</b>					<b>2</b>				<b>2</b>				<b>0</b>				<b>0</b>		

Intensity	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.2	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0
	1.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.4	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0
	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Total BSAs Categorie 1</b>					<b>2</b>				<b>0</b>				<b>0</b>					<b>2</b>
	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Total BSAs Categorie 2</b>					<b>0</b>				<b>0</b>				<b>0</b>					<b>0</b>
	3.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3.2	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0
	3.3	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0
	3.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3.5	1	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0
	3.6	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Total BSAs Categorie 3</b>					<b>2</b>				<b>3</b>				<b>0</b>					<b>2</b>
	4.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4.3	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	1	0	0
4.4	0	1	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	
4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<b>Total BSAs Categorie 4</b>					<b>3</b>				<b>1</b>				<b>0</b>					<b>1</b>	