MSc Research Thesis

"Preference strategies to facilitate BRZO companies in Spatial Adaptation"

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"Preference strategies to improve improve the level of water safety of BRZO companies in the process of spatial adaptation in Zeeland"

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Acknowledgement

This thesis research has been written in the end period of the MSc study Urban Environmental Management at the Wageningen University. The research thesis took place in the period February to July 2017 at the Province of Zeeland. The research topic of this thesis was "spatial adaptation." Due to actuality and abstractness of the research topic, it was a challenge to reach all of the research goals within the strict time limits.

Interesting results were derived from this research. Which hopefully in the future can be used by the Province of Zeeland and other interested parties. In order to be able to improve the level of water safety of BRZO companies.

First of all I would like to thank Drs. F.H. Schumacher and L. Caljouw for allowing me to perform my master thesis research at the Province of Zeeland. Secondly I want to thank the internship guides Dr.Ir. G. Swarte and Dr. G. Van der Velde for thinking with me and giving feedback whenever necessary.

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I wish you much pleasure reading this research thesis.

Glenny Davidse **September 11th 2017,**

Abbreviations

In this research document various abbreviations will be used, which are often related to the topics of spatial adaptation, heat stress, and climate change. Often recalled abbreviations will be defined within this chapter. A list of abbreviations is included below:

BEVI	Decision External Safety Facilities
BOR	Borsele
BRZO	Decision Risks Severe Accidents
DD	Delta Decision
GGD	Gemeentelijke Gezondheidsdienst
IPCC	Intergovernmental Panel on Climate Change
KNMI	Koninklijk Nederlands Metrologisch Instituut
NAP	Amsterdam Ordinance Datum
RUD	Regionale uitvoeringsdienst
RWS	Rijkswaterstaat
SA	Spatial Adaptation
TER	Terneuzen
VLI	Vlissingen
VRZ	Veiligheidsregio-Zeeland

Definitions

In this document professional terminology will be used, which are often related to the topics of spatial adaptation, water safety, and climate change. Often recalled terms will be defined within this chapter, to display the meaning of these words more specifically. A list of definitions is included below:

Climate change	Climate change refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer (IPCC, 2007).
Climate proof	**"**The capacity of a system to continue to function well as the climate changes" (van Drunen et al. 2009).
Facilitation	Is an important term in this research. It is an action within a process whereby a party is facilitated. According to the dictionary it is a practice 'to make easier, or to assist the progress of' (Oxford dictionaries, 2014).
Hazard	The potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources. In this report, the term hazard usually refers to climate-related physical events or trends or their physical impacts (IPCC, 2007) .
Mainstreaming SA	"Initiating spatial adaptation in such a way that in the long term it will be a normal practice for assessment and as implementation." (Uittenbroek, C. J., Janssen-Jansen, L. B., & Runhaar, H. A. 2013).
Multi-layer water safety	Is an approach which uses three various measures. It divides three layers which contribute to water safety. These various layers do have a specific weight how they can contribute to the basic water safety (VROM, 2009).
Resilience	The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation (IPCC, 2007).
Risk	The potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values. Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur (IPCC, 2007).
Spatial adaptation	**"**Spatial adaptation" is a way of adapting towards climate change, whereby spatial functions are alternated in order to be less impacted by effects of climate change (Ministerie van Verkeer en Waterstaat, 2007).
Vulnerability	The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (IPCC, 2007).
Water safety	Is a certain state of equilibrium in which build areas are not susceptible by any or most common forms of storms and floodings. In a way where no or less casualties and financial damage is dealt (Ministerie van Verkeer en Waterstaat, 2007).

Abstract
Companies to which risks of severe accidents are high are often called “BRZO companies.” Until recently water safety of BRZO companies was a topic Provinces in the Netherlands gave little attention to. Because of the growing role of responsibility of companies to the topic of spatial adaptation, it will become necessary that companies take an active role in this process. This document contains the research performed during the thesis period of the master program Urban Environmental Management.

Research was performed to barriers and management strategies that can be used in order to improve the level of water safety of BRZO companies in Zeeland. Data was obtained through the use of literature studies, interviews, a questionnaire survey and performing analyses. By researching what barriers BRZO companies experience in the process of improving their level of water safety, governmental strategies were allocated. Results showed that BRZO companies are open to work together with the joint government in order to take adaptation measures. By analysing methods for management it was found that the Kotter 8 step model can be used to operationalize the preference strategy developed in order to remove process barriers.

Results showed that use should be made of political support and increase willingness to participate. By developing a clear vision on BRZO companies and spatial adaptation, detailed information shared by joint government on best practices in other provinces, local adaptation methods for BRZO companies, providing clear guarantees and local examples (pilots) with a financial picture. Barriers of BRZO companies will be removed and the level of water safety increased.

Keywords: water safety, climate change, spatial adaptation, governmental facilitation

Summary

An assignment was given by “Provincie Zeeland.” The assignment was to research how the joint government in Zeeland can improve its facilitation process in order to improve the level of water safety of BRZO companies. Specifically within the scope of the Delta Program “Spatial Adaptation.” A main question has been set-up, it reads: ***“Which strategies can be developed and used by the Province of Zeeland that will be most effective to increase the level of water safety of BRZO companies?”***

This document is the end product of the thesis research. The topic of the research is to determine strategies that will be most effective in order to improve facilitation of BRZO companies in the process of spatial adaptation. Since it is a recent topic it is not known what current barriers there are in order to mainstream spatial adaptation for BRZO companies. It stresses the importance of finding how influence of the joint government can use strategies in order to remove barriers in place.

Multiple sub-questions have been set-up. After answering these sub-questions it became known which stakeholders are involved in the process of spatial adaptation and what their roles are, the barriers that BRZO companies experience, what influence (semi)-governmental stakeholders have on strategy development, what strengths, weaknesses, opportunities and threats there are in the relationship between joint government and BRZO companies, and what strategic choices can be made by the Province in order to increase involvement of BRZO companies and were these exist of.

By the ministry of Infrastructure and environment it is preferred that late adopters (especially large industries) are stimulated to join the process of spatial adaptation. The joint government has multiple roles in adopting and stimulating BRZO companies in order to take adaptation measures. Before it is possible to facilitate BRZO companies was necessary that barriers of BRZO companies are known. By making use of multiple research methods, barriers were made insightful and a preferred process related strategy was developed. Since various methods used were complementary to each other missing elements could be filled in also validating its research methods used. By using this preference strategy, barriers to mainstreaming spatial adaptation with the focus on water safety to BRZO companies can be removed.

In order to improve the level of water safety and the facilitation process of BRZO companies, the Province should make use of a mix of regulatory and cooperative strategies. To safeguard the approach a vision document should be used as instrument in order to develop and in later phases safeguard a long term vision related to adaptation of BRZO companies. By making use political support and extended use of informative events awareness and willingness to participate will be increased. Fragmented visions of municipalities should be removed by sharing results of joint studies. Provincial expectations should be shared with BRZO companies. Barriers of BRZO companies to take spatial adaptation measures are: “lack of knowledge on vulnerability, climate scenarios and adaptation measures on local scale and adaptation possibilities. By developing a clear (provincial) vision, sharing detailed information on best practices in other provinces, local adaptation methods for BRZO companies and providing clear guarantees and local examples (pilots) with a financial picture, barriers can be removed. It will be necessary that front running companies play an ambassadors role showing off its short term wins. This will increase awareness and willingness of other (BRZO) companies to participate and adapt.

Front running companies should be stimulated to invite the Province and other parties from the process group on site. Companies should take the initiative themselves for adaptation. Communication with companies should be centrally organized preferably via the Province. By making use of the “new environmental law” and policy vision document an inclusive vision on change can be embedded. Guarantees for adaptation in harbour areas should be given by the Province and safeguarded. Adaptation goals to water safety should be integrated in this policy vision document in order to assure companies what visions and goals will be achieved in the future. Finally a reflection meeting should be held in order to reflect upon the process and to verify if process barriers are broken. When not, additional actions should be taken. It is advised that the joint government adopts this strategy and further implements it themselves in order to be able to improve this process. *(see chapter 4.3.3)*

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1. Introduction

1.1 Background and introduction

After a process of multiple years led by the Dutch government, multiple delta decisions were made. One of them is the Delta decision Spatial Adaptation "Ruimtelijke Adaptatie." This delta decision is not an end point, but a start of a transition process that was initiated (Ministerie van Infrastructuur en Milieu, Ministerie van Economische Zaken, 2014).

The expectation of this process is formed by the "*Stimuleringsprogramma Ruimtelijke Adaptatie*" (Stimulating Program Spatial Adaptation) and is directed down from national government to the lower levels of governments, such as provinces and municipalities but also private parties. The coming years the provinces and municipalities in the Netherlands should acknowledge these new guidelines. The ultimate goal of these guidelines is to decrease the effects of climate change, by stimulating and making use of spatial adaptation measures. Adaptation measures are the measures that can be used in order to reduce the impacts of climate change. An example is heightening quays and making use of temporary flood walls in order to prevent companies from flooding (Ministerie van Infrastructuur en Milieu, Ministerie van Economische Zaken, 2014).

The various provinces and their partners Rijkswaterstaat, Veiligheidsregio and Water boards in the Netherlands do have the task to stimulate and facilitate the implementation of Spatial Adaptation of municipalities. But also have to focus on private parties, such as harbour companies, infrastructure related parties such as energy companies, industry etc. By the Province of Zeeland it is stated that the largest threat where spatial adaptation policy "SA" in Zeeland should be focused at is the topic of water safety (Provinciaal overleg Waterkeringen, 2014).

An important part of the Delta Decision Spatial adaptation is that all governmental parties together focus on capturing the ambition that the Netherlands in 2050 will be water robust and climate proof. National government formulated a spatial adaptation guide and a stimulation planning. The State ensures that the functions of national importance which are vulnerable by 2050 will become more resistant to effects of climate change. These include positions several vital infrastructures, like energy, telecom and IT, chain wastewater, drinking water, health, sluices, pumping stations, road transport, chemical companies and laboratories that use pathogens. (Ministerie van Infrastructuur en Milieu, Ministerie van Economische Zaken, 2014).

During the interim evaluation of SA the Delta Commissioner agreed that some stakeholders groups are lacking behind in the spatial adaptation process. The Delta Commissioner decided that the coming years more should be done to actively involve late adopters in the spatial adaptation process. During the interim evaluation steering groups expressed support for an approach in which the national delta plan on national level leads to a further concretization of the delta decision SA. It is then up to "the region" in order to work out regional preference strategies for involving late adopters the coming years (Delta Commissaris, 2016). Concerning late adopters representatives of Zeeland stated that priority goes out focus on developing strategies to improve the level of water safety of BRZO companies. Since these companies are often industrial and make use classified chemicals risks of severe accidents are above average. This is the reason why priority goes out to these companies.

1.2 Research questions

During the thesis research period, research was performed to what strategies can be developed and used in order to involve improve facilitation of BRZO companies in Zeeland. With the goal to ultimately improve the level of water safety. When the answer to this question is known, recommendations can be made on how the Province can safeguard this process. Especially on what strategies can be developed in order to facilitate BRZO companies in Zeeland to reach the goal on participating in the spatial adaptation process. This main question has been set-up:

"Which strategies can be developed and used by the Province of Zeeland that will be most effective to increase the level of water safety of BRZO companies?"

To answer the main question use is made of 3 concepts from literature. These concepts are displayed in the conceptual model displayed in chapter 2. Strategies can be developed by the Province in order to decrease barriers to mainstreaming spatial adaptation of BRZO companies. When barriers of BRZO companies decrease the level of water safety will increase. The Province can formulate strategies since it has authorised supervision (Interview VI). Moreover external (semi)-governmental stakeholders also play a role in this strategy formulation since each of these stakeholders is responsible for its individual responsibilities such as informing, advising, and executing tasks related to BRZO companies. Different strategies formulated according to the theory of resources and customer based theory. These can be either a. direct measures, b. fulfilling requests c. complementary relationship (See chapter 2.2 "Resource and Customers theory").

For this thesis research five sub questions have been set-up to specify research answers. These sub-questions exists of 5 concept elements recognized in the conceptual model. The answers derived from the sub-questions will further specify the conclusions. The sub-questions will be answered in the order such as displayed below. It is chosen to maintain this order since it most coherent with the research approach chosen for. When answering these sub-questions this ultimately the main research questions can be answered in an inclusive way. The sub-questions set-up are:

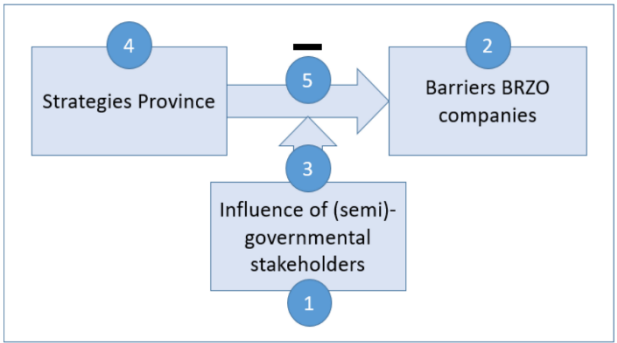


Figure 1 – Sub questions and its location in conceptual model

1. *"Which stakeholders are involved in the process of implementing the Delta program spatial adaptation in the Province of Zeeland, and what are their roles, tasks and obligations related to BRZO companies?"*
2. *"Which barriers do BRZO companies experience in order to contribute in mainstreaming water safety in spatial adaptation?"*
3. *"What influence do (semi)-governmental stakeholders have on strategic influence of the Province related to removing barriers?"*
4. *"What strategic choices can the Province make in order to increase involvement of BRZO companies? And of what components can these strategic choices exist of?"*
5. *"What are the current strengths, weaknesses, opportunities and threats of the relationship between joint government and BRZO companies in Zeeland? With the focus on spatial adaptation."*

1.3 Structure of research and report

This research report has been structured in three phases. Every phase contains its own components from which the research is build-up. In this sub-chapter it will be explained what is included in which phase of the research, and what it contributes to the research as a whole. This mainly can be considered as structure of this thesis document.

Phase 1
In the first phase of this thesis document results are displayed of a spatial analyses, stakeholder analyses and literature analyses performed. These analyses were performed in order make an inventory of spatial and stakeholder characteristics. Stakeholders were categorized based on these findings.

Phase 2
In the second phase of this thesis document, results of the case study, in-depth desk research, practical research and stakeholders interviews performed are displayed. These analyses performed were part of the core research in order to perform in-depth research on the risks of BRZO companies and what they expect of governmental facilitation.

Phase 3
In the third phase of this thesis document, the outcomes derived from the phase outcomes of the interviews and case studies were derived interpreted, and connected to the strategies which can be used to improve the process of mainstreaming. For interpretation a SWOT and TOWS analyses were used. A literature analyses was to form these connections made.

1.4 Relevance water safety/spatial adaptation

Climate change together with a changing role of the government is the reason that the program of spatial adaptation was initiated. (Ministerie van Infrastructuur & Milieu, 2014). Due to the effects of climate change a faster increasing sea level rise in combination with more extreme precipitation and increase in precipitation is observed. Which leads to an increase of flood risks (KNMI, 2015). Flood risks will increase for either living areas as for areas where companies are located.

There are different scenarios that project the estimated level of sea level rise in the Netherlands. Depending on the rise in temperature which is expected to rise 6 degrees centigrade the coming hundred years. Which means that a sea-level rise of 0,55 to 1,20 meters can occur. When taking in account soil subsidence, a relative sea level rise of 0,65 to 1,30 meters can occur (Deltacommissie, 2008).

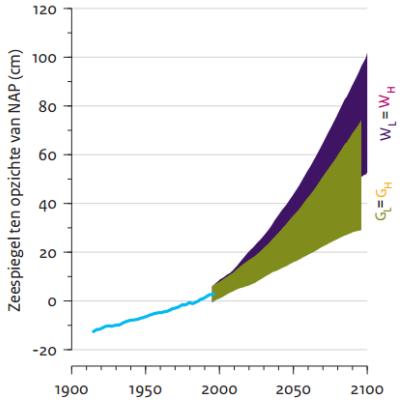


Figure 2 - Sea level rise in the Netherlands (KNMI, 2014)

The flooding of an area can lead to multiple direct effects and indirect effects. Direct effects are casualties and economic damages by the floodings itself. Example of this are drowning citizens because of the high water level or flooding of electrical infrastructure damaging because of being partly underwater. Indirect effects are economic damages caused by social disruption and environmental damages caused by for example due to an industrial disaster (TNO, 2013).

The Province of Zeeland is a deltaic area by nature. Since it is located close to the sea and catchment of rivers it has a history of managing water. Due to different storms in the past often disasters occurred causing the urge to keep improving the level of water safety in Zeeland (Emmen, 2002). Since heightening dikes is not a sustainable solution for the future, executing spatial measures in the

areas that require these in combination with calamity plans is part of the new approach that more often will be used in the future (Ministerie van Infrastructuur & Milieu, 2014).

There are two areas that require a higher level of attention and water safety. These are the areas with a high population density or with an important economic status. In Zeeland the areas with a high economic status are the areas were industry and transport companies are located (VNK2, 2014). In Zeeland these companies are mainly clustered in the harbour area. There are different companies, of these companies the most vulnerable are the so called BRZO companies. These companies have crossed the threshold on dangerous substances (Provincie Zeeland, 2016).

The importance of taking "spatial adaptation" measures related to vital and vulnerable functions against floodings for BRZO companies there are 3 reasons why. According to Heileman et al. these are: 1. Functioning of vital infrastructure is crucial for the functioning of an area. Temporary shutdowns can cause social disruption (economic damage/casualties). 2. A failure of vital and vulnerable infrastructure can lead to failure and increase of flooding to non-flooded areas spreading the effects of flooding. 3. The indirect damage of non-functioning vulnerable functions is often larger than direct damages (Heileman et al., 2012).

1.5 Organizational background

The organization were I performed my thesis research is the Province of Zeeland (Provincie Zeeland). The Province is housed in the Abdij in the city centre of Middelburg. In 2016 Around 475 employees are working at the Province. It is a regional governmental organization working on legislation, policies and various projects. (Provincie Zeeland, 2016b)

As goal the Province focuses on economic development, growth and innovation of Zeeland. The Province of Zeeland makes use of its strategic location next to the sea between Rotterdam and Antwerp. The Province focusses on creating benefits and exploiting its successful sectors which are the process industry with bio based economy, harbours, logistics, recreation and tourism, energy, agriculture, agro food, fishery and aquaculture. Rural-and nature development are also tasks of the Province. The Provincial board is supported by the provincial organization under guidance of the Provincial secretary/director. (See figure 3)

The department "Space," was the department I did performed my research at. It is one of the fourteen departments responsible for execution of various policy assignments. The department of space is responsible for further developing policy goals, organizational goals and visions. Particularly on the topics of spatial development, urbanism, environment, recreation, urbanism, water safety, in policy, programs and projects with a large provincial importance. The development, execution and monitoring of policy, programs, projects and processes can take from several weeks to multiple years (Provincie Zeeland, 2016b).

The Province of Zeeland as regional government has the obligation to execute decisions made on national and European level. Decisions on provincial level are made by the Provinciale Staten, which represent the citizens of Zeeland. Depended on politics, strategies and visions are formulated and executed. These visions concern projects and processes. Moreover these visions can also steer the implementation of national decisions on provincial level (Provincie Zeeland, 2016b). The projects, processes and programs the Province is working on, can take a long time before total completion. An example is the execution of the Delta Program spatial adaptation, which has a duration till the year 2050.

Projects the department of space is working on this moment:

- Coastal zoning for building in coastal areas

- Execution Delta Program spatial adaptation
- Vital and vulnerable functions
- FRAMES
- Implementation new environmental law

To achieve its collective goals employees working for the different departments work closely together with other organizations.

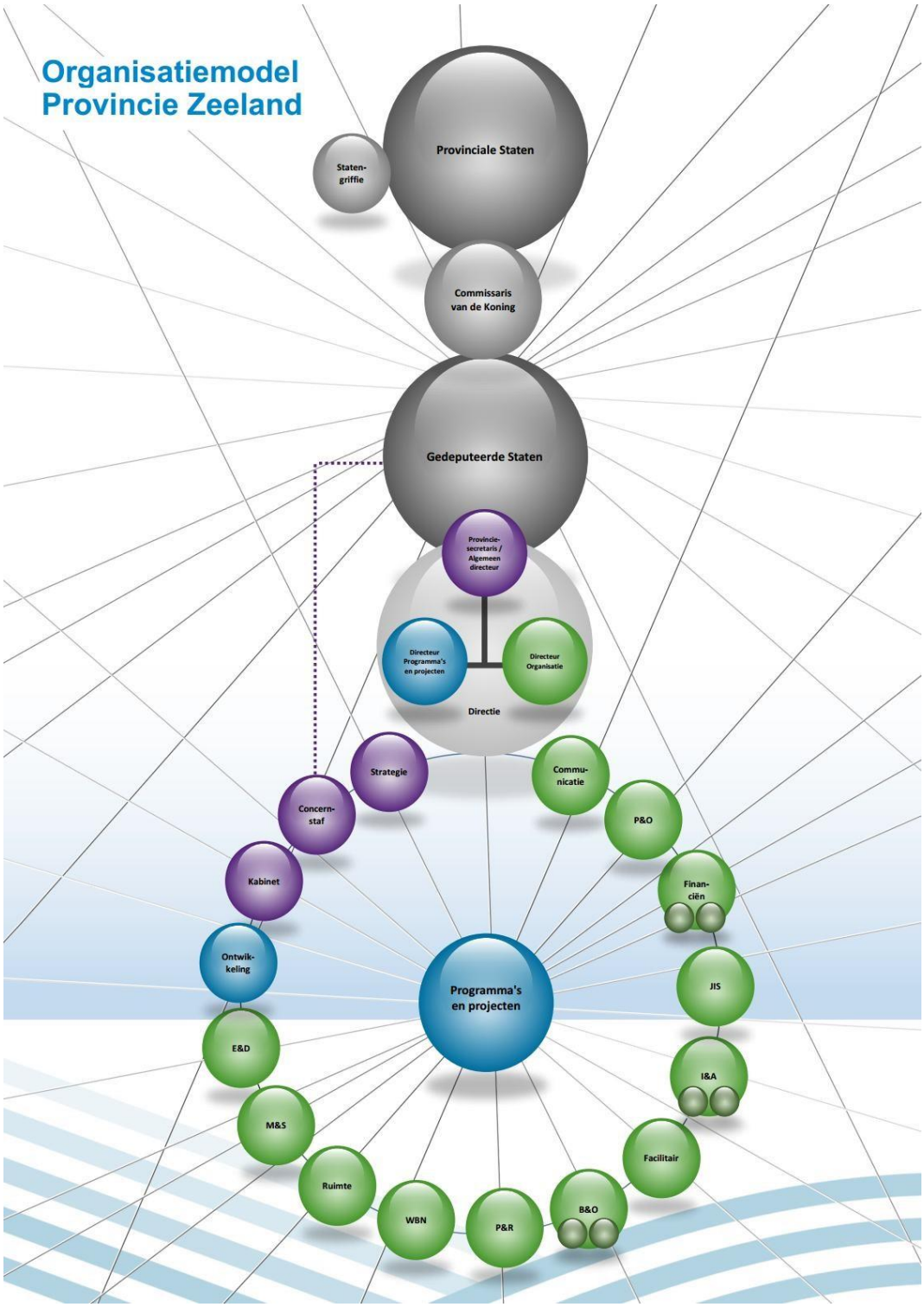


Figure 3 - Organization Chart 2016 Province of Zeeland. Retrieved from the Provincial website.

2. Theoretical framework & relevant literature

To conduct this research it was chosen to make use of the theoretical framework displayed in chapter 2.2. The theoretical framework used, underpins the research and validates methods used. Making use of a research methodology was useful concerning outline, focus to specify definitions, factors and subjects included in the research. By making use of a literature review, (sub)-variables of the theoretical framework were shortly reviewed. This was done in order to show the relevance of variables to and how these effect each other. Next to this the literature research will provide an answer on what main stakeholders are involved in the process of SA (sub-question 1). And partly provide an answer to what categories of barriers exist corresponding to sub question 2.

2.1 Literature research - relevant literature

In this chapter main variables and sub-variables are explained. This is done by explaining definitions, by making use of sources from literature. Definitions of these main variables are displayed below:

- **Climate change**

Climate change is one of the drivers of the growing importance to spatial adaptation. Climate change can be defined as: "*A long-term change in the earth's climate, especially a change due to an increase in the average atmospheric temperature*" (IPCC, 2007). For the Netherlands this will have various effects such as increase in temperature, increase in rainfall, increase in heavy weather related events and an increase of sea-level rise (KNMI, 2014). For the Netherlands this can have severe effects, such as increased change of flooding's, water nuisance and heat events.

- **Goals of spatial adaptation**

The main goal of spatial adaptation is to take smart (win-win) decisions in spatial planning on local level to avoid or withstand the negative effects of climate change over the longer term (Ministerie van Infrastructuur en Milieu, 2014).

- ***The main goal of this Delta decision is:***

Like explained in the chapter “background,” a new national Delta plan with various delta decisions has been made. One of the goals is that appointments are made between various governmental stakeholders on short term in order to start working on the approach of Spatial Adaptation. The ultimate goal of this approach is to decrease the effects of climate change, by making use/stimulating spatial adaptation measures. It focusses on the local level, and municipalities together with the Water boards and private stakeholders should work actively on determining which locations are vulnerable and how these can be developed in a water robust way in the year 2050 (Ministerie van Infrastructuur en Milieu, Ministerie van Economische Zaken, 2014).

- **Growing importance facilitation private parties & bowtie model**

Since the last decade perceptions on the approach of (water) safety are changing. From equal protection to all, to increased protection of areas with a high quantity of civilians or high economic importance. In a research of Van der Most et al this statement was made: “The behaviour of local, political and private importances and parties will become more important in weighting public values. Like protection related and economic values; especially when these are connected to long-term perspectives. Different public and private parties will negotiate about the balance of prevention to other goals and conflicting importances.” (Most et al. 2010). It shows that guaranteeing climate change related safety is a complex process in which a balance should be found between prevention and goals of society.

A model that reflects this "balance" is the bow tie model (see figure 4). It has two sides, on side the potential threats and protection of a certain area, on the other side the potential outcome that is related to disaster recovery. From a historical perspective in the Netherlands there was more often focussed on "protection" & "prevention" than "recovery." Therefore it can be argued that left part of the so-called "bow tie" is larger than the right part (Khakzad et al. 2012). Moreover when the concepts of the program of spatial adaptation are connected to this model it can be argued that it focusses completely on the left side of it. Since spatial adaptation is mainly related to adapting space to reduce potential threats. Since BRZO companies pose the highest threats when a disaster would occur (interview V). Therefor it is of importance to the Province of Zeeland that in the provincial process of spatial adaptation the private sector will become involved and facilitated (Provincie Zeeland. 2016).

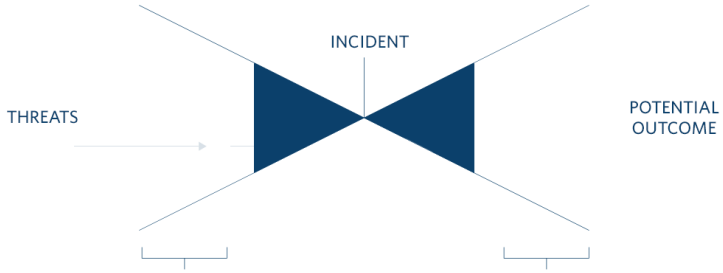


Figure 4 – Bow tie model, shows a balance between threats and outcomes

- ***On national level various things have been done:***

Intention declarations have been signed in which parties declared that they would cooperate. Stimulation-program "Stimuleringsprogramma Ruimtelijke Adaptatie," has been set-up and active since the year 2014. Multiple parties did sign the intention declaration, parties ranging from knowledge institutes to commercial parties and governmental parties. Furthermore on national level a stress test was developed. Already various provinces made use of these on municipal level to determine how vulnerable they are and where points of attention might lie (Ministerie van Infrastructuur en Milieu, 2014). In the Province of Zeeland the first stress-test was held in the municipality Noord-Beveland. During this stress test the four topics of spatial adaptation have been discussed. Threats and opportunities were also discussed (Meeting notes III). By sharing visions actors were able to align their visions on the process of SA.

- **Decision effectivity and translation to other governmental parties:**

In the year 2014 to 2015 many local governmental parties were confused or unknown to the content of the program, since it did not offer specific insights on how governmental parties should facilitate spatial adaptation. The minister of infrastructure and environment, Melanie Schultz stated that governmental parties on the more local levels now should pick up the decision and start implementing it (Ministerie van Infrastructuur en Milieu, Ministerie van Economische Zaken, 2014).

At this moment, local governmental parties such as municipalities are knowing and recognizing their responsibilities concerning the program of spatial adaptation. In a policy document of the Delta Commissary is was stated that there is more attention will be given to involving citizens and companies and give them more responsibility to act on spatial adaptation. "This will require attention for a clear communication, focussing on the urgency and awareness to this subject and the possible instruments that can be used." (Deltacommisaris, 2016).

- **National approach and focus:**

In the syntheses document "Spatial Adaptation," a specific approach is aiming at three steps which first have to be passed through. These three steps are:

- Weten (knowing) - Goal to finish: 2015
- Willen (to be willing) - Goal to finish: 2020
- Werken (working) - Goal to finish: 2050

These steps can easily be explained, it will first be necessary to have enough knowledge on the topic of spatial adaptation. When parties involved in the process, do have enough knowledge about the various factors where Spatial Adaptation exist out of. Then it will be time for the part of willing. This is related to being willing to implement the program of SA in policy planning's and decision making documents. (Ministerie van Infrastructuur en Milieu, Ministerie van Economische Zaken, 2014), (Nieuwbouw en herstructurering, 2014).

What concerns the topic of working, the program of SA will become mainstreamed over a period of time. Then the program of SA will be in the phase of "working." On this moment in time the process of spatial adaptation in Zeeland is in the phase of "knowing." To proceed to the next phase it will first be necessary to generate more awareness towards SA. Also within this phase various researches towards the implementation of SA will be performed. This thesis research is a practical example of a product generated within the phase "knowing." (Ministerie van Infrastructuur en Milieu, Ministerie van Economische Zaken, 2014), (Nieuwbouw en herstructurering, 2014).

- **Phases spatial adaptation Provincial level**

In the program of spatial adaptation there are four topics. These are: heat stress, drought, water nuisance and water safety. For all of these topics three phases have be worked through like described in one of the previous sub-chapters. It is possible that each of these topics find itself in a different phase. From the monitor spatial adaptation 2016, it was observed that the phase a governmental actor is in is perceived differently compared to the various levels of government. Since this research focusses on the Province of Zeeland, only the phases of the topics of spatial adaptation on Provincial level are explained (Brugge et al., 2015).

As can be recognized the topics drought and water safety are already in the phases of working, according to several parties from government. The main reason for this is that a higher priority is given to these topics. Knowledge was already available and parties involved were willing to actively work on these topics. The topic of water nuisance is still in the phase of willing. On this topic sufficient knowledge is available, but the process of working on this topic still has still to be started. The process of heat stress in the Province of Zeeland finds itself in the first phase "*knowing*" (Brugge et al, 2015). It should be stated that there is a difference between the phase were governmental parties perceive they are in and were the overall process is in. An example is that the overall process also includes private parties which were not involved in the process of SA yet. When evaluating the overall holistic process of SA it can be stated that it find itself in the starting phase "*knowing*" (Provincie Zeeland, 2016).

- **Organization of Provincial stakeholders**

Governmental parties on the topic of spatial adaptation are currently organized as displayed in table 1 below. The names displayed below the names of the organizations are the current contact persons responsible within their organization for the topic of SA (Provinciaal overleg waterkeringen, 2014).

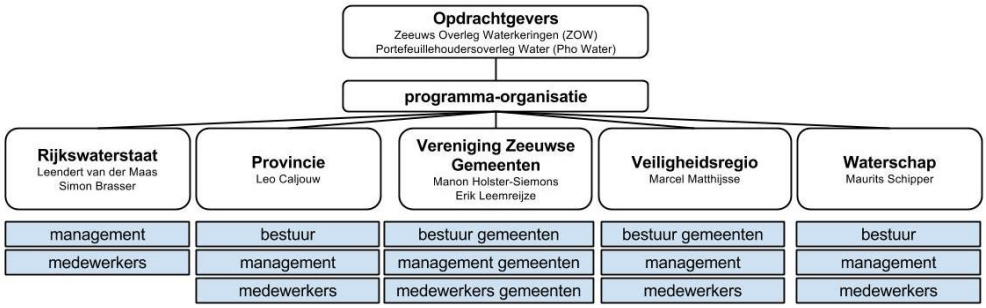


Table 1 – Organization of Provincial stakeholders' spatial adaptation.

- **Provincial process Spatial Adaptation**

In the Province of Zeeland governmental stakeholders initiated a process, on the topic of implementing the Delta Decision spatial adaptation. After the Delta decision was made, regional governmental stakeholders in the Province of Zeeland immediately did pick up the initiative. The regional process of cooperation on this topic started around November 2014 according to the startnotitie ruimtelijke adaptatie (Startnotitie Ruimtelijke Adaptatie, 2015).

To take on this "Delta Decision" a regional coordination team was composed. It does exist out of five parties. Which parties are involved, and which roles, tasks and obligations they have are displayed in table 2 below:

Provincial process – Zeeland – Delta decision spatial adaptation		
Party:	**Role:**	**Tasks and obligations:**
Provincie Zeeland	Main practical and policy coordination	Responsible for policy direction and steering functions. Provides regional information and data sets, GIS layers, communication to the public.
Rijkswaterstaat	Umbrella coordination (keeping informed)	Practical execution and coordination of national and regional water safety measures.
(Vereniging) Zeeuwse gemeenten	Input from the standpoints of municipalities. Municipalities personally do have the main role to assess municipalities to undertake action on spatial adaptation. (together with the technical input from the water board)	Representing regional municipalities.
Veiligheidsregio	Responsible physical/vital infrastructure. Advising role towards other parties.	Responsible for vital infrastructure, crisis communication & management
Waterschap Scheldestromen	Practical execution of stress test and spatial adaptation methods (together with municipalities)	Responsible for local technical water related functions. And enabling its functioning.
Source: (Provinciaal overleg waterkeringen, 2014), Meeting notes I, II		

Table 2 – Roles, tasks and obligations of Stakeholders involved with SA

- **Regional governmental facilitation**

As the table above shows, all parties involved in the process of spatial adaptation in the Province of Zeeland do have certain tasks and obligations. Since provinces do have the obligation of facilitation towards regional spatial planning, and providing information (GIS data, spatial data and national policies). The Province should help municipalities and private organizations to stimulate execution of spatial adaptation. Other parties also have a certain role of facilitation in this regional process. But for this research the main focus is mainly aiming at the Province of Zeeland (Startnotitie Ruimtelijke Adaptatie, 2015).

- **Climate adaptation relation Spatial Adaptation**

Climate has a negative effect on "Water safety," in Zeeland. In the Netherlands various Delta Plans caused improvements of coastal protection guaranteeing water safety according to legal standards. In 2015 a new delta plan came out, with various delta decisions. One of these decisions is "Spatial Adaptation" which focusses on mainly four topics: heat, water safety, water nuisance and drought. It stimulates that smart spatial solutions will be made to decrease of these four factors mentioned

(Ministerie van Infrastructuur en Milieu, Ministerie van Economische Zaken, 2014). In this case research is performed to the factors "*water safety*," and "*water nuisance*."

- **Core definitions water safety**

In a document of the Delta Program "Nieuwbouw en Herstructuring" in the year 2011, a notation was made. This notation defined the core definitions of water safety. There are 6 core definitions. The first three definitions form the build-up of water safety related core definitions. The numbers 4,5,6 are a result of the numbers 1,2,3. These are displayed below, see figure 5.

The core definitions of water safety are defined to serve as theoretical background for the spatial analyses which will be undertaken in phase 1 of the research. This model (figure 5) shows that what concerns basic spatial factors which need to be included to assess or map spatial characteristics based on water safety. These are thus mainly flood change, exposure and vulnerability. Since these spatial indicators do have a better correspondence with the topics of mainstreaming and SA (Deltaprogramma Nieuwbouw en Herstructurering, 2011). These indicators are further defined in detail:

1. **Flood change,** This variable exists out of these sub-variables: Current flood change, Flood defenses, Current (re)-structuring norms. The first two sub-variables are supported by the latest VNK document. (Royal Haskoning DHV, 2015) The variable restructuring norms are supported by Scheldestromen (Scheldestromen, 2014).
2. **Exposure,** This variable exists out of these sub-variables: Soil, Relative height, Flood depth, Water discharge/infiltration and salt intrusion. All of these sub-variables are supported with the data available at *"Geoloket Zeeland,"* and AHN2 maps.
3. **Vulnerability,** This variable exists out of these sub-variables: Population density, vital infrastructure. These variables are supported by the National risk map and Regional risk profile. (Veiligheidsregio Zeeland, 2013)
4. **Hazard**, Combination 1 & 2. Is the potential hazard of a flooding, based on the change of prevention and exposure.
5. **Risks,** Combination 2 & 3. The possible consequences of a flooding in an area based on exposure and vulnerability.
6. **Total risk,** combination 4 & 5. The results of change, exposure and vulnerability of a flooding in an area.

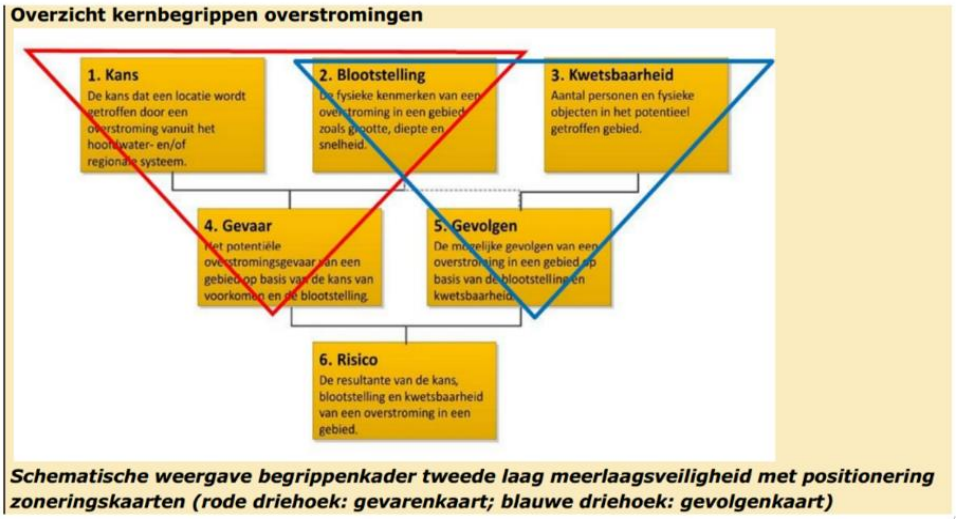


Figure 5 – Core definitions of water safety (Deltaprogramma Nieuwbouw en Herstructurering, 2011).

- **Mainstreaming climate/spatial adaptation**

Mainstreaming is: "*Belonging to or characteristic of a principal, dominant, or widely accepted group.*" (Uittenbroek et al. 2013). So the practical definition of mainstreaming in this case is: "*Initiating spatial adaptation in such a way that in the long term it will be a normal practice for assessment and as implementation*." Mainstreaming is the final goal of the spatial adaptation program in Zeeland. When mainstreaming is reached, the objective and goal is reached. Therefore it can be concluded that this will be the main factor within the research. Like figure 6 displays, various limiting factors in the start period could hinder the mainstreaming process (Ministerie van Infrastructuur en Milieu, Ministerie van Economische Zaken, 2014).

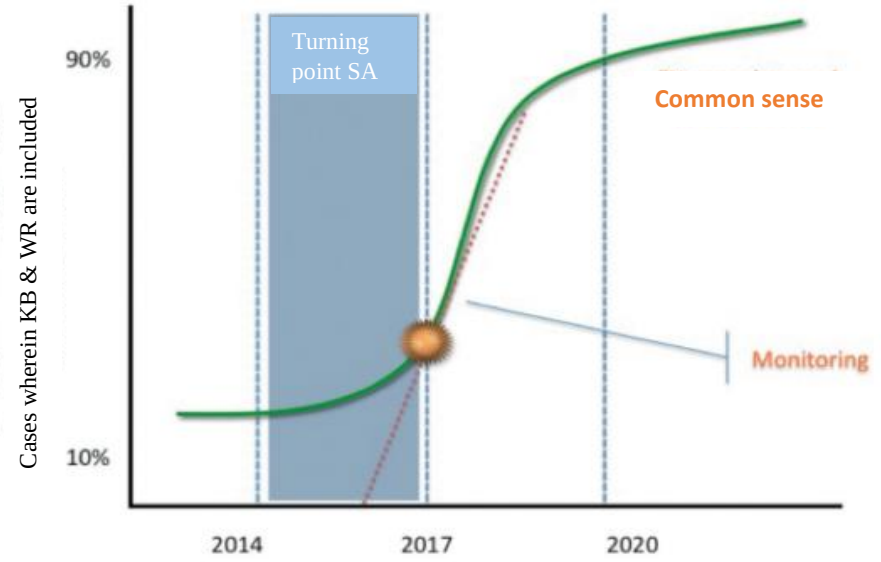


Figure 6 – Mainstreaming of Spatial Adaptation (Synthesedocument ruimtelijke adaptatie, 2014)

Like stated, research shows that mainstreaming does exist out of various barriers which prevent mainstreaming from happening. These factors are:

Capacity related barriers

Capacity related barriers are "shortages in the capacity to implement actual adaptation actions" (Berg M, 2009). Furthermore capacity can refer to a shortage or lack of financial resources. Furthermore these shortages can also refer to the lack of human capacity to "implement actual adaptation actions." Capacity can be seen as an abstract factor but can be easily measured.

Cognitive related barriers

Cognitive related barriers are "knowledge gaps" often "uncertainties as to the starting point of climate change impacts" (Berg M, 2009). "Cognitive" is a relatively broad defined definition, and often includes five sub-variables. These sub-variables have to do with lack of knowledge, uncertainty and unreality. Within this case concerning spatial adaptation and improvement of climate change related barriers.

Social and Cultural barriers

Social and Cultural barriers are: "(Lack of) awareness climate risks" (Berg M, 2011). Sub-variables are often related to various macro and meta levels. Furthermore Influences from the outside can trigger internal barriers concerning execution of climate change adaptation and spatial adaptation. Often due to these barriers problems are not recognized in time. Furthermore this can slow down processes for implementation of spatial adaptation.

Political and institutional barriers Political and intuitional barriers are "(Lack of) cooperation with other parties and governments" (Berg M, 2011). What concerns the sub-variables; these can be triggered top-down or sideward. And it does often connect with lack of cooperation, stimulation or taking responsibility. By not recognizing spatial adaptation problems, no adequate action can be taken. Sometimes it also can happen that spatial adaptation problems are recognized but no action is taken because of not seeing it as an importance. **Technological barriers** Technological barriers are: "Only few adaptation options available." (Biesbroek, 2011). Sub-variables are often limited, since it concerns the concept of technological possibilities. Research at this topic will mainly focus on the technologies available at this moment. Also it will be researched which of these technologies could be locally used within the Province of Zeeland.

Table 3 – Barriers of mainstreaming Spatial Adaptation

- **Methods spatial analyses**

It should be noted that the factors 4, 5, 6 derive from the first three main spatial variables. Therefore it has been determined that the first three variables will be used within the spatial analyses strictly based on spatial indicators. In the research "*Methoden en systemen voor het Afwegingskader Ruimtelijke Effecten*" (IVM, 2002) 5 forms of spatial analyses are displayed. It shows that when a qualitative spatial analysis is performed making use of the method *"balanced score card"* could be used for prioritizing locations. It is mentioned that this method also can be used to later perform in-depth research to the locations which derive as outcome.

- **Mainstreaming connection multilayer water safety & SA**

Between these two definitions a certain connection can be found. Since in the case of this research mainstreaming SA mainly focusses on water safety. These layers could serve as factors towards mainstreaming of SA with the interest on water safety. It is possible to use these factors as testing framework in the spatial analyses. Furthermore these factors could later be used for giving advice.

In this case it is chosen to not use these factors of multilayer water safety directly. The main reason for this, is the unequal relation of all layers of multilayer water safety. An example of this, is the third layer "disaster management," it is limited in its relevance towards the topic of SA. The spatial aspects play a crucial role, and cannot be connected to the main topic. Towards these spatial importances the connection between the core definitions of water safety are more evident. The main reason for this is that the factors where this definition is build up from are more spatial related. Towards this relation with space, in all layers a connection can be found towards the factors 1,2,3 but only in a limited way. All in all when multilayer water safety factors should be connected to the core definitions of water safety, one connects with one, two connects with two and three connects with three (Stowa, 2011), (Uittenbroek et al., 2013).

- **Resources and customer theory**

When translating the current relation and strategy formulation process between BRZO companies and the Province into theory it can best be explained by the theories of resources and customers based approach. There are two main theories that support these approaches. First these two theories will be explained. *The resource based view focusses on the availability of unique means (resources) and skills (capabilities) in organisation will lead to a competitive advantage and also reaching "superior" gains.* (Prahalad & Hamel, 1990), (Reed & DeFillippi, 1990).

The customer based view is a newer theory that focusses on the perspective of the customer that determines what resources are used and what products or services are supplied in order to keep up with the customer's needs. *Due to a complex and dynamic environment the supplier needs to constantly update its portfolio of resources* (Barney, 1986), (Porter, 1980).

Translating these two theories to the practice of this research. The Province and other semi-governmental stakeholders can be seen as the parties with the resources. BRZO companies can be seen as the customers demanding resources in the form of services, facilitation, or measures taken. In strategy formulation different relations can be identified. These relations can be brought back to three different types (see figure 7) displayed as A, B and C.

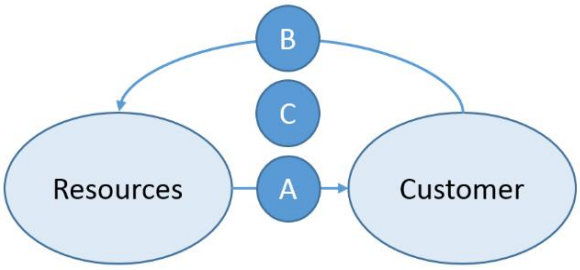


Figure 7 – Model of resources and customer based theories

A. In theory the direct relation, developing measures in which the "customer" has limited say. This with the goal to achieving higher level of water safety. It includes that the government can force "customers" to take actions on improving the level of water safety. This can be done by using policy instruments such as spatial decrees (Prahalad & Hamel, 1990), (Reed & DeFillippi, 1990), (Porter, 1980). It thus can be stated that this type of relation mainly includes taking direct measures from a governmental perspective.

B. Is the theory that the customer (BRZO companies) knows that the provider of the resources is serving all its necessary needs. The reason for this is that the customer knows it has an importance in the market of the region, for example providing economic value. Therefor when government determines that the level of water safety is lacking, the customer could argue that the government should solely execute these measures (Barney, 1986), (Porter, 1980). A coherent theory is the slippery slope theory. In this theory decisions made can be seen as a potential beginning of a trend. An example is when a government makes multiple decisions in favour of a company. The company will be more likely to expect that when future decisions are taken these also will be in favour of company importances (Burg, 1991). It thus can be stated that this type of relation mainly includes the government fulfilling requests for BRZO companies.

C. This is the theory that incorporates a mutual relationship of both parties. Both parties know its importance of cooperation. When measures are taken and decisions are made resources to achieve the ideal situation are more or less equally shared (Sciarelli, 2008). According to literature this is the only relationship between parties in which a successful approach can be guaranteed. Due to complex systems of management, policy and environment direct relationships do tend to be less effective on longer term (Kruijf & Pahl-Wostl, 2016). It can be stated that this relationships is a complementary relationship since it includes a two communication and exchange of resources.

- **BRZO categorization**

In a research performed in 2015 by the insurer Munich, it is observed that companies do find climate change an issue which is becoming more important. It is stated that they do not only find possible damages and possible impacts a topic that is important but also the damages that already were caused to the company by effects of climate change. Examples that were mentioned were flash flood, water nuisance and flood caused do to failing dikes (Munich RE, 2015). In the research of

Munich it is furthermore stated that of natural disaster between the years 1970 and 2012 storms and floodings caused 55 percent of all casualties. Moreover 86 percent of all total economic damages were caused by these storms and floodings. Specialists of Royal Haskoning do see the more urgency and priority of companies in the Dutch context to make inventories and take spatial measures in order to adapt to effects of climate change water safety (Royal Haskoning, 2015).

By the consultancy company HKV it is argued that companies in the Netherlands do limitedly dwell upon the idea that they are vulnerable to floodings. The risks of sectors with a higher priority are already being mapped and worked out how they can reduce the vulnerability to floodings (HKV, 2016). A new European law related to safety SEVESO III was recently released. In this law it is incorporated that BRZO companies are obliged to integrate the effects of floodings and other natural disasters (SEVESO, 2015).

In the syntheses document of spatial adaptation attention is given to the chemical sector. Most companies of the chemical sector in Zeeland are BRZO companies. According to this document a main division can be made between two effects. The first is related to BRZO companies that could cause negative effects related to the environment. The second are the direct effects on safety. This effecting people, environment and economy. Important elements connected to BRZO companies are network functions, location, and its different chemical functions. Therefor it can be argued that a division of importance can be made ranging from low to high depending on the level of “water” safety (Ministerie van Infrastructuur en Milieu, 2015).

Research will be performed to BRZO companies. In Zeeland are currently 20 BRZO companies. In this research will be focussed on BRZO companies in the harbour areas, which concern 17 companies. Companies get a BRZO “function” when legal thresholds of large amounts of hazardous substance and/or that in storage are exceeded. It depends on European, national and regional legislation when high substance thresholds are exceeded. The amount of companies with a BRZO function can change depending on the substances they have available. Locations of the BRZO companies are displayed in appendix 9.11.

- **Conclusions literature analyses**

From the literature analyses can be concluded that there are 5 types of barriers that are in place for BRZO companies. These are capacity, cognitive, social and cultural, political and institutional and technological related barriers. This partly answers sub-question 2 of the research showing which categories of barriers exist. In-depth research will be used in order to determine what barriers are in place and should be removed in order to improve the level of water safety of these companies.

The literature analyses shows what stakeholders are involved in the process of SA. (Semi)-governmental stakeholders involved are: *RWS, VNG, VRZ and Scheldestromen*. These stakeholders have tasks ranging from monitoring to practical execution of stress tests. This partly answers the first research question. Moreover it shows that next to these stakeholders other external stakeholders are involved. Due to complexity it requires in-depth research to find out who which other stakeholders play a role in this process and what the exact relations are to each other.

The resources and customer theory was presented. It showed there are three different forms of how Provincial strategies can be formulated. A. developing measures in which the “customer” has limited say. B. Customer demanding resources of the provider serving all its necessary needs. C. Sharing resources equally to achieve the ideal situation. It depends on characteristics of BRZO companies in what way strategy formulation will take place. After this is known it can be determined which of the three strategic theories will be used. This provides a framework in order to answer sub-question 4.

2.1 Conceptual model

For this research a conceptual model was made. The conceptual model displayed in table 4. The reason why this conceptual model is made is to more clearly display the current process of spatial adaptation in relation to barriers of mainstreaming of BRZO companies. This model is suitable for translating the main concepts and their relations to each other. In the following paragraphs the three main research variables are discussed and explained.

The conceptual model is build up out of three different variables. The first variable is the independent variable (x) “strategies”. The theory of ability of mainstreaming can be enhanced by using strategies (Uitenbroek et al.,). The goal of the research is to find out how the Province can design these strategies in order to reduce the barriers of BRZO companies. The formulation of strategies by the Province of Zeeland will therefore be the starting point of the research. Strategies can be formulated by governmental stakeholders responsible for management and policy making. These stakeholders are the Province and the RUD Zeeland. Between these parties there is a certain closeness of cooperation since the RUD is an executive body of the Province. Since the level of governance complexity is high strategies should be adaptive to fit its goal (Prahalad & Hamel, 1990).

The second variable is the Intervening variable (z) “influence of (semi)-governmental stakeholders”. Next to the main stakeholders (Province & RUD) there is the program organization SA of Zeeland including stakeholders playing roles focussing of facilitation, guaranteeing water safety and guaranteeing external safety. These stakeholders all have their influence and obligations in the process to facilitate BRZO companies. According to Brugge at al. semi-governmental stakeholders should be involved in order to make use of their influence on the process to remove process barriers. (Brugge et al., 2015). When strategies are made by the Province, the (semi)-governmental stakeholders have influence on the influence of the Province on how barriers can be removed. This is the case since the Province is the only stakeholder with authorized supervision that may formulate strategies to remove barriers of BRZO companies.

The third variable is the Dependent variable (y) “barriers BRZO companies.” “Limiting factors” can slow down/prevent/obstruct spatial adaptation of BRZO companies. There are 5 main “limiting factors” these do exist out of various sub-factors. These sub-factors are 1.Capacity related barriers, 2.Cognitive related barriers 3.Social and cultural barriers 4.Political and institutional barriers 5.Technological barriers (Doorewaard, 2010), (Hertog, 2014). These sub-factors are the main topics for the research. The hypothesis on these sub-factors is that some of them will be positive and others will be negative in relation with spatial adaptation of BRZO companies in the future. The theory behind these sub-factors refers to 5 barriers of mainstreaming. These factors have a direct effect on “mainstreaming” implementation of spatial adaptation. When barriers of BRZO companies are minimalized by making use of strategies the level of water safety will increase (Doorewaard, 2010), (Hertog, 2014).

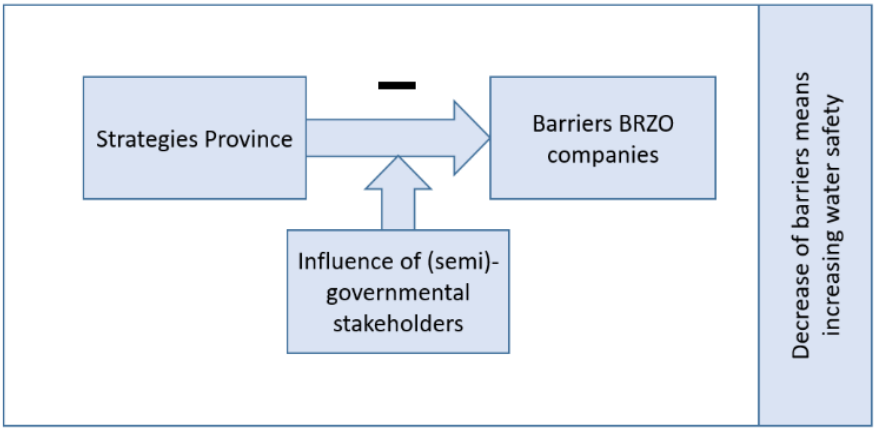


Table 4 – Conceptual model

3. Methods & Activities

This chapter is focusing on methods and techniques used, to find answers to the proposed research questions. The methods discussed are: §3.1.1 stakeholder analyses, §3.1.2 Spatial analyses, §3.2.1 policy analyses, §3.2.2 Summary in-depth interviews, §3.2.3 Summary questionnaires, §3.3.1 Results SWOT & TOWS analyses. Making use of these specific research methods provides advantages. Two main advantages are: 1.Making use of these research methods increases preciseness of context sensitivity in this research. 2. It validates results which due to abstractness and multisided perspectives require a multiple method approach (Cresswell et al., 2003).

3.1 Research activities

To perform the research, multiple activities were performed. Activities performed were coherent with theories that were integrated in the conceptual-and operational model displayed in table 4 & 5. This model displays the main goals for this research and how they are connected to concept entities and relationships between them. In this sub-chapter, research methods used and activities performing during the research are summed up and described.

3.1.1 Stakeholder analyses

By using a stakeholder analyses various parties involved in the process of the delta decision *Spatial Adaptation* were analysed. With the goal to see where they currently stand in the process of SA. Also by making use of this method, the standpoints of the stakeholders towards the facilitation of BRZO companies in Zeeland and their attitude towards other parties can be identified. After the research subjects are known, a SWOT analyses will be used to further focus on the subjects chosen for research (Bryson, 2004), (Reed, 2008).

3.1.2 Spatial analyses

The spatial analyses is a tool, able to assess various landscapes by a comparison of data from various map layers. Topological, geometric and geographic properties can be used as factors for assessment. The Spatial analyses will be used to analyse the various layers of available maps with data, focusing on the locations of BRZO companies in Zeeland. By using this method multiple maps, (focusing on the factors displayed below) an indication can be given on the factor *"flood risk."* When this factor and the sub-factors are known, a division can be made based on area characteristics. This division includes which different area types there are, where the different BRZO companies are located and what characteristics they share. (Haining, 2003) (Burnett, 2003)These following factors found in the maps used for the spatial analyses are of importance:

1. **Flood chance**, This variable exists out of these sub-variables: Current flood change, Flood defences, Current (re)-structuring norms. The first two sub-variables are supported by the latest VNK document (Royal Haskoning DHV, 2015). The variable restructuring norms is supported by Scheldestromen. (Scheldestromen, 2014)
2. **Exposure,** This variable exists out of these sub-variables: Soil, Relative height, Flood depth, Water discharge/infiltration, and salt intrusion. All of these sub-variables are supported with the data available at *"Geoloket Zeeland,"* and AHN2 maps.
3. **Vulnerability,** This variable exists out of these sub-variables: Population density, Vital infrastructure. These variables are supported by the National risk map and Regional risk profile (Veiligheidsregio Zeeland, 2013).

3.1.3 Policy analyses

By using a policy analyses it can be analysed how the Delta Decision spatial adaptation was embedded in current strategies, visions, policy documents etc. This contributes to research purposes

in a way that it becomes known what the responsibilities are of the different stakeholders involved. It could be determined if the BRZO companies already take into account water safety as a factor in their policy plans. Since the main scope of the research aimed at data collection and collaboration between public and private organizations. It is of interest to the research to see how the Province or other actors involved have safeguarded visions of the Delta decision in provincial or local policies. And how BRZO companies integrated policies related to water safety in there company policies. Moreover it can also indicate that it will be necessary to safeguard some actions in policy (Carl V. Patton, 2002).

3.1.4 In-depth interview(s)

The expert interview(s) play an important role in retrieving information related to the current barriers of BRZO companies in mainstreaming spatial adaptation related to water safety. Some of the interviews described were attended during my bachelors' in 2014/2015, and my MSc internship in 2016. The interview(s) held then are still relevant now. For this interview ten in-depth expert interviews will be held. The most important organization of which representatives will be interviewed are; RUD Zeeland, Provincie Zeeland, Water board, ministry, BRZO company representative, representative of network company and Veiligheidsregio Zeeland. The names of the representatives of these organizations which will be interviewed are displayed in appendix 9.3.

3.1.5 Questionnaire survey

A questionnaire survey is a research method, which exists of multiple open or closed questions, with the purpose to gather information of respondents. The pros of making use of a questionnaire survey is that much information can be gather in a short time span. Often this information is more quantitative then qualitative, since this method does not offer the opportunity to ask in-depth questions. Furthermore this research method offers the opportunity to compare results to each other in a structured way (Wester et al., 2005).

By making use of a questionnaire survey, barriers of BRZO companies can be made insightful and compared. Since there are 17 BRZO companies and research time and time of specialists of these BRZO companies is limited, it was chosen to use surveys. Questions were related to the topic: water safety/nuisance and how the Province or government can improve facilitation of companies related to these topics. Furthermore closed questions were asked related to the barriers these companies experience to mainstream spatial adaptation at their companies and make use of adaptation methods. By knowing what barriers are it becomes possible to see what strategies can be used to better facilitate these BRZO companies. Use will be made of both open and closed questions. (see questionnaire surveys in appendix 9.10).

3.1.6 Qualitative observations (observing meetings)

Qualitative observations, or in this case "observing meetings" is a method, which in this case will be used to observe professionals. The professionals which will be observed play a role in the Provincial mainstreaming process of SA (Taylor, 2006). Multiple meetings were attended, by observations it could be determined in which phase the topic of SA is currently in. These observations display the current attitude of various stakeholders towards the topic of SA with the focus on water safety. In the research the observations were mainly used to gather more in-depth background information on the current Provincial process on the topic of SA.

3.1.7 Case studies/Qualitative Comparative analyses

During the case study/qualitative comparative analyses different cases will be compared. These cases concern local examples on how BRZO companies and companies deal with effects of flooding or water nuisance. These local examples will be compared to the approach of Spatial Adaptation and facilitation of BRZO companies in other Provinces of the Netherlands. Moreover best practices and

barriers in the process of this spatial were researched and compared to each other. A scheme was used to separate the approach, best practices and barriers used by the various Provinces. Finally it was displayed what approaches are effective to use concerning the approach of heat stress (Lor, 2011).

3.1.8 SWOT & TOWS analyses

First research subjects were analysed in-depth by making use of multiple research methods. By using a SWOT analyses outcomes of the in-depth analyses can be separated and connected to strengths weakness, opportunities and threats. Moreover connections were formed on specified research subjects, to create a specific focus. This gave a deeper insight in the provincial process of spatial adaptation related to mainstreaming spatial adaptation related to BRZO companies. The main research question has the focus on determining barriers of mainstreaming.

Often barriers are linked to weaknesses and threats displayed in the SWOT analyses (Chermack & Bernadette, 2007). By determining these barriers and allocating strengths and opportunities solutions could be found connected to the process goals. From this could be profited from to determined what was needed from the Province and other stakeholders included in this process (Richter et al.,). With the SWOT analyses strengths, weaknesses, opportunities and threats in the process of heat stress can be determined. The output of the SWOT could serve as input for further research and interpretation.

3.2 Operational model

In this sub-chapter the operational model will be explained. Furthermore connections between activities performed in each phase displayed in the operational model, will in this chapter be described. This shows mainly how the research will be performed. Like stated before, the operational model (see table 5) does exist out of three phases: basic analyses, case study and core research. This model displays the main goals for this research and how they are connected to concept entities and relationships between them. The main theory and use of the operational model* can be explained as follows:

1. Identifying current relations between joint government and BRZO companies in Zeeland was the starting point of the research. After the ***stakeholder analysis was*** performed it was made clear what current agreements, relations and importances between stakeholders are there. It displayed how relations and facilitation of (BRZO) companies in relation with spatial adaptation are shaped. (Therefore it also will be the main end-result of the research.) In research it was stated that spatial adaptation can be a starting point as well as an end goal (Stimuleringsprogramma ruimtelijke adaptatie, 2014).
2. The second step in the basic analyses was the ***spatial analyses***. By using the spatial analyses, the different factors related to water safety in relation with the locations of BRZO companies were made insightful. After this spatial analysis was performed a division of BRZO companies was made based on the vulnerability of the different areas.
3. The third step of the basic analyses was to make an analysis of policy instruments and strategies that can be used to improve facilitation of BRZO companies. This consists of an overview of possible strategies and instruments of which the capabilities and use are described. In a later phase of this research a selection is made of the instruments and strategies displayed in the overview.
4. The first step in the case study phase was to conduct a ***policy analysis***. When relations, obligations, vulnerability of BRZO companies and instruments are known (derived from the basic

analyses) these were tested by making use of a policy analyses. It shows if the BRZO companies and the joint government met their obligations and took their responsibilities in the past. Furthermore it shows what their responsibilities will be in the future and to what extend it will be possible to achieve these. By analysing these different policies including company polices it became clear became clear which stakeholders are early or late adopters concerning mainstreaming spatial adaptation.

5. In the second step of the case study phase 11 ***interviews*** were executed. By having knowledge deriving from the previous steps, interview questions were formulated. These interview questions were set-up by making use of the factors displayed in the theoretical framework.
6. In the third step of the case study phase 13 ***questionnaire surveys*** were held. These questionnaires were sent to the 13 BRZO companies. In order to derive what barriers they experience concerning mainstreaming spatial adaptation. After these questionnaires are held these will be analysed and interpreted for results.
7. Actual spatial developments were tested to policies. Did these BRZO companies took spatial legislation and adaptation into account when building? What went wrong and how could these processes be improved? Did the joint government took the right actions?
8. The final step in the case study phase was having Feedback interviews with specialists of the Province. By discussing what the barriers of the BRZO companies are and how other Provinces approached this process advice was given by policy specialists. Furthermore this feedback interview session contributed to validating the policy analyses, in-depth interviews and questionnaires held.
9. By making use of a ***SWOT analyses***, outcomes of the policy analyses, interviews and questionnaires could be assessed. By making use of this SWOT analyses differences between these BRZO companies and joint government were found. Acknowledgement of spatial

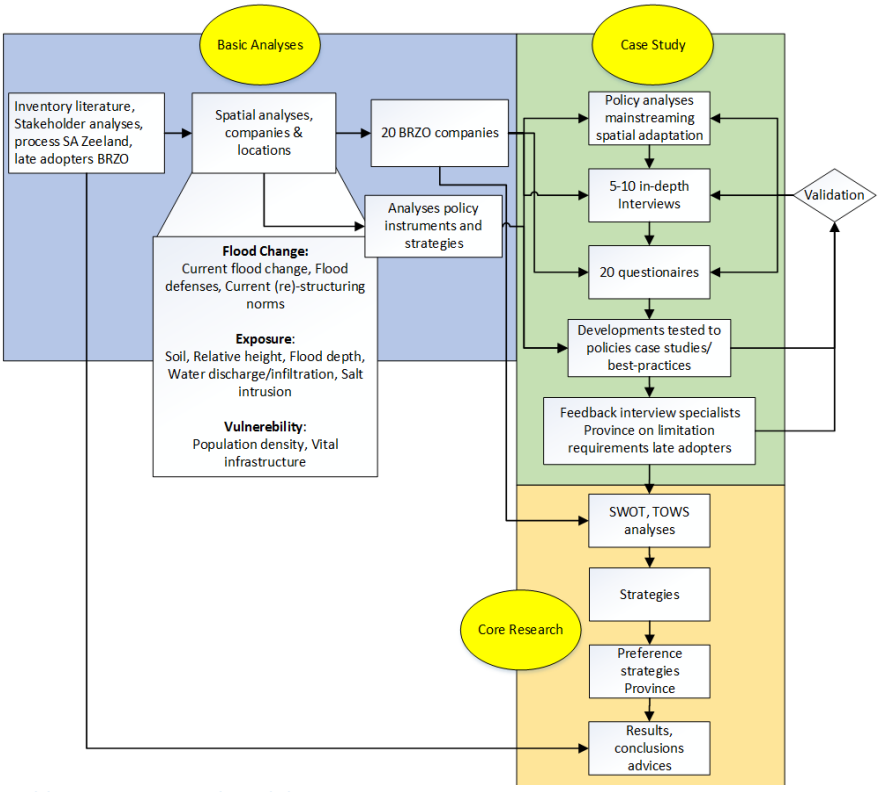


Table 5 – Operational model

weaknesses was necessary to determine what strategies could be used to improve the mainstreaming process of spatial adaptation (Cleveland, 2003) (Zairi, 1997).

10. After knowing what the strengths, weakness, opportunities and threats of BRZO companies are. It was possible to determine which governmental strategies best can be used to improve the facilitation process.
11. (Preference) strategies were presented based on barriers of the different BRZO companies and the existing strengths, weakness, opportunities and threats.
12. A finished thesis report with theory, results, conclusions, advices and strategies serves as final product.

After these steps are performed, as displayed in the operational model the final goal of the thesis research will be reached. The operational model is designed as an ongoing process since the process of facilitation constantly changes. Literature supports the fact that this process is an ongoing process improving itself after input is delivered (Ministerie van Infrastructuur en Milieu, Ministerie van Economische Zaken, 2014).

*The steps displayed in the operational model are directly connected to the methods used in the research. See chapter 3.2 for definitions and the explanation of the execution of these methods.

4. Results

In this chapter results of the thesis research are displayed and presented. These results were derived from the analyses, interviews and surveys performed. Like described in chapter 1.2, the research report does exist out of three phases. The results displayed in this chapter has the same structure as displayed in the operational model. Each of the phases has a certain set of variables from which the conceptual model is build up.

4.1 Basic analyses

In the first phase of this research a basic analyses is performed including a stakeholder analyses, spatial analyses and additional literature study. In this phase the process of spatial adaptation in Zeeland in relation to BRZO companies will be introduced. With the stakeholder analyses the roles of governmental stakeholders and BRZO companies were researched. By making use of both the stakeholder analyses and spatial analyses BRZO companies could be categorized by their locations and obligations related to water safety and spatial adaptation.

4.1.1 Spatial analyses

By making use of the spatial analyses, 17 BRZO companies were categorized based on spatial characteristics. From this an overview was made based on the areas overall risk related to water safety. The spatial analyses is based on the “begrippenkader meerlaagswaterveiligheid” or model of concept multilayer water safety displayed in chapter 2.1. (Deltaprogramma Nieuwbouw en Herstructurering, 2011). The spatial analyses served to differentiate and show what specific kinds of vulnerability have priority to be adapted to in the different areas. The focus of this research is aiming at the factor flooding thus "water safety" in the program SA. Furthermore its connection with precipitation plays a role when connected specially to the topic of flooding's. These will be the main factors assessed in this spatial analyses. In the spatial analyses was focused on 3 areas where 17 BRZO companies are currently located. See figure 1 and 2 in appendix 9.11 for the locations of these companies in the three different harbour areas. The three harbour areas analysed in this spatial analyses are: 1.Buitenhaven, 2.Sloegebied and 3. Kanaalzone.*

Spatial analyses approach

For performing this analyses there is chosen to use a qualitative spatial analysis. The layer approach method of VROM was used (IPO, MILO, VROM, 2008). Since it has multiple analytical strengths. As example it has a strong systematic way of qualitative analyses of different layers (Schaick, 2011). In this case no quantitative method was chosen since Zeeland has not sufficient harbour areas to analyse in a quantitative way. There are 17 BRZO companies on 3 main locations that were analysed. Geophysical indicators will be used to make a division in these different locations in relation with the specific (chemical) functions these companies have.

Furthermore the way of assessment is by giving the three main variables for the spatial analyses an equal weight. The top three areas are given a ranking number. This ranking number is a score. It was chosen to give a score ranging from 1 to 3. Gives an indication what the flood risks of these two locations are. In many spatial analyses plusses and minuses are used to give a value to the variables. Scores can be seen as an alternative to these plusses and minuses. The document "*Methoden en systemen voor het Afwegingskader Ruimtelijke Effecten.*" is the document including methods supporting the approach used (Herwijnen, 2002). The score is based on the level of evidence of certain factors which can be derived out of the various factor related maps used. The meaning of these scores is: ***1= Low, 2= Medium, 3= High*** *Chance/Exposure/Vulnerability*

Finally an average of these scores can be given. This score (displayed in the following subchapter) gives a flood risks indication of both harbour areas.

Results spatial analyses

In table 7 displayed below the scores on the factors of assessment are summarized. There were multiple factors of assessment, existing of main and sub-factors. The system which has been used to assess an area by giving is by giving it equal weighting scores for the multiple sub-factors. When the different sub-factors were assessed the average score of sub-factors was calculated. The number derived from this is the score given to the main factor. The different main and sub-factors assessed are:

1. Flood change – *Current flood chance, Group risk, Economic risk, restructuring norms (VNK2).*

2. Exposure – *Soil, Relative height, Flood depth, Water discharge/infiltration, Salt intrusion.*

3. Vulnerability – *Population density, vital infrastructure.*

For this spatial analyses water safety related maps were used. The maps were related to the theme of the factors displayed above. The maps used had a focus on the use of space, infiltration and the location of vital infrastructure. By making use of various scientific sources, interpretation of these maps was supported. In table 6 a practical example is displayed, showing the spatial analyses approach used of determining one of the spatial sub-factors assessed.

- **Group risk**

Flood risks do have a direct effect on group risk and the other way around. In the latest document released by Projectbureau VNK, Group risks per year per dike ring are displayed. In Zeeland group risks are displayed on an X and Y axis. On the X axis casualties of floodings are displayed and on the Y axis the exceeding of limits per year. Its relevance to BRZO companies is when a flood occurs people living nearby can be affected directly or indirectly (Projectbureau VNK2, 2014). The three research locations/dike rings with the highest group risk, the ranking is displayed as follows:

1. **Buitenhaven (Vlissingen),** In table 5 the group risk of Vlissingen is displayed. It shows that when a 1/1.000 to 1/1.000.000 flooding does occur the amount of casualties can extend to 1300 (Projectbureau VNK2, 2014). For a flood event around the Buitenhaven, in the worst case there will be 5 to 10 casualties. In this scenario the harbor area is flooded and the primary flood defense is damaged (Projectbureau VNK2, 2014). Therefor it can be concluded that the group risk in this area can be seen as "medium."

2. **Sloegebied (Borsele),** In table 6 the group risk of Borsele is displayed. It shows that when a 1/80 to 1/1.000.000 flooding does occur the amount of casualties can extend to 1100 (Projectbureau VNK2, 2014). For a flood event around the Sloegebied, in the worst case there will be 5 to 50 casualties. In this scenario part of the harbor area is flooded including harbor areas located behind the dikes. Therefor it can be concluded that the group risk in this area can be seen as "high."

3. **Kanaalzone (Terneuzen),** In table 7 the group risk of Zeeuws-Vlaanderen is displayed. It shows that when a 1/100 to 1/1.000.000 flooding does occur the amount of casualties can extend to 175 (Projectbureau VNK2, 2014). For a flood event of the Kanaalzone and Dow/Braakmanhaven there will be 0 to 5 casualties. This casualty count was calculated with the input of failing primary protection (Projectbureau VNK2, 2014). Therefor it can be concluded that the group risk in this area can be seen as "medium."

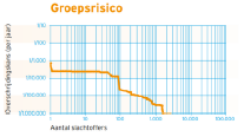


Table 5 – Walcheren group risk

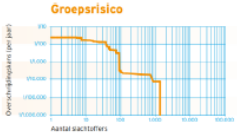


Table 6 – Borsele group risk

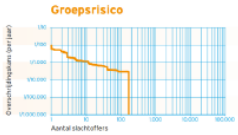


Table 7 – Terneuzen group risk

It thus can be concluded that a flooding of the Sloegebied has the highest group risk based on the VNK2 research documents. Borsele/Goes both have a medium group risk. (Rijkswaterstaat Projectbureau VNK, 2015).

Group risk	Buitenhaven	2
	Sloegebied	3
	Kanaalzone	2

Table 6 – Example of assessment spatial analyses

Based on this a division could be made based on flood risk of BRZO companies. Afterwards there will be a categorization of BRZO companies of flood risk that can either be high, medium or low. This will make insightful which companies at what locations are coping with what factors. This shows what the priority on safety of these companies is. The scientific background, with the argumentation why these factors and sub-factors are used, could be found in chapter 2.1 *"Core definitions water safety"* & *"Methods spatial analyses."*

Factors of assessment:		**Locations:**	**Score:**	**Average**
Flood chance	Current flood chance	Buitenhaven	3	
		Sloegebied	2	
		Kanaalzone	2	
	Group risk	Buitenhaven	2	
		Sloegebied	3	
		Kanaalzone	2	
	Economic risk	Buitenhaven	2	
		Sloegebied	2	
		Kanaalzone	3	
	Restructuring norms	Buitenhaven	3	
		Sloegebied	1	
		Kanaalzone	2	
	Scores:	**Buitenhaven**	**10**	**2,5**
		Sloegebied	**8**	**2**
		Kanaalzone	**9**	**2,25**
Exposure	Soil	Buitenhaven	1	
		Sloegebied	1	
		Kanaalzone	2	
	Relative height	Buitenhaven	3	
		Sloegebied	1	
		Kanaalzone	2	
	Flood depth	Buitenhaven	3	
		Sloegebied	1	
		Kanaalzone	2	
	Water discharge/infiltration	Buitenhaven	2	
		Sloegebied	1	
		Kanaalzone	3	
	Salt intrusion	Buitenhaven	2	
		Sloegebied	1	
		Kanaalzone	3	
	Highest scores:	**Buitenhaven**	**11**	**2,2**
		Sloegebied	**5**	**1**
		Kanaalzone	**12**	**2,4**
Vulnerability	Population density	Buitenhaven	3	
		Sloegebied	1	
		Kanaalzone	2	
	Vital infrastructure	Buitenhaven	1	
		Sloegebied	1	
		Kanaalzone	3	
	Highest scores:	**Buitenhaven**	**4**	**2**
		Sloegebied	**3**	**1,5**
		Kanaalzone	**5**	**2,5**
Flood risk	**Final score:**	**Buitenhaven**	Score: 2,2	
		Sloegebied	Score: 1,5	
		Kanaalzone	Score: 2,4	

Table 7 –Assessment scheme spatial analyses

Results

After conducting the spatial analyses, scores were derived displaying the results. It shows that the Buitenhaven/Sloegebied are different areas compared to the Kanaalzone. The main reason for this is that the Buitenhaven/Sloegebied is located outer diked and the Kanaalzone inner diked. Being located in-or outer diked has a direct connection with the sub-factors of assessment in a way that scores on flood chance, exposure and vulnerability tend to be more extreme. It shows that that the Buitenhaven and the Kanaalzone have a comparable flood risk score. The score a 2.4 on the scale on 1 to 3 meaning average/high risk. The difference between these scores is that the Buitenhaven has a high flood chance and exposure while the Kanaalzone has a high vulnerability and exposure. The Sloegebied has a relatively low flood risk, the reason is that exposure and vulnerability is relatively low. It is important to know why certain sub-factors have a high or low score. The most important are displayed and explained per area:

Buitenhaven (Vlissingen), Sub-factors that contribute to a high level of risk are: ***1.*** *A high chance of flooding, since it is determined to be smaller than one flooding in the hundred years (>1/100) (VNK2, 2015).* ***2.*** *Restructuring of dike system has priority, since the level of safety is currently seen as not-sufficient (Minsterie van infrastructuur en Milieu, 2014).* ***3.*** *High level of exposure due to the relative low location of the quays 3.5 meters above sea level (Provincie Zeeland, 2017).* ***4.*** *High vulnerability due to high population density, displayed on the map with a more intense dark colour.* Sub-factors that contribute to a low level of risk are: ***1.*** *Limited vulnerable vital infrastructures, on the map it is displayed that there is a low number of vital infrastructure connected in this harbour area therefor there is a low risk (Risicokaart, 2017).* ***2.*** *Low exposure based on soil characteristics. The area is located in an area were soil is determined to be stable (Provincie Zeeland, 2017).*

Sloegebied (Vlissingen & Borsele), Sub-factors that contribute to a high level of risk:
1. *Group risk is determined to be high. In the VNK 2 document is was determined that there can be 5 to 50 casualties in a flood situation. (VNK2, 2015).* Sub-factors that contribute to a low level of risk:
1. *Flood chance is low, since there is no urgency for restructuring dikes in this area (Ministerie van infrastructuur en milieu, 2014).* ***2.*** *Low exposure of soil, since soil is determined to be stable. (Provincie Zeeland, 2017).* ***3.*** *Low exposure due to height, since the quays are located around 5 meters above sea level (Provincie Zeeland, 2017).* ***4.*** *Low exposure due to limited flood depth (Deltaportaal, 2013).* ***5.*** *Low exposure due to limited problems related to water safety and discharge/infiltration (Provincie Zeeland, 2017).* ***6.*** *Low exposure due to limited salt intrusion, because of soil properties and height (Provincie Zeeland, 2017), (Shaffer, 2009).* ***7.*** *Low vulnerability low population density, (CBS, 2013).* ***8.*** *Low vulnerability due to limited vulnerable infrastructures present (Risicokaart, 2017).*

Kanaalzone (Terneuzen), Sub-factors that contribute to a high level of risk: ***1.*** *High exposure water discharge and/infiltration caused by the low location along the canal and its soil properties (Provincie Zeeland, 2017).* ***2.*** *High exposure due to salt intrusion, caused by the low location along the canal and its soil properties (Provincie Zeeland, 2017).* ***3.*** *High vulnerability due to vital infrastructure. Many vital infrastructure is present, moreover the location is determined to form possible risks related to its network stability (Provincie Zeeland, 2017).*

An average based score was derived based on BRZO companies see table 8. This table shows the average scores of the two main areas that will be analysed based on an average score of BRZO companies. It shows that Buitenhaven & Sloegebied when seen as one area, has a total risk score of

1,6 meaning a low to medium flood related risk. The Kanaalzone like in table 7 has the same score of a 2.4 meaning a medium to high flood risk.

Final score:	**Buitenhaven & Sloegebied**	Score: 1,6	
	Kanaalzone	Score: 2,4	

Table 8 – Average based score, spatial analyses

**It should be mentioned that there are 3 different harbour areas analysed in the spatial analyses. Since it concerns two BRZO companies that are located in the Buitenhaven these were analysed separately, and later added to the area typology of the Sloegebied. The main reason for this is that spatial characteristics are comparable. For the research approach it is beneficial to have two main areas to compare. Moreover from the scores of the spatial analyses not the average will be derived and worked with, in the research because of it could influence research outcomes negatively. The difference of the Buitenhaven will be emphasised separately and described in footnotes. All in all the spatial analyses these areas are thus analysed separately, for researching strategy development this is seen as one area to improve comparability to the Kanaalzone.*

4.1.2 Stakeholder analyses

The stakeholder analyses performed focusses on the obligations and tasks of the joint government in Zeeland. In the sub-chapters displayed below, the current relations between stakeholders are described. It is described into detail which roles stakeholders play and what their importances are. The goal of the stakeholder analyses is to present what the roles and importances are of the stakeholders involved in the process.

The eleven semi structured interviews held with these stakeholders was used. The goal of the interviews was to find out what roles and obligations stakeholders have and play in the process of water safety related to BRZO companies, what barriers play a role withholding mainstreaming from being reached and what methods can be used to break process barriers. Interviews also played a role in validate the literature research (See, Interviews 1-11).

Roles and importances

From the stakeholder analyses importances and obligations on water safety were derived. Importances related to water safety in a process context, are divided in four types of factors displaying importances of involvement of stakeholders. To summarize these importances a scheme has been made. (see appendix 9.5, Cooperation factors and importances). Both the power interest grids and stakeholder analyses originated from the outcomes of this scheme. It displays what factors are important related to the importances of stakeholders involved. This is based on meeting notes, policy documents, interviews and questionnaire survey. It shows the factors that are lacking or present.

It became possible to define what factors contribute to further collaboration and improved facilitation in the process of water safety and spatial adaptation related to BRZO companies. Moreover it shows the lacking factors that are of importance to stakeholders involved. It gives an indication how substance can be given to factors displayed and what will be required to improve the facilitation and collaboration process. On an individual level stakeholders were analysed, this displayed what the importances and interests of stakeholders are. Moreover is showed what responsibilities stakeholders have in relation with the role they play.

Results stakeholder analyses

Province of Zeeland - Is leading the process of spatial adaptation together with Scheldestromen. The Province is responsible for knowledge generation related to safe spatial planning. By all stakeholders involved the Province is seen as process leader for SA cooperation. To other stakeholders the Province is the most important party to manage closely. The province is not using all of its enforcing and steering related functions. One of the examples is that the Province is authorized supervision for BRZO companies. During the interviews it observed that Policy specialists limitedly know what the role of being authorized supervision includes and where the responsibility of the RUD & Province begins and ends. Moreover there are no employees at the Province that are responsible for double checking of RUD legislative tasks. Which is often the case in other Provinces. During one of the interviews the relation manager of Province with RUD stated that policy specialist is responsible to indicate RUD's additional licensing tasks related to water safety. (Interview IV, V, VI).

"Ultimately the policy specialist is responsible to indicate whether new licensing tasks should be issued to the RUD" (Janse, 2017).

They have the ability to make visions and steer companies to reach the level of water safety that is expected. By utilizing these visions in the new environmental plan/vision companies will know what is expected of them. The Province plays a crucial role related to information and development of data related to water safety in order to inform other stakeholders. Examples are the different projects: FRAMES and NRW which are being executed apart from spatial adaptation with the goal of complementary knowledge generation (Meeting notes I, II, III), (Interview IV, V, VI), (Deltares, 2015)**.**

RUD – Is monitoring and executing environmental, safety, licensing, supervising and enforcement tasks to (BRZO) companies in name of municipalities, Scheldestromen and Province of Zeeland. Since the Province of Zeeland has the authorized supervision it can utilize the RUD by developing policies, and let the RUD supervise if companies are executing these. The main tool they have for this is by giving and checking environmental licenses of companies. The Province plays a managing/directing role to the RUD despite its mandate. The Province can also give tasks to the RUD which are listed in the task list (VR) of the RUD (Interview V, VI).

"Zeeland Seaports should procedurelize climate proof spatial planning when locating new companies" (Lindenbergh, 2017).

Next to this the RUD is responsible for the risk map and its actualization. There is active cooperation between the RUD and the Province, although on the topics of content related matter (water safety & spatial adaptation) are limitedly utilized. Moreover the RUD is responsible for contacting the companies falling under supervision of the RUD. In this the RUD has the task to provide information, check and communicate (BRZO) companies if safety standards are met. Next to this the RUD can give information and advice to BRZO companies or redirect companies to the organization responsible. According to the RUD there are two categories of BRZO companies related to water safety. These categories are outer diked and inner diked. These different characteristics and vulnerability require different methods of spatial adaptation to improve the level of water safety. It was also derived from the interview that distinction should be made in still to be build BRZO companies-and existing BRZO companies. Since both require a different approach to adaptation. Because of the relation with the RUD is important for the Province its relation is placed in "manage closely." (Interview V, VI).

Scheldestromen – Is leading the process together with the Province on equal level. It is their task to "translate spatial adaptation to local context for municipalities and companies." On the topic of water safety the Province is depended on what information the water board supplies. This can be in the form of

"The Province should not interfere with companies and municipalities in order to stimulate spatial adaptation." (Schipper, 2017).

GIS maps, knowledge exchange or the water board's communication with municipalities or companies. Since the water board is the main partner of municipalities within the execution of spatial adaptation, the Province has a large importance for cooperating. By actively cooperating the Province can accelerate this process. Next to this Scheldestromen is responsible for guaranteeing water quality, that sufficient space for water storage is present and crisis organization related to Water board's tasks.

During the interview the water board stated that the Province should not interfere with companies and municipalities in order to stimulate spatial adaptation. Strategies should mainly exist of finding effective ways to improve information provisioning. Companies should be informed about responsibility. When responsibility is clearly known and parties are front runners advice specifically on location can be given and also on how to combine this with redevelopment or new location opportunities. Since the relation with the water board is important to the Province its relation is placed in "manage closely." Scheldestromen is the main partner of the municipalities in Zeeland in the mainstreaming and implementation process of SA. (meeting notes I, II, III), (interview X), (Vereniging van Nederlandse Gemeenten, 2016), (Ministerie van Infrastructuur en Milieu, 2014), (Davidse, 2017).

"BRZO companies rather have clear policies in place then being involved in an active cooperative process" (Matthijsse, 2017).

Veiligheidsregio – Has an advising role to Province and other stakeholders involved in the process. The Veiligheidsregio is responsible for vital infrastructure, crisis communication. Responsible physical/vital infrastructure. BRZO companies. The Veiligheidsregio Zeeland "VRZ" is involved in different projects related to water safety and spatial adaptation. Such as FRAMES, NRW, RAAK and impact analyses. These researches and projects contribute to the overall knowledge and approach on adaptation methods. Moreover the VRZ plays the role of advising the RUD and Province related to approach of calamities. Together with Zeeland Seaports the Veiligheidsregio had a session with BRZO companies about water safety. During this session the pilot project water safety Botlek was used as a best practice example on how to organize safe spatial planning related to BRZO companies.

During an interview held with the project manager Wave 2 of the VRZ it was stated that safety and environmental specialists of BRZO companies rather have clear policies in place in order to adapt. According to the representative of the VRZ it would be most effective to as a joint government and authorised supervision develop clear policies with standards for (BRZO) companies. The nieuwe omgevingswet can serve as a new instrument in which spatial adaptation for harbour areas can be a fixed element that should be taken into account. Only mapping is not effective, more research should be performed to the meaning of flooding's and impacts on different categorizations of industry. According to the interviewee it is currently being integrated in the impact analyses which will be executed by the VRZ. Since the relation with the Veiligheidsregio is important for the Province its relation is placed in "manage closely." (Meeting notes II), (Interview XI).

"Some companies unconsciously implemented spatial adaptation measures in the form of elevated building" (Versluis, 2017).

Zeeland Seaports – Is responsible for informing, overall management, spatial management and safety in harbour areas. On safety it is specifically responsible for informing companies on specific safety issues, ISPS and developing calamity plans. Cooperating and being in the process as intermediate and advising party between company and Province. Moreover it has more the focus on nautical activities and spatial planning in the harbour. Furthermore ZSP owns the soil where harbour companies are renting space. Worked together with the VRZ to organize awareness process to BRZO companies. Another role ZSP plays, is supporting joint governments & companies with

information and expertise. It also includes providing practical advice related to harbour and transportation related procedures. Related to water safety ZSP has undertaken various actions, one of these is developing an operational high water plan (Interview X).

The Province is a stockholder of Zeeland Seaports therefor it has the political and management power set ambitions and direction related to topics of interest. Cooperating and supporting BRZO companies when making spatial changes and inform about responsibilities. From the interview with advisor harbour safety and environment of ZSP it appeared that BRZO companies writing the compulsory risk paragraph are more aware of the flood risks on their specific locations. Also the implications and results of flooding are clearer to these companies. Related to local adaptation methods slam dams were recently introduced. With these slam dams, transformer houses can be protected when overtopping of quays takes place. Moreover it was stated during the interview that companies rather have the government making clear policies. There are two main reasons according to the interviewee: 1. To have clear legislation, so companies know what to do and how to act accordingly to these laws set. 2. Companies will be more inclined to take adaptation measures. Since most of these companies are internationally organized it would be more effective that there is only direct communication based on the parties providing “resources” (joint government) to its “customers” (BRZO companies). Since interest in the process of spatial adaptation is high, but power is limited it is placed in “manage closely.” (Interview X).

Rijkswaterstaat - Is not actively involved in the process of SA. The main reason is that SA takes place on local scale. RWS is executing projects of national importance related to SA and water safety. What concerns water safety RWS is responsible for guaranteeing water safety along the main waters with the focus on structural water safety of primary dikes and infrastructure. Moreover responsible for informing governments when threats might occur. Since it is related to their core tasks, RWS is very interested in the process. (Meeting notes II) Since this process can enhance the level of water safety. Moreover it plays an advising role to the process organization of spatial adaptation, mainly related to their responsibilities. This role is also utilized for communication with other stakeholders involved and maximizing win-win opportunities during development activities. The involvement contributes to cooperation and active exchange of knowledge. This increases the level of awareness on the topics of spatial adaptation. Since the interest of RWS is high, but the active involvement and power is limited it is placed in “keep informed.” (Rijkswaterstaat, 2017), (Interview XII), (Meeting notes II, III), (Deltares, 2015)**.**

Municipalities (Vlissingen, Borsele, Terneuzen.) – Have the responsibility of meeting policies such as the new environmental law. Taking spatial adaptation measures within municipal borders and jurisdiction. On local scale responsible promote spatial adaptation among citizens and companies under “jurisdiction.” For municipalities it will be necessary to acquire climate specific information on local level to be able to take measures. Other importances are to improve contacts with water board which provides technical input. And maintaining contacts to Province which facilitates SA. Since the interest of municipalities is high and the level of power is high it is placed in “manage closely.” (Govers, 2016), (Deltaprogramma, 2016), (Davidse, 2015), (Interview I, II, III, IV).

BRZO companies (13 companies) – Are obligated to operate within the borders of the law, such as environmental legislation, safety legislation and BRZO legislation. Related to water safety companies are responsible to write a water safety related paragraph in their safety plan according to the new SEVESO III legislation. Their interests in future climate change effects and knowing vulnerability in an early stage to maximize spatial investment potential. Companies have sufficient means for taking spatial adaptation measures. Especially when considered as investments over a longer period of time. Their importance to cooperate is to extend networking structure to reach goals, find win-win

opportunities to increase returns on investments. Since the interest of BRZO companies is medium/high and the power is high these are placed in “manage closely.” (Interview VI, X, XI), (surveys, appendix 9.13).

Other stakeholders
Next to these main stakeholders involved also the Municipal Health Service “GGD,” Ministry and network companies play a role in the process. Although these parties do not (yet) play an active role they have a certain importance to Spatial Adaptation.

GGD – In the overall process of spatial adaptation and water safety this stakeholder is not involved yet. Although in national policy it is stated that local GGD’s should seek more involvement related to future tasks of playing and advice role to spatial adaptation process by providing health related specialist knowledge. An example is giving professional interpretation on risk distances related to industrial function when a flooding occurs. The GGD has other tasks which are raising awareness and informing the public. Concluding it can be stated that the GGD can contribute specific information related to industrial functions, the effects of flood disasters and health. Therefor it will become more important to include the GGD as a stakeholder in the future (Ministerie van Infrastructuur en Milieu, 2015), (Provinciaal overleg waterkeringen, 2014), (Meeting notes I, III), (interview IV), GGD GHOR, 2017).

Ministerie van Infrastructuur & Milieu – Is responsible for “vital and vulnerable” functions including the chemical sector. It is the ministry that is responsible for the “Spatial Adaptation” legislation and the sector of chemical companies. The role of the ministry is to improve and check the level of safety related to environment. It steers provinces and municipalities with its policies or policy instruments. Other roles the ministry has are, supporting and developing directional documents that can be used to stimulate Provinces (Interview VIII).

One of its obligations is developing guidelines for BRZO companies. It is cautious for being too involved with BRZO companies since according to the ministry decisions should be made on regional level by the Provinces. One of these guidelines that is carried downward by the ministry is the SEVESO III guideline. After companies take measures to include water safety in their safety plans the ministry has a checking role and will assess with reports provided if safety is according to their standards. When not sufficient the ministry will make use of additional measures. These include intensifying policy and regulation or increasing level of supervision. The ministry will contact the Province and/or the RUD to ask if they want to participate in intensifying BRZO regulations. Since its interest is medium and its power is high it is placed in “keep satisfied.” (Interview VIII), (Ministerie I&M, 2016).

Results cross reference scheme
A cross reference scheme was used to display the obligations and roles of stakeholders involved. (See appendix 9.6). The goal of making use of the cross-reference scheme is to map the relations between the stakeholders in the process of spatial adaptation. Results of the cross reference scheme are:

- The stakeholders involved in the process of spatial adaptation know the Province together with the water board function as manager and leader in this process. Parties such as RWS, VRZ and ZSP find that Scheldestromen is more responsible to advice on the technical content with the focus on water safety and adaptation measures. The Province is seen as authorized supervision for BRZO companies. (Interview V, VI, X, XI).
- By most stakeholders involved it is determined that RWS has medium importance. Since they are responsible for water safety of primary dikes they are the main stakeholder that can improve the level of water safety when necessary. This is mostly related to the BRZO companies that are

located inner diked. For companies that are located outer diked RWS has limited influence since these companies are responsible for water safety themselves. Although when sufficient drive is present win-win opportunities can be targeted for redevelopment. (Interview V, VI, IIX, X).

- The VRZ is sees as important to the Province, Scheldestromen, RUD and ZSP since it provides advice seen as essential to these governmental parties. The RUD is seen with medium importance since the Province has authorized supervision. Therefor parties find that the Province has more power and therefor sees them as the main authority concerning legislation and development. From the perspective of the Province the RUD is seen as an essential party because of its responsibility related to its executing tasks. In the case that this is not done properly the Province will be seen as responsible party. (Interview V, VI, IX, X).
- The municipalities play an important role in this process to most of the stakeholders involved. The main reason is their role as stockholder of for example Zeeland Seaports, responsibility for local execution of SA within municipal border. Moreover municipalities are perceived as essential for BRZO companies since these are dependent on the establishment permits provided often in correspondence together with ZSP. (Interview I, VI, IIX, X.
- In observing stakeholders multiple mismatches in relation can be found. 1. BRZO companies see Scheldestromen to be of high importance for realizing SA adaptation measures. But since it is not responsible for this (limited to giving advice) it should have a medium importance. 2. The Province does see the RUD to have medium importance. But since the Province keeps being responsible for the RUD it is in the Province's importance to guarantee its functioning. 3. BRZO companies do not see Zeeland Seaports as an important party related to spatial adaptation but mere as the owner of space. Since it actually provides more than this responsibility. Examples are providing information to stimulate awareness of responsibilities of SA. (Interview VI), (Survey appendix 9.13).

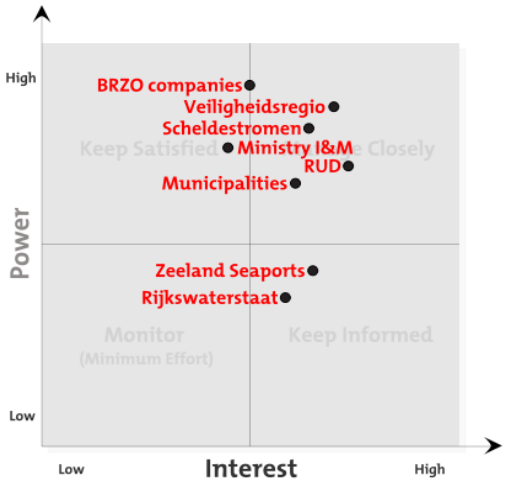


Figure 9 - Power interest grid – SA flood chance, perspective Province

Power interest grid

With the results of the stakeholder analyses and cross-reference scheme a power interest grid was made. (Figure 9) It displays the importance of the stakeholders involved related the Province of Zeeland. Specifically in the process of spatial adaptation related to water safety of BRZO companies. This power interest grid was made in order to get an overview how these stakeholders can be managed and acted upon based on its power and interest.

Conclusions stakeholder analyses

During the analyses four different factors were taken into account. These factors were: policy factors, knowledge factors, factors related to means and collaboration factors. In this conclusion the interests and importances of stakeholders based on the four different are displayed. Moreover it shows why these stakeholders are involved in the process of water safety.

Policy factors: For most leading and executing stakeholders involved legislation makes it compulsory to let them fulfil their functions. These are related to core tasks such as guaranteeing water safety and overall safety related to the chemical functions of BRZO companies. For stakeholders playing an advising role these policy factors are only steering them to cooperate in the process.

Knowledge factors: Most stakeholders do have shared importance to the information stakeholders. For parties responsible for execution it is necessary to acquire climate specific information on local level to be able to take measures. The importance of the RUD related to spatial adaptation is to exchange information between the Province and BRZO companies, in order to function and execute related tasks. Moreover to advising stakeholders also involved in projects and researches such as FRAMES, NRW, RAAK. These researches and projects contribute to the overall knowledge and approach on adaptation methods.

Means: Most stakeholders involved in the process state that means to cooperate to improve water safety for BRZO companies are sufficient. Especially concerning the stakeholders playing an advising role. BRZO companies have the interest to be able to reduce long term costs for investments by utilizing win-win opportunities. Concerning the RUD it requires additional budget when tasks are added to their list of tasks. This budget then need to be approved by representatives of the Province.

Collaboration factors: Stakeholders that play are leading and executing role are mostly obliged to cooperate such as the Province, Scheldestromen, RUD and ZSP. Stakeholders that play an advising role such as RWS & VRZ collaborate to enhance knowledge and strengthen relationships to realize longer term goals. BRZO companies collaborate with the importance to improve contacts with water board which provides technical input.

From the cross reference scheme multiple conclusions could be drawn. It shows the different perspectives stakeholders have about each other. It shows that the leaders of the SA process find the advising parties important related to knowledge development. Multiple mismatches can be observed related to how BRZO companies see the role of Scheldestromen. How the Province of Zeeland limitedly sees the importance of the RUD. And BRZO companies limitedly see the importance in the role of ZSP. The scheme shows that all stakeholders have a positive stance to the process. Although currently some of the stakeholders state that involvement of the GGD related to water safety will become necessary to guarantee knowledge development related to possible effects of chemical functions related to flood risk.

The analysis shows that both policy and knowledge factors play a large role to motivate and steer stakeholders to cooperate in the process of water safety related to BRZO companies. Building collective knowledge and finding effective investments by finding win-win opportunities with return in the middle-long term are main drivers for most stakeholders involved. Depending on the role of the stakeholder means can increase willingness of advising and market driven parties to increase capacity and stimulate cooperation. Collaboration factors are important to all stakeholders involved since it enables them to extend their network and gives the possibility to reach their goals.

4.2 Case study phase 2

In the case study phase of this research document, the two main harbour areas and joint government were researched in-depth by making use of a case study approach. In this case study multiple research methods were used. These methods are: policy analyses, case study, semi-structured interviews, and a questionnaire survey.

4.2.1 Results policy analyses

A policy analyses was performed with the focus on legislation related to spatial adaptation and its execution. The analysis was performed on legislation developed by multiple levels in government. This includes EU, National, Provincial and Municipal legislation. The aim of this analysis was to find out what effects policy decisions made on multiple levels can have for local government and BRZO

companies. Moreover this can give insight in the different strengths, weaknesses, opportunities and threats there are. It shows how to policies can be utilized for strategy development.

The policy documents analyzed were: "*An EU Strategy on adaptation to climate change, Adaptation of Transport to Climate Change, European guideline flood risks (ROR) IPCC AR 4 Climate Change 2007: Working Group II: Impacts, Adaptation and Vulnerability, IPCC AR 5 fifth assessment report summary for policy makers, 2013 National water plan 2016-2021, Bestuursakkoord Deltaprogramma 2014, synthese document ruimtelijke adaptatie, Handreiking stresstest ruimtelijke adaptatie, Working Together With Water, Delta Beslissingen Zuidwestelijke delta, Veilig, Veerkrachtig, Vitaal 2010, Winning combinations Zeeland Seaports 2016, Omgevingsplan Zeeland 2012-2018 (revision 2016), Beleidsvisie Externe Veiligheid Provincie Zeeland 2012, Port Vision 2030 Rotterdam, Pilot Botlek waterveiligheid 2017, Visie Ruimte en Mobiliteit. Provincie Zuid-Holland 2017, Structuurvisie Vlissingen 2010, Rapport Externe Veiligheid Vlissingen 2010, Structuurvisie Borsele 2014, Beleidsvisie Externe Veiligheid Borsele 2005, Structuurvisie Gemeente Terneuzen 2025 (2010), Beleidsvisie externe veiligheid Terneuzen 2005.*"

The approach used for the policy analyses is performing an analysis to policy document and its visions on SA. These visions gave insights on how water safety and spatial adaptation is seen by the legislative bodies. Visions were interpreted and compared to each other on different policy levels. Also the approach of Zeeland was compared to the approach of the Province of Zuid-Holland and their harbour companies. In table 9 a practical example is displayed, showing the approach of comparing roles related to spatial adaptation between the Province of Zeeland and Zuid-Holland.

In this sub-chapter the Province of Zuid-Holland and Zeeland were compared to each other. The subject of the comparison are the roles in spatial policies that the Provinces assigned to themselves. This comparison serves as source from which conclusions can be derived. Moreover it shows the differences between regional roles in the process of spatial adaptation and water safety.

Roles Zuid-Holland	***Roles Zeeland***	***Comparison:***
Steering, anticipator & connector	Policy maker and leader	1. Zuid-Holland is more actively involved in spatial processes with a manager like approach of reaching deadlines. It has an anticipating role concerning future trends. The Province of Zeeland plays an umbrella role. Focusing on motivating parties involved with the goal to let them participate and stimulate executing their tasks.
Guarding quality & playing referee	Guarding quality & playing referee	2. Zuid-Holland makes use of its legislative strengths to enforce practical guidelines. Zeeland focuses more on overseeing stakeholders involved in a process and positively correcting them when there is lived up to current legislation. It is both a different approach. In addition Zuid-Holland is making use of instruments that can be used to enforce SA measures down to local level.
Promotor & stimulator	Developer & investor	3. Zuid-Holland is promoting and stimulating municipalities and the Port of Rotterdam to take initiative to be entrepreneurial and gives information on how to anticipate on future trends. The Province of Zeeland wants to be more in control as developer and investor making decision thus having a more top down approach.
Delegator & enforcer	Enforcer	4. Zuid-Holland delegates its municipalities and Port what to do and what goals to pursue, and giving them freedom by leaving open how to reach these goals. Furthermore the Province is enforcing that these goals are reached. The Province of Zeeland has more a focus on enforcing and controlling that policies are met and sticking to their core tasks.

From this comparison it can be concluded that Zuid-Holland, compared to Zeeland uses more of its steering functions the spatial process. Examples of this are the use of multiple spatial instruments to enforce that spatial decisions are made and implemented. Moreover Zuid-Holland has a longer term perspective on its vision which is related to trends. This vision is communicated with the harbour company and municipalities. Based on this companies are left free to act according to this vision. In Zeeland this is a process more kept in control. Stockholders of for example the harbour company make decisions which are more bureaucratic and based on shorter term trends. (Provincie Zeeland, 2016), (Provincie Zuid-Holland, 2017).

Table 9 – Example, approach of policy analyses

Results policy analyses

Outcomes from the policy analyses are summarized in this sub-chapter. A division in results is made based on policy level of the different legislative bodies.

European level

On European level specific visions and policies were developed. These include multiple topics, relevant document include infrastructure space and climate change. What approach and strategies to use to involve local governments and companies. Steps are aiming at 1. Stimulating to fill the knowledge gap 2. Stimulated to map infrastructure and vital companies. 3. Stimulate front runners, after 2015 legislation will be developed that local governments and companies take sufficient precautions. 4. Stimulate companies to arrange that companies take adaptation measures on local level (European Commission, 2013). Companies and municipalities that have taken these spatial precautions will be covered by with financial products to guarantee financial compensation after a disaster has occurred (European Environmental Agency, 2014). Rotterdam and its harbour are seen as example for Europe on how to make smart decisions with the focus on climate change. In other newer European documents companies and local governments are mentioned and their responsibility is highlighted. It displays a shift in responsibility from government to a more holistic approach (European Environmental Agency, 2014).

National level

On national level concrete development policies were setup by the Dutch government. These were related to improve water safety by having a holistic process in the form of the delta decision “Spatial Adaptation.” The priority is on increased protection of areas with a high economical potential, closely populated areas and areas with a large range of vital functions. Next to this the focus is on smart combinations related to spatial adaptation improving also other factors such as reducing heat stress, water nuisance and drought. It is stated that the goal is to be fully climate-proof in the year 2050 (Ministerie van Infrastructuur en Milieu & Economische Zaken, 2014).

Regional level

It can be observed that on regional level plans made by the national government are specified and developed to be executed on local level (also EU adopted). Interpretations of roles show that the Province prefers to steer various developments and processes. Zeeland has a steering, developing and protecting role related to its spatial policy (Startnotitie herziening omgevingsplan, 2015). Concerning its safety policies the province takes sourced based measures, concentrates on full risks sources, minimizing risks of vulnerable objects using safety contours (Provincie Zeeland, 2012). From the comparison of Zeeland with Zuid-Holland roles were differentiated. These showed that Zeeland focuses on having control while Zuid-Holland has open dialogue companies and makes use of the harbour company to change climate adaptation in an opportunity for the region (Havenbedrijf Rotterdam, 2017). In the policy vision on external safety in Zeeland it was stated that the Province is responsible for 3 main policy tracks which are 1. Source focused policy (Providing licenses and enforcement for risk full companies) 2.Spatial focused policy (Safe spatial planning) 3.Disaster management (Preparing approaches to reduce effects during calamities.) Companies are themselves responsible for 1. Taking measures resulting from the application of the principle of 'inherent safety' 2. Taking measures to influence transport flows to and from the area. 3. Taking “other” spatial measures to reduce impacts on the area of influence (Provincie Zeeland, 2012).

Harbour companies

On regional level the harbour company Zeeland Seaports and Port of Rotterdam were compared. This showed that 1. Both harbour companies are executing their core tasks assigned to them, by playing directing, managing, developing and supervising roles. Although the Port of Rotterdam has an

active and preventive role to make from safety/water safety threats opportunities. 2. Both companies are facilitating their companies with information legislation. The Port Rotterdam is more proactive regarding performing studies to preventive actions of climate change and how to turn this into opportunities. 3. Roles are comparable and do not differ from each other. Both companies have open dialogue about climate change adaptation strategies to the companies in the harbour area. 4. The port of Rotterdam is actively improving its contacts with stakeholders such as the Province, municipalities and DCMR. By actively outreaching to these parties adaptation to climate change can be achieved faster. Zeeland Seaports is openly communicating to their stakeholders, but is not initiating climate adaptation initiatives itself since it awaits instructions from its stockholders. 5. The Port of Rotterdam sees climate change as an opportunity for the Port while Zeeland Seaports sees it as a threat that should be avoided. By seeing climate change as an opportunity its main goal is to find the value proposition and market the Port as "unique" and "climate proof." (Zeeland Seaports, 2016).

Local level

BRZO companies are located in three municipalities which are Vlissingen, Borsele and Terneuzen. The main roles VLI and BOR are comparable with the difference that BOR is limitedly involved with developing themselves compared to VLI. The municipality of TER sees its role more on a higher abstraction level in which its tasks are to co-operate in business cases, to network and facilitate stakeholders rather than being participant itself (Gemeente Terneuzen, 2010). Visions based on spatial development for VLI and BOR are comparable. Both are steering on a high quality. VLI by locating knowledge intensive companies and working together with the HZ. Borsele is doing this by promoting sustainability through guaranteeing overall safety (Gemeente Borsele, 2014). Vision based on safety is different for the 3 municipalities compared. VLI focusses on anticipating and transforming, for example it nudges companies to go from the Buitenhaven to the Sloegebied to reduce risks (Gemeente Vlissingen, 2010). While BOR makes use of a layer/mapping approach to determine how new areas can be redeveloped and smart combinations can be made. It advises risk full companies that do not need to be quay bound to be developed inner diked. TER has a strategy more focussed on strategic projects to cluster comparable companies to reduce risks of vulnerable functions and to increase spatial effectiveness (Gemeente Terneuzen, 2005). Visions based on climate change differ. VLI sees climate change as both an opportunity and threat. An opportunity since it can profile itself as adaptive which can bring positive effects to the business climate. BOR sees climate as a challenge, in order to solve it by making use of a more effective use of space. TER sees climate change as a threat that should be tackled. By clustering risk full companies these threats will possibly be avoided. It does see fewer opportunities for the business climate than VLI or BOR (Gemeente Borsele, 2014).

Conclusions policy analyses

From these results it can be concluded that the multiple layers of government and different stakeholders have influence on BRZO companies. Depending on its location and its municipal border different political forces influence decisions made by these companies. On regional level the Province plays an important role to develop ambitions and a long term related to BRZO companies. On local level it can be observed that municipalities have separate visions related to BRZO companies leading to dispersed spatial legislation.

4.2.2 Best practices as practical example

In this sub-chapter the results of the case study based on a practical example are displayed. It concerns the approach on SA on BRZO companies of the Province of Zuid-Holland together with the harbour company of Rotterdam. This case serves as an example to the Province of Zeeland how this process can be approached. From the case study "*Botlek Waterveiligheid*," multiple results were

derived. Both have a long term vision related to climate change and spatial adaptation. Based on this vision a pilot was launched to give room for improving water safety in this harbour area.

The Botlek is more or less comparable to the Sloegebied in Zeeland since it is also located outer diked. The main difference is that the Botlek harbour still has primary protection in the form of the Measlandkering, which can close when necessary. Another difference is the height of the Botlek harbour which is around 3.6 to 5.25 meters above sea-level (Royal HaskoningDHV, 2017).

First all specialists from the region of the joint government, Harbour Company and BRZO companies were brought together in a project group. Together and one-on-one the effects of flooding and the effectiveness of adaptation strategies were discussed. To start off advice companies Royal Haskoning & HKV were hired. A risk analyses and an impact analyses were used. The risk analyses took into account risks according the model of multilayer water safety. The impact analyses focused on 3 sorts of impacts: economic damage, casualties and environmental damage. It showed that during flooding economic damages are dominant. With this information various scenarios were made and consequences of these were explained. The joint government and companies were informed and it was determined that the acceptable change of a flood was determined. Depending on the type of harbour area and company functions acceptable changes are assigned (Royal HaskoningDHV, 2017).

Based on this, a selection procedure (see figure 10) has been set up. With this procedure effective adaptation measures are chosen. It is based on three steps: Firstly a selection is made by experts of realistic methods that can be used to have controlled floodings and wave reducing measures. Secondly a dialogue was initiated with stakeholders to assess adaptation measures and strategies based on the three layers of water safety. Of the usable adaptation measures costs and benefits were estimated. Thirdly the possible adaptation strategies were discussed with the BRZO companies and assessed on the criteria flexibility, effectivity and feasibility. As a result of this the adaptation strategy for the harbour area was derived (Royal HaskoningDHV, 2017).

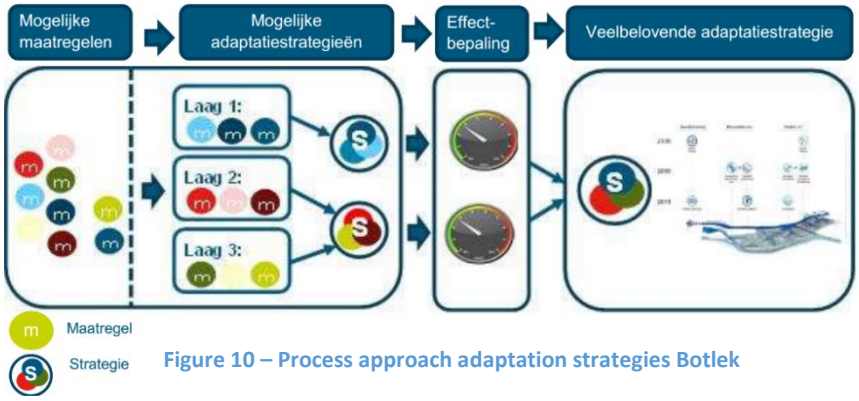


Figure 10 – Process approach adaptation strategies Botlek

Conclusions best practices

From this approach multiple things can be learned. First all stakeholders should be actively involved in the process, and adaptation strategies and measures should be determined. It shows that the process of joint fact finding led to a dialogue deemed necessary to create awareness. Sharing information on knowledge factors, such as chain effects is essential. It showed that by making use of the momentum motivation was triggered to move from theory to taking spatial measures. Furthermore a strategic adaptation agenda and joint preferred strategy with long term shared vision were developed by governmental stakeholders. This provided legislative certainty to harbour companies. An environmental risks report was used as policy tool to quantify risks and measures for redevelopment or issuing new land. Afterwards a joint emergency plan can be developed which proves to be more effective after the process on “knowledge” is finished.

4.2.3 Results surveys

In this chapter the results of the questionnaire surveys are displayed and explained. In total 13 BRZO companies filled in the questionnaire survey which is a response of 100%. It concerns BRZO companies at both locations: Kanaalzone and Sloegebied. Since the topic concerns water safety and environment the survey was filled in by SHEQ managers of BRZO companies. These managers are policy specialists responsible for quality, health, safety and environment at larger companies. The questionnaire featured multiple choice, Likert based and open questions on which graphical and tabular data displayed below is based. (See appendix 9.13 for survey summary).

Awareness on effects of climate change

From the survey it was derived that 77% of the BRZO companies did think in medium to very large extent about the influence of climate change on the functioning of their company. This means that climate change is a topic that is of importance to BRZO companies. 76.9% of these companies know in medium to very large extent what the effects of climate change are on the functioning of their organization, with the focus on water nuisance. 53.8% in high extent and 7.7% in very high extent (see figure 11).

92.3% of the BRZO companies know in medium to very large extent what the effects of climate change are on the functioning of their organization are with the focus on water safety. 61.5% in high extent and 15.4% in very high extent. (see figure 12). Compared to water nuisance more companies in a higher extent know about what effects water safety can have on the functioning of the company. One of the reasons for this is that water safety is seen as more threatening and is a longer existing well known topic, while water nuisance is a more recent day topic.

84.7% of the BRZO companies in a large to very large extended put attention in mapping risks of a possible flood related event. All 13 companies did put attention into mapping risks of a possible flood related event (see figure 13). 38.5% of the BRZO companies in a large extent put attention into mapping risks of methods to use to improve safety against flood risks. (see figure 14). Compared with the previous question it shows that most companies did map risks of flooding but only one third put attention into finding methods to use to adapt.

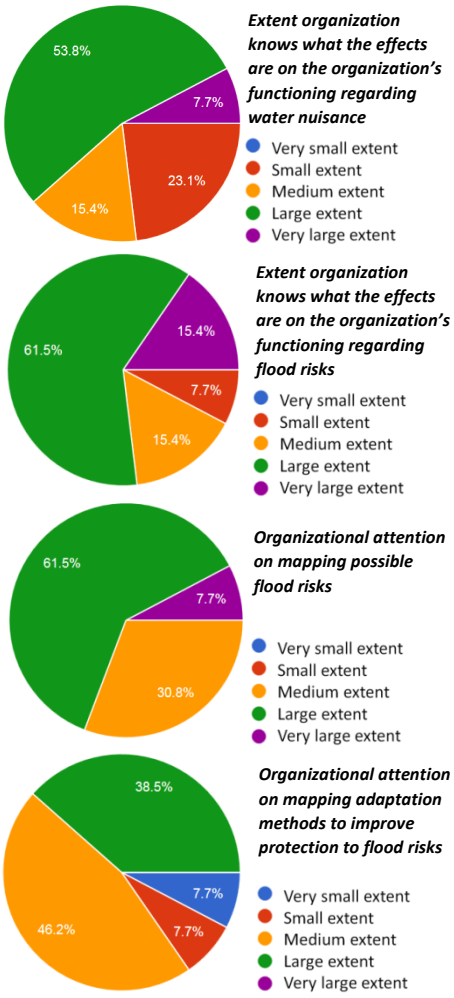


Figure 11, 12, 13 & 14 – survey pie chart

Resources and willingness for adaptation

53.8% of the BRZO companies in a large extent find that they have sufficient knowledge in their company in order to realise climate adaptation measures. Moreover it outcomes display that that 15.4% in a medium extent 23.1% in a small extent 7.7% very small extent of knowledge available to realise climate adaptation measures. Thus 30.8% of BRZO companies do deem themselves not having sufficient knowledge to realise climate adaptation measures (see figure 15). It points out that specialist

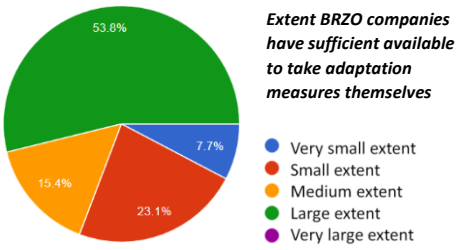


Figure 15 – survey pie chart

help might be required when implementing spatial adaptation measures. Another result is that "smaller" BRZO companies are lacking employees with specialist skills related to climate change.

All BRZO companies would take action when it appears that future flood risks could possibly threaten the conduct of business of these companies. 69.2% would undertake action in a large extent and 23.1% in a very large extent (see figure 16). In a large 61.5% to very large 38.5% extent there is support of BRZO companies to take measures when water safety standards are exceeded (see figure 17). Compared to the previous question it shows that more companies and to a higher extent, actions will be taken when legal standards would be crossed. This means that there is willingness to adapt. Making use of water safety standards could prove effective.

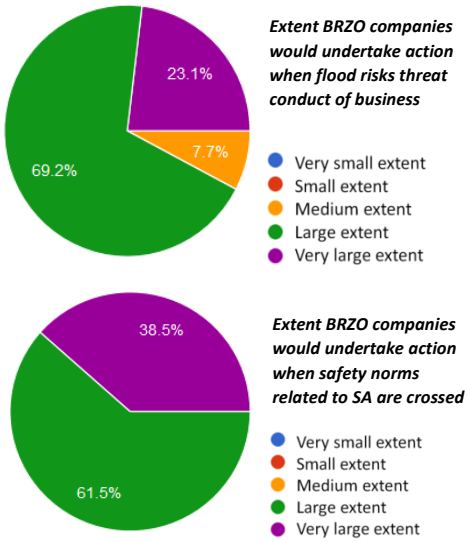


Figure 16 & 17 – Survey pie chart

92.3% of the BRZO companies in medium to very large extent wrote a calamity plan on what effects a flood related event can occur. 69.3% of these companies see chain effects during a flood related event as a threat for the functioning of the organization. Of these companies 30.8% find it a threat to a large extent and 15.4% find this a threat to a very large extent. Furthermore it can be observed that it mainly concerns the "larger" BRZO companies which are often depended on other companies for their substances.

Responsibilities and Roles

All companies find that there is clarity about the responsibility for making use of adaptation measures. Although it is not known specifically who companies think is responsible. From question 12 & 13 it was derived that companies expect the Province, RUD or Scheldestromen to be responsible for taking adaptation measures while in most cases BRZO companies are responsible themselves.

When asked to companies what they expect of the Province and RUD companies gave different answers. From the answers given it was derived that:

- Province and RUD should focus more on informing and advising. What companies specifically demand of Province is to having a discussion on what impacts different scenarios of flooding can have on the companies' conduct of business.
- Have a checking role concerning making decisions about measures so companies are prepared for a flood related event.
- Focus on generating and coordinating generic and business cross-border measures.
- Provide insight in possible adaptation methods that can be used by BRZO companies on a local scale. This will serve as an indication which adaptation methods can be used, since it currently is limitedly known what options are there for these companies.
- Inform about developments related to water safety and spatial adaptation in order to raise awareness at these BRZO companies.
- Expectance that RUD informs companies about future water safety problems and the necessity to adapt.
- Both Province and RUD should map flood risks on local scale so that companies will be aware of their risk.

When asked what companies expect of municipalities it was stated by all companies that they should be involved in the process but play a minor role, with the focus on advising and giving input to Province. Most companies would prefer that a single stakeholder on provincial level is responsible for active communication with companies about the subject of water safety. Next to this companies expect information and clear policies on water safety which are shared with companies through one medium. It also concerns having a combined procedure for licensing. It fits the vision connected with the introduction of the new environmental policy and can possible be combined.

When asked how companies view the role of Zeeland Seaports, Veiligheidsregio and Scheldestromen, companies stated that these roles should be focussed on: *Supporting, facilitating, informing, and advising* by working together. According to the companies Zeeland Seaports should prepare terrains beforehand to be waterproof. It should also take measures to reduce flood risk since it knows local assets and quays.

Process improvement

Companies give the current cooperation between the Province and RUD a score of 6 out of 10 on the subject water safety/climate adaptation. To improve the score for cooperation it was stated: Limited attention is given to inform companies clearly from a common vision. To improve this companies expect that:

- Indicate what is expected of BRZO companies.
- Informing companies as joint government in order to have effective communication
- Clear communication and vision on what assets specifically should be protected.
- Possibility to partake in discussions about water safety when it concerns water safety in harbour areas.
- Companies know there are responsible for taking adaptation measures and are open for it although no information is provided by joint government. Give clarity by sharing expectations with companies in the form of a vision or by including it in regulations.

Most companies know what their height above sea level is. Although they do not know at which heights above sea level assets will be damaged. Companies knowing at which flood heights assets will be damaged during a flooding responded that they visited the information meeting of ZSP and VRZ. This shows that companies that visited the information meeting are more aware then companies that did not. It differs per location, companies located at the Kanaalzone stated that substations are most vulnerable since these are located below the water level in the canal. Companies located in the Sloegebied stated that 30 – 50 cm of water above surface level can lead to failing electricity supply.

Since 2016 BRZO companies are obliged to write a flood risk paragraph according to SEVESO III legislation. 61.5% has done this, 30.8% are currently developing and 7.7% has not yet written the risks paragraph. Results show that companies that wrote the risk paragraph are more aware responsibilities of taking spatial adaptation measures and the effects of a flooding on local scale. Moreover it showed that limited monitoring by the RUD is taking place on the development of risk paragraphs. Moreover companies stated that the information meeting with ZSP and VRZ was very informative and gave insight in what is expected of the harbour companies in the future. Although due to the uncertainty of measures that have to be taken companies are currently not willing to invest.

Differences between locations

It is observed that answers given by companies located at the Kanaalzone and Sloegebied on survey questions are comparable. This means that limited evidence is found that location plays a role in answering of survey questions. Although it is observed that companies of a “larger” size are more aware of effects of climate change and have done more in finding adaptation methods compared to “smaller” BRZO companies that filled in the survey.

4.2.4 Results case study phase

With results of the semi-structured interview and qualitative questionnaire survey table 10 was filled in. It displays the barriers in the process from the perspective of the joint government and BRZO companies. Furthermore it displays which requirements are necessary to break these barriers, according to the perspective of these stakeholders. It can be observed that it differs per stakeholder what factors they observe to be barriers in the process. Although it can be concluded that it mostly concerns cognitive and political related barriers. (Berg, 2009), (Interviews 1-11), (survey, appendix 9.13).

Barriers to mainstreaming of "Spatial Adaptation"						
Barriers:	Stakeholders:					Requirements:
Capacity related barriers	**Prov**	**ZSP**	**VRZ**	**WS**	**BRZO**	
Shortage of financial resources for spatial adaptation						-
Shortage of personal capacity for spatial adaptation	X			X	X	Hiring more employees executing tasks related to water safety and industry.
Cognitive related barriers						-
Lack of knowledge vulnerable locations on local scale		X	X	X	X	Research and organize sessions with companies, determine vulnerable assets.
Lack of useable climate scenario's on local scale	X		X	X	X	Actual detailed info, about these topics produced by the Province or external parties.
Lack of knowledge about potential adaptation measures		X	X	X	X	
Uncertainty climate chance effects (on local level)	X	X	X	X	X	
Uncertainty about societal costs/assets of adaptation measures.		X	X	X	X	Clear guarantees and local examples (pilots) with a financial picture.
Social and cultural barriers (Administrative culture)						-
Lack of local support (during integration of policies)						-
Lack of problem recognition within organizations				X		Long term vision on SA with vision on adaptation for BRZO companies.
Lack of effective instruments	X	X		X	X	A checklist connected with a toolbox made by the province or external party.
Political and institutional barriers						-
Lack of political support/interest	X	X	X			Stimulate involvement and visibility.
Lack of stimulants to implement spatial adaptation (top down)	X	X				Clear (provincial) vision on BRZO companies and SA.
Lack of cooperation in and between governments					X	Active cooperation with 1 stakeholder responsible for centralized communication.
Lack of clarity about responsibility of spatial adaptation	X				X	Clear National vision on BRZO companies and responsibility of stakeholders.
Short term notice towards conflicting policy subjects						-
Technological barriers						-
Limited adaptation possibilities					X	Detailed information shared by joint government on local adaptation methods suitable for BRZO companies

Table 10 – Barriers towards mainstreaming of "Spatial Adaptation"

From the survey held it can be perceived that the limiting factors found for BRZO companies are mainly similar to each other. When comparing with the joint government overlap can be found. A difference that can be found is that governmental parties mainly see political support and institutional barriers as a barrier to adaptation while BRZO companies see cognitive and technological related barriers. Strategies to remove these barriers are allocated in chapter 4.3.2 (Interviews IIX, IX, X, XI), (surveys appendix 9.13).

4.3 Core research phase 3

In the third phase of the research results derived from the basic analyses phase and case study phase are interpreted and connected with methods that can be used to improve the process. When the most effective methods are known, it is possible to develop strategies that can be used by the Province in order to improve the level of water safety of BRZO companies. To interpret results use is made of a SWOT and TOWS analyses. By combining these methods and using a literature analyses connections can be found. According to a research performed by D. Oreski, using a SWOT analysis in combination with a TOWS analyses is effective to developing strategies and its later formulation (Oreski, 2012).

4.3.1 SWOT analyses

For the SWOT analyses outcomes from the analyses performed are interpreted. For interpretation and finding connections a complementary TOWS analyses is used and displayed in the following sub-chapter. Moreover the SWOT analyses shows what strengths, weaknesses, opportunities and threats related to the process could be allocated.

Joint government – Improving water safety of BRZO companies

Strengths

1. (P) Available policy instruments (such as risk map and risk contours) that can be used for steering establishment or expansion of BRZO companies (Interview IV).
2. (P) Sufficient political support in order to justify the process when it comes to facilitating BRZO companies related to water safety. Since water safety is a prominent topic that receives overall large support in Zeeland (interview IIX, IX, X).
3. (K) Sufficient technical knowledge as joint government. Since the joint government conducts various joint studies with the focus on spatial adaptation knowledge on SA topics is high. Having access to technical and policy specialists the joint government both has the knowledge and the resources to be able to inform or facilitate BRZO companies (Interview I-XI).
4. (K) BRZO companies are aware of the roles other stakeholders play, and know in a high extend what tasks these stakeholders are responsible for (Survey appendix 9.13).
5. (C) Support of BRZO companies proven by written risk paragraph. Furthermore some companies conscious and unconsciously already undertook actions to spatially adapt (Survey appendix 9.13), (Interview IIX, IX).
6. (C,K) Good cooperating among joint governmental stakeholders responsible for knowledge creation and research to spatial adaptation, vulnerability of infrastructures in relation to BRZO companies and water safety (Interview IV, V, IX, X).
7. (C) Overall awareness to spatial adaptation of joint government did grow the past year. Although a better connection between the different topics of spatial adaptation could be found (Interview VI).
8. (C) By the Province, ZSP and VRZ it was recognized that SA should become a more prominent topic in daily activities of the joint government (IV, IIX, IX).

Weaknesses

9. (P) Short term vision on SA in regional policy vision document. SA is briefly mentioned, but no goals are set to be reached in 2020 for the phase “willing” and 2050 “working” (Interview IV), (Survey appendix 9.13).
10. (P) Policy documents & vision document limitedly safeguard approach of SA overall (Interviews I-XI).
11. (K) Lack of knowledge vulnerability BRZO companies and chain effects infrastructure (Survey appendix 9.13).
12. (K) Fragmented knowledge among joint governmental stakeholders on water safety. For example Scheldestromen has technical focus, Province policy focus, VRZ safety focus, etc. (Survey appendix 9.13).

13. (K,C,M) The Province and BRZO companies are limitedly stimulated by ministry in the form of knowledge, resources or useable instruments (Interview IV, IIX).
14. (C) Limited capacity of policy specialists and taking responsibility of joint government to actively work to improve water safety of BRZO companies (Interview VI).

Opportunities
15. (P) BRZO companies are open to the idea that the Province develops policies that will steer BRZO companies to take SA measures. It will clarify safety goals that should be worked towards and justify adaptation measures taken to the companies cooperate management. (Interview IIX, IX).
16. (K) Increasing awareness of joint government on SA and water safety. Currently awareness can be increased by sharing the results of the different joint studies being performed on the topic of BRZO companies and their vulnerability. (Interview IX, X).
17. (K) Increasing awareness of BRZO companies and form an integral approach in order to break current barriers in the process. (Interview IIX).
18. (M) Use and stimulation of BRZO companies to play the role of front runners in SA. Playing this ambassador's role will increase awareness and willingness of other BRZO companies to participate and adapt as well (Interview X).
19. (C) The GGD should become actively involved in the process in order to contribute specialist knowledge on public health to find adaptation methods for companies limiting the damage of chemicals (Interview VII).
20. (C, K) The process initiated by ZSP and VRZ of informing BRZO companies to increase awareness related to SA on water safety proved to be effective. When more stakeholders from government and BRZO companies are present in successive meetings, awareness and willingness of both parties to work to common goals can be realized. (Interview IIX, IX).

Threats
21. (P) Uncertainty of SA to water safety, since there is no long term vision or officially anchored in national or regional policies (Policy analyses, interview IV, IX, X).
22. (P) Not properly utilizing the new environmental law to incooperate spatial adaptation approach (V, XI).
23. (C) Stakeholders abdicating responsibility for taking adaptation measures to BRZO companies (interview IV, X, XI), (survey appendix 9.13).
24. (P, C) No double checking by the Province on enforcement tasks of the RUD (Interview VI).
25. (C) Lack of clarity roles of joint government to BRZO companies can lead to awaiting attitude of BRZO companies (Interview IV), (survey appendix 9.13).
26. (C) Limited attention for BEVI companies since these often to stay under BRZO limits. Importance to these is often underestimated since there is more focus on BRZO companies (Interview V).

Multiple outcomes were derived from the SWOT analyses. It showed what strengths, weaknesses, opportunities and threats in the process of improving water safety for BRZO companies are present. Furthermore it displays what factors can be categorized as "*Policy related*," "*Knowledge related*," "*Means related*," and "*Collaboration related*." It can be observed that cooperation factors largely serve as strengths. These are: support of BRZO companies, good cooperating joint governmental stakeholders, grown awareness of joint government to spatial adaptation and recognizing its prominence. Other strengths are related to policy factors: available policy instruments and sufficient political support. Knowledge factors are: joint government has sufficient technical knowledge and BRZO companies are aware of the roles that other stakeholders play.

Related to opportunities factors are diverse, in this extend it includes: BRZO companies accept development of "steering" policies by the Province, sharing results of joint studies will increase awareness of stakeholders, increasing awareness and integral approach BRZO companies to break process barriers, stimulating front running BRZO companies to play ambassador role, Involve GGD to contribute specialist

knowledge on public health to in relation to adaptation and the use of future information events for BRZO companies. Concerning weaknesses factors mainly include policy and knowledge factors which are: Short term vision on SA in regional policy vision document, policy documents & vision document limitedly safeguard approach of SA, lack of knowledge vulnerability BRZO companies and chain effects, fragmented knowledge among governmental stakeholders, the Province and BRZO companies are limitedly stimulated by ministry, Limited capacity of policy specialists and taking responsibility. The factors related to threats concern mostly policy and cooperation factors these are: Uncertainty of SA to water safety, since there is no long term vision or officially anchored in policies, not properly utilizing the new environmental law to incooperate SA approach, Stakeholders abdicating responsibility to BRZO companies, no double checking by the Province on enforcement tasks of the RUD, Lack of clarity roles of joint government to BRZO companies and limited attention safety of companies with medium risk the so called BEVI companies.

From the SWOT analyses multiple results were derived. It was recognized what factors are present and related to strengths, weaknesses, opportunities and threats. It can be concluded that “means” as a factor is of limited relevance compared to policy, knowledge and collaboration factors. Collaboration and policy factors are largely important to all of the strengths, weaknesses, opportunities and threats in the process. Although knowledge and cooperation factors are a strength in the process these also can form threats when not utilized properly. Therefor it is necessary that stakeholders are aware that it is necessary to develop a clear vision on what goal they want to achieve in the future and what resources will be utilized to achieve this.

4.3.2 TOWS analyses

In this chapter connections are made and found between the results derived from the SWOT analyses. (See chapter 4.3.1). By using a TOWS analyses it is possible to find what strategic options can be chosen and developed. It is made insightful how weaknesses and threats can be avoided and how opportunities and strengths can be captured. By finding combinations between internal and external factors in the process, strategic options were found. It shows which areas in the process need additional attention and how these can be achieved. Four strategic options are present, these are: 1. Using strengths to maximize opportunities. 2. Minimizing weaknesses by taking advantage of opportunities. 3. Using strengths to minimize threats. 4. Minimizing weaknesses to avoid threats. The different strategy options are displayed below in table 11.

	Internal strengths: 1-8	**Internal weaknesses**: 9-14
External opportunities: 15-20	(1) Using available policy instruments (risk paragraph) to clarify safety goals worked towards. To steer BRZO companies to take spatial adaptation measures. Continue use of good cooperation -> stimulate open integral process. Sharing technical knowledge and involve more stakeholders like GGD to use their specialist knowledge to facilitate BRZO companies. Use political support and extend use of information meetings to increasing awareness and willingness. This also clarifies stakeholder responsibilities. By sharing the results of joint studies being performed on the topic of BRZO companies and their vulnerability.	(2) Long term vision with goals to increase willingness of government and BRZO companies. Successive meetings raise awareness and willingness to reach common goals. Vision document to safeguard SA approach. By setting standards clarify safety goals that should be worked towards and justify adaptation measures taken to companies. Share results of joint studies performed on BRZO companies and vulnerability to limit fragmented knowledge. Emphasize responsibility of joint government to reserve sufficient capacity in order to be able to take an active part in the facilitation process.

	Stimulate BRZO companies to play the role of front runners in SA. Playing this ambassador's role will increase awareness and willingness of other BRZO companies to participate and adapt as well.	
External threats: 21-26	(3)Combine political support with technical knowledge and resources to remove uncertainty and show the benefits of long term adaptation to BRZO companies. Use support to integrate spatial adaptation in the "new environmental law." Take advantage of good cooperating and awareness to retain stakeholders abdicating responsibility for contributing to adaptation measures. Inform BRZO companies on roles the joint government plays -> will break awaiting attitude of BRZO companies. Informing BEVI companies about advantages of adaptation to water safety to raise general awareness.	(4)Uncertainty of SA approach, not obligatory and anchored by law. -> Provincial guarantees in vision document including goals reduce uncertainty. Develop platform to join fragmented knowledge responsible party for communication. -> improves knowledge provisioning, clarifies roles and easy communication to BRZO companies. Provide incentive in the form of knowledge, resources or useable instruments for stakeholders to stop abdicating responsibility for taking adaptation measures to BRZO companies.

Table 11 - TOWS analyses, combining SWOT outcomes

4.3.3 Strategies

In the previous chapter, the TOWS analysis was used to allocate multiple strategy options available. In this chapter strategies that will be most effective are chosen based on research results. By using the model of "resources and customer based theories" as decision framework in combination with discussing feasibility of strategies with a Province policy specialist. Preferred strategies were allocated.

Strategy selection

Based on the model of resources and customer based theories there are 3 main strategies the Province can use to improve the level of facilitation to improve water safety of BRZO companies. (Barney, 1986), (Porter, 1980). Like displayed in figure 18 there are 3 strategies that can be used:

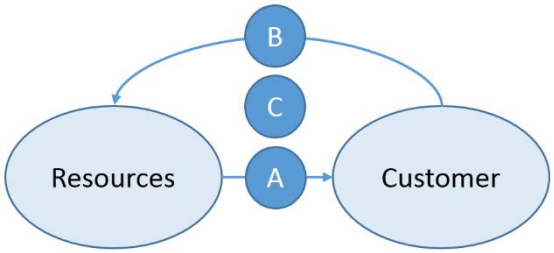


Figure 18 – Model of resources and customer based theories

A. Regulation developed by government that should be adopted by BRZO companies.
B. Open process in which companies take own responsibility, initiative and can demand resources (such as knowledge) when necessary.
C. Active cooperation and responsibility by BRZO companies and government in dividing "*resources.*"

Currently strategies used by the Province are type A strategies with limited elements of C strategies. Since spatial policies are changing from "regulating" to "facilitating" also caused by the introduction of the "new environmental law" replacing traditional spatial instruments. From the discussion with the policy specialist of the Province the necessity was emphasized that a hybrid of strategies A and C would prove most effective. Because of its combination between safeguarding SA approach to BRZO companies and at the other hand leaving enough space for open cooperation. Strategy pathways

were discussed of which the most preferred was: 1.Informing 2.Generating knowledge and facilitating approach to companies 3. Companies should work on realizing local adaptation strategies. 4. Feedback for companies and adjust approach when deemed necessary.

Combining strategy options

Suitable strategy options from the TOWS analysis are a mix of 1. "*Using strengths to maximize opportunities*," and 2. "*Minimizing weaknesses by taking advantage of opportunities."* Since these are based on opportunities strategies are mostly focused on an open approach in which knowledge development can take place with limited necessity of safeguard process.

A management model on is used to support and validate the operationalization of the preferred strategy. Since spatial the provincial process on spatial adaptation can also be seen as a process of "change". Like explained in chapter 2.1 there is a shift from protection to smart spatial planning, taking into account long term developments for climate change adaptation. Because it is focused on the operationalization of (management) strategies it is determined to use the Kotter´s 8 Step Change Model (Hayes, 2014). This model does exist out of 8 steps (See figure 19). By following these 8 steps implementing failures at implementing change will be decreased. Since the process of spatial adaptation for the joint government is already in existence since the year 2013/2014 some of the steps were already taken.

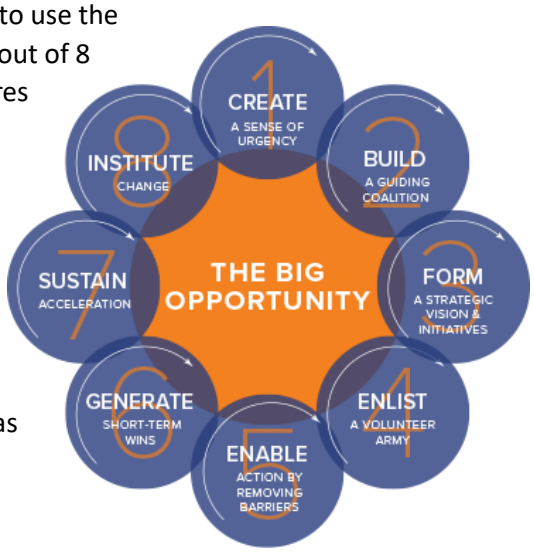


Figure 19 – Kotter's 8 step change model

In appendix 9.5 the Kotter 8 step model scheme was filled in showing that on governmental level already a sense of urgency was created (step 1) and a collation was formed (step 2). Moreover the VRZ and ZSP already communicated their vision on water safety to BRZO companies (step 4). While no shared vision was developed on Provincial level yet (step 3). The following strategy actions should be taken corresponding with the steps in the model:

1. *An overall sense of urgency* related to water safety is already in place on national and regional level. Research and policy plans been developed on national, regional and local levels. Concerning BRZO companies in specific this is still limited. Since the delta commissioner stated that action should be taken through the spatial adaptation process although these have limitedly shared with the public or BRZO companies sense of urgency has been created (Brower et al. 2007). (See appendix 9.5, Kotter step 1).
2. *A Guiding coalition* in the form of a process organization has already been formed (Cowley, 2007). These are the stakeholders discussed in the stakeholder analyses. To improve knowledge development on safety and health the GGD as a stakeholder should be involved. Other parties should use their expertise to give advice on specialisations like described in chapter 4.1.2. (See appendix 9.5, Kotter step 2).
3. *Create a vision for change* and use basic research and data input to work at the rest of the tasks. A regional adaptation strategy should be set-up including a vision on different topics. To safeguard the approach a vision document can be used as instrument in order to develop and in later phases safeguard a long term vision related to adaptation of BRZO companies (Hoover, 2008). (See appendix 9.5, Kotter step 3).
4. *Vision is communicated* and it is shown which parties and leaders are involved (Cowley, 2007). The joint government should form a leading coalition. To start of the approach a large

information session should be organized with all BRZO companies present. The Province should be the initiator together with Scheldestromen. Results of joint studies on the topic of BRZO companies and vulnerability (mainly technical) should be shared with the BRZO companies. Use political support and extend use of information meetings to increasing awareness and willingness to participate. During this meeting the joint government should share expectations of BRZO companies. (See appendix 9.5, Kotter step 4)

5. *Remove obstacles* like displayed in chapter 4.2.4. It shows that obstacles in this case "barriers" are mainly related to a lack of clarity about responsibilities of spatial adaptation, lack of knowledge on vulnerability, climate scenarios and adaptation measures on local scale and adaptation possibilities. These obstacles can be removed by having a clear (provincial) vision on BRZO companies and SA. Detailed information shared by joint government on best practices in other provinces, local adaptation methods for BRZO companies and providing clear guarantees and local examples (pilots) with a financial picture (Cowley, 2007). (See appendix 9.5, Kotter step 5).
6. *Realize short term wins.* By stimulating BRZO companies to play the role of front runners in SA. Playing this ambassador's role showing the short term wins booked by taking adaptation methods will increase awareness and willingness of other (BRZO) companies to participate and adapt as well (Cowley, 2007). (See appendix 9.5, Kotter step 6).
7. *Improvements should be consolidated* after front running companies should be open to invite the Province and other parties from the process group on site. Companies should take the initiative themselves for adaptation. Communication with companies should be centrally organized preferably via the Province (Parish et al. 2008). (See appendix 9.5 Kotter step 7).
8. *Anchor the changes,* by making use of the "new environmental law" It can serve as instrument to integrate provincial guarantees for adaptation in harbour areas. Also the Province can choose to include the goals of water safety in relation to spatial adaptation in the provincial policy vision document in order to assure companies what visions and goals will be achieved in the future. To finalize the approach companies and joint government should have final meeting in which is reflected upon the process. This best can be done by reviewing barriers and see if these are broken. When not, additional actions can be taken (Soltani, 2005). (See appendix 9.5, Kotter step 8).

Conclusion strategy development

From the research to effective strategies it can be concluded that a mix of A and C strategies best can be used. Preferably it is a government that is regulating in combination with active cooperation. Moreover has responsible BRZO companies and equally sharing their resources to finally reach the goal of adaptation. To overcome barriers in the process to improve the level of water safety of BRZO companies' strategy operationalization is essential. By making use of the Kotter 8 management step management model strategy steps were formulated. Shortly its main actions include:

Use polical support and information meetings to create awareness and willingness. Share joint studies to remove fragmented visions. Share expectations with BRZO companies. By developing a clear (provincial) vision on BRZO companies and SA, sharing detailed information on best practices in other provinces, local adaptation methods, providing clear guarantees and local examples (pilots) with a financial picture. Front running companies should be stimulated to play an ambassadors role, showing off its short term wins, by using adaptation methods. Increasing awareness and willingness of other companies to participate and adapt as well. Safeguard the approach by using a vision document as instrument. Use the "*new environmental law*" and policy vision document to embed future adaptation goals. Finally the process group should reflect and define additional actions when necessary.

5. Discussion

The purpose of this thesis research was to determine what strategy will prove most effective in order to improve the level of water safety of BRZO companies. In this chapter results of the research and its limitations are discussed.

- During the progress of the research the sequence of sub-questions 2 and 4 was changed. Because it was necessary to first know what barriers were present in the process, before being able to determine what types of strategies could be used. The sequence of these sub questions was changed since it was sequentially more logically.

- The hypothesis on difference between spatial characteristics and survey outcomes proved not to be true. In this hypotheses it was expected that a comparison could be made of the outcomes of the survey and that for both the companies located in the Kanaalzone and the Sloegebied different strategies could be developed. From the survey it was derived that companies located in both locations gave comparable answers and have comparable barriers. Therefor one main strategy has been developed. Moreover the survey showed a difference between “large” and “small” scale companies. “Smaller scale” companies having shortage of personal capacity for spatial adaptation. This specific difference was included in the current strategy formulation.

- The Buitenhaven/Sloegebied is outer diked therefor there are no legal standards on how to protect outer diked areas. Since it has no legal standards for protection limited research has been performed to the chain effects of a flooding outer diked. The companies in the Sloegebied are more or less comparable quay height for this is the most important factor. It depends on the type of BRZO company, installation and situation if a company is vulnerable or not. For example a when tank or pipes are filled with oil, due to the internal pressure it will be less likely that an installation is damaged or fails. When it is empty or there is less pressure changes of damage or failing installations are larger. The companies which are actually important are the larger ones with heavy chemical functions which can do the most harm such as Dow, Zeeland refinery.

- It took much effort to get responses on the survey by some companies. Most found the topics of water safety and spatial adaptation an important that deemed to be internally discussed first before filling in the survey. This also showed that the topic of the research is an actual topic and of importance to both the joint government and the BRZO companies involved. Due to time spend on convincing companies filling in the survey less time could be spend for interpretation of results.

- Less interviews were performed than written in the proposal. The main reason was the time limitation and complete information that was already provided by the other interviews held. Moreover all interviewees were contacted before the interview to see if they could provide new information other than already provided by previous interviews. Since it was determined that this was not the case a maximum of 12 interviews were held.

- No precise adaptation methods on local scale are presented in the preferred strategy. The main reason for this is that that the process of SA is still in its first phase. Therefor it was first necessary to determine which strategies can be used in order to remove current barriers in the adaptation process itself. When these barriers are removed and BRZO companies are actively involved in the process, it then will be possible to determine which specific strategies can be used to implement adaptation strategies.

6. Research conclusions

After finishing the research to strategies to increase the level of water of water safety of BRZO companies multiple conclusions were drawn. The conclusions drawn answer the sub-questions and main research question.

"Which stakeholders are involved in the process of implementing the Delta program spatial adaptation in the Province of Zeeland, and what are their roles, tasks and obligations related to BRZO companies?"
By making use of the stakeholder and policy analyses performed it can be concluded that in Zeeland the following stakeholders are present and have the following roles, functions and obligations: The Province of Zeeland has a management and leading role with enforcing, steering functions and obligation related to informing and data development. The RUD has a monitoring role and obligation related to executing environmental, safety, licensing, supervision and enforcement tasks related to BRZO companies. Scheldestromen has a leading role, with an advising and informing function and obligations related to BRZO companies.

The Veiligheidsregio has an advising role, with a function responsible for vital infrastructure, crisis communication. With obligations to contribute to overall knowledge development. Zeeland Seaports has informing, overall management harbour companies roles with the function safety issues, ISPS and developing calamity plans and has the obligation of managing space and nautical activities. Rijkswaterstaat has an advising role with the obligation to keep primary dikes up to the preferred level of safety. BRZO companies have the only obligation to operate within the border of the law. GGD is not actively involved yet but have the function of providing health specific knowledge professional interpretation. It can be concluded that the Province of Zeeland together with Scheldestromen play a managing role while other parties have a supporting and advising role. *(See chapter 4.1.2 & 4.2.2)*

From the literature analyses it was expected that stakeholders were aware of the delta decisions made. This hypotheses proved to be right since most stakeholders already took action by starting to inform companies. All stakeholders already applied the theory introduced by Most et al. This includes that different values are weighted and a balance is found between economic importance and public importance (Most et al.,). Due to the perceived economic importance of BRZO companies semi-governmental stakeholders consider the protection of these companies as essential. A shift is observed from public values to economic values. Moreover in literature is was stated that stakeholders in 2015 were rather unclear about the intentions of the program of SA (Brugge et al., 2015). Due to the actions of both the Province and Scheldestromen it was observed that involved stakeholders are aware what it what it consists of and know specifically what their role and functions are.

"Which barriers do BRZO companies experience in order to contribute in mainstreaming water safety in spatial adaptation?"
By making use of literature analyses, specialist interviews, questionnaire surveys, it can be concluded that there are various barriers for BRZO companies. From the survey was derived that all BRZO companies see the necessity of adapting climate change with the focus on water safety in the future. (See chapter 4.2.4). The survey showed that that BRZO companies experience:

Capacity related barriers, specifically a shortage of personal capacity with knowledge of spatial adaptation was observed. This is a barrier mainly present at the smaller scale BRZO companies. It a lesser extend it could be recognized for the larger scale BRZO companies. Hiring more employees executing tasks related to water safety and industry could prove useful when removing this barrier. From the literature analyses it was expected that this barrier would be evident and companies would consider it as minor barrier. This proved to be the case. Companies stated that they know where to find employees with the required expertise and have sufficient resources in order to these experts.

Cognitive related barriers, are the most common barriers of BRZO companies. It includes lack of knowledge vulnerable locations on local scale, lack of useable climate scenarios on local scale lack of knowledge about potential adaptation measures, uncertainty climate chance effects (on local level) and uncertainty about costs/assets of adaptation measures. From the research it was derived that these barriers can be resolved by raising awareness and sharing actual detailed information, about water safety on local scale produced by the Province or external parties. Furthermore clear guarantees and local examples (pilots) with a financial picture will prove useful. From the literature analyses it was expected that cognitive barriers would be the largest barrier in place for BRZO companies. This hypotheses proved to be right since 55% of the companies said it to be the case.

Related to ***Social and cultural barriers***, only the factor lack of effective instruments is seen as a barrier by BRZO companies. To break this barrier it was stated that an instrument in the form of a checklist connected with a toolbox should be provided by the province or external party. From the literature analyses it was expected this cultural barriers would be minimal. This was confirmed by BRZO companies.

Related to ***Political and institutional barriers,*** lack of cooperation in and between governments and lack of clarity about responsibility of spatial adaptation are factors forming barriers. To break these barriers active cooperation with a stakeholder responsible for centralized communication is necessary. Secondly a clear vision on BRZO companies and responsibility of stakeholders. From the literature analyses it was expected that limited political willingness in companies would serve as barrier to adaptation. This proved to be not the case. It was not expected instead of political willingness but lack of clarity between government and companies served most evident barrier.

Related to ***Technological barriers,*** limited adaptation possibilities are seen as a factor forming a barrier. Sufficient information is available on local adaptation possibilities. To break this barrier it requires detailed information shared by joint government on local adaptation methods suitable for BRZO companies. From the literature analyses it was expected that these barriers would play a minor to non-existent role. This hypotheses proved to be wrong since 45% of the companies saw this as an evident barrier to mainstreaming. *(See chapter 4.2.4)*

"What influence do (semi)-governmental stakeholders have on strategic influence of the Province related to removing barriers?"

By making use of specialist interviews, policy analyses, and case studies it can be concluded that the different governmental stakeholders have a large strategic influence on strategies developed by the Province. From the cross reference scheme multiple conclusions could be drawn. It shows the different perspectives stakeholders have about each other. Moreover it shows that the leaders of the SA process find the advising parties important related to knowledge development. Multiple mismatches can be observed related to how BRZO companies see the role of Scheldestromen. How the Province of Zeeland limitedly sees the importance of the RUD. And BRZO companies limitedly see the importance in the role of ZSP. The scheme shows that all stakeholders have a positive stance to the process. Although currently some of the stakeholders state that involvement of the GGD related to water safety will become necessary to guarantee knowledge development related to possible effects of chemical functions related to flood risk.

The analysis shows that both policy and knowledge factors play a large role to motivate and steer stakeholders to cooperate in the process of water safety related to BRZO companies. Building collective knowledge and finding effective investments by finding win-win opportunities with return in the middle-long term are main drivers for most stakeholders involved. Depending on the role of the stakeholder means can increase willingness of advising and market driven parties to increase capacity and stimulate cooperation. Collaboration factors are important to all stakeholders involved since it enables them to extend their network and gives the possibility to reach their goals. From the literature analyses it was

derived that most semi-governmental stakeholders are actively involved in the process in order to facilitate BRZO companies. Therefor it was expected that they would have a large influence on the strategic influence of the Province. This hypotheses proved to be right. Furthermore BRZO companies stated that contact with these semi-governmental stakeholders proved helpful when providing information according to the specialization of the stakeholder. Although the involved semi-governmental stakeholders play a large and effective role to facilitate BRZO companies. Direct strategy development should mainly take place through the Province of Zeeland. The main reason for this is that the Province has authorized supervision over BRZO companies. By making use of this cooperating and bundling vision and expertise of involved stakeholders more effective facilitation can take place in order to remove barriers. *(See chapter 4.1.2 & 4.2.1)*

"What strategic choices can the Province make in order to increase involvement of BRZO companies? And of what components can these strategic choices exist of?"
By making use of a policy analyses, stakeholder analyses, specialist interviews and literature research, it can be concluded that there are 3 major strategic choices the Province can make. Which are: A. Regulation developed by government that should be adopted by BRZO companies. B. Open process in which companies take own responsibility, initiative and can demand resources (such as knowledge) when necessary. C. Active cooperation and responsibility by BRZO companies and government in dividing "resources."

Currently strategies used by the Province are type A strategies with limited elements of C strategies. Since spatial policies are changing from "regulating" to "facilitating" also caused by the introduction of the "new environmental law" replacing traditional spatial instruments. From the literature analyses it was expected that because mutual relations already were in place between the Province of Zeeland, (semi)-governmental stakeholders and BRZO companies a complementary relationship based on the sharing of resources according to the theory of Sciarelli was already established. This hypotheses did not proved to be right. It was derived that current strategies used were mainly focused on one-sided regulative measures that force BRZO companies to comply with legislation. Mainly coherent with the theories described by Prahalad & Hamel.

From the discussion with the policy specialist of the Province the necessity was emphasized that a hybrid of strategies A and C would prove most effective. Because of its combination between safeguarding SA approach to BRZO companies and at the other hand leaving enough space for open cooperation. *(See chapter 4.3.2 & 4.3.3)*

"What are the current strengths, weaknesses, opportunities and threats of the relationship between joint government and BRZO companies in Zeeland? With the focus on spatial adaptation."
By making use of literature analyses, specialist interviews, questionnaire survey, and SWOT/TOWS analyses it can be concluded that factors serving as ***strengths*** are: support of BRZO companies, good cooperating joint governmental stakeholders, grown awareness of joint government to spatial adaptation and recognized prominence spatial adaptation by joint government. Other strengths are related to policy factors: available policy instruments and sufficient political support. Knowledge factors are: joint government has sufficient technical knowledge and BRZO companies are aware of the roles that other stakeholders play. From the literature analyses it was expected that good cooperation among stakeholders was already in place. In the literature analyses was stated that the ministry of infrastructure expects that cooperation among semi-governmental stakeholders should take place or improve in order the mainstream the spatial adaptation process. In this case good cooperation already takes place but still requires some adjustments.

Concerning ***weaknesses*** factors mainly include policy and knowledge factors: Short term vision on SA in regional policy vision document, policy documents & vision document limitedly safeguard approach of SA,

lack of knowledge vulnerability BRZO companies and chain effects, fragmented knowledge among governmental stakeholders, the Province and BRZO companies are limitedly stimulated by ministry, Limited capacity of policy specialists and taking responsibility. From orienting conversations it was expected that short term vision and policy vision documents were absent related to SA. Moreover it was expected that knowledge was limited, but was not clear it concerned vulnerability of BRZO companies and chain effects. These weaknesses showed what substances related to need extra attention for strategy development.

Factors related to ***opportunities*** are: BRZO companies accept development of "steering" policies by the Province, sharing results of joint studies will increase awareness of stakeholders, increasing awareness and integral approach BRZO companies to break process barriers, stimulating front running BRZO companies to play ambassador role, Involve GGD to contribute specialist knowledge on public health to in relation to adaptation and the use of future information events for BRZO companies. Most of these opportunities were expected and described in the chapter "Best Practices." In this chapter Royal HaskoningDHV stated that creating dialogue in combination with companies playing an ambassadors role is an effective measure in that can function as opportunity. Moreover the other opportunities described were also used and proven by Royal HaskoningDHV in the case of Spatial Adaptation Botlek.

The factors related to ***threats*** concern mostly policy and cooperation factors. These are: Uncertainty of SA to water safety, since there is no long term vision or officially anchored in policies, not properly utilizing the new environmental law to incooperate SA approach, Stakeholders abdicating responsibility to BRZO companies, no double checking by the Province on enforcement tasks of the RUD, Lack of clarity roles of joint government to BRZO companies and limited attention safety of BEVI companies. It is observed that threats are mainly related to barriers, presented in the literature analyses. In contrast with sub-question related to barriers, threats are mainly social and cultural & political and institutional related. This is coherent to the theory proposed by Berg M, in which he stated that a lack of taking responsibility can threaten the execution of mainstreaming spatial adaptation. Therefor anchoring the willingness of participation of all stakeholders involved plays an important role. *(See chapter 4.2.4)*

Main question: ***"Which strategies can be developed and used by the Province of Zeeland that will be most effective to increase the level of water safety of BRZO companies?"***
For interpretation of barriers and strategies a SWOT and TOWS analyses were used. A literature analyses was used to form connections made. To increase the level of water safety for BRZO companies first barriers have to be removed. From the research it was determined that these barriers are mostly knowledge related.

Currently strategies used by the Province are type A strategies with limited elements of C strategies. Since spatial policies are changing from "regulating" to "facilitating" also caused by the introduction of the "new environmental law" replacing traditional spatial instruments. From the discussion with the policy specialist of the Province the necessity was emphasized that a hybrid of strategies A and C would prove most effective. Because companies take own responsibility, initiative and can demand resources when necessary, with active cooperation and responsibility by BRZO companies and government in dividing "resources." The most preferred strategy pathway is: 1.informing 2.Generating knowledge and facilitating approach to companies 3. Companies working on realizing local adaptation strategies. 4. Feedback for companies and adjust approach when deemed necessary.

To operationalize the preferred strategy, the 8 step management approach of Kotter is used. Barriers to increase the level of water safety of BRZO companies can be broken. For strategy actions see chapter 4.3.3. In correspondence with the model different steps should be taken. First it will be necessary to increase the level of urgency related to water safety. Next to this it should be shared with the public or BRZO companies. Secondly more stakeholders should be included in the process organization of spatial

adaptation. To improve knowledge development on safety and health the GGD as a stakeholder should be involved. A regional long term adaptation strategy should be developed by the Province. In this strategy goals of joint government and (BRZO companies) should be put in place. Research currently being performed such Frames, NRW, Wave 2, Raak & Impact analyses should be shared among joint government and (BRZO) companies. Especially the information related to technical vulnerability should be shared, since these can remove barriers mainly related to the factor “knowledge.”

To safeguard the approach a vision document should be used as instrument in order to develop and in later phases safeguard a long term vision related to adaptation of BRZO companies. By making use political support and extended use of information meetings awareness and willingness to participate will be increased. Moreover fragmented visions of municipalities should be removed by sharing results of joint studies. During this meeting the joint government should share expectations of BRZO companies. Obstacles should be removed. These are mainly related to a lack of clarity about responsibilities of spatial adaptation, lack of knowledge on vulnerability, climate scenarios and adaptation measures on local scale and adaptation possibilities. By developing a clear (provincial) vision on BRZO companies and SA, detailed information shared by joint government on best practices in other provinces, local adaptation methods for BRZO companies and providing clear guarantees and local examples (pilots) with a financial picture, barriers can be removed. It will be necessary that front running companies play an ambassadors role showing off its short term wins, by using adaptation methods. This will increase awareness and willingness of other (BRZO) companies to participate and adapt as well.

Front running companies should be open to invite the Province and other parties from the process group on site. Companies should take the initiative themselves for adaptation. Communication with companies should be centrally organized preferably via the Province. By making use of the “new environmental law” and policy vision document changes can be embedded. Guarantees for adaptation in harbour areas should be safeguarded. Adaptation goals to water safety should be integrated in this policy vision document in order to assure companies what visions and goals will be achieved in the future. Finally a reflection meeting should be held in order to reflect upon the process and reviewed if barriers are broken. When not additional actions should be taken. It is advised that the joint government adopts this strategy and further implements it themselves. *(See chapter 4.3.3)*

7. Recommendations

Next to the conclusions drawn in the previous chapter, recommendations will be given to the Province of Zeeland. These recommendations also serve other stakeholders involved in the process related to improving water safety of (BRZO) companies in the harbour areas of Zeeland. Moreover it shows what effective strategies can be used related to the approach of spatial adaptation. Recommendations are based on the various analyses performed.

- The Province should continue making use of an open cooperation process. In which they play a more active stimulating role shifting from a currently used A to a hybrid of A and C strategies. The Province should have a different view on using policies on at the one side safeguard spatial adaptation process. And at the other side actively cooperating with companies. By developing an extensive vision document spatial adaptation regulation can be combined with future vision stimulating companies and joint government to actively participate in the process.

- The GGD should be involved as stakeholder in order to interpret and define in which ways health related impacts can be decreased related BRZO companies and their installations. By GGD GHOR it was stated that local GGD's should be involved in processes to increase external safety and other forms of safety including spatial adaptation. It will be necessary that the Veiligheidsregio or the municipalities involved stimulate the GGD to cooperate since these parties have a relation to the GGD.

- Get rid of the 3 mismatches found in stakeholders relations. The first mismatch can be removed by communicating to BRZO companies that Scheldestromen in most cases is not responsible for implementing adaptation measures. By sharing the precise policies when Scheldestromen is responsible this can be achieved. The second mismatch can be removed by making policy specialists of the Province aware that they are responsible for monitoring the RUD on their monitoring tasks. Moreover when the importance of spatial adaptation is seen as such a sufficiently important issue. In line with the strategy of the Province, it can be chosen that additional "policies" are developed in order to safeguard that adaptation measures are will be taken by BRZO companies. The third mismatch can be removed by making it clear to BRZO companies that Zeeland Seaports is not mere owner of the space but also has responsibilities connected to stimulating awareness of responsibilities of SA.

- Stimulate "large scale" BRZO companies such as VOPAK, DOW, and Zeeland Refinery to play the role of frontrunners/ambassadors. Playing this ambassador's role will increase awareness and willingness of other BRZO companies to participate and adapt as well. From the questionnaire surveys it was shown that the larger scale companies have access to resources and personal able to provide "knowledge" on water safety then smaller scale companies.

- The process of spatial adaptation related to water safety should be approached holistically. Since next to water safety the topics heat stress, water nuisance and drought are also part of spatial adaptation interconnectivity. When developing adaptation methods for water safety it will be essential that win-win methods related to the other topics are considered, since multiple problems can be solved all at once. Attention of stakeholders should be drawn in order to guarantee that stakeholders fully utilize this integration.

Specially related to process-management the Province should consider making use of the management model “Kotter’s 8 step model.” Mainly for the implementation of activities in the process of implementing “change”. By combining use of best-practices in combination with steps of the model. Implement the steps of the model:

- Increase the level of urgency related to water safety. Next to this it should be shared with the public or BRZO companies. Secondly more stakeholders should be included in the process organization of spatial adaptation. To improve knowledge development on safety and health the GGD as a stakeholder should be involved. A regional long term adaptation strategy should be developed by the Province. In this strategy goals of joint government and (BRZO companies) should be put in place. Research currently being performed such Frames, NRW, Wave 2, Raak & Impact analyses should be shared among joint government and (BRZO) companies. Especially the information related to technical vulnerability should be shared, since these can remove barriers mainly related to the factor “knowledge.”

- Safeguard the approach a vision document should be used as instrument in order to develop and in later phases safeguard a long term vision related to adaptation of BRZO companies. By making use political support and extended use of information meetings awareness and willingness to participate will be increased. Moreover fragmented visions of municipalities should be removed by sharing results of joint studies. During this meeting the joint government should share expectations of BRZO companies. Obstacles should be removed. These are mainly related to a lack of clarity about responsibilities of spatial adaptation, lack of knowledge on vulnerability, climate scenarios and adaptation measures on local scale and adaptation possibilities.

- Develop a clear (provincial) vision on BRZO companies and SA. By sharing detailed information on best practices in other provinces, local adaptation methods for BRZO companies and providing clear guarantees and local examples (pilots) with a financial picture, barriers can be removed. It will be necessary that front running companies play an ambassadors role showing off its short term wins, by using adaptation methods. This will increase awareness and willingness of other (BRZO) companies to participate and adapt as well.

- Actively communicate with companies to develop centrally organized communication. By making use of the “new environmental law” and policy vision document changes can be embedded. Guarantees for adaptation in harbour areas should be safeguarded. Adaptation goals to water safety should be integrated in this policy vision document in order to assure companies what visions and goals will be achieved in the future. Finally a reflection meeting should be held in order to reflect upon the process and reviewed if barriers are broken. When not additional actions should be taken. It is advised that the joint government adopts this strategy and further implements it themselves.

8. Bibliography

Bakker, M. (2012). *Een onderzoek naar de provinciale ruimtelijke intrumenten van de Wet ruimtelijke ordening.* Beverwijk. Retrieved from http://arno.uvt.nl/show.cgi?fid=122315

Barney J.B. (1986). Strategic Factor Markets: *Expectations, Luck, and Business Strategy, Management Science*, vol. 32, n. 10, 1231-1241. Retrieved from http://dx.doi.org/10.1287/mnsc.32.10.1231

Berg, M. van den. (2011) *Naar een klimaatbestendiger Overijssel. Analyse van klimaatbeleid bij Overijsselse gemeenten*. Enschede: Universiteit Twente.

Berry, D. R. (1999). *Collecting data by in-depth interviewing. University of Sussex*. 1-2. Retrieved from http://www.leeds.ac.uk/educol/documents/000001172.htm.

Biesbroek, R., Klostermann, J., Termeer, C. & Kabat, P. (2011) *Barriers to climate change adaptation in the Netherlands*, *Climate Law,* 2(2): 181-199.

Biesbroek, Robbert G. (2014). Challenging barriers in the governance of climate change adaptation 1-225. Retrieved from http://library.wur.nl/WebQuery/wurpubs/fulltext/290520

Biesbroek, Robbert G. Termeer, J.A.M. Catrien. Klosterman, E.M. Judith. Kabat, Pavel. (2014). *Rethinking barriers to adaptation: Mechanism-based explanation of impasses in the governance of an innovative adaptation measure.* Wageningen University. 108-118. Retrieved from http://www.sciencedirect.com/science/article/pii/S0959378014000703

Bill Taylor, G. S. (2006). *A GUIDE TO FOR RESEACHERS IN MANAGEMENT AND SOCIAL SCIENCES*. 5-220. Retrieved from https://books.google.nl/books?id=Shvcimus4IIC&dq=research+methodology+observation+meetings&hl=nl&source=gbs_navlinks_s

Brugge van der R. Ellen, G.J. Eshuis, J. (2015). *Resultaten van de Monitor Ruimtelijke Adaptatie*. 1-49. Retrieved from http://www.ruimtelijkeadaptatie.nl/l/nl/library/download/urn:uuid:c26b0325-072f-4776-b123-9edda313660b/resultaten+van+de+monitor+ruimtelijke+adaptatie.pdf

Brugge, R. van der (2014) *How to use the implementation canvas?* Utrecht, Deltares 1-2.

Bryson J.M. (2003). *What to do when stakeholders matter: A guide to stakeholder identification and analysis techniques.* Minneapolis: University of Minnesota. 1-40. Retrieved from http://cep.lse.ac.uk/seminarpapers/10-02-03-BRY.pdf

Bryson, J. M. (2004). *What to do when stakeholder matter.* Minneapolis: University of Minnesota.

Burg van der W. (1991). *The Slippery Slope Argument*. *Ethics* 102, no. 1: 42-65. Retrieved from http://www.journals.uchicago.edu/doi/abs/10.1086/293369

Burnett, C. (2003). *A multi-scale segmentation/object relationship modelling methodology for landscape analysis.* Austria: University of Salzburg.

Carl V. Patton, D. S. (2002). *Basic Methods of Policy Analysis and Planning*. 1-9. Retrieved from: https://basicmethodofplanningandanalyses/identification/2002

Chermack, Thomas J.; Bernadette K. Kasshanna (2007). The Use of and Misuse of SWOT analysis and implications for HRD professionals. Human Resource Development International. 10 (4): 383–399.

Cleveland, E. A. (2003). *Job Feedback: Giving, Seeking, and Using Feedback for Performance Improvement.* London.

Creswell, J. W., Plano Clark, V. L Gutmann, M. L. & Hanson W.E. (2003). *Advanced mixed methods research designs: An Expanded Typology for Classifying Mixed Methods Research Into Designs.* 1-38. Retrieved from http://www.corwin.com/sites/default/files/upm-binaries/19291_Chapter_7.pdf

Davidse G. (2015). *Final thesis: Regional Governmental Facilitation towards mainstreaming of Spatial Adaptation focusing on water safety of Municipalities in Zeeland*. HZ University of Applied Sciences. 1-53. Retrieved from https://www.hbokennisbank.nl/record/oai:repository.samenmaken.nl:smpid:56811

Deltacommissaris (2016,) Impressie Informeel Bestuurlijk Overleg Ruimtelijke Adaptatie d.d 1. December 2016. 1-4.

Deltacommissie. (2008), *Samen werken met water: Een land dat leeft, bouwt aan zijn toekomst*. 1-140. Retrieved from http://www.deltacommissie.com/doc/2008-09-03%20Advies%20Deltacommissie.pdf

Doorewaard, H. & Verschuren P.(2010). *Designing a Research Project.* Amsterdam: Boom. 10-312

Emmen. (2002). *De kwetsbaarheid van de Zeeuwen: Factoren die de kwetsbaarheid en veerkracht van de bevolking ten aanzien van dreiging van overstromingen vanuit zee beinvloeden.* 1-64. Retrieved from http://www.ifv.nl/kennisplein/Documents/emmen-4-de-kwetsbaarheid-van-de-zeeuwen.pdf

European Parliament, (2012). *Richtlijn 2012/18EU betreffende de beheersing van de gevaren van zware ongevallen waarbij gevaarlijke stoffen zijn betrokken, houdende wijziging en vervolgens intrekking van Richtlijn 86/82/EG van de Raad*. 1-37. Retrieved from http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:197:0001:0037:NL:PDF

Frank van Haagen. (2007). *Overlevingsstrategieën van professionele dienstverleners in de periode 2002-2004*. Faculteit der Economische Wetenschappen en Bedrijfskunde. Vrije Universiteit Amsterdam. 1-79. Retrieved from http://www.nyenrode.nl/FacultyResearch/Entrepreneurship-Stewardship/PSI/Documents/Presteren%20onder%20druk-Frank%20van%20Haagen.pdf

Fred Wester, Hennie Boeije & Tony Hak (2005.) *Methodische keuzen in kwalitatief onderzoek*. Themanummer KWALON 30. Utrecht: Lemma.

Gemeente Borsele, (2014). Structuurvisie Gemeente Borsele 2014-2019. 1-59. Retrieved from http://www.ruimtelijkeplannen.nl/documents/NL.IMRO.0654.SVBS20142019-0001/d_NL.IMRO.0654.SVBS20142019-0001.pdf

Gemeente Terneuzen, (2005). Beleidsvisie Externe Veiligheid. 1-52. Retrieved from https://www.terneuzen.nl/Onze_Organisatie/Beleid/Beleid/Beleidsnotities/Externe_veiligheid_beleidsvisie_2006.org

Gemeente Terneuzen, (2010). Structuurvisie Gemeente Terneuzen 2025. 1-123. Retrieved from https://www.terneuzen.nl/Inwoners_Terneuzen/Wonen/Bestemmingsplannen/Structuurvisies/Structuurvisie_gemeente_Terneuzen_2025

Gemeente Vlissingen, (2010). Structuurvisie Vlissingen stad aan zee: een zee aan ruimte. 1-71. Retrieved from https://www.vlissingen.nl/fileadmin/user_upload/Structuurvisie_gemeente_Vlissingen_2010.pdf

GGD GHOR. (2012). Publieke gezondheid en veiligheid verbonden. 1-20. Retrieved from https://www.ggdghorkennisnet.nl/?file=11549&m=1358413344&action=file.download

Haining, R. (2003). *Spatial data analysis.* University of Cambridge.

Hertog, M.D. (2014). *Klimaatadaptatie in Gelderse gemeenten: Het overwinnen van belemmeringen bij de integratie van klimaatadaptatie in het ruimtelijk beleid. Nijmegen: Radboud Universiteit.*

Herwijnen, M. van., Koomen, E. Beinat, E. (2002). Methoden en systemen voor het Afwegingskader Ruimtelijke Effecten: Een inventarisatie naar de methodologische aspecten van methoden en DSS toepassingen geschikt voor het Afwegingskader Ruimtelijke effecten (AKRE). IVM, Instituut voor milieuvraagstukken. Vrije Universiteit. 1-78. Retrieved from http://spinlab.vu.nl/wp-content/uploads/2016/09/AKRE.pdf

IPCC. (2007). *Fourth assessment Report: Climate Change.* 1-112. Retrieved from http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_full_report.pdf

IPO, MILO, VROM. (2008). *Milieu in Ruimtelijke Plannen Provincie. Juridische mogelijkheden onder de Wet ruimtelijke ordening.* Retrieved from http://www.vng.nl/files/vng/vng/Documenten/Extranet/Milieu/Provincie%20Milieu%20Wro.pdf

Kern, K. Alber, G. (2008). *Governing climate change in cities: Modes of urban climate governance in multi-level system.* Wageningen University. 174-175. Retrieved from http://edepot.wur.nl/51364

Khakzad, N., Khan F. Amyotte, P. (2012). *Dynamic risk analysis using bow-tie approach.* 36-44 Retrieved from http://www.sciencedirect.com/science/article/pii/S0951832012000695

KNMI. (2014). KNMI '14 Klimaatscenario's voor Nederland; Leidraad voor professionals in klimaatadapatie. De Bilt: KNMI. Retrieved from: http://www.klimaatscenarios.nl/images/Brochure_KNMI14_NL.pdf

Kruijf Vinke de Joanne, de. Pahl-Wostl. (2016). *A multilevel perspective on learning about climate change adaptation through international cooperation.* Environmental Science & Policy. Volume 66. 242-249. Retrieved from http://www.sciencedirect.com/science/article/pii/S1462901116303926

Lor P. (2011). *International and Comparative Librarianship: Methodology in comparative studies.* 1-21. Retrieved from: https://pjlor.files.wordpress.com/2010/06/chapter-4-draft-2011-04-20.pdf

Mauro Sciarelli. (2008). *Resource-Based Theory and Market-Driven Management*. Emerging Issues in Management n2. 1-15. Retrieved from ftp://ftp.repec.org/opt/ReDIF/RePEc/sym/PDF/symjournl125.pdf

Ministerie van Infrastructuur en Milieu, Ministerie van Economische Zaken. (2014). *Deltaprogramma Ruimtelijke adaptatie, Synthesedocument Ruimtelijke adaptatie, Achtergronddocument B3. 1-111.* Retrieved from https://www.deltacommissaris.nl/deltaprogramma/documenten/publicaties/2014/09/16/deltaprogramma-2015-achtergronddocument-b3

Ministerie van Infrastructuur en Milieu. (2014). *Deltabeslissing Ruimtelijke Adaptatie, Het Deltaprogramma: een nieuwe aanpak.* 1-6. Retrieved from http://www.ruimtelijkeadaptatie.nl/l/nl/library/download/urn:uuid:423ed994-bc6a-4b0f-b7a3-f71b01e9f0ef/factsheet+ruimtelijke+adaptatie+(1).pdf

Ministerie van Infrastructuur en Milieu. (2014). *Deltabeslissing Ruimtelijke Adaptatie, Het Deltaprogramma: een nieuwe aanpak.* 1-6. Retrieved from http://www.ruimtelijkeadaptatie.nl/l/nl/library/download/urn:uuid:423ed994-bc6a-4b0f-b7a3-f71b01e9f0ef/factsheet+ruimtelijke+adaptatie+(1).pdf

Ministerie van Infrastructuur en Milieu. (2016). *Delta Programma 2017: Werk aan de delta, opgaven verbinden, samen op koers.* 1-100. Retrieved from https://www.deltacommissaris.nl/deltaprogramma/documenten/publicaties/2016/09/20/dp2017-nl-printversie

Ministerie van Infrastructuur en Milieu. (2016). *Delta Programma 2017: Werk aan de delta, opgaven verbinden, samen op koers.* 1-100. Retrieved from https://www.deltacommissaris.nl/binaries/deltacommissaris/documenten/publicaties/2016/09/20/dp2017-nl-printversie/DP2017+NL+printversie.pdf

Most, H. van der. Wit, S. de. Broekhans, B. Roos W. (2010). Kijk op waterveiligheid: perceptie en communicatie van risico's van overstromingen. Eburon Uitgeverij B.V. 10-234. Retrieved from https://books.google.nl/books?id=0MkHX-ogDdoC&printsec=frontcover&hl=nl&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Munich RE, (2013). *2012 Natural Catastrophe year in Review*. 1-90 Retrieved from https://www.munichre.com/site/mram/get/documents_E1227251636/mram/assetpool.mr_america/PDFs/4_Events/MunichRe_III_NatCat01032013.pdf

National risk map and Regional risk profile. (Veiligheidsregio Zeeland, 2013)

Nieuwbouw en herstructurering. (2014). *Handreiking voor de uitvoering van een Stresstest Klimaatbestendigheid.* Ministerie van Infrastructuur en Milieu. 1-33. Retrieved from http://www.riool.net/documents/10180/3d8ae1a7-87bf-4c67-bd54-7dee3e2fb2cc

Nieuwbouw en herstructurering. (2014). *Handreiking voor de uitvoering van een Stresstest Klimaatbestendigheid.* Ministerie van Infrastructuur en Milieu. 1-33. Retrieved from http://www.riool.net/documents/10180/3d8ae1a7-87bf-4c67-bd54-7dee3e2fb2cc

Oreski, D. (2012). *Strategy development by using SWOT* – AHP University of Zagreb, Facultry of Organization and Informatics,. 1-9. Retrieved from http://tem-journal.com/documents/vol1no4/pdf/Strategy%20development%20by%20using%20SWOT%20-%20AHP.pdf

Oxford dictionaries. (2014). *Oxford dictionaries.*

Porter M., *Competitive Strategies*, The Free Press, New York, 1980.

Porter, M. (1980), *Competitive Strategy: Techniques for Analysing Industries and Competitors*, Free Press, New York.

Prahalad C.K., Hamel G. (1990). *The Core Competence of the Corporation*, *Harvard Business Review*, (May-June), , pp. 79-91

Projectbureau VNK. (2015). *De veiligheid van Nederland in kaart*. 3-120 Retrieved from https://www.helpdeskwater.nl/onderwerpen/waterveiligheid/programma'-projecten/veiligheid-nederland/

Provinciaal overleg waterkeringen. (2014). *Startnotitie ruimtelijke Adaptatie*. 1-5.

Provincie Zeeland. (2016). *Startnotitie overleg hittestress Provincie Zeeland*. 1-2.

Provincie Zeeland. (2016). *Zeeuwse Nota Waterkeringen*. 1-80. Retrieved from https://www.zeeland.nl/digitaalarchief/zee1600343

Reed R., De Filippi R.J. (1990). *Causal Ambiguity, Barriers to Imitation and Sustainable Competitive Advantage, Academy of Management Review*, vol. 15, n. 1, 88-102.Retrieved from http://dx.doi.org/10.5465/AMR.1990.4308277

Reed, M. S. (2008). *Who's in and why? A typology of stakeholder analysis methods for natural resource management.* Aberdeen. 1-17. Retrieved from: https://disciplinas.stoa.usp.br/pluginfile.php/1023868/mod_resource/content/1/Reed%20et%20al%202009%20JEM%20whoisinandwhy.pdf

Reed, M. S. (2008). *Who's in and why? A typology of stakeholder analysis methods for natural resource management.* Aberdeen.

Richter, A. P. (2007). *SWOT Analysis - Idea, Methodology And A Practical Approach. Norderstedt: Books on Demand.* 1-92. Retrieved from https://books.google.co.uk/books/about/SWOT_Analysis.html?id=JJEBWvvG73YC

Rijksoverheid. (2017). *Waterbeheer in Nederland*. 1. Retrieved from https://www.rijksoverheid.nl/onderwerpen/water/inhoud/waterbeheer-in-nederland

Royal Haskoning, (2015). *Implementeren van de SEVESO III richtlijn: Wat komt er op u af en wat moet u doen?* 1-3. Retrieved from https://www.royalhaskoningdhv.com/nederland/-/media/royalhaskoningdhvcorporate/files/local/news/papers-and-articles/2014/20140120-rvr-pag2123-jrg-5-nr-14.pdf

Royal Haskoning, (2016). Heeft uw (BRZO-) bedrijf de overstromingsrisico's al in kaart gebracht? Retrieved from https://www.royalhaskoningdhv.com/nl-nl/blog/water/heeft-uw-brzo-bedrijf-de-overstromingsrisicos-al-in-kaart-gebracht-q/513

RUD Zeeland, (2017). *Over RUD Zeeland*. 1. Retrieved from http://www.rudzeeland.nl/Onze_Organisatie_RUD/Over_RUD_Zeeland

Runhaar, H., Mees, H., Wardekker, A., Sluijs, J. van. der., & Driessen, P. P. (2012). *Adaptation to climate change-related risks in Dutch urban areas: stimuli and barriers. Regional Environmental Change*, *12*(4), 777-790.

Scheldestromen, (2016). *Waterkeringenbeheerplan 2016-2020*. 1-119. Retrieved from https://scheldestromen.nl/sites/scheldestromen.nl/files/documenten/Waterkeringenbeheerplan%202016-2020.pdf

Soltani, E., Lai, P., & Gharneh. N.S. (2005). *Breaking through barriers to TQM effectiveness: Lack of commitment of upper-level management.* Retrieved from https://www.researchgate.net/publication/247494705_Breaking_through_barriers_to_TQM_effectiveness_Lack_of_commitment_of_upper-level_management

Stowa. (2011). *Basisvisie Afwegings-Methodiek voor Meerlaagswaterveiligheid. Stichting toegepast waterbeheer*. 3-30. Retrieved from http://www.stowa.nl/upload/publicaties/STOWA%202011%2026%20LR.pdf

Stuurgroep Zuidwestelijke Delta. (2014). *Deltaprogramma Zuidwestelijke Delta: Synthesedocument Zuidwestelijke Delta. Achtergronddocument B8*. 5-403. Retrieved from https://www.google.nl/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwj_zZ7v2ezSAhWBNxQKHchlCwsQFggcMAA&url=https%3A%2F%2Fwww.deltacommissaris.nl%2Fbinaries%2Fdeltacommissaris%2Fdocumenten%2Fpublicaties%2F2014%2F09%2F16%2Fdeltaprogramma-2015-achtergronddocument-b8%2FDP2015%2BB8%2BSynthesedocument%2BZuidwestelijke%2BDelta_tcm309-358059.pdf&usg=AFQjCNFKSiYIzBVbsbBXtVDnMYO_FxnoUw&sig2=tESgByQYZQwjz2ukMW9t8Q

TNO. (2011). *Fysieke bouwstenen voor de knelpuntenanalyse nieuwbouw en herstructurering*. Climate Proof Cities Consortium. 1-137. Retrieved from https://www.tno.nl/media/4362/knelpuntenanalyse-nieuwbouw-en-herstructurering_2011.pdf

Uittenbroek, C.J.; Janssen-Jansen, L.B.; Runhaar, H.A.C. (2012). *Mainstreaming climate adaptation into urban planning: overcoming barriers, seizing opportunities and evaluating the results in two Dutch case studies.* 783. Retrieved from https://dspace.library.uu.nl/handle/1874/257254

van Drunen, M. A., Leusink-Muis, A., & Lasage, R. (2009). Towards a Climate-Proof Netherlands. In A. K. Biswas, C. Tortajada, & R. Izquierdo (Eds.), *Water Management in 2020 and beyond.* (pp. 165-194). Berlin: Springer.
Vereniging van Nederlandse Gemeenten. (2016). *4.Klimaatbestendig*. 1-2 Retrieved from https://vng.nl/4-klimaatbestendig

VNG, Vereniging van Nederlandse Gemeenten. (2009). *Openbare gezondheid, gezondheidsbeleid.* Retrieved from http: https://vng.nl/4-klimaatbestendig

Zairi, M. (1997). *Business process management: a boundaryless approach to modern competitiveness.* Bradford: University of Bradford.

Zeeland Seaports, (2017). *Organisatie*. 1. Retrieved from http://www.zeelandseaports.nl/nl/het-havenbedrijf/organisatie.htm

9. Appendices

9.1 Research

Analyses I, Spatial analyses 2016 G.Davidse -> hyperlink –

https://www.dropbox.com/s/dec5mhdyt4k6uot/spatial%20analyses%202017%20thesis.docx?dl=0

Analyses II, Policy analyses 2016 G.Davidse -> hyperlink –

https://www.dropbox.com/s/j4jjzf1014lva36/Policy%20Analyses%20thesis%202017.docx?dl=0

9.2 Meeting notes

Meeting notes I, Startoverleg hittestress, 05-09-2016 -
https://www.dropbox.com/s/mgfnnz98j4xrc3y/Meeting%20Notes%20I.docx?dl=0

Meeting notes II, Final preparation Pilot Stress test Noord-Beveland, 08-09-2016 -
https://www.dropbox.com/s/27dy5ybzyup7kvu/Meeting%20notes%20II.docx?dl=0

Meeting notes III, Stress-test Noord-Beveland, 26-09-2016 -
https://www.dropbox.com/s/23waz980q1ly7jd/Meeting%20notes%20III.docx?dl=0

Meeting notes IV, Evaluation Workshop heat stress, -
https://www.dropbox.com/s/2o84st6k4kjhs1y/Meeting%20notes%20IV.docx?dl=0

Meeting notes V, Informative meeting heat stress, 04-10-2016 -
https://www.dropbox.com/s/wldmhy6vtf4xcbs/Meeting%20notes%20V.docx?dl=0

Qualitative observations meetings

2015

1. Meeting, Veiligheids Regio Zeeland	– F.H. Schumacher, M. Matthijsse
2. Meeting, Veiligheids Regio Zeeland	– F.H. Schumacher, P. Troost
3. Meeting, Waterschap Scheldestromen	– Various municipalities, RWS, Water board, Province
4. Meeting, POHO water	– Various municipalities, Province

2016

6. Meeting, Kick-off heat stress	– Municipality Middelburg, Alterra, Cas, Province, GGD.
7. Meeting, heat stress	– RWS, municipality Vlissingen, Province, Scheldestromen.
8. Preparation meeting stress-test	– Municipalities, Province, Veiligheidsregio, HZ, Scheldestromen.
9. Workshop, stress-test SA Noord-Beveland	– Municipalities, network companies, Province, Veiligheidsregio, HZ, Scheldestromen etc.
10. Meeting, Heat stress	– Municipality Vlissingen, Rijkswaterstaat.
11. Meeting, Frames Sloegebied	– Internal at Province.
12. Meeting, Frames partner meeting	– Province, Veiligheidsregio, HZ, Scheldestromen, Rijkswaterstaat

2017

13. Meeting, Vital and vulnerable	– Joint governments, network companies and representatives of BRZO companies.

9.3 Interviews

Interview I, Onderzoek mainstreaming RA Provincie Zeeland, Interview gemeente Middelburg 21-04-2015 https://www.dropbox.com/s/wprysv43c9upfps/mb.docx?dl=0

Interview II, Onderzoek mainstreaming RA Provincie Zeeland, Interview gemeente Vlissingen 29-04-2015 https://www.dropbox.com/s/xyqk7put285yfou/vli.docx?dl=0

Interview III, Onderzoek mainstreaming RA Provincie Zeeland, Interview gemeente Reimerswaal 07-04-2015 https://www.dropbox.com/s/92pf7j6kq86xwsr/interview%20RW.docx?dl=0

Interview IV, Introduction interview Provincie Zeeland. E. Schumacher. 22-02-2017 https://www.dropbox.com/s/qdyiq3d89u0yrcb/4.%20Introductie%20vragen%20Provincie.docx?dl=0

Interview V, RUD Zeeland, A. Lindenbergh. 16-03-2017 https://www.dropbox.com/s/ualrdbqkfmbzdso/5.%20Interview%20RUD%20A.J.%20Lindebergh.docx?dl=0

Interview VI, Provincie Zeeland, E. Janse, 19-05-2017 https://www.dropbox.com/s/3jw2wo2pr8dfx7z/6.%20thesis%20interview%202017%20Janse.docx?dl=0

Interview VII, Ministery I&M, E. Gerbrand, 19-05-2017 https://www.dropbox.com/s/1o2eerv2ni0ls99/7.%20Telefonisch%20interview%20erik.gerbrand.docx?dl=0

Interview IIX, Veiligheidsregio Zeeland, M. Matthijsse, 30-05-2017 https://www.dropbox.com/s/sjjro38jjajcqrw/8.%20thesis%20interview%202017%20VRZ.docx?dl=0

Interview IX, Zeeland Seaports, H. Versluis, 29-05-2017 https://www.dropbox.com/s/sqmase5y6iegwlc/9.%20thesis%20interview%202017%20ZSP.docx?dl=0

Interview X, Scheldestromen, M. Schipper, 13-06-2017 https://www.dropbox.com/s/s2ygjx8pl2enpnm/10.%20Interview%20Scheldestromen%20M.%20Schipper.docx?dl=0

Interview XI, Final interview Province, F.H. Schumacher, 30-06-2017 https://www.dropbox.com/s/fqj123zririk6tt/11.%20Interview%20Schumacher%20final.docx?dl=0

In-depth interviews held				
Nr.	**Date/year:**	**Stakeholder:**	**Names:**	**Topic:**
1.	2015	Municipality 1, Middelburg,	W. Rijenierse & L. Suylen	SA approach mainstreaming municipality Middelburg
2.	2015	Municipality 2, Vlissingen	W. Vael	SA approach mainstreaming municipality Vlissingen
3.	2015	Municipality 3, Reimerswaal	B. Sandee	SA approach mainstreaming municipality Reimerswaal
4.	2017	Province of Zeeland,	F.H. Schumacher	Introduction interview
5.	2017	Province & RUD	F.H. Schumacher & A.J. Lindenbergh	Obligations and role of the RUD in the process of facilitating BRZO companies.
6.	2017	Province of Zeeland	E. Janse	Obligations and role of Province in the process of facilitating BRZO companies.
7.	2017	Ministry of Infrastructure and Environment	G. Neaff & Annemarieke Grinwis	Role of ministry in Provincial approach mainstreaming BRZO companies
8.	2017	Zeeland Seaports	H. Versluis	Obligations and role of the ZSP in the process of facilitating BRZO companies.

9.	2017	Veiligheidsregio Zeeland	M. Matthijsse	Obligations and role of VRZ in the process of facilitating BRZO companies.
10.	2017	Waterschap Scheldestromen	Maurits Schipper	Obligations and role of Scheldestromen in the process of facilitating BRZO companies.
11.	2017	Province of Zeeland	F.H. Schumacher	Final interview on Provincial strategy formulation

9.4 Scheme cooperation factors & importances

Provincial process – Zeeland – Delta decision spatial adaptation – Water Safety BRZO		
Stakeholder:	**Factors:**	**Importances concerning heat stress:**
Provincie Zeeland	Policy factors	- An intention declaration "Ruimtelijke Adaptatie" has been signed and agreed upon to cooperate in spatial adaptation (meeting notes I, II, III), (interview IV). - Leading and steering Provincial process of SA to guarantee reaching goals of Delta Program (interview IV). - Core task and serving integral approach. (meeting notes I, II, III). - Preventing effects of water safety related to physical and social environment. To satisfy the needs of the Delta Program (interview IV). - Responsible for developing policies for BRZO companies since is the authorized supervision (Interview VI). - Future integration of water safety policies into new environmental plan (Interview V).
	Knowledge factors	- Cooperate with the goal of achieving integrated knowledge development (Deltares, 2015), (Meeting notes II, III).
	Means	- Sufficient means are available. Although when additional tasks should be performed it requires more means for enlarging capacity (Interview VII).
	Collaboration factors	- Plays a leading role, this is displayed in the scheme... All stakeholders are involved in an early stage to stimulate bottom up initiatives and enable active participation (Meeting notes I), (interview IV, V, VI).
Waterschap Scheldestromen	Policy factors	- Signed intention declaration, cooperate however possible. (meeting notes I, II, III), (interview X). - Core tasks with the focus on guaranteeing water safety, reducing water nuisance and safe guarding water quality. (meeting notes I, II, III), (interview X).
	Knowledge factors	- Cooperate with the goal of achieving integrated knowledge development and sharing. Advising role related to knowledge development among involved stakeholders (interview X).
	Means	- Interest to be able to reduce long term costs for investments by utilizing win-win opportunities. (Vereniging van Nederlandse Gemeenten, 2016), (Ministerie van Infrastructuur en Milieu, 2014), (interview X).

	Collaboration factors	- Strengthening relationships by cooperation to realize longer term goals (interview X).
Rijkswaterstaat	Policy factors	- Its core tasks are to guarantee water safety along the main waters with the focus on structural water safety of primary dikes and infrastructure. Moreover responsible for informing governments when threats might occur (Rijkswaterstaat, 2017), (Interview X). - Signed intention declaration -> duty to inform and cooperate however possible (Rijkswaterstaat, 2017), (Interview XII).
	Knowledge factors	- Cooperate with the goal of achieving integrated knowledge development (Deltares, 2015)**,** (Meeting notes II, III).
	Means	- Limited -> integrated knowledge aspect is its main importance (Deltares, 2015)
	Collaboration factors	- Cooperation and active exchange of knowledge to increase awareness on the topics of spatial adaptation. (Deltares, 2015), (Meeting notes II, III)
Municipalities	Policy factors	- Meeting policies, such as new environmental law (Govers, 2016). - Responsible themselves for taking spatial adaptation measures within municipal borders and jurisdiction. On local scale responsible to promote spatial adaptation among citizens and companies. - Have urge to fulfill fixed ambitions and agreements (Deltaprogramma, 2016).
	Knowledge factors	- Necessary to acquire climate specific information on local level to be able to take measures. (Davidse, 2015)
	Means	- Limited -> municipalities are aware of their financial responsibilities on the topics of water safety. (Interview I, II, III, IV)
	Collaboration factors	- Improving contacts with water board which provide technical input. (Interview I, II, III, IV) - Maintaining contacts to Province which facilitates SA. (Interview I, II, III, IV)
RUD	Policy factors	- Executing of environmental and safety tasks in name of municipalities, Scheldestromen and Province of Zeeland (interview V, VI).
	Knowledge factors	- Necessary to exchange information between the Province and BRZO companies, in order to function and execute related tasks (interview V, VI).
	Means	- Dependent on means of Province. Since it executes “checking” tasks that are outsourced. When additional tasks need to be executed an extended budget needs to be made (interview V, VI)
	Collaboration factors	- Obliged to cooperate since the province has given its mandate to the RUD for licensing, supervising and enforcement (interview V, VI).
Zeeland Seaports	Policy factors	- Responsible for informing, overall management, spatial management and safety in harbour areas. On safety

		specifically responsible for informing companies on specific safety issues, ISPS and developing calamity plans (interview IIX).
	Knowledge factors	- Cooperating and being in the process as intermediate and advising party between company an Province. Moreover it has more the focus on nautical activities and spatial planning in the harbour (Interview IIX).
	Means	- Commercial company receiving funds from renting out harbour terrains. No additional necessity for means of Province related to the process of water safety. (Interview IIX). - The Province is a stockholder of Zeeland Seaports therefor it has the political and management power set ambitions and direction related to topics of interest (IIX).
	Collaboration factors	- Cooperating and supporting BRZO companies when making spatial changes and inform about responsibilities. Supporting governments & companies with information and expertise. Providing practical advice related to harbour and transportation related procedures (Interview IIX).
BRZO companies	Policy factors	- Operating within the borders of the law, such as environmental legislation, safety legislation and BRZO legislation (interview V, X, XI), (surveys, appendix 9.13).
	Knowledge factors	- Interests in future climate change effects and knowing vulnerability in an early stage to maximize spatial investment potential (interview V, X, XI), (surveys, appendix 9.13).
	Means	- Sufficient means for taking spatial adaptation measures. Especially when considered as investments over a longer period of time (interview V, X, XI), (surveys, appendix 9.11).
	Collaboration factors	- Extend networking structure to reach goals, find win-win opportunities to increase returns on investment (interview V, X, XI), (surveys, appendix 9.13).
Veiligheidsregio Zeeland	Policy factors	- Advising role to Province and other stakeholders involved. Responsible for vital infrastructure, crisis communication. Responsible physical/vital infrastructure. Advising role towards other parties. Meeting policy obligations (Meeting notes II), (Interview IX).
	Knowledge factors	- Is involved in different projects related to water safety and spatial adaptation. Such as FRAMES, NRW, RAAK and Impact analyses. These researches and projects contribute to the overall knowledge and approach on adaptation methods (Meeting notes II), (interview IX).
	Means	- Sufficient means available (Interview IX).
	Collaboration factors	- Extending networking structure, to reach goals (Meeting notes II), (interview IX).
Meeting notes I-VI, Interviews I-XI, Questionnaire survey,		

9.5 Stages of Kotter

Eight stages of Kotter and its implementation steps		
Eight stages of Kotter:	**Implementation steps:**	
1. Establish sense of urgency	Communicate specifics regarding expected results, time tables, and employee change (Cowley, 2007)	X
	Build understanding before commitment (Brower et al. 2007)	X
	Break down, through language, old models—nullify information no longer relevant or functional (Brower et al. 2007)	X
	Promote, through language, disengagement from outdated commitments (Brower et al. 2007)	X
	Confront "brutal facts" (Brower quoting Collins, p. 70)	X
	Establish intellectual and emotional actualization (Hoover, 2008)	X
2. Form a powerful guiding coalition	Signal involvement (senior leaders), including change advocacy through informal channels and deployment of resources through formal processes (Cowley, 2007).	X
	Build a "linked arm" coalition (senior leaders) (Cowley, 2007).	X
3. Create a vision	Motivate followers through empathy, envisioning, and empowerment, including establishment of high standards for performance and creative strategies for goals (Choi, 2006)	
	Emphasize what data is now relevant, affirm the mission, inspire energy towards that. (Brower et al. 2007)	
	Establish intellectual and emotional actualization (Hoover, 2008) (Appointments on expectation and realization were made.)	
4. Communicate the vision	Communicate expected results in advance (Cowley, 2007).	X
	Signal involvement (senior leaders), including change advocacy through informal channels and deployment of resources through formal processes (Cowley, 2007).	X
	Establish behavioural and perceptual actualization (Hoover)	
5. Empower others to act on the vision	Signal involvement (senior leaders), including change advocacy through informal channels and deployment of resources through formal processes (Cowley, 2007).	X
	Communicate specifics regarding expected results, time tables, and employee changes (Cowley, 2007).	
	Recognize followers may respond to charismatic leader because of sense of trust and self-efficacy (Choi, 2006)	
	Allow and officially sanction improvisation, which can provide new ways of completing tasks when resources are in limited supply (time, materials, staffing) (Leybourne, 2006)	
	Build high-quality leader-member exchange relationships through increased sharing of information, mutual trust, and encouragement of employee participation (change process quality). When there are high-quality LMX relationships, employees are receptive to change (Van Dam et al. 2008)	
6. Plan for and create short-term wins	Ensure senior manager signals are communicated in order to create sustained employee accountability (commitment to see the projects/changes through) (Cowley, 2007).	

	Allow and sanction improvisations which can provide new ways of completing tasks when resources are in limited supply (time, materials, staffing) (Leybourne, 2006)	
7. Consolidate improvements and produce more change	Establish and sustain key antecedents to affective commitment to change (employee engagement): positive employee-manager relationships, job motivation, and role autonomy (Parish et al. 2008)	
	Build and sustain positive leader-member exchange relationships through increased sharing of information, mutual trust, and encouraged employee participation (change process quality). (Van Dam et al. 2008)	
8. Institutionalize new approaches	Balance use between formal and informal channels necessary for sustainable accountability (Cowley, 2007)	
	Control management mobility to manifest benefits of organizational learning, ensure consistency in leader style and prioritization, and ensure manager accountability for long-term outcomes (Soltani, 2005)	
	Clarify purpose, unload “old baggage” (past frustrations with change processes), and sell problems, not solutions (Bridges)	

Scheme 3, source table: http://www.changemanagementonline.com/acht-stappen-in-het-veranderproces-kotter-1996/

9.6 Cross reference scheme stakeholder roles

Cross reference scheme stakeholder roles and obligations – how do stakeholders see each other in Spatial Adaptation process								
Importance: Low Medium High	Provincie Zeeland	Waterschap Scheldestromen	Rijkswaterstaat	Veiligheidsregio Zeeland	RUD	Gemeente Vlissingen, Borsele, Terneuzen	Zeeland Seaports	BRZO companies
Provincie Zeeland		Shared role process leader SA cooperation	Shared role process leader SA cooperation	Shared role process leader SA cooperation	Directing and managing role, with checking function	Shared role process leader SA cooperation	Main stockholder thus directing function	Legislator, and for some partner and facilitator
Waterschap Scheldestromen	Main partner SA		Advice technical adaptation measures & responsible for inner dikes	Advice technical adaptation measures & responsible for inner dikes	Manager of the water system	Advice technical adaptation measures & responsible for inner dikes	Advice technical adaptation measures & responsible for inner dikes	Advice technical adaptation measures & responsible for inner dikes
Rijkswaterstaat	Technical input higher perspective	Cooperation SA responsible main dike rings		Cooperation larger scale projects/crisis	Responsible safety primary protection	Technical input larger water related projects	Responsible safety primary protection (harbour companies)	Cooperation the level primary water safety
Veiligheidsregio Zeeland	Cooperation, responsible for crisis management	Cooperation, input perspective crisis management	Cooperation, input perspective crisis management		Cooperation, input perspective crisis management	Cooperation, input perspective crisis management	Cooperation, input perspective crisis management	Cooperation on calamity plans and advising
RUD	External safety, integrated cooperation	Necessary cooperation adaptation & calamities	Necessary cooperation larger scale projects/crisis	-		Responsible for licensing and control companies out of mandate	Regular discussion environmental and safety plans for companies	Advising, cooperating developing disaster plans
Gemeente Vlissingen, Borsele, Terneuzen	Executing SA measures locally, checking BRZO	Necessary facilitation municipalities technical aspect	Providing local information around primary dikes.	Active cooperation crisis management plans.	Checking BRZO and reporting to RUD		Stockholders, there for directing function	Dependent on establishment permits. And municipal legislation.
Zeeland Seaports	Responsible for managing harbour related activities & safety.	Cooperating & discussing how to improve water safety (adaptation) measures in harbour area	Cooperation when necessary reinforcing primary protection harbour area.	Essential partner in developing safety plans and enrolment	Reporting duty management organization for harbour related companies	Management party, harbour companies essential for employment in municipalities		Legal, spatial facilitator and service provider
BRZO companies	Offers employment & large risks. Essential adaptation subjects	Limited importances can serve as partner to share adaptation resources	Limited importances can serve as partner to share adaptation resources	Working together in setting up safety policies and regular trainings	Comply with environmental and safety policy regular checking	Essential for employment. Financial beneficiary, increases risk	Clients of port, necessary for cooperation and further growth	
Sources: Interviews I-XI, Policy analyses								

9.7 Introduction interview preparation.

Introductie interview
Datum: **Naam:** **Onderzoek mainstreaming RA Provincie**

1. Onderzoeks uitleg -
2. Lengte interview
3. Vooraf het interview nog vragen?

- **Wat heeft u voor functie?**

- **Wat is uw connectie met de DB RA?**

- **Welke projecten spelen er op dit moment op het gebied van Ruimtelijke Adaptatie? En wat heeft op dit moment de prioriteit?**

- **Wat is het belang om achterblijvers binnen RA mee te nemen? En wat voor rol heeft de Provincie hierin.**

- **Wat is de rol van BRZO bedrijven ten aanzien van de verplichte risico paragraaf?**

- **Hoe ligt de verhouding en verantwoordelijkheid tussen de Provincie en de RUD om de verschillende BRZO bedrijven te faciliteren. Welke rol spelen beide partijen hierin? En hoe vullen beide partijen hier elkaar in op.**

- **De Provincie kan strategieën opstellen. Uit welke componenten zouden deze strategieën moeten/kunnen bestaan (instrumenten, planning etc.)**

- **Verschil belangen met betrekking tot meerlaagswaterveiligheid en locatie.**

- **Wat in uw opinie een goede manier zijn om strategieën op te stellen om BRZO bedrijven beter te faciliteren.**

- **Welke rol speelt de Provincie?**

- **What contacts?**

9.8 Interview preparation

Datum: ….. **Onderzoek strategieën RA Provincie Zeeland** **Interview met:….**

4. Onderzoeks uitleg
5. Lengte interview
6. Vooraf het interview nog vragen?

- Wat heeft u precies voor functie bij deze organisatie?
- Wat is uw connectie met de DB RA/ effecten van klimaatsverandering?
- Welke projecten spelen er dit moment?
- Heeft u binnen de gemeente, volgends uw mening genoeg moeite besteed aan het inpassen van RA in het huidige beleid?
- Heeft u volgends uw mening ook genoeg moeite besteed aan de implementatie van RA in de uitvoering. (van diverse projecten)?

Factoren: wateroverlast, waterveiligheid, droogte, hitte

Wanneer ja:
- Wat vindt u specifiek goed gaan?
- Waar ziet u verbeter punten?
- Wat denkt u dat de belemmerende factoren zijn? (laat lijstje factoren zien)
- Waar kan de Provincie (of andere partijen jullie specifiek verder mee helpen.)

Wanneer nee:
- Waarom nog niet?
- Zijn jullie er mee bezig?
- Wat denkt u dat de belemmerende factoren zijn? (laat lijstje factoren zien)

Capaciteit gerelateerde beperkingen
- Tekort financiële middelen
- Tekort personeel capaciteit

Cognitieve gerelateerde beperkingen
- Gebrek aan kennis kwetsbare locaties (vitale infrastructuur)
- Gebrek bruikbare klimaatscenario's op lokale schaal
- Gebrek kennis potentiele adaptatie methodes
- Onzekerheid klimaat gerelateerde effecten (op lokaal niveau)
- Onzekerheid

Sociale en Culturele beperkingen
- Gebrek aan lokale ondersteuning (tijdens inpassing)
- Gebrek aan probleem herkenning binnen de organisatie
- Gebrek aan effectieve instrumenten (zoals stresstest)

Politieke en institutionele beperkingen
- Gebrek aan politieke steun/interesse
- Gebrek aan stimulatie voor ruimtelijke adaptatie (top down)
- Gebrek aan samenwerking binnen en tussen gemeentes en overheden
- Gebrek aan helderheid over verantwoordelijkheid ruimtelijke adaptatie
- Aankondiging op korte termijn ten aanzien van beleidsonderwerpen.

Technologische beperkingen
- Potentieel weinig adaptatie mogelijkheden.

Wat verwacht u van de provincie en waar kan de Provincie (of andere partijen jullie specifiek verder mee helpen?) binnen lopende projecten?

9.9 Format interviews topic list

Respondents: (…)	Preferred situation: [Dutch transcript]	Keywords:
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		

9.10 Questionnaire survey preparation

Survey vragen bedrijven

Wat heeft u voor functie binnen het bedrijf?
Open vraag

Is er binnen uw organisatie nagedacht over de eventuele gevolgen van klimaatsverandering op het functioneren van het bedrijf?

1. Lage mate
2. Noch lage nog hoge mate
3. Hoge mate
4. Zeer hoge mate
5. Geen

In welke mate weet uw organisatie wat de gevolgen voor klimaatsverandering zijn voor het functioneren van het bedrijf ten aanzien van wateroverlast?

1. Lage mate
2. Noch lage nog hoge mate
3. Hoge mate
4. Zeer hoge mate
5. Geen

In welke mate weet uw organisatie wat de gevolgen voor klimaatsverandering zijn voor het functioneren van het bedrijf ten aanzien van overstromingsrisico's?

1. Lage mate
2. Noch lage nog hoge mate
3. Hoge mate
4. Zeer hoge mate
5. Geen

Is er binnen uw organisatie aandacht besteed aan het in kaart brengen wat een eventuele overstroming.

1. Lage mate
2. Noch lage nog hoge mate
3. Hoge mate
4. Zeer hoge mate
5. Geen

Er is binnen uw organisatie aandacht besteed aan het in kaart brengen van methodes te gebruiken om het bedrijf in de toekomst beter te beschermen tegen overstroming risico's. (of andere effecten van klimaatsverandering)

1. Lage mate
2. Noch lage nog hoge mate
3. Hoge mate
4. Zeer hoge mate
5. Geen

Er is binnen mijn organisatie genoeg kennis om klimaatadaptatiemaatregelen te realiseren.

1. Lage mate
2. Noch lage nog hoge mate
3. Hoge mate
4. Zeer hoge mate
5. Geen

Er is binnen uw organisatie aandacht besteed om de gevolgen van een eventuele overstroming in het calamiteiten plan of risicoplan uit te schrijven.

1. Lage mate
2. Noch lage nog hoge mate
3. Hoge mate
4. Zeer hoge mate
5. Geen

In welke mate ziet u keteneffecten (tijdens overstroming) als gevaar voor het functioneren van uw bedrijf?

1. Lage mate
2. Noch lage nog hoge mate
3. Hoge mate
4. Zeer hoge mate
5. Geen

In welke mate zou uw organisatie actie ondernemen wanneer het blijkt toekomstige overstromingsrisico's de bedrijfsvoering bedreigen?

1. Lage mate
2. Noch lage nog hoge mate
3. Hoge mate
4. Zeer hoge mate
5. Geen

In welke mate is er draagvlak binnen de organisatie om maatregelen te nemen wanneer (veiligheids)normen gerelateerd aan waterveiligheid worden overschreden.

1. Lage mate
2. Noch lage nog hoge mate
3. Hoge mate
4. Zeer hoge mate
5. Geen

In welke mate is er duidelijkheid over wie er verantwoordelijk is voor het nemen van klimaat gerelateerde adaptatie maatregelen (noem een voorbeeld) gerelateerd aan de waterveiligheid van het bedrijf.

1. Lage mate
2. Noch lage nog hoge mate
3. Hoge mate
4. Zeer hoge mate
5. Geen

Vragen over de rol van bedrijf naar gemeente toe en wat men eventueel in de relatie ziet (dingen benodigd)
Open vraag

Vragen over de rol van bedrijf naar de Provincie toe en wat men in de relatie ziet (dingen benodigd)
Open vraag

Hoe beoordeeld u de samenwerking met de Provincie Zeeland/RUD voor wat betreft de onderwerpen waterveiligheid/klimaatadaptatie?
Schaal 1 tot 5

Wat zou er verbeterd kunnen worden binnen de samenwerken met de Zeeland/RUD?
Open vraag

In de nieuwe SEVESO III richtlijn zijn BRZO bedrijven verplicht gesteld om overstromingsscenario's in kaart te brengen, en hoogwaterplannen op te stellen. Heeft u organisatie dit al gedaan?
() Ja
() Nee
() In ontwikkeling

Welke van de onderstaande factoren spelen vanuit uw perspectief een belemmerende rol om bedrijfsmatig aanpassingen te verrichten om de organisatie beter te beschermen tegen toekomstige effecten van klimaatsverandering?

Capaciteit gerelateerde beperkingen
()Tekort financiële middelen
()Tekort personeel capaciteit

Cognitieve gerelateerde beperkingen
()Gebrek aan kennis kwetsbare locaties (vitale infrastructuur)
()Gebrek bruikbare klimaatscenario's op lokale schaal
()Gebrek kennis potentiele adaptatie methodes
()Onzekerheid klimaat gerelateerde effecten (op lokaal niveau)
()Onzekerheid

Sociale en Culturele beperkingen
()Gebrek aan lokale ondersteuning (tijdens inpassingsbeleid)
()Gebrek aan probleem herkenning binnen de organisatie
()Gebrek aan effectieve instrumenten (zoals stresstest)

Politieke en institutionele beperkingen
()Gebrek aan politieke steun/interesse
()Gebrek aan stimulatie voor ruimtelijke adaptatie (top down)
()Gebrek aan samenwerking binnen en tussen gemeentes en overheden
()Gebrek aan helderheid over verantwoordelijkheid ruimtelijke adaptatie
()Aankondiging op korte termijn ten aanzien van beleidsonderwerpen.

Technologische beperkingen
()Potentieel weinig adaptatie mogelijkheden.

Heeft u nog verdere opmerkingen?
Open vraag

9.11 Locations & functions BRZO companies

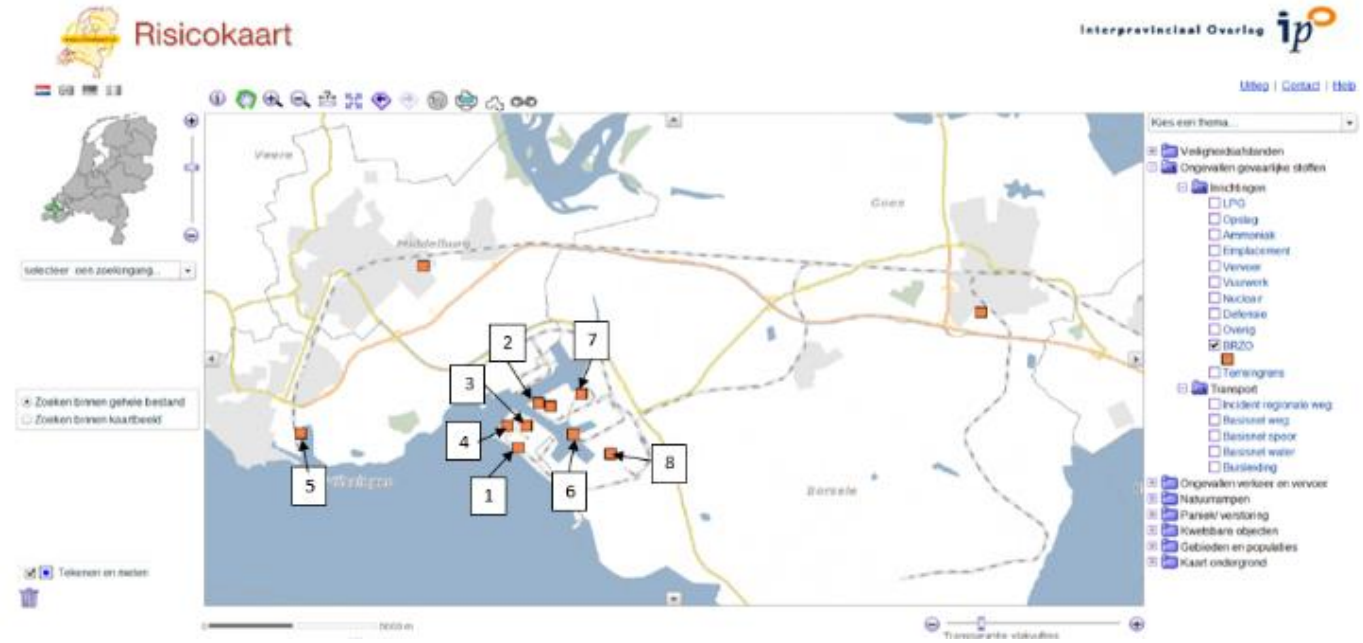


Figure 1 – BRZO companies Buitenhaven & Sloegebied

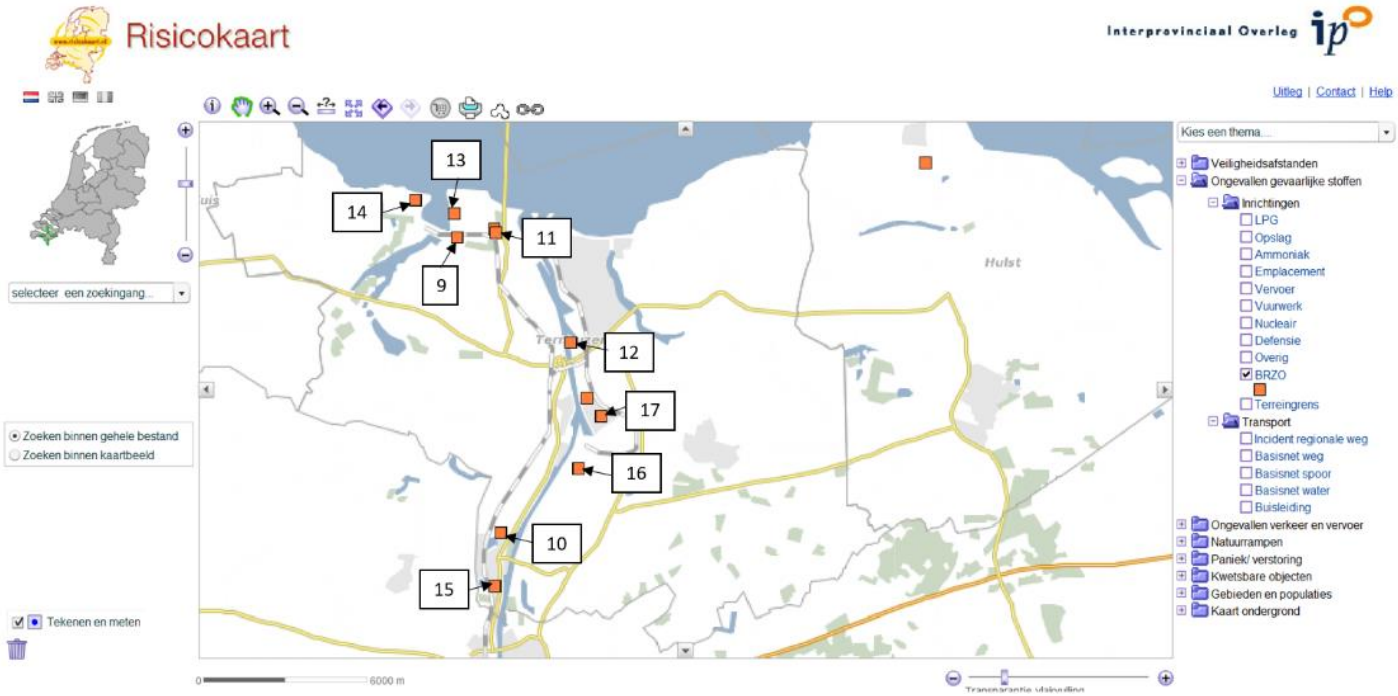


Figure 2 – BRZO companies Kanaalzone

Overview BRZI-companies in Zeeland – Name & description	Municipality
1. Air Liquide technische gassen BV Hoek Luchtscheiding, productie van zuurstof, stikstof en argon LDI	Terneuzen
2. Arkema Vlissingen BV Vlissingen Productie van organotin verbindingen, industriële reinigers, kunststoffen HDI	Vlissingen
3. Bison Goes Goes Distributiecentrum van producten LDI	Goes
4. Cargill BV Sas van Gent Verwerken van maïs en tarwe tot zetmeel en glucosestroop HDI	Terneuzen
5. Century Aluminium Vlissingen BV (vh. Zalco) Vlissingen Productie van (groene) anodes tbv aluminiumproductie. HDI	Vlissingen
6. Dow Benelux BV Hoek Productie van grondstoffen voor kunststofproductie, kunststof eindproducten en tussenproducten HDI	Terneuzen
7. Dry Bulk BV (in 2016 in bedrijf) Westdorpe Opslag en verlading van meststoffen HDI	Terneuzen
8. Eastman Chemical Middelburg BV Middelburg Productie van koolwaterstoffen, natuurhars, gebaseerde harsen, harsdispensies, brandstoffen en brandstofcomponenten HDI	Middelburg
9. Electrawinds GreenFuel BV (vh. Heros; op 17 maart 2015 is door de rechtbank Zeeland-West-Brabant het faillissement uitgesproken) Sluiskil Opslag van grondstoffen, biodiesel en chemicaliën, raffinage van ruwe natuurlijke olie, productie van biodiesel LDI	Terneuzen
10. ICL-IP Terneuzen BV Terneuzen Productie van broomhoudende producten, niet-broomhoudende producten, blenden en verpakken voor derden HDI	Terneuzen
11. Indaver Gevaarlijk Afval BV Hoek Inzamelen en verwerken van (gevaarlijke) afvalstromen, wasstraten voor tankcontainers, spoorketelwagons en verontreinigde emballage, zuiveringsfabriek voor afhoudende waterstromen LDI	Terneuzen
12. Maschem (in aanbouw en naar verwachting in 2016 in bedrijf) Hoek Ethoxyleringsfaciliteit voor productie van oppervlakte-actieve stoffen op basis van alcoholen, oliën, esters, vetzuren en amines HDI	Terneuzen
13. Oiltanking Terneuzen BV Hoek Op- en overslag van aardolieproducten en chemicaliën HDI	Terneuzen
14. Packaging Terneuzen Terminal (er loopt een vergunningentraject waardoor dit bedrijf niet meer Brzoplichtig is) Terneuzen Op- en overslag en verpakken van nitraathoudende en nietnitraathoudende meststoffen HDI 5 BRZO-plus heeft op zijn website een uitgebreide lijst van afkortingen, begrippen en synoniemen gepubliceerd. http://Brzoplus.nl/algemene-onderdelen/deurmat-2e-3e-kolom/algemeen/begrippen/ 14 Naam bedrijf Plaats Omschrijving Brzo categorie	Terneuzen
15. Rosier Nederland BV (vh. Zuid-Chemie BV) Sas van Gent Productie van enkelvoudige en samengestelde meststoffen HDI	Terneuzen
16. Tieleman Transport BV Kloosterzande Opslag- en transportbedrijf HDI	Hulst
17. Van Citters Beheer BV (vh. Thermphos) Nieuwdorp Voert het beheer en de sanering uit van vm. Thermphos site HDI	Borsele
18. Verbrugge Scaldia Terminal Nieuwdorp Op- en overslag van diverse goederen (vnl. non-ferro metalen, staal, pulp, papier, hout, containers, lood-, zink- en koperconcentraat Assemblage en metaalbewerking van off-shore constructies. HDI	Borsele
19. Vesta Terminal Flushing BV Westerhavenweg (vh. Mercuria Terminals Flushing BV) Vlissingen Op- en overslag van K1, K2 en K3- producten HDI	Vlissingen
20. Vesta Terminal Flushing BV Oosterhavenweg (vh. Mercuria Terminals Flushing BV) Vlissingen Op- en overslag van K1, K2 en K3- producten HDI	Vlissingen
21. Vopak Terminal Vlissingen Vlissingen Op- en overslag van vloeibaar gemaakte brandbare gassen in bulk HDI	Vlissingen
22. Yara Sluiskil BV Sluiskil Productie van stikstofmeststoffen, ammoniak, kooldioxide en salpeterzuur HDI	Terneuzen
23. Zeeland Refinery (vh. Total Raffinaderij Nederland NV Nieuwdorp Winnen van diverse producten uit ruwe aardolie HDI	Borsele
(Source: bedrijvenlijst RUD Zeeland, 2015)	

9.12 Complete interviews

Interview 1 Datum 29-04-2015 Onderzoek mainstreaming RA Provincie Zeeland Interview gemeente MB

1. Onderzoeks uitleg
2. Lengte interview
3. Vooraf het interview nog vragen?

- **Wat heeft u precies voor functie bij deze gemeente?**

Lex Suijlen and Willem Reijnierse

Urban development and civil engineering.

- **Wat is uw connectie met de DB RA?**

The main connection towards DB RA is that MB already integrated some parts within current spatial planning. Concerning the municipality of MB the main importance is water nuisance. Middelburg does not see water safety as priority.

- Welke projecten spelen op dit moment?

Hazenburg noord, Ritthemburg, Esseveld,

- **Heeft u binnen de gemeente, volgends uw mening genoeg moeite besteed aan het inpassen van RA in het huidige beleid?**

On this moment there is chosen to not actively adapt towards RA within the policy plans.

- **Heeft u volgends uw mening ook genoeg moeite besteed aan de implementatie van RA in de uitvoering. (van diverse projecten)?**

Yes but unconsciously, mainly focusing on water nuisance, making decisions based on water safety does not have any priorities.

Factoren: wateroverlast, waterveiligheid, droogte, hitte

Wanneer ja:

- **Wat vindt u specifiek goed gaan?**

Door goede samenwerking met het waterschap, is er een huidige over capaciteit van lokale gemalen. Dit brengt met zich mee dat de komende jaren toereikend kan worden gepompt. Door deze goede bemaling heeft MB op dit moment geen wateroverlast.

- Waar ziet u verbeter punten?
- Wat denkt u dat de belemmerende factoren zijn? (laat lijstje factoren zien)
- Waar kan de Provincie (of andere partijen jullie specifiek verder mee helpen.)

  Middelburg vind het de taak van de Provincie. Dat de Provincie toeziet op het complete scala, wat betreft waterveiligheid.
  Verder vond de gemeente Middelburg dat de Provincie de gemeente niet te veel stuurt in het nemen van ruimtelijke beslissingen. De gemeente Middelburg vindt dat het op dit moment al te veel gebeurt en zou het liefst zo veel mogelijk met rust gelaten worden.

Wanneer nee:

- Waarom nog niet?
- Zijn jullie er mee bezig?
- Wat denkt u dat de belemmerende factoren zijn? (laat lijstje factoren zien)

Interview blad RW, gefocust op mainstreaming RA factoren		
Capaciteit gerelateerde beperkingen	Er zijn geen capaciteit gerelateerde beperkingen binnen de gemeente MB.	
Tekort financiële middelen	Dit is er niet -> tot op zeker niveau wel op nationaal niveau door crisis etc.	
Tekort personeel capaciteit	Dit is geen probleem.	
Cognitieve gerelateerde beperkingen	**-> gericht op RO**	
Gebrek aan kennis kwetsbare locaties (vitale infrastructuur)	De gemeente weet waar de kwetsbare gebieden liggen, mede door modellen van de Provincie en RWS.	
Gebrek bruikbare klimaatscenario's op lokale schaal	Dit ontbreekt op het moment, de gemeente wacht op input van een hoger niveau. B.V. op de klimaatmodellen van de Provincie	X
Gebrek kennis potentiele adaptatie methodes	De gemeente Reimerswaal zegt dat het een soort overzicht nodig heeft van structurele adaptatie methodes welke op lokaal niveau gebruikt kunnen worden. Kennis moet van het waterschap komen.	X
Onzekerheid klimaat gerelateerde effecten (op lokaal niveau)	Dit is enigszins duidelijk, maar het is momenteel niet precies zichtbaar hoe b.v. een bepaalde doorbraak van een dijk zich ontwikkeld. De Provincie zou hierin kunnen ondersteunen met de informatie voorziening.	X
Onzekerheid	De Gemeente RW heeft met RA nog niet veel gedaan in kleinschalige projecten omdat er ze nog niet goed weten wat er van hun verwacht wordt. Ook willen ze eerst zekerheid van de Provincie wat betreft uitvoering ook voor RO'ers meer sturing zou best mogen, net als in Utrecht.	X
Sociale en Culturele beperkingen (bestuurscultuur)	**-> veel ondersteuning geen hoofdprioriteit**	
Gebrek aan lokale ondersteuning (tijdens inpassingsbeleid)	Geen probleem	
Gebrek aan probleem herkenning binnen de organisatie	This can be seen as one of the main problems for the municipality of MB. Since the municipality on this moment in time does not recognize the importance of the delta decision spatial adaptation. This with the main reason that they are no coastal municipality. Unclearity also plays a large role.	X
Gebrek aan effectieve instrumenten (zoals stresstest)	Ja dit ontbreekt en zorgt voor de huidige onzekerheid. (De Provincie moet meer sturen wanneer er een mogelijk voor RA zich voordoet.) Instrumenten die helpen zijn erg welkom. Bijvoorbeeld ook aanvullingen op de stresstest en handreiking.	X

Politieke en institutionele beperkingen		
Gebrek aan politieke steun/interesse	-> goede steun, only the municipality of MB sees this as less interesting topic serving as a factor in their spatial planning.	
Gebrek aan stimulatie voor ruimtelijke adaptatie (top down)	Stimulatie is er wel, alleen de onzekerheid wordt vergroot doordat er weinig duidelijkheid is op dit moment.	X/0
Gebrek aan samenwerking binnen en tussen gemeentes en overheden	Geen probleem	
Gebrek aan helderheid over verantwoordelijkheid ruimtelijke adaptatie	De verantwoordelijkheid is redelijk duidelijk. Behalve voor b.v. vitale infra maar daar wordt aan gewerkt. Verder is het zo dat onzekerheid het grootste gebrek aan helderheid veroorzaakt.	X/0
Aankondiging op korte termijn ten aanzien van beleidsonderwerpen.	Geen probleem	
Technologische beperkingen		
Potentieel weinig adaptatie mogelijkheden.	Dit is geen probleem. Binnen MB is er genoeg kennis, wanneer er behoefte aan technische kennis nodig is liggen de lijntjes naar het waterschap klaar. MB weet dat er voldoende adaptatie mogelijkheden zijn -> maar die moeten meer de focus op het gemixt stedelijk landelijk gebied hebben. Hier zouden ze nog wat meer informatie voorbeelden etc over willen hebbben.	X/0

Conclusie interview:	From this interview it can be concluded that Middelburg currently has various limitations concerning mainstreaming spatial adaptation. It should be taken into account that some limitations concerning mainstreaming which are currently present are triggered by limiting factors. (see conceptual model) The limitations which are most evident are like RW mostly cognitively related. Furthermore social and cultural limitations (administrative culture) do play a large role. This means that policy makers within the municipality do limit the mainstreaming of SA. Awareness of policy makers plays a large role within this factor. Political and technological factors limitation mainstreaming of SA within the municipality of MB do not play a prominent role. Although from the in-depth interviews it can be concluded that the first two factors have a negative influence on the political and technological dimensions. Like described earlier, cognitively related limitations is most evident limiting the mainstreaming of SA within the municipality of MB. Unclearity of the SA program plays the largest limiting factor for the municipality of MB to adapt towards SA within their spatial processes. Furthermore for the municipality of MB it plays an important role that SA is not legally bound by law. The limitations which are most evident are especially cognitive related. According to various sources it would help for the municipality of MB that the Province uses various instruments to steer spatial processes. Especially when changes are not captured by the municipality themselves. Furthermore the municipality stated that a clear overview of methods and win-win situations of SA would help them within the mainstreaming process. Uit dit interview kan worden geconcludeerd dat er een aantal beperkingen zijn voor de gemeente MB wat betreft de mainstreaming van RA. Er moet rekening mee gehouden worden dat sommige beperkingen welke aanwezig zijn, worden getriggerd door veroorzakende factoren. (Zie schema) De beperkingen welke het meest evident zijn vooral cognitief gerelateerd. Verder spelen sociale en culturele beperkingen (bestuurscultuur) ook een redelijk grote rol. Dit heeft dus te maken op de wijze hoe

	de bestuurders binnen de gemeente met het onderwerp van RA omgaan. Wat betreft politieke en technologische beperkingen, deze zijn niet aan de orde. Maar de eerste twee factoren hebben wel een negatieve invloed op deze factoren. Zoals al eerder vermeld zijn de cognitieve beperkingen het meest evident welke de mainstreaming van de gemeente MB tegenwerkt. Hierin speelt de onzekerheid van RA de grootste rol. Omdat het niet in de wet is vastgelegd. Het zou voor MB helpen dat de Provincie b.v. met instrumenten aanstuurt op uitvoering. Wat verder zou helpen voor de gemeente MB is een helder overzicht van de te gebruiken methodes of meekoppelkansen van RA. Voordat met instrumenten etc. kan worden aangestuurd op uitvoering. Is het eerst van belang sociale en culturele beperkingen weg te nemen of verminderen. Dit heeft vooral te maken met de bestuurscultuur en bewustwording tot verandering. Specifieke voorbeelden zijn, dat de gemeente Middelburg het geen persoonlijke taak vind de factor waterveiligheid binnen RA in acht te nemen. Dit gedeeltelijk doordat Middelburg geen kustgebied is. Wel lijkt het MB belangrijk dat er actie ondernomen wordt, wanneer het blijkt dat bijvoorbeeld aanleg van natuurvriendelijke oevers overstromingskans wordt vergroot. Een voorbeeld dat genoemd werd dat MB in samenwerking met het Waterschap b.v. als Door sturing van de Provincie zou dit doel misschien bereikt kunnen worden. Verder heeft de gemeente MB nog geen projecten uitgevoerd met RA in het achterhoofd. Bij nieuwe projecten zoals het bouwen van woonwijken wordt er met de factor waterveiligheid binnen RA niet bewust rekening gehouden. Wanneer er gebouwen of andere structurele projecten worden ontwikkeld met een vitale functie. Zoals het ziekenhuis op Walcheren wordt er geen rekening gehouden met de kwetsbaarheid van een locatie. Wel wordt er rekening gehouden met de praktische uitvoering. Zoals, het plaatsen van operatiezalen en belangrijke faciliteiten op de bovenverdieping. Before instruments can be used to steer the execution of spatial processes. It first will be necessary to reduce or take away the cultural limitations. This especially has to do with the management culture of the subject municipality. Awareness and accepting change could help within this process. A specific example is, the Province of Middelburg does not think it is their task to take the factor water safety into account. The argument which was supplied is that the municipality is not connected towards the coastline. However it seems important to MB that actions are taken, if it appears that some current situations seem to reduce the water safety. For example the case of the nature friendly banks. From this case it seemed that since these were constructed, when a flooding would occur, flood times within Walcheren do increase rapidly. In this case MB sees the importance of building closable dams. In this case MB would like to cooperate with the water board to achieve this goal. Furthermore the municipality of MB did not execute any project with the DDSA actively in mind. Within new projects such as constructing residential areas the factor of water safety is not taken into account actively. When buildings or other structural projects with a vital function are constructed, MB sees the priority. (In this case MB will make spatial decisions to reduce the vulnerability of these functions towards water safety.) When comparing this saying to a practical case, the outcome is slightly different. For example a new hospital was planned within MB. On the lowest location which is relatively vulnerable towards flooding. In this case the spatial vulnerability was not taken into account. MB reacted and said that within the practical execution water safety would be taken into account. Examples of this are locating the surgery on the second floor.

Quote: "We unconsciously already implemented many factors of the delta decision spatial adaptation within our spatial processes."

Interview 2 Datum 21-04-2015 Onderzoek mainstreaming RA Provincie Zeeland Interview gemeente VLI

1. Onderzoeks uitleg
2. Lengte interview
3. Vooraf het interview nog vragen?

- Wat heeft u precies voor functie bij deze gemeente?

  Adviseur ruimtelijk ordening
- Wat is uw connectie met de DB RA?

- Welke projecten spelen op dit moment?
  Projecten zeeweringen, hotel britania, voorloper delta programma, zeeland voorbeeld concept vlissings model
  Vitale infrastructuur beginnend -> burgemeester steemerder ding wadi's
  Overleg met waterschap en rijk verloopt goed
  Waterveiligheid medeafhandlijk waterschap

- Heeft u binnen de gemeente, volgends uw mening genoeg moeite besteed aan het inpassen van RA in het huidige beleid?

- Heeft u volgends uw mening ook genoeg moeite besteed aan de implementatie van RA in de uitvoering. (van diverse projecten)?

Factoren: wateroverlast, waterveiligheid, droogte, ~~hitte~~

Wanneer ja:
- Wat vindt u specifiek goed gaan?
- Waar ziet u verbeter punten?
- Ruimtelijke spoort heel goed -> aanspreekpunt civiel.
- Wat denkt u dat de belemmerende factoren zijn? (laat lijstje factoren zien)
- Waar kan de Provincie (of andere partijen jullie specifiek verder mee helpen.)

Wanneer nee:
- Waarom nog niet?
- Zijn jullie er mee bezig?
- Wat denkt u dat de belemmerende factoren zijn? (laat lijstje factoren zien)

Capaciteit gerelateerde beperkingen
- Tekort financiële middelen

Intergreren alles op langer termijn goedkoper, rijks voortouw voorfinancieren vandaag. Voorbeeld heel goed nolle westduin pantarij.
- Tekort personeel capaciteit

Cognitieve gerelateerde beperkingen
- Gebrek aan kennis kwetsbare locaties (vitale infrastructuur)
- Gebrek bruikbare klimaatscenario's op lokale schaal
- Gebrek kennis potentiele adaptatie methodes
- Onzekerheid klimaat gerelateerde effecten (op lokaal niveau)
- Onzekerheid

Oplossingen -> waterveiligheids aspecten

Sociale en Culturele beperkingen

- Gebrek aan lokale ondersteuning (tijdens inpassingsbeleid)
- Gebrek aan probleem herkenning binnen de organisatie
- Gebrek aan effectieve instrumenten (zoals stresstest)

Politieke en institutionele beperkingen

- Gebrek aan politieke steun/interesse
- Genoeg
- Gebrek aan stimulatie voor ruimtelijke adaptatie (top down)
- Gebrek aan samenwerking binnen en tussen gemeentes en overheden
- Gebrek aan helderheid over verantwoordelijkheid ruimtelijke adaptatie
- Aankondiging op korte termijn ten aanzien van beleidsonderwerpen.

Technologische beperkingen

- Potentieel weinig adaptatie mogelijkheden.

Wat verwacht u van de Province en waar kan de Provincie (of andere partijen jullie specifiek verder mee helpen?) binnen lopende projecten?

Hulp stresstest Ruimtelijke adaptatatie Contact leo caljouw goed lijntje.

Interview blad VLI, gefocust op mainstreaming RA factoren		
Capaciteit gerelateerde beperkingen	Er zijn geen capaciteit gerelateerde beperkingen binnen de gemeente	
Tekort financiële middelen	Dit is er niet -> tot op zeker niveau wel op nationaal niveau door crisis etc.	
Tekort personeel capaciteit	Dit is geen probleem.	
Cognitieve gerelateerde beperkingen	**-> gericht op RO'ers begint het nu te komen**	
Gebrek aan kennis kwetsbare locaties (vitale infrastructuur)	De gemeente weet waar de kwetsbare gebieden liggen, mede door modellen van de Provincie en RWS.	
Gebrek bruikbare klimaatscenario's op lokale schaal.	De gemeente is al lang bezig met RA mind set	
Gebrek kennis potentiele adaptatie methodes		
Onzekerheid klimaat gerelateerde effecten (op lokaal niveau)		X
Onzekerheid	Geen last van	
Sociale en Culturele beperkingen (bestuurscultuur)	**-> veel ondersteuning geen hoofdprioriteit**	
Gebrek aan lokale ondersteuning (tijdens inpassingsbeleid)	Geen probleem	X
Gebrek aan probleem herkenning binnen de organisatie	This can be seen as one of the main problems for the municipality of VLI. Since the municipality on this moment in time does not recognize the importance of the delta decision spatial adaptation. This with the main reason that they are no coastal municipality. Unclearity also plays a large role.	X
Gebrek aan effectieve instrumenten (zoals stresstest)	Ja dit ontbreekt en zorgt voor de huidige onzekerheid. (De Provincie moet meer sturen wanneer er een mogelijk voor RA zich voordoet.) Instrumenten die helpen zijn erg welkom.	X

	Bijvoorbeeld ook aanvullingen op de stresstest en handreiking.	
Politieke en institutionele beperkingen		
Gebrek aan politieke steun/interesse	-> goede steun, only the municipality of VLI sees this as less interesting topic serving as a factor in their spatial planning.	
Gebrek aan stimulatie voor ruimtelijke adaptatie (top down)	Stimulatie is er wel, alleen de onzekerheid wordt vergroot doordat er weinig duidelijkheid is op dit moment.	X
Gebrek aan samenwerking binnen en tussen gemeentes en overheden	Geen probleem	
Gebrek aan helderheid over verantwoordelijkheid ruimtelijke adaptatie	De verantwoordelijkheid is redelijk duidelijk. Behalve voor b.v. vitale infra maar daar wordt aan gewerkt. Verder is het zo dat onzekerheid het grootste gebrek aan helderheid veroorzaakt.	
Aankondiging op korte termijn ten aanzien van beleidsonderwerpen.	Geen probleem	
Technologische beperkingen		
Potentieel weinig adaptatie mogelijkheden.	Dit is geen probleem. Binnen VLI is er genoeg kennis, wanneer er behoefte aan technische kennis nodig is liggen de lijntjes naar het waterschap klaar. VLI weet dat er voldoende adaptatie mogelijkheden zijn -> maar die moeten meer de focus op het gemixt stedelijk landelijk gebied hebben. Hier zouden ze nog wat meer informatie voorbeelden etc over willen hebbben.	

Conclusie interview:	From this interview it can be concluded that Vlissingen currently has various limitations concerning mainstreaming spatial adaptation. It should be taken into account that some limitations concerning mainstreaming which are currently present are triggered by limiting factors. (see conceptual model) The limitations which are most evident are like RW mostly cognitively related. Furthermore social and cultural limitations (administrative culture) do play a minor role. Although from the in-depth interviews it can be concluded that the first two factors have a negative influence on the political and technological dimensions. Like described earlier, cognitively related limitations is most evident limiting the mainstreaming of SA within the municipality of MB. Unclearity of the SA program plays the largest limiting factor for the municipality of MB to adapt towards SA within their spatial processes. Furthermore for the municipality of VLI it plays an important role that SA is not legally bound by law.

Interview 3 Datum 07-04-2015 Onderzoek mainstreaming RA Provincie Zeeland Interview gemeente RW

1. Onderzoeks uitleg
2. Lengte interview
3. Vooraf het interview nog vragen?

- **Wat heeft u precies voor functie bij deze gemeente?**

Beleidsmedewerker RO en Water beleid, volledig waterbeleid, beheer geen stedelijk water. Ook project functie met de focus op dijken -> 380kv afdeling ruimtelijke ordening verwerking in plannen. Advies inpassing in wetgeving voor kleine en grote projecten b.v. 380KV.

- **Wat is uw connectie met de DB RA?**

In de begin fase meegedraaid met klankbord. Heeft nog steeds een afwachtende houding. Er is vraag naar helderere verwachtingen en een lijst met concrete maatregelen en factoren waarin ook kosten worden afgewogen.

- **Heeft u binnen de gemeente, volgends uw mening genoeg moeite besteed aan het inpassen van RA in het huidige beleid?**

Op hoofdlijnen, waterveiligheid focus op dijken op hoofdlijnen in beleid. Verder is het redelijk in het huidige beleid van de gemeente ingebouwd, alleen het is zo dat op dit moment de achterliggende gedachte wat betreft de uitvoering nog ontbreekt.

- **Heeft u volgends uw mening ook genoeg moeite besteed aan de implementatie van RA in de uitvoering. (van diverse projecten)?**

Op hele kleine schaal, watertoets niveau, eigen initiatief heel weinig -> gebrek conreet maatregelen

Wanneer er een belangrijke beslissing wordt genomen, net als 380KV wordt er ook rekening meegehouden. Ook worden alle meekoppel kansen benut.

Wanneer ja:

- Wat vindt u specifiek goed gaan?

Bewustwording van veiligheid en ruimtelijke adaptatie is heel belangrijk binnen de gemeente Reimerswaal. Andere ambtenaren zijn echt heel bewust van RA.

- Waar ziet u verbeter punten?

Op dit moment gaat het al heel goed, maar het is nooit verkeerd dat de bewustwording verder wordt vergroot.

- Wat denkt u dat de belemmerende factoren zijn? (laat lijstje factoren zien)

Er zijn er verschillende kijk maar naar het lijstje, het is aangevinkt wat er nog niet goed is.

- Waar kan de Provincie (of andere partijen jullie specifiek verder mee helpen.)

Sterke -> bewustwording, door bv 3d simulaties, berekeningen en de dijken en bepaalde functie toe te bedelen. Verder vinden ze het nodig dat Vitale en kwetsbare functies in beeld gebracht worden.

1e laag goed voor elkaar, per regionale waterkering sterkte en zwakte secundair, functies per dijk, 2e laag concreet maatregelen pakket ro's, 3e laag verschillende scenario's afwegen -> vluchtroutes punten etc. Sturing routering

Wateroverlast afkoppelen gemeentelijk riool plan

Het is voor de gemeentes erg belangrijk dat lokale adaptatie te bekostigen is.

Samenwerkings verband RA te adhoc achtig, -> wordt nu vast agendapunt vast item planvorming -> maatwerk toe, initiatieven aansluiten 1 keer per maand stebouwkundige werkgroep, waterschap input, technische grote lijnen, communicatie perfect, waterschap minder, ook naar gemeentes toe aan goede communicatie. Het is beter voor de mainstreaming dat RA een vast agenda punt krijgt op een ambtenaarlijk overleg.-> pas dan zal het serieus aangepakt worden.

Wanneer nee:

- Waarom nog niet?
- Zijn jullie er mee bezig?
- Wat denkt u dat de belemmerende factoren zijn? (laat lijstje factoren zien)

Stedenbouwkundige werkgroep provincie sturend, provincie een focus rol, watertoets bijsturen,

Interview blad RW, gefocust op mainstreaming RA factoren		
Capaciteit gerelateerde beperkingen	Er zijn geen capaciteit gerelateerde beperkingen binnen de gemeente Reimerswaal.	

Tekort financiële middelen	Dit is er niet -> tot op zeker niveau wel op nationaal niveau door crisis etc.	
Tekort personeel capaciteit	Dit is geen probleem.	
Cognitieve gerelateerde beperkingen	**-> gericht op RO**	
Gebrek aan kennis kwetsbare locaties (vitale infrastructuur)	De gemeente weet waar de kwetsbare gebieden liggen, dit zou in principe doorgecomuniceerd kunnen worden naar de Provincie etc.	
Gebrek bruikbare klimaatscenario's op lokale schaal	Dit ontbreekt op het moment, de gemeente wacht op input van een hoger niveau. B.V. op de klimaatmodellen van de Provincie	X
Gebrek kennis potentiele adaptatie methodes	De gemeente Reimerswaal zegt dat het een soort overzicht nodig heeft van structurele adaptatie methodes welke op lokaal niveau gebruikt kunnen worden. Kennis moet van het waterschap komen.	X
Onzekerheid klimaat gerelateerde effecten (op lokaal niveau)	Dit is enigszins duidelijk, maar het is momenteel niet precies zichtbaar hoe b.v. een bepaalde doorbraak van een dijk zich ontwikkeld. De Provincie zou hierin kunnen ondersteunen met de informatie voorziening.	X
Onzekerheid	De Gemeente RW heeft met RA nog niet veel gedaan in kleinschalige projecten omdat er ze nog niet goed weten wat er van hun verwacht wordt. Ook willen ze eerst zekerheid van de Provincie wat betreft uitvoering ook voor RO'ers meer sturing zou best mogen, net als in Utrecht.	X
Sociale en Culturele beperkingen	**-> veel ondersteuning geen hoofdprioriteit**	
Gebrek aan lokale ondersteuning (tijdens inpassingsbeleid)	Geen probleem	
Gebrek aan probleem herkenning binnen de organisatie	Geen probleem	
Gebrek aan effectieve instrumenten (zoals stresstest)	Ja dit ontbreekt en zorgt voor de huidige onzekerheid. De Provincie moet meer sturen (volgends RW) wanneer er een mogelijk voor RA zich voordoet. Instrumenten welke helpen zijn erg welkom. Bijvoorbeeld ook aanvullingen op de stresstest en handreiking.	X
Politieke en institutionele beperkingen		
Gebrek aan politieke steun/interesse	-> goede steun	
Gebrek aan stimulatie voor ruimtelijke adaptatie (top down)	Stimulatie is er wel, alleen de onzekerheid wordt vergroot doordat er weinig duidelijkheid is op dit moment.	X
Gebrek aan samenwerking binnen en tussen gemeentes en overheden	Geen probleem	
Gebrek aan helderheid over verantwoordelijkheid ruimtelijke adaptatie	De verantwoordelijkheid is redelijk duidelijk. Behalve voor b.v. vitale infra maar daar wordt aan gewerkt. Verder is het zo dat onzekerheid het grootste gebrek aan helderheid veroorzaakt.	X
Aankondiging op korte termijn ten aanzien van beleidsonderwerpen.	Geen probleem	

Technologische beperkingen		
Potentieel weinig adaptatie mogelijkheden.	Dit is geen probleem. Binnen RW is er genoeg kennis, wanneer er behoefte aan technische kennis nodig is liggen de lijntjes naar het waterschap klaar. RW weet dat er voldoende adaptatie mogelijkheden zijn -> maar die moeten meer de focus op het landelijk gebied hebben, met de zelfde factoren als Reimerswaal.	X

Conclusie interview:	Uit dit interview kan worden geconcludeerd dat er een aantal beperkingen zijn voor de gemeente RW wat betreft de mainstreaming van RA. Er moet rekening mee gehouden worden dat sommige beperkingen welke aanwezig zijn, worden getriggerd door veroorzakende factoren. (Zie schema) De beperkingen welke het meest evident zijn vooral cognitief gerelateerd. Verder spelen sociale en culturele beperkingen ook een kleine rol. Wat betreft politieke en technologische beperkingen, deze zijn niet aan de orde. Maar de eerste twee factoren hebben wel een negatieve invloed op deze factoren. Zoals al eerder vermeld zijn de cognitieve beperkingen het meest evident welke de mainstreaming van de gemeente Reimerswaal tegenwerkt. Hierin speelt de onzekerheid van RA de grootste rol. Omdat het niet in de wet is vastgelegd of geen vast agendapunt heeft. Het zou voor RW helpen dat de Provincie b.v. met instrumenten aanstuurt op uitvoering. Wat verder zou helpen voor de gemeente RW is een helder overzicht van de te gebruiken methodes of meekoppelkansen van RA. Verder heeft de gemeente RW nog geen projecten uitgevoerd met RA in het achterhoofd. Meer doen met dijken is wel een ontwikkeling welke hieraan gerelateerd is. Ook wordt er bij het project 380 KV voor het eerst rekening mee gehouden. Verder werd het als belang gezien dat de RO'ers verdere bewustwording opbouwen om het als vast item te gaan zien in projecten. Een informatie middag voor RO'ers zou erg welkom zijn . Cognitief Gebrek bruikbare klimaatscenario's op lokale schaal Gebrek kennis potentiele adaptatie methodes Onzekerheid klimaat gerelateerde effecten (op lokaal niveau) Onzekerheid Sociale en culturele beperkingen Gebrek aan effectieve instrumenten (zoals stresstest)

Wat verwacht u van de Provincie en waar kan de Provincie (of andere partijen jullie specifiek verder mee helpen?)

De gemeente Reimerswaal heeft behoefte aan een SWOT. Ook behoefte aan een concreet technisch pakket pakket voor RO’ers ook wil de gemeente kunnen voorsorteren op watertoetsniveau. Verder behoefte aan een uitleg voor beleids makers en RO’ers binnen de gemeentes. En met een structurele uitleg wat er lokaal gedaan kan worden.

Welke instrumenten kunt u gebruiken on RA verder door te voeren?

Vanuit de hogere niveaus zijn er alleen technische en structurele voorbeelden en sturing nodig.

Interview 4 Introductie interview Provincie Zeeland Datum: 22-02-2017 Naam: Erik Schumacher
Onderzoek mainstreaming RA Provincie Zeeland

Respondents: Erik Schumacher	**Preferred situation: [Dutch transcript]**	**Keywords:**
1.	His function is policy specialist water safety at the Province of Zeeland. He is working in different projects and processes related to spatial adaptation, water safety, climate change and space. With the specific focus on leading these processes and projects. Furthermore his tasks are focussing on formulating provincial policies.	Function
2.	Different projects: FRAMES, Vital and Vulnerable, heat stress, etc. The project FRAMES and Vital and Vulnerable are projects that fall under the umbrella Spatial Adaptation. The topics of these projects are related to BRZO companies. In a sense that the project FRAMES is focussing on functions the harbour area can fulfil as an evacuation location when a casualty would occur. Furthermore FRAMES and Vital and Vulnerable are focussing on the importance of infrastructure related to topics of climate change and spatial adaptation. With the goal of safe spatial planning of these vital objects in the future. Another example of "vital" is companies with a BRZO function therefor it has a high relevance.	Projects and priority
3.	Discussing research questions, Erik says that he thinks that it is important to research what the Province can do to improve facilitation of BRZO companies but also the joint government. Furthermore he says he likes the focus on BRZO companies since it is an actual topic. The Province together with other governments is responsible for facilitating stakeholders, in order that they adopt to SA.	Importance and role Province
4.	In the European document on safety "Seveso III," Erik shows me: this is written down: In artikel 13 van het RRZO is bepaald dat de beschrijving van externe en natuurlijke oorzaken, in ieder geval: een schatting van de kans en de omvang van de effecten van een mogelijke overstroming; een schatting van de kans en de omvang van de effecten van een mogelijke aardbeving; een opsomming en een onderbouwing van de maatregelen die zijn genomen om de risico's van zware ongevallen te beperken, bevat. Around the start of 2016 it became obligatory that a flood risk paragraph is written in the in the safety plan of BRZO companies.	Role BRZO companies risk paragraph
5.	According to the Province the RUD is responsible in supervising and keeping the norms of the different BRZO companies related to the laws Since 1-1-2016 the Province is authorized supervision to facilitate BRZO companies. First the municipalities had authorized supervision of these companies. Erik does not know what it means and what the tasks are now that the Province has authorized authority. Erik does not know who is officially responsible for what factors related to water safety of BRZO companies. He knows that the Province has certain tasks and the RUD. Although it is somewhat vague where the responsibility of the RUD & Province begins and ends.	Responsibilities Province and RUD
6.	The relation time and space is very important concerning the topic of spatial adaptation. Since the BRZO companies are located in different areas the effects of flooding and/or water nuisance are different. Furthermore it is important to know where the different companies are located concerning networks such as electricity. The chain effect is important to consider since these networks are important to keep functioning otherwise these companies could also shutdown.	Importance water safety and locations
7.	Does not know precisely. Although the Province has a steering role in Spatial Adaptation. Therefor it is also responsible to steer the process related to SA of BRZO companies together with the RUD. It will be necessary that obligations of the Province and the RUD are researched into detail to become known what responsibilities of both stakeholders towards BRZO companies are.	Role of Province

Interview 5 Introductie interview RUD Zeeland
Datum: 16-03-2017 Naam: A.J. Lindenbergh Onderzoek mainstreaming RA Provincie Zeeland

Respondents: A.J. Lindenbergh	**Preferred situation: [Dutch transcript]**	**Keywords:**
1.	Specialist external safety. Background of the RUD -> Due to the disaster in Enschede it became important that external risks related to objects that can cause a disaster are mapped and checked regularly. It is secured in the decision juridical instrument. In this decision the maximum distances to build areas of risk full areas are included. Another subject that is included in this policy are the thresholds of different materials and substances that can be stored related to its threshold.	Function
2.	Rud executes the safety and environmental policies of the Province. It checks the BRZO companies if they reach current safety standards. The connection DB RA is specifically connected with the work the RUD does based on checking and preventing a disaster from happening. SA has a connection with this since it is also focussing on prevention but then with the focus on smart spatial planning. So that costs for recovery will be limited. Contribution risk inventory external safety/organisations. Responsible for the risk map and the actualisation of it. Most of the time the RUD keeps this map up to date with minimum/maximum twee weeks of delay.	Connection delta decision spatial adaptation & water safety
3.	Of the BRZO companies there are a few which require extra priority. There are different companies having products on the terrain containing an exceeded standard of dangerous matter like ores. This matter could cause a danger for the environment, and cannot cause a danger to external safety. Furthermore there are companies which purposefully avoid and stay under the BRZO legislation border. The companies do this to avoid legislative duties connected to being a BRZO company. André told me that these companies can form a certain risk than some companies that are BRZO companies because they do not have to meet the BRZO legislation and duties. Het is zo dat deze bedrijven een extra risico kunnen vormen omdat ze een middel grote capaciteit gevaarlijke stoffen hebben die net onder de norm blijft. For the RUD there are no projects on the area of Spatial Adaptation. It is so that the RUD, the Province and the ministry are working to execute SA. Therefor the RUD will give its cooperation to different projects related to BRZO companies wherever necessary.	Current project and priority
4.	Geld-> impuls -> DVO, I&M -> description of tasks is displayed in DVO. End of this year the funding of the ministry of I&M will stop and it is expected by the RUD that this funding will have to be supplied by the Province. Every Province has a different approach. The Province relatively can give the RUD different tasks to execute and new legislation for them to check. In the current situation this is not often done. It depends on the capacity of the Province and the initiative of the civil servant(s) responsible for this.	Importance facilitating late adopters
5.	It is obligated to meet this risk paragraph. The legislation made is from end 2015/start 2016. There are companies that already have written the risk paragraph. Some companies are front runners in this since they already written the paragraph and in detail by making use of recognized sources. A good example of this is the company Acyll. (see received documents). They made use of different VNK 2 relative height maps make an inventory of the risks on their location.	Role BRZO companies related to risk paragraph
6.	The RUD is responsible for checking if the different companies do not break any policies. The main tool they have for this is by giving and checking environmental licenses of companies. The Province plays a managing/directing role to the RUD despite its mandate. The Province can also give tasks to the RUD which are listed in the task list (VR) of the RUD. Concluding there are responsible for licensing, supervising and enforcement of the different companies under legislation.	Stakeholder roles and responsibilities

7.	All in all a distinction should be made in still to be build BRZO companies-and existing BRZO companies. Zeeland Seaports is issuing land, together with the Province have to play a leading role. Zeeland Seaports should also play a role that they think about climate proof spatial planning before a new company can settle.	Components of strategies
8.	It depends on the location how safe it is. Related to water safety there are two locations that have a main categorization. These are the companies located outer diked and inner diked. Moreover André states that to the topic of water safety exact information about vulnerability of location is known. Although he states that locations with different characteristics and vulnerability require different methods of spatial adaptation to improve the level of water safety.	Importances water safety and location
9.	Bow tie construction per company prevention measures and recovery measures can be differently constructed. In this the safety region also plays a role. Risk full spatial planning BRZO threshold. -> Limited capacity for responsibility municipalities. First in some municipalities the municipalities had authorised supervision for BRZO companies. An example is the municipality of Goes, who first had authorised supervision of the Bison. Because of capacity related limitations of the municipality all authorised supervision was send to the Province in the year 2016. The RUD in other Provinces makes use of 3 different registering systems. In the Province of Zeeland they make use of 1 main system for registration. Not every BRZO company is a danger for the living environment. Two examples of these companies are according to André, Verbrugge in the Scaldia harbour and Zalco.	Strategies to facilitate BRZO companies
10.	The Province plays a controlling/checking role to the RUD. Since the Province did give its mandate to the RUD. The RUD is responsible for checking if the different companies do not break any policies. The Province plays a managing/directing role to the RUD despite its mandate. The Province can also give tasks to the RUD which are listed in the task list (VR) of the RUD.	Role of Province

Interview 7. Datum: 18-05-2017 Naam: Erik Schumacher & Gerbrand Naeff interview by phone on behalf of Annemarieke Grinwis Onderzoek mainstreaming RA Provincie

Respondents: (Erik Schumacher & Gerbrand Naeff) interview by phone on behalf of Annemarieke Grinwis	**Preferred situation: [Dutch transcript]**	**Keywords:**
1.	Yearly round of making a progress report. Delta program 2018 -> more attention for pilot projects and areas. 2x reporting. Link to region and having better worked out examples. How far is every region? Vital and vulnerable, stress test	Vision and role ministry
2.	Accent in Zeeland is on electricity and the chemical sector. Mainly the BRZO companies and network companies. Networks are important since these can cause cascade effects having effects on the functioning of BRZO companies but also on flood recovery since it can disable pumps for draining flood water. Around 2019 end results of current projects. Including knowing and willing. Electricity and water robustness focus on Hulst area schakelstation also the small ones. Delta scenarios 1 at 40.000 to scan assets. Enduris Tennet are involved and willing to cooperate to test water robustness. Chemical functions – RUD BOV -> sharpened guidelines, RUD has its role -> the roles are described in the document veiligheids rapport chemie.	RA importances Zeeland
3.	Conclusion Annekke -> Danger people, environment-> relatively small risks. Non BRZO smaller companies can also deliver dangerous situation. Utrecht has a decree for companies with certain functions that in areas with a flood risks cannot be build.	Responsibility water safety and RA

	Vital and vulnerable who is responsible? The ministry is responsible, only it is cautious for being too involved in this matter. It tries to let the decisions be made on the local level by the Provinces. The sector chemical companies is waiting on ministries, so the national government and the ministry. In this case they play an important role. The Province states that it thinks that it is important that next to bottom-up facilitation and policy making also a top-down approach with policy making and a ministry making clear guidelines is necessary. Annekke Raap Chemical companies	
4.	Vital and vulnerable, BRZO companies it is unclear what roles what parties exactly play. It is too complex. Therefor it is possible that the stakeholders (RUD) responsible for checking that BRZO companies are behaving according legislation are not always doing their tasks. The ministry is not always transparent, this can be improved. Law BRZO -> companies need to take actions themselves -> RUD and inspectie leefomgeving assesses the companies. Role ministry every Province is responsible for its own. When law is put on paper correctly the task of the ministry is finished.	Roles of joint government and BRZO companies.

Interview
Datum: 29-05-2017 **Naam: Hein Versluis** **Onderzoek mainstreaming RA Provincie**

Respondents: Hein Versluis	**Preferred situation: [Dutch transcript]**	**Keywords:**
1.	Advisor harbour safety and environment	Function
2.	Zeeland Seaports focusses on Management, spatial business, everything connected with space, water, infrastructure and logistics on the water. Specifically related to the harbour. Operational plan high water BRZO know that they are responsible themselves to adapt now. Not all BRZO companies were present at the meeting, but most companies that attended are aware now.	Connection DD SA Water safety
3.	On the area of water safety informing companies is an important role ZSP plays. For when high water levels occur a safety plan has been made. When the water reaches 2.70 a first warning is given to the companies. Then between 3.30 meter and 3.70 meters evacuation warning are given. Around 4.20 evacuation will take place and safeguarding.	Policy or protocol for water safety policy?
4.	A process is initiated in which spatial adaptation meetings are held to raise awareness to all harbour related companies and specifically to BRZO companies. Moreover an operational safety plan is developed. This plan will be improved in the coming years. It provides information related to flood risks, and other climate related events. Moreover other stakeholders contribute information to give meaning to the advice included in the safety plan.	Projects related to SA water safety & priority?
5.	Buitenhaven, since this location is located low and is directly located at the sea. Moreover the BRZO company located here has already more or less unconsciously implemented adaptation methods. Examples of this are that in the office the ground floor is not used, but the first floor is. Moreover a wall is built around the tank storage to keep the product in. This also keeps water out for a limited amount of time. Moreover the Kanaalzone also knows some vulnerable locations, but it is not known how water safety can impact the companies since not everything can be predicted. Moreover slam dams will now be used in the Buitenhaven. These are plastic barriers can be placed over vital objects such as a transformer house or electricity boxes. Also there will be regular training with the slam dams in order to know what to do when a calamity related to flooding will occur.	Vulnerability of BRZO companies

6.	Most companies are still not involved. The companies present at the meeting related to enlarging awareness on spatial adaptation are aware now of the implications and their personal responsibility.	Importance involving late adopters
7.	Dow is a frontrunner, moreover Hein does not now which other companies are front runners or late adopters since ZSP has now insight in the safety plans. The only stakeholders that have access are the RUD and the Province since these parties have authorised supervision.	BRZO companies front runners or late adopters?
8.	BRZO companies have to write a risk paragraph in their safety plans. Because of writing this risk paragraph companies will be more aware of the flood risks on their specific locations. Also the implications and results are clearer to these companies. Hein does not know which companies have or have not written this risk paragraph already. The reason for this is that ZSP has not the authorised supervision. Therefor only the Province and the RUD have the rights to have insights in these safety plans. It is seen as something strange that the harbour company does not have access to these safety plans.	Role BRZO companies related to risk paragraph
9.	Is watching this from a distance, Province has authorised supervision, RUD is executing. Province can make legislation and set conditions together with the RUD. On this moment there is not really a relation between the joint government and BRZO companies. Currently policies are made by government and followed up by (BRZO) companies. This is typically a top-down in the joint government relation with BRZO companies related to safety. Although the first phase of the process has been initiated to improve the cooperation between these parties and make it a lasting cooperation. Although during the interview Hein stated that this is hard within the company's management process because of international ownership and decision making. Moreover companies that were at the meeting stated that they rather have the government making clear policies related to water safety and spatial adaptation. There are two main reasons for this 1. To have clear legislation, so companies know what to do and how to act accordingly to these laws set. 2. Companies will be more inclined to take adaptation measures. Since most of these companies are internationally organized it would be more effective that there is only direct communication based on the parties providing "resources" (joint government) to its "customers" (BRZO companies).	Responsibilities province, RUD and joint government
10.	Zeeland Seaports, the Veiligheidsregio and BRZO companies thought about this subject during the meeting. It was concluded that companies find it most effective policies are developed by authorised supervision. Also during this meeting the spatial adaptation plan of the harbour of Rotterdam/Botlek was used as example. This document showed how the same topic in Zeeland can be approached. Based on this and as outcome of the first meeting a practical guidance document will be written in order to find an approach to handle the current situation. It will be important to take into account the chain actions of harbour infrastructures. Since different companies are connected with products and services, it will also be essential to have open communication between these companies, joint government but also internationally and with other harbour areas in the Netherlands. As an instrument Zeeland Seaports can make use of the havenbeheersverordening, with this they can lead ships or vehicles out of the port when necessary. This can happen when safety cannot be guaranteed. Like stated earlier developing a clear framework on how to act and approach spatial adaptation. And developing clear policies which companies can follow-up.	Strategies and instruments to use for facilitation of BRZO companies

- Welke barriers ervaren BRZO bedrijven en in welke hebben zij de behoefte om gefaciliteerd te worden?

Reconignized limitations to mainstreaming	Intrepretation of present limitations
Capaciteit gerelateerde beperkingen - Tekort financiële middelen - Tekort personeel capaciteit	Both limitations can be recognized. Hein stated that in most situations companies and organization are complaining that they have a shortage of means and

	personal. Although when looking at the long term costs made will earn themselves back so this can never be an excuse. Thus these limitation cannot be recognized.
Cognitieve gerelateerde beperkingen - Gebrek aan kennis kwetsbare locaties (vitale infrastructuur) - Gebrek bruikbare klimaatscenario's op lokale schaal - Gebrek kennis potentiele adaptatie methodes - Onzekerheid klimaat gerelateerde effecten (op lokaal niveau) - Onzekerheid	Currently stakeholder's thus joint government and BRZO companies are working to remove these limitations. Specifically there is still a shortage of all these limitations. On larger scale all information on all of these subjects is known. On local scale this is still missing.
Sociale en Culturele beperkingen - Gebrek aan lokale ondersteuning (tijdens inpassing) - Gebrek aan probleem herkenning binnen de organisatie - Gebrek aan effectieve instrumenten.	1. According to Hein there is sufficient local support also for realising spatial adaptation. 2. There is also no shortage of problem recognition in the different organizations. Most of them are aware. There are BRZO companies that see climate change as an acute problem to which should be acted immediately. 3. The joint government have sufficient effective instruments. It was mentioned that these instruments are divided unequally. The organizations with authorized supervision such as the Province, RUD and in a limited way the municipalities have spatial instruments that can set rules for organizations to which they should act upon. In these policies a certain building height and requirements for protection measures could be drafted.
Politieke en institutionele beperkingen - Gebrek aan politieke steun/interesse - Gebrek aan stimulatie voor ruimtelijke adaptatie (top down) - Gebrek aan samenwerking binnen en tussen gemeentes en overheden - Gebrek aan helderheid over verantwoordelijkheid ruimtelijke adaptatie - Aankondiging op korte termijn ten aanzien van beleidsonderwerpen.	1. Political support on different levels should spatial adaptation of BRZO companies on the agenda. Especially on local level this is currently very limited. 2, 3 For stimulation and cooperation a process is initiated that when advanced further stimulation and cooperation can be derived from. 4, Clarity has been provided by the meeting held. By clear policies in the future this can be further improved. 5. Is not a limitation.
Technologische beperkingen - Potentieel weinig adaptatie mogelijkheden.	1. Is not a limitations since most adaptation possibilities are known and much information is available.

Interview water board Scheldestromen
Datum: 13-06-2017 Naam: M. Schipper Onderzoek mainstreaming RA Provincie Zeeland

Respondents: M. Schipper	**Preferred situation: [Dutch transcript]**	**Keywords:**
1.	Advisor environmental policies & water management	Function
2.	Zeeland Seaports focusses on Management, spatial business, everything connected with space, water, infrastructure and logistics on the water. Specifically related to the harbour.	Connection DD SA Water safety

	Operational plan high water BRZO know that they are responsible themselves to adapt now. Not all BRZO companies were present at the meeting, but most companies that attended are aware now.	
3.	Chairman "regio overleg waterveiligheid & Ruimtelijke adaptatie" Together with the Province leader in the process of spatial adaptation and water safety. Translating spatial adaptation to local context for municipalities and other local stakeholders to act. The water board has more the focus on guaranteeing water quality and that sufficient storage is present. Together with SAS and wastewater chain they are responsible that water is purified. This also related to the different BRZO companies.	Connection DD SA water safety
4.	Currently in the Water board there is worked to improving the crisis organisation and safety plans related to floodings, but also water quality events. First this was more ad-hoc now it is changed into a more professional approach and plan.	Projects related to SA water safety & priority?
5.	There is a certain protocol for overall safety measures. For example within safety there is worked together with multiple parties. One of these parties is the Veiligheidsregio. Related to BRZO companies' safety related to calamities is always priority. Next to this is guaranteeing environmental quality.	Policy and protocol water safety BRZO companies
6.	Scheldestromen makes use of the theory to facilitate and offer the knowledge on how to adapt to the front running parties. The late adopters should become motivated by the front runners and therefore be motivated to take adaptation measures by themselves. Moreover when it comes to (BRZO) companies (outer diked) these are mostly late adopters. It will be the task of the current coalition of SA, to provide sufficient information to these companies to point out their personal responsibility. Moreover when it concerns (BRZO) companies' located inner diked the Water board should be more facilitative. This is shaped by trying to capture win-win opportunities during redevelopment of an area.	Importance involving late adopters
7.	Currently the Buitenhaven, is the most vulnerable area, after that the Sloehaven. In Maurits opinion these areas are most vulnerable related to their location outer diked. Moreover it will be important that sufficient information is provided in the outer diked areas that they are responsible on reducing risk by taking measures themselves.	Area most vulnerable water safety
8.	It does not play a role in helping or facilitating companies by doing this. According to Maurits it could help when a different climate stress test for outer diked harbour areas could be developed. This could display how vulnerable these outer diked companies are and what they themselves can do to adapt to risks. Moreover it can show potential adaptation methods for the future that be built as a form of win-win opportunity during redevelopment.	Role water board companies related to risk paragraph
9.	In Zeeland, Scheldestromen also plays a role related to the RUD. From the water board an additional supervisor is appointed responsible for monitoring Water board related tasks such as water management, water quality related to sewerage and to improve cooperation and communication between the RUD and the Water board.	Responsibility provenance and RUD to facilitation
10.	The most ideal role that should be played is moving from a top-down regulating government to a informing and facilitating government. By facilitating mostly by information provisioning etc.	Roles of joint government
11.	Leading and facilitating together with the Water board.	Responsibilities province, RUD and joint government
12.	The Province should not interfere too much with companies and municipalities in order to stimulate spatial adaptation. Strategies should mainly exist of finding effective ways to improve information provisioning. Companies should be informed about responsibility. When responsibility is clearly known and parties are front runners advice specifically on location can be given and also on how to combine this with redevelopment or new location opportunities.	Strategies and instruments to use for facilitation of BRZO companies

Interview Province Zeeland
Datum: 30-06-2017 Naam: F.H. Schumacher Onderzoek mainstreaming RA Provincie Zeeland

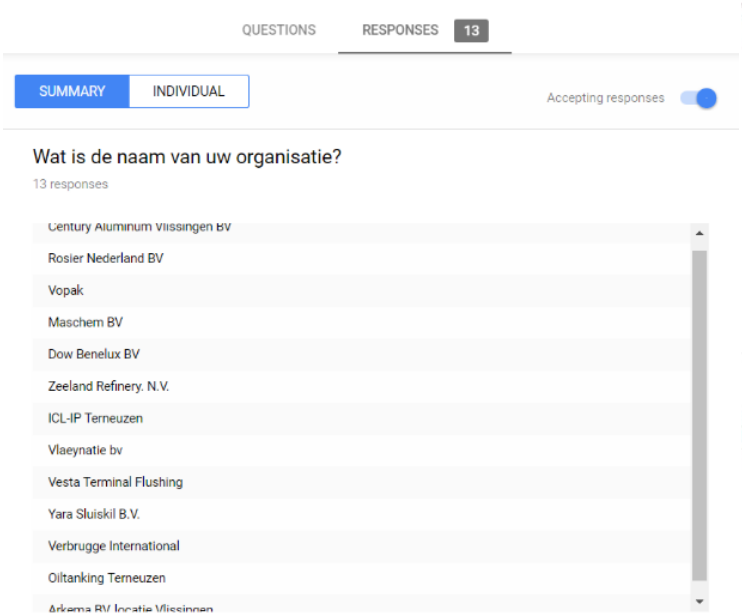
Respondents: F.H. Schumacher	**Preferred situation: [Dutch transcript]**	**Keywords:**
1.	Beleidsspecialist waterveiligheid	Function
2.	His function is policy specialist water safety at the Province of Zeeland. He is working in different projects and processes related to spatial adaptation, water safety, climate change and space. With the specific focus on leading these processes and projects. Furthermore his tasks are focussing on formulating provincial policies.	Connection DD SA Water safety
3.	Different projects: FRAMES, Vital and Vulnerable, heat stress, etc. The project FRAMES and Vital and Vulnerable are projects that fall under the umbrella Spatial Adaptation. The topics of these projects are related to BRZO companies. In a sense that the project FRAMES is focussing on functions the harbour area can fulfil as an evacuation location when a casualty would occur. Furthermore FRAMES and Vital and Vulnerable are focussing on the importance of infrastructure related to topics of climate change and spatial adaptation. With the goal of safe spatial planning of these vital objects in the future. Another example of "vital" is companies with a BRZO function therefor it has a high relevance.	Projects related to SA water safety & priority?
5.	According to the Province the RUD is responsible in supervising and keeping the norms of the different BRZO companies related to the laws Since 1-1-2016 the Province is authorized supervision to facilitate BRZO companies. First the municipalities had authorized supervision of these companies. Erik does not know what it means and what the tasks are now that the Province has authorized authority. Erik does not know who is officially responsible for what factors related to water safety of BRZO companies. He knows that the Province has certain tasks and the RUD. Although it is somewhat vague where the responsibility of the RUD & Province begins and ends.	Policy and protocol water safety BRZO companies
6.	Discussing research questions, Erik says that he thinks that it is important to research what the Province can do to improve facilitation of BRZO companies but also the joint government. Furthermore he says he likes the focus on BRZO companies since it is an actual topic. The Province together with other governments is responsible for facilitating stakeholders, in order that they adopt to SA.	Importance involving late adopters
7.	Outer diked has a larger chance for flooding and a smaller risk. Inner diked has a small chance of flooding but a high impact.	Area most vulnerable water safety
8.	In the European document on safety "Seveso III," Erik shows me: this is written down: In artikel 13 van het RRZO is bepaald dat de beschrijving van externe en natuurlijke oorzaken, in ieder geval: een schatting van de kans en de omvang van de effecten van een mogelijke overstroming; een schatting van de kans en de omvang van de effecten van een mogelijke aardbeving; een opsomming en een onderbouwing van de maatregelen die zijn genomen om de risico's van zware ongevallen te beperken, bevat. Around the start of 2016 it became obligatory that a flood risk paragraph is written in the in the safety plan of BRZO companies.	Role water board companies related to risk paragraph

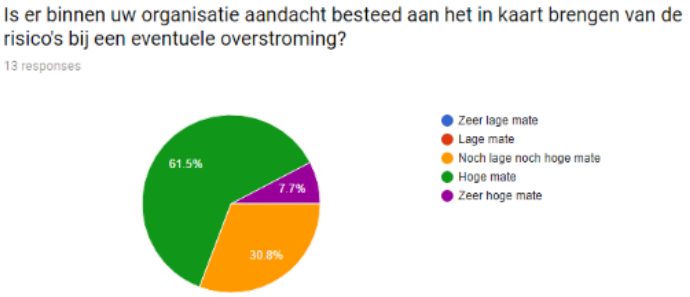
9.	- According to the Province the RUD is responsible in supervising and keeping the norms of the different BRZO companies related to the laws - Since 1-1-2016 the Province is authorized supervision to facilitate BRZO companies. First the municipalities had authorized supervision of these companies. Erik does not know what it means and what the tasks are now that the Province has authorized authority. - Erik does not know who is officially responsible for what factors related to water safety of BRZO companies. He knows that the Province has certain tasks and the RUD. Although it is somewhat vague where the responsibility of the RUD & Province begins and ends.	Responsibility provenance and RUD to facilitation
10.	Currently it is A with some elements of C. In the future the Province hopes for more C since this will become necessary to let adaptation take place. Informeren, kennis genereren en faciliteren – bedrijven aan zet – later bijsturen Number 3 is the most preferred and realistic. First a regional adaptations strategy should be set-up including a vision on different topics. BRZO companies and water safety should become one of the topics. One large session should be organized with all BRZO companies.	Strategy which is realistic and preferred by Province
11.	- Tekort personeel capaciteit - Gebrek bruikbare klimaatscenario's op lokale schaal - Onzekerheid klimaat gerelateerde effecten (op lokaal niveau) - Gebrek aan politieke steun/interesse - Gebrek aan stimulatie voor ruimtelijke adaptatie (top down) - Gebrek aan helderheid over verantwoordelijkheid ruimtelijke adaptatie	Barriers according to province
12.	The Province should be the initiator together with Scheldestromen. Other parties should use their expertise to give advice. Advice should be about roles, facilitation, etc. After this it companies should be open to invite the Province and other parties from the process group. After this companies should take the initiative themselves for adaptation. To finalize the approach companies and joint government should sit around the table for a final reflection.	Influence of semi-governmental stakeholders on strategies

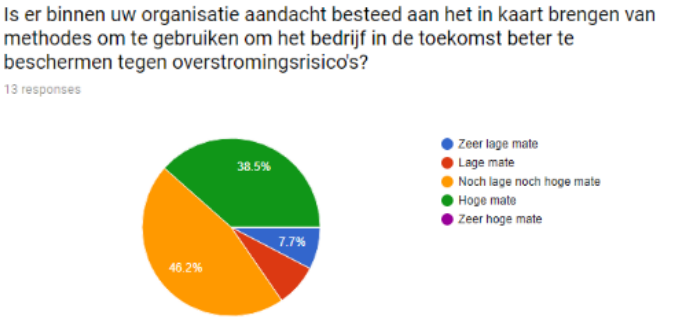
9.13 survey summary

Since companies preferred that individual results of the survey were not shared only the summery will be available. The summery contains the same results as the individual results only these are portrayed in a more anonymous way. For the summery of the survey see the link displayed below:

https://docs.google.com/forms/d/1-k8F4i_4GiffjdP5fdtw3UH5BqKhqOxXJZI_hVzt4sQ/viewanalytics

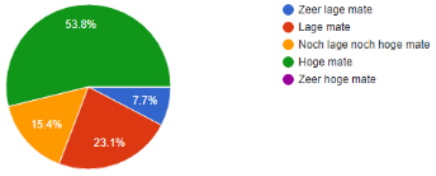






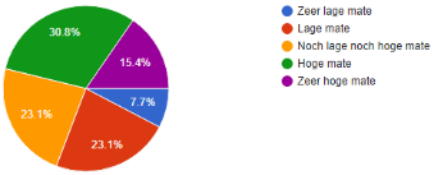
Is er binnen uw organisatie genoeg kennis om klimaatadaptatiemaatregelen te realiseren?

13 responses



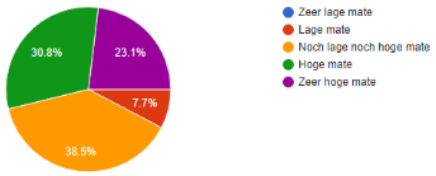
In welke mate ziet u keteneffecten tijdens een overstroming als gevaar voor het functioneren van uw organisatie?

13 responses



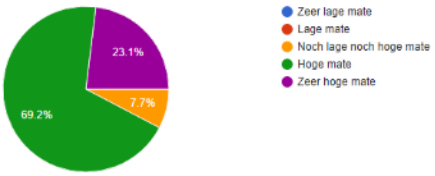
Is er binnen uw organisatie aandacht besteed om de gevolgen van een eventuele overstroming in het calamiteitenplan uit te schrijven?

13 responses



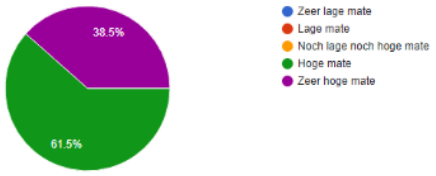
In welke mate zou uw organisatie actie ondernemen wanneer blijkt dat toekomstige overstromings risico's de bedrijfsvoering bedreigen?

13 responses



In welke mate is er draagvlak binnen de organisatie om maatregelen te nemen wanneer veiligheidsnormen gerelateerd aan waterveiligheid worden overschreden?

13 responses



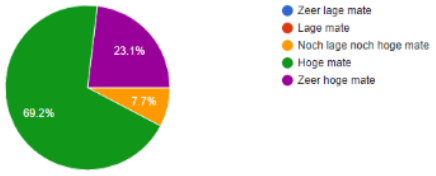
Hoe kijkt uw organisatie aan tegen de rol van de gemeenten in dit proces? en wat zouden zij voor uw organisatie kunnen betekenen?

13 responses

Onze organisatie heeft weinig direct met de gemeente te maken in het kader van "water veiligheid". Alles loopt via RUD of RWS
Gemeenten kunnen hier wellicht via de Veiligheidsregio input leveren, zodat er binnen de gemeenten een gezamelijke visie wordt geventileerd via één kanaal.
Kleine rol, deze ligt eerder op provincie niveau (BRZO)
Maschem BV bevindt zich op het I-park van DOW welk sterj=k betrokken is met de gemeente Terneuzen
idem als richting een Provincie.
Advies en voorlichting
-
We mogen niet in "hokjes" blijven denken bij zulk een problematiek, daarom is het van belang dat gans onze overheid, met gans hun "expertisecellen" het nodige advies en ondersteuning aanbieden aan alle bedrijven die hiermee te maken hebben.
onbekend
Nauwelijks een rol. Bij overstroming van de region zullen de ambtenaren van de gemeent zelf ook prive
Kleine rol, input leveren aan en via andere partijen zoals Provincie. Wij zouden graag via 1 partij alle informatie ontvangen.
Geen rol
Geen rol voor de gemeenten. Leg de verantwoordelijkheid bij één organisatie op preovinciaal niveau

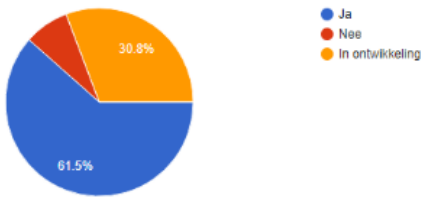
In welke mate is er duidelijkheid over wie er verantwoordelijk is voor het nemen van klimaat gerelateerde adaptatie maatregelen met de focus op waterveiligheid van de organisatie?

13 responses



In de nieuwe SEVESO III wetgeving zijn BRZO bedrijven verplicht gesteld om overstroming scenario's in kaart te brengen, en hoogwaterplannen op te stellen. Heeft uw organisatie dit al gedaan?

13 responses



Hoe kijkt uw organisatie aan tegen de rol van de Provincie/RUD in dit proces? en wat zouden zij voor uw organisatie kunnen betekenen?

13 responses

- Een controlerende rol als het gaat om het nemen van maatregelen zodat het bedrijf voorbereid is op een overstroming. Verder een adviserende rol in relatie tot mogelijke maatregelen die genomen kunnen worden maar niet redelijkerwijs noodzakelijk zijn.
- Ik verwacht van de RUD dat de bedrijven, welke daadwerkelijk te maken hebben met deze problematiek, hiervan op de hoogte worden gebracht.
- Tijdig informeren over ontwikkelingen + nemen van algemene maatregelen ter bescherming overall industriegebied
- Als BRZO bedrijf werkt Maschem BV al nauw samen met de RUD
- Als bedrijf kijk je naar de maatregelen die een overheid neemt, zeker wanneer een bedrijf achter de Westerschelde dijk is gelegen. Bedrijf is lager gelegen dan peil Westerschelde hetgeen het lastig maakt om als bedrijf (zeker bestaande bouw) maatregelen te nemen om gevolgen van overstromingen te voorkomen.
- Advies en voorlichting
- Informeren over feiten t.a.v. risico's / waterstanden
- In eerste instantie zou er voorafgaandelijk een overlegronde dienen plaats te vinden wat de consequenties zijn van zulk een klimaatverandering en welke impact dit heeft op onze bedrijfsvoering als BRZO bedrijf.
- Adviserende en informerende rol
- Nauwelijks een rol. Bij overstroming van de region zullen de ambtenaren van de Provincie / RUD zelf ook prive problemen hebben
- De RUD handhaven en de Provincie Informeren en Stimuleren.
- Provincie/RUD zouden het overstromingsrisico in kaart moeten brengen, zodat alle bedrijven in de omgeving hetzelfde risico kennen.
- Het opstellen en coördineren van generieke en bedrijfsgrensoverstijgende maatregelen

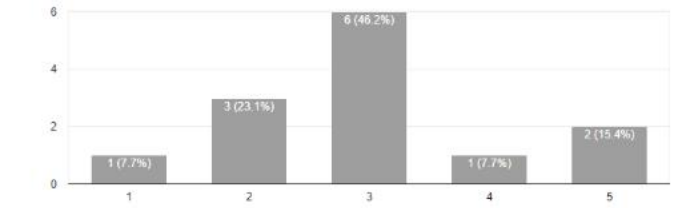
Hoe kijkt uw organisatie aan tegen de rollen van Zeeland Seaports, Veiligheidsregio, en Waterschap aan in dit proces en wat zouden zij voor uw organisatie kunnen betekenen?

13 responses

- Zeeland Seaports is in ons geval eigenaar van de grond. Deze organisatie zou maatregelen kunnen nemen/initiëren om overstromingsrisico's voor ons te verlagen.
  Veiligheidsregio een controlerende rol als het gaat om het nemen van maatregelen zodat het bedrijf voorbereid is op een overstroming. Verder een adviserende rol in relatie tot mogelijke maatregelen die genomen kunnen worden maar niet redelijkerwijs noodzakelijk zijn.
  Waterschap zou maatregelen kunnen nemen door extra opslagcapaciteit voor water te realiseren in geval van kans op overstroming
- Ik ga er vanuit dat deze gezamelijk optrekken wat deze problematiek betreft.
- Hoofdrolspelers in het geheel, kartrekkers voor overleg.
- Gezien we op DOW zitten en ons afval water niet naar het waterschap gaat maar alles via de biox van Dow loopt hebben we weinig contact met het waterschap.
  Alles gaat dus via Dow.
- Goede communicatie naar bedrijven, maar ook realisme betreffende het feit dat bestaande bedrijven soms moeilijk maatregelen tegen het voorkomen van overstromingen kunnen nemen.
- Advies en voorlichting
- Informeren over feiten t.a.v. risico's / waterstanden

Hoe beoordeeld u de samenwerking met de Provincie en de RUD met betrekking tot de onderwerpen waterveiligheid/klimaatadaptatie?

13 responses



Wat zou er verbeterd kunnen worden binnen de samenwerking in de samenwerking met Provincie Zeeland/RUD?

11 responses

- Ik had wat moeite met de beantwoording van de vorige vraag. De contacten over deze materie zijn tot nu toe zeer beperkt geweest.
  Wat beter zou kunnen is het aangeven van wat zij verwachten van de bedrijven.
- Ik heb hier geen duidelijk beeld van
- Samenwerking is nu met VRZ en Zeeland Seaports - weet niet of RUD daar een actieve rol in moet hebben, als de partners (VRZ in het bijzonder) hier al in betrokken zijn. Minimaal deelnemen aan de overleggen.
  Wel een rol vanuit BRZO wetgeving.
- is prima
- Goede communicatie en wat is de visie. Wat wordt beschermt
- Is prima nu
- Er komt niet veel informatie. Bal wordt bij bedrijven gelegd.
- Communicatie tussen beide geledingen.
- Samenwerking met Provincie Zeeland/RUD is in principe goed, maar het onderwerp waterveiligheid/klimaatadaptie staat momenteel niet echt op de rol
- Is prima zoals het is

Weet u op wat voor hoogte boven n.a.p. uw organisatie is gelegen? Zo ja op welke hoogte?

13 responses

- 5 meter boven n.a.p.
- Ons bedrijf is gelegen aan het kanaal van Gent-Terneuzen. Ons berijf ligt onder het KP van dit kanaal.
- Ja, zie veiligheidsrapport (zou ik op moeten zoeken)
- Idem Dow Ipark
- +1 a +1,9
- 2.5 m
- Nee
- Ja, 4,95 meter
- ca 4,5 m +NAP
- Gemiddeld rond 2.75+NAP
- 5.3 meter boven nap
- Weet ik niet

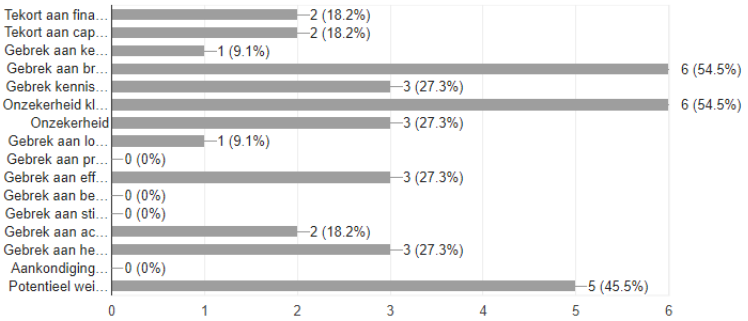
Hoeveel centimeter boven het maaiveld zou binnen uw bedrijf een gevaar op kunnen leveren?

13 responses

- Bij storm gaan we er vanuit dat we dat enige tijd van tevoren weten. Dan kunnen we onze processen stoppen. Kritische onderdelen bevinden zich dan 1 m boven maaiveld
- Onze substations liggen onder het KP van het kanaal.
- Zie veiligheidsrapport (zou ik op moeten zoeken). Er is gekeken naar vitale onderdelen, zoals stroomvoorziening, compressoren etc.
- Idem Dow Ipark
- 30-50 cm vanwege elektriciteitsuitval.
- 1
- Niet bekend
- ??
- niet vastgesteld
- Overtromingsscenario gaat uit van 80 cm water boven het maaiveld als voorstelbaar zwaarste scenario
- Onbekend

Welke van de onderstaande factoren spelen vanuit uw perspectief een belemmerende rol om bedrijfsmatige aanpassingen te verrichten om de organisatie beter te beschermen tegen de effecten van klimaatsverandering?

11 responses



Heeft u nog verdere opmerkingen?

7 responses

Er is begin dit jaar een eerste overleg geweest vanuit ZSP (met VRZ aangeschoven), dit was erg goed.
Probleem voor maatregelen is dat er een grote mate van onzekerheid zit in wat er nu werkelijk gaat gebeuren en de noodzaak voor de korte termijn is er daarom nog niet om maatregelen te nemen.
Zeker in tijden van aandacht voor reductie van kosten is het niet logisch om nu te investeren in zaken die nog niet duidelijk zijn.

Succes met het afronden van je opleiding.

In de policy van MaschemBV en de Musim Mas groep is duurzaamheid steeds een van de topprioriteiten. We zijn dan ook een RSPO gecertificeerd bedrijf.

PGS-6 verplicht bedrijven niet om overstromingscenario's te hebben. Bedrijven moeten een analyse hebben uitgevoerd, is anders dan een scenario.
Betreffende de laatste vraag: Bestaande constructies/installaties zijn is lastig.

nee

Neen

nvt

Nee

9.14 Meeting notes

Date & title:	**05-09-2016 Start overleg hittestress**
Present:	*Maurits Schipper, waterschap Scheldestromen - Cor Jacobs, Alterra - Arjen Koekoek, St. CAS - Caroline Jonkers, gem. Middelburg - Bas Kole, gem. Middelburg, Marloes van Tilburg, provincie - Arnold Bergstra, GGD – Leo Caljouw Provincie – Glenny Davidse stagiair Provincie*
Introduction:	- *In Zeeland is gekozen voor een gezamenlijke aanpak van het Deltaprogramma Ruimtelijke Adaptatie => door bestuurders is ingestemd met een startnotitie met actieprogramma* - *Als 1e stap vindt in alle Zeeuwse gemeenten een klimaattest plaats, waarbij kwetsbaarheden op gebied van overstromingsrisico, wateroverlast, droogte, hitte en crisisbeheersing zichtbaar worden gemaakt* - *Voor de meeste klimaataspecten is in de regio voldoende informatie voorhanden, m.u.v. hitte* - *De Provincie en het Waterschap werken samen als leiders en trekkers in het proces van RA.* - *Keuze tot het* ontwikkelen regionaal instrument hittestress *-> 2 doelen: 1. Effecten van een hittegolf zicht maken via klimaat effect atlas* en 2. droogte schade voor de landbouw *voorspellen. In stedelijk gebied de effecten op gezondheid bepalen.* - *Via een meetprogramma wordt gekeken of datgene dat het model voorspelt in de praktijk wordt aangetroffen. Verder wordt er onderzoek gedaan naar het land-zee effect.*
CAS/Alterra:	- Oversterfte: elke graad temperatuurstijging boven 16 graden Celsius => Circa 30 doden per dag door hitte stress; geen “early harvest” - Bijdrage warmte UHE door zeearmen? => *KLOPT DAT? Urban Heat Island effect ontstaat alleen in steden* - Bij hittegolf kan arbeidsproductiviteit met 50% dalen. - Model maakt gebruik van LGN -> Land gebruik kaart Nederland - Bas -> we werken aan BGY, maar dat systeem wordt geleidelijk gevuld. => *zou ik maar weglaten, want dit gebruiken we toch niet* - Visualisatie op wijkniveau! Er moeten keuzen gemaakt worden uit klimaatscenario´s - Voor de visualisatie van de informatie is het jaartal 2050 gekozen.
GGD:	- Epidemiologische relatie tussen nacht temperatuur en sterfte? Zit in atlas van GGD-> per gemeente - Arnold Bergstra -> gaat na of de informatie beschikbaar is, en op welk detailniveau - Bas Kole -> doet dat ook bij de gemeente (Gemeenten geven informatie over sterfgevallen door aan het CBS) - Klimaat effectatlas is over te zetten naar GEOWEB. - Provincie/Waterschap levert aan: Gedetailleerde grondwater standen -> Dino. Arjen kijkt na *of hij toegang heeft tot dit bestand.* - Bodemkaart GEOWEB & Zeeuwsbodemvenster *=> Arjen vergelijkt deze info met de bodemkaart waarover CAS beschikt*
Scenario:	- *Uitgangssituatie*: gebruik informatie op basis van de laatste 10 zomers. - Scenario’s voor 2050, er is gekozen om uit te gaan van de W+ scenario. Want de metingen tot nu toe passen binnen dit scenario.
Measuring program:	Hoe wordt de locatie *voor de meetstations* bepaald? - Kust effect, *locaties van het meetinstrument op korte en op ruime afstand tot de zee => geeft info over verkoelende werking van de zee*. - Verschillende typen wijken -> *worden bepaald op basis van de* internationale validatie van stadswijken. - Voorkeursoptie - 2 wijken uitkiezen in Vlissingen, 2 wijken uitkiezen in Middelburg, 1 wijk in bijv. Arnemuiden - Cor/Arjan *voeren* modelstudie *uit* en zullen hulp vragen aan gemeenten voor definitieve keuze -> voor 5 oktober. - Onderhoud van de meetapparatuur -> veilige locatie (*vandalisme)* heeft de voorkeur. - 2017 is het jaar van de energie -> wellicht is er een bepaalde koppeling mogelijk. Afdeling WBN daarbij betrekken? - De meetperiode is 1 jaar. *Na 1 jaar is nieuw besluit nodig over voortzetten meetprogramma.*

Appointments & communication:	- Communicatie en bewustwording speelt een grote rol naar de samenleving toe. *Hierover worden komende maand afspraken gemaakt met communicatiespecialisten van regionale overheden* -> Overleg verslag aan Cor en Arjen - Water temperatuur -> heeft RWS data van metingen? De focus ligt vooral op Zee en de grote wateren. - Vergunning voor de meetapparatuur nodig? Bas zoekt dit uit. - Links naar de filmpjes van Arjen over opwarming van de aarde: http://climate.nasa.gov/climate_resources/139/ http://www.climate-lab-book.ac.uk/2016/spiralling-global-temperatures/ - Leo neemt contact op met de gemeente Vlissingen - Intern bij de Provincie word er gekeken welke data beschikbaar is en verzameld wordt.

Meeting notes II – topic list

Date & title:	**04-10-2016 Informative process meeting heat stress**
Present:	An informative meeting as final preparation before the stress test of Noord-Beveland was held. The following stakeholders were present: *Municipality of Vlissingen, Maurits Schipper, Martijn van Kalmthout - Scheldestromen, Leo Caljouw. Province of Zeeland, Tom Vermin - Municipality Noord-Beveland Erik Leemrijze - Municipality Tholen, Bas Kole – Municipality Middelburg, Marcel Matthijsse - Veiligheidsregio Zeeland, Leendert van der Maas - Rijkswaterstaat*
Introduction:	During the meeting the stress test of Noord-Beveland was prepared and the background of Spatial Adaptation was discussed. Furthermore the process and approach of heat stress was discussed since it is a relatively new topic. Roles of stakeholders, stakeholder relations and perspectives to each other in this process were discussed more in-depth. Furthermore it was discussed what information they would be able to share.
Role of Province of Zeeland:	- Responsible for policy direction and steering functions. Also provides regional information and data sets. - Main practical and policy coordination.
Role of Rijkswaterstaat:	- Practical execution and coordination of national and regional water safety measures. - Umbrella coordination (keeping informed). - RWS has access to information helpful for develop of the calculation model. It mainly concerns information of category 2, such as water temperature, wind speeds and possibly atmospheric humidity.
Role Vereniging Zeeuwse Gemeenten:	- Representing regional municipalities. - Input from the standpoints of municipalities. Municipalities personally do have the main role to assess municipalities to undertake action on spatial adaptation. (Together with the technical input from the water board). - Municipalities are aware of the obligations of spatial adaptation and that they are responsible for practical execution on local level.
Role Veiligheidsregio:	- Responsible for vital infrastructure, crisis communication. - Responsible physical/vital infrastructure. Advising role towards other parties. - Is not involved in the first phase concerning heat stress. Largely interested in the outcomes of measurements.
Role Scheldestromen:	- Responsible for local technical water related functions. And enabling its functioning. - Practical execution of stress test and spatial adaptation methods (together with municipalities). - Active cooperation, the Province is depended on information the water board supplies. This can be in the form of GIS maps, knowledge exchange or the water board's communication with municipalities.

Role Alterra, CAS:	- Responsible for developing, attaching and monitoring the measurement tool. - Making maps and showing the effects of heat stress on local level in Zeeland.
Role HZ:	- Cooperating and being in the process as a knowledge partner, with the goal of extra knowledge development. Especially with the focus on integrated knowledge development in relation with SA. - Lobbying for research projects, with financial goal. - Satisfying integrated importances and institute goals by increasing cooperation with regional stakeholders.
Role GGD:	- Obligation to protect the health of citizens, by informing them. - Researching to which extend heat stress is an actual problem. (Researching death of citizens in relation to heat waves by making use figures from their database. - Involving expertise related to outcomes of CAS/Alterra research researching implications of effects of heat stress on local level to health of citizens. - Contributing information of category 3.
Appointments & communication:	- Afterwards roles of the parties involved in the process of heat stress were made clear.

Meeting notes III – topic list

Date & title:	**26-09-2016 Stress-test Noord-Beveland 26-09-2016**
Present:	*Municipality of Vlissingen, Maurits Schipper, Wouter Quist, Martijn van Kalmthout - Scheldestromen, Manon Holster, Walter Jonkers, Leo Caljouw -Province of Zeeland, Tom Vermin - Municipality Noord-Beveland, Erik Leemrijze - Municipality Tholen, Bas Kole – Municipality Middelburg, Marcel Matthijsse - Veiligheidsregio Zeeland, Leendert van der Maas – Rijkswaterstaat, Dick Fundther – Hogeschool Zeeland, Arnold Bergstra – GGD, Patrice Troost- VRZ.*
Introduction:	- A day was planned to have a stress test with the focus on spatial adaptation. During the day there were 4 different workshops. The workshop I attended was to discuss the topic of heat stress with policy makers. Effects and adaptation methods to heat stress were discussed. Moreover the roles of stakeholder factors of importance to make process enhancements were discussed.
Effects, impacts and possible adaptations methods of heat stress:	- Finding a balance between wet and dry. - IT riolen kunnen de verkeerde kant op werken. - Waterlevering in droge periode genoeg capaciteit + kwaliteit? - Oppervlakte water is geen oplossing voor hittestress.
Responsibility:	- Rol facilitatie gemeente binnen visie - Verdichting verantwoordelijkheid naar gemeenten - Lokale aanpak + oplossingen - Haakse belangen natuur en landbouw lage grondwaterstand/hoge grondwaterstand - Op gemeentelijk niveau samenwerken met kennis van B.V. het waterschap en stakeholders zoals verschillende lokale bedrijven zoeken naar kansen en oplossingen. Biedt de bodem oplossingen? Of moeten er structureel oplossingen worden ontwikkelt? - Bedrijven en particulieren verantwoordelijk, maar belangen en oplossingen naar politiek en overheid doorgeschoven. - Oplossing -> faciliteren in mix van maatregelen + maatwerk leveren
Evaluation Workshop – heat stress – Agreed by all parties attending meeting	
Process factors:	Process enhancements:

Policy factors:	• Scheldestromen as direction proprietor should think about the reducing the political influence of the agricultural sector. • Securing role facilitation by municipalities within municipal vision. • Securing greening urban space in municipal vision. • Condensation responsibility to municipalities. • Concerning heat stress companies and citizens are responsible themselves to take action. Although the issues too often are passed through to government and politics to solve.
Knowledge factors:	• Make evacuation a more important part of the "willing" phase • Better mapping of "urban green" • Researching the effect of tourists and citizen ratio and possible effects of heat stress. • Awareness among employees and stakeholders can be increased. Since it is sometimes not recognized as priority by these actors.
Means:	• Clear appointments on who is responsible for costs.
Collaboration factors & conclusions:	• Evenly dividing people with similar expertise during workshops. • More stakeholders should be involved in the phase of "knowing" such as ZLTO, Recron, public transport parties, horticulturalists and representatives of elderly homes • More youth should be involved in process of "willing" to raise awareness and state wishes. • Raising awareness among citizens to join vision.

Meeting Notes IV – topic list

Date & title:	**29-09-2016 Evaluation Workshop Heat stress**
Present:	The following stakeholders were present: *Municipality of Vlissingen, Maurits Schipper, Martijn van Kalmthout - Scheldestromen, Leo Caljouw. Province of Zeeland, Tom Vermin - Municipality Noord-Beveland Erik Leemrijze - Municipality Tholen, Bas Kole – Municipality Middelburg, Marcel Matthijsse - Veiligheidsregio Zeeland, Leendert van der Maas - Rijkswaterstaat*
Introduction:	A meeting was held to reflect on the stress test Noord-Beveland. The meeting focussed on the four different workshops held. In this topic list only the conclusions concerning the topic of heat stress are written down.
Reflection of workshop.	- Goed dat de burgemeester gelegenheid had de groep welkom te heten, briefing vooraf wel relevant. Het project "klimaat adaptatie" leeft nog niet zo bij bestuurders. - Beetje spannend of alle kaarten op tijd zouden zijn, eerder gereed maken, voorkomt stress. - Jammer dat de dagvoorzitter te laat was, mist zo de kans om mensen de hand te schudden en welkom te heten en wat netwerkkansen en enthousiasmeren. - Inzet studenten was schot in de roos, luisterden goed, schreven flink, hadden goede opmerkingen. We trachten "hun" probleem op te lossen! Goed betrokken. - Duidelijker uitspreken dat de "oogst van de dag" (hoe ziet die er uit??) gebundeld aangeboden zal worden (door wie) aan de gemeente.
Preparation:	- Het vergaren van mailadressen was nog een hele toer - Mensen reageren niet op een verzoek zich aan te melden, lang onduidelijk of er meer dan 5 mensen kwamen. Lastig voor de catering en het slagen van de dag. - De groep was nu al best groot. De kans is aanwezig in geval van "het eiland Walcheren" de themagroepen een onbestuurbare omvang krijgen. Je moet dan wel met beamers en digitale kaarten gaan werken, met 30 man over een A0 plot hangen wordt wat lastig. - Zou een "aansprekende dagvoorzitter" niet meer lokken, een bestuurder voor strikken?
Evacuation:	Evacueren is een speciaal proces wat onderbelicht is. - Preventief evacueren? Vergt een bepaalde aanloop. - Evacueren in geval van een ramp, spontaan, leidt tot chaos. Evacuatie zal geheid erg traag en moeizaam verlopen. Hoe kunnen we inwoners voorbereiden op een redelijk

	"geordende evacuatie"? Bebording, gele kaart uitdelen, spotjes op TV, Smart Phone tools? - Moeten mensen een Noodrantsoen aanleggen hoog in huis? - Link met het Zeeuwse brede crisis beheersplan?
Conclusions and recommendations heat stress:	**Aanbevelingen specifiek voor hitte stres en droogte** Bewustwording is noodzakelijk, kans op slachtoffers is veel hoger dan bij overstromingen: het lijkt wel een geaccepteerd gegeven, "als het erg warm is sterven er meer mensen….." - De huidige generatie meer wijzen op de effecten van droogte en hitte stress. De jeugd ondergaat de uitwerking van onze keuzes, hun betrekken bij dit proces? - Groenvoorzieningen beter in beeld brengen, groen in steden en dorpen temperen het effect van hitte stress. - Meer grote bomen in steden en dorpen, bekend dat ze een goed effect hebben op het voorkomen van hitte stress. - Stoppen met verkoop van snippergroen! Ieder bosje heeft zijn bijdrage, zowel als open bodem om regenwater in te laten zakken als wel voor temperen van temperatuur door schaduw werking. Onze eigen grond betegelen we niet! - Verharden van tuinen en het wegnemen van groen zien te voorkomen. Beleid op afstemmen? Groene tuinbeheerders belonen om de tegelfanaten mee te krijgen? Opwarmende bestrating in de tuin zorgt voor meer hitte stress. De gevolg van snellere afstroming van geheel verharde tuinen niet oplossen, geen riool aanpassingen voor doen. De mensen zelf de gevolgen laten ondervinden. - Hitte bestendige beplanting zoeken, vaker kans op hitte stress, langere drogere periodes. - Geen vertegenwoordiging van bejaardencentra o.i.d. benaderd, gevoelige groep in geval van hitte stress en droogte. Wellicht hebben zijn scenario`s gereed liggen, is alles paraat en voorzien maar misschien is dat onderbelicht en liggen er synergie kansen. - Een "mooiweer-fonds" oprichten. De extra inkomsten van toeristenbelasting door een langere drogere zomer, parkeren om de gevolgen van verdroging en hitte stress mee te betalen. - De landbouwsector heeft steeds zwaardere machines, die vereisen een vastere ondergrond en dus lagere slootpeilen. De gevolgen van hitte stres en droogte voorkom je juist o.a. door sloten vol te laten staan. Het waterschap is daar regie houder in, echter opereert onder veel invloed van de landbouwsector. - Met een dynamische drainage systeem kan je water in je perceel beter vasthouden, een drainsysteem gaat iets van 30 jaar mee, tijd genoeg om alles tot 2050 aangepast te hebben. - Moeten er buffers aangelegd worden waarmee sloten gevuld kunnen worden? Verhard dak oppervlak genoeg, kwestie van goed inzetten. - De kans op paalrot is overal op Noord-Beveland aanwezig, maar door de grove kaarten was dit niet inzichtelijk. Per straat de leeftijd van de woningen aangeven?? Mogelijk op hout gefundeerde panden komen dan snel in beeld. Via BAG bestanden te achterhalen? - Gevolgen voor misoogsten zijn amper aan de orde gesteld. "Een keer een slecht jaar, kan gebeuren"… Dieper op inzomen? - Bodemdaling door zetting, als gevolg van dalende grondwaterstanden hoeft geen gevolgen te hebben voor ondergrondse infra. Gaat geleidelijk over een groot vlak. Zakt gewoon mee met de rest. - Er zou een kaart moeten komen waarin de diepte ligging van veenlagen in beeld komen. Zit veen diep, dan zal zetting door verlaging van het grondwater meevallen. Zit veen ondiep, dan zal zetting door verlaging van het grondwater reëel zijn, met alle gevolgen van dien. - Communicatie naar de burgers is volgens mij cruciaal om leed te voorkomen (adviezen over woning koel houden, voldoende drinken, hoe herkennen geval van droogte letsel, tuin niet sproeien, auto niet wassen, etc,etc), - Onze AOV-er was maar kort beschikbaar, een gemiste kans om vanuit de deskundigen in het veld knelpunten en aanbevelingen te horen.

Specific Recommendations Noord-Beveland	- De verhouding “vaste inwoners – toeristen” = 7.500 – 50.000 geeft een extra uitdaging, zeker bij droogte en hitte stres als het gemeentehuis op een 25 % bezetting draait vanwege vakanties….

Meeting notes V – topic list

Date & title:	**04-10-2016 Informative process meeting heat stress 04-10-2016**
Present:	Ferry Kramer, Gemeente Vlissingen – Leendert van der Maas, Rijkswaterstaat - *Leo Caljouw Provincie – Glenny Davidse stagiair Provincie*
Introduction:	Wat zijn de doelen van het proces rondom hittestress. En hoe worden deze de komende tijd benaderd en aangepakt. Welke data is er benodigd in het hittestress proces. Hoe pakken Alterra en CAS het aan? - De Provincie Zeeland presenteert samen met het waterschap de klimaattest Zeeland op het delta congres. - Montage meetapparatuur half tot eind november.
Comments municipality Vlissingen process involvement:	- Responsible for policy direction and steering functions. Also provides regional information and data sets. - Main practical and policy coordination. - Municipality of Vlissingen is open to the idea of cooperating and that a measuring instrument will be placed. - Municipality of Vlissingen sees it as an opportunity to be a front runner in the process of heat stress and is curious to the outcomes. - Ferry said that it would be a nice possibility that all municipalities contribute to developing the measuring tool. So that every municipality pays a couple hundred to 1000 euros.
Actions municipality Vlissingen:	- Zorgen voor overzicht overledenen uit het GBA.
Comments Rijkswaterstaat process involvement:	- Practical execution and coordination of national and regional water safety measures. - Umbrella coordination (keeping informed). - RWS has access to information helpful for develop of the calculation model. It mainly concerns information of category 2, such as water temperature, wind speeds and possibly atmospheric humidity. - RWS is executing projects on a higher level. Although it is not their main importance, RWS is very interested in the process.
Actions Rijkswaterstaat:	- Wat zijn de meetreeksen en eenheden van RWS data, voor Vlissingen en Middelburg. Specifiek met de focus op watertemperatuur, luchtvochtigheid, windsnelheid en zonnestraling. (Deze actie is al uitgevoerd).
Developing instrument heat stress and process involvement:	*Ontwikkeling instrument hittestress voor steden en dorpen in het landelijk gebied (Zeeland)* Hittestress is een klimaateffect waarover in Nederland nog relatief weinig bekend is. Onderzoek heeft zich vooral gericht op de (grote) steden. Vanuit Zeeland is een aanvraag ingediend voor een herijking van de huidige rekenregels voor hittestress, waarmee regio-specifieke omstandigheden kunnen worden meegenomen. - Province + Scheldestromen contribute money for calculation model - Finding funding for measuring after the first period has stopped. -> VZG, Province, Scheldestromen.

3.2.2 Organisation phase (1,5 month)

The organisation phase of a research project consists of a thorough problem analysis and it results in a detailed research plan. This research plan provides the basis for the whole research project. If it is not clear, too ambitious or not specific enough, problems will likely arise in the course of the research. The detailed research plan must include at least the following elements:

- The student's and the advisors' names, the breadth of the research (number of ECTS) and the starting and completion dates
- Project title, introduction, and short description of the problem area
- The goal, main research question and detailed research questions
- The theoretical and methodological approaches
- Specific research methods including a draft questionnaire in case of survey research and sources of information
- Planning schedule
- Names of third parties that will co-operate in the research or serve as contacts.
- The research plan will be presented in the research proposal colloquium.

In the case of an external research project, the scientific advisor will visit the organisation where the proposed research will be conducted within 1 to 1 1/2 months after the research plan has been submitted.

3.2.3 Implementation phase (2 months)

In the implementation phase, the problem to be researched is analysed and the results are interpreted. During this phase, the student meets on a regular base with the scientific advisor and at least once with the reader to discuss his or her progress. Maintaining regular contact with these advisors will stimulate the solving of problems and will ensure that the research project runs smoothly.

The student is required to e-mail to the advisor(s), at least one day before each meeting, a list of topics and relevant materials to be discussed. Interim reports must also be presented to the advisors. The advisors' comments are then incorporated in a subsequent draft or final report.

Any revised version of the report must be submitted together with the previous draft to give the advisors the opportunity to evaluate the student's progress.

Students wishing to complete a MSc thesis are required to attend at least four research/internship proposal colloquia and four final research/internship colloquia of other students in Management Studies, the dates and times of which are received from the Departments' secretary. The scientific advisor of the student who presents at the colloquium will verify the attending students' participation by signing their research record forms. The student acts as a co-referent in one of the four research/internship proposal colloquia and one of the four final research/internship colloquia. He/she has read the BSc, MSc or Academic internship proposal or the BSc, MSc or Academic internship final thesis and starts the discussion.

3.2.4 Completion phase (2 months + 1 month feedback, presentation etc.)

The completion phase consists of the reporting and evaluation of the research in a thesis in English with a preferred size up to 60 pages. The research project ends with a public colloquium presented by the student and an oral examination conducted by the scientific advisors and, in the case of an external research project, the company supervisor. The objective of the colloquium is to present the content and scientific results of the research. The colloquium should last no longer than 30 minutes, allowing 20 minutes for presentation and 10 minutes for

discussion. The research project culminates in a final report. In some cases, this can be in the form of an article for an international scientific journal. The final report should include the following chapters:

1 Abstract (maximum of 250 words that describes the research for the general public);
2 Management summary (one to two pages that describe the research objectives, the methods used, and the most important conclusions and recommendations);
3 Introduction (factors leading to the research, objective of the report and the time frame of the research), plus two or three keywords for bibliographic searches;
4 Description of relevant characteristics of the organisation in which the research was conducted (in the case of external research), based on e.g. an organogram, trade developments, turnover, number of employees etc.;
5 Problem analysis (detailed research of the problem and analysis of the problem-owners);
6 Research design (definition of the problem and research questions, and justification of the theoretical perspectives, applied research methods);
7 Theoretical framework;
8 Results (description and interpretation of the results using tables, graphs, etc.);
9 Discussion (critical analysis of the results, indication of risks related to the assumptions made, suggestions for further research);
10 Conclusions and recommendations for the management (answers to research questions);
11 Reference list;
12 Appendixes.

The title page of the report should present the project title, student's name, date, name of the Department of Management Studies, and the Wageningen University emblem. The following page should list the breadth of the research (in number of ECTS) and the advisors' names.

During the final oral examination, the scientific advisors and/or company supervisor evaluate the research and give the student a final mark. The student is responsible for planning the colloquium and the final oral examination. The final mark is based on (1) the scientific quality (theoretically and methodologically) of the final report, the degree of independence and creativity demonstrated by the student during the research project and the colloquium and defence of the thesis. The procedure for the completion phase is as follows:

- Every month there is a specific date for the MST research proposals and one for the final research colloquia. The student schedules the exact time for the colloquium and, in case of a final research colloquium, the oral examination with the secretary at least three weeks in advance. The student is responsible for ensuring that the research supervisors and external supervisor can be present on the selected date and time.
- At least one week before the colloquium and examination, the student submits to the secretary an electronic version of the MSc thesis and a separate summary of the thesis (no longer than one A4 page) to be placed on the MST-website. In addition three hardcopies of the thesis has to be given to the secretary for the supervisors.

The research project is finalised in a meeting with Prof. Dr S.W.F. Omta, the head of the Department of Management Studies, who approves the mark by signing the research record form. This is then submitted to the secretary of the department.