

UNIVERSITEIT LEIDEN

# Integrating risk- & crisis management at 'Waterschap Drents Overijsselse Delta'

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A thin line between risk- and crisis management

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**Integrating risk- & crisis management at Dutch regional water authority**

**‘Waterschap Drents Overijsselse Delta’**

A thin line between risk- and crisis management

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## Abstract

This research investigates the crisis management organization of the Dutch regional water authority ‘Waterschap Drents Overijsselse Delta’ using the High Reliability Organizing theory (HRO) of Weick & Sutcliffe (2015). WDODelta wants to know how risk- and crisis management could be integrated more successfully in the organization.

Weick and Sutcliffe (2015) argue that the reliability-enhancing characteristics (1) of preoccupation with failure, (2) reluctance to simplify and (3) sensitivity to operations are about the ability of organizations to anticipate to unexpected events. The reliability-enhancing characteristics (4) commitment to resilience and (5) deference to expertise captures the ability to contain problems and unexpected events (Weick and Sutcliffe, 2015). The five (5) mentioned characteristics imply both structural as well as cultural measures to be taken within the organizations. The structural measures should stimulate reporting and analyses of potential failures either in training of real-life settings with all involved internal and external actors, whereas the cultural measures would imply stimulations of learning skills in a multi-disciplinary environment. In order to find out if HRO could be used to further integrate risk- and crisis management at WDODelta, the following research question was formulated:

*Could the introduction of High Reliability Organization-principles in the organization of regional water authority ‘Waterschap Drents Overijsselse Delta’ be helpful in integrating risk- and crisis management and if so how?*

Based on the findings in this research, it is concluded that the introduction of HRO-principles would be helpful in integrating its risk. Findings suggest that a lot of measures have been (implicitly) implemented that relate to the HRO-principles but a lot can be done to further improve. A prerequisite for HRO’s is to invest in risk awareness; respondents argued that risk awareness is something that should be invested in through improving in scenario thinking and organizational knowledge. Furthermore it is important to implement strategic management. HRO theory could help WDODelta to further integrate risk- and crisis management in their organization. Overall, it is concluded that WDODelta a basic structure has been formalized for the crisis organization, but to fully integrate their crisis organization it is helpful to make a connection with risk management. High Reliability Organizing theory is based on multiple disciplines that could be used as a guideline in thinking about new policy at WDODelta on both structural and cultural level related to risk- and crisis management.

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## 1. Introduction

Where water levels rise, danger and risk arise. During the storm in England in December 2015, 16.000 homes were flooded (BBC, 2016). Heavy weather with a lot of rain in Europe ravaged France, Germany, Belgium, Luxemburg and parts of the Netherlands at the beginning of June 2016. Nowadays these kinds of intense, extreme and rapid weather changes occur more frequently due to climate change (RTL, 2016). Historical and recent events show that water management is an important task for a country. The Dutch are known for living below sea level and their skills in water management. In history, the Dutch have had several water related crises to overcome, with the most well-known crisis the ‘Watersnoodramp van 1953’, or the ‘North Sea Flood of 1953’ (Committee on Disaster Studies, 1955). The ‘Watersnoodramp’ resulted in 1863 casualties due to flooding. An event like this indicates the importance of water management.

‘Rijkswaterstaat’, part of the Dutch ministry of Infrastructure and Environment, “*is responsible for the design, construction, management and main infrastructure facilities in the Netherlands. This includes the main road network, the main waterway network and watersystems*” (Rijkswaterstaat, 2017). In performing this task Rijkswaterstaat closely works together with so called ‘waterschappen’ or ‘regional water authorities’. These are public bodies which are responsible for the water quantity, water quality and protecting the land against flooding by constructing and maintaining dikes (Rijksoverheid, 2015) in the Netherlands. Dutch regional water authorities are self-dependent. All 23 different regional water authorities have their own democratically elected boards and collect their own taxes from the inhabitants of their area to realize and perform their tasks. Due to this right to collect taxes, they have their own board elections every four years. This way the accountability to society is ensured, because regional water authorities are directly included in the democratic order of the Netherlands. Due to the nature of their task, regional water authorities have an important role in water management: water quantity, water quality and the construction and maintenance of dikes. These tasks are crucial for living in the Netherlands (Rijksoverheid, 2016).

In 2009 a concept called ‘multi-layer safety’ was introduced in the National Water Plan 2009-2015 (Rijksoverheid, 2009). The ‘multi-layer safety’ is a three-tier approach for protection and prevention against water related crises. The first and second layer focus on risk management, the third layer focuses on crisis management. The first layer concentrates on the securing of the territory through preventative measures such as building, improving and

maintaining dikes and the building of the regional water network and system within the territory. The second's layer focus lies on environmental and spatial planning; for instance, creating retention areas. The third layer is responsible for mitigating the effects of crises such as flooding and water disturbance. Mitigating the effects of crises is done through organizational preparations such as improving crisis management skills of the regional water authorities and its employees and improving coordination with crisis management network partners.

Since 2010, with the formation of so called Dutch security regions, the Dutch water authorities have officially been considered formal crisis partners. The chairman of the Dutch regional water authorities, named the 'Dijkgraaf'<sup>1</sup>, is always invited to join meetings of the board of the safety regions. This is established by the 'Wet Veiligheidsregio artikel 12.1' (Dutch Security Regions Act Article 12.1). Dutch security regions were formed mainly to improve multidisciplinary cooperation between traditional security partners and new partners, as formulated in the safety regions act by the Ministry of Security and Justice in 2013 (Government of the Netherlands, 2016). This means the Dutch regional water authorities have to operate and support crisis management activities, which results in implementing, stimulating and improving crisis management structures and skills in daily routines.

Dutch regional water authorities work together on a national and international level when it comes to vision and ambition on water management and promotion of their interests. All regional water authorities are part of the 'Unie van Waterschappen' (UvW), in English they call themselves: Dutch Water Authorities<sup>2</sup>. Due to the 'Wet Veiligheidsregio's' the regional water authorities want to collaborate in the field of crisis management as well, in order to fulfil their role as crisis partner. They share a vision on crisis management which is named: 'Samenwerking in Crisisbeheersing', (in English: 'Collaboration in crisis management'). In this vision, which is further developed into an implementation plan until 2020, they focus on several core factors to increase their crisis management skills, such as: intensifying bonds with network partners and working in a multidisciplinary environment on an external level. On an internal level they standardized crisis organizations and plans, information management and organized a shared education program (Unie van Waterschappen, 2012).

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<sup>1</sup> Similar to the title of the Dutch Mayors, but this is specifically for the chairman of a Dutch regional water authority.

<sup>2</sup> General information can be obtained at their website: Dutch Water Authorities (2016). Visited on the 23<sup>rd</sup> of August, 2016. From: <http://www.dutchwaterauthorities.com/>

WDODelta is a new regional water authority arisen from a fusion between ‘Waterschap Groot Salland’ and ‘Waterschap Reest en Wieden’ in January 2016. WDODelta is located in Zwolle, it is a newly merged water board which has the mission to integrate two different organizational cultures and transform it into one organizational culture. WDODelta wants to use the merge as an opportunity to further professionalize risk- and crisis management. WDODelta wants to realize that crisis management perspectives become part of the organizational culture. This means that a new vision on risk- and crisis management needs to be acknowledged in ‘business as usual processes’.

In an opening event of the new crisis organization of WDODelta on the 9<sup>th</sup> of January 2016 there was an introduction on a safety culture concept called: ‘High Reliability Organization Theory’ (HROT) (Weick and Sutcliffe, 2015). High Reliability Organizations focus on building ‘mindfulness’ through interactions of knowledgeable employees and this is guided through five disciplines or characteristics, divided into two categories (Weick and Sutcliffe, 2015): anticipation of unexpected events and effective containment of potential failures, as shown in figure 1. According to Weick and Sutcliffe (2015), investing in the reliability-enhancing characteristics leads to building ‘mindfulness’. High Reliability Organization Theory is a concept that focuses on designing an organization with high reliability through investment in knowledge development (situational awareness and mindfulness). The knowledge development has to contain both structural and cultural measures to be successful.

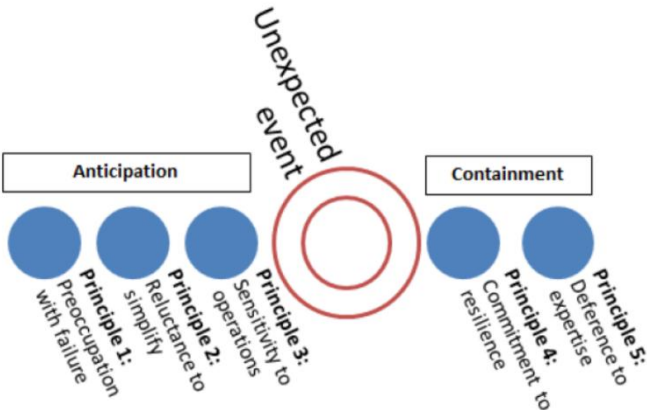


Figure 1 Model of 5 HRO-principles (Weick & Sutcliffe, 2007)

The management of WDODelta wants to find out if HROT can help to realize that crisis management perspectives become part of the new organization and corresponding organizational culture.



## 1.1 Problem definition, research objective and research question

The management of WDODelta has decided to develop a separate part of its organization with the task of managing crisis, but – by doing so – anticipates tensions between this new sub-organization and the traditional part concerned with preventing crisis. The aim of this research is to see if the introduction of High Reliability Organization Theory can be helpful in closing the perceived gap between risk management and crisis management within Dutch regional water authority: ‘Waterschap Drents Overijsselse Delta’ (WDODelta).

The management of WDODelta has the ambition to professionalize its risk management and crisis management continuously and embed the crisis organization more successfully within its regular organization. How to realize this within WDODelta has yet to be determined. One way to approach this professionalization is by researching the organizational culture of WDODelta and look at the ways how HRO-principles can contribute to higher reliability. A possible approach is to do research on which disciplines of High Reliability Organizations are present and which disciplines are missing in WDODelta in order to gain insight into what disciplines can improve to be more reliable in terms of risk- and crisis management. For this research, the following central research question has been formulated:

*Could the introduction of High Reliability Organization-principles in the organization of regional water authority ‘Waterschap Drents Overijsselse Delta’ be helpful in integrating its risk- and crisis management and if so how?*

## 1.2 Academic relevance

This research is relevant for scholars who are academically or theoretically involved in risk- and crisis management in general and within public administrative organizations in particular. In this research the concept of High Reliability Organization Theory is applied into a different context, namely the Dutch regional water authorities where this has not been applied to yet. By applying the theoretical framework of High Reliability Organization Theory in a different context the usability of the framework can be tested. This will develop new insights into the question if high reliability characteristics can be applied to other organizations, other than typical HROs; such as aircraft carriers, nuclear power plants, firefighting units and air traffic control centres, as well. Improved knowledge about organizational culture with a focus on risk- and crisis management could help those who are involved in implementing a high reliability organization disciplines.

### **1.3 Societal relevance**

This research has a direct link with public administration in general and crisis and security management in particular. Regional water authorities are part of the Dutch government and are involved in regional and national crisis management where they fulfil an advisory role when a crisis is water related. The practical, or societal, relevance of this research is the gained knowledge for organizations and their employees involved in crisis management. If there is more knowledge about high reliability organizational cultures - and how to implement those according visions and ambitions successfully - other organizations can avoid potential problems and consequences while implementing a new organizational culture ambition. The ambition to improve and professionalize risk- and crisis management continuously within public administrative organizations is beneficial to the society as a whole.

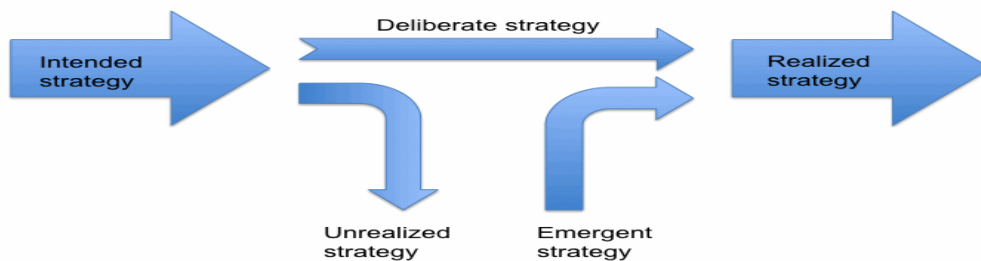
### **1.4 Reading guide**

To answer the central research question it is important to develop an analytical framework that forms the basis for further review into WDODelta. This framework is developed in the second chapter. The framework leads to additional sub questions that form the basis for the analysis of empirical data. Subsequently, the research design and methodology are explained. After that, a chapter with the empirical findings and answers of the sub questions are presented; thereby answering the main research question. The last chapter, reflection and recommendations, reflect on the findings from a broader perspective, also taking into account the limitations of this research, and lead to recommendations on policy and future research.

## 2. Theoretical Framework

The management of WDO Delta has the ambition to integrate crisis management perspectives more within its core organization. This chapter discusses strategic organizational change and High Reliability Organization Theory as the main theory of this research. The chapter ends with an analytical framework that forms the basis for the methodology and the empirical analysis in further chapters.

In the social sciences in general and in business administration more particularly, there has been a continuing debate about managing organizational change. Ansoff (1991) argues that changes can be planned and realized accordingly, which is called the ‘design-school’. On the other hand, Mintzberg and Waters (1985) argue that changes in organizations are caused by unknown influences that are unintended or expected by management. Mintzberg and Waters (1985: 258) therefore make a distinction between an ‘intended strategy’ and a ‘realized strategy’ in their analysis of strategic changes (see figure 2).



*Figure 2 Types of strategies in organizations (Mintzberg & Waters 1985, p. 258)*

Mintzberg and Waters (1985) argue that a part of the ‘intended strategy’ would never be realized as intended. First, if the management wants to realize everything as intended, then the management of an organization should formulate their expectations and intentions clearly and transparently. Secondly, all parts of the organizations should share these same intentions. Thirdly, no further (external) involvement should occur during the change process. If all these conditions are met, a pure ‘deliberate strategy’ would be sufficient to arrive at the ‘realized strategy’ as ‘intended’. However, since in practice these conditions are not met, a part of the ‘intended strategy’ will never be realized, therefore ‘non-intended’ or ‘emergent’ strategies occur in the organization as a result of ‘misinterpretation’ or lack of full knowledge. These

'emergent strategies', will emerge spontaneously from within the organization without formal planning or intentions of the management, for instance through interaction between people.

The interactions between deliberate and emergent strategies were studied in depth by Reijling (2015). He states that organizations may be formed by several organizational elements that respond different to environmental influences. Those elements might lead to different responses within the organization itself. Therefore organizations may show characteristics that fit a closed systems approach or an institutional perspective instead. As a consequence, the organization structure will develop as part of a dynamic social (construction) process. These dynamics are on the one hand caused by perceptions on the said structure of an organization and the hierarchal power positions that the used structure enforces in order to be resourceful and sustainable in the long run. On the other hand they are caused by perceptions about 'social practices' by actors in organizations, which determine their identity within the organization and the relationship with the institutional environment. Both external environmental factors share the fact that actors decide for themselves what kind of behaviour fits them personally and how that can be legitimized. Besides these external orientations of actors, the chosen organizational design and the execution or implementation of this design also affects the identity of actors. Structural measures and knowledge- and cultural development have an institutional and organizational context.

When an organization is part of a larger policy network this connection could cause conflicting demands to the organization (Reijling, 2015). Supporting this observation, Jian (2007) emphasizes that organizational changes always lead to tensions between the management level and the operational level. These tensions are caused because the management fulfils its goals by formulating its vision and ambition, while on an operational level this new ambition causes insecurity about the operating procedures. Managers think in texts and intentions, while operators think in actions and procedures.

To realize the 'alignment of logics of action' (Bacharach, 1996) a strategy has to be developed for the planned changes, in order to eliminate structural causes of differences in insights within the organization. Organizational change can be analysed by studying the interactions and alignment of intentional structural elements and unintentional cultural practices. In this case the organizational change is aimed at improving the position of WDODelta as a crisis partner. The question is whether implementation of the theory of High Reliability Organization would support the necessary structural and cultural changes and the alignment thereof.

As a first step in determining whether HRO would support the organizational change, more elaboration is required on the concepts of risk- and crisis management and the theory of HRO.

## **2.1 Structural characteristics of risk and crisis management**

In this research both risk- and crisis management are researched at WDODelta. To do that, it is important to define those concepts from a theoretical perspective. Generally, risk management is about avoiding unexpected events and crisis management is about managing (potential) unexpected events.

### **2.1.1 Risks and risk management**

Drennan and McConnell (2014, p.2) define risk as:

*“The chance of something happening that will have an impact on objectives; often specified as an event or set of circumstances and the consequences (both positive and negative) that will flow from this”.*

Drennan and McConnell (2014) differentiate between strategic and operational risks.

#### **2.1.1.1 Strategic risk**

Strategic risks are the risks that are present in the long term and are fundamental in nature. Strategic risks are divided in three main categories: typical strategic decisions (effectiveness and efficiency, internal oriented), recognized risks that occur at non-strategic levels (responsibility for correct policies, procedures and delegations) and external organizational environmental strategic risks. Drennan and McConnell (2014) argue that the public sector most likely faces the following strategic risks: political, economical, social, legislative, environmental, competitive and customer/citizen.

#### **2.1.1.2 Operational risk**

Drennan and McConnell (2014) say that within the operational level there are different risks than compared to the strategic level. When talking about the operational level, they mean these members of the organization that bring strategic vision to life through the implementation of policies. Within the public sector the operational level entails the employees that face the public, like social workers, police officers and doctors. Drennan and McConnell (2014) notice that the people that are accountable for making decisions about risks have to meet their superiors about their decisions. This creates problems in empowering people to ‘own’ those risks for which they are accountable. In the public sector operational

risks are focused on: professional, financial, legal, physical, contractual, technological and environmental risks.

### **2.1.1.3 Risk management**

Risk management is about avoiding unexpected events. Drennan and McConnell (2014, p.2) define risk management as:

*“The processes involved in managing risk in order to achieve objectives, by maximizing potential opportunities and minimizing potential adverse effects”.*

And the processes that are mentioned in this definition refer to the risk management processes, which are defined as:

*“The systematic application of management policies, procedures and practices to the tasks of communicating, establishing the context, identifying, analyzing, evaluating, treating, monitoring and reviewing risks”.*

### **2.1.2 Crisis and crisis management**

Drennan and McConnell (2014, p.2) define a crisis as:

*A set of circumstances in which individuals, institutions or societies face threats beyond the norms of routine day-to-day functioning, but the significance and impact of these circumstances will vary according to individual perceptions”.*

A crisis entails three elements according to Drennan and McConnell (2014), which are: a severe threat (for instance to life or property), uncertainty (about causes or escalation of the situation) and urgency (the need for direct action and response). Within scientific research there are a lot of different definitions of the concept of crisis. Similarities within definitions are that a crisis includes a profound event which affects the vital interests of a society. The event causes uncertainty and a shortened response time to make decisions (Scholtens, 2011; Muller, et al., 2009). There are different types of crises, such as: natural disasters, fires, explosions, transport accidents, riots and disturbances, terrorism and hostages, psycho-crises, public administrative crises and economical crises (Muller et al., 2009). Overall, the crises result in physical and materialistic damage and societal turmoil (Duin & Wijkhuijs, 2014). Because of modernization and globalization the societies in the Western world become more complex and vulnerable (Boin, 2009; Quarantelli et al., 2006; OECD, 2003).

### 2.1.2.1 Crisis management in the Netherlands

Crises can demand a multi-disciplinary approach to mitigate risks and chances for further escalation effectively and to handle the situation. Zanders (2008) states that all involved actors in a crisis need to coordinate their activities to realize an effective emergency operation. This means that all actors have to adjust their activities to other parties in order to achieve a common goal. For instance, when a traffic accident occurs with multiple cars and a heavy loaded truck, containing chemical supplies, and there is an ongoing fire, multiple actors show up to handle the situation. In this example the police force would protect the perimeter by setting up a roadblock so the fire brigade can handle the car fire. An ambulance shows up in order to treat those who are injured. The local government shows up to coordinate crisis communication to the media. Those are the main actors. But then, the regional water authority shows up in order to make sure the chemicals of the loaded truck will not spread through the water system and infect a wide area. They do so by shutting of the water system to stop the water from spreading through the system or placing barriers in the water to physically contain the polluted water. This process where involved actors coordinate their activities is called crisis management.

In the Netherlands the organization of crisis management and disaster response is formalized by law and through the organization of safety regions (Wet Veiligheidsregio's, 2010). The so-called: Gecoördineerde Regionale Incidentbestrijdings Procedure (GRIP) is used to structure the way organizations have to scale up to respond to the crisis (Instituut Fysieke Veiligheid, 2014). GRIP is a coordinated regional incident control procedure. In table 1 the different GRIP-levels are explained. In this procedure all involved teams have a different task and responsibility. Through this procedure all involved actors know how big the 'crisis' or incident is to ensure that organizations deploy the right people and teams decision making and managing the crisis.

Table 1 Structure of up scaling from involved crisis management organizations in the Netherlands

GRIP-level	Crisis team	Authority in charge	Size of incident	Team composition
GRIP 1	CoPI = Incident command location	Mayor	Source control	<ul style="list-style-type: none"> <li>• Leader CoPI</li> <li>• Fire Department Officer</li> <li>• Police Officer</li> <li>• Medical Care Officer</li> <li>• Public Service Officer</li> <li>• Official Crisis Communication CoPI</li> <li>• Information Manager CoPI</li> <li>• Optional: Officer of a Crisis Partner</li> </ul>
GRIP 2	ROT = Regional Operational Team	Mayor	Source and effect control	<ul style="list-style-type: none"> <li>• Leader ROT</li> <li>• General Commander Population Care</li> <li>• General Commander Fire Department</li> </ul>

GRIP	GRIP 3	GBT = Municipality Policy Team	Mayor	Threat to the wellbeing of large communities	<ul style="list-style-type: none"> <li>• General Commander Medical Care</li> <li>• General Commander Police</li> <li>• Official Crisis Communication ROT</li> <li>• Information Manager ROT</li> <li>• Optional: General Commander of a Crisis Partner</li> <li>• Mayor as authorized authority</li> <li>• (Chief) Officer of Justice</li> <li>• Advisor of GBT Population Care</li> <li>• Advisor of GBT Fire Department</li> <li>• Advisor of GBT Medical Care</li> <li>• Advisor of GBT Police</li> <li>• Official Crisis Communication GBT</li> <li>• Information Officer GBT</li> <li>• Optional: General Commander of Crisis Partner</li> </ul>
	GRIP 4	RBT = Regional Policy Team	Chairman of safety region	Municipality Cross-border incident or threat to develop as such	<ul style="list-style-type: none"> <li>• Chairman of the Safety Region as authorized supervision</li> <li>• Mayors of involved municipalities</li> <li>• Chief Officer of Justice</li> <li>• Chairman of all involved Regional Water Authority is invited</li> <li>• Advisor of RBT Population Care</li> <li>• Advisor of RBT Fire Department</li> <li>• Advisor of RBT Medical Care</li> <li>• Advisor of RBT Police</li> <li>• Official Crisis Communication RBT</li> <li>• Information Manager RBT</li> <li>• Optional: Chairman of a Crisis Partner</li> </ul>
	GRIP 5	Involved interregional ROT's and interregional RBT's. With CoPI's.	Chairman of Safety regions (largest municipality)	Interregional incident or threat to develop as such	<ul style="list-style-type: none"> <li>• One region coordinates based on:</li> <li>• Agreements</li> <li>• Source region of incident</li> <li>• Best equipped</li> </ul>
	GRIP RIJK (State)	MCCb = Ministerial Commission of Crisis Management	Ministers/ MCCb	Threat to national safety or necessity of control by the state.	<ul style="list-style-type: none"> <li>• National Coordinator Terrorism &amp; Safety (NCTV) as chairman</li> <li>• Ministers of involved Ministries</li> <li>• National Crisis Centre</li> </ul>

Table 1 shows the structure of up scaling in the Netherlands. The size of the incident is a crucial factor in determining which GRIP-phase is established. If an incident happens, the regional water authorities in the respective safety regions are alarmed by their Safety Region. A regional water authority decides to join the intervention of the GRIP structure by estimating if an incident hits their areas of concern (i.e. water systems, water quality or dikes) or when their advice is specifically asked for. The regional water authorities establish a crisis organization within their own organization with a similar structure as the primary actors in crisis management in order to equalize decision making powers. The structure within regional water authority WDODelta is described in the fourth chapter of this research.

As a sub conclusion of this part, it is noted that risk management is mainly an internally focused matter, while crisis management has a multi disciplinary approach where collaboration with external crisis partner, working towards a mutual goal, is needed.



## **2.2 High Reliability Organization Theory**

High Reliability Organizations (HROs) distinguish themselves from other organizations because they can avoid crises and disasters in an environment where incidents are almost inevitable due to their complex systems and high risks involved in those systems and environments (Weick and Sutcliffe, 2015). The most well-known HROs are aircraft carriers, nuclear power plants, fire fighting units and air traffic control centres. In the following theoretical framework the principles driving these organizations are explained. Weick and Sutcliffe (2015) believe that the integration of their principles within the management of an organization helps to improve organizational mindfulness. Organizational mindfulness supports anticipating small disturbances with greater flexibility and improves the chance to anticipate and contain incidents and mitigate escalation of that incident. An in-depth literature review has been done by Lekka (2011) for the Health and Safety Laboratory, which is used throughout the overall HROT section in this literature review as well.

### **2.2.1 History of High Reliability Organization Theory**

There are two dominant approaches to accidents in complex systems. Those approaches are divided into Normal Accident Theory (NAT) and High Reliability Organization Theory (HROT). Normal Accident Theory originates from Perrow (1984) and it states that accidents are inevitable in complex organizations that operate and process high-risk technologies. According to Perrow (1984), tight coupling and interactive complexity are characteristics of complex organizations that cause the occurrence of accidents. Coupling refers to the interdependency of systems components and interactive complexity refers to the interactions in the system components that are unpredictable and/or invisible. Perrow (1984) further classifies systems within high risk (nuclear weapons, aircrafts and military systems) and lower risk (manufacturing plants, oil refineries, and chemical plants).

Perrow's (1984) NAT advanced the knowledge of organizational or system characteristics that increase the chance and/or possibility of catastrophic errors. However, NAT has received a lot of criticism. The classification of high risk and lower risk does not relate to the accident rates within these organizations. The 'High Risk' systems reports lower accident rates than the 'Lower Risk' systems, according to Leveson, Dulac, Marais and Carroll (2009), which is in contrast to predictions of Perrow's classification system (Leveson et al., 2009). Perrow's NAT differentiates poorly between the design features of the corresponding systems (Leveson et al., 2009) and it does not focus on conditions that contribute to the 'not failing' of systems. Hopkins (1999) argues that the concepts of NAT (coupling and complexity) are defined poorly, the theory has a rather pessimistic approach to the occurrence

of disasters and the theory does not help in explaining the small number of accidents in those organizations.

This is where HROT comes in; HROT focuses on understanding the conditions of complex systems that support reducing complex system failures. Accidents in complex systems are not inevitable because high hazard organizations effectively manage to prevent and contain catastrophic errors over long time periods (e.g. Roberts, 1990; LaPorte and Consolini, 1998). LaPorte and Consolini (1998, p. 848) say that these organizations “*are so effective that the probability of serious error is very low*”. The view of HROT researchers is that organizations can invest in their reliability by creating a positive safety culture and supporting and stimulating safety-related behaviour and attitude (Weick and Roberts, 1993). Characteristics of these high risk organizations in this view are; a preoccupation with failure to gain anticipation to potential failure and to become more resilient. They do so by investing: in a strong learning orientation, in prioritization of safety, on training and preparation, on checks and procedures. LaPorte and Consolini (1998) and Roberts and Bea (2001) claim that those characteristics in high risk organizations reduce the accident rates.

HROT also sustained criticism. According to Sagan (1994; cited in Weick, Sutcliffe and Obstfeld, 1999) HROT ignores the social and environmental contexts of HROs that may limit the potential of learning from errors. For instance, the open reporting of errors can be influenced by political implications that restrain organizations to do so. The different perspectives between NAT and HROT about hazardous technologies are shown in table 2.

*Table 2 Competing perspectives on Safety with Hazardous Technologies (Sagan 1993:46)*

High Reliability Organization Theory (HROT)	Normal Accidents Theory (NAT)
Accidents can be prevented through good organizational design and management.	Accidents are inevitable in complex and tightly coupled systems.
Safety is the prioritized organizational Objective.	Safety is one of a number of competing objectives.
Redundancy enhances safety: duplication and overlap can make “a reliable system out of unreliable parts”.	Redundancy often causes accidents: it increases interactive complexity and opaqueness and encourages risk taking.
Decentralized decision-making is needed to permit proper and flexible field-level responses to surprise.	Organizational contradiction: decentralization is needed for complexity, but centralization is needed for tightly coupled systems.
A “culture of reliability” will enhance safety by encouraging uniform and appropriate responses by field-level operators.	A military model of intense discipline, socialization, and isolation is incompatible with democratic values.
Continuous operations, training, and simulations can create and maintain high reliability operations.	Organizations cannot train for unimagined, highly dangerous, or politically unpalatable operations.
Trial and error learning from accidents can be	Denial of responsibility, faulty reporting, and

effective, and can be supplemented by anticipation and simulations.	reconstruction of history cripples learning efforts.
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## 2.2.2 The struggle to define High Reliability Organizations

Defining HROs seems to be difficult, because researchers have been debating about how to best define and identify an HRO. In the past HRO researchers relied on accident statistics as a ‘high reliability’ criterion of error-free performance. Hopkins (2007) argues that this is problematic because error-free performance could take place at the expense of safety. Rochlin (1993, p.17) counters this argument:

*“What distinguishes reliability-enhancing organizations is not their absolute error or accident rate, but their effective management of innately risky technologies through organizational control of both hazard and probability”.*

This definition of HROs puts emphasis on process management instead of accident statistics.

Other researchers focus on technological characteristics that categorize an organization as ‘high risk’ with similarities to the concepts used by Perrow’s (1984): tight coupling and interactive complexity. Robert and Rousseau (1989) identify the following characteristics to distinguish HROs from other organizations:

- Hyper complexity and tight coupling: a variety of interdependent components and systems with unpredictable processes and difficulties in interrupting (Perrow, 1984);
- Hierarchical structures with clear roles and responsibilities;
- Redundancy where multiple individuals make decisions and lead important operations;
- High levels of accountability with strict following of procedures where substandard performance is not tolerated;
- Short time factors where major processes need to take place in seconds.

HROs would accomplish all of those characteristics whereas other organizations obtain some. Hopkins (2007) argues that nowadays less emphasis is put on identifying HROs through criteria; instead the focus lies on the types of processes and practices that enable reliability enhancement. Hopkins (2007, p. 6) states that HRO research;

*“moves away from questions of just how safe does an organization have to be before it can be considered an HRO, and it highlights instead what an organization needs to do in order to reach the required end state”.*

Waller and Roberts (2003) argue that mainstream organizations can learn from the HRO-principles used in typical HRO’s. Weick and Sutcliffe (2015) supplement that statement by

stating that HROs and non-HROs have similarities, because failure can be disastrous for all types of organizations if it is not managed. Nowadays, the focus in HRO research is shifted from identifying factors for HROs towards reliability-enhancing processes and characteristics to improve safety performance that distinguish HROs from other organizations.

### **2.2.3 The five reliability-enhancing characteristics of High Reliability Organizations**

Weick, Sutcliffe and Obstfeld (2008) have investigated why and how High Reliability Organizations are successful in managing the unexpected and have done so by looking at their best practices. By studying those organizations, five HRO-principles were formulated that can help other organizations to improve their reliability and resilience performance. Together these HRO-principles are seen as a management style which focuses on mindful organizing.

The five HRO-principles are:

1. Preoccupation with failure;
2. Reluctance to simplify;
3. Sensitivity to operations;
4. Commitment to resilience;
5. Deference to expertise.

#### **2.2.3.1 *Preoccupation with failure***

According to Weick and Sutcliffe (2015) the first reliability-enhancing characteristic is a preoccupation with failure, which contains the need for alertness, understanding, wariness and attention for signals or symptoms of larger problems in a system. If no attention is given to these weak signals, a system can become unpredictable and uncontrollable. Weick and Sutcliffe (2015) formulate three acting styles of HROs that focus on a preoccupation with failure:

- HROs work hard to detect small, emerging failures because these may be a clue to additional failures elsewhere in the system;
- HROs work hard to anticipate and specify significant mistakes that they don't want to make;
- HROs know that people's knowledge of the situation, the environment and their own group is incomplete.

An HRO perceives near-misses (something that could have gone wrong) and incidents as indicators of a system's health and reliability. The reporting of near misses and errors is stimulated because these moments are seen as learning opportunities and as a means of

building knowledge about their operations. Near-misses are analysed because they are seen as opportunities to improve the processes. Learning of these incidents and near misses improves HROs in their ability to be preoccupied with failure. Rochlin (1993) argues (cited in Weick et al. 1999, p.40):

*“[...] the value [of errors] to the organisation of remaining fully informed and aware of the potentiality for the modality of error far outweighs whatever internal or external satisfaction that might be gained from identifying and punishing an individual and/or manufacturing a scapegoat to deflect internal or external criticism.”*

An organization that focuses on gathering information about indicators and symptoms of failure in a blame-free environment are more successful in managing the unexpected than organizations that blame employees for reporting indicators and symptoms of failure and see the employee as the cause for the potential failure.

According to Weick and Sutcliffe (2015) there are ways to practice a preoccupation with failure. A reliability-seeking organization should focus on uncovering their blind spots in managing failures by diving into questions focused on what kind of failures happen, if employees report the failures and how the employees act to those failures in daily situations. Furthermore, the management should invest in:

- Articulating their expectations;
- Creating awareness of vulnerability;
- Actively tracking down bad news;
- Clarifying what constitutes good news;
- Consolidating their explanations;
- Seeing near-misses as failures;
- Preoccupation as strategy.

As Weick, Sutcliffe and Obstfeld (2008) conclude (cited in Boin et al. 2008, p. 41):

*“In the more effective HROs, complacency is interpreted as a failure of striving, inattention is interpreted as a failure of vigilance, and habituation is interpreted as a failure of continuous adjustment. Attending to potential failures implicit in success is equivalent to acting on the assumption that any current success makes future success less probable.”*

This means that in order to be successful in a preoccupation with failure an organization has to invest in restricting complacency, invest in paying attention to improve vigilance and prevent that habituation occurs. This implies both structural as well as cultural characteristics since actors should be stimulated to report by means of any formal reporting system and learn by analysing those potential failures and adapt standard operating procedures.

### 2.2.3.2 *Reluctance to simplify*

The second reliability-enhancing characteristic is formulated as reluctance to simplify. HROs focus on their ability to collect, analyse and prioritize all indicators that something could be wrong and avoid making assumptions about the causes of potential failure (Weick and Sutcliffe, 2015). From an HRO's perspective a failure can lead to a causal chain of events with potentially more failures within a system. According to Weick, Sutcliffe and Obstfeld (2008) simplifications increase the chance of surprise, because they allow anomalies to accumulate, intuitions to be disregarded and unwanted consequences to grow.

A common principle in organizing is simplifying complex tasks in order to manage them (Turner, 1978). HROs see simplifications as a potential danger because it limits the precautions people take and the number of consequences they see. Effective HROs want to know what they do not know, which is ignored when a task or situation is simplified. To avoid simplification HROs invest in making fewer assumptions and support people to notice more (Xia, Milgram and Doyle, 1997). HROs try to match internal complexity with external complexity (Perrin, 1995, p.165) by diverse checks and balances through committees and meetings, adversarial reviews, selecting and recruiting employees with non-typical experience, job rotation and re-training.

Another aspect of reluctance to simplification in HROs is 'negotiated complexity' (Schulman, 1993b, p.361). Negotiation and continual renewal of processes and procedures is embraced formally in the organization in order to ensure reliable operations. HROs believe that the process of renewing and reviewing procedures mitigates complacency and rigidity. Weick, Sutcliffe and Obstfeld (cited in Boin et al. 2008, p. 43) argue that within HROs;

*“there is a premium on interpersonal skills (e.g., Schulman, 1993a; Weick and Roberts, 1993), mutual respect (Weick, 1993a), norms that curb bullheadedness, hubris, headstrong acts, and self-importance (Schulman, 1993a, p.45), continuous negotiation (Perrin, 1995), reaccomplishment of trust, and simultaneous cultivation of credibility and deference (Bierly and Spender, 1995).”*

According to Weick and Sutcliffe (2015) an organization can practice a reluctance to simplify. Nag, Corley and Gioia emphasize that: “*Practice, then, acts as a linchpin connecting organizational identity and knowledge*” (2007: 822). As such social practices support the cultural characteristics of the organization. They state that reliability-seeking organizations should invest in:

- Think and question out loud;
- Develop sceptics;
- Seek requisite variety;
- Put a premium on interpersonal skills;
- Revise assessments as evidence changes.

### 2.2.3.3 *Sensitivity to operations*

The third reliability-enhancing characteristic of HROs is their sensitivity to operations, which entails their ability to obtain the bigger picture of operations in order to be able to anticipate future failures. Weick and Sutcliffe (2015) argue that unexpected events can be managed through three processes: the detection of small failures (HRO-principle 1), the differentiation of categories (HRO-principle 2) and watchfulness for moment-to-moment changes in conditions (HRO principle 3). In this principle the focus is shifted from the strategic towards the operational level. Weick and Sutcliffe (2015) state that HROs seek the views of front line staff actively to obtain this bigger picture of operations and potential safety concerns within the organization.

A sensitivity to operations in HROs could be described as “having the bubble”, a phrase used in the Navy (Roberts & Rousseau, 1989). Endsley (1997) argued that having the bubble is similar to situational awareness. LaPorte (1988, p. 244) combined those terms earlier and formulated sensitivity to operations in HROs as:

*“the effort and intensity of purpose required to build what we sometimes characterize as the ‘bubble’, the state of cognitive integration and collective mind that allows the integration of tightly-coupled interactive complexity as a dynamic operational process, is enormous.”*

Weick, Sutcliffe and Obstfeld (cited in Boin et al., 2008, p. 43) state that: “*The importance of sensitivity to current operations is reflected in much of the terminology associated with HROs. Descriptive words such as struggle for alertness, misinterpretation, overload, decoys, distraction, mixed signals, surprise, vigilance, near misses, warnings, anomalies, lookouts,*

*clues, and neglect, all portray the concern to catch errors in the moment.*” Furthermore, Weick, Sutcliffe and Obstfeld (in Boin et al., 2008, p. 44) argue that situational awareness and sensitivity to operations are crucial to reduce incidences of surprise and periods of inaction. They conclude that:

*“it is collective knowledge of failures, details, potentials for recovery, and relevant past experience, gathered into mindful processing, that provides the context within which present operations either make sense or are reconstructed to make sense. (Weick, Sutcliffe and Obstfeld, cited in Boin et al., p. 45)*

Weick and Sutcliffe (2015) argue that HROs invest in increasing interaction between people within an organization. Face to face contact is important to gather detailed information about operations. They state that an organization can practice their sensitivity to operations by:

- Being guided by actionable questions such as the STICC protocol (Situation, Task, Intention, Concerns and Calibrate);
- Cultivating situated humility (embrace that you do not know anything);
- Encouraging people to simulate their work mentally (impact of actions on other processes);
- Make yourself physically and socially available;
- Reward contact with the front line;
- Speak up (if you see something, say something);
- Bring unique knowledge to the surface (rely on process mechanisms that stimulate people to raise questions and reveal information, such as brainstorming).

#### **2.2.3.4 Commitment to resilience**

The fourth reliability-enhancing characteristic is commitment to resilience. Resilience is the ability of an organization to cope with and bounce back from unexpected events (Weick and Sutcliffe, 2015). To improve resilience an organization is committed to learn from past experiences with unexpected events and near misses from within the organization and from other organizations. Weick and Sutcliffe (2015, p. 95) formulate three definitions for resilience:

1. “The capability of a system to maintain its functions and structures in the face of internal and external change and to degrade gracefully when it must”



2. “The amount of change a system can undergo (its capacity to absorb disturbance) and remain within the same regimen— essentially retaining the same function, structure and feedback.”
3. “A resilient system is able effectively to adjust its functioning prior to, during, or following changes and disturbances, so that it can continue to perform as required after a disruption or a major mishap, and in the presence of continuous stresses.”

In order to act resilient, an organization has to improve its learning capacity and the ability to act during unexpected events to mitigate them.

In HROs the commitment to resilience is noticeable through the forming of informal ‘epistemic networks’ when a crisis emerges (Rochlin, 1989, p.161-168). This is a form of resilience where people organize themselves into ad hoc networks to provide expert problem solving. The commitment to resilience in the form of improvisation is also formally supported (Bourier, 1996, p. 109). The ultimate form of resilience is:

*“Improvement in overall capability, i.e., a generalized capacity to investigate, to learn, and to act, without knowing in advance what one will be called to act upon, is a vital protection against unexpected hazards” (Wildavsky, 1991, p. 70).*

Weick and Sutcliffe (2015) argue a commitment to resilience can be improved by:

- Adopting a mind-set of cure rather than prevention;
- Enlarging competencies and response repertoires;
- Not overdoing lean ideals;
- Accelerating feedback;
- Treating your past experience with ambivalence.

#### **2.2.3.5 Deference to expertise**

The fifth reliability-enhancing characteristic is deference to expertise. A HRO is characterized by a hierarchal structure with clear roles and responsibilities and lines of reporting. However, during unexpected events these structures make room for decision-making by expert knowledge.

HROs tend to focus on expertise rather than hierarchy. Weick and Sutcliffe (2015) argue that reliable systems are organized in such a way that problems attract and create their own hierarchies that propose unanticipated solutions. Weick et al. (1999, p. 49) argue:

*“[...] What is distinctive about effective HROs is that they loosen the designation of who is the “important” decision maker in order to allow decision making to migrate along with problems [...] hierarchical rank is subordinated to expertise and experience.”*

Weick and Sutcliffe (2015) state that deference to expertise in an organization can be practiced by:

- Stimulating people to ask for help;
- Creating flexible decision structures;
- Encouraging imagination as a tool for managing the unexpected;
- Bewaring the fallacy of centrality;
- Refining the grasps of expertise;
- Listening with humility.

Summarized Weick and Sutcliffe (2015) argue that the reliability-enhancing characteristics (1) of preoccupation with failure, (2) reluctance to simplify and (3) sensitivity to operations are about the ability of organizations to anticipate to unexpected events. The reliability-enhancing characteristics (4) commitment to resilience and (5) deference to expertise captures the ability to contain problems and unexpected events. Combined, these reliability-enhancing characteristics are referred to as aspects of ‘collective mindfulness’ (Weick and Sutcliffe, 2015). The five (5) mentioned characteristics imply both structural as well as cultural measures to be taken within the organizations. The structural measures should stimulate reporting and analyses of potential failures either in training of real-life settings with all involved internal and external actors, whereas the cultural measures would imply stimulations of learning skills in a multi-disciplinary environment.

### **2.3 Change Management**

HRO relates strongly to creating a learning environment by taking both structural and cultural measures. When motivations behind organizational change measures are known and the linked change strategy is determined; the organizational management has to stimulate active dialogue in order to realize a collective learning process on all levels within the organization. Mantere and Vaara (2008) state that actors communicate based on a ‘discourse’. A ‘discourse’ is a specific, by actors developed, vocabulary in which views on core values, mutual relationships and norms are integrated. Words such as ‘strategy’ and ‘leadership’ gain a

specific meaning for the members of an organization which improves the communication because the actors understand each other better. Mantere and Vaara (2008) conclude that:

*“Discourses are linguistically mediated constructions of social reality. They are not mere representations of social reality but important means through which beliefs, values, and norms are reproduced and at times transformed in social life.” (2008: 341)*

Mantere and Vaara (2008) identify six strategies of ‘discourses’ in their case study which are used in order to strengthen participation of all relevant actors in the implementation of organizational changes. These strategies are divided into two categories: non-participative and participative discourses as shown in Table 3 and 4 on the next page.

*Table 3 Non-participative discourses (Mantere & Vaara, 2008)*

<b>Non-participative discourses</b>	<b>Mystification</b>	<b>Disciplining</b>	<b>Technologization</b>
<b>Conception of strategy process</b>	Strategy process is driven by visions, missions and other strategy statements – not to be questioned or criticized – that provide the basis for organizational activity.	Strategy is linked to effective organizational discipline and command structures.	Strategy process is driven by a specific system
<b>Subject positions</b>	Top managers are given a central role as leaders defining the key strategies.	Top managers are seen as the key strategists. This often involves responsibility but also heroification	Specific people, usually top managers, define the system to be used.
<b>Linkage to other social practices</b>	Strategies are often crafted in closed workshops.	Strategy work is closely linked to organizational control mechanisms.	Access to information is controlled.
<b>Effect on participation</b>	The exclusive right of top managers to define strategies and withhold information is legitimized.	Other organizational members can only participate in ways defined by their superiors.	Legitimizes the use of specific systems, often effectively limiting the ability to bring up new perspectives or issues.

Table 4 Participative discourse (Mantere & Vaara, 2008)

Participative discourses	Self-actualization	Dialogization	Concretization
Conception of strategy process	Strategy process is about finding meaning in organizational activities.	Strategy process involves dialectics between top-down and bottom-up processes.	Strategy process is seen as a natural, almost mundane part of organizational decision-making.
Subject positions	All organizational members can in principle participate in strategizing.	All actors that have a vested interest are to participate in strategy processes.	The role of top managers as key strategists is not questioned but expected to follow joint rules.
Linkage to other social practices	Strategy work is linked to micro level (unit or group) strategy workshops and meetings.	Strategy work is limited to concrete negotiation processes involving various internal and external stakeholders.	Strategizing is intimately linked to normal organizational decision-making.
Effect on participation	Legitimizes separate group and individual-level strategizing efforts and even conflicting ideas.	Legitimizes top managers special status as key strategists but not independently of other groups.	Call for clear-cut and transparent rules helps to demystify strategizing and legitimize wide participations.

Mystification and Disciplining are methods that are linked to the conception that an organization could perform as one identity if there is one generally accepted vision together with a corresponding hierarchal structure. Within Mystification the strategy- and vision development are closed activities carried out by leaders of the inner-circle within top management. By participating in these inner-circle activities the position of those involved strengthen even more. The implementation of the determined strategic vision is the task of the executive organization. The assumption is that the top management is in a better position to formulate a vision for the organization because of their information position and experience. The strategy of Mystification is implemented in the organization with a top-down perspective.

Within Disciplining there are specific responsibilities and powers that are acknowledged to (top) managers. An illustrative statement that fits with this discourse is:

*“I mean that these decisions are not collective. Somebody just has to make the decisions and get the others to follow.” (Mantere and Vaara 2008: 349)*

In the Disciplining method employees are considered as objects that are expected to loyally carry out the decisions by managers. A comparison is made with a military structure.

Mantere and Vaara (2008) emphasize that Mystification and Disciplining discourage the participation of employees on operational level.

The third non-participative discourse is Technologization. Within Technologization systems are used in order to coordinate participation. Examples of these systems are reporting, performance measuring and workflow-systems. The employees of the organization are considered resources that generate input to the used systems. Within this method Mantere and Vaara (2008) also emphasize that participation of employees on operational level is discouraged.

Specifically with regard to the use of information technology to direct staff behavior, Pentland and Feldman (2008) also point out the need for design of routine procedures based on ‘living’, ‘generative systems’. These are developed by mutually independent actors and not by ‘dead’ systems or ‘artifacts’. Pentland and Feldman (2008) state that:

*“We argue that artifact-centered assumptions about design are not well suited to designing organizational routines, which are generative systems that produce recognizable, repetitive patterns of interdependent actions, carried out by multiple actors. Artifact-centered assumptions about design not only reinforce a widespread misunderstanding of routines as things, they implicitly embody a rather strong form of technological determinism.” (Pentland and Feldman, 2008: 235)*

Self-actualization focuses on people’s ability to formulate their own goals as part of the strategy formulation. Strategic Management is here, according to Mantere & Vaara, a form of collective mapping (2008: 351). An illustrative statement by Mantere & Vaara in this is:

*“Anybody here can get an appointment with the CEO if they want to share an idea.” (2008: 351)*

Personal and mutual trust, are core values with which strategy formation is seen as a process of collective meaning in the broad context of the organization in its environment. It is assumed that top management fulfils the appropriate conditions for a personal and meaningful completion of tasks associated with assigned responsibilities. Important in this is also a shared reflection on the organization’s identity (Mantere & Vaara, 2008: 351). In self-actualization,

concepts such as ‘vision’ and ‘mission’ are also important, but unlike Mystification, they are not the starting point for further implementation by operational units but the results of a collective search and learning process. Strategic and vision development is therefore seen in this discourse as a common responsibility that is not exclusively linked to top management. In their case study, Mantere & Vaara (2008), also found that self-actualization in organizations was used to counterbalance too directive impetus from top management.

Within Dialogization top-down and bottom-up perspectives are integrated in order to improve support for any adjustments. In the view of Mantere & Vaara, such an approach fits into modern concepts of cooperation in organizations. Executive units recognize, if dialogue is applied, the value of management frameworks provided they are still able to carry out nuances in their elaboration. Strategy development is seen in this as an iterative and collective process. An illustrative statement in this is:

*“Yes, I do feel that I am qualified to participate in our strategy process. My superior is certainly not qualified to do our action plan alone.” (Mantere and Vaara, 2008: 352)*

Concretization seeks to find concrete processes and practices that also lead to specific actions in the implementation practice, which gives the strategic assumptions significance for the workplace. In other words, concretization is situated on the opposite side of mystification (Mantere and Vaara, 2008:352). Strategy development is seen as an integral part of business management, meaning that visions and practice procedures are continuously linked. Although the role of top management as starters of vision development is not denied, principally every organizational member is a strategist within his own context and working environment (Mantere & Vaara, 2008: 353. Thus, Mantere & Vaara state:

*“Concretization involves collective and distributive agency.” (Mantere & Vaara, 2008: 353)*

When overlooking the characteristics of HRO’s, concretization seems to be in line with the formulated vision that any strategic change should lead to adaptations in knowledge and methods. To achieve this, the necessary knowledge development must be fed by applications in the organization’s implementation practice. Nag et al. (2007) differentiate between ‘knowledge-use practices’ and ‘knowledge content’. Knowledge structure, they say *“is viewed more as an ongoing dialogue between practice (action) and meanings (cognition).”* (Nag et al., 2007: 824). They emphasize that actors might not resist to ‘change’ as such, but to

circumstances that pose a threat to change. These threats represent: “..at the intersection of identity (who we are), knowledge (what we know) and practice (what we do).” (Nag et al., 2007: 842).

## 2.4 Analytical framework

Earlier in this chapter concepts like risk- and crisis management and the characteristics of High Reliability Organizations were defined in more detail. Central in all elaborations is the need to investment in knowledge development (situational awareness and mindfulness) on anticipation and containment of crisis.

Risk- and crisis management seem to complement each other with respect to the ability to anticipate to unexpected events, but with respect to the containment of crisis, crisis management supplement risk management. Furthermore crisis management requires an external orientation placing the organization in its broader environment. The knowledge development in the organization has to contain both structural and cultural measures to be successful.

The assumption in this study is that implementation of the reliability enhancing characteristics of High Reliability Organizations would support the necessary structural and cultural changes and the alignment thereof. Based on the theoretical framework the following research questions are formulated:

- *Which structural changes are foreseen or have been implemented in order to increase the focus on crisis management and how do they relate to HRO principles?*
- *Which social practices, i.e. cultural changes, are foreseen or have been implemented in order to increase the focus on crisis management and how do they relate to HRO principles?*
- *What is the dominant organizational change strategy in Waterschap Drents Overijsselse Delta and to what extend does this strategy support the alignment of structural and cultural changes towards crisis management?*

### 3. Research Methodology

In the previous chapter the theoretical and analytical framework of this research has been established. The central research question is supported with sub questions in order to determine if High Reliability Organization Theory (HROT) can add value to the organizational change at the Dutch regional water authority ‘Waterschap Drents Overijsselse Delta’ (WDODelta). This chapter will go into detail about the used research methodology.

#### 3.1 Research Design

In this research qualitative methods are used to answer the central research question. The emphasis in high reliability organization theory on relationship and context justifies the use of qualitative research. A quantitative method won’t be successful because high reliability organization theory, strategic management, risk management and crisis management are topics that are highly interpretative. The intention is to find out if HRO-principles are present in WDODelta. To do so, the organizational change strategy is analyzed through a framework based on the HRO-principles. Then discrepancies between the organizational change strategy and HRO-disciples are explained.

A single case study design is chosen, specifically WDODelta because the writer conducting this research works at WDODelta and therefore has access to people and policy plans which are not easily accessible by public. Single case study research is a qualitative method where one case is extensively researched (Swanborn, 2010). In this research one case: WDODelta, is researched. Swanborn (2010) explains that a case study refers to the study of a social phenomenon, in this research the social phenomenon is: the way the organizational change strategy is organized and how risk and crisis management are embedded in that strategy in order to influence people on their behavior towards a more reliable performing organization. According to Swanborn (2010) a case study research has to meet the following characteristics:

- The research focuses on the natural environment of the social phenomenon in a specific period where during that period multiple measuring moments are used to gather information about the cases;
- The research methods entail multiple data sources, such as: documents, interviews and observations to ensure triangulation of data.

WDODelta has started their organizational change strategy in 2016. Now, a year later a research is conducted focused on organizational change with a relation to risk management



and crisis management. Documents (policy plans) are analyzed, interviews are conducted and desktops research has been done in order to ensure triangulation of data.

In this research it is important to take a holistic approach. A holistic approach means that *“we have to take into account that behaviour of people and social phenomena, in general, are determined by a complex set of causes”* (Swanborn, 2010, p.18). In chapter two, the part about strategic management emphasizes these behavioral aspects. A holistic approach entail that the researcher avoids selection of aspects or causal relationships beforehand and avoids the use models that neglect relationships between actors and/or factors. The way of thinking in the holistic approach has similarities with the ‘High Reliability Organization Theory’, because a reluctance to simplify is important to be high reliable.

The overall design of this research is a holistic single case study design (WDODelta) with the use of qualitative methods in order to research the analytical framework as described in chapter two.

## **3.2 Data collection methods**

In order to collect data, it is necessary to choose the right methods. This research is considered as a research which consists of desk top research, document analysis and supplemented with interviews. The theoretical framework is already known, which means that this research is deductive. Most data is obtained through analyzing policy documents and the use of interviews with employees on policy level, operational level and external partners.

### **3.2.1 Desktop research**

This research started with desk top research. The theoretical framework is an important aspect of this research, because it provides the analytical point of view which is used to analyze documents and is used in interviews as well. It is important to know the organization that is researched as well. In order to do so, documents were studied which described the organization of WDODelta. For example by studying policy documents describing the functioning of WDODelta, its crisis management organization and the way risk management is implemented in the organization. In the fourth chapter this desk top research is gathered in order to get a grip on the way WDODelta is organized.

### **3.2.2 Document analysis**

To do research about the organizational change strategy of WDODelta and its relation to risk- and crisis management it is necessary to include document analysis. It is important to note that most documents are not publicly accessible. Important documents to analyze are:

- Policy documents of WDODelta about the organizational change strategy;
  - Transitieplan/richtingaanwijzers: organisatie ontwikkeling (English: Transition plan for organization development)
  - Infographic van WDODelta werkt: verandertraject hard en zacht (English: Infographic of WDODelta works: change strategy hard and soft measures)
  - Transitie naar het nieuwe werken (English: Transition to the new work environment)
  - Plan van Aanpak Organisatie Ontwikkeling Spring (English: Action plan organization development by Spring)
- Policy documents of WDODelta about risk management;
  - Risicomanagement 2.0 (English: Risk management 2.0)
  - Handboek Projecten 2.0 (English: Handbook projects 2.0)
- Policy documents of WDODelta about crisis management;
  - Crisisplan WDODelta 2017

In the fourth chapter an overview is given of the above state documents. In the fifth chapter the documents are analyzed from a theoretical perspective, in order to find out to what high reliability organizing principles are present.

### 3.2.3 Interviews

The third data collection method is conducting interviews. Multiple interviews are conducted with employees of WDODelta. Based on the theoretical and analytical framework the interview topics were formulated.

Interviews can be divided in structured (pre-set of questions), semi-structure (topic list) and unstructured (open) interviews. The interviews in this research have a semi-structured design, to enhance openness and flexibility during the interview. A topic list is used to address relevant topics. Semi-structured interviews offer a greater flexibility for both the interviewer and the interviewee. During the interview the conversation can go deeper into specific topics, depending on how the interview develops.

The interviewees are not randomly chosen, but they are informed experts on risk management, crisis management and at the operational level at WDODelta. People who are directly involved can provide inside information about choices and decisions related to the organizational change strategy and the relation to risk- and crisis management, which is not mentioned in publicly available sources. Also external respondents are chosen. Beside the internal scope, also the external scope is taken into account. On the external level, a crisis partner of the safety region IJsselland and an external consultant on risk- and crisis

management are chosen as interview respondents. The interview respondents are listed in Table 5.

*Table 5 List of interview respondents*

Scope	Name	Role
<b>Policy level</b>	Jan Dirk van der Borg	Crisis Coordinator at Waterschap Drents Overijsselse Delta
<b>Policy level</b>	Paul van Poorten	Risk manager at Waterschap Drents Overijsselse Delta
<b>Operational level</b>	Freddie Schutte	Specialist water systems and dikes at Waterschap Drents Overijsselse Delta
<b>Operational level</b>	Robert Pannenburg	Specialist water systems and dikes at Waterschap Drents Overijsselse Delta
<b>External level</b>	Marian Bootink	Calamity Coordinator at Hoogheemraadschap de Stichtse Rijnlanden
<b>External level</b>	Richard Kamphuis	Crisis Management Manager at Veiligheidsregio IJsselland

All the data collection methods together give information and insights about the used organizational change strategy and its relation to risk- and crisis management, specifically focused on reliability-enhancing characteristics. The insights provided from the interviews should provide knowledge about how WDODelta can integrate its crisis management with risk management in order to be a higher reliable organization.

### **3.3 Data analysis**

In order to do the data analysis some preparation is needed. The interviews are focused on three topics that address the scope of sub questions from the analytical framework. The sub questions and topics during the interviews are focused on the organizational change strategy and its (structural) changes, the recognisability of reliability enhancing characteristics and the discrepancies between the former and latter. These themes are abstract, so the themes need to be put into context. Table 6 shows the three research themes and the topics where the questions are focused on in the interview. Appendix 1 shows the question list that is used, in order to steer the interview in the right direction.

Table 6 Interview topics

Structural aspects regarding risk- and crisis management	Cultural aspects regarding risk- and crisis management	Dominant organizational change strategy regarding risk- and crisis management
Risk management	Risk Awareness	Organizational change strategy
Crisis management	Training & Education	Organizational learning related to crisis management
Planning & Control	Evaluations	Further integration of network management, and risk- & crisis management

In the first part the interviewees are questioned about their interpretation of risk management and crisis management within WDODelta. After that, the interviewees are questioned about possible differences between the former and the latter, or if they supplement each other. Furthermore, the interviewees are asked about the policies on risk management and/or crisis management (based on their field of expertise), in order to set a baseline for the second part of the interview. The first part is mainly focused on gathering data about definitional interpretations, the policies and structure on risk- and crisis management level within the organization. This way the structural changes in risk- and/or crisis management can be identified which helps in answering the first sub question.

In the second part of the interview, the respondents are asked in what way the day-to-day situation differs in relation to set policies in the organization (which are described in the first part of the interview). Perception of the individual is an important aspect in this part. Based on the field of expertise from the respondent, one could explain about risk- and/or crisis management. Followed up, the questions about culture and risk awareness are asked in order to find out how the culture in WDODelta is identified and described by the respondent. Furthermore, questions are asked about the perceived quality of risk and/or crisis management. This way results are gathered about the value of risk and/or crisis management specific competences and the perceived professionalism on these fields. In the analysis this information is used to answer the second sub question in this research, which is focused on determining in what ways the perceived situation corresponds with the vision of High Reliability Organizations.

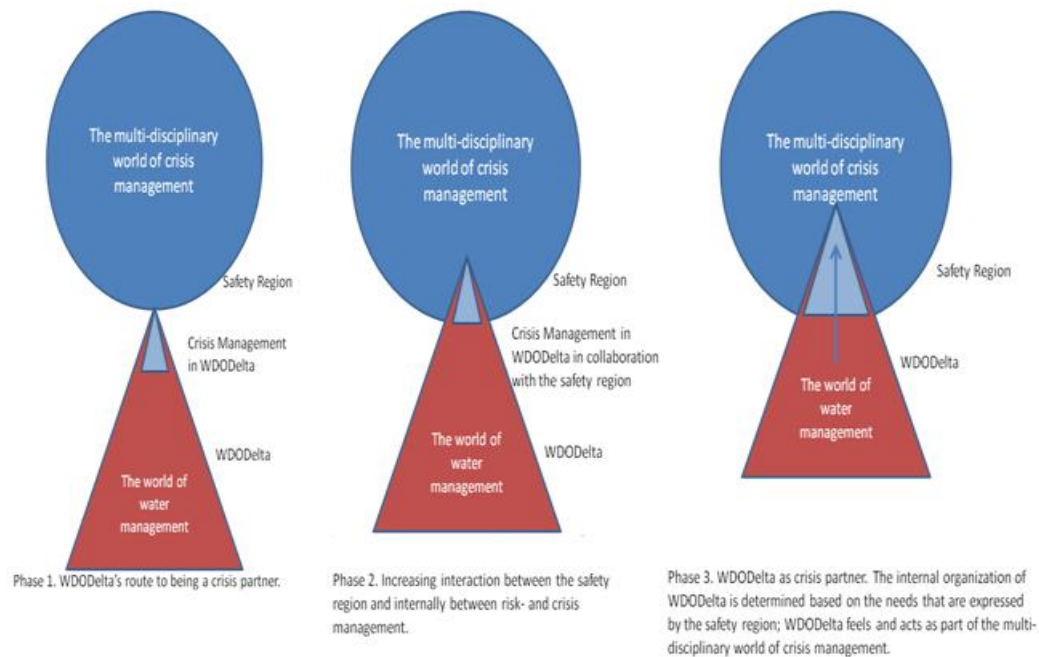
The third part is about the way organizational management tries to carry out their vision and ambition on crisis management in the organization. By asking questions about how the management stimulates and/or invests in risk- and crisis management results are gathered about the perception of employees on how this is done and how it maybe should be done. In

addition, questions are asked about the learning capacity, ability and knowledge development within WDODelta. By gathering knowledge about the way organizational management invests in risk- and crisis management, data is gathered about the way the intended and/or realized change strategy supports the alignment of structural and cultural changes towards crisis management.

In the analysis the results of the interviews are related to the policy documents by using the theoretical framework as conceptual glasses. Every sub question is answered by using the same 3-step structure. First the related policies are mentioned, and then the perceptions of the respondents are analyzed in relation to the reliability-enhancing characteristics. Then a sub conclusion is formulated for every sub question.

### 3.4 Conceptualization

Based on the theoretical framework a conceptual visualization is made, which is supposed to help determine in which phase WDODelta is considering developments in their role as crisis partner, as shown in figure 3.



*Figure 3 Conceptual visualization of the route of WDODelta towards being a crisis partner*

Phase 1 shows WDODelta as an actor that is not integrated in the multi-disciplinary world of crisis management. They do practice crisis management, but do that on mono-disciplinary level. Additionally, no integration of risk- and crisis management is noticed and therefore not being characterized as a High Reliability Organization.

Phase 2 shows WDODelta as an actor that is partially integrated in the multi-disciplinary world of crisis management. Crisis management is interpreted from a multi-disciplinary perspective; there is increased interaction between the safety region and WDODelta. Furthermore, increasing interaction between risk- and crisis management is noticed due to policies and measures that relate to the HRO-principles.

Phase 3 shows WDODelta integrated in the multi-disciplinary world of crisis management. The crisis management processes are based on the needs that are expressed by the safety region; WDODelta feels and acts as part of the multi-disciplinary world of crisis management and succeeds in integrating its crisis organization in their organization.

### 3.5 Validity and reliability

In a research it is important to consider the validity and reliability of the research, to enhance the quality of the research. In a nutshell, the validity of the research is about the question if the used measurements measure the concept. In short, reliability means that if someone else does the same research, will that researcher come to the same findings and results.

#### 3.5.1 Validity

According to Babbie (2010) validity is a term that is used to describe if the used measurements in the research correctly reflect the concepts that have to be measured. Swanborn (2010) describes three forms: construct-, internal- and external validity. To improve the construct validity in this research an interview protocol, consisting of research themes and research questions, has to be used. The interview themes are included in table 6 and the interview questions are included in Appendix 1. The interview questions are based on the theoretical framework. When a reader reads the interview questions, he/she should think that the right questions are asked to gather the necessary data. To improve the internal validity of the findings and results, multiple data sources are used to identify the organizational change strategy and its relation to risk- and crisis management.

The internal validity concerns the bias, or systematic error, within a research. For instance, the interview questions should measure what the researcher wants to measure (construct validity), but when a respondent answers he/she could be biased in their answer. They can answer questions positively or negatively, depending on: their own goal, subjectivity, or they could have the feeling that their answers will be misused for other ends. External influences could have a negative impact on the internal validity. To mitigate this, the interviewees are told that their arguments will not be specifically mentioned together with their name, in order to assure certain confidentiality. Furthermore, the internal validity is strengthened by interviewing multiple employees of WDODelta who offer different insights and perspectives about the topic of research.

The external validity is a weakness in this research, because this is a single case study. The results are highly contextual because it is about one specific organization; Waterschap Drents Overrijse Delta. This means that the results of this research apply for WDODelta in particular, and do not apply regional water authorities in the Netherland. In terms of generalization this research is lacking. This generalizability is taken into account beforehand, but it is important to note in this part.

### 3.5.2 Reliability

Babbie (2010) stated that the reliability of a research is guaranteed when a different researcher can come to the same results (and conclusions) when the same research is repeated. To improve the reliability of this research, it is necessary to be specific in definitions, concepts, indicators and sources. Concepts are defined in the theoretical framework, in order to create a conceptual view for all potential readers. The operationalization is developed by formulating research themes (Section 3.3 Data Analysis) and includes an interview questions list in Appendix 1.

To improve the reliability of this research, a triangulation of data sources is ensured. A triangulation of data sources is needed to ensure that multiple perceptions are used to clarify the gathered data and verifying that a particular observation is correct (Stake, 2000). By using a theoretical framework based on scientific research, analysing multiple policy documents and doing personal interviews the triangulation of data sources is realized.

The personal interpretation of the gathered information by the researcher is influenced by personal subjectivity. The researcher works at Waterschap Drents Overijsselse Delta, which means that the researcher already has background information on some topics. This can have either a positive or a negative impact on the interpretation of the results. The positive side is that the researcher knows the context, so data can be put into context more effectively.



## 4. Analysis

This chapter presents the findings and analysis of all the sub-questions. Based on the theoretical framework the following research questions are formulated:

- *Which structural changes are foreseen or have been implemented in order to increase the focus on crisis management and how do they relate to HRO principles?*
- *Which social practices, i.e. cultural changes, are foreseen or have been implemented in order to increase the focus on crisis management and how do they relate to HRO principles?*
- *What is the dominant organizational change strategy in Waterschap Drents Overijsselse Delta and to what extent does this strategy support the alignment of structural and cultural changes towards crisis management?*

Findings will be based on the interviews with respondents representing the policy and operational level in WDODelta and several external actors. In addition to that several policy documents were reviewed. As has been mentioned in the previous chapters, the five (5) HRO-characteristics imply both structural and cultural measures to be taken within the organization of WDODelta. The structural measures should stimulate reporting and analyses of potential failures either in training of real-life settings with all involved internal and external actors, whereas the cultural measures would imply stimulations of learning skills in a multi-disciplinary environment. Finally one would expect, given the ambition of WDODelta's organizational management, alignment of both structural and cultural measures in order to integrate and increase crisis management considerations as part of day-to-day business practices. In order to determine to what extent HRO-principles would be helpful in integrating risk- and crisis management processes the research focused on the following themes:

- a. The organizational structure of WDODelta, crisis management, risk management and planning & control of crisis management exercises and real-life crisis response; as the main structural characteristics.
- b. Evaluations and training & education; as the main cultural characteristics.
- c. Organizational change strategy & governance, further integration of risk- & crisis management and organizational learning capacity; as the main elements of change-management.

First, a general description of the main tasks of WDODelta is given.

## 4.1 General description of the tasks of WDODelta

### *Characteristics of the control area of WDODelta*

WDODelta provides water management in Southwest and Central Drenthe, Northwest Overijssel and in Salland. Their area is approximately 255,000 hectare wide and contains 22 municipalities. WDODelta manages the water of rivers, streams and other waterways with a total length of approximately 7640 kilometres, of about 244.5 kilometres of primary watercourses, 142.1 kilometres of secondary watercourses, and purifying water from approximately 580,000 inhabitants on 16 sewage treatment plants (Crisisplan WDODelta, 2016). WDODelta has three main tasks:

- Flood control through the building and maintenance of dikes;
- Water system management, provide sufficient water and clean water;
- Water chain management, ensure the purification of wastewater.

The area of WDODelta is next to regional water authorities: Vechtstromen, Hunze en Aa's, Noorderzijlvest, Wetterskip Fryslân, Zuiderzeeland, Vallei and Veluwe and Rijn and IJssel. The area of WDODelta overlaps with the safe regions of IJsselland, Drenthe, North and East Gelderland, Twente and Flevoland (mainly IJsselland and Drenthe).



Figure 4 Care area of WDODelta (Source: <https://www.wdodelta.nl/over-ons/waterschap-verhaal/>)

### *Risks of WDO Delta regarding their main tasks*

The emphasis of the activities of the water board is on keeping the management area (prevention) safe. This is reflected in, for example, the safety standards for primary and regional watercourses, the National Water Management Act (NBW) standards, the water management and maintenance strategy of the water board and the priorities for enforcement tasks arising from the Water Act and the Authority. The occurrence of water crisis and its consequences is not always possible. The combination of the risk of accident occurring and its consequences together form the (residual) risk. In a risk assessment it is necessary to understand both the chances of occurrence and the effects (effects) in the event of calamities. The following events and the associated risks that can lead to crises (chances x consequences) at the water board are shown in table 7:

*Table 7 Events that can lead to crises at WDO Delta*

Failing primary dikes, secondary or other dikes;	Severe water pollution;	Long-term loss of ICT / Telecom;
Failing water system through extreme precipitation;	Long-term failure of a water purification plant;	Long-term loss of electricity;
Failure of water system due to malfunction of a water pumping station;	Long-term failure of a sewage pumping station;	Major fire at headquarters;
Failing water system due to prolonged drought;	Breakage of a pressure line;	Drop out of a large part of the employees (due to a pandemic for instance).

If one of the above situations occurs or if there is a threat the crisis organization is activated.

## 4.2 Structural characteristics of WDODelta

To discuss the culture aspects the following topics will be addressed: organizational chart & meeting structures, crisis management at WDODelta, risk management at WDODelta and planning & control.

### 4.2.1 Organizational chart & meeting structures

The main organizational structure, as defined in 2016 at the start of WDODelta is flat and entails eleven departments as is shown in the figure 5.

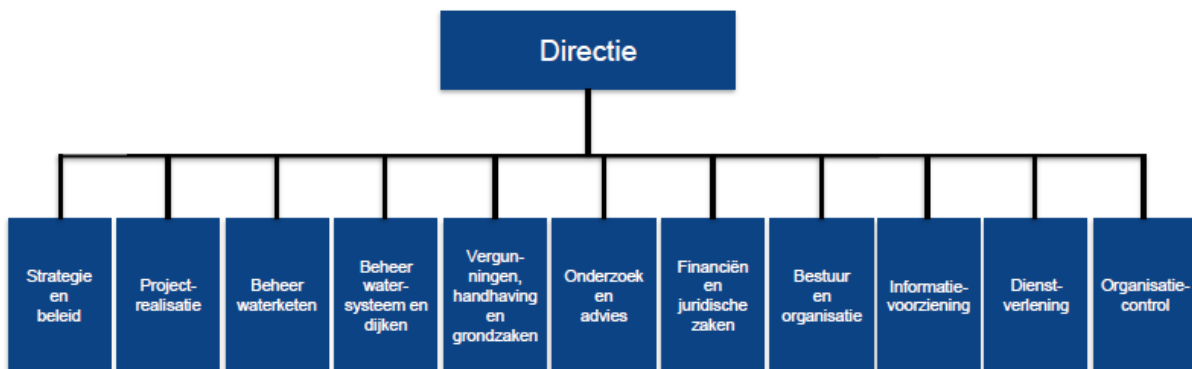


Figure 5 Organizational chart of WDODelta (Source: <https://www.wdodelta.nl/over-ons/>)

The direction board is accountable for the functioning of WDODelta and consists of three directors. They manage the overall organization and hold meetings every week. Eveline de Kruijk is the secretary-director (SD); the SD is responsible for the functioning of the organization. Other directors receive their mandate from the SD. The directors have different portfolios, crisis management is part of the portfolio of the SD. The direction board is the direct link with the democratically chosen general committee and the executive committee. The general committee is the highest governing body at WDODelta and decides about policies of WDODelta, laws, budgeting and taxes. The executive committee consists of five members and a chairman (the *Dijkgraaf*). The executive committee prepares the propositions for the general committee. The executive committee is responsible for implementing decisions of the general committee.

The management team consists of the members of the direction team (the three directors), all department managers (eleven) and the concern controller. They meet every four weeks on Monday. The management is responsible for everything within the departments, managing the departments and implementing policies and decisions from the executive committee.

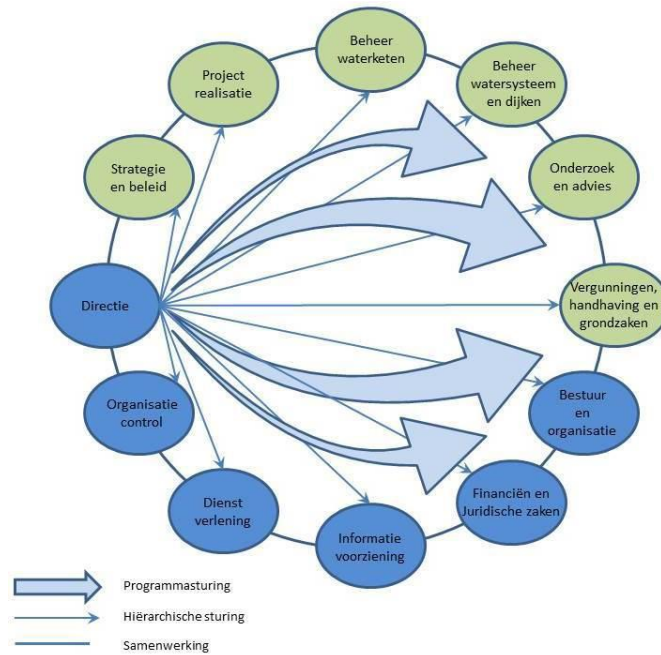


Figure 6 Organizational chart with steering principles at WDO Delta (Internal source: organization and formation report, WDO Delta)

Figure 6 shows the organizational structure and shows the steering principles as well. The big arrow represents program steering, the small arrow represents hierarchal steering and the lines between all balloons represent cooperation. There are six (6) primary departments:

- Department of Strategy and Policy: Setting the frameworks;
- Project Realization Department: Project implementation;
- Department of Water Chain Management: The implementation of management and maintenance tasks;
- Department of Water Systems and Dikes: The implementation of management and maintenance tasks;
- Department of Authorization, Enforcement and Land Affairs: Licensing, surveillance and acquisition and management of land;
- Department of Research and Advice: Investigate, monitor, evaluate and adjust (advice primary process).

WDODelta also has four (4) supportive departments and an organization control department.

- Department of Finance and Legal Affairs: Orientation on governance;
- Department of Governance and Organization: Orientation on organization and people and contributing to the organizational development task;
- Department of Information Providers: Orientation on information provision to primary- and secondary processes and the ‘Connection to the environment’ development task;
- Department of Services: Orientation on internal and external services;
- Organization Control: A generic control function that signals opportunities and failure in processes to achieve performance indicators, operates independently and reports to the management.

The two departments that are important in this research are the Department Governance and Organization, due to their involvement in crisis management and the Department Project Realization, due to their involvement in risk management.

The department Governance and Organization provides professional advice and support to the management. The department has a capacity of forty-two (42) employees. They have the following core tasks: governance affairs, relationship management, international cooperation, crisis management, regional coordination of muskrat control, human resource management, business management, organization development, QHSE (quality, health, safety & environment) and communication. On a structural level WDODelta has 1.5 FTE capacity available for crisis management over two (2) employees. At the level of crisis management there is a steering committee which meets monthly and consists of the secretary-director, the crisis coordinator and the managers of the three most operationally involved departments: water chain management, water system & dikes and governance & organization.

The department Project Realization ensures the execution of projects with the required quality within time and budget. They also take environmental, administrative and social consequences into account. The department has a capacity of fifty-eight (58) employees. Key concepts are predictability and traceability for environment, governance and organization. WDODelta is an organization which connects living, working and nature with water. The department Project Realization is directly involved in three organizational programs with their projects: Water Safety, Water Chain and Water Systems.

#### **4.2.2 Crisis management at WDODelta**

WDODelta is responsible for water system management (water quantity, dikes) and the water purification management (water quality) in its area. Unfortunately, situations may arise which will seriously jeopardize the water system management and/or purification management. WDODelta prepares for such situations, with the aim of preventing or limiting harmful effects. External developments, such as: climate change, changing laws and regulations, and cooperation at international, national and regional levels, has greatly increased the importance of proper preparation to harmful situations. Article 5.29 of the Water Act obliges regional water authorities to draft a disaster management plan. In line with rural developments, WDODelta has chosen to mention it as a crisis plan. The following information about the crisis management is used from the Crisisplan 2016 (WDODelta, 2016).

The purpose of the crisis plan at WDODelta is twofold: 1. Describe the structure of how WDODelta is organized during a crisis; 2. Inform involved employees, directors and network partners. Crisis management is based on a few assumptions, which are (Crisisplan WDODelta, 2016):

- The crisis management builds on the day-to-day operations. The roles of the members in the crisis organization are similar to their regular job (function & hierarchy).
- During a crisis, the organization will activate their crisis organization. Depending on the severity and size of the crisis a coordination phase will be chosen. The teams of the crisis organization represent the hierarchical levels of the regional water authority.
- When the crisis organization is active, those activities have priority. The focus is on the functioning of both water system management and purification management.
- For the continuity of and roles are filled by multiple employees.
- Safety regions are the main network partners of the regional water authority.

#### ***Operational documents at WDODelta***

Through proactive and preventive measures in daily work, WDODelta tries to reduce risks as much as possible. This includes the management and maintenance of water management structures, licensing and enforcement. Despite these measures, risks cannot be completely ruled out and things can always go wrong. For this reason, operational documents have been prepared for the most important risks which are evaluated and updated if necessary.

#### **Crisis response plans**

The crisis response plans, or disaster management plans, provide a more detailed description of the risks that directly correspond to the main tasks of water quantity, water quality and

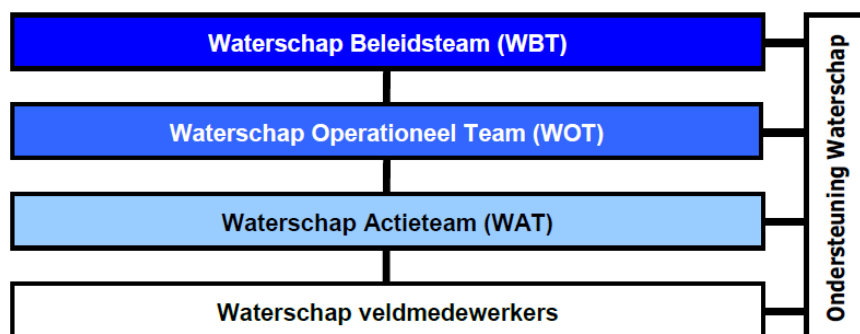
dikes and their control measures. The water board distinguishes the four disaster management plans: - Water pollution and water shortage, - High water levels, - Failure purification work and Water quality.

### Continuity plans

The continuity plans describe risks that endanger the continuity of the organization. Examples of this include the loss of staff, the loss of utilities, the loss of ICT, and the loss of facilities. Because continuity risks affect day-to-day operation, they can cause water-related risk as a chain effect, thereby damaging the main business. Thus, the loss of electricity can lead to water pollution, because a water pumping station does not function anymore.

### *The crisis organization of WDODelta and their structure*

The crisis organization is the part of the organization that comes into action when there is a (imminent) crisis. When there is no crisis, the crisis organization is inactive. The crisis organization of WDODelta consists of three teams and various roles. Each team and each role has its own tasks, powers and responsibilities. Figure 7 shows the crisis team hierarchy:



*Figure 7 Crisis team hierarchy of the crisis organization of WDODelta*

The teams work together in the *Actiecentrum Water* (Action Centre Water: ACW). The incoming information and the actions performed are continuously translated into a water image (depiction of the current situation). This team is depicted as the *Ondersteuning Waterschap*, Supportive team (*Actiecentrum Water*). The operational employees are responsible for executing the activities, as decided in the crisis organization, in the field.

The *Waterschap Actie Team* (WAT), the action team, is responsible for resource control. The action team develops scenarios, determines the concrete control measures and coordinates the use of people and resources in the field together with the people of the *Actiecentrum Water*.

The *Waterschap Operationeel Team* (WOT), the operational team, is responsible for the limiting the effects of a crisis. Based on available information, scenarios and resources, the



WOT outlines a crisis control tactic, taking into account all possible effects. The WOT forms the link between the WBT and the WAT and maintains intensive contact with the outside world.

The *Waterschap Beleidsteam* (WBT), the policy team is responsible for the actions of the crisis organization. The policy team is concerned with the policy aspects of the fight and thus determines the strategy of the action of the water board. The WBT is also responsible for the (inter) regional administrative coordination and coordination with water managers and other government organizations.

During a crisis the crisis organization has the highest priority at the WDODelta. The regular organization is therefore fully available to the crisis organization. The ACW provides all necessary support (content, communication, facilitation, ICT, legally, arbo and environment, etc.) to the crisis organization. The support is organized from the regular organization. In this way, no complex organizational structures need to be raised. The units themselves organize the completion of the requested support, including working hours.

#### *Coordinated approach at WDODelta*

WDODelta uses the 'coordinated approach' in tackling issues within projects, problems or under special circumstances. The coordinated approach is used when there is a need for overview, guidance and coordination. WDODelta applies the coordinated approach when:

1. Technical action of the organization is required but is not as "normal" circumstances;
2. The environment / press / media may experience impact from the event at hand.

The coordinated approach is used in order to close a gap between day-to-day business activities and being in a crisis. The coordinated approach, depending on the event, may lead to the escalation towards the crisis organization and has the following characteristics:

- During meetings the *P.B.O.B.-Method* (*Proces, Beeldvorming, Oordeelsvorming, Besluitvorming*) is used containing four steps: process agreements, imaging the current situation, judgment about measures to be taken and decision making;
- Delayed moment in time.
- Composite group of content experts supplemented with core utilization, including chairman, communication, process monitoring and information management.
- Go or no go moment for further up scaling
- Defined actions and action holder.

### *Up scaling towards the crisis organization and the coordination phases*

Crises differ in nature and size; the crisis organization adapts to the crisis at hand, which is done through different levels which is called ‘up scaling’. The levels are called coordination stages and are based on the need for coordination, including different type of teams and roles. Which coordination stage is needed, depends on four indicators:

1. Threat level, impact of the crisis at the source and in the impact area.
2. Administrative involvement, for coordination with partners and the use of powers in decision-making.
3. Financial impact, estimated cost of the inflicted damage and costs of the crisis response.
4. Crisis communication and media, to inform citizens and to media questions.

Based on the indicators, different up scaling criteria have been formulated for each phase, see table 8. If a criterion is exceeded, the crisis organization will scale up to the corresponding coordination phase. In addition to these "general" up scaling criteria, specific up scaling criteria have been formulated for the highest risks for up scaling towards coordination phases. These are described in their corresponding disaster management plans.

*Table 8 Coordination phases from the crisis organization of WDODelta*

Phase	Active Teams	Threat level	Administrative involvement	GRIP	Trigger in up scaling within GRIP
Regular	Regular management (Emergency response service)	The incident is controllable within daily routine	None	0	Meeting at the incident location
1	ACW, WAT	The calamity has impact on the environment	Chairman of WOT and the chairman of WBT are informed	1	Source control, very limited effects for area
2	ACW, WAT, WOT	A calamity with great impact on the environment	Chairman of WBT is informed	2	Source- and effect control, high impact for surrounding area
3	ACW, WAT, WOT, WBT	A disaster with very high impact and threatening to human and environment	Local (political) administrative dilemmas	3	Big impact on population, much attention concerning politics / government / media
4	ACW, WAT, WOT, WBT	The disaster has impact cross border (different regions)	Regional (political) administrative dilemmas	4, 5, RIJK	Municipal cross-border effects possible scarcity in resources. Need for national coordination regional (multiple safety regions)

### *Alarming and scaling up at WDODelta*

Each crisis begins with a notification, a malfunction or a warning. Within office hours, these notifications will arrive at the relevant departments. Outside office hours, the reports will be sent to the emergency response employee. The following types of notifications are used:

- Interference with technical installations by telemetry;
- Signals of high water levels via telemetry or prediction models;

- Extreme precipitation warnings via external providers;
- Complaints and reports about water quality or water quantity of external persons;
- Notifications of safety regions' reporting rooms about incidents.

The employee who receives the report verifies the information and makes an initial estimate of severity and size of the incident. If the report does not seem to fit in day-to-day business, the employee informs the responsible department manager about the situation or another responsible within that department. The person responsible assesses the situation using the up scaling criteria and, if necessary, decides to scale up and activate the crisis organization. If the decision to scale up is made, the regional water authority activates their crisis organization and calls the respective leaders and crisis officers to aid.

#### Informative up scaling

In addition to physical up scaling, informational up scaling also takes place. The WAT leader informs the Operational Leader of WDODelta when the crisis organization is active in coordination phase 1. The operational leader (the secretary-director) always informs the *Dijkgraaf*. In this way, all important people within the organization are aware of the situation and can, if necessary, take preventive measures or decide to scale up towards the next coordination phase of the crisis organization. The *Dijkgraaf* informs the board about the situation if he deems it necessary. This process of organizational and informative up scaling repeats itself when upgraded to Phase 2 and 3. The informative chain between the Operational Leader and *Dijkgraaf* is actively maintained throughout the entire crisis.

#### Decision making regarding up scaling

The line managers and the chairmen of the crisis teams have the decision-making powers to scale up towards the crisis organization. If the line managers or chairman of a crisis team decides to not scale up, they may be instructed by the operational leader or the *Dijkgraaf* to do so. For the WBT, such an indication may be given by the, the King's Commissioner or the responsible minister, as stated in Article 5.31 of the Water Act. Up scaling does not always have to follow the coordination phases from 1 to 4. The crisis organization could directly be activated in a higher coordination phase if it seems necessary.

#### Target times

There are no guidelines for attendance times for crisis organization officials. However, employees involved at the emergency response team of WDODelta are available 24 hours a day and do have target times to get in action or on site; their target time is 60 minutes.

### *Down scaling and aftercare*

After a crisis has been resolved, the crisis organization needs to be scaled down. The chairman of the highest active team decides to do so. It is possible to scale off at once, but this can also be phased. After scaling down the crisis organization, WDODelta returns to their day-to-day business. The heads of crisis teams are responsible for a smooth transfer. If a crisis is controlled, that does not mean that all the work has been done. Every crisis has a phase after the crisis which needs some actions as well, this is called: aftercare; the bigger the crisis, the longer and more intensively the aftercare. The aftercare is carried out under the responsibility of the regular organization. Fixed activities of the aftercare are:

- Recovery of damage to the water system and / or water purification plants;
- Personal aftercare for employees exposed to shocking events;
- Evaluation of the crisis organization's performance, the process evaluation.
- Legal and financial settlement of the crisis.

### *Crisis teams*

All the crisis teams include different disciplines, in order to ensure that the teams look at crises from different angles and approach different angles towards the problem at hand. The composition of the crisis teams is shown in table 9. This indicates which roles are represented in the teams by default and what their main task is. The chairmen of the teams are responsible for the composition of the teams and, if desired, can add roles to their team.

*Table 9 Crisis teams in the crisis organization of WDODelta*

Team	Roles	Task
Operational level	1. Leader in the Field	1. Coordinates activities in the field
	2. Operational employee	2. Executes measures for incident control
WAT	1. Head ACW/WAT	1. Chairman of the team and decision-maker about activities and measure.
	2. Leader in the Field	2. Informs and advises on the state of affairs in the field.
	3. Advisor WAT	3. Informs and advises about incident control (dikes, water system, quality).
	4. Advisor Communication	4. Informs about crisis communication.
	5. Advisor Judicial	5. Informs about judicial issues.
	6. Information coordinator	6. Coordinates the information for a current water image WDODelta.
	7. Information processor	7. Develops and builds a current water image WDODelta.
	8. Reporter	8. Supports reporting and visualizing the issue at hand.
WOT	1. Operational Leader / Head WOT	1. Chairman of the team and decision-maker about the tactics.
	2. Chairman ACW/WAT	2. Informs and advises on the state of affairs in the field.
	3. Advisor Water Systems	3. Informs and advises about the water system.
	4. Advisor Water Chain	4. Informs and advises about the purification processes.
	5. Advisor Communication	5. Informs and advises about crisis communication.
	6. Advisor Judicial	6. Informs and advises on judicial issues and legal matters.
	7. Crisis Coordinator	7. Informs and advises on crisis management processes.
	8. Information Coordinator	8. Coordinates the information for a current water image.
	9. Reporter	9. Supports reporting and visualizing the issue at hand.
WBT	1. Head WBT	1. Chairman of the team and decision-maker about strategy.
	2. Operational Leader / Head WOT	2. Informs and advises on the state of affairs in the field.
	3. Advisor Regular Organization	3. Informs and advisor about the day-to-day business.
	4. Advisor Communication	4. Informs and advises about crisis communication
	5. Advisor Crisis Management	5. Informs and advises about crisis management processes.
	6. Information Coordinator	6. Coordinates the information for a current water image.
	7. Reporter	7. Supports reporting and visualizing the issue at hand.

### Water Action Centre (ACW)

The Water Action Centre is a group of people who have access to the necessary facilities in a room. The ACW is continuously updated and monitors the situation at hand and create a current situational representation of the event: the Water Image WDODelta. The information coordinator is responsible for creating the Water Image WDODelta. Depending on the coordination phase and the nature of the crisis, there are several participants with different disciplines active in the ACW. In the ACW, the Information Coordinator collects the information, analyzes and translates it into a Water image (text and images). The Water Image is presented on a screen in the ACW. They use a specific system for this: *Landelijk Crisis Management Systeem* (LCMS, National Crisis Management System) which is also used by other crisis partners in order to share information between partners. The participants in the ACW discuss the Water Image and jointly determine what actions are required. The Information Coordinator will capture these actions in the Water Image.

### *Platform Crisis Management*

WDODelta is part of a platform: *'Platform Crisisbeheersing Waterschappen Midden-Nederland'* (i.a.: Platform Crisis Management). On regional level, with five (5) included regional water authorities, they aim to uniform crisis management and coordinate education, training and practice together. Within the Platform Crisis Management there are many colleagues that can support each other with all kinds of issues and questions.

### **4.2.3 Risk management at WDODelta**

Risk management is part of the department: Project Realization and Crisis management. Risk management is specifically focused on project realization. The department project realization is divided into four programs: Water System, Water Chain, Water Safety and Society & Organization. All departments have their own responsibility and budget to realize their departmental goals. Risk management at WDODelta is a continuous and systematic process that identifies, assesses and implements management measures and risk and opportunity objectives focused at projects. The purpose of risk management is to make and manage risks explicitly, to increase risk awareness and to deal with risks proactively and consciously. Proper risk management is crucial to carry out the project within scope, estimated time and cost. Risk management at WDODelta is carried out through the department of Project Realization. At this moment risk management has a capacity of 1.5 FTE with three (3) employees.

### *Risk management from a project perspective*

The work method used in risk management at WDODelta entails four-steps in order to continuously and systematically identify and control risks.

#### 1. Risk analysis.

The first step of risk analysis entails five elements (a, b, c, d, and e). A risk analysis helps identify what the most important risks are that may endanger the project outcome (expressed in time and money). Each project starts with a risk analysis using the RISMAN method which approaches five categorized risks: Politics, Financially, Legal, Technical, Organizational, Spatial and Societal. The risk manager facilitates these sessions. The following steps are taken in the risk analysis:

*1A: Intake.* As a start of the project, an intake is done between the project manager and the risk manager, an initial overview of the possible risks that may arise in the project are discussed and they start developing a risk file.

*1B: Risk Session: Determining the unwanted top event (UTE) and the corresponding risks.* The project team members identify what the unwanted top events (UTE) are and what risks are related to the UTE's. *1C: Risk session: Quantification of risks.* Each risk is quantified, basically by estimating the probability and its impact in time and money to realize a link with; planning, estimation and contract strategy. Risks are quantified three times (initial, current and residual risk). The initial risk entails the first quantification and reporting it in a risk file. The current risk is based on already implemented measures to mitigate the initial risk. The residual risks are the risks that are not addressed. These risks are updated periodically to monitor the ongoing situation.

*1D: Identify risk management measures.* For each identified risk measures are taken by the parties involved. The most important measures are SMART-formulated; the risk quantified, has a responsible actor (each risk and measure has an owner), schedule date and weighing of the measure in relation to the risk (cost vs. reduction of risk). Risk management measures are categorized in strategies: avoid, transfer, accept or control the risk.

*1E: Determine risk file.* The result of the risk analysis (steps a through d) is a risk file with designated risks, including: quantification, allocation, owners, management measures and action holders. The project manager is responsible for the risk file. The risk file becomes

part of the Plan of Conduct, which is determined by the client. When determining the risk file for the first time the risk profile is determined.

All identified residual risks added together form the risk profile of the project and that is quantified financially. The risk profile of a project depends on the conditions and developments in a project. If the risk profile is established, it is a condition that there is budget to cover at least the two biggest risks. The risk file is input for the budget estimate, planning and contracting.

## 2. Risk management.

Risk management is a cyclic process based on a risk file. After determining the risk file, control measures are implemented. The project manager remains responsible for managing the project and making strategic decisions and the project team members are owners of risks and the measures. Through periodic risk sessions and/or bilateral consultations between the risk manager and project team members of the project, risk information is collected and processed in the risk file. The frequency of updating the risk file depends on developments within the project, the risk profile of the project and the phase of the project. Generally, the risk profile decreases during the project, as fewer risks can occur and control measures have the intended effects.

## 3. Forecast and reporting.

The project manager reports monthly on the top five risks in terms of time and/or money, including its control and risk profile, based on an updated current risk file to the client. Consultations will be held during the monthly progress meeting with the client.

## 4. Deviations

There are four situations deviating from the standard risk management approach which require a report on which the client must agree:

- Depletion of the designated risk reserve by the occurrence of a risk or multiple risks;
- Depletion of the designated risk reserve by taking new risk management measures;
- When transferring risk reserves; this decision lies with the executive board;
- Situation when using a mandate.

Within risk management at WDODelta several points of attention are formulated. The Risk Manager is responsible for the establishment and implementation of the risk management process by means of monitoring, pursuing and facilitating. Exogenous risks are risks beyond

the responsibility of the project leader; these are submitted to the client. In order to learn from the risk assessment made it is important to evaluate regularly. Risks are estimated for each phase in the project. In addition to the designated risk reserve, a percentage of unlisted risk provision is also included in the budgeting. The estimated risk reserves should be made clear in the budget (through account numbers and cost centers).

**4.2.4 Planning & Control**

In the internal released program budget report 2015 is stated that the organizational resilience shows the relation between resilience and the identified risk. The resilience capacity consists of: - freely usable reserves, - unutilized taxation capacity, space in the operating budget, and – silent reserves. The internal released program budget report also states that the resilience capacity is based on the organizational budget reserves and the destination reserve. To be able to receive any unexpected financial setback the equity capital is the designated post. There are numerous risks that are taken into account, divided over the four programs: water safety, water system, water chain and society & organization. The internal released budget report has a resilience capacity section included. The resilience capacity is defined as the extent to which WDODelta is able to absorb and anticipate to a financial setback due to risks. The resilience is determined based on calculating the necessary resilience and divide that with the available resilience. If the resilience is equal or greater than 1 there is a sufficient degree of resistance. Through the use of risk simulation the necessary resilience capacity is calculated; the necessary resilience capacity is based on the expected (net) impact of risks. In the budget report (WDODelta, 2016) the following figure is included:

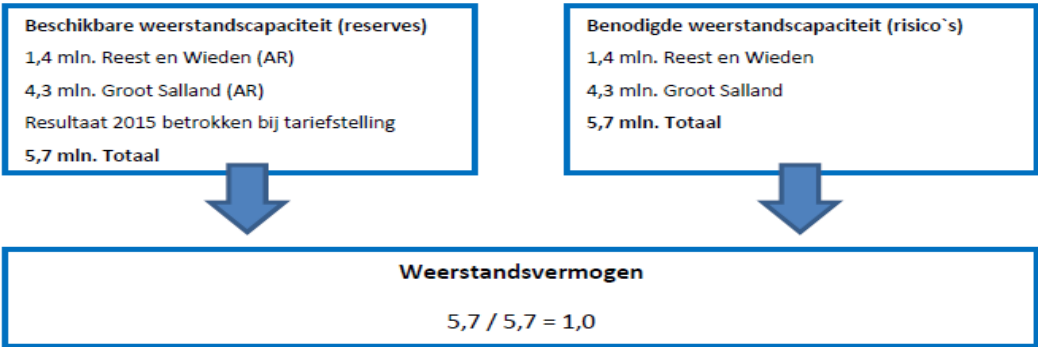


Figure 8 Resilience capacity WDODelta (internal source: budget report 2016)

Figure 8 shows that WDODelta has enough resilience capacity, but this calculation has not integrated the risk profiles of project; which means that the actual resilience capacity is lower and could be identified as unsustainable.



The risk manager at WDODelta explains that risk management is explicitly organized at project and program level at WDODelta and focuses on project risks: money and time related. There are sixty risk files (one of each project) with a high amount of risks at WDODelta; the department Project Realisation aims to cluster their risk files at program level (for example: water safety, water chain and water system). At this point, risk management starts at the start-up phase of a project, decisions about the goals and scope have already been made that may influence the control phase (after the project has been realized). Projects are not considered as day-to-day activities; therefore they are not included in any organizational PDCA-cycle (Plan, Do, Check, Act).

In daily management there are organizational risks; that is where risk- and crisis management come together according to the crisis coordinator at WDODelta. Disaster management plans are developed based on the identified high-impact risks within the departments and measures are formulated to control or mitigate those risks. To implement organizational risk management it is necessary to SMART-formulate (specific, measurable, acceptable, realistic, time-frame) strategic goals with corresponding Key Performance Indicators (KPI's) and an evaluation process; it would be beneficial to involve risk management for organizational risks in an earlier stage at WDODelta, according to the risk manager at WDODelta. Organizational risk management should, in potential, reduce incidents and crises because in an early stage the right decisions are made and measures are taken, but at this point this is only realized on project level and not on organizational level.

The team leader enforcement at the department of Water Systems at WDODelta argues that risk management is a daily activity in his department; on a yearly basis they optimize their processes and operational plans on events such as how to deal with calamities (or incidents), how to deal with oil spill in the water, water purification plants that do not function or a big fire with chemical pollution in the water.

Every department within WDODelta executes their own form of risk management implicitly. The PDCA-cycle is implemented at dike management and daily maintenance at WDODelta to realize evaluations and improvements. The specialist in water systems at WDODelta argues that it is important to focus on improvements and create 'ownership' to those improvement points. He explains that risk management could be approached from an asset management perspective; every dike could be tested based on specific criteria on a yearly basis (now this is done once in every five years). The use of audits would make risk

management more accessible due to information and knowledge gathering. According to the specialist in water systems organizational risk management would be too detailed and therefore not feasible; risk management is dependent on the discipline of employees to monitor and keep track of what needs to be done.

The crisis manager at safety region IJsselland (SRIJ) explains risk management is seen as an activity within the organization to realize business continuity on their core business processes, by: building resistance, recruit expertise or take measures within business management. Risk analysis at the SRIJ has been performed on the business processes resulting in three categorized risks: financial, reputation and disruption of the service relating to crisis management. Continuity plans are developed including arrangements and norms, like. At the SRIJ they are convinced that their employees have the knowledge to focus on risk management without external contractors. At the SRIJ the urgency to focus on risk management was created by their board; in the risk section of their budget report was stated that the organizational resistance capacity was estimated at zero (0) and the municipalities, as primary financers, were their risk-bearers. The board at the SRIJ wanted to improve the organizational resistance, organizational risk management was introduced in 2014; the staff, finance and policy departments were commissioned to tackle this issue with an organizational wide approach resulting in a structural financial support for risk management in the risk section within the budget report.

### *Planning & Control in crisis management*

Regarding Planning & Control in crisis management the PDCA-Cycle is mentioned in the Crisisplan (WDODelta, 2016) to continuously optimize their crisis management processes. It is stated that crisis management is not an independent task but an integral part of the regular tasks and activities. The crisis management system consists of:

1. capturing the way of working in documents;
2. Study program for crisis officials;
3. Collaborating with the network partners;
4. Anchoring the crisis organization in the regular organization.

To ensure quality within crisis management WDODelta uses a PDCA-cycle for the preparation phase (cold phase) and the response phase (warm phase).

Table 10 Preparation (cold phase) PDCA-cycle from the Crisis plan (WDODelta, 2016)

<b>Plan:</b> The establishment of activities in plans, a study program and collaboration with network partners in an annual plan.	<b>Do:</b> Executing the activities such as: updating plans, organizing training activities, coordinating activities with network partners.
<b>Act:</b> Adjusting the activities based on bottlenecks and implementing developments and recommendations in the new annual plan.	<b>Check:</b> Monitor progress and achieved results and measure if all planned activities are executed. Formulating bottlenecks and recommendations.

Table 11 Response (warm phase) PDCA-cycle from the Crisis plan (WDODelta, 2016)

<b>Plan:</b> Determining crisis management processes, developing the crisis plan, disaster management plans and operational plans. Educating and training the crisis officials.	<b>Do:</b> Crisis management in real-life, and testing if the crisis organization follows the structure and processes as agreed.
<b>Act:</b> Adjusting the crisis plan, disaster management plans and operational plans based on the improvement points. Developing new activities or courses for crisis officials.	<b>Check:</b> Evaluating crisis and training activities to measure if the crisis organization performs as desired and shows results to signal improvement points. The crisis coordinator monitors if improvement points are realized.

## Reporting

The team leader enforcement at WDODelta argues that throughout the organization the people that are involved in daily operational activities are aware of the risks, especially in the operational departments. On a national level the focus on risk management has intensified, due to the High Water Protection Program (in Dutch: *Hoogwaterbeschermingsprogramma*), which has its influence within the own organization as well. On a national level there is less attention to address topics such as the failures of a water purification plant; this seems to be considered as business continuity issues. However, it is necessary to have plans and procedures for operational activities like: the KEI-Brigade (Kamper Eilanden Brigade), High Water Brigade, Dike Guard Organization. Furthermore there are scripts and procedures for incidents like a big fire with polluted extinguishing water and how to deal with botulism. In the end, emergency response service employees have to estimate if a situation is ‘out of control’ based on his/her skill, experience and knowledge. The disaster management plans help the organization in their scenario thinking.

Within the organization the employees are aware of the operational risks and the potential crises that are involved. Both operational respondents argue that the development of crisis plans, disaster management plans and protocols receive the right amount of support from the organizational management and their motivation shifts downwards to the

departments as well. However, crisis management is considered as a secondary subject for most employees and that has impact on the way crisis management is interpreted.

#### Relationship management

In the region of the SRIJ (and WDODelta) water safety is important; ten out of eleven municipalities could have issues with water disturbances from the traditional perspective (high water levels). The new perspective in water safety is extreme precipitation which has a disrupting impact on local society; climate changes influence both intensity and frequency. The regional water authorities have an independent responsibility and an important societal function and are directly part of the democratic order while safety regions are an extension of the regional government (they are, officially, part of the municipal government because the primacy of public order and security belong to the mayor). The crisis manager at the SRIJ notices that WDODelta aims to professionalize the crisis management philosophy.

The crisis manager at the SRIJ explains WDODelta is not on the same level as the Ministry of Defence regarding crisis management. The Ministry of Defence detach a 'major' at the SRIJ for three (3) days a week to optimize their collaboration. This possibility has been explored with the regional water authority as well, but detaching an official for is considered as too intensive. He explains that a difference between the SRIJ and WDODelta is that at WDODelta they use the crisis organization to solve internal issues as well; similarities between the SRIJ and WDODelta are that with difficult issues the crisis management meeting structure is chosen. However, WDODelta actively invests in their collaboration and show major contribution to each other; reliable effort can be expected from the crisis coordinators at WDODelta in terms of relationship management.

On a structural level there are differences between HDSR and WDODelta; HDSR has structurally 2.5 FTE available for crisis management compared to the 1.5 FTE at WDODelta, which makes WDODelta's crisis organization vulnerable. The calamity coordinator at HDSR does praise the quality of relationship- and network management at WDODelta, considering their structural capacity, which results in close ties with the Ministry of Defence.

The crisis manager at the SRIJ acknowledges that it is important to improve the relationship as network partners in order to know what services they can provide to each other. The crisis manager at the SRIJ is an advocate in networking in new areas, because creativity and ideas arise at the edges of the organisation. If an organisation learns to think outside of their own organizational boundaries, then they can learn from each other.

Regarding the sharing and exchanging of information WDODelta aims to indicate the potential impact of risks and crises in collaboration with the SRIJ; it is difficult to indicate what information is useful for a network partner. The crisis manager at the SRIJ describes this first stage of information sharing as the negotiating phase, which is entered if organizations start with exchanging information. To prevent the creation of endless product lists which specify information criteria, it is necessary to start the dialogue about information that is already shared (about incidents, impacts, risks) and search for added value.

The connection with network partners can always be improved but a first start has been realized; there have been meetings with network partners like: *Rijkswaterstaat*, Safety Regions, Environmental Services (*Omgevingsdienst*) and the Ministry of Defence. Attending network meetings is crucial to get to know the network partners as well. The ambition is to perform scenarios simulation exercises together in order to get to know each other's capabilities are regarding crisis management, this important to improve collaboration during crises as well.

### *Improvement points for crisis management exercises in real-life response*

#### *Alarming & Informing processes*

Regarding alarming and informing the team leader enforcement argues that if there is not an incentive to activate the crisis organization with an incident, such as a fire, the emergency response service employees do not always report that they have participated in a CoPI. The team leader enforcement describes this as the *gray area* which should be explored more. The crisis manager at the SRIJ argues that it remains difficult to inform each other at the right moment; is it necessary to alert or only inform about a situation? The SRIJ has introduced that when a fire is reported WDODelta is informed through their alarming and reporting system. Does that message go to the right person, or should it be done differently? These questions are evaluated. These processes are considered as part of improving the situational awareness and situational understanding (monitoring what happens in the area and the ability to act adequately multi-disciplinary); a different mindset and organizational culture and structure are needed to be pro-active instead of reactive. WDODelta should be more risk oriented; the organizational management should initiate this from a strategic perspective by addressing subjects as: the grey areas in alarming, situational awareness and scenario thinking.

### Operational capacity

On the operational level less capacity is available nowadays; most operational activities are outsourced and WDODelta. Due to this transition - from an operational organization towards an instructive organization - WDODelta is dependent on contractors in their operational activities, which is considered as a risk for both risk- and crisis management according to the specialist in water systems. There are two solutions: instructing contractors and educate them to provide them the necessary knowledge or train coordinators within WDODelta to be in charge of the operational activities. The crisis organization is focused on coordinating a crisis from the office, but the work has to be executed in the field and that seems to be forgotten explains the specialist in water systems at WDODelta. WDODelta is dependent on external information that is delivered digitally. Technological innovations bring new risks; these should be inventoried in order to estimate potential impact. The organizational management is probably not aware of these risks (operational capacity, coordinators and technological risks); these should be expressed more clearly. If WDODelta wants to connect risk- and crisis management the organizational management should invest in a risk oriented approach from a strategic perspective.

The crisis manager at the SRIJ explains that the abilities to prevent and limit the impact of flooding are purely hypothetical. The last flood in the region of the SRIJ was in 2012, in the meantime when experience and knowledge potentially have been lost due to people leaving the organization. WDODelta depends on scenario simulation exercises, the collaboration between partners and their knowledge in crisis management. The crisis manager at the SRIJ explains that WDODelta is a different organization when it comes to operational preparedness compared to the primary emergency response services. If the SRIJ is alarmed for a fire during the night they anticipate immediately, the regional water authority often responds at the start of the next working day. During office hours the crisis management at WDODelta is solid, but their performance outside regular office hours is questionable; the 24/7 emergency preparedness at WDODelta is lower than at the primary emergency services.

### Process improvement points

The team leader enforcement at WDODelta explains that a process is implemented to prevent and eliminate mono-disciplinary substantive interference in decision-making at crisis teams: the chairman of the crisis team is someone different than the responsible department manager. The downside of the measure is that the crisis coordinator has to inform the chairman of the

crisis team about important information of the responsible department; resulting in a dependency on the crisis coordinator's presence to deliver information and knowledge.

#### Structural improvement points

The crisis coordinator explained that the crisis organization is used in situations where the organization considers being 'out of control' to provide the necessary resources (people, money, time). Through education, training and exercises competences and skills of crisis officials are improved. The calamity coordinator at WDODelta argues that quality management, reports and evaluation could be improved in crisis management processes. Structurally more capacity is needed to focus on those improvement points. Only 1.5 FTE is structurally available on crisis management level. A structural lack in capacity in the cold phase does not have to be a problem, if choices are made about prioritizing some topics within crisis management. The crisis coordinator at WDODelta argues the organizational management support both urgency and importance of crisis management. Crisis management is positioned on the same floor as the directors, realizing a close link between them to organize on crisis management a strategic level. The most ideal situation for crisis management would be to be directly linked to the director, without departmental interference. Policy on crisis management is arranged at secondary level, while the emergency response service is arranged at the primary level at WDODelta.

#### 4.2.5 Sub Conclusion

The first sub question guiding the analysis of the structural aspects was:

*Which structural changes are foreseen or have been implemented in order to increase the focus on crisis management and how do they relate to HRO principles?*

The main characteristics of the structural aspects are formed by the organizational structure of WDODelta and planning & control of crisis management exercises and real-life crisis response are analyzed.

It is noticed after a review of policy documents at WDODelta that risk management at WDODelta is mainly internally focused, which corresponds with Drennan and McConnel's (2014) definition that risk management are the processes involved in managing risk in order to achieve objectives, by maximizing potential opportunities and minimizing potential adverse effects.. Risk management at WDODelta is project based; the RISMAN method is used to identify project risks, which takes Politics, Financially, Legal, Technical, Organizational, Spatial and Societal into account. The risk analysis helps to identify what risks endanger the

project outcome expressed in time and money. It seems that knowledge is present inside WDODelta to perform risk management, but a strategic orientation is lacking and therefore strategic risk management is not implemented. There are risk files and risk profiles, but thus far a link with crisis management is not structural.

Relating to the theoretical framework, it seems that crisis management at WDODelta is externally focused and takes the multi-disciplinary aspects of crisis management into account; their structure relates to the crisis management structure in the GRIP. The crisis organization of WDODelta aims to form crisis teams with a similar structure as the primary crisis management actors in order to match the powers and responsibilities with the primary actor. It is noticed that the crisis organization of WDODelta can be used both for internal and external crises, from that perspective they differ from their network partners. The operational preparedness at WDODelta is different, inside office hours the emergency response is solid. The crisis organization shows that hierarchy is an important factor, which contradicts with the HRO-principle: deference to expertise.

The organizational resilience and the planning & control in risk management do meet the criteria of HRO's. Risk management is about analysing risks, taking appropriate measure which is similar to the crisis management processes, the difference is that risk management is focused on their own processes and activities. At this moment, risk management has implicitly an appropriate place at WDODelta; protocols and activity lists become active when weather forecasts predict critical situations, but it is not explicitly managed from an organizational perspective. The organizational management, and the board, should embrace risk management; it should be implemented throughout the entire organization. Knowledge is implicit; knowledge disappears if an expert leaves the organization because their work methods are not always written down in plans, procedures or policy. Risk management seems organized differently in every department, from a HRO-perspective it would be beneficial to invest in an organizational wide approach throughout the different departments.

Regarding planning & control in crisis management it is important to mention that HRO-principles are partially met. Crisis management is considered as a secondary theme for most employees and that has impact on the way crisis management is interpreted. The Crisisplan (WDODelta, 2016) and the disaster management plans are written on outlines, because every disaster is different regarding context and scale. The ambition to be a reliable crisis partner of the safety regions can be realized if WDODelta invests in improving the:



situational awareness, risk analysis and risk awareness. Investing in information sharing with network partners improves the mutual situational awareness and situational understanding. The collaboration between SRIJ and WDODelta is mainly focused on crisis management, not formally organised on risk management. The structural capacity affects the vulnerability of WDODelta regarding crisis management negatively.

When considering improvement points for crisis management it seems that WDODelta needs to invest in multiple areas to improve HRO-disciplines. Findings show that a lot of grey areas are noticed in alarming & informing processes, more knowledge about those processes is needed. It seems that employees unjustifiably think that their knowledge of the situation, the environment and their own group is complete, which shows a low preoccupation with failure. On the operational level it seems that there is a dependency on contractors which caused by a low operational capacity; there is no organizational policy to reduce these risks, this shows a low sensitivity to operations. Furthermore, the operational level argues that the organizational management is unaware of the corresponding risks of a low capacity, which also shows signals that the sensitivity to operations is not high enough. Regarding process improvements there seems to be a dependency on the crisis coordinator; a revision of the processes is needed. A good development would be to invest in structural capacity in crisis management to improve the resilience of the crisis organization.

### **4.3 Cultural characteristics in WDODelta**

As the main characteristics of cultural changes the risk awareness, training & education and evaluations at WDODelta are analyzed.

#### **4.3.1 Risk awareness**

The organizational culture at WDODelta regarding crisis management is different compared to other primary crisis management partners according to the team leader enforcement; it could be characterized as passive and reactive, while the strategic level is proactive and involved. The risk manager at WDODelta claims that organizational culture is an important factor in realizing strategic risk management. He describes that he notices a certain smugness or complacency within WDODelta, during risk sessions employees express themselves as followed: “Why should we change our approach, nothing bad has happened!” or “Why should we change if it works?” The risk manager at WDODelta argues that this situation creates a fertile soil for failures and blindness for risks. It is the task of the organizational management to gain support for the ‘new approach’. More capacity is needed on risk management to

improve risk awareness. When recruiting new people they focus on competences and select people that have no prior experience in risk management. A risk manager is a communicator and a facilitator in the organization and strives for addressing problems. ‘Learning on the job’ is an important element; a training program is developed to train new risk specialists. Implicitly risk management has a high standard within the organization, but explicitly (on paper) it isn’t there yet; to improve the connection (or relation) between risk management and crisis management this should be made explicit including organizational risks.

Risk awareness should improve through organizational management according to the calamity coordinator at HDSR; a manager and their employees should be able to open up for issues, problems and bottlenecks. The calamity coordinator at HDSR explains that they have a ‘red button system’ to report issues that have to be solved. Practical issues should be solved as fast as possible; otherwise people won’t report issues or find solutions by themselves.

The calamity coordinator at HDSR argues that the organizational management should, through a top-down approach, create personal safety in terms of: openness to discuss issues without facing consequences. Experts approach their work with a mentality like: “nothing will happen”, what misses are people that think about the potential impact: “what if a crisis does happen?” Employees miss a platform to discuss risks; this has to be created in some way by the organizational management. The issues and/or concerns from the operational level do not reach the organizational management at HDSR; a reason for this could be that concerns or issues are not desirable at that moment due to their financial consequences. Within the regional water authorities a lot of issues are solved due to the loyalty and creativity of employees to their jobs to solve their own issues.

When addressing risk management and risk awareness it is important to maintain an organization wide approach; the management, policy and operational level should be involved. It is important to frame in a popular way that employees can relate to; the phrase ‘High Reliability Organizing’ has been used but was unsuccessful.

#### Risk oriented approach

Crisis management is an extension of daily management and risk management according to the specialist in water systems at WDODelta, the difference is that in some situations it is necessary to coordinate activities organization wide. Dike management becomes explicit when water levels rise; disaster management plans, such as the crisis plan, are activated. The scenarios are written, but they never prevail as described. The officials in the crisis

organization should have the right competences and knowledge to manage a crisis. At this point the structure of the crisis organization has been formalized; employees are chosen for a crisis role but optimizing and updating is always necessary.

The team leader enforcement argues that WDODelta needs to invest in a risk oriented approach to improve the link between risk- and crisis management. Within a risk oriented organization resources are invested in scenario thinking and managing those risks. A connection between policy employees and operational employees should be realized in order to do so. Communication is crucial in a risk oriented approach; explaining the reason for new policies in a constructive way is important to gain support from the employees. The team leader enforcement at WDODelta argues that most employees are process oriented and lack risk awareness capabilities. A risk oriented approach helps improving a connection with the environment; both in relationship management and area knowledge.

The crisis manager at the SRIJ argues that WDODelta is process oriented while safety regions are risk oriented; this could influence how organizational risks are interpreted in the organization. Sometimes it is necessary to create a window of opportunity to address an organizational risk. To address information security at the SRIJ they hired a mystery guest to reveal sensitive information about the organization. This greatly increased the urgency to address information security; a similar method could be used when approaching subjects as connecting risk- and crisis management. It is possible to wait for a window of opportunity (caused by an event) or create a window of opportunity (hiring a mystery guest for example). In risk awareness small issues could be symptoms for larger issues, therefore it is important to create a setting where people can report small disturbances.

#### Organizational knowledge

The team leader enforcement at WDODelta explains that the merge towards WDODelta causes change within the departments, teams and the motivation of employees. It seems difficult to express the needs and problems between departments; a lack of interdepartmental and organizational knowledge seems to be present. In his department they focus on gaining departmental knowledge by organizing meetings between different disciplines and showing each other their daily operational activities. The team leader enforcement argues that an organizational policy is missing on the topic of improving organizational knowledge. Managers should actively express their expectations regarding improving organizational knowledge; this could be realized by formulating policy, discussing this topic with team

leaders and developing processes. The team leader enforcement argues that the merge was successful, but transitions and changes are implemented in a high pace which could result lacking support; therefore it is important to involve employees actively in upcoming change processes.

### **4.3.2 Training & Education**

When reviewing the crisis management system it seems that Training & Education plan is missing at WDODelta. On the intranet of WDODelta they have a page dedicated to the crisis management to consult all plans and procedures. It is impossible to get insight about upcoming events. However, a general announcement is written about the regional scenario simulation exercise '*Oefening Deining en Doorbraak*' organized with the Platform Crisis Management that will be organized at the end of September 2017. At the page of the crisis management on intranet they refer to the Platform Crisis Management study guide. The Platform Crisis Management develops a yearly study guide to facilitate education, training. For all roles in the crisis organization they offer various courses to improve competences and knowledge about crisis management (processes).

The crisis organization of WDODelta has a role book; every crisis role has tasks, responsibilities and powers. The crisis organization has an event calendar for education, training and scenarios simulation exercises. There have been two thematic 'crisis weeks' organized at WDODelta to focus on crisis management. The first 'crisis week' (in June 2016) was focused on basic education in crisis management and the second 'crisis week' (in June 2017) was focused on scenario simulation exercises. WDODelta also participates in educational and training activities of the Platform Crisis Management. WDODelta practices with safety regions to stimulate cooperation and to learn from each other. Furthermore, a regional scenario simulation exercise is planned: '*Oefening Deining & Doorbraak*'; during a week five regional water authorities, the Dutch Army, two Safety Regions and Water Management Centre Lelystad test their crisis organization in September 2017. The crisis coordinator at WDODelta argues that a lot has been realized to improve crisis management since 2016.

Recruitment and competences regarding crisis management within the WDODelta is a sensitive topic according to the crisis coordinator at WDODelta; in recruitment of regular functions the crisis management competences are not included in the criteria. During the recruitment of the last department managers the competences for crisis management were not

taken into account; every department manager or director should be able to take the lead during a crisis and therefore have the right crisis management competences. Regarding the operational level; it is important that people can be included in the emergency response service and that there is enough capacity to manage crises. The crisis coordinator at WDODelta argues that the most ideal system is a competence system where you can test the competences and offer the right education for every crisis official.

Crisis management has received a lot attention since the merge according to the operational respondents; the structure is formalized, disaster management plans have been updated, two thematic crisis weeks have been organized to educate and train people in crisis management and a regional scenario simulation exercise is planned in September 2017. The collaboration with regional water authorities in the Platform Crisis Management has a high contribution in facilitating education, training and exercises. Lately, all types of issues are actively coordinated with the use of the coordinated approach of the crisis organization, also on a mono disciplinary level in departments, resulting in better knowledge of the the crisis management processes throughout the entire organization.

The boundaries in decision making, powers and responsibilities and the position of WDODelta in crisis management are considered as a grey area; that needs to be explored more through education, training and exercises according to the team leader enforcement at WDODelta. After a CoPI training of the safety region Drenthe in 2016 they evaluated together and discussed questions like: - What are the interests of the different involved crisis partners? - When do I activate towards the crisis organization? - Where are the boundaries to facilitate and to intervene to maintain the interests of WDODelta? The team leader enforcement at WDODelta actively reports and discusses the performances with his employees; this is not a formalized work method between team leaders, all team leaders are responsible for their own approach towards crisis management. The department managers and team leaders select their crisis officials based on competences, expertise and knowledge; important competences that have to be considered are the ability to recognize the interests of other organizations and estimate how that affect the interests of WDODelta. Evaluating incidents, calamities and exercises are important to measure the performance of the liaisons. The team leader enforcement claims that the liaisons that participate in potential CoPI's have the skills to intervene be a representative of WDODelta.

When discussing education, training and exercise within the crisis organization, the specialist in water systems at WDODelta argues that the quality of education and training in crisis management is questionable. He claims that the structure of the educational program for crisis management should be evaluated and advises to focus more on training and testing skills and competences. A good structure would be to focus on a specific theme, like creating a situational risk image or informing and alarming processes, within crisis management processes and then: - Providing a theoretical framework (education) - Training the acquired knowledge in practice (training) – Organizing a scenario simulation exercise to test the new acquired skills and knowledge (exercise) – Evaluating to measure if the quality is sustainable. Norms have to be formulated in order to be able to audit, test and evaluate.

The specialist in water systems at WDODelta facilitates training in crisis management for operational employees on a yearly basis where he discusses crisis management processes and the disaster management plans. The information about crisis management has to be repeated more often to be memorized, because crisis management is not part of their daily activities. He emphasizes that this is not organizational policy, but he facilitates this in his department because crisis management is a task within the operational departments; they are responsible for a professional deployment and have to instruct and inform their employees about the crisis management structure and processes.

Despite the improvement points for the crisis organization the organization is still in control according to the specialist in water system; due to the prior experience and knowledge of the crisis officials. The formalized role of regional water authorities as a crisis partner in the Law of the Safety Regions (*Wet van de veiligheidsregio's*) realized that WDODelta implemented the current crisis management structure. Before the emergency response was rather uncoordinated and realized with a best effort motivation; doing what you think is right to do. The specialist in water systems at WDODelta acknowledges that the professionalism of crisis management at WDODelta has improved.

#### *Multi-disciplinary training & education*

The crisis manager at the SRIJ explains that there were some challenges after a scenario simulation exercise 'Connecto' in 2014 (before the merge). One of the goals was to practice a network-centric approach to explore the possibilities for the regional water authority; results were that information sharing between network partners was necessary they could embrace the network-centric method, with a system like LCMS, to realize that. The crisis manager at

the SRIJ argues that more development would have been possible at WDODelta than they show now; reasons for their stagnation could be the merge towards WDODelta which diverts in general, another reason could be the role of the Institute of Physical Security (*Instituut Fysieke Veiligheid*) regarding the costs for implementing the LCMS system.

The SRIJ expresses their need of a liaison that has a mandate and decision-making powers when there are water-related crises. He argues that at a ROT's WDODelta sends their secretary-director (WDODelta's Operational Leader) which makes sense considering the mandates and expertise. However, a struggle is noticeable where the operational leader has to choose between participating at the ROT and WDODelta's crisis organization, which is a difficult decision. Competences that a liaison of WDODelta at a ROT should have are: expertise on identification on what is going on and being able to separate major and minor issues; mono-disciplinary details are not important in a multi-disciplinary setting.

At CoPI level it is more difficult to identify the necessity of WDODelta participating in a CoPI, because CoPI's are focused on incident control at the source. They are allowed to participate if the incident affects WDODelta in some way. The liaison takes note of the incident control strategy and could advice to revise the incident control strategy if it: negatively affects WDODelta and/or has greater ecologically and financial consequences than expected. However, this is considered as a difficult task in a CoPI, especially if you lack any mandate or formal decision-making powers. The officers in a CoPI have a different role in their organization than an emergency response liaison from WDODelta.

At a RBT's (Regional Policy Teams) the *Dijkgraaf* of WDODelta has to participate. The crisis manager at the SRIJ argues that all municipalities would appreciate his participation in a RBT, because he is an involved board member who has knowledge in his field of expertise. WDODelta shows their interest on a multi-disciplinary level and that is appreciated. In RBT's both political and administrative skills are needed, the crisis manager at the SRIJ estimates that other members of the board at WDODelta would not fulfil the crisis role well enough considering their competences and experience.

Every regional water authority has their own processes to select their people for the crisis organization. Recruiting on competences is difficult at regional water authorities, because crisis management is a secondary task. During regular job recruitment crisis management competences are not taken into account, at HDSR they discuss crisis management competences in an informal setting. Most crisis officials are selected because

due to their hierarchal position in the regular organization or they perform well in their job and have specific skills or knowledge about systems or processes. It is important that the crisis officials are able to perform under stress, pressure and tension. According to the calamity coordinator at HDSR, the following crisis management competences are important: expertise at their own discipline, expertise at multi-disciplinary level, being able to take perspectives of other organizations into account, being able to work hierarchical, being able to formulate and advise short and concise, and being a team player.

### 4.3.3 Evaluations

In the Crisis Plan (WDODelta, 2016) it is noted that all calamities, crisis and simulation exercises are evaluated in order to signal bottlenecks and formulate points of improvements. However, after reviewing the crisis management system it seems that since the merge towards WDODelta there have not been any documented or reported evaluations for the actual real-life calamities where the crisis organization was activated. There were at least six (6) calamities in 2016 and at this point six (6) calamities in 2017, but no formal evaluation report has been found. The crisis management page at the intranet of WDODelta does include an evaluation form which could be used by crisis officials to give feedback about facilities (meeting room, resources, catering, software/hardware) and crisis management processes, but nowhere is formulated that it is obligated to use that.

One evaluation report has been found of the thematic Crisis Week in June 2017, but since there has not been an agreed format for evaluation reports this evaluation report looks rather simplistic. It shows a description of the thematic crisis week and includes seven recommendations with no further explanation or SMART-formulation and does not show action holders, it is unclear what is done with the recommendations. According to the team leader enforcement at WDODelta all incidents, exercises and evaluations are evaluated with those involved and the crisis coordinator, which results in improved: coordination, representing of WDODelta, environmental awareness and team work according to the team leader enforcement at WDODelta; so probably this is done implicitly.

An ongoing discussion within WDODelta is whether it was justified to activate the crisis organization or not. The crisis coordinator at WDODelta explains that he has experienced multiple GRIP 1 situations at WDODelta where: - a liaison showed up at the CoPI but did not report that and/or informed the management - the choice or consideration whether or not to show up is not reported. Employees argue: “The situation isn’t that big of an issue, we can



solve this incident ourselves” These situations are a problem, because the employees do not follow the crisis management processes and do not seem to understand the necessity of reporting and sharing information to the office. If the situation escalates, then WDODelta will experience an information delay resulting in potential financial or judicial consequences. The employees need to realize that they, as a liaison, should not be individually responsible. If WDODelta wants to improve their risk awareness, these performances should be evaluated thoroughly and the crisis coordinator aims to do so.

The calamity coordinator at HDSR argues that every regional water authority has a unique culture. At WDODelta two cultures have been mixed as a result from the merge; during the first six months in 2016 this was noticeable, but slowly these differences are less prominent. HDSR is characterized by an informal culture; this is shown by giving trust, employees are allowed to perform errors to some extent. The calamity coordinator at HDSR thinks that WDODelta is less informal than HDSR. Regarding differences in crisis management on a cultural level, the calamity coordinator at HDSR explains that she noticed resistance to the concept of ‘crisis organization’ during a basic education course in crisis management in the crisis week in 2016. The usefulness and necessity are not always understood; the advantages of using the crisis organization should be expressed actively. To evade problems with negative connotations about the concept of the ‘crisis organization’ a new term is introduced: ‘the coordinated approach’. However, the underlying issue could be that activating the crisis organization is not perceived as helpful for problem solving. It is important to show results as well regarding the use of the crisis organization. According to the calamity coordinator at HDSR results need to be provided within two weeks, otherwise the use of the crisis organization could be interpreted as non-effective. Advantages such as: providing urgency, forming teams with the right people involved, coordinate activities (during summer time with less capacity), mobilization of resources and insight in capacity spent on the issue should be expressed actively.

#### **4.3.4 Sub Conclusion**

The second sub question guiding the analysis of the cultural aspects was:

*Which social practices, i.e. cultural changes, are foreseen or have been implemented in order to increase the focus on crisis management and how do they relate to HRO principles?*

The main characteristics of cultural changes formed by the risk awareness, evaluations, training & education are analyzed.

A prerequisite for HROs is that risk awareness is strived for. Respondents argued that risk awareness is something that should be invested in at WDODelta through focusing on a risk oriented approach and improving organizational knowledge. On the operational level a passive and reactive culture is noticeable. More structural capacity is needed in risk management to realize that. At this moment WDODelta is process oriented, respondents argue that to improve risk awareness a more risk oriented approach would be necessary. It is necessary to show how the (impact of) risks affect the business processes and activities to open up the dialogue; using low categorized risks (high chances, minimal impact) instead of high categorized risks (low chance, high impact) seems more effective because employees relate more easily to risks that affects their activities directly. As long as risk awareness is not optimized, WDODelta will not be able to function as a HRO.

Regarding training & education it seems that quality management is lacking. The crisis organization has a standalone study program, excluded from regular training programs of the organization. Both documentation about participating in training & education and the quality of training & education is lacking. Respondents argued that a revise of the study program in general would be beneficial. The policy and the operational level seem to contradict each other in their statements, the policy level argues that multi-disciplinary knowledge is lacking and the operational level claims that their liaisons have right skills and competences to participate in a multi-disciplinary environment; exercising intensively with safety regions seems necessary to explore the grey areas in alarming, informing and decision-making. Furthermore, training & education seems to be focused on the crisis officials in the office; the operational level seems to be forgotten. On the operational level the departments have the responsibility to instruct and inform their employees about crisis management processes; but an organizational policy seems to lack on this area.

Considering recruitment & selection WDODelta has the ambition to test on competences, but that seems ambitious, because crisis management is interpreted as a secondary task. Therefore, the crisis organization is dependent on personal competences and is not able to invest a lot of capacity to train every individual intensively. The safety region expressed their needs regarding competences and skills from liaisons; WDODelta aims to fulfill those needs as much as possible.

Evaluations are an important tool to improve risk awareness and crisis management processes. In policy at WDODelta it is mentioned that Evaluations have to be realized for all events where the crisis organization was activated, but in practice no formal evaluation report has been found. Since the start of WDODelta only one evaluation report has been found, which shows signs of simplicity. Regarding quality management it seems that WDODelta can improve a lot, reasons for slack in this area is the structural capacity available for crisis management.

#### **4.4 Organizational Change Strategy**

To address organizational changes the change strategy & governance, organizational learning related to crisis management, differences and difficulties between risk- & crisis management, further integration of network management and further integration of risk- & crisis management are analyzed.

##### **4.4.1 Organizational change strategy & governance**

To improve the chances of a successful merge WDODelta formulated a governance & change strategy. As a side note, crisis management is not included in this strategy. At WDODelta they focus on improving six challenges between 2016 and 2025. The name of this program is: 'WDODelta Works!' WDODelta have two approaches to realize their ambitions: organization-wide development and optimization of business operations. The six challenges are:

1. Being in connection with the environment;
2. Being Excellent in service;
3. Working on climate change impacts;
4. Optimizing the water infrastructure;
5. Contributing to circular economy;
6. Working efficiently.

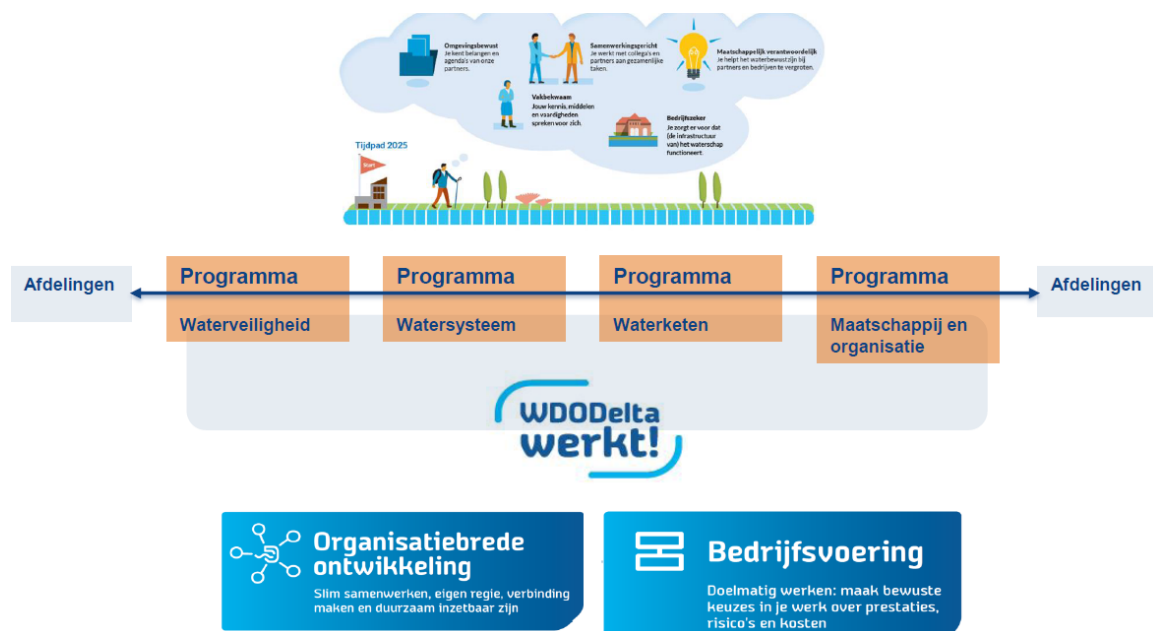


Figure 9 Organizational Structure 'WDODelta Works!' (Internal source: WDODelta Works! Structure)

The program of 'WDODelta Works' has an organization wide approach. The structure is shown in the figure above. The aim is to integrate the program in all organizational programs (represented with the horizontal line through the programs) with a focus on organization wide development and business management.

The cloud in figure X shows five points of attention:

- Environmental awareness, knowing the interests and agenda's of network partners;
- Cooperation-oriented, work together with colleagues and partners on activities;
- Expertise, your knowledge and competences are known;
- Reliable, realize that WDODelta's infrastructure functions;
- Societal responsibility; improving knowledge about water management at partners.

### Organizational learning capacity

The organizational management support their employees to formulate a personal development goal and let them invest time to reach their developmental goal during cooperative sessions with colleagues. Each employee has a personal budget of 5.000 Euros over five (5) years to invest in their personal development. The info graphic of 'WDODelta Works!' shows that WDODelta strives for organization wide development through multiple measures. WDODelta aims to stimulate organization wide development in their program 'WDODelta Works!' Teams aim to develop on smart collaborations, self-management and connectivity. There is also a focus on sustainability of employees.

### Smart collaborations, self-management, connectivity and sustainability

Teams aim to develop collaboration. Employees are expected to use their skills and involve their colleagues; they are guided by the question: Is this smart to do? WDODelta aims to improve collaboration between colleagues and express the need to be clear to each other in assignment and appointments.

Employees are expected to show responsibility and take initiative by indicating opportunities, discussing bottlenecks and by realizing solutions. Employees take actions where possible and involve others if necessary. Employees of WDODelta are expected to be focused on achieving the intended results.

Furthermore, employees show interest in others' work, their views and perspectives. They are involved with their colleagues to improve connectivity by asking questions and having conversations with each other. As a colleague you are expected to support each other if possible. All employees show who they are and where they stand for.

To invest in employees' career and development WDODelta provides numerous services provided in the form of: mandatory courses (for safety reasons or to learn new systems) and optional courses to invest in competences. WDODelta also aims to improve mobility through internal soliciting, meeting cycles with supervisors and thematic weeks to invest in organizational knowledge. To increase vitality WDODelta has reintegration policies and lifestyle coaching.

### *Business management*

The info graphic of 'WDODelta Works!' shows that in business management asset management is used as basis principle. WDODelta aims to improve efficiency and make informed decisions taking performance, costs and risks into account. The overall business management model in the info graphic is displayed in figure 10.

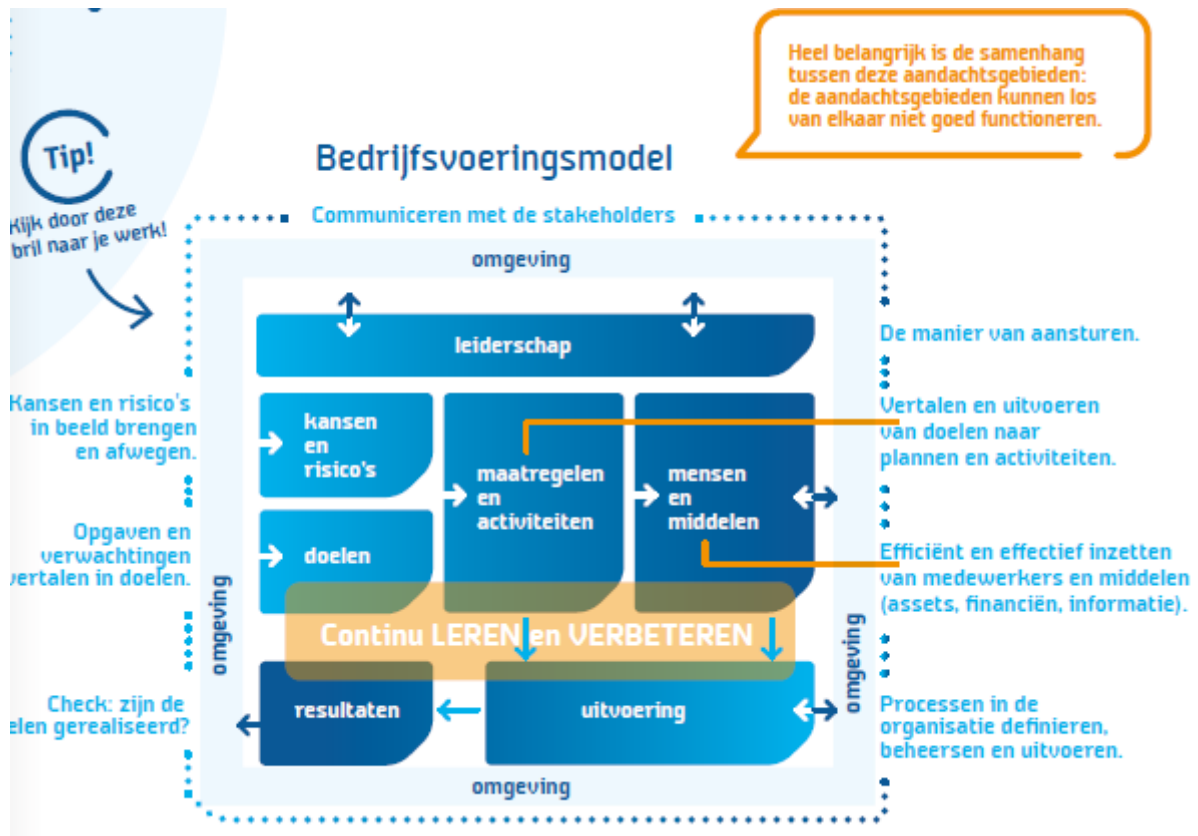


Figure 10 Business management model of 'WDODelta Works!' (Internal source: Info Graphic WDODelta Works!)

The business model shows, translated, following the arrows: leadership, opportunities and risks, goals, measures and activities, people and resources, continuous learning and improving, executing (operational) activities and the results in a cyclic process. Leadership represents the steering of the organization. Opportunities and risks have to be taken into account when determining goals. Then measures and activities are formulated and people and resources are allocated to those measures. Subsequently the measures activities are executed, showing results in the end. This process is continuously monitored and improved through the use of the PDCA-cycle.

#### 4.4.2 Organizational learning related to crisis management

Regarding organizational learning capacity, the risk manager at WDODelta argues that the Check and the Act of the PDCA cycle are a missing link at WDODelta; auditing business processes could improve this. He argues that implementing structural processes like auditing, improvement plans and creating an analysis process are ways to improve the organizational learning capacity. The specialist in water systems at WDODelta argues that the PDCA-cycle is crucial to improve the organizational learning capacity; improvement points have to be prioritized and listed on the agenda during meetings. After a scenario simulation exercise it is important to evaluate, monitor developments and realize points of improvements within a

short time-frame. Ownership of improvement points is important, this would be the right thing to do for processes and protocols in WDODelta; it is a matter of prioritizing and organizing.

The organizational learning capacity depends on the employees, some people learn faster than others, which are considered as personal competences according to the calamity coordinator at HDSR. The organizational management should provide the necessary knowledge and skills to employees to solve problems and allow them to make errors; eventually it is important that the organization is capable to learn from their mistakes. Within the Platform Crisis Management a PDCA-Cycle is implemented to realize a learning-loop for calamities and exercises with scenario simulation. HDSR expects from WDODelta as a network partner that they support and observe each other during scenario simulation exercises in order to learn from each other. Evaluations and improvement points are used as input for new training courses and exercises. Knowledge, expertise and experience are needed to adequately manage calamities and crisis.

Accountability and hierarchy are elements that have to be eliminated during evaluations to increase learning capacities. The crisis manager at the SRIJ notices that employees from the same hierarchal level evaluate easily together; when a superior intervenes the learning capacity decreases. Employees that are held accountable will shut themselves down in terms of openness and disclosure and therefore the learning capacity decreases.

The crisis manager at the SRIJ explains that he is impressed by the short period that WDODelta needed to organize just after the merge; they continued their processes that are of societal importance as quickly as possible. WDODelta seeks contact with their crisis partners and is active in the security domain; the collaboration with the Platform Crisis Management shows that as well. When considering network collaboration learning from each other is the best by-catch, because in networks the organizations act on the edges of their organization which results in learning capabilities. Taking an active role in the security domain, intensifying collaborating with network partners and being open for any discussion are facets that indicate that WDODelta is an organization that invests in organizational learning. WDODelta and the SRIJ are practically neighbors and this improves their collaboration. The crisis manager at the SRIJ argues that, since the merge, there are more resources available on crisis management: resources intensified, the capacity increased and experience has improved. The collaborative agenda with WDODelta is stacked: the regional scenario simulation exercise 'Deining and Doorbraak' in September 2017, improving network-centric working,

investing in the multi-layer safety strategy and raising risk awareness on climate change. If WDODelta wants to improve more, they could consider detaching an official of WDODelta for an 'x' amount of hours a week at the SRIJ to address topics like alarming and informing more intensively and explore new areas as well. The organizations stimulate each other to engage in new subjects, the cooperation between WDODelta and the SRIJ is solid and there are areas where collaboration could intensify even more.

#### **4.4.3 Differences and difficulties between risk- & crisis management**

The connection between risk- and crisis management is an important topic for the crisis coordinator at WDODelta, but it is difficult to frame and position in the organization; departments should take their responsibility to create urgency for connecting risk- and crisis management and improve risk awareness. A tension is noticed between the necessary bureaucracy (documentation and reporting issues in systems), responsibility and the resources (financially) to link risk- and crisis management. A situation where these tensions are shown are the temporary measures that were taken to heighten the dikes (using sandbags) at the *Kamper Eilanden* to anticipate to a structural rise of the water levels. There were two options; heighten the dikes structurally or temporarily; the temporary control measures were framed as a responsibility of the crisis organization. The dilemma is: Who is responsible – the department or the crisis organization - and who should finance these measures? The crisis coordinator at WDODelta argues that, in situations like this, the involved department should be responsible; situations like this should be budgeted beforehand to prevent discussion.

The difference between risk- and crisis management is the coordinated structure used in crisis management which is explicitly described and trained. If a risk arises; there is no coordinated approach. At the SRIJ the operational leaders are not the same people as the organizational management in the regular organization while at WDODelta the secretary-director functions as an Operational Leader. When it comes to business continuity disruption and risk management, there is no agreed approach beforehand; the director is responsible for decision-making. The crisis manager at the SRIJ argues that he could imagine that at WDODelta a different interpretation towards risk- and crisis management is noticeable. For example: crisis management could be considered as a topic of their crisis coordinator instead of an organizational objective. The SRIJ collaborates with Windesheim (educational institution) and their crisis organization is based on three aspects: financial damage, reputation damage and disruption of their service (facilitating education). The crisis manager at the SRIJ argues that he notices similarities with WDODelta's crisis organization. Those aspects are the



basis for risk management at the SRIJ. However, support for crisis management is present at the organizational management; the secretary-director at WDODelta has high ambitions, which helps WDODelta tremendously.

#### 4.4.4 Further integration of network management

The multi-layer safety strategy argues that network partners collaborate to prevent disruption and mitigate impact; the multi-layer safety strategy is a good example. The multi-layer safety strategy could be approached one-dimensional: regional water authorities are layer one, municipalities are layer two, safety regions are layer three. According to the crisis manager at the SRIJ some network partners think one-dimensional regarding responsibility and accountability; for example when discussing financial consequences then one-dimensionality is necessary. Within the layers of the multi-layer strategy one actor has the primary responsibility of a layer, but to be successful inclusivity is necessary. Network partners can support each other concerning: development, vision and concepts. Actions to collaborate are taken more actively lately, for example: both are engaged in projects to raise awareness about *ready-to-act* and *be prepared* philosophies.

WDODelta and SRIJ organized an introduction about crisis management at the *Kamper Eilanden*. They also join forces in the organization of the regional scenario simulation exercise: *Deing en Doorbraak*, which is organized by the Platform Crisis Management in September 2017. They also find each other in their network-centric approach; WDODelta created LCMS (*landelijk crisis management system*, national crisis management system); activity to anticipate to a prolonged drought and they created a link with the SRIJ in order to share a situational risk image. The crisis manager at the SRIJ believes in inclusivity: creating added value in networks to address tough issues. These developments show that their collaboration is solid. In networks the partners are complementary to each other, especially when considering inclusivity; the safety regions' are able to advise the regional water authorities on the completion of their primary task and also the other way around.

A development at the SRIJ is that a (weekly) situational risk image is developed in the LCMS to monitor risk-raising events and potential threats that could lead to disruptions or affect their core business processes. This new work method was implemented using an interesting strategy; the idea came arose from experts and they allowed them to make a proposal for the new work methods. The SRIJ inventoried what information they wanted to monitor and share; the necessary information was available but not yet centralized. A work

method agreement was made to share the necessary information in the LCMS and they had to keep track on the time spent during a monthly tryout; resulting in implementing this new work method that is supported by both risk- and crisis officials. Without project initiation document, project plan, governance structure, proposal in the Management Team this new work method has been implemented. By using the LCMS for this, infinite mail exchanges are eradicated. The LCMS becomes part of the regular business process and becomes an actively used system; creating a win-win situation because the system's contribution increased as well. The crisis manager at the SRIJ refers to Murphy's Law indicates: everything that can go wrong will go wrong. To be prepared they develop a situational risk image; it is not necessary to indicate a meaning to the shared information, but it functions as an impetus to awareness to those involved in risk- and crisis management; this could be implemented at WDODelta in order to connect risk- and crisis management.

The crisis manager at the SRIJ is concerned about developments in which some safety regions (Drenthe as partner of WDODelta) deviate from the national crisis management structure and eliminate their Regional Operational Team (ROT). From a collaborative point of view it is unrealistic to expect that WDODelta has to anticipate to structural changes from a single organization. The secretary-director at WDODelta has strongly expressed her concerns about this issue. However, the crisis manager at the SRIJ believes that when there is a water-related crisis the corresponding safety regions will activate a ROT. But if they anticipate do the people know each other and are they able to easily find each other? The crisis manager at the SRIJ argues that that knowing each other is a crucial prerequisite for being able to work together successfully. Perhaps the deviations turn out to be successful and should be implemented at the national level.

#### **4.4.5 Further integration of risk- & crisis management**

The risk manager and crisis coordinator at WDODelta argue that organizing risk management on strategic level is beneficial for a connection between risk- and crisis management. WDODelta is divided into programs; first steps would be to strategically organize risk management at the organizational programs with SMART-formulated goals and the implementation of a Plan, Do, Check, Act-cycle. Subsequently the aimed results and their risks could be identified; then the employees can easily understand which risks are considered as an event for the crisis organization. The risk manager at WDODelta argues that the current programs are activity lists rather than goal-oriented programs. Within the department Project Realisation there are no explicit developments regarding strategic risk management or

connecting risk- and crisis management. The crisis coordinator at WDODelta argues that the connection between risk- and crisis management is an innovative thought. The risk manager at WDODelta explains that, considering the PDCA-cycle, the Check and the Act are often a missing link. If an organization manages to organize the Check adequately, the organization is able to make informed choices and decisions. On organizational level the PDCA-cycle is implemented differently, all departments have their own approach. He further argues that organizational risk management has to be implemented; *“Just do it”*.

The boundaries between the regular organization and the crisis organization are blurred and create a fertile soil for ad hoc problem solving which is embraced by the organizational management; exploring those boundaries is necessary to identify events for the crisis organization. The risk manager at WDODelta argues that the acknowledgment of the crisis organization within WDODelta will increase if the goals, focus, scope, KPI's and activities are explicitly formulated in programs; because then it is known which situations require the involvement of the crisis organization. He has three recommendations to improve the link between risk- and crisis management: - implement strategic risk management on organizational programs, - involve the crisis organization actively in those organizational programs, and – structurally connect the risk manager and the crisis coordinator.

The team leader enforcement wonders if the employees at WDODelta share the same ambition as the organizational management to professionalize crisis management. The urgency to focus on crisis management will increase over time, when the regular business processes have been optimized according to the specialist in water systems at WDODelta. The operational respondents argue that the crisis officials have the qualities and competences to handle a crisis. Both operational respondents argue that crises give an incentive to focus on crisis management and scenario thinking; after a crisis in high water levels crisis in '98 the organizational focus on scenario thinking increased they realized that external factors are an unpredictable factor in crisis management that have to be taken into account.

The calamity coordinator at HDSR argues that support of the organizational management is crucial to connect risk- and crisis management; they should be open for new ideas and facilitate initiatives. Expertise and experience offer that an employee is able to foresee the impact of policies, potential risks, feasibility and usefulness. She explains that she experienced that issues of employees were simplified by the organizational management, if the 'gut feeling' is ignored the attention for the small details will fade away. Focusing on

long-term risks has to be organized through the use of risk sessions; risk sessions could invest risk awareness on both short- and long term. The long-term focus seems to fade away in the organizational culture at regional water authorities, because new generations of employees lack long-term vision, due to the current society. Connecting risk- and crisis management is a topic that loses its interest over time; ad hoc and short-term coordination and steering replaces long-term visionary thinking.

The crisis manager at the SRIJ notices similarities between risk- and crisis management; doing risk analyzes, valuing and prioritizing the risks. All safety regions in the Netherlands use the same mechanism which leads to a risk profile with a number of prioritized risks (flooding is one of those prioritized risks) that need control measures, for other risks (like fire fighting) a generic approach is applied. Both risk- and crisis management use the probability versus effect calculation to estimate the impact of a threat as well as the weighing the expected costs versus benefits when taking measures; a balance between accepted risks and risk reduction is needed. An advantage of linking risk- and crisis management could be that the added value of crisis management is more related to by the employees and the topics become becomes a part of the organizational culture at WDODelta.

The calamity coordinator at HDSR argues that within the Platform Crisis Management the relation between risk- and crisis management will be part of their new policy plan 2018-2021; workshops, risk sessions and realizing that the organization wide involvement is stimulated are elements that will be part of their new policy. A year ago this topic has been part of the agenda at the steering committee of the Platform Crisis Management, but urgency fade away; the effects of a lacking relationship between risk- and crisis management were not prominent. It is considered as a blind spot; an unconsciously incompetent area. The calamity coordinator at HDSR differentiates between three perspectives: - the daily processes and activities, - a gap, - the crisis organisation; policy is missing to bring those perspectives together. The Dutch Water Association (DWA) started an initiative to organise workshops to create urgency and a common goal. Every department and every discipline should be involved; otherwise this topic will be approached exclusively by the crisis management officials or solely experts and the idea of managing organizational risks will disappear. It is important to involve the crisis coordinators due to their proactive traits and the organizational management has a special role; they need to stimulate an open culture where employees from the operational level can share their issues by organizing blame-free sessions to express concerns and ideas about issues and risks within the organization.

According to the crisis coordinator at WDODelta the organizational management at WDODelta acknowledges the importance of crisis management and risk awareness; they actively supported the updating of the disaster management plans after the merge towards WDODelta. Inventorying risks, scenario thinking and formulating control measures are important processes related to the development of disaster management plans which improves both risk awareness and crisis management processes. A lot has been achieved since the merge: - updating the disaster management plans, - organizing thematic crisis weeks, - improving the relationship with network partners and - realizing the first steps in the 'High Water Levels Protection Program'. The crisis coordinator at WDODelta argues that goals in the near future are: - improving quality management, - being a reliable crisis partner, - the regional scenario exercise 'Deining & Doorbraak' and - creating a professional educational program which focuses on improving competences of crisis officials and knowledge about crisis management.

#### 4.4.6 Sub Conclusion

The sub question guiding this part of the analysis was:

*What is the dominant organizational change strategy in Waterschap Drents Overijsselse Delta and to what extent does this strategy support the alignment of structural and cultural changes towards crisis management?*

The main characteristics of organizational change strategy & governance are formed by the strategy, organizational learning related to crisis management, difference and difficulties between risk- & crisis management, and measures to further integrate risk- & crisis management

The organizational change strategy at WDODelta is named 'WDODelta Works!' and aims to develop organizational learning capacity and business management organization wide by being implemented throughout all organizational programs. They aim to let employees develop in smart collaboration, self-management and connectivity. Business management is aimed at continuously monitoring through the use of the PDCA-Cycle. Involvement of all employees seems important. In the current organizational change strategy the crisis organization is not included, which shows that crisis management is seen as a separate subject within WDODelta. In the change strategy there is a focus to involve relevant actors in the implementation of organizational changes, employees need to be committed to each other to

make the organization successful. Relating to the theoretical framework, a participative discourse is noticed with a focus on self-actualization at WDODelta (Mantere & Vaara, 2008). Employees are expected to formulate their own goals. The vision and mission are not the starting point for further implementation by operational units but the result of a collective search and learning process. To further integrate risk- & crisis management in the regular organization, it is important to search for a link with the ongoing change strategy.

Regarding organizational learning related to crisis management it seems that the check & act seem a missing link in the crisis management processes in practice. A structural approach is missing regarding evaluations. It is important to develop a structural approach towards evaluation to increase learning capacity in crisis management where accountability and hierarchy are eliminated. Doing so would over time greatly increase a commitment to resilience. This is important, because crisis do not happen often at WDODelta so making sure that all opportunities to improve are utilized is important.

The organizational management at WDODelta supports for crisis management is tremendously, due to efforts of the secretary-director at WDODelta. To further integrate risk- & crisis management it is necessary to implement strategic management. At the moment, the boundaries between the regular organization and the crisis organization are blurred, which stimulates ad hoc problem solving in WDODelta. Implementing strategic risk management would help to explore those boundaries, because insight will develop about what events are considered as 'out of control'. Three recommendations were given to improve the link between- risk and crisis management: - implement strategic risk management on organizational programs, - involve the crisis organization actively in those organizational programs, and – structurally connect the risk manager and the crisis coordinator.

Goals in the near future for crisis management at WDODelta are: - improving quality management, - being a reliable crisis partner, - the regional scenario exercise '*Deining & Doorbraak*' and - creating a professional educational program which focuses on improving competences of crisis officials and knowledge about crisis management.

## 4.5 Overall conclusion

The main research-question of this study was:

*Could the introduction of High Reliability Organization-principles in the organization of regional water authority 'Waterschap Drents Overijsselse Delta' be helpful in integrating risk- and crisis management and if so how?*

The basic assumption in this study is that HRO-principles are suitable for developing organizations that avoid crises and disasters in an environment where incidents are almost inevitable due to their complex systems and high risks involved in it (Weick and Sutcliffe, 2015). Implementation of these principles however requires structural and cultural changes within the organization. The study was therefore aimed at defining whether these changes can be met specifically in the context of the WDODelta. Studying the ambition of the WDODelta-leadership to become a crisis partner did also offer an opportunity to reflect on the applicability of HRO-theory in a public environment.

Based on the findings in this research, it is concluded that the introduction of HRO-principles would be helpful in integrating its risk. Findings suggest that a lot of measures have been (implicitly) implemented that relate to the HRO-principles but a lot can be done to further improve. A prerequisite for HRO's is to invest in risk awareness; respondents argued that risk awareness is something that should be invested in through improving in scenario thinking and organizational knowledge. HRO theory could help WDODelta to further integrate risk- and crisis management in their organization.

The first HRO-principle, preoccupation with failure, is characterized by perceiving near-misses and incidents as indicators of a system's health and reliability both structurally and culturally. On a structural level, it seems that risk management is implemented at project level. In crisis management they create disaster management plans to be prepared to some crises. The processes involved in creating plans have to be cherished in order to improve organizational risk awareness and subsequently the preoccupation with failure. On cultural level it seems that complacency is noticed during risk sessions at WDODelta. In HRO's complacency is interpreted as a failure of striving.

The second HRO-principle, reluctance to simplify, is characterized by actively collecting, analyzing and prioritizing indicators about potential failures and avoiding making assumptions them (Weick & Sutcliffe, 2015). At WDODelta risk management is organized at

project level explicitly, throughout departments risk management is more implicit, but strategic management is missing. A passive and reactive mentality is noticed at WDODelta, this is a negative cultural aspect because that could imply that people simplify issues to avoid any hassle. Investing in scenario thinking would help to open up the dialogue about issues and concerns. Simplification is also noticed in crisis management processes. At WDODelta the boundaries in decision making, powers and responsibilities and the position of WDODelta in crisis management are considered as a grey area; that needs to be explored more through education, training and exercises.

The third HRO-principle, sensitivity to operations, is characterized by a high focus on details and a connection between the staff and the operational level (Weick & Sutcliffe, 2015). It is mentioned that concerns from the operational level do not seem to reach the organizational management. Creating a platform where concerns and issues can be shared is important to improve sensitivity to operations.

The fourth HRO-principle, commitment to resilience, is characterized by the ability bounce back from unexpected events (Weick & Sutcliffe, 2015). Learning from past events is crucial in this principle in order to improve resilience. The fifth HRO-principle, deference to expertise, is characterized by the focus on expertise rather than hierarchy. Furthermore, it is concluded that quality management needs to be improvement. Evaluations and reports seem to be missing, which could be a reason that improvement points will not be realized in the near-future.

The fifth HRO-principle, deference to expertise, is characterized by a focus on expertise rather than hierarchy (Weick & Sutcliffe, 2015). In the crisis organization hierarchy is important in decision-making. This causes that decision-making is influenced by hierarchy rather than expertise.

The main obstacle that seems to exist to implement HRO is that the theory in itself is not something that employees at WDODelta relate to. Crisis management is interpreted as a secondary task within WDODelta, and not all employees fully support the way the crisis organization is used. A second obstacle is that risk management is only implemented at project level. Strategic risk management is not present in WDODelta, which causes that it is not clear when or why the crisis organization is activated in WDODelta.



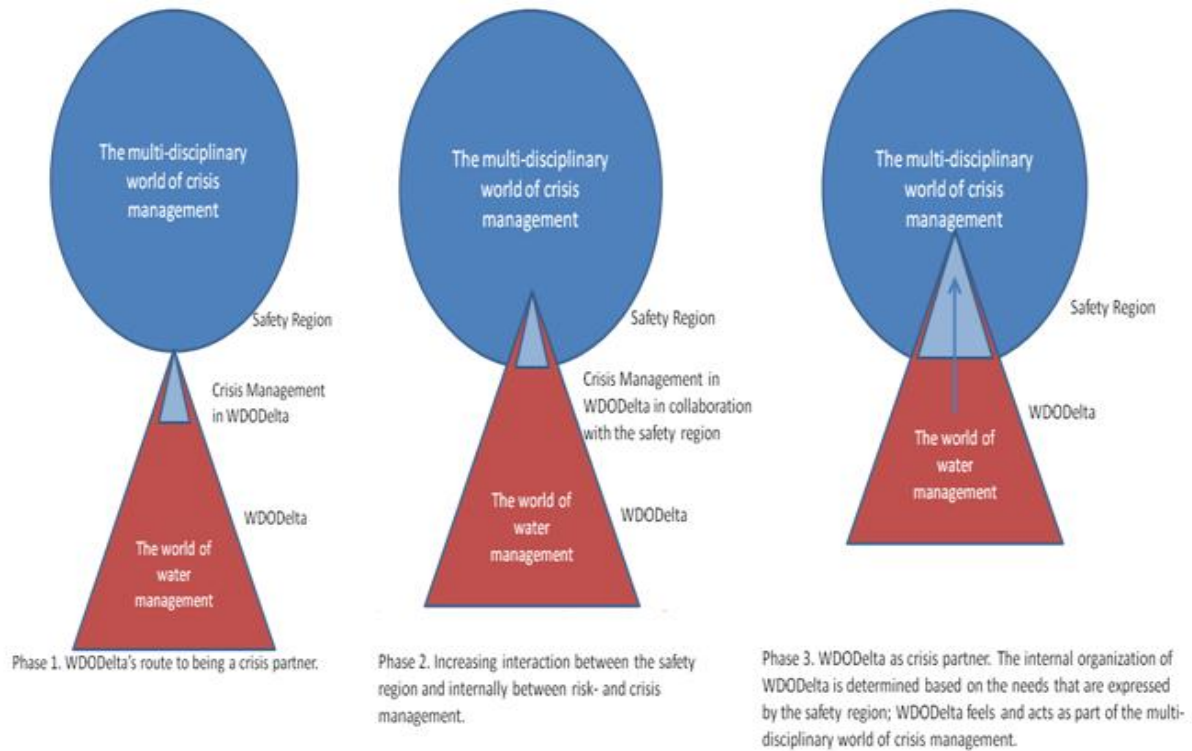


Figure 11 Conceptual visualization of the route of WDOdelta towards being a crisis partner

A transition of WDOdelta towards its future goal is illustrated in figure 11. At this point WDOdelta is in phase two (2): Increasing interaction between the safety region and internally between risk- and crisis management. The structure of the crisis organization at WDOdelta is similar to the GRIP structure, regarding hierarchical up scaling and aiming for a multi-disciplinary approach. However, the operational preparedness of WDOdelta is lower than primary actors in the security domain.

Overall, it is concluded that WDOdelta a basic structure has been formalized for the crisis organization, but to fully integrate their crisis organization it is helpful to make a connection with risk management. High Reliability Organizing theory is based on multiple disciplines that could be used as a guideline in thinking about new policy at WDOdelta on both structural and cultural level related to risk- and crisis management.

## **5. Reflection and recommendations**

### **5.1 Review of study results**

This research shows that a HRO theory can be used to further integrate risk- & crisis management in the organization of WDODelta. As far as this research went, a lot of knowledge about for risk- & crisis management has been gathered, but a more in-depth study is needed to understand how these improvement points can be used in WDODelta. If WDODelta aims to continue this research, more respondents will be questioned from different operational departments and the organization controller.

### **5.2 Recommendations on future policy**

Given the general support of HRO-principles by most of the respondents the study shows the implementation of HRO-principles would support the integration of risk- and crisis management.

In order to speed up the necessary structural and cultural changes it is suggested to:

- a. Improve quality management for the crisis organization to be able to measure and monitor developments.
- b. Implement a work method to create weekly situational risk image, just as the SRIJ to improve risk awareness and integrate risk- and crisis management more.
- c. Involve crisis management in the ‘WDODelta Works!’ program, to create a link between risk- and crisis management.

### **5.3 Future study**

Strengthening of crisis management practices within WDODelta presupposes stronger couplings between the WDODelta and the Safety Region and at the same time stronger couplings between organizational elements that are concerned with crisis management and the traditional Risk Management-tasks. Orton & Weick (1990) however emphasize loose couplings may develop in case of fragmented external and internal environments and causal indeterminacy. This could lead to a situation in which organizational elements react differently towards environmental and institutional pressures. The case of WDODelta is a further illustration of this phenomenon. It is therefore suggested, in line with Orton & Weick (1990), to further investigate the proper balancing of ‘tight’ and ‘loose couplings’ within public organizations concerned with crisis management.

## 6. References

- Ansoff, H. I. (1991). Critique of Henry Mintzberg's "The design school: reconsidering the basic premises of strategic management". *Strategic Management Journal*, 12(6): 449-491.
- Babbie, E. R. (2010). *The practice of social research*. Belmont, Calif: Wadsworth Cengage.
- Bacharach, S., B., Bamberger, P., & Sonnenstuhl, W. J. (1996). The organizational transformation process: the micropolitics of dissonance reduction and the alignment of logics of action. *Administrative Science Quarterly*, 41(3): 477-506.
- BBC (2016). *Storms Desmond and Eva flooded 16.000 homes in England*. Visited on April 25, 2017 from: <http://www.bbc.com/news/uk-35235502>
- Boin, A., 't Hart, P. & McConnell, A. (2009). Crisis exploitation: political and policy impacts of framing contests. *Journal of European Public Policy* 16-1:81-103.
- Committee on Disaster Studies (1955). *Studies in Holland flood disaster 1953*. Four volumes.
- Waterschap Drents Overijsselse Delta (2016). *Crisisplan 2016*. Visited on 6th of august 2017, from: [https://www.wdodelta.nl/publish/pages/10932/crisisplan\\_wdodelta\\_20161116.pdf](https://www.wdodelta.nl/publish/pages/10932/crisisplan_wdodelta_20161116.pdf)
- Dailymail UK (2016), *Paris closes the Louvre and moves all its artworks to the top floors after the Seine bursts its banks as France and Germany continue to be devastated by the flood*. Visited on 23th of August 2016. From: <http://www.dailymail.co.uk/news/article-3621639/Nine-killed-thousands-evacuated-non-stop-rain-causes-river-banks-burst-sweep-away-homes-France-Germany.html>
- Drennan, L.T., McConnell, A., Stark, A. (2014). *Risk and Crisis Management in the Public Sector*. New York: Routhledge.
- Duin, M. & Wijkhuijs, V. (2014). *Lessen uit crises en mini-crisis 2013*. Den Haag: Boom Lemma Uitgevers.
- Government of the Netherlands (2016). Retrieved on August 23, 2016 from: <https://www.government.nl/documents/decrees/2010/12/17/dutch-security-regions-act-part-i>.
- Jian, G. (2007). Unpacking unintended consequences in Planned Organizational Change; a process model. *Management Communication Quarterly*. 21(1): 5-28.

OECD. (2003). *Emerging risks in the 21<sup>st</sup> century: An agenda for action*. Paris: Organization for Economic Cooperation and Development.

Instituut Fysieke Veiligheid (2014). *GRIP-regeling 1 t/m 5 en GRIP RIJK*. Infopunt Veilig, Instituut Fysieke Veiligheid.

Lekka, C. (2011). *High Reliability Organisations A review of the literature*. Health and Safety Laboratory (HSE) Books.

Mantere, S., & Vaara E. (2008) On the Problem of Participation in strategy: a critical discursive perspective. *Organization Science*, 19(2): 341-358.

Mintzberg, H., and Waters, J. A. (1985). Of Strategies, Deliberate and Emergent. *Strategic Management Journal*. 1985(6): 257-272.

Muller, E., Rosenthal, U., Helsloot, I., & Dijkman, E. (2009). *Crisis, studies over crisis en crisisbeheersing*. Deventer: Kluwer.

Nag, R., Corley, K.G., & Gioia, D.A. (2007a). The intersection of organizational identity, knowledge and practices: attempting strategic change via knowledge crafting. *Academy of Management Journal*. 50(4): 821-847.

Orlikowski, W. J. (1996). Improvising organizational transformation over time: A situated change perspective. *Information Systems Research*. 7(1): 63-92.

Orton, J. D. & Weick, K.E. (1990). Loosely Coupled Systems: a reconceptualization. *Academy of Management Review*. 15(2): 203-223.

Pentland, B. T. & Feldman, M. S. (2008). Designing Routines: On the Folly of Designing Artifacts, While Hoping for Pattern of Action. *Information and Organization*. 18(4): 235-250.

Perrin, C. (1995). Organizations as contexts: Implications for safety science and practice. *Industrial and Environmental Crisis Quarterly*, 9, 152–174.

Quarantelli, E.L., Lagadec, P., & Boin, A. (2006). A heuristic approach to future disasters and crises: New, old and in-between types. In H. Rodriguez, E.L. Quarantelli, & R. Dynes (Eds.), *Handbook of disaster research* (pp. 16-41). New York: Springer.

Reijling, J. (2015). *Bestuursvernieuwing bij defensie van 2003 tot 2014: Het omgaan met verschillende perspectieven en belangen*. Enschede: Ipskamp Drukkers.

Rijksoverheid (2009). *National Water Plan 2009-2015*.

Rijksoverheid (2015). *Waterbeheer in Nederland*. Retrieved on December 17, 2015 from: <https://www.rijksoverheid.nl/onderwerpen/water/inhoud/waterbeheer-in-nederland>.

Rijksoverheid (2016). *Wat is een waterschap?*. Retrieved on August 17, 2016 from: <https://www.rijksoverheid.nl/onderwerpen/provincies/vraag-en-antwoord/wat-is-een-waterschap>.

Rijkswaterstaat (2017). *Rijkswaterstaat*. Retrieved on March 28, 2017 from: <https://www.rijkswaterstaat.nl/english>.

RTL Nieuws (2016). *Noodweer Europa doden en overstromingen*. Visited on 23th of August 2016 from: <http://www.rtlnieuws.nl/nederland/noodweer-europa-doden-en-overstromingen>

Sagan, S.D. (1993). *The limits of safety: organizations, accidents and nuclear weapons*. Princeton, N.J.: Princeton University Press.

Scholtens, A. (2011). *Hoe doen we het effectiever en efficiënter in de regio Drenthe? Een onderzoek naar de mogelijkheden voor een kwalitatief betere crisisbeheersing*. Assen: Veiligheidsregio Drenthe.

Schulman, P.R. (1993b). The negotiated order of organizational reliability. *Administration and Society*, 25, 353–372.

Stake, R. E. (2000). Case Studies. In N. K. Denzin, Lincoln, Yvonna S. (Ed.), *Handbook of Qualitative Research second edition* (pp. 134-164). Thousand Oaks, CA: Sage Publications, Inc.

Swanborn, P.G. (2010). *Case Study Research What Why and How?*. Los Angeles: SAGE Publications inc.

Turner, B. (1978). *Man-made disasters*. London: Wykeham Publications.

Unie van Waterschappen (2012). *Samenwerking in Crisisbeheersing*. Retrieved on August 23, 2017 from: <https://www.uvw.nl/wp-content/.../04/Samenwerking-in-crisisbeheersing-2012.pdf>

Weick, K.E. and Sutcliffe, K.M. (2015). *Managing the unexpected: Sustained Performance in a Complex World*. New Jersey: Wiley

Wet veiligheidsregio's (2010, 11 February). Retrieved on April 25, 2017 from:

<http://wetten.overheid.nl/BWBR0027466/2017-01-01>

Xiao, Y., Milgram, P., and Doyle, J.D. (1997). Capturing and modeling planning expertise in anesthesiology: Results of a field study. In C. Zsombok and G. Klein (Eds.), *Naturalistic decision making* (pp. 197–207). Mahwah, NJ: Erlbaum.

Zanders, A. (2008). *Crisismanagement: Organisaties bij crises en calamiteiten*. Bussum: Coutinho.

## **7. Appendices**

7.1 Interview question / topic list with internal respondents

7.2 Interview question / topic list with external respondents

## 7.1 Interview question / topic list with internal respondents

### **INTRODUCTION about my research (reason and research question);**

- O What is your function within WDODelta and how does this function relate to the introduction of crisis management?
- O What is your role in risk management?
- O In what way do you come into contact with risk management in your work?
- O What is your role in crisis management?
- O How do you come into contact with crisis management in your work?

### **PLAN Structural organizational changes in risk- and crisis management (at policy and / or operational level)**

#### **Risk management**

- O What is the organizational policy on Risk Management within WDODelta?
- O What is your view on risk management within WDODelta, is there enough attention for the topic?
- O Does risk management has a right place within the organization?
- O In what way is attention being spent on risk management following the merger of WDODelta?

#### **Crisis management**

- O What is the organizational policy on Crisis Management within WDODelta?
- O What is your view of crisis management within WDODelta, is there enough attention for the topic?
- O Does crisis management has the right place within the organization?
- O In what way is attention being spent in crisis management in the WDODelta following the merger of WDODelta?

#### **Relation between risk- and crisis management**

- O What are the differences between risk- and crisis management from your perspective?
  - Is there for example a distinction between risk management and crisis management? Is the first more important than the latter?
  - Is crisis management within WDODelta part of a staff bureau or part of the line organization?
- O Are there any efforts in the current policies to bring these subjects closer together?
- O What is your opinion on the subject of connecting risk- to crisis management?



**DO Cultural changes in crisis management and risk management (at policy and / or operational level)**

**Risk management**

- Do you notice differences between theory (policy) and practice within WDODelta at the level of risk management?
- What happens in practice that does not return in policy?
- What is not done in practice what should happen?
- What is being done to ensure that the ambitions involved in risk management are realized?
- Are the appropriate resources available to ensure that employees meet the formulated ambitions of risk management?
- What do you think about the risk awareness within the organization?
- Is there enough attention for the subject of risk management within the organization?

**Crisis management**

- Do you notice differences between theory (policy) and practice within WDODelta at the level of crisis management?
- Are there any exercises organized to test the organizational crisis plans?
- What is not done in practice what should happen?
- Are the appropriate resources available to ensure that employees meet the formulated ambitions of risk management?
- Is there enough attention for the subject of crisis management within the organization?
- What do you think about the crisis management policies in the organization?
- Do the crisis officers have the right skills and competencies to cope with a crisis?
- What do you like to see differently in crisis management policy?
- Do you see any improvement points on the topic of crisis management?

**CHECK / ACT Ways in which the organizational management stimulates and guarantees the development of crisis management and / or risk management. (Learning ability of the organization)**

**Risk management**

- What does the organizational management do to encourage risk management within the organization?
- Are procedures adjusted after disturbances?
- Are procedures evaluated?
- How does WDODelta invest in raising risk management to a higher level?
- What went well over the last year and a half in relation to risk management?
- What are improvement points for the past year and a half considering risk management?
- Where does the organization have to focus on in the coming years considering risk management?

### **Crisis management**

- What does the organizational management do to encourage crisis management within the organization?
- How does WDODelta invest in raising crisis management to a higher level?
- What went well over the last year and a half in relation to crisis management?
- What are improvement points for the past year and a half considering crisis management?
- What does the organization focus on in the coming years owing to crisis management?
- Where does the organization have to focus on in the coming years considering crisis management?

### **Learning capacity**

- What is done within the organization to learn from any bottlenecks and disturbances?
- How is the organization learning from: exercises, evaluations, calamities or other bottlenecks?
- Are evaluation reports available from recent crisis management exercises or actual incidents?
- To what extent are the improvement points visible; for example by adjusting consultation structures, budget allocations or training? Changes in planning? Are you really following this in practice?
- Is enough done to learn from calamities, exercises? Is there a follow-up?

### **Further recommendations**

- To link risk management and crisis management;
- To increase the risk awareness of the organization;
- With regard to the change plan of WDODelta;
- Respondent's personal ideas regarding risk management;
- Respondent's personal ideas regarding crisis management;
- How would you like to place risk management within the organization?
- How would you like to place crisis management within the organization?

## 7.2 Interview question / topic list with external respondents

### **INTRODUCTION about my research (reason and research question);**

- What is your function within your organization and how does this function relate to the introduction of crisis management?
- What is your role in risk management and how are you involved?
- What is your role in crisis management and how are you involved?
- How do you get in touch with WDODelta in your work?

### **PLAN Structural: Evaluation and experience with WDODelta as a network partner due to Risk management and crisis management at structural and organizational levels;**

#### **Risk management**

- How do you interpret risk management?
- What is the organizational policy on risk management within your organization?
- What differences do you see with WDODelta regarding risk management?
- What do you think of the way risk management is organized within WDODelta?
- What differences do you see in the risk management approach since the merger to WDODelta?
- What do you expect, structurally, of WDODelta in the field of risk management, in cooperation with the safety region?
- To what extent are these expectations realized?
- What differentiates WDODelta's approach in comparison with other crisis partners?
- Do you have any suggestions / recommendations for another approach regarding risk management?

#### **Crisis management**

- How do you interpret crisis management?
- What is the organizational policy on crisis management within your organization?
- What differences do you see with WDODelta regarding crisis management?
- What do you think of the way crisis management is organized within WDODelta?
- What differences do you see in the crisis management approach since the merger to WDODelta?
- What do you expect, structural, of WDODelta in crisis management, in cooperation with the security region?
- To what extent are these expectations realized? crisis management?
- What differentiates WDODelta's approach with that of other crisis partners owing to crisis management?
- Do you have any suggestions / recommendations for another approach due to crisis management?

**The link between risk management and crisis management within the security region, network partners and recommendations about it;**

- What are the differences between risk- and crisis management from your perspective?
- Is there for example a distinction between risk management and crisis management? Is the first more important than the latter?
- Is crisis management within your organization considered as a part of the staff bureau or part of the line organization?
- Does your organization actively engage these topics to bring them closer together?
- What is your vision of linking / bringing together risk- and crisis management?
- Do you have any ideas about how risk management and crisis management can be brought together?
- How would you like to collaborate on these themes in your own organization and / or between network partners?
- What is needed to link risk management and crisis management?

**DO Cultural: Review and experience with WDODelta due to Risk management and crisis management at cultural level (profiling, competencies, skills, RTD);**

**Risk management**

- How do you experience the collaboration with WDODelta as a network partner regarding risk management?
- What competencies and skills are required in organizing risk management?
- To what extent does WDODelta possess those competencies?
- How would you describe the risk culture at WDODelta?
- How do you rate the risk awareness at WDODelta compared to other network partners?
- How does the culture at WDODelta's differ in comparison to other network partners?
- What do you think of WDODelta's profile regarding risk management (e.g. ambitions)?
- What would you like to see differently in this area?

**Crisis management**

- How do you experience the collaboration with WDODelta as a network partner regarding crisis management?
- What competencies and skills are required in organizing crisis management?
- Do WDODelta's crisis officers (liaisons) have the right skills and competencies to cope with a crisis?
- How would you describe the crisis management culture at WDODelta?
- How does the culture at WDODelta's differ in comparison to other network partners?
- What do you think of WDODelta's profile due to Crisis management (eg ambitions)?
- What would you like to see differently in this area?
- What can WDODelta do to improve in crisis management?
- What culture is needed to link risk management and crisis management?

**CHECK / ACT Management from organizational leadership: ways in which the organizational management can stimulate the development of risk management and crisis management;**

**Risk management**

- O What does your organization's do to encourage risk management within the organization?
- O What does WDODelta do to get risk management to a higher level?
- O What went well over the last year and a half? Risk management, looking at the collaboration with WDODelta?
- O What are improvement points for the past year and a half due to Risk management, looking at the collaboration with WDODelta?
- O What should be improved in the near future (collaboration wise)?

**Crisis management**

- O What does the organizational management in your organization do to encourage crisis management within the organization?
- O What does the organizational management in WDODelta do to encourage crisis management within the organization?
- O What went well over the last year and a half regarding crisis management and the collaboration with WDODelta?
- O What are improvement points for the past year and a half regarding crisis management and the collaboration with WDODelta?
- O What does the organization focus on in the coming years owing to Crisis management, looking at the collaboration with WDODelta?
- O Is there a difference in the experience between the operational side and the policy side, looking at the collaboration with WDODelta?

**Learning capacity**

- O What is done within the organization to learn about any bottlenecks and disturbances?
- O How does WDODelta learn from exercises, evaluations, calamities or other bottlenecks. Do you notice differences in performance?
- O Are evaluation reports available from recent crisis management exercises or actual incidents?
- O To what extent are improvements visible in the performance of the crisis organization at WDODelta?
- O Is enough done to learn from calamities, exercises? Is there a follow-up?
- O What does WDODelta need to improve to be a better network partner?
- O In what way does WDODelta differ from other network partners?

**Expectations regarding network partners in general and in particular WDODelta, Improvement Points / recommendations for WDODelta regarding being a network partner.**

- O To link risk management and crisis management;
- O To increase the risk awareness of WDODelta;
- O With regard to the change plan of WDODelta (is sufficient attention paid to risk management and crisis management?);
- O Respondent's personal ideas regarding risk management;
- O Respondent's personal ideas regarding crisis management;
- O Collaboration as a network partner
- O Improving competencies