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Are Dutch water management authorities able to make sense of the 'unknown unknowns' of climate change?

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Governmental authorities increasingly face the challenge of dealing with risks due to unpredictable potentially damaging events. Whereas the so called known unknowns are familiar but unpredictable as to when and where they will happen, the unknown unknowns are completely unforeseen until they happen. An example is climate change, that potentially brings about continuous and unpredictable changes in weather patterns. This paper examines the question as to what extent governmental actors are able to deal with these risks, which are nearly impossible to predict and thus hard to prepare for. We propose a conceptual framework that draws on Weick's work on sensemaking. We demonstrate the utility of this framework by analyzing how Dutch water management authorities try to deal with the unknown unknowns of climate change. We argue that the challenge of enabling society to adapt to climate change requires organizational change.

1. Introduction

Governmental authorities face the challenge of dealing with risks due to unpredictable potentially damaging events. Some of these events, the so called known unknowns, are familiar but unpredictable as to when and where they will happen. Others, the unknown unknowns, are completely unforeseen until they happen, and will always be experienced as surprises (Longstaff, 2005). Because our world is increasingly connected and complex, surprises are expected to become more common than predictability (Norris et al, 2008). The consequences for government authorities will be far-reaching. Many citizens expect the government to protect them from risks that are nearly impossible to predict and to prepare for. Traditional governmental practices such as hierarchies, planning and command and control strategies are not effective against surprises and can even make things worse (Norris et al, 2008). Consequently, governments face the paradox that they must plan but also plan for not having a plan (Longstaff, 2005).

Climate change is an example of a problem that faces the challenges of both dealing with the known unknowns and the unknown unknowns. The risks and uncertainties involved seem to expand as a result of couplings between the physical

aspects of climate change, the vulnerability of regions and the strategic behaviour of the actors involved. The International Panel on Climate Change (IPCC, 2007) has pointed out how physical aspects will potentially affect society. Even when the world succeeds in bringing about a significant reduction of greenhouse gas emissions, the already ongoing climate change will potentially result in continuous and unpredictable changes to local weather patterns, water supplies, river discharges, salt intrusion and sea levels. Uncertainties not only concern the local impacts of climate change, and the effectiveness and feasibility of various policy options but also the different ways actors value, interpret and frame climate change. The high political and societal attention to climate changes and the huge amounts of money involved in it, stimulate people to display strategic behaviour, varying from shifting the burden to assuming all responsibilities.

This paper addresses the question as to what extent governmental authorities are able to deal with the known and the unknown unknowns of climate change which are almost impossible to predict and to prepare for. To examine this question we draw on the work of the organization psychologist Karl Weick (Weick 1979, 1993, 1995, 2000, 2001, 2009; Weick & Sutcliffe, 2001). Weick considers sensemaking as the root activity when people deal with an unknowable and unpredictable world (Weick, 2009, 235). Sensemaking is an active process by which actors make their world logical and meaningful through talking and acting (Weick 1979, 1995). Seven resources affect sensemaking: identity, retrospect, enactment, social, ongoing, salient cues and plausible stories (Weick, 1995). When these resources are threatened, sensemaking can collapse with sometimes fatal consequences for people, organizations and the physical environment. Therefore Weick revealed organizational conditions that can facilitate and that can hinder sensemaking (Weick, 2001: 461). These conditions can be used to assess organizations' ability to be reliable under trying and surprising situations and can help to develop devices to make organizations more resilient (Weick, 2001; Weick & Sutcliffe, 2001).

We demonstrate the utility of the sensemaking approach by examining how Dutch water management authorities prepare for climate change. With its differentiated and high-value economic activities, its high population density and large parts of the delta lying below sea level, the Netherlands is particularly vulnerable to climate change impacts such as sea level rise, increasing river discharges, and increasing salt intrusion. Our focus is on Rijkswaterstaat, the policy-implementing agency of the Ministry of Infrastructure and Environment, one of the key organizations in this field.

In what follows, we first present the theoretical framework in which we give a brief rendition of Weick's work. Subsequently, and in two steps, with the help of this framework we analyse how Rijkswaterstaat tries to deal with the new challenges of climate change. We conclude this paper with reflections and conclusions both on the fruitfulness of the sensemaking framework and on the weaknesses and strengths of the Dutch water management authorities.

2. Theoretical framework

In his famous article on the Mann Gulch fire disaster, Weick analysed how the death of 13 fire-fighters could be explained by a collapse of sensemaking (Weick, 1993). In short

the story is about a crew of fire-fighters who expected a so called ten o' clock fire, meaning that the crew would have the fire under control at 10 a.m. the next morning. Instead the fire exploded and forced the man into a race for their life. During the turbulent conditions at the site, the men persisted to call it a ten o' clock fire even though their tenses told them that is was something more than that. Without sharing information or other forms of communication the foreman changed his story of what was happening and accordingly changed his actions. He lit a fire in front of the men, told them to drop their tools and to lie down in the area he had burned. However, none of them did, instead they ran in a direction that they hoped would be safe.

In Weick's analysis sensemaking collapsed because the fire-fighters were not be able to come loose of their interlocked routines, could not rebuild some sense of what was happening, and finally were no not be able to do what would have saved their lives. He explained this collapse by the way the firefighters were organized. Through the structures and cultures of the organization it was very difficult for them to get access to the seven resources of sensemaking: identity, retrospect, enactment, social ongoing, salient cues and plausible stories (Weick, 2001: 265). They lost their grasp of what was happening because cues became unstable due to changing and dispersed information, because they stopped the ongoing updating of interpretations, because the stories of what was happening became less plausible and less credible, because new enactments and probing actions were avoided, because people put their faith on anticipating rather than appreciating the retrospect, because they felt isolated from social contexts (especially the lack of trust between the crew and the foremen) and because identity was threatened since firefighters do not lit the fire (Weick, 2001: 465).

Throughout his work and based upon many other case studies Weick developed organizational conditions that can strengthen and deepen processes of sensemaking. To prepare organizations to deal with the known and unknown unknowns is to organize that people have access to the seven resources of sensemaking. The idea is that it doesn't matter how the organizations are designed and which programme governance authorities actors use, as long as they contribute to the basic conditions for sensemaking. These are:

1. Allow for clear identities (identity)

Sensemaking is grounded in identity construction of people and organizations. What a situation means for an actor is influenced by what the actor is or want to represent in that setting (Weick, 1995: 24). When identity is blamed, threatened or diffused people can resist updating and revision and drop back to interlocked behaviour (Weick, 2001: 461). A complicating factor is that in cases of the unknown, multiple identities can provide a more accurate scheme to deal with turbulences in the environment. Consequently, the more identities people and organizations have access to, the less the likelihood that they find themselves paralyzed by surprises (Weick, 1995: 24). This variety can confuse people and diffuse their identities, unless multiple roles are themselves a key element of the identity. In sum, organization conditions are needed that strengthen the development of clear identities that provide room for flexibility, adaptability and mutability (Weick, 1995, 24).

2. Appreciate past experiences (retrospect)
In occasions of unpredictability and uncertainty organizations tend to rely on planning. However, because people are not very good in forecasting it is also important to make use of past experiences (Weick, 2001). They provide rich and validated schemes of interpretation that can help to reduce ambiguity. Organization conditions are needed that enhance the appreciation of past experiences, by encouraging people to remember, to collect and to share these experiences (Weick, 2001: 462).

3. Stay in motion (enactment)
Sensemaking is not a passive act of discovering reality but an active process in which actors enact their environment. When disturbances or discontinuities in the environment of organizations occur, actors may isolate those changes for closer attention, probe some activities, see what environmental responses it pulls and see how people react, deepen their insights etcetera (Weick, 1979: 130). Successful coping with the unknown processes of ecological change is most likely when actors stay in motion, and when policies and processes animate people to do so (Weick, 2009: 235). This can be strengthened by organizational conditions that encourage action rather than hesitation, that focus on outcomes rather than compliance with policy programmes, and that allow for experiments and the testing of hunches. Especially in cases where programmes for actions are publicly chosen it can be difficult to revoke, which means that people are bound to those plans and search for arguments that justify these planned actions as rational (Weick, 2001: 461).

4. Interact respectfully (social)
Sensemaking can never be solitary because actors in organizations have to fit their own line of activity in some manner with the actions of others (Weick 1995). Above all social interaction between people with multiple interpretations can improve our understanding of what is going on. Especially in occasions of surprises and ambiguity it is impossible for individuals to make sense of what is happening (Weick, 2001:461). To increase the collective capability to grasp complexity, respectful interactions are needed that involve trust (respect the reports of others and be willing to base beliefs and actions on them), honesty (report honestly so that others may use your observations) and self-respect (respect your own perceptions and beliefs) (Weick, 1993: 643). When trust, honesty and self-respect are underdeveloped, and when social anchors disappear, people can feel isolated from social reality of some sort, and finally lose their grasp of what is going on (Weick, 2001: 461).

5. Encourage improvisation and bricolage (ongoing)
Sensemaking is an ongoing process that never starts and never stops. However, the ongoing character of sensemaking can paralyze people. They can wait until the picture is complete, yet the flow of experiences and events will never stop. An appropriate strategy is to invest in bricoleurs and to encourage improvisation. Bricoleurs are people that remain creative under pressure, and are able to create order out of whatever materials are at hand (Weick, 1993: 639). Improvisation refers to the capability to investigate, to learn, and to act, without knowing in advance what one will be called to act upon (Weick 2009: 124) Generally, structures that can fit a variety of new environments are preferred above more specialized structures (Weick, 2009: 21).

6. Look closely and update often (salient cues)
Even once actors have developed reasonable cues of what is happening, they will still have to check, update and even revise their sense of events. Small moments of inattention or misperception can escalate into serious adverse events (Weick & Sutcliffe, 2001: 49). However, when a sense of the situation begins to develop people tend to look for evidence to confirm it and to ignore data that may suggest troubles (Weick, 2001: 460). Only conditions that allow for local updates, and that encourage complicating, can resist this temptation of normalisation. By considering the facts and alternative explanations more fully, people will find a better solution and way forward than if they jump prematurely to an early conclusion.

7. Develop an attitude of wisdom (plausibility)
When issues are contested, ambiguous and uncertain an attitude of wisdom is needed to develop credible stories of what people face and what they can do. Most people, especially those who are specialized in engineering, information system or accounting, tend to believe that uncertainty problems can be solved by investing in better models (Weick, 1995: 186). However there is the paradox that knowledge and ignorance grow together: "the more we learn about a particular domain the greater the numbers of uncertainties, doubts, questions and complexities" (Weick, 2001: 112). Above all, multiple interpretations need to be encouraged, because they can provide a rich picture of turbulences in the environment. Wise people know to navigate between extreme confidence and extreme caution, because both extremes can destroy the adaptability of organizations. Organization conditions are needed that animate this attitude of wisdom and more specifically, that favour plausibility criteria for these stories above probability criteria (Weick, 2001).

3. Method

Our empirical research consisted of two steps. The first step included a study of how Rijkswaterstaat prepares for climate change (Section 4). The second step concerned the application of the seven conditions of Weick's framework to Rijkswaterstaat's sensemaking (Section 5).

In the first step, we studied the way in which Rijkswaterstaat tries to prepare for climate change by focusing on three analytical levels. Drawing on the sensemaking perspective, we first analysed Rijkswaterstaat's organizational identity, and its changing political and strategic positioning within Dutch society, indicating also how it aims to prepare for climate change (see also van den Brink, 2009). For this purpose, we interviewed several actors who have a leading part in the development of recent transformation plans, such as the deputy director-general of Rijkswaterstaat and the programme manager Public-Oriented Network Management. In addition, we studied several internal documents on Rijkswaterstaat's transformation and organizational identity.

The second level of our analysis focused on the way in which Rijkswaterstaat aims to prepare for climate change and tries to operate in concrete climate adaptation

practices. To demarcate our object of study, we decided to analyse three recent planning practices, namely the development and implementation of the Room for the River project, the introduction of the flood risk approach, and the introduction of the Second Delta Plan, respectively. For this analysis, we could draw on previous extensive research of the authors, based on a large amount of semi-structured interviews and participatory observations (e.g. van den Brink & Meijerink, 2006; van den Brink, 2009; Termeer & Meijerink, 2009; van den Brink et al, 2010a, 2010b).

The third level of our analysis focused on how Rijkswaterstaat aims to prepare for and tries to operate in crisis situations. A methodological problem was that there are hardly any data about how Rijkswaterstaat actually operates in times of crisis – the last near river flood disaster took place in the early 1990s. We therefore focused our analysis on how Rijkswaterstaat is preparing for crisis situations; for example how it takes part in disaster exercises. For this purpose, we analysed various policy documents about Rijkswaterstaat's risk and crisis management (e.g. Inspectie Verkeer en Waterstaat, 2008; Ministerie van Infrastructuur en Milieu, 2010; DCC-VenW, 2010), and we analysed several documents and reports about disaster exercises in which Rijkswaterstaat was involved.

After this analysis we entered the second step of our empirical research, in which we applied the seven conditions of sensemaking to the Rijkswaterstaat organization. These seven conditions cannot be 'objectively' applied. As researchers we interpreted the information, collected in the first step, in relation to the seven conditions. Our main aim was to develop some plausible arguments regarding the strength and weakness of each condition.

4. Rijkswaterstaat prepares for climate change

> *"We have water that flows from high to low, and which has to be kept at bay. That is the justification for our existence. This duty will not change. You can perform it in a different way, but the job remains the same. But it has to be done now". (Deputy director-general on 24 May 2007, when Rijkswaterstaat was 209 years old)*

Rijkswaterstaat was established in 1798 and nowadays employs more than 9.200 employees. On behalf of the Minister and State Secretary of Infrastructure and Environment, Rijkswaterstaat is responsible for the design, construction, management and maintenance of the main infrastructure facilities in the Netherlands. Starting as an organization based on craftsmanship, Rijkswaterstaat has developed from a semi-military organization to an organization of civil engineers with a strong esprit de corps (Bosch & van der Ham, 1998; Lintsen, 2002). Rijkswaterstaat is now well known for its powerful position in the development of transport and hydraulic infrastructure in the Netherlands, for its engineering expertise and for bringing the Dutch worldwide fame by realising major public works, such as the Delta Works in the southwest of the Netherlands that closed off the sea inlets and shortened the Dutch coastline after the flood disaster of 1953.

Level 1: Analysis of Rijkswaterstaat's organizational transformation
Since the 1970s, several social and political trends within Dutch society put the position of Rijkswaterstaat, and the technocratic way in which it realised infrastructure projects, under pressure. The explosive rise of the environmental movement, the democratisation within Dutch society and the related emancipation of citizens, and, from the 1980s, the rise of the neoliberal politico-economic ideology in many western countries, were some of the 'waves of change' (Schwartz, 1993) that Rijkswaterstaat had to learn to ride. Rijkswaterstaat – 'a state within the state' and 'the giant among government departments' (van den Berg, 2005) – had to contend with numerous cutbacks and efficiency operations. Moreover, instead of being responsible for both policy making and policy implementation, Rijkswaterstaat was gradually repositioned as a policy-implementing agency. It was obliged to attain the greatest possible efficiency in its delivery of services and had to be responsive to the needs and desires of those it worked with.

As a consequence, it needed to develop a new and appropriate organizational identity and way of working. For Rijkswaterstaat, the search for a new organizational identity was a road with many obstacles. While its responsibility for carrying out several important public tasks, such as the protection of the country against floods from the sea and the rivers, require technical knowledge and expertise on the Dutch water system, it was also being criticised for its technocratic working style. Rijkswaterstaat therefore found itself caught 'on the horns of a dilemma' (van den Brink, 2009): it needed its renowned expert status to fulfil its public responsibilities, whereas it needed to distance itself from this expert status to be able to meet the increasing societal and political imperative of developing into a more responsive and efficient public organization.

In 2004, Rijkswaterstaat introduced a Business Plan to rapidly transform its organization into a government business (Rijkswaterstaat, 2004, 2008). It set itself high ambitions, as it wanted to become the most public-oriented national policy-implementing agency in the Netherlands. First, the internal management of the organization had to be much simpler and uniform. Drawing on New Public Management (NPM) ideas – the toolkit developed to implement the neoliberal ideology (Osborne & Gaebler, 1992; Kettl, 2000) – various management tools from private business were introduced to improve in effectiveness and efficiency. For instance, a new business model was introduced consisting of three internal steering relationships with the Ministry, a new working style was adopted with the introduction of 'the market, unless' principle, and several radical internal reorganizations were implemented to create 'one Rijkswaterstaat'. Second, also in line with NPM ideas, Rijkswaterstaat wanted to develop from a 'traditional road and water manager' to a 'public-oriented network manager'. The infrastructure networks for which it is responsible were no longer managed because of their own quality, but to serve the users of those networks better. The aim was to improve the flow on these networks. Accordingly, public-oriented network management was defined as Rijkswaterstaat's new working style.

Third and finally, to be able to transform into a public-oriented government business, Rijkswaterstaat wanted to renew its organizational culture through organizational learning. Rijkswaterstaat was inspired by the writings of the former head of planning for Shell, Arie de Geus. According to de Geus, the ability of companies 'to live in harmony with the business environment, to switch from a survival mode when times were turbulent to a self-development mode when the pace of change was slow' (de

Geus, 1988: 1) depended on organizational learning. For instance, a Corporate Learning Centre was established and various learning courses were developed to teach the Rijkswaterstaat employees the new competences and social skills that were required to put the ambitions of the Business Plan into practice.

Level 2: Analysis of climate adaptation practices

Since the establishment of Rijkswaterstaat, flood protection in the Netherlands has been a public rather than a private responsibility. In this respect its mission statement is unambiguous: "The first task of Rijkswaterstaat will always remain the realisation of dry feet: to control flood prevention and to be prepared for crisis" (Rijkswaterstaat, 2008: 16). As a consequence, despite the fact that many people live in the low-lying Rhine delta, public awareness of the potential danger of the water is relatively low. Should a dike break, causing a flood disaster, Dutch society will hold the Ministry of Infrastructure and Environment, and Rijkswaterstaat in particular, responsible. It is expected and taken for granted that Rijkswaterstaat has the expertise to prevent floods and other water-related problems, and that it will use it.

To prepare for climate change, Rijkswaterstaat is trying to develop and implement new modes of flood management. Recent and major planning practices in the Dutch water safety domain include the development and implementation of the Room for the River project, the introduction of the flood risk approach, and the introduction of the Second Delta Plan (van den Brink et al, 2010b). The basic idea of the 'room for the river' safety concept is to enlarge the discharge capacity of the main Dutch rivers by increasing the amount of space for the rivers (Wiering & Driessen, 2001). The emphasis is on spatial rather than technical measures to reduce the flood probability. The central programme office was established at Rijkswaterstaat. In line with the Business Plan and its new organizational identity as a policy-implementing agency, its main aim was to develop and implement the river-widening measures within the strict and non-negotiable conditions set by Parliament (regarding safety, budget, planning). To enable the parties involved to learn about the impact that various combinations of river-widening measures would have on the water levels in the main rivers, a Decision Support System, the 'Planning Kit' was introduced, consisting of around 600 possible river-widening measures. From a managerial control perspective, the focus was on implementation of the project in the most effective and efficient way, thereby aiming less at improving the legitimacy of the new river policy, or at increasing the public support for the measures (van den Brink, 2009).

In addition to the development of new and more spatial modes of flood protection, Rijkswaterstaat also tried to develop policies to reduce the potential impacts of flooding. Careful planning of evacuation routes, developing early warning systems, and adapting houses and infrastructure to prepare urban areas better for flooding are some examples. The flood risk approach – 'flood risk' is defined as the probability of a flood times the potential impact of flooding – was introduced formally in the 'Draft Policy Document on Water Safety', which was published in 2008 (Rijksoverheid 2008). It was the first time that Rijkswaterstaat aimed to address the whole safety chain, from flood prevention to evacuation and even aftercare (see also Meijerink & Dicke, 2008). With the introduction of the flood risk approach, it therefore aimed to address the whole safety chain, from pro-

action and prevention to preparation, response and aftercare (see Table 1 for an overview).

Table 1. The five successive chains of the safety chain approach in Dutch water management (modified after ten Brinke et al., 2008; Ministerie van Infrastructuur en Milieu, 2010).

	Chains	*Description*
Risk management	Pro-action	Eliminating structural causes of flood accidents and disasters to prevent them from happening in the first place (e.g. adjustments to real estate and infrastructure and relocating houses)
	Prevention	Taking measures beforehand that aim to prevent flood accidents and disasters, and limit the consequences in case such events do occur (e.g. building dams, dikes and storm surge barriers)
Crisis management	Preparation	Taking measures to ensure sufficient preparation to deal with flood accidents and disasters in case they happen (i.e. contingency planning, training and practise)
	Response	Actually dealing with flood accidents and disasters (e.g. response and calamity teams)
	Aftercare	All activities that lead to rapid recovery from the consequences of flood accidents and disasters, and ensuring that all those affected can return to 'normal' and recover their equilibrium (including answering the responsibility question and evaluation)

Finally, to anticipate the projected effects of climate change, in 2007 a state committee was established to develop a more general and coordinating course of action to 'climate-proof' the Netherlands. In September 2008, it published its advice 'Working together with water: a land that lives is building its future' (Deltacommissie, 2008), which is also referred to as the Second Delta Plan. Its main aim is to protect the Netherlands against the effects of climate change and to make the country climate-proof for the long term, while it remains an attractive place to live and to invest in. The primary focus again is flood prevention, as that had proven to be the most effective strategy in the past. The committee invested in various new and innovative technologies. For instance, the concept of the 'Delta Dike' was introduced. Rijkswaterstaat is actively involved in the concrete planning and implementation phase of the Delta Plan (see also Deltaprogramma, 2010a). In the most vulnerable areas of the Netherlands, it is organising consultation processes with national, regional and local government authorities, NGOs and involved citizens to develop strategic climate adaptation measures and investments. In addition, Rijkswaterstaat has been assigned the task to develop the 'Delta Model', that is, one integrated computer model consisting of all existing hydraulic models (Deltaprogramma 2010b). After the example of the 'Planning Kit', the Delta Model will function as a Decision Support System that can be used to learn about the impact of particular adaptation strategies on the whole main water system.

Level 3: Analysis of crisis management practices

In the Netherlands, the climate issue is now high on the political and societal agenda. The current sense of urgency was in particular triggered by the Hurricane Katrina disaster in 2005 in the United States and by Al Gore and its film 'An Inconvenient Truth', which was released in 2006 (Breeman & Timmermans, 2008). From its establishment in 1798, Rijkswaterstaat primarily focused on flood prevention and probability reduction. However, after these events it not only started to reconsider its water safety policies, but it also realised that a sound crisis management strategy was lacking. Crisis management involves the organization and implementation of the three final phases of the safety chain. Contingency planning, training and practise, and the establishment of response and calamity teams are some examples of main activities. In the Netherlands, the Ministry of the Interior and Kingdom Relations is primary responsible for crisis management. However, in close cooperation with this Ministry Rijkswaterstaat plays a key role in preparing specifically for flood disasters, which is mainly due to its up-to-date hydraulic knowledge and expertise, and its capability to accurately predict rising water levels and thereby potential situations of crisis.

In reaction to the Hurricane Katrina disaster, in 2006 the Dutch Parliament explicitly defined the goal to improve its organizational and administrative preparation for floods. For this purpose, it established the Taskforce Management Floods (*Taskforce Management Overstromingen, TMO*). An important task of the TMO was to organise a national flood disaster exercise in 2008, which was also referred to as the 'Water Test'. The Water Test made clear that in particular the crisis management organization within Dutch water management was not sufficient and needed to be improved (Ministerie van BZK, 2009). Recommendations of the TMO concerned the improvement of public awareness for crisis management, the need for overall coordination and operational plans, the development of more disaster scenarios, the establishment of clear rules regarding the tasks and responsibilities of water managers in times of crisis, better crisis information and communication, and flood disaster exercises on a much more regular basis.

In 2009, the Steering Group Management Floods (the *SMO*) was established to realise the recommendations of the TMO. It included elected members of the water boards, general directors of Rijkswaterstaat and of the water policy department of the Ministry. For instance, it developed the Central Scenario for Flooding and Flood Disasters (Rijkswaterstaat, 2010a), and it established the Dutch Water Management Centre for crisis information and advice (Rijkswaterstaat, 2010b).

In accordance with its new organizational identity, Rijkswaterstaat considers crisis management as 'network management' (Ministerie van Infrastructuur en Milieu, 2010): emphasising in particular the organizational and administrative organization of crisis management. Rijkswaterstaat thus not only prepares for physical measures (climate adaptation practices and risk management) but also for organising its social networks with other partners in the safety chain.

5. Analysis: organizing for sensemaking

1. Allow for clear identities
Being part of the Corps of Engineers, Rijkswaterstaat engineers are typically loyal, very motivated, committed and proud of their work. To deal with the changing social and political circumstances, and to cope with the horns of the dilemma on which it found itself caught, Rijkswaterstaat integrated elements and practices of in particular the neoliberal managerial discourse into its technical-engineering identity (van den Brink, 2009). Distancing itself from its technical-engineering culture and way of working, and thereby jeopardizing this strong identity, was no alternative. However, by making this choice, and by cherishing this clear identity, less room is left for variety and flexibility. As a result, Rijkswaterstaat employees 'at the front', involved in concrete practices, are not enabled to make their own choice out of multiple identities. This can cause tensions when they are confronted with situations in which actions are needed that are not consistent with their familiar identity. For example, Rijkswaterstaat employees involved in the consultation processes for the Room for the River project already struggled with how to integrate the required collaborative thinking role into their engineering identity and managerial control position. As one of the regional Room for the River project leaders explained:

> *"For Rijkswaterstaat, implementing a project requires quite a strict controlling hand, quite a corporate and project management approach. But if you participate in a process in which an area is being developed, where you have interests too, and where you have to collaborate with other people, then that requires an entirely different working style and an entirely different set of skills. Then you have to let go of that binary thinking, and think: what's in it for me, and how can I achieve what I want?"*

This project leader found himself in a difficult situation, caught between the new corporate way of working, and the resulting strict project control, and collaborating with the local and regional parties in an integrated planning process. He argued that Rijkswaterstaat's traditional, technical working style, fixed and static in nature, was not suited to this team thinking type of role, which required a more flexible and dynamic way of thinking and working. It is likely that when Rijkswaterstaat employees will be confronted with real surprises, they will become even more confused and perhaps even run the risk of getting paralyzed.

2. Appreciate past experiences
Even in times of ambiguity and uncertainties, the quality of sensemaking is influenced by the appreciation of past experiences, that is, by how well people remember these experiences and to what extent people are encouraged to collect and share these experiences. First, Rijkswaterstaat is very proud of its past experiences through which it realized many famous public works in the Netherlands. Moreover, in spite of many recent cutbacks, albeit with a new managerial look it managed to appreciate and increase its traditional technical-engineering expertise. However, the severe cutbacks, presented by the new coalition government, will further force Rijkswaterstaat to implement efficiency

operations and to contract out tasks and activities to private parties. This will inevitably put the maintenance of its institutional memory and its processes of knowledge sharing under pressure. Second, our analysis showed that Rijkswaterstaat primarily focuses on flood prevention, as that has proven to be the most effective strategy in the past. However, future challenges are partly unknown and might need other experiences to rely and build upon. Projects like the Oosterschelde storm surge barrier and Room for the River have shown Rijkswaterstaat's capacity to innovatively integrate water safety and ecology, and water safety and spatial planning. Remarkably, Rijkswaterstaat connects its achievements more to its engineering expertise rather than its innovative and integrative capacities.

3. Stay in motion

As Schwartz et al. (1995: 31) put it, external events undermined Rijkswaterstaat's "confidence in extrapolations and predictions, and created the need for contrasting scenarios and alternative strategic options for thinking in terms of uncertainties instead of certainties". At the end of the 1970s, Rijkswaterstaat started to reflect fundamentally on its role and positioning within Dutch society. It thereby aimed to become a learning organization – and, inspired by de Geus (1997), even a 'living company' – that is able to adapt to changing external circumstances. For this purpose, for example a Strategy Department and a Future Centre were established, which, by bringing together people with innovative ideas and by developing scenarios for the future, explore both substantive trends (such as the projected impacts of climate change) and new public-administrative trends (such as the changing role of government authorities due to the rise of the neoliberal ideology) (see e.g. Scenarioteam RWS 2020, 2007). The objective of these scenarios was to contradict and challenge the existing 'mental models' and to develop an answer not only to the question 'What will happen?', but also to the question 'What will we do if it happens?' Following de Geus, Rijkswaterstaat organized this organizational learning in relatively safe environments and preferably before the pain of a crisis. However, until now these activities are at most loosely coupled with daily practices. Rijkswaterstaat therefore still runs the risk of adapting to what it expects to happen and what it had planned to do in that situation, rather than experimenting in the here and now, and observing what it creates through that acting. The transformation towards a policy-implementing agency with a focus on contracted outcomes and service level agreements will further restrict Rijkswaterstaat to revoke of prescribed plans and policy programs.

4. Interact respectfully

To make sense of what is going on, respectful interactions are required between people with multiple interpretations. First, with regard to its intraorganizational interaction, Rijkswaterstaat's Corps of Engineers is characterized by a high level of self-respect and mutual trust. The value of mutual respectful interactions is deeply rooted in its technical-engineering identity and in the corresponding technical discourse in the field of Dutch water management. However, central in this discourse is also the belief that technical methods and methodologies are the only valid means to solve social problems and to obtain 'true knowledge'. The idea of only one possible truth excludes other values and realities, and thereby decreases Rijkswaterstaat's capability to grasp complexity.

Second, with the introduction of the Business Plan in particular Rijkswaterstaat's

interorganizational interaction grew in importance. To prepare for climate change, Rijkswaterstaat increasingly positions itself as a partner in a network. Following the example of the Room for the River project, local and regional parties will also be involved actively in the development and implementation of the various measures that are part of the Second Delta Plan. Crisis management is even defined as 'network management', focusing on organizing social networks with the other actors involved in the safety chain, instead of preparing for technical measures alone. However, the development of respectful interactions with other network partners turns out to be a difficult task, as for example the Room for the River project showed. Rijkswaterstaat's predominant technical-managerial rationality conflicted with the socio-cultural rationality of local and regional government authorities, NGOs and citizens, and these conflicts not only caused confusion but also hindered the progress of the project. Finally, Rijkswaterstaat's interaction with the general public is important.

5. Encourage improvisation and bricolage

Due to the unpredictable nature of many climate change effects, the capability of actors (bricoleurs) to improvise during crises is important. The way in which a Dutch mayor improvised during the 1953 flood disaster provides a famous example of bricolage (see Hulspas, 2007). When this mayor realised that the formal protection plans would not prevent his village to become flooded, he ordered two fishermen to close the hole in the dike by sinking their ships. The new NPM inspired technical-managerial identity may discourage the improvising capability of Rijkswaterstaat. Evaluations of the aftermath of Hurricane Katrina, for example, have shown how a focus on deliverables and a belief in 'deliverology' can cause governmental failure in times of disasters (Mulgan, 2009). At the level of the society in general, Rijkswaterstaat contributes to the rather underdeveloped capability to improvise of citizens – its mission statement emphasises that it will realise their dry feet. As a result, it is likely that the 'control paradox' (Remmelzwaal & Vroon, 2000) will remain to exist and will even increase. As people feel safe behind dikes and trust that the government c.q. Rijkswaterstaat will take care of them, they will not develop the capability to improvise at times of crisis. Moreover, the dominant focus on probability reduction rather than improvising in times of crisis suppresses improvisation skills.

6. Look closely and update often

Rijkswaterstaat allows its employees continuous access to information about the impacts of climate change, and enables them to make adjustments in project plans and governance structures. The programmatic approach of the Room for the River project and its continuously changing organizational structure and the corresponding division of roles and responsibilities are some good examples (Hufen & Lotze, 2004; ten Heuvelhof et al., 2007). However, the new technical-managerial identity and accompanying organizational structure give Rijkswaterstaat employees little room for manoeuvre and freedom to participate in strategic local and regional negotiations about context-specific and tailor-made solutions. One important fear is that when the safety norms are made part of integrated, interactive and decentralised planning processes, water safety could come off worst. Efficiency measures can further discourage employees to investigate alternative explanations more fully before arriving at a solution.

7. Develop an attitude of wisdom

To prepare for climate change, Rijkswaterstaat primarily focuses on realising strict safety norms through technical measures of flood prevention. From a managerial control perspective, it is also considered the most effective and efficient way of protecting the Netherlands against floods. Rijkswaterstaat thereby strongly beliefs in and values the use of computer models and simulations to determine climate scenarios, to calculate flood risks and to construct and plan defensive measures. The strong one-sided reliance on scientific experts regarding uncertainties can be considered a weakness. Although without advanced knowledge about land use, ocean and atmospheric processes and feedbacks and sophisticated climate models, climate change most likely would still be a non-issue, important uncertainties and ambiguities exist, which cannot be solved by scientific experts alone. In this respect, the ambition to develop a 'Delta Model' is a rather paradoxical choice. In spite of the continuously increasing uncertainties and ambiguities the aim is to integrate all hydraulic knowledge in one integrated model. This ambition can further force Rijkswaterstaat to rely on one scientific reality, which is primarily based on probability rather than plausibility arguments. Moreover, it can exclude the involvement of local and regional authorities, citizens and NGOs, which is necessary to develop downscaled and contextualized stories of what is going on.

6. Conclusion and reflection

This paper addressed the question as to what extent water management authorities, such as Rijkswaterstaat in the Netherlands, are able to deal with the known and the unknown unknowns of climate change, which are almost impossible to predict and to prepare for. In addition, this paper aimed to investigate to what extent Weick's sensemaking framework is useful for answering this question.

Starting with our first aim, we can conclude that the Rijkswaterstaat organisation has been successful so far to cope with flooding related risks. Still, any organisation inevitably has weaknesses, which are often related to or even a consequence of the strengths. Following Weick, we argued that allowing for clear identities is a basic organisational condition for sensemaking. The paper revealed how Rijkswaterstaat is characterized by a strong identity, accompanied by a high level of self-respect, proud and mutual trust. However, it is just this strong identity that gives cause to many of the revealed weaknesses. Let us explain that.

In the paper we have shown how the technocracy discourse influenced and structured the organizational development of Rijkswaterstaat and its way of thinking and acting. Core values were the belief that technical and scientific knowledge and expertise could be harnessed to solve social problems, and the belief in the possibilities for shaping society. The tide turned in the 1970s, due to the rise of new social and political discourses. In reaction, Rijkswaterstaat decided to transform into a public-oriented government business, thereby integrating elements and practices of in particular the neoliberal managerial discourse. From a managerial control position and on the basis of its engineering knowledge and expertise, it now tries to protect the Netherlands against floods.

However, in order to prepare for climate change, the choice to cherish and 'managerialise' the technical-engineering identity can be questioned. As a result of this choice, first, less room is left for variety and flexibility. Rijkswaterstaat employees 'at the front' are not enabled to make their own choice out of multiple identities, depending on the specific situation. Second: further efficiency operations and contracting out can cause knowledge leaks and put the processes of sharing of past experiences under pressure. Third: organizational learning is only loosely coupled with daily activities, and the recent agencification further restricts Rijkswaterstaat engineers to revoke from prescribed plans and schedules. Fourth: the dominant idea of only one possible truth decreases Rijkswaterstaat's capability to grasp complexity, and hinders respectful interactions with other networks partners and societal stakeholders. Fifth: the managerial turn together with the dominant focus on risk reduction suppresses improvisation skills during crisis of both Rijkswaterstaat and society. Sixth: the chosen identity leaves less room for a culture of complicating through continuously questioning insights and investigating alternative explanations more fully before arriving at a solution. Seventh: the reliance on one scientific reality, which is primarily based on probability rather than plausibility arguments, decreases the capacity to develop rich and contextualized stories of what is going on.

We started our empirical research with an analysis of the transformation process of Rijkswaterstaat towards a new organizational identity that could better cope with political and societal developments and demands. To better prepare for the unknown unknowns of climate change, we suggest that Rijkswaterstaat would restart this search process to an appropriate identity. The pathway is not to distance itself from the managerial-technical identity nor to domesticate some elements of the sensemaking and resilience organisations discourse. Indeed, the challenge Rijkswaterstaat is facing is to develop an identity, that 1) encourages multiple realities, media and interpretations; 2) animates employees to understand technical expertise as part of the continuously changing physical environment and the social context in which it is embedded; and 3) legitimizes messy meetings in which people can make sense of complex situations and problems of ambiguity, in spite of the managerial efficiency frame.

Let us then briefly return to our theoretical framework. On the basis of Karl Weick's work we revealed 7 organisational conditions that can strengthen sensemaking in order to better cope with surprises and disturbances. This list of 7 conditions has proven to be a useful framework to describe and analyse how Rijkswaterstaat prepares for climate change. In spite of some overlaps, these seven resources helped to focus on different organisational aspects. The Rijkswaterstaat study showed that the resource of identity differs from the other resources, because all other resources are more or less rooted in identity. A methodological problem in this study was that there are hardly any data about how Rijkswaterstaat actually operates in times of crisis. Therefore the results of our study have the character of an ex ante assessment. The proof of the pudding is in the eating.

In this paper we restricted ourselves to the writings of Karl Weick. We have not paid attention to how his theories relate to others. His concept of sensemaking, for example, shows several similarities with theories on interactional framing (Dewulf et al, 2009) and discourse analysis. From a more prescriptive point of view many of Weick's arguments and devices show similarities with currently popular complexity theories,

resilience theories and adaptive governance theories (Flood, 1999; Teisman et al, 2009, Holling, 1978; Norris et al, 2008; Olsson et al, 2006; Pahl-Wostl, 2007). However, through its focus on organizational conditions (structures and cultures) we assume that the sensemaking approach introduced by Weick can contribute to our knowledge about how governmental authorities deal with the known and unknown unknowns of climate change.

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