

# Learning to become adaptive: an exploration of collective action frames on learning in Dutch infrastructure renewal

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Keywords: learning; collective action frames; infrastructure renewal; adaptive planning

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## Abstract

*Traditional infrastructure networks in western countries are aging and need soon to be renewed. Infrastructure planners are in search for adequate approaches to infrastructure renewal, in which notions of adaptivity come to the front. Adaptive planning literature emphasises the importance of both single-loop and double-loop learning, which organisations have to undertake collectively. Since infrastructure planning demonstrates a tendency towards single-loop learning, infrastructure planners are currently exploring novel, adaptive ways of working, in which there is more room for double-loop learning. To this end, a case study in the Dutch inland waterway network is researched. Taking a framing perspective, collective action frames of both public and private parties are examined to research how parties perceive why and which type of learning is considered important in practice. Our results reveal that the collection action frame on the strategic level pays more attention to adaptive approaches and, accordingly, double-loop learning. Yet, these thoughts are limitedly translated to lower levels. The collective action frames on the project and programme level are largely focused on project or programme performance. Consequently, mainly single-loop learning occurs. Likewise, there are tensions between public and private parties how to operationalise cooperation among them. Altogether, the collective action frames of both public and private parties remain relatively traditional and have not yet incorporated thought related to adaptive planning.*

## 1. Infrastructure renewal: the need for learning

Traditional infrastructure networks such as inland waterways and highways are increasingly under pressure in western countries. Much transport infrastructure is built from the 1930s onwards. This implies that network assets have aged and soon have to be renewed. Infrastructure planners are therefore shifting their attention from network expansion towards infrastructure renovation and renewal. At the same time, planners have to cope with socio-spatial changes, resulting in changing infrastructure demands and potentially ineffective networks (Frantzeskaki & Loorbach, 2010). Moreover, external threats such as climate change need to be accommodated as well. For planners, this creates a highly dynamic context to

operate in, which requires a continuous process of adaptation (Folke et al., 2005). As a result, infrastructure planners are in search of new, adaptive planning approaches to adequately deal with infrastructure renewal. One of the key elements in adaptation literature is the importance of learning and cooperation (Weick, 1995; Mintzberg, 1996; Adger, 2003; Folke et al., 2005). Following Adger (2003), organisations are “bound up in their ability to act collectively” (p.388). This, as amongst others Folke et al. (2005) argue, requires an anticipatory learning process. In infrastructure planning practice, novel collective arrangements between public and private parties are explored to fully incorporate learning and, ultimately, to increase adaptive capacity.

Learning in relation to adaptive capacity is often operationalised as a process of reflection-in-practice. In this perspective, learning is a response to experience over time. These experiences challenge the underlying frames organisations hold on not only how to perceive the world, but also how to act (Argyris & Schön, 1974). The outcomes – or experiences – of these actions offer two types of learning (Argyris & Schön, 1974). First, existing strategies might be further refined and optimised; hence, exploitation occurs to modify actions to reach the set goals. Second, based on new insights, organisations could also explore and experiment with novel strategies, which requires exploration. Both types of learning are necessary to successfully adapt to a changing context (March, 1991; Folke et al., 2005; Gupta et al., 2010). Organisations should therefore attempt to find the right balance between optimising current actions as well as reconsidering and reframing the stated goals. However, research shows that organisations mainly follow a process of single-loop learning. As Armitage et al. (2008) argue, organisations “are unlikely to engage in learning that brings about critical questioning of an organization’s purpose” (p.89). As a consequence, the conventional approach organisations typically follow is one which can be classified as reactive and adaptationist (Staber & Sydow, 2002). Novel experiences are incorporated into existing ways of working, leading to incremental changes. Organisations responsible for managing traditional infrastructure networks could also be represented as traditional and conservative (e.g., Lenferink et al., 2014; Leendertse, 2015). The infrastructure sector, therefore, has a strong tendency towards single-loop learning, i.e. the refinement of existing means to reach the set objectives. In contrast, double-loop learning requires other qualities different from a focus on efficiency (cf. Thiry, 2002).

The Netherlands is one of the countries which is exploring new shared ways of working among public and private parties, to include both types of learning and therefore becoming more adaptive in the light of infrastructure renewal (Raad voor Verkeer & Waterstaat, 2009; Deltaprogramma, 2012; RWS, 2012a; Ministerie van Infrastructuur & Milieu, 2013). Especially infrastructure programmes are currently proposed as a means to increase learning (Busscher, 2014; Rijke et al., 2014). Consequently, besides strategic explorations, currently some infrastructure renewal programmes have already been launched, such as the road infrastructure programme Schiphol-Amsterdam-Almere and the waterway programme on hydraulic works. In this paper, we will focus on the Dutch inland waterway network and its €3 billion renewal programme on hydraulic works (in Dutch: *Programma Sluizen*). This programme is founded by the national government to replace six major navigation locks in the Dutch inland waterway network. Right from the start, the public

agency Rijkswaterstaat, the leading organisation of the programme, formulated a clear twofold learning objective. This programme intends to increase efficiency, for example by saving costs in tendering these projects. Simultaneously, it aims to be able to deal with changes in the context. To this end, Rijkswaterstaat operates in close alignment with private parties (e.g., construction companies, consultancies).

The paper explores collective action frames in Dutch waterway infrastructure renewal to examine what the underlying principles are in regard to learning. In particular, the renewal programme on hydraulic works in Netherlands will be researched to examine how involved parties give shape to the twofold learning objective, in which there is space for single-loop and double-loop learning. Furthermore, existing frames on higher, strategic levels as well as on the project level will be researched to explore potential differences. As a result, by identifying the frames the organisations involved demonstrate in regard to learning, our aim is to understand why which types of learning occur in infrastructure renewal practice and to what extent this contributes to adaptive infrastructure planning. Our main research question is as follows: which collective action frames are espoused in regard to learning in Dutch waterway infrastructure renewal and how does this either enhance or hinder adaptive planning?

Taking a framing perspective (Schön & Rein, 1994; Snow, 2004) helps to understand institutional processes, in this case learning. Widely applied in social movements, theoretically we aim to translate the framing perspective to an organisational context (cf. Van den Brink, 2009). Empirically the paper aims to contribute to the growing interest in infrastructure renewal and its governance response. For example, do programmes indeed provide more space for double-loop learning? Chapter 2, in which the theoretical framework is presented, will explain Argyris & Schön's (1974) learning theory in further detail and relate this to collective action frames on different institutional levels. In the third chapter, the research approach is explained as well as an introduction to the case study is provided. Chapter 4 presents the results, in which four collective action frames are distinguished. The conclusions are presented in chapter 5.

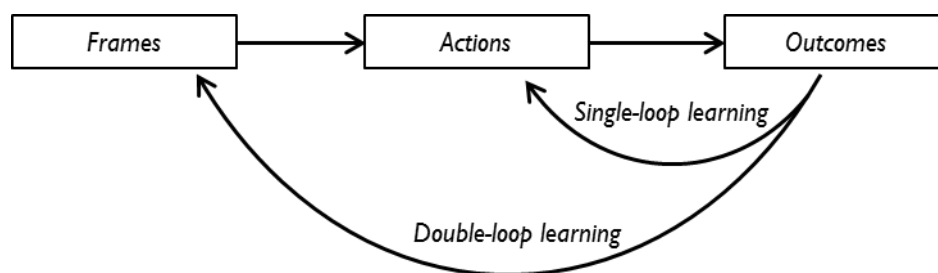
## **2. Learning explained: the role of frames**

### **2.1. Learning from experiences: single-loop and double-loop learning**

The growing concern of an environment in constant flux has made planners exploring adaptive ways of planning. As March (1991) states, "a central concern of studies of adaptive processes is the relation between the exploration of new possibilities and the exploitation of old certainties" (p.71). In adaptive planning, learning is often operationalised as experiential learning, i.e. learning from experiences (Folke et al., 2005; Gupta et al., 2010). Based on observations and reflection on concrete experiences, individuals form "theories-of-action" on how to act in practice (Argyris & Schön, 1974). Learning occurs whenever mistakes are noticed and corrected in these theories (Susskind & Corburn, 1999), but this depends on how experiences are collectively interpreted. As a consequence, learning could be considered as a

“looped” process, in which theories are continuously verified in practice and, subsequently, refined.

In that regard, Argyris & Schön (1974) distinguish two loops of learning. On the one hand, organisations can learn to adopt new action strategies to reach the set objectives. Such a process is reflected in single-loop learning. The focus is typically on increasing efficiency and effectivity by improving existing strategies and techniques, but it does not address underlying routines and assumptions. Double-loop learning, on the other hand, provides the opportunity for more meaningful or fundamental learning, in which indeed underlying values are questioned (Susskind & Corburn, 1999). Such a process of frame reflection contains all actors involved, who reflect together on practice and, if necessary, adjust their frames (Schön & Rein, 1994). According to Gupta et al. (2010), adaptive institutions should facilitate both single-loop and double-loop learning (figure 1).



**Figure 1. Two distinguished types of learning (Argyris & Schön, 1974)**

## 2.2. The importance of frames

The concept of frames play an essential role as an explanatory factor of how organisations make sense and interpret their surroundings, because learning occurs on the base of interpretations of experiences in practice (Argyris & Schön, 1974). As a consequence, the extent to which organisations demonstrate either single-loop or double-loop learning depends on the process of sense-making (Weick, 1995). Frames are “schemata of interpretation” and operate as frameworks of understanding (Goffman, 1974). The process of meaning-making is termed framing, in which selection and salience occur (Johnston, 2002). Organisations select and highlight certain elements in a frame, whereas at the same time they intentionally neglect or downplay other elements. These elements are sequenced in such a way it becomes a distinguished story (Benford & Snow, 2000). Moreover, frames guide action as they function as a “theory-of-action” (Argyris & Schön, 1974) and lead to specific goals (Lindenberg, 2000). Frames, in sum, have to main purposes: they describe not only how organisations perceive the world, but also influence how organisations act (Schön & Rein, 1994; Snow, 2004).

Literature on collective action framing (Benford & Snow, 2000; Snow, 2004) examines how actors construct collectively an interpretative schema that underlies mobilisation and sustains action. This is the outcome of negotiated shared meaning, in which frame conflicts among stakeholders are overcome (Schön & Rein, 1994). Originally applied to social movements, Van den Brink (2009) demonstrates how such collective action frames

can also be applied to organisations. Accordingly, an organisation's collective action frame provides a deeper understanding on how it interprets its environment and how these interpretations are translated into specific "theories-of-action".

Collective action frames are not static, but are constantly challenged and verified in reality. Frames are therefore continuously evolving over time, by means of learning experiences. For instance, the behaviour demonstrated in practice based on existing frames may not meet its initial intentions. This could lead to modifications of the chosen strategies, i.e. single-loop learning. More fundamental is frame reflection, which is part of double-loop learning (Schön & Rein, 1994). Existing frames are reflected upon and assessed if still sufficient. Learning, then, becomes "reflection-in-action" and is based upon day-to-day experiences instead of being a passive, abstract process (Schön, 1983; Pelzer & Geertman, 2014). It might as well involve a round of renegotiating amongst organisations to reframe the issue at stake (Susskind & Corburn, 1999).

### **2.3. Learning in infrastructure planning: different frames across three levels**

Collective action frames are likely to differ across institutional levels. The institutional level in which planners mainly operate is the meso-organisational level (Alexander, 1995; 2005). This inter-organisational level is the field of practice in which infrastructure planners, both from the public and private side, meet in different constellations.

In infrastructure planning, the most dominant arrangement is the project (Glasbergen & Driessen, 2005; Busscher et al., 2013). Projects are related to the operational level, in which public and private parties typically operate together in partnerships. Projects are defined as temporary organisational arrangements, in which clear goals are defined, such as the completion of a highway or a hydraulic work. Projects are well-known for their emphasis on budget, time and scope. As a consequence, projects are usually classified as inward-focused and task-oriented (Lycett et al., 2004). Altogether, the collective action frame in projects is concerned with project performance, which is optimised by single-loop learning (Thiry, 2002). Learning types related to double-loop learning seem less appropriate within projects, even more because projects are relatively short, temporary organisations.

Projects, though, are not operating in isolation: they are established to meet a broader aim and are therefore connected to a higher-scale organisation on the strategic level (Salet et al., 2013). In general, the strategic level demonstrates more attention towards double-loop learning and keeps track of the longer term. To illustrate, novel insights might lead to reframing the overarching strategic mission. As a result, the collective action frame on the strategic level is more open to double-loop learning. However, as Flyvbjerg et al. (2003) show, "under tight financial and procedural conditions, the level of strategic thinking and acting often tends to be rather thin" (Salet et al., 2013, p.1992).

As the worlds of the project on the operational level and the organisation on the strategic level might be hard to connect, programmes have been proposed recently as a means

to better connect both worlds (Busscher, 2014; Rijke et al., 2014). Programmes consist of a group of projects and have also temporary character. Usually the scope of programmes is broader than of projects, with a project-transcending aim. Programmes could be regarded as complementary to project management by creating higher-scale platforms for double-loop learning. These spaces are for example shaped on the coordinative programme-level, which directs a group of projects. For instance, Lycett et al. (2004) distinguish knowledge and information sharing between projects as a cornerstone in effective programme management. For that reason, programmes connects the strategic level by operationalising the sometimes somewhat abstract aims from the strategic level.

To summarise, three main inter-organisational levels have been distinguished: the strategic level, the programme level and the project level. In general, as the literature shows, the higher the institutional level, the more double-loop learning could be expected (figure 2). The tendency towards either single-loop or double-loop learning is based on the espoused collective action frame, which differs at each level. Since both types of learning are necessary in becoming adaptive, an appropriate balance should be found between them in each institutional level.

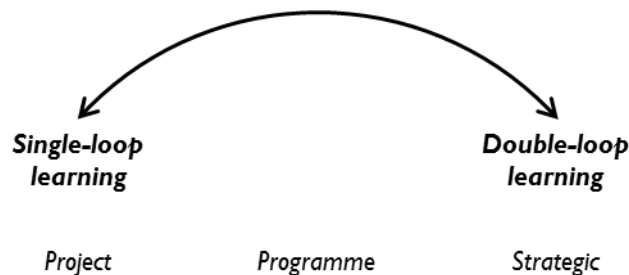


Figure 2. Learning differs across institutional levels

### 3. Research approach

#### 3.1. A case study approach: the Dutch inland waterway network

To research the collective action frames on learning and their differences, and referring back to the research question as stated in the introduction, the following research approach is proposed. The distinguished institutional levels (figure 2) and the differences in their frames on learning are researched in the Dutch inland waterway network. The public agency Rijkswaterstaat, the executive agency of the Dutch Ministry of Infrastructure & the Environment, has started several exploratory studies how to tackle the issue of infrastructure renewal (e.g., Deltaprogramma, 2012; RWS, 2012a). Likewise, it has started a first renewal programme, the €3 billion renewal programme on hydraulic works, consisting of six projects. In this programme, a clear learning objective is formulated and efforts are made to apply adaptive governance into practice. As a result, the programme is part of a larger trend in the water sector to move more towards adaptive forms of governance, in which the importance of collective learning is emphasised (Pahl-Wostl, 2007; Van der Brugge & Rotmans, 2007). In regard to this, not only single-loop learning is necessary, but also double-loop learning (Gupta et al., 2010). As Rijke et al. (2014) argue, programmes could be regarded as an

operationalisation of such governance structures, of which our case study is one of the examples. Therefore, we explore the differences between the collective action frames across different institutional levels as well as between the public and private side.

To this end, we followed a qualitative research approach, in which three main sources of data could be distinguished. First, a document analysis was carried out to review external and internal documents on the concept of learning: e.g., how is learning referred to in documents? And how do involved stakeholders present themselves? Second, two rounds of semi-structured interviews were conducted with officials working in the infrastructure sector. In the beginning, a sector-wide round of interviews was carried out to get a clear picture of existing ways of working. Subsequently, a more specific interview round was executed with officials directly related to the renewal programme<sup>1</sup>. Until now, 15 interviews are conducted with both public and private officials, operating on all levels (projects, programmes, strategic). On the base of these data, key elements of the collective action frame came to the front. Third and final, a series of events was joined, such as programme team meetings, consultations with private companies and sector-wide discussion afternoons, leading to observations of how the frames manifest themselves in practice. Altogether, these data provide a solid base to construct the collective action frames on learning and the tensions among actors in constructing them.

The data analysis consists of three steps. First, the completely transcribed interviews and the documents are coded in the computer programme Atlas.ti (version 7.0). Based on the topics of the interview guide, a list of codes has been developed that is used as a starting point for the coding process. The list of codes was extended during the coding process itself; as such, an iterative qualitative research process took place, in which there is space for both *in vitro* and *in vivo* coding (Hennink et al., 2010). The second step clustered these codes into groups and related them to specific actors. Finally, the collective action frame itself was constructed by translating the groups of codes to crucial frame elements. This process of frame articulation (Benford & Snow, 2000) was checked with the participants in several sessions. In addition, certain elements were considered to be more important and, accordingly, highlighted: frame emphasis.

Before moving to the results of the collective action frame in practice, we present first an introduction to the case study as a set.

### **3.2. An introduction to the case study**

The renewal programme navigation locks (in Dutch: *Programma Sluizen*) is set up by Rijkswaterstaat, the executive arm of the Dutch Ministry of Infrastructure and the Environment. Rijkswaterstaat is responsible for the inland waterway system in the Netherlands (e.g., Meuse, Rhine and several main canals). In these waterways, many hydraulic works can be found, of which most are built in the 1930s. As infrastructure works

<sup>1</sup> This round of interviews is still ongoing at the moment of writing.

usually last for 80-100 years, the agency is entering a phase of renewal. Consequently, Rijkswaterstaat is inventorying the state of their infrastructure assets and developing a strategy to renew those. The renewal programme navigation locks is among the first programmes to start with this renewal task.

The programme was launched in 2012 and consists of six projects, each relating to one navigation lock, scattered across the Netherlands (figure 3). Together an investment of approximately €3 billion is needed to upgrade the works. Five of the six projects are or will be tendered with a Design, Build, Finance and Maintain (DBFM) contract, which has not happened in the water infrastructure sector before globally. Initially, the six projects were sequenced on the base of their size and capacity to support the learning process (RWS, 2012b). At the moment of writing, navigation lock Limmel is tendered and navigation lock IJmuiden, Eefde and the Beatrix sluices are to be tendered. The remaining projects (Terneuzen, Afsluitdijk) will follow at the end of 2015 or early 2016.



**Figure 3. The location of the six projects in the Netherlands. From North to South: Afsluitdijk, IJmuiden, Eefde, Beatrix sluices, Terneuzen and Limmel (RWS, 2012b)**

Several actors are involved in implementing this programme. On the one hand, from the public side, one principal actor is involved: the Ministry of Infrastructure & the Environment, specifically Rijkswaterstaat. Rijkswaterstaat has appointed a programme director who coordinates the whole programme and interacts with project teams. The six project managers form together with the programme director the programme team. The team operates in close alignment with the regional bodies of Rijkswaterstaat, which manage the waterways in their district. There are also contacts with other regional authorities, such as the province and municipalities. On the other hand, private parties typically enrol for the tender of a specific project, collaborating in partnerships. In this case, the partnerships consists usually of a construction company as the main contractor, working together with companies in engineering-related fields such as electro mechanics. The programme tries to establish common ground between the public and private side by organising several meetings to discuss any type of issues. Also the Platform Hydraulic Works is founded to enable organisations to exchange thoughts and experiences.

#### **4. Collective action frames on learning in the renewal programme on hydraulic works**



In this chapter, the frames that exist in the four levels distinguished will be elaborated upon (summarised at the end of this chapter in table 1). Each frame will discuss its key elements (frame emphasis), the relation between these elements (frame articulation) and the eventual guide for action (frame transformation) (cf. Snow, 2004).

#### 4.1. The collective action frame on the strategic level

Rijkswaterstaat presents itself as the manager of the Dutch national inland waterways network (*hoofdvaarwegennet*). One of its core focus points is the conservation of the network, since many assets are aging (RWS, 2011). This involves not only an inventory of the state of the infrastructure network, but as well a fundamental reflection on which demands the network should meet in the future. Regarding the latter, Rijkswaterstaat highlights two points in external documents (e.g., RWS, 2009; RWS, 2011; Spijkerboer, 2015).

First, the conservation of the network should be executed in both a cost-effective manner and a flexible, or adaptive, fashion. On the one hand, this implies increasing efficiency and effectiveness, i.e. single-loop learning. On the other hand, incorporating flexibility and adaptivity requires more reflective way of working, thus asking for double-loop learning. The frame on the strategic level is therefore a challenging balancing act between two seemingly contrasting viewpoints. Second, to reach this twofold objective, Rijkswaterstaat is actively seeking to intensify the cooperation with private companies. This is not only due to ongoing budget cuts, but also because Rijkswaterstaat's partners expect to be increasingly involved (RWS, 2009). Rijkswaterstaat positions itself therefore more firmly as a societal actor, instead of an external expert (see also Van der Brink, 2009). Hence, Rijkswaterstaat feels it should tighten the relationships with private companies and create more strategic alliances. In conclusion, the frame on the strategic level emphasises the conservation of the network which should be conducted in a cost-effective as well as an adaptive manner. To this end, Rijkswaterstaat acknowledges the importance of collaborating with other societal actors, particularly private companies.

#### 4.2. The collective action frame on the programme level

The collective action frame of the programme consists of three key elements. First of all, the start of programme immediately constrained the context for action. Back in 2012, the chief engineer and director of Rijkswaterstaat was facing a problem. Rijkswaterstaat needed to construct six navigation locks the following years: an almost impossible task, according to the chief engineer. Within the organisation, there was not sufficient financial and human capacity to form six separate project teams to properly manage each project, due to ongoing governmental budget cuts. Moreover, these projects needed to be tendered with a Design, Build, Finance and Maintain (DBFM)-contract, which was a novel element in the water infrastructure sector. As the current programme director summarises it: *"We do not have a lot of things we need to have. We have no experience with DBFM-contracts. We have no capacity to form six project teams, of which each will build a lock. And still we have to make sure these*

*projects are delivered on time.*<sup>2</sup> This point of departure immediately positions the frame on learning. It marked the start of a search how learning could contribute to the delivery of the projects. One of the project managers: *“The programme consists of six separated projects, with separated financing and responsibilities. We are a multi-project and we have to search for cooperation between projects, so we can learn from each other and do not make the same mistakes twice.”*

As a consequence, the coherence between the projects was actively sought. It was argued that inter-project learning would enhance the use of the available human capacity, time and money. In that regard, the programme team tackled, on the one hand, the limited available human resources, budget and time frame. On the other hand, it was expected the inter-project learning would support the implementation of the new DBFM-contracts effectively. The projects were put in a certain sequence, as learning would benefit from this: *“The underlying idea was to work from small to large projects. You can learn from the small objects, which experiences you can use when working on the larger projects.”* (Programme director) By starting with the small, relatively easy projects (±€65 million euros), the expected teething problems of particularly implementing DBFM-contracts would not harm the biggest, more difficult megaprojects (>€800 million euros). Due to emphasis on the limited budget, capacity and scope, the frame on learning was directed towards single-loop learning: improving from one project to another, delivering a better standard in each project. This becomes most apparent in the inter-project learning to improve the DBFM-contract standard.

The second key element regards the implementation of DBFM-contracts in the water infrastructure sector. The interviewed public officials continue to mark the pioneering element of their programme: the implementation of DBFM-contracts in the water infrastructure sector. After experiences in the highway sector, Rijkswaterstaat is exploring the benefits of DBFM in the waterways sector. Hence, interviewees mention the novelty of their programme – in their views, a clear example of double-loop learning. One of the project leaders: *“This is the first time ever we are tendering DBFM-contracts in the water sector. (...) It really is a discovery: how does it really work?”* Navigation lock Limmel, the first project, was the first time globally that a water infrastructure object was tendered with a DBFM-contract.

Third and final, Rijkswaterstaat is still exploring how to organise the tender phase properly and wishes this to do in close alignment with market parties. Interviewees from Rijkswaterstaat mentioned the importance of openness and transparency from the perspective of Rijkswaterstaat. Through open discussions with private companies, Rijkswaterstaat hopes to come to a standard for tendering DBFM-standards. The motivation behind these sessions are the result of Rijkswaterstaat, which had a clear image the new contract type was not only an issue they had to tackle, but also market parties had to. The programme director: *“This is the case for Rijkswaterstaat, we can learn something to work from small to large, but that is also the case for the private sector. They will have a look first at that small navigation lock Limmel, how things all work and gain experience, in particular with that new contract type.*

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<sup>2</sup> All quotes are originally stated in Dutch; for clarity reasons they are translated into English by the first author.

*Subsequently, we will enlarge it, so we can finish eventually with the last and biggest one, Terneuzen.”* (Programme director) And a project manager: *“It is a sort of pioneering which you could do best together.”*

The reconsideration of Rijkswaterstaat to operate in closer alignment with the market does not narrow down only to DBFM-contracts. As the programme director puts it, *“there are around 30 private parties participating in the current and upcoming tenders, which are more or less the companies that will realise the projects the next couple of years. I am keen on letting all these companies participate in the learning process we are in.”* Again, the focus was mainly put on single-loop learning. For Rijkswaterstaat, it would be efficient if private parties all gained experience in the first projects, so they would not have to “reinvent the wheel again” in the succeeding project. To illustrate, one interviewee mentioned that Rijkswaterstaat should support private companies and even ‘escort’ them during the process, so they do not have to invent everything themselves. *“It will become less of a search for them [market parties]”*, as one project manager puts it.

In sum, the collective action frame on the programme learning strongly centres on efficiency: using the limited available capacities wisely to deliver the six projects on time. At the same time, this efficiency will contribute to an effective implementation of the novel DBFM-contract in the water infrastructure sector. To carry out their programme efficiently, echoing the importance of cost-effectiveness on the strategic level, the programme articulates the need to work closely together with private companies in a joint learning process.

#### **4.3. The collective action frame on the project level**

On the project level, the prevailing frame is one of constructing: *“We are a real project club, right? We want to build. There is nothing more fun to see a project developing outside. You just want immediately to start, whereas you should think, “Gee, how should we actually do this?”.”* (Programme director) The scope of the project hugely determines the direction: *“You just have to be sure to reach your scope and all other things, that is just hassle which distracts. You just do not want that. (...) You have to realise yourself, especially in DBFM-contracts, time is sacred. A delay of a month costs easily a million euros.”* (Contract manager) Consequently, on the project level, less attention is paid to moments of reflection. The frame in the project is one concerned with reaching the scope and ensuring performance. Thus, the scope of the project offers a strong framework for action. Reflection, or even the exploration of new insights, are abandoned as irrelevant to the scope; these elements can only mix up the original scope.

Regarding learning, there is a strong tendency of single-loop learning: refining current procedures and actions. In that sense, the projects in our case studies are no different from other infrastructure projects (see e.g., Lycett et al., 2004; Busscher, 2014) The programme director explains: *“Content-wise you are right that we often still choose the safe way. (...) We like to play it safe within Rijkswaterstaat, we do. So if there are opportunities for innovation, we take them, but not directly an enormous innovation in the largest project. You have to*

*balance that a little.*” The performance is a key element in the frame: *“A hydraulic work should be available for shipping 98% of the time, so the reliability of the system, this is crucial. That is incredibly important. We are counted upon that.”* (Contract manager) In addition to opting for well-known, proven solutions, Rijkswaterstaat’s rather careful way of working is further influenced by wanting to spend tax’ payers money smartly. To conclude, on the project level, the existing frame focuses on performance and reaching your scope, offering mainly space for single-loop learning.

#### 4.4. The collective action frame from a market perspective

The frame of market parties is particularly focused on the need to win tenders to be able to participate in projects. As the head of a representative organisation puts it, *“In the current working climate (...) the ‘hunger’ to have work is huge (...), so [companies] tender on the edge. That is what the companies do themselves, but otherwise they do not have a job. Yes, as a client you can ask them not to tender so sharp, but well, then they do not earn a living. They do that for the continuity of their company.”* Companies’ guide for action is thus trying their best to keeping their head above the water.

This becomes clear in the tendering phase of the projects in the programme. Private parties perceive joining the tender phase as a high investment; a capacity they either do not have or do not want to release. Dutch national media claimed that the programme was in danger, because private companies do not want to participate anymore: *“The time-consuming and costly tendering procedures associated with the ambitious programme for hydraulic works follow after each other in a too high pace”*, as a national newspaper describes it (Polman, 2015). The open discussions initiated by Rijkswaterstaat are referred to as *“a lot of talking”*, but offer no direct outcomes. In a similar vein, learning is mainly considered an internal task for each company; other companies might benefit directly from sharing experiences. In particular after winning a tender, private companies are not greedy to share their experiences – they might lose their competitive edge. *“Our fear is that another party runs off with our idea”*, according to a bid manager of a private company. *“I am not going to make my rivals any wiser than they already are.”* All in all, it demonstrates the prevailing frame: one that is short-sighted and greatly devoted to upcoming projects.

As a result, long-term foresights on how the sector should evolve gains less attention; that is in particular a task for the public authority Rijkswaterstaat, companies argue: *“we will follow in that regard Rijkswaterstaat. We fill the freedom that Rijkswaterstaat allows.”* (director of a construction company) Private parties prefer a predictable and stable client, on which they can rely. Until now, they express their gratitude to share their experiences, but they emphasise Rijkswaterstaat should draft the rules of the game and stick to them. Simultaneously, private parties feel no need to collectively frame how to learn in this programme, in particular regarding DBFM-contracts.

Frame	Key elements articulated	Leaning towards...
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<i>RWS-Strategic</i>	- Conserving the national inland waterway in both a cost-effective and adaptive, flexible way. - Cooperation with private companies should be actively sought	Single-loop (cost-effective) and double-loop (adaptive) learning
<i>RWS-Programme</i>	- No capacity, no experience with DBFM: “we have to use the capacity wisely”. - Achieving these aims in close alignment with market parties.	Single-loop learning, yet intentions for more double-loop learning
<i>RWS-Project</i>	Delivering your project right, ensuring performance	Single-loop learning
<i>Private companies</i>	Winning upcoming projects, “appease the work hunger”	Single-loop learning

**Table . The frames summarised.**

#### 4.5. Competing frames: two striking points

On the base of the collective action frames distinguished (summarised in table 1), two main tensions between the frames come to the front. First, there exists a wide gap between the strategic level on the one hand and the programme and project level on the other hand. The frame on the strategic level described a balancing act between being both cost-effective and adaptive, which needed to be carried out in cooperation with private companies. Compared to the programme and project level, the notion of becoming adaptive does not resonate with the lower-level frames; the balance is – so to say - beaten by the focus on cost-effectiveness. The key frame element of cost-effectiveness is an eminent aspect for Rijkswaterstaat in the last couple of decades, as Rijkswaterstaat is outsourcing its tasks to private parties. Hence, Rijkswaterstaat is struggling to reposition itself and to make fundamental changes in their dominant *modus operandi*, which does not necessarily involve ideas of adaptivity. Our results reveal that renewal projects are approached as ‘business-as-usual’. Therefore, double-loop learning still occurs very limitedly, mainly on the strategic level and disconnected to the other levels. Although programmes are said to bridge the project and strategic level, the arrangement of this programme does not provide this linking element. Since the programme is established to support inter-project-learning, the connection between the project and programme is strong, yet the strategic level receives less attention. This is further increased by the fact that the programme has no overarching goal, resonating with higher-level formulated targets (cf. Rijke et al., 2014).

The second tension consists between the public authority Rijkswaterstaat and private parties. As both parties seem to have a different frame on how to operationalise the collaboration, there is no shared opinion on learning. Although both parties agree on the benefits of DBFM-contracts, the interpretation of implementing the contract is different. Rijkswaterstaat is searching for the appropriate approach and frames this as a collective act, i.e. together with market parties. By doing so, they aim to optimise the DBFM-contract standard over the projects, in line with their focus on inter-project learning. Private companies, on the other hand, frame this mainly an internal task for Rijkswaterstaat. The experiences of the tender of the first project Limmel illustrates this point rather well. Based on these experiences, Rijkswaterstaat wanted to adjust the tender phase. Instead of excluding four consortia in the tender, as was decided upon, the programme team proposed to continue

with all nine consortia. The programme director explains: *“You know what, they [the companies] were all afraid! They thought “Huh?! What are you going to do now? Are you going to change the rules of the game you set yourself? That is not the Rijkswaterstaat we know, that robust, stable organisation which always choose their own way.” So that was very surprising to them. And eventually the companies decided against the proposal.”*

Rijkswaterstaat, however, continues to push collective learning. The programme director: *“I would like that the other companies can join to learn. Maybe not that much as if you are sitting front row, but still in the back, you can hear everything and you are joining the journey, if I can put it like this. So I am looking for a method, together with representative organisations, to share the lessons we learn now. Learning together, that is most important.”* Private companies are resistant to fully join in this process, afraid of sharing too much information other competitors might benefit from. Besides, Rijkswaterstaat mentions the strict juridical frameworks. It is navigating between being a client and being a partner: *“it is true, you want to position yourself between the others. Though, the dependence of private parties on Rijkswaterstaat, that will always remain.”* (Programme director)

A full reconsideration of each party's role – related to double-loop learning – has not yet happened. The programme is trying to enable collective learning, for instance seen in the following quote by the programme director: *“it results in the development of a different type of relation with each other.”* Rijkswaterstaat is exploring these issues, but mainly from a perspective to reduce costs. Private parties seem to opt for their safe way of working, reluctant to share much information, although some private parties are more open than others to new ways of working. In summary, there are some intentions for frame reflection, to reconsider each party's role in infrastructure renewal, yet both parties seem to fall back on their business-as-usual approach.

## **5. Conclusions and reflection**

This paper examined the collective action frames espoused by public and private parties in regard to learning in Dutch waterway infrastructure renewal and its influence on adaptive planning. Both single-loop and double-loop are crucial elements in adaptive planning (Folke et al., 2005; Gupta et al., 2010). In infrastructure planning, learning on the operational-project level leans towards single-loop learning, whereas double-loop learning mainly occurs on the strategic level. Since the operational and strategic levels are often hard to bridge in practice, programmes are currently proposed as a bridging concept. Accordingly, it could be expected that learning differs across institutional levels, although both types of learning are necessary to become adaptive.

In this paper, a framing perspective is taken to understand why which type of learning occurs: how do public and private parties frame themselves on the different levels and how does this guide their actions? Such a viewpoint contributes to the understanding of underlying assumptions and values, which explains why certain behaviour is exposed. On the public side, three collective action frames were distinguished, based on the operational-project, tactical-

programme and strategic level. The private side was covered with one collective action frame. These four frames were specifically explored in the context of the Dutch renewal programme on hydraulic works in the Netherlands.

Our results reveal that, although working in a programme, mainly single-loop learning happens in practice. Moreover, there seems to exist a gap between the operational and strategic level: whereas on the project level ideas related to flexibility and adaptivity are hardly mentioned, on the strategic level these concepts receive considerable attention. The programme failed to connect the two worlds, although programmes are presented as a means to do so. In general, in this case of Dutch water infrastructure renewal, the problem at stake was immediately framed as a capacity problem, due to a limited budget, a tight time horizon and limited human resources. Learning, therefore, centred on inter-project learning to efficiently and effectively use the available budgets and capacity; in other words, single-loop learning. Also the implementation of Design, Build, Finance and Maintain (DBFM) contracts – presented as a novel element in the water infrastructure sector – tended to mainly consider single-loop learning: operationalising and improving the already established ‘DBFM-standard’. Altogether, the collective action frame centres on programme and project performance.

As a result, frame reflection and a reconsideration of the approach taken, or double-loop learning, occurs only limitedly. These elements are considered as outside the scope and, consequently, also outside the frame. Our case study illustrated that, instead of adaptive planning, the infrastructure sector still demonstrate a tendency to instrumental-rational planning approaches (cf. Alexander, 2000). Public and private parties showed to have the most difficulties to overcome this issue of frame reflection. While Rijkswaterstaat expresses a strong interest in cooperating in close alignment with private parties, private parties are more hesitant. Rijkswaterstaat hopes that succeeding projects will benefit from sharing experiences and working towards a sector-wide standard. Private parties, instead, express little incentives to share their experiences and frame Rijkswaterstaat as the leading, dominant actor which should set the standard and of which they are dependent of. At the same time, Rijkswaterstaat is struggling to reframe herself as a partner instead of a client. To summarise, although operating in a programme context, the pitfalls of project management seem to be prevalent in our case study, in which performance is put central and other issues are snowed under.

To conclude, our case study demonstrates that the appropriate balance between single-loop and double-loop learning is hard to find and, consequently, it could be questioned to what extent the infrastructure sector is becoming adaptive. Learning is bounded to single-loop learning; in contrast, becoming adaptive requires the questioning of its underlying values too. The framing perspective taken in this paper helped to reveal these underlying values, which still seem to be similar to more ‘traditional’ planning approaches. Future research hopes to address this latter point more thoroughly by examining in closer detail the incentives of public and private parties to adjust their ways of working.

## References

- Adger, W.N. (2003) *Social capital, collective action and adaptation to climate change*. *Economic Geography*, 79(4), pp.387-404
- Alexander, E.R. (1995). *How Organizations Act Together: Interorganizational Coordination in Theory and Practice*. Gordon and Breach Publishers, Luxembourg.
- Alexander, E.R. (2000) *Rationality Revisited: Planning Paradigms in a Post-Postmodernist Perspective*. *Journal of Planning Education & Research*, 19(3), pp.242-256
- Alexander, E.R. (2005). Institutional Transformation and Planning: From Institutionalization Theory to Institutional Design. *Planning Theory*, 4(3), 209-223.
- Argyris, C. & Schön, D.A. (1974) *Theory in practice: increasing professional effectiveness*. Jossey Bass, San Francisco.
- Armitage, D., M. Marschke & R. Plummer (2008) *Adaptive co-management and the paradox of learning*. *Global Environmental Change*, 18(1), pp.86-98
- Benford, R.D. & Snow, D.A. (2000) *Framing processes and social movements: an overview and assessment*. *Annual Review of Sociology*, 26(1), pp.611-639
- Busscher, T. (2014) *Towards a programme-oriented planning approach: Linking strategies and projects for adaptive infrastructure planning*. CPI Koninklijke Wöhrmann, Zutphen
- Busscher, T., T. Tillema & J. Arts (2013) *Revisiting a Programmatic Planning Approach: managing linkages between transport and land use planning*. *Planning Theory & Practice*, 14(4), pp.492-508
- Deltaprogramma (2012). *Vervangingsopgave Natte Kunstwerken*. Delta program, Ministry of Infrastructure & the Environment, The Hague.
- Flyvbjerg, B., N. Bruzelius & W. Rothengatter (2003) *Megaprojects and risk: an anatomy of ambition*. Cambridge University Press, New York, NY
- Folke, C., T. Hahn, P. Olsson & J. Norberg (2005) *Adaptive governance of social-ecological systems*. *Annual Review of Environment and Resources*, 30, pp.441-473
- Frantzeskaki, N. & D. Loorbach (2010) *Towards governing infrasystem transitions. Reinforcing lock-in or facilitating change?* *Technological Forecasting and Social Change*, 77, pp.1292-1301
- Glasbergen, P. & P.P.J. Driessen (2005) *Interactive planning of infrastructure: the changing role of Dutch project management*. *Environment and Planning C: Government and Policy*, 23, pp.263-277
- Goffman, E. (1974) *Frame analysis: an essay on the organization of experience*. Harvard University Press, Cambridge, MA
- Hennik, M., I. Hutter & A. Bailey (2010) *Qualitative Research Methods*. Sage, London.



- Johnston, H. (2002) *Verification and proof in frame and discourse analysis* In B. Klandermans & S. Staggenborg (eds.) *Methods of social movement research* (pp.62-91). University of Minnesota Press, Minneapolis, MI
- Leendertse, W.L. (2015) *Publiek-Private Interactie in Infrastructuurnetwerken. Een zoektocht naar waardevolle marktbetrokkenheid in het beheer en de ontwikkeling van publieke infrastructuurnetwerken*. CPI, Koninklijke Wöhrmann, Zutphen
- Lenferink, S., T. Tillema & J. Arts (2014) *Lifecycle driven planning of infrastructure: public and private experiences with more integrated approaches for managing project complexity*. *European Journal of Transport & Infrastructure Research*, 14(2), pp.82-101
- Lycett, M., A. Rassau & J. Danson (2004) *Programme management: a critical review*. *International Journal of Project Management*, 22(4), pp.289-299
- Ministerie van Infrastructuur & Milieu (2013) *Meerjarenprogramma Infrastructuur, Ruimte en Transport. Projectenboek 2014*. Ministerie van Infrastructuur & Milieu, Den Haag
- Mintzberg, H. (1996) *Managing government, governing management*. *Harvard Business Review*, May-June 1996
- Pahl-Wostl, C. (2007) *Transitions towards adaptive management of water facing climate and global change*. In: Craswell et al. (eds) *Integrated Assessment of Water Resources and Global Change. A North-South Analysis*, pp.49-62. Springer, Dordrecht.
- Pelzer, P. & S. Geertman (2014) *Planning Support Systems and Interdisciplinary Learning*. *Planning Theory & Practice*, 15(4), pp.527-542
- Polman, J. (2015) *Sluis op losse schroeven*. News article in *De Telegraaf*, 17-03-2015
- Raad voor Verkeer & Waterstaat (2009) *Witte zwanen, zwarte zwanen. Advies over proactieve adaptatie aan klimaatverandering*. Raad voor Verkeer & Waterstaat, Den Haag.
- Rijke, J., S. van Herk, C. Zevenbergen, R. Ashley, M. Hertogh & E. ten Heuvelhof (2014) *Adaptive programme management through a balanced performance/strategy oriented focus*. *International Journal of Project Management*, 32(7), pp.1197-1209
- RWS (2009) *Beheer- en Ontwikkelplan voor de Rijkswateren 2010-2015. Werken aan een robuust watersysteem*. Rijkswaterstaat, Utrecht.
- RWS (2011) *Ondernemingsplan 2015. Eén Rijkswaterstaat, elke dag beter!* Rijkswaterstaat, Utrecht.
- RWS (2012a) *MultiWaterWerk. Verkenning vervangingsopgave van de natte kunstwerken*. In cooperation with Van Hattum & Blankevoort, Deltares en IPV Delft. Rijkswaterstaat, Utrecht
- RWS (2012b) *Uitkomsten marktconsultatie – DBFM Sluizenprogramma 2 november 2012*. Rijkswaterstaat, Utrecht.

- Salet, W., Bertolini, L. & Giezen, M. (2013). Complexity and Uncertainty: Problem or Asset in Decision Making of Mega Infrastructure Projects? *International Journal of Urban and Regional Research*, 37(6), 1984-2000.
- Schön, D.A. & Rein, M. (1994) *Frame Reflection: Toward The Resolution Of Intractable Policy Controversies*. Basic Books, New York
- Schön, D.A. (1983) *The Reflective Practitioner*. Basic Books, New Yorks, NY.
- Snow, D.A. (2004) *Framing Processes, Ideology, and Discursive Fields*. In: D.A. Snow, S.A. Soule & H. Kriesi (eds.) *The Blackwell Companion to Social Movements* (pp.380-412). Blackwell, Oxford
- Spijkerboer, R. (2015) *Trends en Opdraken in het Ruimtelijk Domein: een verkenning*. Faculty of Spatial Sciences, University of Groningen, Groningen.
- Staber, U. & J. Sydow (2002) *Organizational Adaptive Capacity: a structuration perspective*. *Journal of Management Inquiry*, 11(4), pp.408-424
- Susskind, L.E. & J. Corburn (1999) *Using Simulations to Teach Negotiation: Pedagogical Theory and Practice*. In: Herz., D. & A. Blatte (eds) *Simulation und Planspiel in den Sozialwissenschaften. Eine Bestandsaufnahme der internationalen Diskussion*, pp.63-90. LIT Verlag, Munster.
- Thiry, M. (2002) *Combining value and project management into an effective programme management model*. *International Journal of Project Management*, 20(3), pp.221-227
- Van den Brink, M.A. (2009) *Rijkswaterstaat on the horns of a dilemma*. Eburon, Delft
- Van der Brugge, R. & J. Rotmans (2007) *Towards transition management of European water resources*. *Water Resources Management*, 21(1), pp.249-262
- Weick, K.E. (1995) *Making sense of the organization*. Blackwell, Oxford