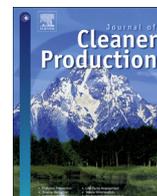




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The value of reflection on the evolving individual and collective practice of public policy innovation in water management: An action science approach

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ABSTRACT

This article examines the impacts of reflection on the practice of public policy innovation for water management. The reflection is provided for a specific community of practitioners, the professionals involved in an innovation program of the Dutch ministry of Public Works and Water Management. Innovation is perceived necessary for developing and promoting new solutions for the challenges in water management, induced by climate change. Instead of blocking water through technical solutions grounded in civil and hydraulic engineering, alternative approaches such as spatial accommodation of water, building with nature and multi-layered safety must become equally feasible. The community agreed that regular reflection was needed to learn from their experiences. Learning could guide them in changing, and if possible, improving their innovation practice. Action science delivers knowledge based on which intervention can be designed to promote change in a community of practitioners, thus enhancing the community's capacity to learn. Here, the theory of action assumes that reflection will inform change in innovation practice, if perceived necessary by the community of practitioners involved. Reflection was provided during a period of two and a half years. Its impacts were evaluated through in-depth interviews with the participating professionals. The needs for reflection were assessed in an ex ante evaluation. The impacts of reflection provided were assessed in two ex durante evaluations and an ex post evaluation. The ex post evaluation indicates an important impact on separate aspects of the individual innovation practice of the professionals involved. The impact on the development of a collective innovation practice is limited but important: the realignment of the program's substantive focus during its implementation. Interpreting the impacts of reflection made clear that reflection helps to identify the possibilities for improvement and guides their targeted implementation in practice.

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1. Introduction

It is generally recognized that climate change will lead to more frequent unsafe situations in estuary-situated countries, such as The Netherlands. Higher temperatures will lead to melting glaciers and polar ice and to expansion of ocean water, causing rising sea levels. The impacts of climate change must be mitigated by targeted water managing policies and measures. The traditional approach of heightening and strengthening the protective system of dikes, dams and levees will, in the long run, not suffice in dealing with the

estimated sea level rise, the expected increased force of the waves, the reservation of fresh water for dry periods and the larger discharge of the river system. To maintain the necessary protection in vulnerable areas, water systems must be provided with more space to run freely, instead of being contained. As a consequence, the water managing authorities have to develop alternative approaches that are better adjusted to the changing characteristics of the comprehensive water system in the Dutch delta. The new adage for these alternative approaches to water management is expressed in the strategy of retaining, storing, and discharging water. This means that water managing authorities have to change the existing engineering approaches, aimed at normalization of the water system (cf. Woud, 2006) to a different, more spatially oriented way of dealing with water challenges. New concepts and measures are

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needed for accommodating this, and deliberate public policy innovation must see to its development and implementation.

The objective of the Innovation Program for Water Management (hereafter abbreviated to IPWM) of the Dutch ministry of Public Works and Water Management, is the promotion of durable and novel solutions for the challenges in water management, for which the Ministry is responsible. The professionals who 'inhabit' the innovation program anticipated that reaching the program's objective would be no easy task. They expected that changing the current practices, grounded in hydraulic engineering, hydrology and construction, would put their efforts under much strain. They agreed that regular reflection was needed to learn from their experiences and to guide them in changing and improving their innovation practice (IPWM internal memo, 2004):

"We need reflection on our experiences. And because the group [of professionals] must be able to learn [from this reflection] immediately, we need [this] feedback. For this we need one or more external parties who can take on this auditing role. Theme leaders and program management have indicated that this [reflection] cannot be done at the cost of the primary process and, therefore, cannot take too much time. [The method for reflection] must become a best-practice method for the transfer of generated knowledge and experiences within the IPWM program. Sharing knowledge is the central objective and an open mind is essential to do so."

As such, reflection on the evolving practice of innovation should be considered as an integrated and continuous activity in IPWM, based on the premises that reflection has added value for evolving practices.

Therefore the research question addressed is how the development of new practices for organizing water management innovation might benefit from structured and structural reflection. The added value is explored through theoretical concepts public policy innovation (Brandesen, 2004; Howlett, 2014; Kiparsky et al., 2013; Duijn, 2009), practice (Lave, 1988; Giddens, 1984; Shove et al., 2007; Reckwitz, 2002) and reflection (Preskill and Torres, 1999; Mink et al., 1993; Schön, 1983; Biggs, 1999).

This article is structured as follows. First the theoretical framework is discussed. Next, the methodology, the central research question and research design are described. Third, the organizational context of the case study, the Innovation Program for Water Management (IPWM) is elaborated. Fourth the added value of reflection for the evolving practice of water management innovation is assessed, on the individual as well as on the collective level. The article is completed by a discussion of the impacts of reflection on both levels of abstraction and by drawing conclusions.

2. Theoretical framework

2.1. Public policy innovation

The first question is what innovation means in a largely public policy domain as Dutch water management. How can actors in the public domain 'introduce something new?' And more importantly, how can we recognize public policy innovation? How does it differentiate from 'normal' policy-making? It must be emphasized that public policy innovation is not the same as innovation policy. Innovation policy can be understood as the efforts that public policy actors can undertake to improve the innovation system (cf. Hekkert et al., 2006) that is composed of private sector firms, knowledge institutes and technology developers within a certain institutional context. Public policy innovation addresses the renewal of the characteristics and artefacts in the public policy domain, such as

policy objectives and measures, instruments and resources, alliances and institutions. Brandesen (2004: 39) defines innovation in the public policy domain as "the deliberate effort to replace old routines in order to be successful in a new policy regime". He advocates using the term innovation to emphasize "that switching routines is not a mechanical process, but a costly and uncertain quest for new knowledge" (Ibid.).

It is proposed here to speak of public policy innovation when the development of a new policy regime (Kemp, 1994) is deliberately pursued in an attempt to operationalize a shift of the existing policy paradigm. Burke (1979: 34) claims that a paradigm is "a cluster of assumptions, beliefs, theories, methods, and applications which taken together make up an interdependent network of commitments". A paradigm "helps delineate and justify existing roles, organizations, skills, and technologies" (Ibid.). A policy paradigm is composed of the existing values and standards on which authoritative relations, rules, and routines are grounded (cf. Alink, 2006). Policy paradigms are then interdependent networks of commitments to guide policy processes in a specific public policy domain (cf. Burke, 1979). Public policy innovation refers to an extraordinary type of policy-making, directed at substantiating a new policy paradigm through an alternative policy regime. Analogous to Kuhn (1962) distinction between normal science and revolutionary science, 'normal policy making' should be perceived as 'thinking inside the box' of the existing policy regime, whereas public policy innovation – to paraphrase Kuhn, revolutionary policy making – refers to the desire to 'think outside the box'.

Hall (1993: 284) describes a policy paradigm shift as "a radical shift in the hierarchy of goals and sets of instruments employed to guide policy". It is commonly accepted that water management in the Netherlands is undergoing a 'paradigm shift', encompassing the change from a purely technical approach to a more spatial orientation for sustainable management of future water-related problems. This calls for a sustainability transition (Markard et al., 2012) of Dutch water management, often referred to as paradigm shift, anticipating a fundamental and lasting change in the existing policy regime. The existing policy paradigm is often undergoing change inspired by expected or experienced changes in society, driven by new emerging values and expressing new social preferences (Foote, 1992). Changing social preferences put the effectiveness and efficiency of existing policy regimes under pressure, eventually inducing public policy actors to change their network of commitments. For example, the changed societal preference to act on the expected impacts of climate change encourage public policy actors to review the effectiveness of the existing policy regime in Dutch water management. Water managing authorities concluded that an alternative way of dealing with water had become necessary, resulting in the need to initiate a new policy regime. Thus, a shift in the policy paradigm leads to the need for change of the existing policy regime for water management. Policy regimes are the expression of clusters of policy objectives, measures, resources, institutional arrangements, and power distributions that both characterize and shape a specific policy domain. The deliberate effort to change the existing policy regime making way for a new one, is defined here as public policy innovation. Therefore, innovation that is deliberately initiated by a public policy actor, through a program of public policy innovation should then be directed at actively developing the new regime elements (Howlett, 2014). In other words, public policy innovation must be aimed at thinking outside the box of the existing policy regime. If the existing policy regime stays intact, then we should speak of normal policy-making (cf. Howlett, 2014; Van der Duin and Hermeler, 2014). Christensen (1997) makes a distinction to sustaining and disruptive innovations, also indicated as the difference between incremental and radical innovation (Dewar and Dutton, 1986; Kiparsky et al.,

2013). If public policy actors resort to initiating a public policy innovation program there must be a grounded conviction and/or historic evidence that normal policy making will not be capable of delivering the desired disruptive or radical change. Also, there must be a conviction that public policy innovation can be deliberately staged, e.g. through an innovation program.

The concept of innovation has an essentially difficult relationship with the public policy domain because of it aims at change instead of stability. Duijn (2009: 134–135) described three difficulties of innovation in the public policy domain (see also: Considine, 2012). The first difficulty is the integration of new practices and routines with the existing policy routines, practices and their underlying knowledge and experiences. Brandsen (2004) states that public policy actors are often not equipped to accommodate innovation. On the contrary, they tend to “institutionalize activities for the sake of efficiency, exactly so as to avoid unnecessary cost and efforts” (Ibid., 39). Public policy actors are likely to be reluctant towards innovation and will only resort to it when they have to.

The second difficulty is that public policy innovation requires public resources without knowing beforehand what the return on investment will be. Howlett (2014, 4) suggests that “innovations are by definition risky business”, indicating that taking action is often less attractive to decision-makers than doing nothing. Howlett refers to the behavior of blame avoidance that often frustrates public policy innovation. Taking risks and potentially wasting tax payers' money are not easy to justify and explain, making it public decision makers highly risk averse and look for ways to avoid failure (Hood, 2010; Skogstad, 2007; Walsh, 2006). The institutional context often hinders the opportunities for public policy innovation (Roy et al., 2008), adding to the risk averse behavior of public policy organizations and professionals in exploring and implementing new approaches and technologies. Therefore Laws (2006: 354) claims that accountability is an inevitable aspect of innovation across public-private boundaries because it “...may provide new insights into how to provide accountability by tying evaluation of action to deliberation about shared expectations and the common good”.

The third difficulty is the creation of legitimacy (Kiparsky et al., 2013; Duijn, 2009). If public policy actors are reluctant to renewal and the return-on-investment of innovation is questionable upfront, then the necessity of public policy innovation will be continuously questioned. This means that the legitimacy issue is an inextricable aspect of public policy innovation. Actors engaged in public policy innovation should be capable of providing a sound explanation that innovation is necessary to pursue the common good. They must be capable of arguing that without innovation, the desired new policy regime cannot be developed. As such, society will not be prepared well enough for changes in the external environment, such as global warming. Actors engaged in public policy innovation must have a convincing story ready at all times, and show tangible results to ‘prove’ that public resources provided for innovation are being well spent.

In line with Wagenaar and Cook (2003) advocacy for taking the individual policy analyst back into account, Laws (2006) emphasizes the importance of individuals for initiating and implementing innovation. Therefore it is important to examine the concept of (professional) practice.

2.2. Practice

The second question is how public policy innovation as an act, can be understood. Innovation refers to doing, making it a practical effort, next to an intellectual one. However, a dominant perspective perceives practice as ‘mere doing’. This is based on Comte's meaning of ‘the capability of acting in the right way’. Lave (1988: 5)

describes practice as “an attempt to deal with the problem of context”. Human action is situated in the material and social worlds which induce us to pay specific attention to the conceptualization of the relationship between the individuals acting and the surrounding environment. Practice refers to the dynamic interaction between the individual capacities to perform – i.e. agency – and the shared norms of conduct in a social context, i.e. structure (cf. Giddens, 1984; Scott et al., 2012). According to Reckwitz (2002: 249–250) a practice is generally defined as ‘a routinized way in which bodies are moved, objects are handled, subjects are treated, things are described and the world is understood’. Practices are essentially social and, because they are produced in social interaction, become more or less standardized among the people involved. Next to agency, structure and ‘standardization’, Shove et al. advocate that practice is composed of the components: ‘material artefacts, conventions and competences’, also referred to as ‘stuff, image and skill’ (2007: 9). Lave argues that actors in trying to solve problems that come up within the course of their everyday work, improvise with the material, social, and experiential resources at hand. Wagenaar and Cook (2003: 149) argue to employ a comprehensive understanding of the concept of practice, by including a number of interrelated concepts: “Practice then entails action, community, situatedness, criteria, standards, warrants, knowing, dialectic, discourse, emotions and values”. Røpke (2009: 2492) explicitly refers to the improvised, bricolatic nature of practice: ‘forming a practice-as-entity is about gluing activities together’. Practice as a concept has strong connections with the idea of ‘social bricolage’ (Lévi-Strauss, 1966). Practice can be perceived as a configuration of heterogeneous elements (Røpke, 2009; Shove et al., 2007).

Giddens (1984) advocates that most day-to-day activities are carried out without conscious reflection. This observation only seem to apply to already existing, routine practices. However innovation is essentially non-routine. When new forms of practice within a certain social structure need to be developed – simply because they are not available yet – some type of conscious reflection is required to evaluate and readjust as it is evolving. With practiced-oriented reflection, practitioners can (collectively) figure out what the desired, innovative practice should be.

In this study practice is operationalized by separate aspects that together compose what the IPWM-professionals can deploy to perform in their specific role:

- The objectives the professionals formulated for themselves;
- Their perceived tasks;
- Their perception of the required competences;
- Their description of their functional role and responsibilities;
- Their perspectives of the environment;
- Their developed contacts and relationships; and,
- The use of knowledge sources.

These specific aspects were put before the professionals in the evaluative interviews to ask them to reflect on their developing innovation practice.

2.3. Reflection

The third question is whether reflection can foster the development of non-existent and non-routinized practice. This paper's objective is aimed at identifying the added value of reflection on the individual and collective practice of innovation in a designated community of practitioners. This reflection is directed at informing action, that is, change, and potentially improving the practice of innovation. Therefore the concept of reflection needs to be elicited here. According to Preskill and Torres (1999: 101) many theorists

agree that reflection is “a process whereby we carefully consider the knowledge, beliefs, assumptions, actions and processes that influence our behavior in order to understand our experiences”. [Issitt \(2003: 174\)](#) describes reflective practice as “the demonstration of competence to reflect on and evaluate one’s own values, priorities, interests, and effectiveness and to synthesize knowledge into the development of one’s own practice”. Reflection plays an important role in learning in context of professional practice. This is articulated by [Mink et al. \(1993: 8\)](#) who describe the value of critical reflection as follows: “to learn from our experiences we must become competent in taking action while simultaneously reflecting on that action. To effectively initiate, implement, and sustain transformation, we must reflect on the values behind our actions. We must be willing to reflect critically on what we are doing. Theories should guide practice, and then practice should inform theory”. The question for what reason reflection enters practice is answered by [Schön \(1983: 56\)](#) who claims that “much reflection-in-action hinges on the experience of surprise”. He refers to the practical situations which call for reflection, that is, situations that are unknown and challenging for the practitioner. This is certainly the case in public policy innovation. Reflecting on how to deal with unknown situations is especially valuable for an evolving innovation practice. Because it is not clear what the right way to go is, reflection may improve of the practice of innovation. Reflection aims at improvement of what is reflected on, in this case the practice of public policy innovation for water management, referring to [Biggs \(1999: 6\)](#) who claims that “a reflection in a mirror is an exact replica of what is in front of it. Reflection in professional practice, though, gives back not what is, but what might be, an improvement of the original”.

3. Methodology

The objective of providing reflection on an evolving practice can be supported with the methodology of action science ([Argyris et al., 1985](#)). Intervening in a community of practitioners, such as the IPWM-professionals, calls for an action-oriented approach. Action science has an interventionist nature which is expressed through the ambition of [Argyris et al. \(1985: ix\)](#) to not only aim for “knowledge that can be used to produce action, but also to contribute to a theory of action”. This ambition is supported by [Friedman \(2001: 160\)](#) definition of action science: “action science attempts to bridge the gap between social research and social practice by building theories which explain social phenomena, inform practice, and adhere to the fundamental criteria of a science”. [Argyris et al. \(1985: xii\)](#) claim that their ambition is derived from Kurt Lewin’s idea that “one of the best ways of understanding the world is to try to change it”. Applying knowledge to produce action therefore leads to understanding action itself and its impact on the community and the world (cf. [Argyris et al., 1985](#)). This leads to a theory of action, that is, a general idea of what works why and how. Here, the attempt to reflect on and, if perceived necessary, change the innovation practice should then lead to a better understanding of it. That, then, may lead to new knowledge that can create more insightful attempts to change them. An iterative pattern of intervention, reflection, interpretation, and renewed intervention thus evolves. [Argyris et al.](#) claim that action science “takes a normative position” ([1985: 5](#)) instead of taking a “disinterested stance” ([Ibid. p. 6](#)). A normative position tends to be unavoidable since it is the aim of action science to initiate change, and change is informed by at least some notion of direction. The normative position of action science can be justified by referring to critical theory (cf. [Habermas, 1976](#)) as underlying argumentation. [Argyris et al. \(1985: 6\)](#) think that the value of the normative position of the researcher lies in the objective “to criticize what is, from

the perspective what might be”. Action research, as a critical social science, “engages human agents in self-reflection in order to change the world” ([Ibid. p. 6](#)).

Reflection produces knowledge to inform practice its social context. According to [Friedman \(2001\)](#), there is no need for a division of labour between those who are expected to generate knowledge and those who are expected to apply it. Doing research from an action-science perspective presupposes a strong connection between those who produce and those who use knowledge. The legitimacy of practice-oriented knowledge is strengthened by involving those who are expected to use it, in its actual production of this knowledge ([Duijn and Rijnveld, 2007](#)). The role of the researchers involved is to create conditions under which practitioners can formulate and try out theories of practice for the purpose of changing, or advancing them. Together practitioners and researchers form so-called communities of inquiry (cf. [Argyris et al., 1985](#)). These communities have a reciprocal nature: they produce knowledge to inform social practice, and simultaneously, produce knowledge about the approaches or methods with which the practice-oriented knowledge is generated.

3.1. The central research question

An assessment of the need for reflection in IPWM was executed in an ex ante evaluation, applied for identifying the topics for reflection that need to be addressed. In-depth interviews with the IPWM professionals indicated that the following eight topics were shared among them as priorities:

- (Re-)interpretation of the concept of innovation;
- Working from the outside to the inside: external orientation of the IPWM-professionals;
- Role division and role perception of the professionals;
- Organizational focus of the program;
- The impact of IPWM on the Ministry and on the world outside;
- Tension between substantive or content-oriented innovation and procedural innovation;
- Tension between normal policy-making and innovation work;
- Personal skills and competencies.

An important challenge for the ‘learning course’ was to develop a collaborative understanding of these issues and the underlying dilemmas. Thus, an important objective for reflection is to develop an understanding of the internal and external challenges IPWM must resolve to achieve the desired innovations. The development of this joint understanding as a basis for action can be perceived as learning. Learning to understand and unravel the topics and their underlying dilemmas in close interaction with the co-workers in the innovation program is helpful for developing one’s individual innovation practice, and perhaps even a collective one. Trying to jointly interpret and re-interpret the objectives of the innovation program, its institutional context, their tasks and the subsequent roles and role division among them, is the principle challenge for the reflection provided in IPWM.

Here, the objective is to assess the impacts of reflection on the practice of innovation that is provided for a specific community of water innovation professionals. Reflection is directed at informing action, that is, change, and potentially improving the individual and collective practice of innovation. Therefore, the central research questions of this study read as follows:

- What are the impacts of reflection, provided by the learning course, on the practice of innovation, in this specific community of IPWM-professionals? and,

- How can the impacts of reflection be explained and understood, from the perspective of reflective practice?

Based on a reflection on the impacts of reflection, the action-science approach 'prescribes' that an attempt has to be made to contribute to a theory of action. The theory of action that underpins this study assumes that,

- Reflection will inform change in the innovation practice in the IPWM, if perceived necessary by the practitioners involved.

However, it is clear that the aimed-for reflection as well as the change that will be informed by it, has an ironic nature (Rorty, 1989): changes (for the better) will always be provisional to the background of ever-evolving contextual circumstances. What is appropriate today may become obsolete tomorrow. It is with this knowledge that the community of IPWM-professionals attempted to use the outcomes of reflection to change and, potentially, improve their individual and collective innovation practice.

3.2. Describing the research design

This section is reserved for answering the first component of the central research question that is how to understand the identified impacts of reflection on the innovation practice. This answer is based on an ex-post evaluation, executed through in depth interviews with the participants. The impacts of the reflection on the innovation practice in IPWM has two levels of abstraction: the individual level and the collective level. The impact on the first level refers to the influence of reflection on the individual innovation practices of the professionals involved. The impact of reflection on the collective level was assessed by examining the contribution to the expected collectively shared practice of innovation.

The interview questions covered the separate aspects of (innovation) practice, outlined in the practice section of the theoretical framework. Due to organizational changes the number of interviews slightly differs. Table 1 indicates that most of the professionals interviewed were involved in IPWM throughout the entire runtime of this study. Based on this, a so-called learning course was designed, composed of 6 stages, as shown in Fig. 1.

The ex ante evaluation functioned as an intake of the reflection needs on the evolving innovation practice. In addition it was indicated by those interviewed how this reflection could be best organized, within the context of IPWM. Based on this, a so-called learning course was designed. Both ex durante evaluations after year 1 and 2 covered questions about the appreciation of the reflection provided. The ex post evaluation looked back at the entire runtime of the reflective support, examining the sustainable contribution to the (improved) change of different aspects of innovation practice.

4. The organizational structure of IPWM as a social context for practice

Three key roles were present in the IPWM-community. First of all program management, including the program manager, the program's controller and administrative co-workers. Second the professionals who coordinated the separate innovation projects

and activities in specific innovation topics.¹ And third the managers of separate IPWM innovation projects, often referred to as pilots in which new water managing technologies and concepts were developed and tested. These roles will be referred to as program management, coordinators and project managers in the case description.

At the time of this study, IPWM-professionals were geographically dispersed to several offices in the country. Coordinators and project managers worked mostly as 'part-time' innovators, in addition to their formal assignments as policy professionals at other departments of the Ministry. Coordinators devoted around twenty percent of their working time to IPWM, the other part of their time they worked in their 'formal departments', with standard routines, interests, relations and power distribution. Project managers were active fifty percent of their time at IPWM. The IPWM-community met once every six weeks in team meetings to make decisions on the progress of their innovation work. Most professionals involved can be perceived as senior experts on technological issues, and not so much as organizational and/or process experts.

The outcomes of the ex post evaluation presented below refer to the professionals' account of the impact of reflection on their own individual innovation practice and the collective – shared – practice in the IPWM team. In the two years that are included in this study, one specific event stands out. In the first year that the learning course was operative, the Ministry's top-level management expressed its concern over the substantive focus and progress of IPWM, mainly regarding the underdeveloped long-term focus and societal outlook of the innovation program. It was perceived that the program had too much focus on short-term, technological innovations whereas it was also established to prepare the Ministry for its future tasks in water management. The concerns of the top-level management led to discussions in the IPWM team on what had to be done to bring the program back on track and regain support from top-level management. A meeting with the top-level management was held to learn what its concerns were and how they should be tackled. In this meeting top-level management posed the following question to the IPWM team: "What societal tasks can the Ministry expect in the next decades with regard to water management?" The answer(s) to this question indicate the upcoming challenges for the Ministry.

The concerns of the Ministry's top-level management about IPWM's course also changed the contents of the 'learning course'. Instead of the topics for reflection that were to be addressed at that time, the reflective sessions were 'reprogrammed' and used to prepare and evaluate the discussion with the organization's top-level management. The outcomes of this discussion calibrated the objectives of the program by putting more emphasis on societal issues and needs for the long term. IPWM conducted an exploratory study about the major societal trends and their relevance for future challenges in water management. These challenges functioned as an evaluative framework to identify the Ministry's future water management tasks. These tasks then had to be translated in new initiatives for public policy innovation for water management, organized by IPWM. However, then new long term focus led to tension with the current running projects. This was pointedly expressed by one of the coordinators:

"The transformation to a more long-term focus on water management innovation means that we will move away from short-running projects. This is exciting because I expect that we then

Table 1
Number of interviews at the separate evaluation stages.

Evaluation stage	Ex ante	Ex durante 1	Ex durante 2	Ex post
Number of interviews	11	12	13	13

¹ IPWM covered the topics river basin management, water management and spatial planning, sediment management and coastal zone and marine management.

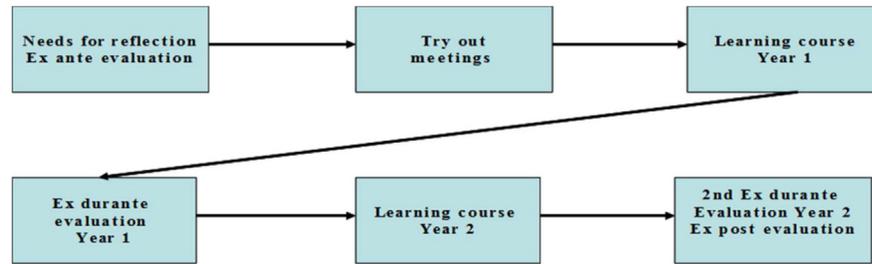


Fig. 1. The 'learning course' for IPWM.

will address the issues in a more integrated way In addition it will be a challenge to connect the current pilot projects to the desired long-term perspectives on water management”.

The tension between long-term thinking and ‘managing existing activities’ with a short-term focus was illustrated by one of the program management professionals:

“The desired shift towards a long-term perspective does not mean that the coordinators can focus solely on formulating visions, they will have to be able also to decide on a timeframe, milestones, and products [...of their innovation efforts]. Based on that, people will have to be assigned to realize them there will increasingly more emphasis on process management, instead of scientific validation or substantial expertise. Hence, you will have to make compromises to get results”.

The objectives of the program were modified along the interpretations the professionals had of their discussion with top-level management. The learning course reflected on the internal and external legitimacy of IPWM as the Ministry’s key innovation program on water management. These reflections resulted in extensive, existentialist discussions among the professionals, raising such questions as “Why was this innovation program established?”, and “What should we achieve for regaining support from our top-level management (internal legitimacy) as well as from the Dutch water management field (external legitimacy)?” The relationship between internal and external stakeholders around IPWM and their ability to provide or deny legitimacy to the program’s substantial focus and progress should be better assessed. The opinions and actions of external stakeholders significantly affect the opinions of internal stakeholders about IPWM, and vice versa. One of the coordinators specifically referred to the political aspects of the legitimacy issue:

“The issues in the reflections were very relevant and gave a positive impulse to IPWM Yes, the insights into the potential political impact of innovation was refreshing. The effort of connecting to political circles has been put on the agenda consciously, and has resulted in new ideas. For example, the enactment of a U-turn: appealing to politics by addressing societal issues And this is also the way for attempting to bypass the internal formalities to connect to the top-level management for our innovation initiatives”.

5. Assessing the added value of reflection for the individual and collective practice in IPWM

As expected, it was difficult to make a retrospective evaluation of a series of ‘interactive and reflexive engagements’ that lasted for

two and a half years. The difficulty lies in the fact that the learning course were not the only social environment in which the professionals work and learn. Nevertheless, a number of recurring issues illustrate the impacts of reflection on the development of the innovation practice in the program. Reflection on the innovation practice was assessed on the individual and collective level. In reflection and learning, both levels are highly intertwined, shaping each other as they evolve. For the sake of analysis, they have been separated. The impact of reflection was identified by the perceived changes in individual and collective innovation practice, expressed by the professionals involved.

5.1. Evidence of the added value of reflection for individual practice

The analysis of the interviews elicit certain patterns along which the changes in the distinguished aspects of their practice evolved.

5.1.1. Did you make changes in your objectives?

The objectives that IPWM-professionals formulated for themselves did not change dramatically under the influence of the learning course. There was only a gradual change in the professionals’ objectives, as a result of the changed focus of IPWM, as a coordinator stated:

“My objectives have not changed dramatically but I see new ways to achieve them. The long-term focus has been brought to the forefront, and must be expressed among others in the improvement of the public image of the Ministry and the Netherlands in the domain of water management”.

Through the exploratory study about the major challenges for future water management, it became clearer that the program’s objectives should be outward-oriented and have a long-term focus. Consequently, most professionals indicated that they tried to translate the changed programmatic objectives to the objective(s) for their own functional role. The lessons from reflection were incorporated into the objectives the professionals set for themselves, as indicated by one of IPWM’s coordinators:

“The change in objectives has everything to do with the fact that I now pay more attention to the context of the intended innovation. What are the societal issues, and how can I connect my substantive innovation challenge to them?”

And:

“I have reformulated my objective in the sense that I want to support the progress of the pilot projects more explicitly. More co-thinking, through acting like a sound board. But also stronger steering on preconditions and pro-actively searching for alternatives for bottlenecks that have arisen”.

5.1.2. Have your tasks (been) changed?

The professionals mentioned the following changes in their tasks. First, they took more initiative to 'go outside'. External contacts were contemplated, established sooner and more frequent. They found that they had become bolder in collaborating with external parties to develop innovation assignments. They indicated a more strategic approach to their innovation assignments by devoting more attention to the communicative aspects of innovation work. Second, they see connecting IPWM and the Ministry's staff proactively as an additional task for creating favourable pre-conditions for working together on innovation. In doing so, they believe they have become more open to what the Ministry's top-level management describe as 'societal needs for water management' and how this should be dealt with. Third, more was done to situate innovation in its societal context by examining more thoroughly what the driving forces behind their individual innovation tasks are. These changes are captured by one of the coordinators' account of his changed tasks:

"I now pay more attention to develop coalitions for involve the 'world outside', mostly private sector firms and other water managing authorities, in organizing my work".

5.1.3. Did you develop other competencies?

The interviewees indicated that reflection provided a clear contribution to developing (new) innovation competencies. The changes in attitudes, resolution,² capabilities and skills can be summarized in four categories: 1) outward oriented behavior, 2) networking, 3) realigning tasks and 4) giving more emphasis to the process-aspects of innovation.

Outward oriented behavior is expressed through the newly developed capability to see the innovation assignment from different societal perspectives, and not solely from the Ministry's viewpoint. Also, showing more sensitivity towards societal needs as driver for the innovation assignments for IPWM and improving its coherence with innovation assignments in other public policy domains, indicates the more outward orientation of the IPWM-professionals. Networking is visible in the resolution to initiate contacts with external actors to build new relationships. As such the IPWM-professionals acknowledge the role they play as representatives of public water management innovation. Networking also has an internal focus, as can be observed in the changed attitude to involve other colleagues at the Ministry in IPWM-projects, by organizing innovation tasks more collaboratively. As such the IPWM-professionals acknowledge the importance of internal legitimacy a basis for success. Realigning tasks can be viewed in the increased ability to steer more towards key issues and, in doing so, leave other actors, both internal and external, to take care of the actual implementation of innovation projects. In addition, the professionals have learned to better articulate their own innovation tasks by using alternative metaphors, concepts, argumentations and ideas, thus attempting to (re-)position themselves in their dynamic environment. Lastly, professionals indicate that they have acquired more understanding for the value of process aspects in innovation work, next to substantive aspects, such as new technological concepts. As such, the art of getting things done has gained a more prominent place in their capabilities.

² Resolution for changed action are based on assumptions, and assumptions are part of practice because they are part of the attempt to deal with the problem of context (Lave, 1988) and refer to the particular configuration of human activity (MacIntyre, 1981).

5.1.4. Has your perception of your functional role changed?

The changes in role perception are described next. First, the professionals indicated that they had developed more recognition of their context-related, future-oriented innovation assignment and less for its substantive conception. This became manifest in a more facilitative attitude towards the 'substance' of innovation, as the program manager claims:

"I have taken on a more distant position from the content of the pilot projects, and focus more on creating the right conditions for them. Why? Well, both coordinators and project managers have grown in their role, and this gives me confidence in letting go. And in the external environment of IPWM, there is so much going on that I need to pay attention to".

Second, the professionals indicated to act more as a link between internal and external parties involved in water management innovation. Efforts have been made to connect with professionals at other departments of the Ministry and with external actors, as one of the coordinators indicates:

"I see myself now developing towards a strategic connector. I take initiatives to bring parties together".

5.1.5. Has your perspective on the environment changed?

The foregoing impacts show that as a result of the reflections provided, the professionals regarded the outside world differently. They perceived it more often as an 'ally' in their attempts to conceive and organize innovation, as one of the project managers said:

"The environment I see less as threatening or a hindrance for achieving innovation. I have become more sensitive to the importance of good contacts with external parties and for working with them".

More insight was gained for a productive exchange between internal and external forces around IPWM. According to the professionals, the reflections made clear that the outside world can be used to build up pressure to convince other departments at the Ministry of the necessity to innovate and, in turn, the innovation needs of the Ministry could be deployed as a driver for stimulating external actors to come up with new ideas.

5.1.6. Have you developed other new contacts inside or outside of IPWM?

The contribution of reflection as a medium for the actual establishment of new contacts seems to be limited. It is likely that the development of new contacts, perhaps implicitly, occurred under the influence of an increased external orientation of the professionals and of the more exploratory objectives they had 'learned' to pursue. The professionals found it difficult to distinguish between the new contacts developed due to the learning course and the new contacts they made while performing in IPWM and in their formal work environment at one of the departments of the Ministry. Most of them indicated that the learning course was at least useful for comprehending the importance of developing, shaping and maintaining contacts within IPWM. The reflections strengthened the contacts between IPWM and the Ministry's top-level management, with the changed focus of the program as a tangible result. The innovation practice of the professionals changed in the sense that their actions gained a more external orientation. Gradually, they have been taking up innovation more

as an organizational and relational challenge, instead of a cognitive-technological endeavour solely. There is an increased notion of the importance of external communication with other actors in trying to 'move or seduce' them to contribute to innovation and change in water management. This is illustrated by the following quote:

"Yes, I have developed new contacts with engineering consultancies, knowledge institutes, and policy-makers. These contacts have everything to do with a role switch for me as coordinator, which requires more communication with the external environment".

The professionals indicated that they had learned to recognize that, without the participation of other actors, socially relevant innovation could not be achieved. This recognition materializes in increased connections with the policy and political-administrative environments, as can be understood from this quote:

"We have more contacts with the Ministry's Staff department and with the department Water Policy now. I try to work along the idea of networks, and pay more attention to the information that flows through them. I try to make productive use of these information flows in the external environment, for example by monitoring other water innovation initiatives".

5.1.7. Have you used other knowledge sources to perform your tasks?

Some professionals indicated that they had used no other knowledge or information sources. Others state that they have indeed used other sources under influence of reflection. Often, the professionals claimed to act as intermediaries for transferring and sharing knowledge and information with colleagues outside IPWM. Due to limited capacity of IPWM-professionals new knowledge and information was often sought externally. For example, external experts were asked for their assistance to help elaborate innovative ideas.

5.2. Conclusions about the added value of reflection on individual practice

The acknowledgment that organizing innovation in water management is not a straightforward project-oriented task, but an ongoing process of pro-actively balancing evolving expectations and emerging opportunities, is the most important change in the individual practices of the IPWM-professionals. They acknowledged the capabilities to interpret and re-interpret their way of conduct on a continuous basis. With regard to reflection on the professionals' individual practice, the following questions were frequently posed:

1. "How do I actually approach certain challenges for innovation in my functional role?"
2. "Do I need to change this approach?" In other words: "Is my innovation practice appropriate?"
3. "If not, how should I go about changing my practice?"

This was most obvious when handling the challenge of bringing the program's substantive focus and progress back on track. As a consequence, it seems to be appropriate to adjust Wagenaar and Cook (2003) definition of practice by claiming that practice thus means: anything (human) individuals can deploy to perform or to carry out a task, both individually and collectively, within a certain social environment *that constitutes and defines as well as appreciates*

and interprets what is deployed. The intervention by the Ministry's top level management shows evidence of the importance of the social environment for executing legitimate public policy innovation.

5.3. Contours of the added value of reflection for collective practice?

Based on the ex post evaluation, the most frequently mentioned added value of reflection on the collective level are best described in terms of 'connectedness' and 'inspiration'; words that were literally used by the interviewees. These terms might refer to a burgeoning collective practice of performing in IPWM. Joint reflection on its progress and each individual's contribution to it, was an important reason for conferring on how to perform in IPWM. According to the professionals, the reflections generated connectedness and provided inspiration for advancing one's own innovation practice. Both aspects are described below.

5.4. Connectedness

Most participants indicated that joint reflection strengthened the internal network of innovators within the Ministry, enabling them to learn about each other's innovation experiences. Participation in the learning course was perceived as part of an implicit mutual commitment to one another and tangible evidence of being a member of the IPWM-community. A significant impact of reflection was the facilitation of mutual connections between the professionals, as the IPWM's central 'meeting place', ensuring continued involvement. This is illustrated by the following quotes from the interviewed professionals:

"I couldn't imagine IPWM without the learning course".

"Without reflection, I would have had (too) little opportunity to meet my IPWM colleagues".

"If the learning course were to discontinue, the program would be just a loose number of projects".

"The learning course was the only place where all IPWM-professionals had the opportunity to collaboratively reflect on their experiences."

"Through the things we have shared in reflection, we can now connect to each other more easily. It is not clear to me that this was caused by the topics we addressed or merely by the fact that we were together".

"The reflection on the functioning of our team has had an important impact. It freed new energy with which we can take on new things. The learning course gave me a good feeling, it served as 'team coach' that guided us continuously because we learned by making adjustments to the program as we go along".

5.5. Inspiration

The reflection provided was perceived as opportunities to 'withdraw from work' and gain new inspiration. As indicated, the professionals only partially worked in IPWM; most of their time they were active in the policy departments of the Ministry. Inspiration not only supported reflection on IPWM's state of affairs and their evolving innovation practice, but also on their formal work practice. Inspiration incorporates the capacity to present relevant knowledge of a meaningful, but sometimes subversive nature, from the outside world to IPWM. 'Subversive' refers to the professionals' estimation that they had acquired lessons through reflection that

were not fully line with the formal objectives for water management innovation at the Ministry.

Can the shared added value of reflection, mentioned above, be understood as signs of a collaborative practice in IPWM? Through reflection on innovation practice, connectedness and inspiration were apparently provided as a basis for developing a set of shared 'principles' for tackling IPWM's innovation assignments. Participants collaboratively conferred on the need for an enhanced external orientation and for an emphasis on a long-term perspective for the challenges to water management. Next, they acknowledged the need for a shift from innovation as a personal, 'intellectual' responsibility to a collaborative challenge. The expressed need for an alternative perspective on innovation was coined by the professionals as an organizational rather than cognitive challenge.

We might assume that these first signs could provide a foundation for developing a collective practice for organizing and conducting innovation. But there is little significant evidence that the reflection provided stimulated the actual and pro-active development of a collective practice in IPWM. The reflective nature of the learning course did stimulate discussion about how to tackle innovation challenges. But these discussions did not materialize in concerted action that was advocated by some of the IPWM-professionals:

"When faced with an issue of a certain kind, we should be able to decide to tackle it in a shared and coordinated way".

Too often, the discussions about coordinated action got stuck in exchanging opinions, without reaching common ground. The ex post evaluation showed no significant evidence of effectively and pro-actively conferring on what needs to be done, apart from the changed substantive focus of IPWM.

5.6. Conclusions about the limited added value of reflection on collective practice

The development of collective practice in IPWM is significant but rather meagre in its spread. There are some explanatory factors that led to unfavourable conditions for developing a collective practice. As indicated earlier, the professionals were geographically dispersed over different departments of the Ministry, across the country. They worked as part-time innovators, in addition to their formal work as policy professionals at the Ministry. Next, confusion about the division of tasks in the functional roles was an additional reason for 'not practicing together'. The IPWM-professionals were each engaged in their own specific types of tasks, responsibilities and networks. They were reluctant to 'invade' each other's authority and competence and, in turn, had incongruent expectations of what 'the others were supposed to do'. Consequently, they developed their own practices and did not actively communicate about them.

These factors make the deliberate development of a collective practice more difficult, but not impossible. A more profound motive for not practicing together proved to be the absence of a *perceived necessity* to co-work on the program's innovation assignments. Apparently, the professionals thought that they did not need each other to reach their objectives and carry out their tasks. Tasks and frames of reference were perceived as diverging so considerably that they saw little necessity for synchronizing their individual practices into a (more) collective problem-solving capacity. Perhaps IPWM bears more incentives to develop one's own 'private' innovative practice than devoting time and effort in establishing a collective approach to organizing water management innovation. And of course, there is always the possibility that the reflection

provided was more adequate for developing individual practices than for a collective one.

6. Discussion and interpretation of the impacts of reflection

The second component of the central research question concerns the interpretation of the impacts of reflection. The impact of reflection on the development of an individual, professional practice can be interpreted through the idea of canonical vs. non-canonical practice (Brown and Duguid, 1991). With regard to collective practice the emergence of shared narratives as collective understanding can be understood through the concept of semiotic mediation (Wells, 2007) and sense-making (Weick et al., 2005).

6.1. The impacts on the individual level: public policy innovation as individual professional practice?

The impacts of reflection on the individual level indicate that the IPWM-professionals are continuously adjusting and exploring ways to meet the objectives. For examining the development of a practice of water management innovation, we have to resort to the practice of 'normal policy making' that functions as a frame of reference for its deliberate development. This is necessary because there is no formal, standardized practice of organizing innovation at the Ministry. However, the very reason that IPWM was founded lies in the observation that normal policy making will not suffice to prepare the Ministry well enough for its future tasks. Therefore the professionals had to move away from the existing practices, in order to deliver the artefacts for the new policy regime. As a consequence, IPWM was drawn into a struggle with the formal practices in water management and their institutions to find, create, or gain 'manoeuvring room' to develop innovative practices. This struggle can be understood as a clash between canonical and non-canonical practices (Brown and Duguid, 1991). The mechanism behind this struggle reason seems trivial but is crucial, when in line with Brown and Duguid (1991) innovation is understood as 'developing non-canonical practices'. Attempting to connect formal and innovative practices – i.e. the practice of normal policy making vs. the practice of public policy innovation – and to frame innovation work within the formal conditions of a bureaucracy inevitably limited IPWM's ability to develop practices that went beyond the formal, prescribed practices. This could eventually harm IPWM's legitimacy in the longer run. The earlier described interference by the Ministry's top-level management with regard to IPWM's focus and progress was a meaningful indication that its legitimacy was at stake. Apparently, it was felt that there was a discrepancy between the actual practices at IPWM and the needs for innovation perceived by the Ministry's management. The actual individual innovation practices of the professionals had gone out of sync with the managerial expectations. Thus, each individual IPWM-professional was confronted with the challenge of developing their innovation practice amidst the formal practices of a government bureaucracy, and that must be in line with the (also evolving) managerial expectations.

6.2. The impacts on the collective level: shared narratives as collective understanding?

Through reflection, the professionals shared their 'wisdom' with each other through narratives. The professionals thus revealed aspects of their mental framework on which they have grounded their innovation practice. Through collective reflection narratives were developed, modified and transferred. These processes were instrumental to collaborative problem diagnosis and the exploration of problem-solving strategies. By posing questions and

debating with each other they attempted to acquire, share and synchronize the knowledge they were searching for. The top level management's intervention served as a 'war story' (Orr, 1996) with coordinative and cohesive power in this community. The narratives that developed and were used can be perceived as a specific manifestation of what Wells (2007: 245) calls "semiotic mediation". The collective assessment of individual stories, led to common understanding between the professionals, serving as a platform for synchronizing their efforts.

Collective understanding emerged about importance of being legitimized to innovate, leading to a need to refocus the program, and to implement the outcomes of this refocusing process, i.e. the long-term, societal perspective on water management issues. Contemplating, assessing and initiating change towards the new focus of IPWM can be seen as the main impacts of the reflection provided. The professionals attempted to translate the new focus in their individual practice: they included the legitimacy issue ("which actors will be affected by and hopefully benefit from my innovation project?") and the long-term focus of their innovation practice ("how does my innovation project contribute to the future challenges in water management?").

Of course, individual and collective practices depend on each other. The coordination between them can be interpreted through the idea of community membership, as manifestation of the specific identity each IPWM-professional assumed by being part of this program. Reflection stimulated the development of a sense of 'shared identity' for the professionals involved. As such reflection can be perceived as the instigator for an emerging IPWM-identity through its capacity to stimulate the participants' involvement in a specific community.

It can be acknowledged that the added value of reflection on the collective can be coined by the attempt to (re)acquiring legitimacy and by conducting collaborative sense-making. The deliberations about the new focus were a vital and continuous part of discussions among the professionals. Reflection facilitated these discussions that touched IPWM's legitimacy. Legitimacy has an internal and an external orientation. Internal legitimacy refers to support for the program within the Ministry. In other words, to what extent does IPWM live up to the expectations of the internal stakeholders with regard to their formal tasks in water management? External legitimacy refers to support for the innovation program in the political domain and in society at large. Is IPWM capable of meeting the expectations of politicians and societal stakeholders with regard to improvements in water management? The impact of the reflections on the development of shared understanding tends to refer to goal seeking, connecting to the process of sense-making (cf. Weick et al., 2005). The collaborative assessment of making sense of what is going in the dynamic, professional context of IPWM served as new starting point for realigning the innovation program.

7. Conclusion: evaluating the theory of action

With regard to the theory of action that underpins this study, Argyris et al. (1985: 232) claim that "action science is an inquiry into social practice, broadly defined, and it is interested in producing knowledge in the service of such practice", fits the outcomes mentioned above. Applying knowledge to produce action, leads to understanding action itself and its impact on the community and the world. This presupposes a theory of action, a general idea of what works why and how. Here, it was assumed that reflection is capable of producing knowledge to inform change in the professional innovation practice. Of course, change must be perceived or felt necessary before being initiated. Informing change in the innovation practice should then lead to a better understanding of the traits of the improved practice. That then, may lead to new

knowledge that can establish more insightful attempts to actually change the practice of innovation towards the improved one. Informed change, perceived necessary by the professionals involved, would unquestionably be aimed at improving the innovation practice. Change, based on reflection, is typically aimed at the advancement or improvement of what is reflected on (Biggs, 1999). Professionals often have an implicit notion of 'what might be' that informs the 'corrective changes' in their practice. However, any changes or advancements in the innovation practices that follow from reflection, are ironic (Rorty, 1989) and thus always provisional.

The evaluation of the theory of action builds on the acknowledgment that reflection plays an important role when practice is essentially improvised, bricolatic (cf. Lévi-Strauss, 1966) and practically non-existent, as is the case in public policy innovation. Reflection is an important means for developing new ways of conduct (in contrast to Giddens' claim that practice does not need reflection).

The question whether the reflection provided did inform change must be answered predominantly in the affirmative. Roughly summarized, collaborative reflection informs change of individual practices more than it informs change of the collective practice of public policy innovation for water management. Returning to the IPWM-case study, the theory of action is valid: reflection is capable of informing change in the practice of public policy innovation, for a specific community of professionals in their attempts to cope with the ever-evolving contextual circumstances of their social practice. The capacity to follow up on the dynamic needs for reflection of a designated community of practitioners at a specific moment in time, working in a specific institutional context, is a genuine attempt to support professional reflective practice (Schön, 1983).

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