Performing and orchestrating governance learning in practice

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Introduction

"Nothing less than a systemic transformation of our societies, our economies, and our world will suffice to solve the climate crisis and close the ever-increasing inequality gap." [1] That was the main message of "The People's Test on Climate 2015". This document was sent to world leaders before the 'Conference of the Parties' - or COP21 - in Paris as well as before the climate talks of the United Nations. Over recent years discourses on vulnerability, resilience and sustainability have begun to overlap around issues associated with climate change adaptation (Turner et al, 2010; Adger et al, 2009). A common thread exists in the way this is increasingly viewed as a governance learning process for systemic transformation that moves complex socio-ecological systems towards a sustainable trajectory. There is a growing acknowledgement that barriers to climate change adaptation may not lie so much in the "gaps" in the scientific or technical understandings, but rather on account of the complexities within the social, institutional and cultural changes in climate change governance (Ison et al. 2007; Godden et al, 2011).

Also in academic literature it is becoming increasingly recognised that effective responses to complex environmental issues require learning for systemic governance transformation (Leeuwis, 2002, Pelling and High, 2005, Wals, 2007, Ison et al, 2007, Hounkonnou et al, 2012). Literature shows that limiting our ideas about these transformations to processes of adoption and diffusion of research findings is no longer useful. Numerous studies have shown that research finding are often not taken up by policy makers and practitioners, and that

[1] See http://peoplestestonclimate.org/

transformations are usually based on an integration of knowledge from multiple actors, including scientists. However, co-learning for systemic governance transformations still remains poorly understood. Little is known about how policy makers, practitioners and researchers together can learn their way out of anthropogenic issues such as climate change (Tschakert and Dietrich, 2010; Ison et al, 2011; Powell et al, 2014).

To address this issue, this paper analyses the performance and orchestration of governance learning for systemic transformation in practice, drawing on examples of the international CADWAGO project. The CADWAGO project was a three year projected that aimed "to address the global challenge of water management in the context of climate change by promoting systemic and adaptive transformations in water governance"[2]. One of the special characteristics of the CADWAGO project was its explicit engagement in co-learning by means of the design of a series of so called 'governance learning events'. This means that alongside the research, the research team invited practitioners and policy makers from the European water governance context to be joint "co-learners" throughout the various stages of the project.

Co-production of knowledge and boundary work at the science, policy and practice interface

In this paper, we link up to the growing body of literature on the relationship between science, policy and practice. Traditionally, science, policy and practice are conceptualised as domains that are separate and disconnected. Science is conceptualised as a 'place of knowledge production' (Gibbons et al, 1994) in which value-free facts are produced. Policy on the other hand is seen as a 'place of knowledge use' and is supposed to use the facts that are produced by science in policy processes. In this 'knowledge utilisation model', knowledge is 'disseminated' from science to society. Communication is seen as the means to bridge the gap between these two domains (Bulkeley and Mol 2003).

This linear model of knowledge production and use is questioned in science and technology studies (e.g. Funtowicz and Ravetz, 1993; Gibbons et al, 1994; Jasanoff and Wynne, 1998) as well as in interpretive policy analysis (e.g. Fischer, 1998; van Eeten, 1999; Hajer and Wagenaar, 2003). This literature argues that an increase in the complexity and uncertainty of scientific questions should likewise result in an increase in the democratisation of procedural rules as to how to do science. Thus, when complexity and uncertainty are low, science can

[2] See http://www.cadwago.net/

proceed in a more orthodox manner. In the face of uncertain, complex questions (e.g., environmental risks), however, scientific ways of knowing break down as values and uncertainty require scientists to look beyond the facts to include other thoughts, observations and data - and therefore include practitioners and policy makers - in the production and use of knowledge. This co-production of knowledge model challenges the traditional conceptualization of science as a practice that produces facts to fill knowledge gaps. Instead, encounters between science, policy and practice are seen as social processes that involve dynamic co-construction processes of knowledge production and use.

Research shows that despite the fact that many co-production of knowledge processes are attempted, in practice many of these end up reproducing a linear conceptualisation of science with its strict separation of knowledge production and use (Maasen and Weingart. 2006, Turnhout et al, 2013). This resonates with studies on participatory approaches that show that participation often unintentionally results in the marginalisation of the very people it aims to empower (Cooke and Kothari 2001; Aarts and Leeuwis 2010; Turnhout et al. 2010). This results in a call (see Turnhout et al, 2013) for going beyond good intentions and ideals about co-learning and co-production of knowledge, to how these work out in practice.

In this paper, we use the concept of boundary work to investigate how boundaries between science, policy and practice are negotiated in practice. Boundary work was originally introduced by Gieryn (1983) to describe the discursive practices in which boundaries between different kinds of knowledge are demarcated and/or co-ordinated. This draws the attention to boundaries as barriers. Gieryn's work (1983, 1995, 1999) shows that boundaries can separate and protect in three different ways, namely by means of 1) expulsion, 2) expansion and 3) protection of autonomy. However, more recent work (Guston, 2001; Metze, 2010; Quick and Feldman, 2014) shows, boundaries need not be barriers. They may also be junctures that join and connect. Their work shows boundaries can connect in three different ways, namely by means of 1) decentring differences, 2) translating across differences and by 3) aligning among differences. This shows that the barriers and junctures are not an intrinsic characteristic of boundaries but boundaries are enacted in practice when people take specific actions. In this article we therefore conceptualise boundary work as a dynamic site with the potential to separate as well as connect.

In this paper, we investigate specific boundary work practices that either create barriers that separate or junctures that connect. In line with Quick and Feldman (2014) we recognise that

some of the practices we describe as boundary work are characterised elsewhere as negotiation, translation, demarcation, bridging, or coordination. These concepts indeed apply to many of the practices that we describe. However, conceptualised these practices as boundary work draws attention to the practices that determine whether and how whether and how to make boundaries into sites of separation where differences are established or whether and how to make boundaries into sites of connection where junctures are established. This can help to get insight into how co-learning and co-production of knowledge processes work in practice.

Methods

Our analysis is based on materials from the CADWAGO governance learning events. The data were collected by means of participant observation by the authors who were all part of the CADWAGO team that designed and organised these events. During the events we divided our attention between facilitation and organisation, and observation and recording of reactions, questions and conversations of the co-learners (both researchers and practitioners). The latter observations were recorded by means of note taking and audio recording when possible. The field notes were divided into categories related to 'context', 'interpretations' and 'direct observations'. The field notes were compiled both in and out of 'the field' during the design and organisation of the events as well as during the reflections on the events afterwards. As such, the notes included in-situ observations as well as post-hoc interpretations of materials (documents, powerpoint slides, flipcharts) and conversations about the learning events (both from notes and from audio recordings).

Following the approach of hermeneutic interpretative analysis (Yanow and Schwartz-Shea, 2012, 2015), analysis of the content took place during the learning events, at night following each learning event and 'out of the field' in the weeks and months following the events as well as during the writing process. By reading and re-reading the material that was collected, patterns started to emerge. Particular attention was paid to boundaries and boundary work. Furthermore, due to the use of ethnographic methods, the researchers themselves served as primary tools of measurement, and so our own reactions to the learning events also served as an input to understanding the process. The analysis presented below is the result of this iterative process.

Background to the case

CADWAGO - *Climate change adaptation and water governance - reconciling food security, renewable energy and the provision of multiple ecosystem services* – is an international project that aimed to improve water governance by developing a more robust knowledge base and enhancing capacity to adapt to climate change (CADWAGO, 2013). It was a three year international project that brought together 10 partners from Sweden, the UK, Italy, the Netherlands, Australia and Canada. The project followed a call put out by a trio of European Foundations - including Compagnia di San Paulo from Italy, Volkswagen Stiftung from Germany and Riksbankens Jubileumsfond from Sweden - as part of a Europe and Global Challenges Programme. The project was designed initially to include a series of case studies from Europe, Australia and Canada and three work packages that focussed on:

• Framing of ecological components of ecosystems (WP 1)

• Climate change adaptability in water governance institutions and organisations (WP 2)

• Systemic governance practices (WP 3)

When designing CADWAGO, engagement with practitioners was already recognized as an important element in of the project. The original project document noted that "The lessons from the cases, the evidence from the cross case synthesis and the facilitated policy learning is intended to answer CADWAGO's research questions." The process was 'framed' as 'policy learning'. It was envisioned as an iterative process consisting out of three so-called 'Policy Analysis Workshops'. These events were envisioned to take place once a year with the first one planned in Sweden in 2013, the second one planned in the UK in 2014 and third one planned in Italy in 2015. Policy learning was mostly conceptualized as a linear, transfer of knowledge process in which the participating practitioners would learn about the new insights from the CADWAGO project and they would then implement these in the European governance context. The Policy Analysis Workshop were to coincide with existing events such as conferences or symposia. Claims were made to funders in the presentation of the bid that CADWAGO would hold 'large' policy learning events.

During the inception phase meeting of the CADWAGO project - which was held 18 and 19 October 2012 in the sustainability Research Centre, University of the Sunshine Coast, Queensland, Australia - the idea of 'policy learning' was re-conceptualized and a fourth work package was created. It was recognized that a linear, transfer of knowledge process was inconsistent with the theories on learning and change used by the project in its other work packages. It was decided that 'we need to walk our talk'. First of all, in order to get away

from linear connotation associated with 'policy learning' literature, 'policy learning' was re-framed as 'governance learning'. The process was then re-conceptualized as a two-way co-production of knowledge process that would provide an opportunity for CADWAGO to secure feedback on the design, purpose and results of the project from stakeholders working with change processes linked to water governance issues in Europe. It would also provide an opportunity for the stakeholders to learn from CADWAGO experiences and incorporate new insights into their practice. A fourth work package (WP 4) was desirable to work at a meta project level.

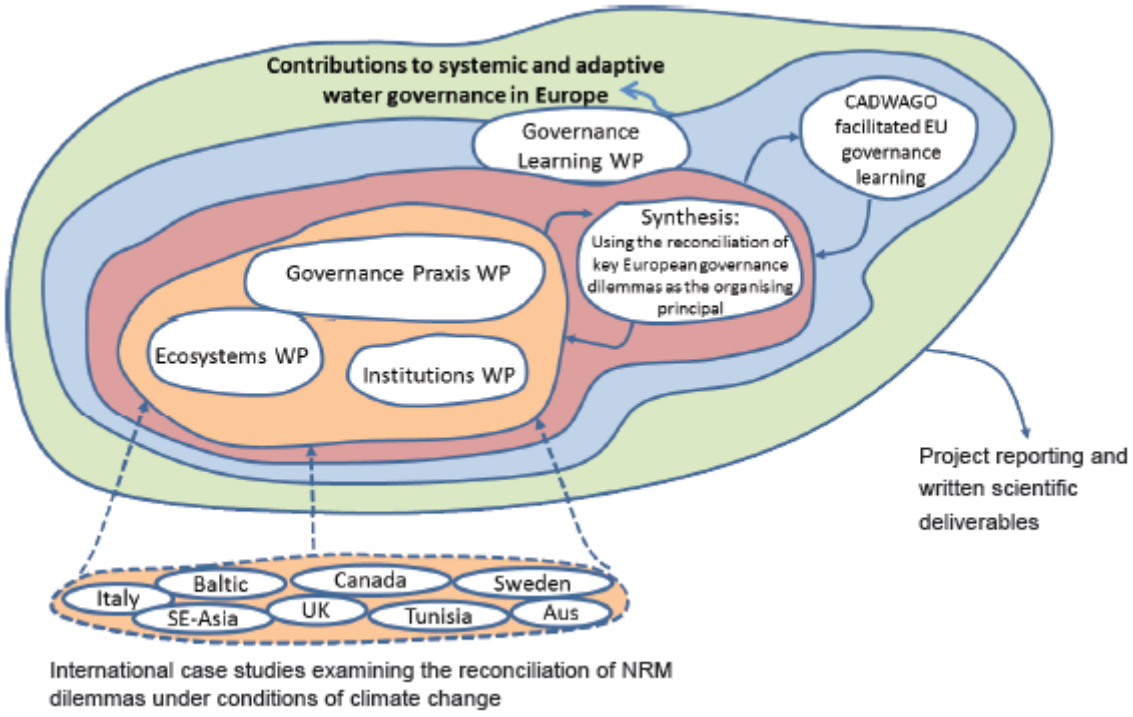

Figure 1: the CADWAGO research process (CADWAGO, 2013)

Figure 1 shows how three of the work packages applied their theoretical lens (inner circle) to a set of case studies to reflect on water dilemmas manifest in a diverse set of transnational contexts. These lenses enabled a cross-case narrative describing the orchestration of a diverse set of governance performances (second circle). Dialectic between the cross case narratives and co-learners of European water dilemmas was facilitated by CADWAGO's governance learning WP (third circle). The emergent governance learning enabled conceptual, institutional and practice innovations to support systemic and adaptive water governance in Europe (outer circle).

WP4 would focus on governance learning by facilitating CADWAGO's learning relating to governance beyond the project staff to the wider European water governance environment. In WP4 we wanted to do this by (i) designing and operationalize an enabling environment for co-production of knowledge processes to emerge, (ii) analysing these processes and reflecting on them, and (iii) using these findings to contribute to increased governance learning which can help to bring about desirable change in European water governance domain.

In the initial CADWAGO project proposal, support had already been included for three European governance learning events. But we quickly recognised that a yearly one-day governance learning event alone would not necessarily provide the level of engagement and continuity that might be required for co-learning to develop. Additional funding was applied for in year 2 to organise interim governance learning events on a national or regional level to keep co-learners engaged in between the yearly face-to-face European Governance Learning events. This additional funding came in at the beginning of year 3 and provided some dedicated staff time for WP4 to work on supporting governance learning for transformation for year 3. In addition to the Governance Learning events that were organised or co-organised by WP4 (see figure 1), co-learning also occurred on case-study level and during non-CADWAGO led events - such as conferences or symposia – that involved CADWAGO researchers as well as practitioners and policy makers.

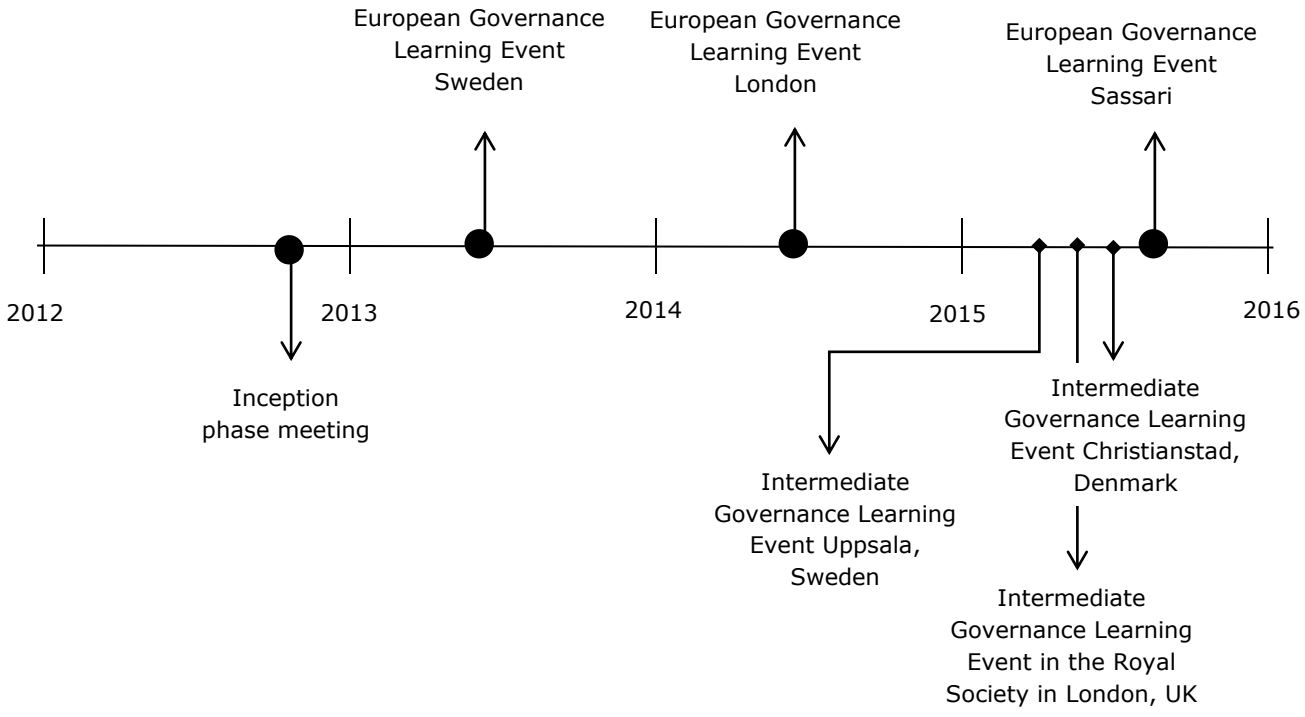

Figure 2: Timeline of Governance Learning events organised and/or co-organised by WP4 during the CADWAGO project.

The CADWAGO 'Governance Learning' experience

Creating a shared identity

A lot of thought was given to how to design the process as well as whom to invite. In terms of inviting participants, we decided to work with practitioners and policy makers already involved in promising change processes related to water governance at different levels of organization (local, regional, national, European) of the European network. They were thought to be in the best position to operate at the boundary between the project and the other stakeholders in the broader European water governance context. These practitioners were referred to as 'champions', 'change agents', 'critical friends', 'co-learners' or as "folk who are at or near some tipping point towards our approaches and who can effect changes in water governance through their work". All participants were invited as "co-researchers", and were able to contribute to the design (first learning event), the findings (second learning event) and the conclusions of the CADWAGO research (third learning event). During the governance learning events, everyone was referred to as 'co-learner' including the CADWAGO researchers. This removed the attention from the previous difference among the domains of 'research', 'practice' and 'policy' thereby effectively blurring boundaries between identities and organisations to such an extent that it was often difficult to distinguish between CADWAGO staff and engaged stakeholders during the learning workshops.

In terms of design, we used a methodological lens that drew on a range of social and environmental learning traditions, and it drew on past and ongoing experience in relation to system theories, methodologies and techniques, community of practice work and other participatory approaches. In each workshop we started with an interactive session which aimed to explore the participants' experiences in water governance, for example, by developing rich pictures, or conversation maps. The process of collectively creating a rich picture or a conversation map entailed either drawing or writing as well as describing what was being drawn or written to each other. It created a dialogue among participants and it allowed them to share their experiences of water governance while 'feeling heard' by the others. Through reflecting back and open questions, the other participants communicated their

genuine interest in what the speaker had to say. As such, the interactive sessions were designed to involve all participants as equals.

Language also played an important role in drawing different boundaries between the CADWAGO project, including its co-researchers, and its perceived environment. Those involved in the CADWAGO project all shared an interest in transformative change. The environment was thereby framed as 'business as usual'. The project used a specific language connected to transformative change such as 'system of interest', 'emergence', 'social learning', 'concerted action' and 'promising configurations'. To some of co-learners this language was new. Others were already familiar with these concepts from earlier case-study workshops. This conceptual, scientific language could have resulted in a boundary between the CADWAGO researchers and the other co-learners – excluding the policy makers and practitioners from scientific practice, but it did not. At the beginning of each governance learning event, the project leader introduced the CADWAGO project and implicitly explained the meaning of the concepts to all co-learners. This translation allowed all participants in the room to engage with these notions. Many co-learners were attracted to the CADWAGO Governance Learning workshops because of their experience of running into the barriers of 'business as usual' when trying to initiate transformative change in their own environmental contexts. Many welcomed the new vocabulary as it gave them a shared sense of community as well as new ways to understand the context that they were operating in.

This shows the way in which boundaries of identity, organisation and discourse were blurred during the design of the co-learning events. By framing everyone as a 'co-learner' and by designing the process in a way that allowed everyone to contribute equally, differences among participants were decentred. The creation of a shared language also contributed to this by translating across differences and thereby bypassing pre-existing discursive divides and barriers. Instead boundaries were re-drawn - not along organisational or discursive divides – but along a shared interest in the issue of 'transformative change' thereby connecting co-learners and excluding 'others' with an interest in 'business as usual' through boundary work practices of expulsion.

Co-production of knowledge

The Governance Learning events were explicitly designed as co-inquiries – also referred to as collaborative inquiries - into European water governance in a context of climate change. Entering the workshop space of the European Governance Learning event in London in June

2014 (see Foster et al, 2014), the chairs were arranged in different groups around tables and all co-learners were encouraged to take a seat at one of these tables. During the general welcome and introduction by the project leader we learned that the aim of this particular learning event was to get feedback on the first preliminary results of the CADWAGO project. During the 'first iteration' of the project, the post-doc researchers from WP 1, 2 and 3 had analysed the ten case studies, and identified common themes that emerged from them. The Governance Learning event provided the opportunity for co-learning intended to engage with these themes and further advance them. During the 'second iteration' of the CADWAGO research, the emergent themes would then feed back into the CADWAGO research where these themes would be used as cornerstones for further investigation in the next round of research.

After the introduction, we were asked to create a conversation map with our group (5-6 people) in an interactive working session. There was a large piece of empty paper in the middle of the table and there were markers in various colours waiting for us to be used. The conversation maps exercise comprised two parts. The first part comprised a conversation 'trigger'. This trigger was the same for all groups, namely 'our experiences with water governance'. We were asked to write this down in the middle of the piece of paper and to put a circle around it. The second part comprised our responses to the trigger, which we were requested to write down and link together with a line as the conversation progressed. Each of us had a marker of a different colour and that is how it was possible to trace 'who said what in relation to what' in the conversation (see figure 3). This first interactive working session initiated dialogue among us and it helped us to develop systemic awareness of the issue by exploring our experiences of water governance.

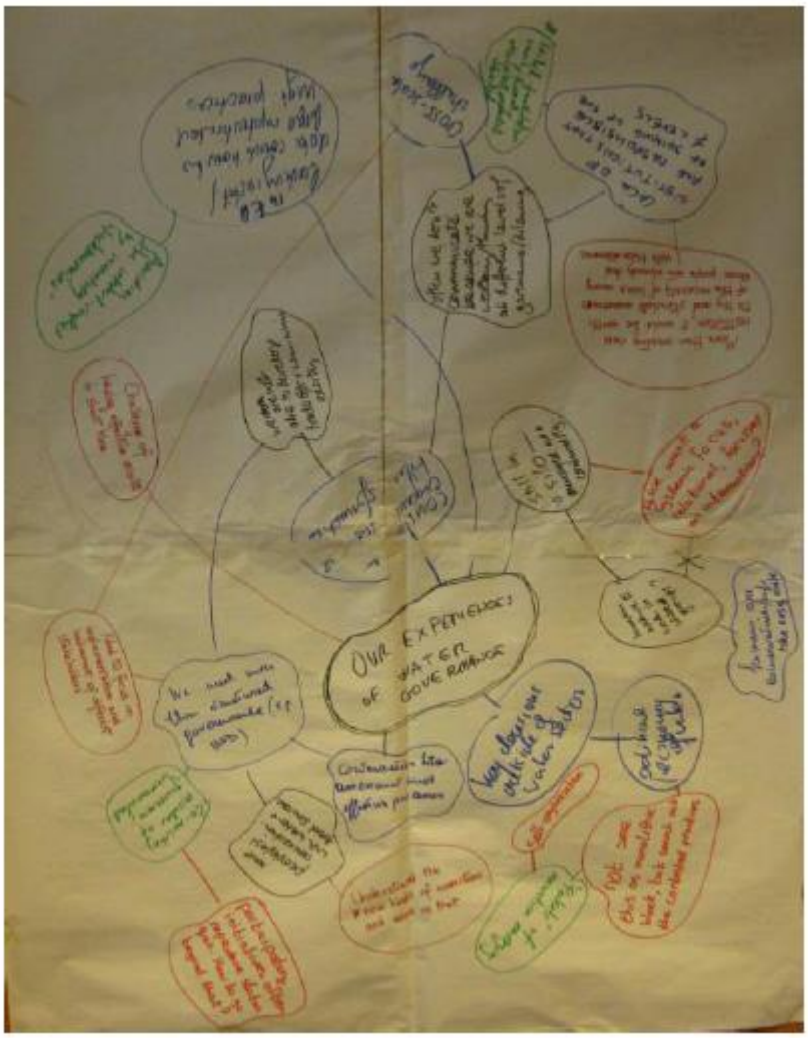

Figure 3: One of the conversation maps from the London learning event (Foster et al, 2014).

On the basis of the conversation map that we had created, we identified ‘themes’ that were important in relation to our experiences with water governance. We were given a limited number of coloured post-it stickers to write down our main themes. Our post-it stickers were collected by the workshop facilitator. With the help of this facilitator, all participants together clustered the themes from each group into a set of six themes in a plenary session (see figure 4).

Figure 4: The six themes that were jointly identified by all co-learners on the basis of their conversation maps (Foster et al., 2014)

This discussion was mainly dominated by CADWAGO researchers. This probably also explains the similarities between some of the emergent themes from the first iteration of the CADWAGO research and the emergent themes from the Learning Event (see table 1). Nonetheless, also some new themes came up such as 'planning under conditions of uncertainty'. All co-learners supported the six themes that were identified during the learning event.

Emergent themes CADWAGO	**Emergent themes Learning Event**
Inter - and intra- action in levels of governance in the context of water governance dilemmas	Breaking-out of siloes and governance structures
Reconciling new and existing roles and responsibilities in the context of water governance dilemmas	Roles and responsibilities in changing dynamic of water governance
Learning for transformation/adaptation	Knowing and learning about water and its

	purpose
Power and social justice	
Masculine governance structures and reconciling water governance dilemmas	
Water crises as catalysts for change	Water crises as opportunities for governance change
Exportation of environmental issues (trans-sectorial and trans-national)	
Target-oriented versus process oriented policies	Mismatch between expectations of new processes and the outcomes
Commodificaton of water and water resources (PES)	
Role of third sector organisations (non-state actors)	
Perceived knowledge gaps as opportunities/barriers to action	
	Planning under conditions of uncertainty

Table 1: Clusters of themes identified by the CADWAGO researchers before the Learning Event and the themes identified by co-learners – including CADWAGO researchers - during the CADWAGO learning event.

The conversation maps and the clustering of themes created space for integrating different types of knowledge in a patchwork of co-produced knowledge that partly validated the findings in the first iteration of CADWAGO research as well as creating space for the development of new insights and new understandings.

After a break, we continued with the second interactive working session which focussed on 'issues and opportunities for change'. In this session, we selected one of the six themes that we wanted to explore. In the middle of table we had big sheet of paper. We also had a number of sticky notes for capturing the issues and opportunities for change for our theme. During the discussion these issues and opportunities were written down on the sticky notes and put on the paper. The discussion was facilitated by a researcher of the CADWAGO team. After the allocated time for discussion had passed, we were given five sticky dots per person and we

were asked to use them to 'vote' for the issue or opportunity that was most important for us in relation to change that we envisioned and desired in water governance. The issue or opportunity that received most dots was taken forward as a 'system of interest' to be investigated further in the next interactive session (see Foster et al, 2014). In the third session, we identified the actions required if the water governance system were to function as intended. Again, we wrote down the activities on post-it notes and then we clustered them on a large sheet of paper. We then compared these actions to the situation in practice through questions such as: "If this activity is missing in the real-world, is that a good thing?" "For whom?" "Does it matter?" "What are the implications of filling a gap?" "How might it be filled?" We shared these findings in a plenary session in which it became clear that various actions would have to be taken to improve the situation. Some of these actions could be taken by the participants on in our own capacities and in our own organisations, but others required action by people. The second and the third interactive session helped the participants to slowly move away from the situation in which differences between types of knowledge where collapsed and into a situation in which these differences mattered again. This allowed them to step back into their own roles and reflect on their own responsibilities as well as their own respons-abilities. Differences were not a barrier but a resource for concerted action.

The learning event ended with a plenary evaluation session. During this session only a small number of participants reported learning in relation to new information. Those that did, reported new insights such as "Issues are so similar across EU and Canada" or they reported "Better understanding of water governance dilemmas/issues". This learning was related to the substantive content of the discussions. Others reported that what they were taking out of the workshop was learning about dynamic and inclusive processes, methods and techniques that facilitated and enabled the sharing of knowledge and experiences amongst the participants. They reported new insights such as "Useful – methodologies. Useful the design of the learning event that promoted very much the dialogue with and among invited guests. Going to use this myself" or "New creative methods / ways of co-learning. Can blend well with otherwise scientific/ technical issues (such as nitrate pollution)." What these participants took out of the workshop had little to do with the content but was rather related to participatory design and techniques. Third of all, new networks were a valued outcome of the workshop by several participants. They reported issues such as "supportive forum" or "Continue own learning process and engage with others working with similar change processes". Again this had little to do with the content but was rather related to communication and networking. Last

but not least, some participants reported validation when asked about learning. This included learning "That the barriers we are experiencing in terms of WFD delivery are a systems and governance problem – and that they have parallels across other cultures and scenarios. Understanding (these) brings some sort of acceptance and allows space and development of solutions (instead of just 'giving up')" or "Validation of approach from experts" or "Themes emerging from CADWAGO case studies reinforced by workshop". So emotional support and validation were also mentioned as important outcomes of the workshop.

This description of the learning event in London shows that the boundary between scientific knowledge and 'other' types of knowledge (local, political, practical) collapsed during the interactive sessions of the learning event. All knowledge counted and all knowledge had equal value. At the end of the learning event, the boundaries were put back in place. That is when each participant reflected on their own position and the sort of action that they could take to improve the situation. For the CADWAGO researchers their responsibility as well as their respons-ability translated into taking on board the input of policy makers and practitioners in the remainder of the research process. For other participants, other actions were more appropriate. This shows that co-learning in practice was far more than learning about content only. Putting the organisational and discursive boundaries back in place allowed co-learners to align their differences. By recognizing differences and making use of them to achieve complementarity, the participants combined their efforts to create a loosely organised network of concerted action for improving and transforming water governance.

Challenging boundaries of science

The last issue that stood out during the Governance Learning events was their focus on 'performing science differently'. This is best illustrated by the Intermediate governance learning event which was held on 16 September 2015 in the Royal Society in London (see Foster et al, 2015). This event had elements of a symposium and it also had elements of a co-inquiry. The aim was to discuss the past, current, and future of water governance in the UK and the EU. CADWAGO researchers from the Open University in WP3 had been working with a range of actors in the UK – such as policy makers, representatives from NGOs, researchers – to get insight into water governance in the UK and how this could be improved in practice. The results of this process were used as point of departure for the learning event in the Royal Society. Between 50 – 80 people participated in this event which aimed at developing of an agenda for transforming water governance in the UK and the EU. Getting a

co-inquiry into the Royal Society in London felt like a challenge to the 'normal' boundaries of science and a call to expand the traditional boundaries of science by making a claim on a different kind of expertise.

Figure 5: CADWAGO symposium, The Royal Society London, 16th September 2015 (Foster et al, 2015)

In addition to this, the metaphor of 'performance' in relation to enacting an expansion of the boundaries of science also came out strongly during the third and final Governance Learning Workshop between the 14th and 16th October, 2015 in Sassari, Italy (de Bruin et al, 2015). The aim of the event was to: 1) showcase and discuss project findings and insights; 2) engage in co-learning processes to enable critical reflections on our collective learning; 3) formulate actions for transforming water governance in our different contexts. The workshop was designed around an on-going Italian case study concerned with sustainable water management in Arborea, Sardinia. The event started in the evening of the 14th of October when we were invited to the concert "Music Acqua": musical variations on climate, a piece composed by Sante Maurizi and inspired by the context of CADWAGO. It was organised by Conservatorio di musica Canepa and the CADWAGO partner Nucleo di ricerca sulla desertificazione dell'Università di Sassari (NRD). It combined instrumental and vocal music, performed by the Sardinian Youth Orchestra and the Canepa youth choir, and spoken theatre (de Bruin, workshop report). The following day we prepared for the field trip to Arborea. In the afternoon, we travelled by bus through the Sardinian landscape to the central part of Sardinia

where we participated in a live debate, known as 'La Rasgioni'[3], staged in the Municipal hall of the Arborea district. La Rasgioni is a traditional form of peaceful conflict resolution which had operated in Gallura until 50 years previous. It aims not only to solve disputes peacefully but also to restore pre-existing relationships that had been negatively affected by a conflict, thus preserving the community cohesion. Inspired by La Rasgioni the event in Arborea comprised a debate between representatives of all the regional, national and international institutions involved, and representatives of the entrepreneurs in the area including farmers and fishermen. The 'judge' allowed all representatives to speak. We, as CADWAGO co-learners, played the part of the 'jury'. Both the Music'aqua and la Rasgioni enacted the performance metaphor by including an orchestrated musical performance as well as a theatre performance into the co-learning event. Similar to the co-inquiry at the Royal Society in London this challenged the 'normal' boundaries of science by re-drawing them and including practices not usually associated with 'normal' scientific practice.

Governance learning as an orchestrated performance

CADWAGO started from a conceptualisation of change and governance learning as an interactive co-production of knowledge process. What was intended was much more than simply co-designing research questions and communicating the research findings but coproduction of questions and findings and joint learning and reflection about implications, lessons and future outlooks. This called for highly interactive forms of knowledge generation where multiple stakeholders (including researchers) engaged in transdisciplinary joint knowledge production, dialogue and learning processes. This paper investigated the enactment of governance learning for systemic transformation in practice by investigation the co-production of knowledge process by means of an analysis of the boundary work practices and their potential to separate and/or connect.

Using the boundary work practices for creating junctures (Metze, 2010; Quick and Feldman, 2014) and divides (Gieryn, 1983, 1995, 1999) we have shown that making boundaries into junctures went hand in hand with the creation of boundaries as sites of separation. In agreement with Quick and Feldman (2014) our analysis shows that during the co-learning events junctures were constructed by decentring differences, translating across language and aligning differences. At the same time, in agreement with Gieryn (1983, 1999), our analysis also shows that during the co-learning events separations were constructed and traditional

[3] translated into English as 'the water court'

boundaries were challenged through expansion, expulsion and protection of authority. Both practices of separation and connection were important elements of the co-production of knowledge process.

The creation of junctures did take place at other moments in time and in different places than the creation of separations. Within the group of co-learners, the junctures were mostly created during the interactive sessions at the beginning and in the middle of the learning event. The separations were put back in place at the end of the learning event. The invitations and the design of the interactive sessions blurred boundaries between science, policy and practice in terms of identity, discourse and knowledge. At the end of the learning event, the opposite happened and differences were re-established and aligned to allow for self-organised, concerted action. As such the practices of separation and connection were able complement each other.

The creation of junctures along a shared interest in the issue of 'transformative change' resulted in a re-drawing of the boundaries between the group of co-learners and 'business as usual', including 'business as usual' science -– thereby creating separation. Inspired by Gieryn's metaphor of cartography, we could say that the map of water governance was re-drawn, challenging the existing organisational, discursive and knowledge boundaries associated with 'business as usual'. As such, the practices of separation and connection were also able to complement each other 'spatially'. All in all, they functioned as two sides of the same coin - as a duality instead of a dualism (see also Ison et al, 2011).

We suggest that the boundary work practices of separation and connection are central to the creation of an orchestrated performance aimed at governance transformation in the European water management landscape. Boundary work served important functions: 1) it contributed to the creation of a network of co-learners with a shared interest in transformative change; 2) it re-defined identities, discourse and knowledge along the boundaries of this system of interest; 3) it allowed for the identification of concerted action as well as the alignment of differences required to bring about the desired change. This illustrates the argument by Ison (2010, p. 249) of what the metaphor of an orchestra can help to reveal in relation to co-production of knowledge or social learning. "An orchestra is something that can be invested in; it is thus referred to and understood as an entity. At the same time what is being invested in is the on-going capacity to create, adapt and deliver performances by a group of people with different instruments, skills, perspectives, histories and so on, that satisfy some socially determined

purpose." During the co-learning events, the boundaries between science and society were both re-produced and challenged. The flexibility and fluidity of boundaries – and playing with those - helped co-learners to rehearse their orchestrated performance as well as to gain access to practices and resources in ways that would allow them to address the envisioned water governance transformations in practice.

Conclusion

The co-learning events and the co-production of knowledge process did not merely serve as a neutral place in which reality was represented and actors learned about the state of affairs from each other during exchange of knowledge. Instead it served as a place where a certain alternative reality –or subaltern reality - was created. Recognizing this means reconceiving co-learning and co-production of knowledge as performative practice. Such a perspective goes beyond overly optimistic views of co-production of knowledge as a radical process of democratisation of science in which traditional science-society relations are transformed. It also goes beyond the critical views that see co-production of knowledge as the mere reproduction of the traditional linear model of science in which knowledge production and use are reproduced as separate process and strict boundaries are reinforced. Instead, it appreciates both the re-production of science-society boundaries as well as the challenging of those in co-learning events as as meaningful and legitimate attempts to simultaneously bring about a particular sort of change, namely 1) social change or "coherence" (the ability to harmoniously live with ourselves and others) and 2) socio-environmental sustainability or "correspondence" (people interacting with the environment in ways that builds resilience). According to Maturana and Varela (1987, cited in Capra, 1996, p. 330) this requires a diverse, resilient community "capable of adapting to changing situations. However, diversity is a strategic advantage only if there is a truly vibrant community, sustained by a web of relationships. If the community is fragmented into isolated groups and individuals, diversity can easily become a source of prejudice and friction. But if the community is aware of the interdependence of all its members, diversity will enrich all the relationships and thus enrich the community as a whole, as well as each individual member. In such a community information and ideas flow freely through the entire network, and the diversity of interpretations and learning styles-even the diversity of mistakes-will enrich the entire community" An orientation to boundaries and boundary work in co-learning to practices of connection as well as separation can support the creation of such a resilient community and

thereby support the performance and orchestration of effective governance transformations in practice.

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