Scores rapportserie 2020:6

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Scores rapportserier 2020:6
ISBN 978-91-88833-11-2

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# The role of epistemic signalling in transdisciplinary knowledge production

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By Mikael Klintman, Maria Grafström & Anna Jonsson

## Abstract

The number of arrangements where academia collaborates with governmental and nongovernmental organisations, as well as industries, have increased over the last decades. While research has focused on whether knowledge produced in such collaborations is genuinely influenced by others than the 'experts', or those with the highest status and power, this report explores the influence of framings and re-framings of what the participants and society should perceive as the nature of knowledge: epistemology. We analyse the framings of epistemology through the concept 'epistemic signalling'. Epistemic signalling refers to communication or rule-making that indicates what type(s) of knowledge is considered relevant, valuable or useful in knowledge collaboration. Empirically we draw on two examples of transdisciplinary collaborations in the field of water management (one from the UK and one from the US). In-depth interviews were combined with document analysis.

We have analysed three themes of epistemic signalling that we suggest influence knowledge collaborations. The first one concerns how the form and theme of the collaboration were decided upon and is based on Arnstein's (1969) ladder of participation. The second refers to what type(s) of participants were considered suitable – as for example experts or lay people. Here we use the framework of aggregate (bargaining-oriented) versus integrative (deliberative) processes of knowledge collaboration in our analysis. The third and last theme concerns what is perceived as valuable and successful in the collaborations, something that we discuss in terms of procedural and epistemic virtues of knowledge collaborations.

The epistemology of organisations and participants in knowledge collaborations ought to be a distinct subject of open discussions from the earliest planning stage and onwards. It is easy to assume that epistemic signalling would be esoteric parts of practical, collaborative knowledge production. To the contrary, open epistemological reflections may help highlight situations where hierarchies turn out to be remains of routines inconsistent with new goals of more profound exchange of practical and scientific knowledge. In such cases, the epistemologies need to be revised to better fit the new goals.

## Preface

This report has been authored within the framework of the three-year research project “Beyond the market stalls and ivory towers: A study on integrated science for sustainable provision of knowledge” (FSK15-1081:1). The project examines the emerging perspective of integrated science as one of many strategies and ideas for how society's various actors jointly can contribute to long-term knowledge development. While collaboration between academia and other sectors of society is often highlighted as important, the relationship also includes contradictory, and sometimes naïve, opinions and expectations. The purpose of the project has been to develop understandings of the conditions for integrated processes in knowledge production – such as its many challenges as well as aspirations that the various societal sectors hold for such collaborations. Empirically, the report is based on two case studies of knowledge collaboration in the field of water management.

The project is funded by the Riksbankens Jubileumsfond for the Advancements of the Humanities and Social Sciences in collaboration with Formas, Forte and the Swedish Research Council and has been conducted the research programme "Society's long-term knowledge supply". More about the program and its other seven projects can be found at https://www.rj.se/Var-forskning/samhallets-kunskapsforsorjning/

## Content

## Introduction

Over the last three decades, the number of arrangements where academia reaches out and collaborates with governmental and nongovernmental organisations as well as industries has increased (Irwin, 2016). The stated goals typically include mutual learning between participants in different positions and with different experiences of the problem at stake. Environmental degradation, health challenges, physical planning dilemmas, and social inequality – often labelled 'wicked problems'– are common themes that are subject to innovations in such transdisciplinary knowledge collaboration (Head and Alford, 2015; Weber and Khademian, 2008). This is also emphasised as an overall goal in Agenda 2030.

In previous research, arrangements of knowledge collaborations have been examined from a wide range of perspectives, from the macro-level of research policy (cf. Jasanoff 2003; Pohl 2008) to the micro-level where such collaborations are observed and analysed in great detail (Buchy and Ahmed 2007; Martin 2008). Common questions in such studies of transdisciplinary collaborations include whether such processes are truly collaborative and relatively free from power dynamics, and whether the knowledge produced is truly influenced by others than the 'experts' or those with the highest status and power.

The report indeed makes use of such factors. Still, it places its specific focus on a different level: how arrangements of knowledge collaboration involve framings (Druckman 2004; Klintman and Boström 2004); that is, the framing of conflicts and re-framing of what the participants and even society as a whole should perceive as the nature of knowledge: epistemology. What knowledge is and how it works is anything but straightforward, which makes the influence on how people understand the nature of knowledge and the value of knowledge collaborations an important part of such arrangements. The knowledge collaboration process – that is, how knowledge evolves – is often treated as a black box in research and various concepts and models aiming to describe knowledge collaboration (Jonsson et al., 2020). We argue that an important part of the influence and power within arrangements of knowledge collaboration is dependent on the degree of success in terms of knowledge development among participants, and in having others accept their explicit or implicit epistemic view (Klintman, 2019).

In this report, we analyse the framings of what participants in transdisciplinary collaborations perceive as the nature of knowledge through the concept that we coin here: 'epistemic signalling'. Epistemic signalling may, for instance, refer to communication or rule-making that indicates what type(s) of knowledge is considered relevant, valuable or useful in collaborative arrangements. This includes questions about what should count as successful knowledge collaboration as well as whether the idea about consensus or conflicting views is emphasised. The extent to which epistemic signalling gains 'cultural resonance' in the group or in collaborative knowledge schemes, we argue, has great significance for the collaborative outcome and power structures.

Our exploration of epistemic signalling in this report has parts of its basis in earlier work on disputes at the interface of science and policy concerning the regulation of food and agriculture (Klintman, 2002b). These analyses revealed how polarised groups (e.g. environmental NGOs vs GMO-promoting, biotech organisations) strategically altered their epistemic position to an opposite one in order to fit their polarised goals. This has been labelled *epistemic crossovers*. An example was when GMO-promoting groups held a strong, realist epistemology regarding the certainty of the safety of GMO-technology. At the same time they held strong, constructivist and relativist epistemology concerning the arbitrariness and extreme uncertainty of

scientifically-based product labelling of GMOs. The NGOs that were anti-GMO made the completely reverse epistemic crossovers (Klintman, 2002a).

In these earlier studies, it was evident that epistemological positions are not only "innocent philosophies" but also strategic (nonconscious or conscious) positions. Signalling, therefore, need to be analysed as part of the ways that participants try to influence knowledge processes in their own interest. The group from which the epistemic signalling stems can with it strengthen their power and influence on the collaborative process and perhaps also, by extension, influence policy processes on the topic discussed in the arrangements. In this report, we suggest that successful epistemic signalling may influence routines for priorities in academia or other societal contexts.

The *aim* of the report is to identify the epistemic signalling that is in play and how it may influence knowledge collaborations and their related arrangements. One overriding question concerns what epistemic signalling can be traced in arrangements aimed at transdisciplinary knowledge collaborations. Another refers to whether there are tensions or inconsistencies between explicit goals of knowledge sharing and the actual structure of the arrangements.

We develop our explanation through an analysis of two separate cases of knowledge collaboration dealing with water management, which is in line with Agenda 2030 target 6 "Clear water and sanitation":

- A series of 'Environmental Competency Group' (ECG) sessions in the UK, organised by Oxford University, Bristol University and citizens in the local region of Marlborough (in 2015-2016).

*and*

- A series of 'Uncommon Dialogue' sessions organised by Water in the West at Stanford University in the US (in 2015-2016).

The remaining report is structured into five parts. In the next section, we motivate the selection of the two cases studied and the two data sources – interviews and documents – and how we structured our analytical work. We also present the two cases – the Environmental Competency Group session in the UK as well as the Uncommon Dialogue in the US – in more depth. This is followed by three analytical sections in which we discuss the role of epistemic signalling in relation to (a) the form and theme of the knowledge collaboration; (b) what participants are considered to be suitable 'types' to be included (or excluded); and (c) what is defined by the participants as a valuable and successful outcome. The discussions include both separate presentations of each of the two cases and concluding sections in which differences and contrasting aspects between the two cases are highlighted. Finally, we present and discuss key conclusions and how epistemic signalling may influence and provide power dynamics in the organising and undertaking of knowledge collaboration, and thus impact the actual outcome of such collaborations.

## Theory: Epistemic signalling and its impact on knowledge collaboration

Our theoretical framework consists of three different themes: (a) ladder of participation, (b) aggregative and integrative processes, and (c) procedural and epistemic virtues.

*The first theme* refers to knowledge collaborations on the ladder of participation. In order to learn about the underlying epistemic understandings and power conflicts that may take place in arrangements of knowledge collaboration, it is valuable to examine the process of deciding the

format of the arrangement as well as its central theme. This process involves prioritising, framing, and resolving possibly conflicting views about what form and theme are preferable, and why. The overriding question to ask here is: What role do the different participants have in terms of their position and background in deciding the themes, issues, and appropriate normative positions? For conceptualising this question, it is useful to relate to the classic 'ladder of citizen participation', created by Arnstein half a century ago (Arnstein 1969). The context in which Arnstein created this – deliberately provocative – ladder was social programs on anti-poverty, urban renewal and Model Cities. Obviously, since there are extensive differences between that context and our schemes of knowledge collaboration, Arnstein's normative assessments cannot be directly transferred to our cases. Knowledge production on partly scientific dimensions of water management and drought (which is our focus) is substantially different from political ambitions to alleviate poverty by inviting citizens to participate and exercise influence. Still, we find it relevant to bring up a couple of steps – each of which describes the level and type of participation – on her ladder:

(A) *Informing (in a one-way flow)* is located quite low on the ladder (the lower the position is on the ladder, the lower the level of participation and influence). It falls within the category of 'tokenism' in Arnstein's model, referring to symbolic and a partly illusory form of participation. This means that the public is deceived into believing that they have a say in the process when they do not.
(B) *Placation* is found close to the centre of the participatory ladder. Through placation, citizens are invited to plan and to give extensive advice. Still, power-holders always have the last say, judging whether the advice is feasible and legitimate.
(C) *Partnership*, located at the highest level of the types of participation that we choose to borrow from Arnstein, takes place where negotiations entail the redistribution of some power between power holders and citizens (Collins and Ison, 2009).

For our purpose of identifying epistemic signalling and its role in collaborative knowledge arrangements, it is fruitful to analyse where on the above-mentioned participatory steps the planning and themes of our two cases of knowledge collaboration take place. This helps us shed light on the power dynamics and 'depth' of the collaboration, as revealed in everything from the planning to definitions of 'success' stated in the knowledge collaborations.

*The second theme* distinguishes between aggregate and integrative processes of knowledge collaboration. In previous studies, the question of who is allowed to participate in collaborations mainly concerns what type of knowledge, position and specific interests they might represent, such as interests and rationalities of political and administrative organisations or the private sector (Polk and Knutsson, 2008). The two cases in this study, however, illustrate the power dynamics and epistemic signalling underlying a more fundamental choice: of whether to include stakeholders in the knowledge collaboration arrangement at all, and why (not). This topic is best understood by introducing two contrasting concepts from political theory: integrative (deliberative) versus aggregative (bargaining-orientated) styles of debate and decision-making (Gutmann and Thompson, 1996). Applied to knowledge collaboration, the integrative style – often called deliberative – refers to processes where all parties are prepared to adjust or even abandon their own initial knowledge beliefs, preferences and priorities. They are willing to do this in light of possibly better arguments and data that emerge through the collaboration, regardless of the formal position and status of the one who advances the better knowledge. The aggregative-style processes are characterised by each participant (individual or organisation) having certain stable knowledge claims, preferences and priorities about which (s)he seeks to convince the others to adopt. In our cases, the principles and decisions of

including or excluding ‘stakeholders’, described below, appear to reflect various positions in relation to the integrative- aggregative dualism of debates and decision making.

*The third theme* concerns the procedural and epistemic virtues of knowledge collaborations. The procedural virtue of a certain democracy arrangement concerns, for instance, the degree of inclusion of a wide range of participants. The epistemic virtue, on the other hand, refers to the extent to which the democratic procedure in question can be expected to generate the best knowledge outcome (Boström and Klintman, 2011). Against this background, we examine how successful and valuable knowledge collaboration is framed and discussed in the River Kennet ECG (Oxford and Bristol University) and Water in the West (Stanford University). The procedural dimension of success could, in principle, refer to extensive social participation, networking, the extent to which non-experts gain a new self-confidence through the participation, and whether participants claim to have increased their understanding of other actors’ positions and perspectives. The epistemic dimension of success refers to the quality of the generated knowledge as such (evaluations that may differ across actors, of course) the degree to which the level of epistemic knowledge has increased with regard to the actual topic among some or all participants. What ‘product’ or ‘deliverable’ has come out of the knowledge collaboration, or whether the collaboration has a raised awareness within and outside of the group, can also be categorised as the epistemic dimension. We will analyse how these, partly overlapping, dimensions are discussed and implied in the two knowledge collaborations, and conclude by discussing how all parties seem to work towards impact as well as/or including a successful sharing of an epistemic ideal within and/or outside the group.

## Method and material

Following our aim with this report, we build on a qualitative case study approach. As noted by, among others, Yin (2003), a case study design is preferred when the aim is to develop novel insights concerning a situation or, as in our case, a social phenomenon.

The two cases, which we refer to as the Oxford case and the Stanford case, have been selected due to both their similarities and differences. For instance, both cases refer to the water sector, drought and the involvement of a number of sessions and exchanges of experience between academic and other participants. These are issues that correspond well with the promises that the notion of knowledge collaboration holds (e.g., Dillon et al., 2016; Harris and Lyson, 2014; Irwin, 2006). The differences include the more expert-oriented character of the Stanford case, and the contrasting rules concerning what categories of participants should be allowed to participate. Although the report involves numerous comparisons of this kind, we find it crucial not to treat the cases as fully comparable, in terms of similarities *or* differences, but rather to contrast and discuss their approaches to organising knowledge collaboration. For now, it suffices to mention that they have obviously taken place in different policy contexts, and concern different regions and ecosystems. In order to present each case in its own right without forcing excessive comparisons on our analysis, the largest sections of each analytical section of the report consist of separate portrayals of each case. These are followed by brief, contrasting discussions.

*The two cases: ECG and Uncommon Dialogues*

*Our first empirical case* was The Environmental Competency Group sessions (ECG) concerning the River Kennet in the Marlborough area in the UK took place in 2015 and 2016. The sessions were organised by Oxford and Bristol Universities. Participants were local residents and university-based academics.

Environmental Competency Groups are portrayed as a particular research method that is based on a collaboration between local residents and scientists. ECGs stem from a 'critical philosophy of science in society' that questions, among other things, a static separation of 'expert' and 'lay' knowledge. It was first trialled by social scientists from Oxford University in another project, on food risk management, that ran from 2007-2010. ECG arrangements usually involve no more than 15 participants in order to make sure that each participant, from natural scientist to local resident, can make their voice heard (Landström 2017b, p. 5).

The general goal of ECGs is to create new knowledge concerning the local environment by drawing on a wide range of experience and knowledge from university and local representatives. ECGs are said to enable such joint knowledge and learning, without having a common, scientific vocabulary (Landström 2017a). However, the new knowledge that ECGs are supposed to generate does not concern how to manage the risks (in physical terms); instead, the new knowledge is intended to inform decision making and public debate.

Our study focuses on one set of workshops that took place in Marlborough. These workshops focused entirely on water scarcity and the risk of drought in, or related to, the River Kennet. This included the relationship between water quantity and quality in light of increased residential demand (due to an increase in housing) and assumed implications of climate change. The Kennet ECGs were directly tied to a multi-sited consortium, MaRIUS (Managing the Risks, Impacts and Uncertainties of Droughts and Water Scarcity), with funding from the UK Droughts and Water Scarcity Programme of the Natural Environmental Research Council (NERC).

According to the MaRIUS consortium website, the Kennet ECG saw social and natural scientists (the latter with expertise in hydrology, water resources and water quality) collaborate with amateur naturalists, local conservationists and other interested locals (MaRIUS project, 2019).

In total, six bimonthly sessions were carried out, starting in September 2015, and were supplemented by field visits and personal testimony work, among other things. The sessions ranged from framing the problems to be examined (related to drought), sharing knowledge and practising water modelling, to completing a report in the final session.

*The second* empirical case was The Uncommon Dialogues in the US. These dialogues were undertaken during 2015 and 2016 by Water in the West – a joint program of the Stanford Woods Institute for the Environment and the Bill Lane Center for the American West – at Stanford University. On its website, Water in the West is presented as a bridge maker between academic research and applied solutions, working through "creating new practical tools and forming strong partnerships to inform policymakers, water managers, businesses and environmental groups" (Water in the West, 2019). The program was established by Stanford University in 2010 to address and find sustainable solutions to the growing water crisis in the region.

Our study focuses on one set of workshops – on groundwater model development – that Water in the West held in collaboration with the Gould Center for Conflict Resolution and California State University Sacramento Center for Collaborative Policy. According to the Water in the West website, the workshop series "brings together a select group of groundwater managers, county and state representatives, and technical and water policy experts" (Water in the West, 2018). The workshops are part of the "Sustainable groundwater" program at Stanford

University, and the aim is to jointly develop regulatory and policy solutions to challenges related to collecting, coordinating and analysing data prior to the implementation of the Sustainable Groundwater Management Act (SGMA). In total, four workshops were held:

1. Groundwater models (November 16, 2015)
2. Groundwater data (January 28 & 29, 2016)
3. Tools to support decision-making (June 3, 2016)
4. Geophysical methods for sustainable groundwater management (October 13, 2016)

Each workshop focused on one aspect of how to develop models for groundwater data, and experts in the field were invited to share their expertise and participate in discussions. There was a core group of a dozen people – local residents and university-based academics - who participated in almost all the sessions. To some extent, the same people participated in all four workshops, but on some occasions, experts were invited to participate in one particular workshop, depending on the theme.

*Data sources – interviews and documents*
We developed our two empirical cases of knowledge collaboration about water management by drawing on two data sources: interviews and documents. The structure of data collection was the same for both cases in the UK and the US.

Through interviews, it was possible to develop an understanding of all the phases of the collaboration process, of what motivations and goals guided the process, and a sense of what the individuals involved thought was, for example, difficult, what they paid extra attention to, and how they would define a successful result of the collaboration (cf. Eriksson-Zetterquist & Ahrne, 2015). Such understanding made it possible for us to identify and analyse what kinds of epistemic signalling were in place in these two separate knowledge collaborations.

Interviews were conducted with individuals who had a central position and played a key role in the knowledge collaboration studied. In both cases, we conducted the first interview with the main contact person for the specific collaboration activity that we were interested in: i.e. the person who had the main responsibility for defining the format and deciding how the collaboration would be organised. Thereafter, we identified other key individuals who had experience from the current knowledge collaboration. We strived to create a mix of respondents to cover different backgrounds, positions, and organisations. In total, eight interviews were held (four in the US case, and four in the UK case, see Table 1). All the interviews lasted between 1-1.5 hours and were recorded and then transcribed verbatim.

The interviews were supplemented with an analysis of relevant documents. Both cases were extensively documented, both during the collaboration process (through agendas, background information, sub-reports) and after completion (final reports). In this way, we could retrospectively track the process of knowledge collaboration through the documentation.

Table 1. Interviews in the two cases.

| Fictitious name | Position | Organisation | Misc. |
|---|---|---|---|
| *Sam* | Water modeller | Oxford University | ECG participant |
| *Charlie* | Social scientist & ECG organiser | Oxford University | ECG organiser & participant |
| *Justice* | Local citizen | Local citizen, Marlborough, UK | ECG participant |
| *Sidney* | Local citizen & environmental adviser to farmers | Small business owner, Marlborough, UK | ECG participant |
| *Lennon* | Research associate and Uncommon Dialogues (UD) organiser | Stanford University | UD organiser & participant |
| *Frankie* | Engineer and director at a water agency | Water agency in California, US | UD participant |
| *Robin* | Social scientist and collaboration specialist | California State University | UD organiser and facilitator |
| *Skyler* | Manager of Groundwater Management program and Director of the Office of Research | State Water Resource Control Board (regulation agency) | UD participants |

*Data analysis*

In order to analyse and contrast the two cases, we structured our work into three stages. As a first step, we mapped key findings from each case individually. This allowed us to develop an overall understanding of how the knowledge collaboration and the two sets of sessions/workshops were organised and undertaken in each of the cases. At the same time, it allowed us to gain a deeper understanding of the specific characteristics of each. For example, differences in terms of who were invited to join in the knowledge collaboration became distinct (amateur naturalists and other interested locals in the Oxford case, as compared with different experts and key stakeholders in the Stanford case).

In the second stage, we jointly and in more depth explored the two cases with the goal of developing themes that were identifiable and relevant in both of them. We also investigated the literature on transdisciplinary knowledge collaboration, and were able to go back and forth between our empirical material and extant studies on the role of epistemic views among collaborative participants. Through our discussions, and based on insights of the individual empirical cases developed in the first stage, as well as extant literature within the field, we developed three tentative themes regarding the *format* of the knowledge collaboration, the selection of *participators*, and what is considered as a (successful) *result*.

As a third and final stage of the analysis, we engaged in a more detailed structuring of the four themes and specifically focused on how these may be related to what we call 'epistemic signalling'. We developed each of the themes with the help of political theory. In this way, we were able to construct aspects/categories to analyse and compare in relation to each theme, and to further develop the actual theme: (a) the form and theme of the knowledge collaboration are discussed in relation to three of the steps in Arnstein's (1969) ladder (information, placation, and partnership); (b) who are considered suitable 'types' of participants is discussed with the

help of the integrative-aggregative framework (Gutmann and Thompson, 1996); and (c) what is considered as a valuable and successful outcome of the knowledge collaboration is explored as fulfilling either procedural or epistemic virtues.

## Epistemic signalling in the planning of format and theme

In this section we ask: What role do the different participants have in terms of their position and background in deciding the format, themes, issues, and appropriate normative positions? This question is examined by drawing on Arnstein's (1969) classic ladder of citizen participation with particular attention paid to the levels that she calls informing, placation and partnership as described previously.

*The format – strict versus loose*

Environmental Competency Groups (ECGs), the basis for the River Kennet case in the UK, have a rather strict and explicit form. The groups meet six times, once every second month, possibly supplemented with activities between the sessions. ECGs usually comprise 12-15 persons. According to the principles of ECGs, the specific topic(s) to be investigated and learned about together should be decided at the first meeting. The particular problem should be selected within the group. In our case, however, all the organisers were social scientists and had determined the overriding theme beforehand.

The ECG principles dictate during which stages it is appropriate to take into account the whole range of participants' wishes and values, and when they should stick to knowledge and learning. (In this case they dictated drought should be prioritised.) The principles here also dictate what values and views should be left aside once the scientific basics about the water supply system have been discussed. In this sense, there appears to be an implied, epistemically rooted idea that these two components – values/opinions and knowledge acquisition – can, and should, be separated. For example, the participants' views about what should be the overriding theme should not influence the decision.

The format and method used in Water in the West's Uncommon Dialogues were – in contrast to ECG – described in the interviews as informal and flexible. The workshops were informal to the extent that one of the organisers claimed that no method was involved:

> We are not using a specific method at all. No, no […] And we kind of have a formula for sure, in terms of, like, we kind of … you know, have these sessions throughout the day, and we have speakers and the like. But we really try at the same time to have it feel a little bit informal (*Lennon*).

However, having no method is arguably also a method. The difference between formal and informal is often that, as with any improvisation, the procedures and rules are implicit. Although informal usually implies more flexibility, it is critical to search for patterns for how the flexibility is played out. It is rarely random. In the case of the Uncommon Dialogue, there were four workshops in one series. Each workshop included preparations, on-site work and documentation, and was led by a facilitator. There were thus well-developed and strict programmes and structures for each meeting that in themselves functioned as a format and framing of the discussions.

Despite the informality of the Uncommon Dialogues, Water in the West engaged a steering committee and an external committee that decided the central theme of the workshops – themes that, in turn, also guided who to invite (e.g. experts in a specific area). Moreover, the committees

chose the concrete problem to be discussed throughout the Dialogue series, as well as the contents of each meeting. The Uncommon Dialogue builds on making a distinction between participants who are also part of these committees, and participants who are not. Participants who are only invited to attend cannot influence the themes. In effect, this procedure is more excluding than ECG, where – to be sure – it had been decided that drought was to be the overriding theme, but where the specific problems were agreed upon jointly. In this way, the Uncommon Dialogue can be understood as being rather formal, albeit in a different way than was the case in the UK. One of the interviewees describes how the steering committee has extensive power to define themes and frame not only what will be discussed, but also who will be invited to these discussions:

> … because that steering committee really does frame the whole Uncommon Dialogue – not only the topics and how long it'll be and all that, but who should be invited, too. But if you're just invited, you're not on the steering committee. Then, you know, you don't really have a say in the agenda and the structure of the meeting. That's left to the Water in the West and the steering committee people to work on (*Frankie*).

However, the fact that not all the participants in the Dialogues are invited to plan and develop the theme and agenda of them does not necessarily mean that there is not a wide range of voices represented in these committees and at the actual workshops. When asked what category of actors make up the committees who set the agendas, the answer revolved around the Stanford theme in cooperation with state agencies. The reason for the focus on state agency was that the Uncommon Dialogues were motivated and developed with a focus on how to handle challenges in implementing new legislation: The Sustainable Groundwater Management Act (SGMA), passed in 2014. The legislation was described as a first step towards creating a state-wide requirement for sustainable groundwater management. However, in order to successfully implement the legislation, the fragmented nature of the current water management required not only that it be reorganised, for example through introducing a single or multiple coordinated Groundwater Sustainable Agency(s). It would also require better coordination of groundwater data and the methods used to determine water budgets, sustainable yield and changes in groundwater storage. Further, the Stanford team made strategic and informal approaches to certain other stakeholders, who would implement the new legislation or could inform such an implementation, in order to shape the agenda.

*The theme – perceptions of what is a problem*

In the River Kennet case, the central theme – drought – had been decided by the Oxford initiators before the first workshop meeting. In the interviews with the organisers, it was implied that the theme of drought had been decided for two reasons.

The first reason was that a previous ECG with the "opposite" theme – flooding – had recently been conducted in another region. A scientific curiosity regarding how the opposite theme of drought would play out in an ECG seems to have been the partial motivator for choosing this theme. Testing whether ECGs could be used for two radically different environmental challenges reflects a common scientific strategy for studying the power of any methodology:

> The opportunity to try the ECGs methodology on issues other than flooding arose with the MaRIUS (Managing the Risks, Impacts and Uncertainties of Drought and Water Scarcity (Report of the 2015-16 River Kennet Environmental Competency Group, 2017, p. 3).

Even though drought had been decided on beforehand, all the workshop participants were required to agree on specific questions that the group found problematic underneath the umbrella of the overriding theme. This decision-making process allowed for diverging values and opinions.

The second reason why the organisers of the River Kennet ECG had decided on drought also had to do with epistemology, as well as scientific methodology. Problems in the physical environment may often be invisible to the untrained eye. Scientific procedures and instruments are therefore needed to identify even severe problems of water resources and water supply systems. Encouraging the local population to spend time exploring something of which they might not be aware – the risk of drought in a region where they have mainly seen flooding – posed an intriguing challenge to the development of the ECG methodology. The initiators and scientific experts involved in the ECG had to struggle with the motivation of the local residents. The latter had little or no initial interest in drought. After all, the primary collective, historical water experience among the public in the UK has to do with flooding, not drought. As one of the EPG initiators, put it:

> How could anyone among the general public in the UK be interested in drought [ripple of laughter], when most of them usually find themselves standing in water up to their knees here in England? (*Charlie*).

It was important for all the participants to recognise that everyone had to adapt to the decision of 'the formal actors' – as one respondent called them – on drought as the theme to be investigated. Yet the lukewarm, not to say negative, reception of the theme by the locals forced the formal actors to reflect on two things.

The first reflection concerned how to clarify why they found drought so significant here, in a region that from an everyday perspective seems more challenged by flooding than a drought. The scientists were preoccupied with drought partly because they were interested in water resources and water supply systems. However, this interest was too abstract and remote from the experiences of the informal participants. And even though the area around the River Kennet had been subject to a period of drought some years earlier, the problem-framing of drought did not resonate with people's interests. When the formal actors asked the laypeople in the group whether they were not worried that they would be without water someday, the answer was a definite no. The formal actors, therefore, had to dive deep into the theme of drought. They had to search for ways to reframe specific applications of this theme in a way that resonated with the interests and concerns of all the participants.

In order to do so, the formal actors identified issues that were rooted in the question of drought, but that would better resonate with the concerns of the laypeople in the local region. The hope among the formal actors was that it would be possible to find specific, drought-related issues that raised controversies between various knowledge claims in the group, to give the discussions more energy. This had been achieved in previous ECGs:

> In the previous ECG on flooding, knowledge controversies were key. The knowledge that was used to manage risks [flooding], the scientific knowledge was challenged by the local population because the [scientific] knowledge is too poor. We thought that controversies would exist about drought as well because that's often good for getting some dynamics [Swedish: driv] in the discussions. But no,

> there was no controversy about drought. Still, there were some different perspectives: those who see water as a natural resource, or as something in the river, as a management system, etc. (*Charlie*).

Searching, and hoping, for knowledge controversies is far from an obvious or standard approach in knowledge collaborations (Arnstein, 1969). One advantage of controversy is that it can make room for a wider range of problem views as well as solutions (Klintman and Boström 2004). However, this would probably be difficult to handle in the clearly defined format of ECGs. What the interviewee above is referring to is, rather, an energy-generating range of positions and misconceptions, such as about scientific knowledge claims, that are useful for the discussion (cf. Whatmore 2009).

The other reflection of the formal actors referred to what is often a powerful strategy for raising concerns and interests: the risk of *another community* exploiting the community of the local participants by implying that the relationship between 'us' and 'them' is a zero-sum game. The lay participants were worried that the River Kennet and its ecology would be harmed by mismanagement resulting in excessive algae production and the end of much of the birdlife around Marlborough. One risk that gained particular resonance was that Thames Water (the River Kennet is in the domain of this company and is partly used in its supply system) would take too much water from the Marlborough area and send it to Swindon. The latter is a town in another region, causing the water levels to sink dramatically. Intriguingly, even though this topic helped to raise the heat and discussion level in the first ECG, the notion of a zero-sum game and simple interest conflicts between communities was later contradicted by the water modeller:

> The integration of various [water] catchments [between, for instance, Marlborough and Swindon] I think they realised through our discussion. Before, they used to say: "We don't want to save our catchments to give to any other catchments." I'd argue against that. "If you do that, other catchments will suffer more, and in other cases, we will need water from the other catchments." It's about integration of the systems, it's not just us in this local town. They have to give water to others as well. (*Sam*)

In addition to water quality, quantity and farming practices, the ECG participants were interested in the expansion of housing close to the rivers. Learning more about these processes and their relationships was something in which the laypeople soon expressed an interest. It was unanimously decided that neighbourhood planning was the main problem angle of drought, since everyone had a concern about housing expansion. Moreover, the scientists in the ECG, including the water modeller, perceived it as doable.

The principles of ECGs contend that once the specific focus issues have been decided, the participants should leave their values, wishes, opinions or even daily practices related to the problems aside. At that point, they were instructed to focus entirely on sharing, learning and collaborating in producing knowledge about the issues.

In comparison to the case of ECG, in the Uncommon Dialogues not only drought but also the specific problems were discussed less in terms of opinions and subjectively influenced priorities, than as objective problems that had been identified by the government and agreed upon by scientists and expert practitioners: extensive groundwater extraction, manifested in, for instance, 21 of the groundwater basins and sub-basins in California being over-drafted (Purkey et al., 2015). The previously mentioned SGMA legislation, which was approved in

2014 and at the time of the series of workshops, was still in the early stages of the implementation process. This legislation in demanded that local water agencies introduced rules to better manage groundwater. In addition to this precise problem framing, one root cause is also discussed as an indisputable fact: the behaviour of 'Californians' with regard to water. This means that who are considered to be the main actors differs from the UK case, where the blame was placed at the organisational level: on water companies, planners, the construction companies and farming practices. In the US case, 'Californians' refers mainly to the individual Californian households:

> [W]e Californians seem to have gotten a little lazy when it comes to water conservation. We've started watering our lawns more often. We're not putting buckets in our showers as much. (In fact, we're taking longer showers.) And we don't let yellow mellow — meaning, we flush our pee instead of just letting it sit in the toilet bowl […]. In January, Californians used about 71 gallons per person per day. That's almost as much as the 74 gallons we were using in January 2013 - a year before California's drought emergency was declared. In other words, we appear to be almost back to our free-wheeling attitudes about water (Guerin, 2018).

Scarce media coverage during droughts, as well as the Governor's declaration that the latest drought was over, are a couple of the more institutional obstacles to changes in household behaviour that were discussed. The four workshops in the Uncommon Dialogue ranged from such accessible discussions to more technical discussions, such as those that demanded some expertise in water management. This is how one of the facilitators of the workshops put it:

> I would say that in this case, we started with framing for the first workshop that was more general and more accessible to all kinds of participants. And as we went through the workshop series, it got more technical. (*Robin*)

This development – from accessible to technical – over the workshops differed from the ECGs in the UK. There, an early mission was to provide the lay participants and practitioners with the basic technical knowledge needed to approach the case and develop the knowledge shared in a report that would be accessible to the local authorities and other non-technical actors.

*Contrasting discussion of the Oxford and Stanford cases*

Whereas the ECG format was highly formalised, the format and method used in Water in the West in California were not (however formal it was in other, less explicit ways). This would suggest that the Oxford case was less open for the views and opinions of the participants in the planning stage/deciding the format of the sessions than the Stanford case. At the same time, the Stanford case – despite the lack of a highly formalised format or a specific method – did not leave very much room for flexibility. Even though key participants were invited to the planning process in order to give their views on the format, the set-up and the internal structure of the workshops were highly developed based on previous experiences of the organisers themselves (Water in the West at Stanford University in collaboration with the Center for Collaborative Policy at California State University). This means that previously used formats of collaborative workshops functioned as templates, making the Stanford case rather formalised in character too.

In line with the steps of Arnstein's ladder, since the Oxford case was not only *using* a highly formalised format but also *informing* the participants that there was no room for influencing the format, this can partly be conceptualised as information. However, while Arnstein suggests that

this is a symbolic and partly illusory form of participation, we could argue that it was made clear to the participants of the sessions that the method used was fixed and there was no room to negotiate the format. At the same time, since the format to a great extent sets the boundaries for the knowledge collaboration, the fixed format and method can in itself lead to the entire project – the knowledge collaboration – becoming more of symbolic activity, rather than creating space and room for locals, in this case, to raise their voices and have an impact on the problem being discussed.

In the Stanford case, the 'no method' approach and the solicitation of at least some views of participants beforehand lead us to the step that Arnstein calls placation: stakeholders invited to give their perspectives at the planning stage may understand this as being a way to actually impact the process. At the same time, the organisers only have to listen and adapt to external advice to the extent that suits themselves. In this way, the organisers are still very much the power holders.

Drought, its causes and challenges, was an overriding theme both in the River Kennet ECG and in the Uncommon Dialogue of Water in the West. However, one difference in the problem framings can be noted. In the River Kennet case, problem perceptions were discussed more in terms of values, as opinions and preferences, albeit based on the 'objective' condition of drought, or at least the risk of drought. Once these opinions had been spelt out and the specific problem to be studied had been agreed on, the participants were expected to move from opinions to knowledge searching and exchange.

In the interviews with organisers of and participants in the Uncommon Dialogues, it was not simply drought but also the specific problem that was discussed far less in terms of opinions or subjectively influenced priorities. Instead, drought was treated more as a broad, objective reality consisting of underlying, objective mechanisms and conditions for scientists to discover and expert practitioners to manage. The discussions and knowledge exchanges during the workshops were in this respect also of a more technical nature. They focused on how to solve problems with data collection and management, rather than an attempt to understand and grasp the problem *per se* (since that was treated as a 'given').

## Epistemic signalling in selecting suitable 'types' of participants

In this section, we ask: What types of participants were, according to the organisers, perceived as suitable for the knowledge collaborations? And how can those preferences be understood in light of two styles of debate and decision making: aggregative vs integrative styles (Gutmann and Thompson, 1996; Klintman and Kronsell, 2010).

*To exclude and include stakeholders*

In the River Kennet ECG, the water modeller categorised the participants as two sub-groups: scientists (i.e. natural and social scientists from academia) and local residents in various non-academic capacities:

> We had seven scientists and seven local people in the River Kennet ECG. This was the first time I was involved in this kind of activity. That was a good opportunity for me. (*Sam*)

Within ECGs, including the River Kennet group, there is a criterion for participation that differs from many other arrangements for knowledge collaborations. No one who can be considered a

stakeholder is permitted to participate – and therefore, all possible participants that could be defined as 'stakeholders' were automatically excluded from the knowledge collaboration.

The term stakeholder is used differently depending on societal contexts. In the literature, it has often been used carelessly, simply denoting any participant with interest in the subject of knowledge collaboration. More recently, its meaning has become narrower, and it now refers mainly to formal actors and organisations with power and influence. One reason that ECGs exclude stakeholders (even from environmental, governmental agencies) is that initiators of ECGs find what they perceive as alliances between natural scientists and power authorities, often at the national level, problematic. As stated in the introduction, however, the ECGs are closely related to a larger project called MaRIUS (Marius Drought Project, 2019), in which stakeholders are permitted:

> In the MaRIUS project on drought in England, we have formal stakeholders: Thames Water, Seven Trent Water and The Environment Agency. But we have developed our own, small alternative: ECGs, where we work with the local population. (*Charlie*)

The substantial power differences between, for instance, industrial actors and local participants from the general public cannot be overstated. However, in theoretical publications about so-called deliberative meetings, the underlying conviction is that it should be possible for participants to agree beforehand that they will not try to exploit differences in power when they make their knowledge claims and arguments (Fishkin 2018). The ECG format deviates from this hope of deliberation found in the deliberative democracy literature. Firstly, the design of ECGs implies the view that power differences between actors' corrupt knowledge exchange. Lions cannot lie next to lambs. Secondly, ECGs are founded on the notion that is less often discussed in the literature of deliberative democracy. This notion contends that merely being in the position of representing an individual or an organisation – powerless or powerful – makes it inevitable that this stakeholder will create an aggregative debate style:

> This is why we can't work with stakeholders. Because if you represent a group, say a company, you can't go in and change your view just because you've received new input. Then you have betrayed the group. (*Charlie*)

This is related to a view expressed in our interviews, namely that specific categories of stakeholders – particularly formal actors in the business sphere, such as water companies – can only see the general public in one role: as consumers. According to one of our interviewees (*Charlie*), this is a problematically narrowing perspective that makes stakeholders from the business sector ill-equipped for deliberative knowledge exchange in the form of ECG.

The perspective contends that an integrative (deliberative) debate style is in principle impossible for stakeholders. Although some stakeholders have certain interests in common with most or all of the participants in the River Kennet ECG (such as increasing water efficiency and water-saving in households), no stakeholder can be expected to betray other interests of the organisation they represent. This raises the issue of the potential for academics to allow themselves to debate in a deliberative manner, changing their view when they receive new input. Even if this informant also conceives of academics as representatives of a group – their discipline and institution – the informant implies that academia and its actors are not locked into the inevitability of staying loyal to the knowledge claims and beliefs of their group.

Academic actors are welcome to participate but must make an effort to be open to changing their positions:

> The same is true for scholars [also representatives of a group]. You can't go in and represent a specific, academic discipline. You must be prepared to commit treason against your discipline to be allowed to participate. (*Charlie*)

This treatment of academics is more in line with most of the deliberative democracy literature. Awareness, self-reflection and meta-discussions in the group of knowledge collaborators ought to make it possible to achieve a debate-style where everyone is open to changing her view and learning from others (Dryzek et al., 2019).

In contrast, people with experience of the Uncommon Dialogues express no concerns about the participation of stakeholders in our interviews. On the contrary, as long as people bring some relevant perspective and expertise given the specific topic of the Dialogue, and work for an appropriate organisation, such as a state or local authority, environmental NGO or groundwater managing agency, they are welcome (as long as they are invited). The interviews do not include the need to make all voices heard – a democratic rhetoric prevalent in the literature on 'engaged science', 'community-based participatory research' (Delemos, 2006, p. 331) and other types of knowledge collaboration on. In these calls, different values, opinions and circumstances of the participants are stressed. Instead, the Uncommon Dialogues focus on the participants' specific roles and challenges in the joint effort to implement legislation to resolve the problem of drought that everyone agrees on; a problem manifested in an excessive extraction of groundwater. In this sense, the problem is framed as 'complicated and tame' rather than as 'complex and wicked'. The tone suggests that everyone works in his or her own way towards the same goal but with different 'expertise'. Disagreements may arise about how to prioritise and coordinate the activities of the groups represented by the stakeholder, but the Uncommon Dialogues do not reach a fundamental questioning of what the problem is in the first place.

Concerns about representation and specific interests of stakeholders are not absent, however. Symmetry and an 'unbiased' proportion of stakeholders is an issue that the organisers say they work hard to obtain:

> This [the risk of disproportionate representation] happens more with, say, the NGO or interest groups, where they'll want to invite more people. And for us, I think it can be… You know, it sends a message if you have too many people from a specific interest group. And so we'll try really hard to say: "You know what? We only let one representative from a specific agency come into this space." Because we try to make it, you know, as comfortable for everyone as possible and not have it super-biased toward a specific interest or the like. I mean, obviously, our institution is for the environment. So, we have a bias. (*Lennon*)

It is interesting to note that this interviewee does not use the term 'special interests', but 'specific interests'. Special interests would connote an adversarial situation of wicked problems where the interests of stakeholders contradict and clash with each other. Still, specific interests seem to refer to single pieces that are part of the joint puzzle to prevent drought. One of the water managers participating in the Uncommon Dialogue indicates this by stressing his efforts to improve coordination between various types of planning and by representing 'interests' of the Association of California Water Agencies in this process:

> I co-chair a subcommittee there on land use and groundwater management, trying to work to better…, to improve coordination between land use planning and groundwater management planning. So some of the Uncommon Dialogues in the past have also, I think, represented some of the interest of ACWA too, in that regard. (*Frankie*)

In this puzzle to solve the problem of drought, there is still a risk that some items are given far more attention than others, even if everyone is working towards the same broad goal.

*Whose interests are being represented – 'the local people' versus experts*

Who, then, are 'the local people' who should be permitted to participate in an ECG? The local people were not selected with any intent to represent the local population as a whole. Thus, to understand the epistemic basis for the selection, it becomes essential to learn what knowledge and experience the organisers of the ECG were looking for. Contrary to our previous assumptions, the local people selected did not have any common engagement in environmental and ecological issues. The common denominator was instead the welfare of the community in general (*Charlie*). Water challenges were only one set of topics among others where these participants were, or said to be willing to become, active locally.

The two organisers of the ECG on site spread information via the local media in Marlborough inviting people to be interviewed about possible participation in the River Kennet ECG:

> We couldn't force anything. Catharina and Sarah had some kind of interviews with them. Someone was a consultant to farmers. And someone else from an NGO. Not very academic. (*Sam*)

As to what types of knowledge background the organisers of the ECG perceived as valuable, it was clear that they did not ask for particular knowledge about droughts in the local area. One of the local people, a woman in her sixties living beside the River Kennet in Marlborough, put it this way:

> I had a second interview with the ECG group, and told them that I knew about flooding but nothing about drought. That was fine. They wanted me to join. I was interested because there were so many academics. I like learning. Sometimes it's way over my head. (*Justice*)

This woman experienced some anxiety as a result of feeling ignorant and less 'useful' than some of the other actual, as well as potential, participants from the local area. There was no explicit demand for even a basic scientific understanding of drought. Yet she felt that it would have been valuable to share knowledge about the cultural history of the community with the group if only she had such knowledge:

> *Justice*: A layperson could have provided the others with the local history.
>
> *Interviewer*: What would have been appropriate?
>
> *Justice*: More about the local history here. Changes in water use, the mammoth explosion of housing, etc. My knowledge came mainly through a woman who led the local NGO, Action for the River Kennet. I had nothing to offer the group. But I got quite a lot out of it.

In contrast to ECG, the Uncommon Dialogues are geared towards optimising expert competencies related to the specific topic of a dialogue series. Once the topic is decided upon – such as, in this case, the need to collect and coordinate groundwater data in order to meet the requirements of the SGMA legislation – the aim, according to one of the interviewees, is to "try to get a bunch of experts with a whole different variety of backgrounds or roles concerning the implementation of that legislation" (*Lennon*). The experts are a mix of representatives from state agencies, academics who work in that particular field, water lawyers, groundwater managers – who will be responsible for the actual task of implementing the legislation – and various non-governmental organisations. The idea is to get "all of those people in the room together – and they are all experts" (*Lennon*).

The search for a broad range of relevant expertise for an Uncommon Dialogue extends even to the details of each workshop:

> I think with this particular series, what we tried to do – and this wasn't always the case, but we try to have sort of a core group that we track through all four of the data workshops – but then add experts for each of the different topics – as we thought that was necessary […] We really want this mix. (*Lennon*).

The goal of having a mix of participants is favourable for the range of expertise and specific challenges covered in a Dialogue. However, the organisers also perceive this idea of multiplicity to entail risks; the participants may develop an overly adversarial debate climate if they not only represent different specific interests but also are strangers to one another.

As a way to make the discussion climate less aggregative and more integrative, the organisers of the Uncommon Dialogues aim to foster relationships between the various stakeholders. This is done in part by inviting some of the participants more than once. Having stakeholders who represent different interests and organisations getting to know each other helps to reduce the us-versus-them distinction that otherwise leads the stakeholders to exaggerate how different their understandings of the world are:

> Having an existing relationship is really key – that they kind of trust the work that you're doing, that they will see some benefit to it. And for these water managers… Because water is so politicised here, for them to be able to sort of sell the research to their constituents. I mean, they're elected officials. Like, having that relationship in advance is really, really important. (*Lennon*)

In reality, the organisers try to have a core group of participants (representing various specific interests and competencies) that keep coming back to the workshops and also to the different Uncommon Dialogues. In addition to this core group, they invite new people, not least groundwater managers representing various agencies and associations.

*Contrasting discussion of the Oxford and Stanford cases*

In order to create the conditions for an integrative approach in the knowledge collaboration, the ECG sessions excluded stakeholders. There was also an explicit request that the participants (including the social scientists) should leave all their extant views and opinions out of the discussion. All the participants were thus expected to be fully open for any possible idea or perspective that would come up in the discussion.

The participants in the Uncommon Dialogues are selected on criteria very different from those for the ECGs. More specifically, the Uncommon Dialogues are much more geared towards optimising expert competencies related to the specific topic of a dialogue series. The approach towards stakeholders is the opposite from the situation in the ECG sessions in the UK. Still the design in the Uncommon Dialogues in the US is very much in line with an integrative collaboration approach. Here, the experts are expected to gather around – and be adaptive towards – the *facts* about how data can best be collected and analysed. They are expected to set their individual interests as stakeholders aside in order to fully play the role of experts with a 'higher goal', namely to solve the acute problem of decreasing groundwater. This is also further enhanced through an emphasis on creating and establishing long-lasting relationships between the participants.

## Epistemic signalling through what is considered valuable and successful

This section investigates how the success of knowledge collaborations is defined, portrayed, and implied in our two cases. The two classical notions of procedural and epistemic virtues of democracy serve as the bases for understanding views of success of knowledge collaboration.

*Procedural success*

When the issue of success was raised, the ECG interviewees highlighted several procedural factors. One merely involves the understanding of the perspectives and positions of others, without necessarily aspiring to acquire some of the epistemic knowledge of the other participants. The modelling expert saw this as particularly rewarding concerning the insight he gained into the perspectives of social scientists and their concern with governance:

> From a scientific perspective, the interaction with the social scientists helped us understand each other better, and each other's work. We understand more about the complexities of policymaking, governance, etc. (*Sam)*

The procedural success of learning about perspectives different from one's own need not concern only people. The opportunity to see the physical reality of a local site that one usually only studies from a distance or via models is another procedural factor that the scientists in the ECG found rewarding:

> One of our scientists, who is not from the UK, had never seen an English river before. His data sets used to be his entire image of nature. For scientists to get out and see and to recognise that there are local forms of knowledge is very valuable. (*Charlie*)

On the other side of the spectrum of procedural success, respondents mention increased confidence that some lay participants claim to have gained. Such a confidence boost from participating in an ECG is not portrayed, however, as dependent on an increase in knowledge about the topic in question in epistemic terms. Instead, it is confidence based on adopting the epistemic conviction that even *scientific* knowledge claims are uncertain, and that modelling is not an exact or certain science:

> A layperson participating in the River Kennet ECG said that afterwards she dared to question consultants or decision-makers who say that we need to do this or that with the groundwater because we know this about groundwater: "How do you know?" she can ask them now. (*Charlie*)

Some remarks were made by participants from the local area regarding the gap between how the ECG was carried out and how success in both procedural and epistemic terms could have been further strengthened. One procedural remark was that the ECG took place mainly indoors:

> When meetings mean sitting down, it's difficult to get people involved. When it's more about hands-on stuff, people, like people by the river, are much more willing to join. (*Justice*)

This remark hinted at a wider point made by the local people about how more successful ECGs would demand that the group did more than 'only talk'.

Despite the seemingly more expert-orientated and technical focus of the Uncommon Dialogue, their success was discussed by the organisers as something that was in the eyes of the stakeholders who participated in defining and assessing. In this sense, success – according to the organisers – was ultimately about procedural success:

> Well, mostly the official answer would be [that success of the Uncommon Dialogues is] whatever the stakeholders determine – whatever the sponsor plus the stakeholder together frame as a success. I accept that. … There's a difference across facilitators and mediators about how… You know, is it completely up to your participants or are there values – like your personal values or professional values? Social justice values, for example. (*Robin*)

However, given the various interests of the stakeholders, their demand for specific contents within the dialogue procedures may very well include requests for a strong focus on epistemic issues, such as sharing of expertise.

The procedural success, from the organisers' perspective, can be measured in a quantitative way similar to the way retailers can measure success: namely, whether people come back to ask for the services of the organisation. In addition, the organisers pointed to how more offhand comments from the participants can be signs of success:

> You don't evaluate sort of […] But I think there are a few kinds of things that we would point to. We're having groundwater managers and others come to us and sort of say: "Hey, we really appreciated this dialogue. Can we do another one?" And I think that that demonstrates the value. (*Lennon*)

To learn about how the various stakeholders perceive success, in order to better meet these perceptions during the next session or dialogue, organisers hold interviews during the assessment:

> I ask the stakeholder: How would you define success for this? And then I integrate what I hear from all the stakeholder interviews into a straw definition of success that I put into the assessment report, and I check with the stakeholders: "Does this resonate with you?" (*Robin*)

From the perspective of the invited participants, the Dialogues arrangements must have some content that is of procedural value. This includes the opportunity for social interaction through an informal conversation between participants in different roles and positions:

> The Uncommon Dialogues sometimes are one day, but often they're a two-day event. And so they always host a dinner and so there's good opportunities for what we call networking and kind of just casual conversation and getting to know other folks or just being able to kind of talk more broadly. And so that's often very helpful too. (*Frankie*)

According to this invited participant, the exchange of experiences reveals to the participants that they are not alone in having to deal with the epistemic and socially intricate challenges of her or his working tasks, which was greatly appreciated. The participants accordingly gained some energy when they understand that there are no quick-fixes that everyone but them has found:

> It could be "Oh, we're struggling with this issue. But so is everybody else and there's no easy answer that we don't have." It could be something like that. It kind of provides a little perspective that, you know, we're not… You know, just because we're struggling with this, so is everybody else and you have a better reason why we're all struggling. (*Frankie*)

However, the procedural value of the Dialogues is not only seen as intrinsic. There is also a time perspective here, where the procedural dimension of the success of these Dialogues increases the chances of long-term success in epistemic terms: improving knowledge, informing decisions, and stimulating the solving of concrete problems. As stated by one of the interviewees: The Dialogues "can long-term inform their management or their decision-making process, depending on what group it is" (*Lennon*).

*Epistemic success*

The formal instructions for how ECGs should be carried out make clear what ought to be the main goal and thus also the primary definition of success: developing new ways of thinking concerning the epistemic topic in question. The instructions clarify this overriding goal, in contrast to another possible epistemic goal that participants and external parties might favour: concrete problem solving: When one of the participants read a brochure about ECGs out loud to the interviewer (Klintman) she exclaimed that "ECG works best when the primary objective is to develop new ways of thinking about a problem rather than to solve it". One of the local participants in our interviews claimed that she had asked another participant where they were going with all the talking and information. She said that she did not value information or knowledge for its own sake: "I wouldn't volunteer again. It didn't work for me on quite a few levels: it was just talking and learning, not solving problems" (*Justice*).

Even some of those who did see an inherent value in knowledge sharing stated that they would have liked – or still hoped for – some further success in epistemic terms. Epistemic meant, however, slightly different things to different respondents. One of the organisers described the ECG as an experiment. And experiments can fail. She was still hoping that the ECG at the River Kennet will generate at least some scientific knowledge. The previous ECG – about flooding at another UK site – resulted in far better scientific knowledge and even a local solution, which is more than she dared to hope for in the River Kennet ECG.

The computer modeller was also cautious about claiming the epistemic success of the River Kennet ECG. He had hoped that the group would gain something more exciting and impactful in epistemic terms than what they managed to deliver: a neighbourhood plan.

Interestingly, it was one of the local participants who perceived herself as 'the least knowledgeable in the group' who suggested and pushed for the written neighbourhood plan which would become the only – so far – epistemic output from the group, aside from written reports about the actual ECG:

> I said to the group that we could produce a document that could be used by the Marlborough neighbourhood plan group, and they could angle the new houses to having all the water-saving things that we need in order to prevent drought. And the group accepted that. If there's one thing I brought to the group, it was probably that. (*Justice*)

Both this participant and the other interviewees considered the production of this written plan and the impact it might have to be a factor of epistemic success, albeit not a huge one:

> My only real joy is that this knowledge can get into an area neighbourhood plan and maybe alter the course, where everyone is saying: we need to build more houses all the time. (*Justice*)

According to one of the organisers of the ECG, the most robust epistemic outcome – regarding a scientific 'product' – was some methodological development that they made in parallel with the actual ECG activities. In that development, the organisers hope to develop the ECG method further and create a faster and more efficient method that they call community modelling.

There was an assumption among the organisers that the stakeholders participating in the Dialogues know more or less beforehand what knowledge it will be useful for them to acquire or learn during the sessions. In epistemic terms, the participants should be given access to their 'known unknowns':

> What's important is understanding your goals and objectives – what will success… How do these sponsors define success? And sometimes it's not just the sponsors, but the participants too. Because if you design the event in a way that will serve their needs as well, their needs for knowledge and all sorts of things, then they'll come. But they're busy, so you have to make it work for them too. (*Robin*)

A report by Water in the West intended to guide model development (see Moran, 2016). The report incorporated management practices that were claimed to support model development in relation to SGMA legislation. The report in itself also functioned as a way to engage stakeholders in continuous partnerships for research.

According to one of the organisers, part of what the respondents would perceive as signs of the epistemic success of Water in the West and their activities, including the Uncommon Dialogues, could be to meet the increasing request from some grants agencies to produce knowledge in collaboration towards applied, public benefits (*Lennon*). Filling this niche of applied, accessible but scientifically grounded knowledge production is a type of activity where this organiser sees much potential for epistemic success.

In addition to the procedural value mentioned earlier of exchanging experiences of how challenging certain tasks are, with no quick fixes, participants also point to a more concrete, epistemic value of having both formal and informal discussions with the others in the Dialogues:

> I think it's helpful to be in a room with people who are knowledgeable about issues. And you can learn from each other. And perhaps somebody else from a different part of the state or the country has thought of something or has an experience that might help you to address some of the issues you're dealing with on a certain issue. So I find that very helpful. (*Frankie*)

The epistemic dimension of success should not be interpreted as merely the success in having an external knowledge impact outside of the group of participants involved in the Dialogue. One of the organisers mentioned, for example, the 'successful' routine whereby the participants developed a technical knowledge base for everyone in the group to use and learn from between the sessions:

> The participants built up a common knowledge base that equipped them to better discuss the more technical things later. And there was a little bit of change from one workshop to another in terms of who participated, but 90 per cent were the same, so you got the benefit of building on the last conversation. (*Robin*)

Although there is an interest in strengthening the epistemic dimension of the Uncommon Dialogues, participants do not perceive this dimension as synonymous with the group jointly producing hard data with a direct bearing on concrete policies and rules. Instead, the epistemic dimension here seems to lie close to the procedural, sometimes with an overlap. One of the participants explains, from his perspective, how the question of the success of these Dialogues should be understood:

> 'There's nothing rigid coming out of them. There's nothing that's regulatory or a requirement coming out of them. So they're very much …, you know, kind of educational […] outcomes, I guess. And informative. And they're not hard-lined: "Here's the result: X, Y and Z," and you know, developing rules and regulations out of it. That's not what comes out of this. So I think it's more of kind of a socialisation of the issues. And hopefully coming out of it with a more in-depth understanding and perspective in addressing the particular issue.' (*Frankie*)

*Contrasting discussion of the Oxford and Stanford Cases*

In both cases, it appears to be easier to define success from procedural parameters than epistemic. In the River Kennet ECG success was mainly defined in relation to the number of locals who were engaged in the collaboration as well as how many 'meetings' between locals and scientists that the organisers were able to create. Similarly, but in a very different setting and with experts instead of laypeople, the success of Uncommon Dialogues was measured in relation to the participants. The mere fact that experts choose to participate – and that they often also returned and participated again in other collaborative activities – was taken as an indicator of success (that in turn may generate epistemic value). In this way, one explicit goal was – similar to ECG – to create meeting points, and in this case between experts. When experts meet and learn to know each other, they will also more easily be able to work together and solve problems in the future.

That the procedural and epistemic values are often intertwined is also evident in how tricky it was for the respondents to identify clear-cut epistemic values with the knowledge collaborations. Each participant may value the collaboration and the outcome of the process differently. This is particularly evident in the Uncommon Dialogues. A more concrete way to

understand the epistemic values of the collaboration is through outputs of the workshops in terms of reports or other types of documents. In the case of ECG, only one report has been published – and that was because one participant was asking for it. The production of reports – and other types of documents – seems not to be valued among the participants. One respondent stated for example, that "as a natural scientist, you can't get a publication out of this. The time I spent didn't pay off in terms of publications or career, but it was a great experience to be involved in. It was in my own interest" (*Sam*). In the US – and the Uncommon Dialogues – the production of text was part of the formal setting and the way that the workshops were organised and undertaken. The documents were many: shorter (public) summaries from each workshop, longer reports with in-depth analyses of specific questions and models about groundwater management as well as other types of texts, such as all the PowerPoint-presentations of the participators. All these documents were made public on the website of Water in the West.

## Conclusions and discussion

This report has placed its focus on a specific dimension of knowledge collaborations across academia and 'external actors', such as expert groups, corporation, public authorities, NGOs and informal groups of the lay public. The focus has been on the role of what we here call 'epistemic signalling'. This term refers to implicit and explicit communication or rule-making that indicates what type(s) of knowledge is considered relevant, valuable or useful in collaborative arrangements. We have argued that how knowledge is perceived by the participants has an impact on how the collaborative processes are arranged. An underlying idea of the report was that the way this is signalled, and what types of epistemic signalling are most prominent, is partly related to the influence and power within the collaborative arrangements.

Three aspects of epistemic signalling were analysed. The *first* concerned such signalling in the planning of theme and form. The ECG followed a rather strict form, where the organisers had determined one umbrella theme – drought – that all its six sessions should cover. The underlying epistemology was a dualist one where drought risks were considered an objective fact in the region (primarily visible to science and not necessarily to the public), whereas what manifestations of drought risks was most concerning belonged to value judgements. The latter was subject to discussions and open decision making in the group, entailing a joint decision of what theme should be examined. That theme turned out to be neighbourhood planning and the relative catchment levels of water between different, local areas dependent on the River Kennet. In theoretical terms, the preparation of theme and form ranged from what the low level of participation that Arnstein (1969) calls 'informing' (about the overriding theme) to a high level of participation, that she calls 'partnerships' (about neighbourhood planning).

In the Uncommon Dialogues in the US, the respondents described the form of knowledge collaboration as flexible and informal. Still, each meeting had a pre-defined and strict structure. The 'informality' that the respondents referred to mainly concerned the 'method' or processes of interaction between the participants. Despite this, a steering committee and an external committee were deciding on the central theme, whom to invite and what should be the overriding question as well as the contents of each meeting. In Arnstein's (1969) terms, participants who were part of these committees participated in the 'partnership'. By contrast, invited participants acted on the lower levels of 'informing' and 'placation,' the latter involving giving feedback after each session to the organisers, feedback that could be influential or not.

The *second* epistemic signalling has to do with what 'types' of participants are suitable to invite to the collaboration. The ECG in the UK and the Uncommon Dialogues in the US turned out to have opposite principles. In the ECG, as in all ECGs, stakeholders were excluded. In the

Uncommon Dialogues, stakeholders were included and welcome. What was signalled about epistemology with these different principles? In our interviews and document analyses of the ECG, it was evident that excluding stakeholders was based on the conviction that it is impossible or likely for actors who represent an organisation, particularly a company, but also an NGO, to conform to the open, deliberative debate climate required in an ECG. The agreement that the topics of neighbourhood planning and catchment areas were 'wicked' (complex, uncertain, value-impregnated, and involving conflicting goals) was consistent with the call for a deliberative, integrative conversation climate. Stakeholders could not be part of this, the organisers argued, since conforming would mean that the stakeholders failed to do their job of bargaining for the interests of their organisation.

The epistemological reason for why stakeholders was included and welcome in the Uncommon Dialogues appears to be that the problem(s) it addressed were considered shared beforehand among all participants. Moreover, the problem(s) are deemed complicated but tame: to implement legislation to resolve the issue of drought. In our interviews about the Uncommon Dialogue, stakeholders were not described as having their particular agendas and interests that were in complete conflict with the goals of the others. Thus, the debate climate could be an integrative, deliberative one because of the agreed 'nature' of the problem and of the knowledge searched for: as complicated but not too distorted by differences in values and interests.

The *third* and final type of epistemic signalling refers to what type(s) of knowledge is considered relevant, valuable or useful in collaborative arrangements. Here, we distinguished between procedural success (the process of knowledge collaboration, inclusion, interaction, etc.) and epistemic success (referring to the knowledge as such that is generated). The two types of success turned out to be quite tricky – and sometimes impossible – to separate. Yet, some distinctive features between these types – as well as between our cases – could be found. In the ECG, procedural success factors were particularly highlighted among the scientists and experts, in some cases as a counter-weight to certain disappointment that 'so little substantial stuff' had been acquired. The procedural factor of strengthened mutual understanding between the participants was repeated as highly valuable. Moreover, increased confidence among lay participants enabled them to criticise dead-certain claims stated in the name of science outside of the ECG. As to epistemic success, there seemed to be some misunderstandings among the lay participants, where they had hoped that the group would produce more knowledge than turned out to be the case. On the other hand, the concrete, written neighbourhood plan created by the group, was a 'product' that compensated for much of this mild disappointment concerning epistemic success.

In the Uncommon Dialogue, with its technical and export-oriented profile, it was surprising to learn that the organisers perceived procedural success as more critical than epistemic success. In quantitative terms, they measured 'success' through the number of participants and groups that wished to come back for additional Dialogues. A more qualitative measure that they used was the feedback they asked participants for at the end of each session or dialogue. There was sometimes a high level of technical jargon in the Dialogues. Participants often mention (both according to the organisers and in our interviews) how crucial it is to learn that the other participants struggle with the same problems – technical and policy-oriented – as oneself. This created a sense of social bonding and mutual understanding – which ought to be categorised more as procedural than substantive success.

In sum, this report has shed some light on how epistemic signalling is related to several factors of knowledge collaboration. We wish to end with three reflections, or implications for future

collaborative projects – both those related to Agenda 2030 and others – to learn from both in research and in practice.

Firstly, whereas epistemic signalling has been reasonably straightforward to identify in our two cases, our results – in terms of content – should not be interpreted as generalizable to cases beyond these. Still, *the themes* of the report – format and problem, participation, and how to define success – could very well be used in other cases of collaborative knowledge production, possibly supplemented with additional themes. The specific findings, the content, of how epistemic signalling played out in the two cases, should be treated as illustrative examples.

Secondly, the report has not aspired to establish causality. We do not have the right type of data for asserting whether epistemic signalling is an effect, for instance of power relations or of 'the nature' of the overriding problem examined or if epistemic signalling – based on, for example, views on what is the value of knowledge collaboration, causes power relations that in turn are manifested in the themes discussed. Rather, our primary purpose has been to point at links and logics connecting epistemic signalling to these themes. However, for future research, this could be a subject for further study. In this context, the concept of 'epistemic injustice' (Fricker, 2007) could be relevant to include when developing an understanding of the framings of collaborative projects between research and practice.

This leads us to our last and third point, namely why it matters that epistemic signalling takes place in processes of knowledge collaboration, apparently during most if not all stages. We are convinced that the epistemology of organisations and participants in such collaborations ought to be a distinct subject of open discussion from the earliest planning stage and onwards. It is easy to assume that epistemology (and epistemic signalling) are esoteric parts of knowledge production that are irrelevant in the often practically-oriented knowledge collaboration schemes between academia and 'the rest of society'. On the contrary, however, we have seen how epistemic signalling – typically implicit – steers how much of the collaborations should take place, who should have a say, and when, and so forth. Often, a hierarchy might be necessary – not least to organise collaboration in knowledge production. Openness about this is vital. By lifting epistemological reflections already in the initial conversations of knowledge collaboration, all participants will be able to recognise and comment on possible inconsistencies between participatory mantra (implying the removal of hierarchy) and the actual procedures of the sessions. In addition, open epistemological reflections may help highlight situations where hierarchies (e.g., the traditional, binary division between lay people and experts) turn out to be unreflected remains of routines inconsistent with new goals of more profound exchange of practical and scientific knowledge. In such cases, the epistemologies need to be formed in ways that better fit the new goals. Future research should therefore dig more deeply into understandings of how epistemic views and signalling matter. For instance, such studies would need to more in detail examine how conceptualisations of 'knowledge' itself play out – not least in terms of how practical knowledge (*phronesis*) is valued in relation to scientific and technical knowledge (e.g. Östling et al., 2020).

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