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How Can Practitioners Analyze and Engage Science-Intensive Public Disputes?

ABSTRACT:
This paper brings together three theoretical approaches to the analysis of science-intensive policy disputes, namely policy studies, the sociology of scientific knowledge and an emerging field I call "convergence conceptualizations". Each of these approaches generates relevant questions about the ways in which actors attempt to engage and influence the outcome of science-intensive public disputes. By bringing together these diverse approaches and listing the most relevant questions and their theoretical underpinnings, this paper seeks to provide a practical list of considerations for practitioners that find themselves involved in a science-intensive policy dispute.

1. Introduction

The relationships between scientific information, policy formulation and implementation and stakeholder participation are complex, context-specific and dynamic. This makes the use of science in policy-making and more generally, in political decision-making, a contested site for research and action. Much recent work has focused on a perceived disconnect between the production of scientific information and the ability of policymakers to use that information to engender change[i]. The very notion that science and policy are two distinct domains that "interface" with each other is a metaphor that is not uncontested[ii]. Other metaphors and models, such as co-production[iii] and co-evolution[iv] point to different processes through which information and decisions are generated. These concepts allow for a variety of interpretative schemes to understand current practices, but they do not immediately provide practitioners with a set of tools to engage with potential, emerging and escalated public disputes in which the use of information plays an important role. A broad range of practices has emerged in the *institutional void* [v] in which science-intensive public disputes often occur. Some of these practices can be readily described: scientists are regularly called upon to sit on committees to inform

legislators about the scientific facts on a particular policy topic, public officials regularly invite scientists onto technical committees to provide information throughout the planning and implementation of policy. Public and elected officials will often claim that regulations are based on sound science by pointing to the scholarly paper, or esteemed academic that provided information in support of a piece of policy. These uses of science and scientists as a powerful tool in politics makes the demarcation problem between science and non-science politically especially relevant. Science can be considered an *essentially contested concept*[vi], since *science* is clearly *appraisive* in this context, and furthermore it is internally complex, variously describable, open in character and derived from an exemplar understanding of science. This variety of practices within which science is used to inform policy does not seem to have given rise to an institutional framework that provides participants in science-intensive disputes with a broadly shared set of constraints on their behavior. How to design such institutions, or even recognize their emergence out of social interaction is a question that continues to make it difficult for people to confidently engage in science-intensive policy disputes, despite much recent scholarship on the science-policy nexus, or the co-production of social and scientific stability, or the co-evolution of physical and political system.

The notion of the science-policy interface points to the study of the boundaries between science and policy, to allow for a social demarcation of where and how science occurs and where it doesn't[vii]. This perspective does allow for questions about the institutional location of science in decision-making. The analysis of these boundaries creates a more detailed understanding of the way in which scientists have contested with other professions for jurisdictional control over certain tasks and therefore how they obtained this cognitive authority. But how can participants in

science-intensive disputes use their understanding of these boundaries to inform their behavior and strategy in engaging others who are involved in the dispute? Cooperation between scientists and non-scientists frequently occurs as well and gives insight into ways in which "shared cognitive authority" might happen[viii], in objects that span these social boundaries, and allow for flexibility and reflection on the role of science within those boundary-objects. But how can practitioners recognize such a boundary object, or the potential of a given artifact to function in this way?

In this paper, I suggest that there are three broad approaches to analyze the science-policy interface, and each of these approaches is associated with a body of literature and particular insights into the meaningful aspects of this complex dynamic. The first approach is focused on the policy process, and describes how knowledge is, or should be used in policy-making. This perspective is informed, among others, by the work of John Kingdon[ix], in which public decision-making is seen as involving multiple streams of activity including *the definition or framing of problems, the search for and assessment of possible solutions, the engagement of various participants and the creation of a range of choice opportunities*. This perspective develops an understanding of how policy-making is influenced by the availability of scientific information, but does not explicitly inquire into the origins of that information. The second approach to the science-policy interface focuses on the production of scientific information, and is informed by the work of Bruno Latour[x] and David Bloor[xi]. These scholars describe and analyze how science is made, and how this information structures one's understanding of societal problems, without necessarily focusing on the interface between science and policy. The third perspective on the science-policy interface challenges the notion of the relevance of the distinction between these two spheres, and instead points to the ways in which

science and policy support each-other and change simultaneously. The science-policy interface metaphor is replaced by metaphors that focus on the mutual nature of this relationship, like co-production and co-evolution. I will describe this third perspective as convergence conceptualizations, and this perspective is associated with the recent work of Sheila Jasanoff and Lasse Gerrits.

This paper will consist of brief discussions of each of these perspectives, focusing on the practical questions that each of these perspectives generates about different aspects of the science-policy interface. Each of these perspectives can be understood to have produced a set of internally coherent critiques of the science-policy interface that practitioners can benefit from. This paper is an attempt to distill these descriptions and prescriptions into a set of straightforward questions that people who are involved in a science-intensive public dispute can ask, to better understand the constraints on their behavior and that of others, and to allow them to think and act strategically and based on a sophisticated understanding of the complexities of the dispute.

2. The Policy Process

A classic formulation of the way in which a public determines a course of action through interest-articulation and decision-making by representatives can be found in the work of John Dewey[xii], but alternative descriptions of the policy-process have emerged since. Policy-making as the result of the work of advocacy coalitions[xiii], or as the result of the confluence of different streams[xiv] are more recent examples of this perspective on how information and science can be used to influence policy. Viewing the policy-making process as an ongoing negotiation process is another way of analyzing the interactions between scientists and policymakers in pubic disputes.

Drawing on the literature in public dispute resolution, many science-intensive disputes can be regarded as a *distributional dispute*, a disagreement with a *" (...) focus on the allocation of funds, the setting of standards, or the siting of facilities (including how we use our land and water)."* (Susskind and Cruikshank, 1987: 17). To view a conflict in which scientific information plays a relevant role as a distributional dispute suggests that interested stakeholders have tried to justify their claims and undercut the claims of others using different kinds of arguments and by amassing different kinds of information. This way of understanding the interactions between scientists, policy-makers and the public differs from a purely legal or technical analysis and generates a first question that practitioners can ask when involved in a science-intensive dispute, namely:

1. *What is at stake for the people involved in the dispute?*

This fundamental question will be answered differently by people involved in a dispute, and therefore immediately requires the answering of a second, related question:

2. *Who are directly and indirectly involved in attempts to resolve the dispute?*

Participation in decision-making is an important predictor of the outcome, and a variety of decision-making processes exist that include citizens and their representatives to participate in different ways. The notion that a public doesn't naturally emerge, but is constituted as the result of shared interests or a certain level of social capital can be found in the work of John Dewey[xv], but since then other formulations of the relationships between groups of individuals and dilemmas in the public sphere have emerged. The question of who is involved can only be answered effectively is a structuring principle is chosen to categorize the different groups and organizations in a way that clarifies that relationship to the dilemma, and to each

other. A common way of viewing these groups is that of stakeholders, where people with a physical or emotional stake in the outcome of the dispute are considered legitimate participants in the decision-making process. This perspective requires a somewhat stable and agreed upon notion of what is at stake, since otherwise the groups of relevant stakeholders constantly shift. An alternative to this perspective is that of *enunciatory* communities[xvi], which is based in the notion that groups of people who advocate on their behalf should be viewed as the central actors in a dispute. This reduces the focus on organized groups, and allows for a more dynamic conception of the relevant actors in a dispute, since the claims and demands of this advocacy can shift over time, but this does not preclude these groups from participating. In a public dispute where levels of organization among the people involved are low, and large groups go essentially unrepresented, the use of the concept of enunciatory communities to describe and analyze who is involved in the dispute might be more appealing. A second alternative to the notion of stakeholders is that of epistemological communities, that do not share a stake, or an advocacy claim, but a way of knowing[xvii]. This concept can be relevant to discover alliances and collaborations in a dispute that are not based on a material stake in the outcome, but on what can be considered a relevant and salient way of understanding and describing the issues at stake. These different conceptualizations of the people involved in the dispute are not mutually exclusive. Nor is there one single, best way to describe these groups. In the context of this paper it is important to stipulate that somebody involved in the dispute needs to be aware of the different ways in which he or she can describe the relationships between the communities and the issues at hand, and use these different conceptual schemes to generate a better understanding of the motives and strategies of different groups.

It is important to know not just who is, or should be involved, but also what the structure and process of their involvement is. This points to the third question, namely[xviii]:

3. *What are the modes of communication and decision-making?*

This question points to the central importance of the choice of a forum or process in which the people and organizations involved in the dispute are brought together. Different kinds of forums and processes impose different rule of communication and decision-making, all of which has a real impact on the outcome. In determining the mode of communication, scientists are often considered an important group of stakeholders, since they can be broadly described as experts who are asked to provide complex advice at key moments, which can often not be communicated clearly to other groups involved in the dispute given the technical complexity of that information. Therefore the role played by scientists is more complex than the role played by most other stakeholders. Scientists and organized scientific interests often claim to be disinterested or skeptical of the claims of others[xix], and *"Based on the assumption that the scientific method does indeed ensure the political neutrality of knowledge thereby produced, stakeholders in environmental conflict have crafted four important roles for science. These are the roles of science as a discoverer, mechanism of accountability, shield, and a tool of persuasion."* (Ozawa, 1996: 222). In the context of public dispute resolution, the concept of scientific neutrality (or the neutrality of knowledge) is regularly challenged. This leads to the next question,

4. *What kind of information is considered relevant to resolve the dispute, and how does this information frame the issues at stake?*

One important way in which scientists involved in a distributional dispute can be particularly influential, especially when using complex technical information based

on academic research, is as providers of an interpretative scheme[xx], or frame. This role, as framers of environmental disputes, is one that scientists are often presumed to play. In many science-intensive disputes, experts influence the problem definition and the formulation of what are presumed to be appropriate solutions. An important resource to establish credibility and authority is language. As Maarten Hajer writes: *"Determining the way a phenomenon is linguistically represented has repercussions for politically essential questions such as 'Who is responsible?', 'What can be done?', 'What should be done?'."* (Hajer and Wagenaar (eds.), 2003: 62). David Laws and Martin Rein write of framing: *" (...) as a particular way of representing knowledge, and as the reliance on (and development of) interpretative schemas that bound and order a chaotic situation, facilitate interpretation and provide a guide for doing and acting."* (Laws and Rein in Hajer and Wagenaar (eds.), 2003: 173). All actors in an environmental disputes engage in framing, but tracing the ways in which scientists and scientific information frames important elements of a dispute allows for new ways of understanding the role of scientists. This leads to the fifth question that emerges from the policy analysis perspective on science-intensive disputes, which is:

5. *What are the power dynamics among the people and organizations that are directly and indirectly involved in the dispute?*

This question can be answered in a variety of ways, since power is a complex and multi-faceted concept[xxi]. The key point is that power-dynamics play an important role in resolving public disputes, and that anyone involved in such a dispute needs to have a developed understanding of the distribution of power and how it can or might shift during the process of decision-making.

These five questions do not form a definitive overview or summary of the work in public policy analysis as an academic endeavor, but they do represent key concerns within that field, that are directly relevant to practitioners. In the next section, I will focus on the scholarly field of Science and Technology Studies, and will distill a set of additional questions that are directly relevant to practitioners in science-intensive public disputes.

2. The Scientific Process

A classic view of the scientific process includes an independent, truth-seeking scientist who conducts his or her work in virtual isolation from societal and political influences. This traditional view of the scientific process was challenged as early as 1930, when Antonio Gramsci described the *organic intellectual* as a producer of knowledge firmly tied to the class from which he or she emerged, essentially producing information tat would help that class to further its interests[xxii]. This concept immediately points to the first question about scientific information that a practitioner is likely to ask, which is:

6. *What are the conditions under which the information that is used in a public dispute was produced?*

This question about the origin of information points towards the decision-making process that preceded the production of the information, the origin of the resources that were required to produce it, and the social interactions that facilitated the production of the information. The origin of scientific information needs to be understood in more than financial terms, it also needs to be understood in terms of the personal and disciplinary backgrounds of the producers of the information. Different scientific disciplines have different conventions about what to describe as relevant in

a given context, and this can have a direct impact on what is considered relevant in the decision-making process. This is especially important to think about given Michel Foucault's description of the ways in which the disciplines view the world, which in turn creates power relationships between those who are viewing, and that which is being observed[xxiii]. The act of viewing is an act of power. So in choosing a way of viewing, or a discipline, one is choosing a particular way of structuring a power relationship. The malleability of sight might allow for power relationships that are different than those that are presumed based on a simple understanding of the relative power balances of the different communities that are involved in the public dispute. For a practitioner in a science-intensive dispute, it is therefore important to understand not only the social and financial origins of the information that is available, but also the disciplinary origins, and how these might shape the dispute at hand.

A variety of more recent scholars focus on studying the production of scientific knowledge, and like David Bloor through the Strong Programme in the Sociology of Knowledge and Michel Callon using Actor-Network Theory, to understand the construction of scientific facts from a social perspective. This work allows for a different kind of analysis of the interaction between scientists and non-scientists, and yield some insight into the ways in which this relation can be understood and therefore institutionalized in ways that can help practitioners better understand the complex dynamics in a given dispute. David Bloor[xxiv] argues for causality, impartiality, symmetry and reflexivity in analyzing the production of scientific in the *strong programme*. This focus on the causes of beliefs or knowledge and the importance of reflection give some important clues about how practitioners can engage the production of scientific information without disregarding it. By understanding scientific contributions to policy-making in Bloor's terms, a far more

sophisticated understanding of how science is performed will result. This understanding revolves around the next question, which is:

7. *How did this information become credible, stable and reliable?*

This question presumes that the available information is credible, stable and reliable, since if this is not the case, a practitioner is forced to look for new sources of information that does meet these requirements. In that case, it remains relevant to question what makes information in a given public dispute credible, stable and reliable. The origin of the information is often an important source of credibility, but there are clearly other ways in which credibility is achieved, and not all of those ways are automatically relevant in a science-intensive dispute. Staging and performance are ways in which scientists and advocates can present information in a way that lends credibility independent of the content of the information. Stephen Hilgartner's use of the metaphor of performance[xxv] to understand science advice points towards the relevance of the way in which information is presented. This allows for a description of the role of an organization like the National Academy for the Sciences that does not assume one report or advice to be intrinsically better than another based on some relationship to reality. This aspect of the analysis seems closely linked to Bloor's work in the strong programme, and Erving Goffman's original formulation of social interaction as performance[xxvi] predates that work. When trying to understand the different ways in which science influences policy, this "performance" metaphor actually allows for an unpacking of scientific advice that is not limited to trying to ascertain which recommendation is "correct", or how power-relations have resulted in a particular outcome. The performative interaction between experts and other people involved in the dispute shapes the participants' understanding of their roles, and this reflection is important for practitioners involved in a dispute.

Another source of credibility can be language, or more broadly discourse. The role of discourse in the ability of scientists to win credibility is central to many scholars' understanding of how credibility and stability are achieved. Steven Shapin argues against an overarching theory of how credibility is achieved, since, and I paraphrase[xxvii]: *the resources and tactics are likely to be very diverse*. He does offer some methodological principles for those wanting to study credibility, and these seem strongly influenced by Bloor's work. The notion that scientific claims are similar to claims we make in ordinary life in the sense that credibility needs to be achieved, and that these claims come with a set of practices to establish that credibility is strongly reminiscent of the strong program. The role of discourse in Shapin's account seems to be that it is one of many resources scientists can draw upon to win credibility. This contradicts Maarten Hajer's work on discourse in the policy process, which seems to attempt to come up with an overarching theory of the role of credibility by arguing that it is a result of story-lines and discourse coalitions, which in turn are created in argumentative interaction and speech situations. Discursive reproduction and transformation should be understood as a social process that allows participants to re-evaluate their interests and subject-positions vis-à-vis institutions and structures. The institutions in turn can be transformed as needed based on a new understanding of their role. In this fluid discursive process, credibility is (temporarily) achieved in a policy-arena when story-lines are created that allow actors to understand themselves as parts of a discourse coalition, realizing that the notion of a single "arena" is closely linked to the acceptance of a particular discourse. This notion of interests as both constituted through discourse and expressed using that discourse seems to contradict Cohn's finding about scientific discourse: *"I suggest that techno-strategic discourse functions more as a gloss, as an ideological patina that hides the actual reasons*

decisions are made", (Cohn, 1987: 183). This discussion of the role of language in establishing credibility might not seem directly relevant to practitioners, but the central notion adds a layer of complexity to the questions about information and mode of communication that emerged form the work in public policy analysis. Not only are representations and communication important, scientists have access to, and use representations and language to ensure credibility, and this can lead to the subtle disenfranchisement of certain groups or people. This is why it is important for practitioners to question the sources of credibility, stability and reliability. The idea that the performance and discourse of scientists is relevant for the way in which information is evaluated points to the next question, which is:

8. *What is the structure of accountability for the information that is used in the dispute?*

This points to the notion of the accountability of those who create the knowledge that is used in the knowledge state to its citizens. Daniel Sarewitz notes[xxviii] that the strong public support for science and its funding y governments is relevant in this context because it is contingent upon the relevance of science, and therefore science, as an institution, can and should be held accountable to the public. This accountability differs markedly from the "honor code" scientists are supposed to adhere to regarding the conduct of science as a peer-reviewed, transparent activity. Sarewitz further argues that the research community will have to accept this different standard of accountability it will be held to in public disputes, and this might require a fundamental change in the way in which the science community is organized and administered. So engaging in science-intensive dispute shouldn't require for all citizens to become scientists, but it does require its scientists to behave like accountable citizens. A more radical view is held by Shiv Visvanathan, who views

this relationship between scientists and citizens as one of knowledge producer and consumers[xxix]. The notion of giving the citizens voice through participation does not afford adequate status for the local citizens, since it still implies an uneven division of power. Cognitive representation needs to be ensured to allow for a truly accessible system of knowledge generation and dissemination. For practitioners involved in science-intensive disputes, a whole new system of knowledge production and dissemination might not be very feasible, but the underlying question of accountability of scientists as both experts and citizens is a relevant one. What are the accountability structures that are in place to ensure that experts provide salient information needs to be understood by those involved in a science-intensive public dispute to ensure adequate accountability for all of those involved. The accountability structure in which information is used is rarely directly and uniquely related to the production of this information, and this brings me to the third and final framework for understanding science-intensive policy disputes, namely those perspectives that focus on the emergence of mutually supportive elements in science and policy, and thereby undermine the notion that these are two separate spheres that can be analyzed and understood in isolation.

4. Convergence Conceptualizations

A significant third way to approach the complex interplay between science and policy is by viewing these two spheres as deeply intertwined, to the extent where separate analyses are less useful than a more holistic approach. This can be achieved in part by the introduction of *co-production* as the framework for understanding this relationship. Sheila Jasanoff describes[xxx] co-production as a process through which distinct networks are organized that allows humans to understand nature and culture.

Representation is central to the ability to distinguish between nature and culture and power lies in the control over the main tools that can be used to facilitate the spreading of these representations. The process Jasanoff describes as co-production asserts that in constituting the natural and the cultural as two distinct spheres, scientists can easily be seen as representing those networks, and therefore they are central to society's ability to understand and engage them. This generates a new question that is relevant for practitioners, namely:

9. *Who and what is represented in the public dispute, and which elements go unrepresented?*

Representation is a key concept in a democratic society, yet it is also central to scientific practice. But the way in which people and their environment are represented in a dispute often emerges out of a similar logic. Yaron Ezrahi describes[xxxi] the ways in which the interactions between knowledge-makers and knowledge users as shaping norms and expectations. Depersonalization of the exercise of power by using science as a way to rationalize actions allows knowledge makers and users to control citizens in a seemingly transparent way. This is why the representation question applies to both the people involved in the dispute, and the non-human elements that are being represented, often through scientific models and interpretative schemata. Co-production seems to be a valuable idiom to describe the relationship between science and politics and the power distribution that is inherent in that relationship, but there are changes that seem problematic to the continuation of this process of co-production. Nowotny et al. note[xxxii] that it is possible to understand the way in which modernity is changing in two contexts. The first is that it is increasingly difficult to differentiate between science and society. The categorization that underlies many modern assumptions about the way in which the world should work is therefore no

longer relevant. The second context exists in the notion that several broad forces, to which both science and society are subject, have changed science and society in very similar ways, which allows one to understand the two spheres as "co-evolving". The most important of these broad forces is the self-organizing capacity within both society and science, described as the ability to define its own boundaries and constitute everything outside of those boundaries as context. This self-organizing capacity is increasing within both spheres, making it more difficult to regard everything outside of that sphere as complex, as opposed to the systematic nature within society or science. This work generates a new question about science-intensive disputes for practitioners, namely:

10. *What is the self-organizing capacity of the individuals, communities and organizations involved in the dispute?*

In Benedict Anderson's view[xxxiii], the ability of elites to organize and to a large extent control large groups of people was created by the latter's willingness to imagine themselves as being part of (national) communities. This ability and willingness to imagine was (and is) greatly facilitated by a set of practices, which Anderson calls the *policy levers of official nationalism*. Mass communication can be used as one of these tools to create this imagination. The changes in communication technology can therefore be understood as problematic to the continued ability to imagine ourselves as belonging to a particular community, and these technologies might also inhibit the spreading of representations of the natural and the cultural that Sheila Jasanoff describes as central to the hybrid forms of science and politics that seem increasingly common. This question therefore relates to the use of communication technologies as producing social imaginaries, and whether or not these can, or have been, applied in a given dispute. If this self-organizing capacity is understood as the ability of

institutions to span the boundaries between science and politics, then where, in this fragmented landscape, should we look for the creation of new identities, institutions, discourses and representations, assuming these are the pathways through which power is produced? These final questions will be further considered in the conclusion, in which I will also outline a preliminary vision of how the set of questions can be used to generate new insights into the science-policy interface.

5. Conclusion.

The unstable, complex and contextual nature of the science-policy interface and its emergence in the *institutional void*, renders it a difficult phenomenon to describe and analyze. Different approaches have been developed to categorize[xxxiv] and stabilize this dynamic terrain, but very few of these conceptualizations have achieved a translation for those directly involved in science-intensive policy disputes. This paper forms an attempt to translate some of that scholarship into a compact and coherent set of questions that, when answered, provide better insight into the nature, content and dynamics of a given dispute, and allow a practitioner to engage in reflective action. This set of questions, and the brief outlines I have provided of the scope of potential answers, can, and need to, be improved by actually applying them to real-world science-intensive disputes.

The first step in engaging a specific conflict can be achieved by seeking answers to the first five questions. People that are directly involved are likely to have very different views of what is at stake, what desirable environmental conditions are, and how they can be achieved. A practitioner can begin to answer these questions by interviewing members of all of the relevant groups and organizations in an attempt to better understand how they describe and understand the conflict. Especially

interviewing a broad variety of groups and people outside of the formal organizations, I expect that these contexts in which the dispute occurs, but that are largely omitted from the formal descriptions of the dispute, will emerge. This first step is largely analogous to a "conflict assessment" as outlined in Chapter 2 of the Consensus Building Handbook[xxxv]. The difference however, is that questions 4 and 5 invite a critical evaluation of the underlying framing and power dynamics in a dispute, which is intended to give somebody involved a better idea of how and if to engage in the dispute.

The second step in the process of engaging a science-intensive dispute based on these questions will consist of identifying the important sites of knowledge-production in relationship to the particular dispute. Whether the information is produced at universities, government agencies, or the result of local traditions, questions 6 through 8 cannot be answered adequately without a deep understanding of the creation of knowledge and the conditions for the acceptance of knowledge. Often, the same people that take part in committee meetings and steering groups in which the interventions are planned and discussed, also play an important role in the construction of knowledge, and thereby guide the implementation of policy based on that knowledge. Understanding these dynamics should result in a rich description of the ways in which norms and institutions are generated and challenged in a dispute that plays out in the boundary area between science and policy.

The third step in engaging a science-intensive dispute is intended to acknowledge the fact that these disputes do not occur in a vacuum. Involving the broader communities around a dispute will allow a practitioner to better understand the ecological, social and political contexts in which the dispute occurs. The concepts, techniques and principles that the people involved in a given dispute use can work to

represent certain communities in very particular ways. The last step forces a practitioner to question those representations. Elements like a certain species, or a particular type of tree are commonly represented in science-policy disputes as "what is at stake". However, these communities also change and thereby affect the way in which they can be represented. Rather than conceptualizing this as a comparison between the way in which scientists and policy-makers represent those communities in different ways, a practitioner might be able to examine the ways in which the construction of the science-policy interface involves and stabilizes specific representations. Rather than just being a theoretical exercise, I would argue that questions 9 and 10 should be answered by directly engaging the physical and organizational spaces that play a role in the dispute. By going to the region, area or organization in question one is likely to get a better idea about the ways in which representation actually works. This physical interaction with the places and spaces which feature prominently in many science-intensive disputes might be a prominent part of the daily work of many practitioners, but very visit all the relevant places on a regular basis. To better understand and engage with a dispute of this nature, the last two questions can only be answered by visiting a variety of locations.

Finally, without having used this method extensively it is difficult to foresee which questions and issues will emerge as salient and interesting to describe and how they can best be answered, but I hope this mix of conflict assessment, questioning knowledge creation and doing fieldwork will allow practitioners involved in a dispute to understand, experience and describe the complexities of science-intensive disputes, and generate insights that can inform both practical and institutional responses and more effective governance in these complex situations.

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