Decision Support

Issues Mapping: A problem structuring method for addressing science and technology conflicts

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ABSTRACT

There are new opportunities for the application of problem structuring methods to address science and technology risk conflicts through stakeholder dialogue. Most previous approaches to addressing risk conflicts have been developed from a traditional risk communication perspective, which tends to construct engagement between stakeholders based on the assumption that scientists evaluate technologies using facts, and lay participants do so based on their values. 'Understanding the facts' is generally privileged, so the value framings of experts often remain unexposed, and the perspectives of lay participants are marginalized. When this happens, risk communication methodologies fail to achieve authentic dialogue and can exacerbate conflict. This paper introduces 'Issues Mapping', a problem structuring method that enables dialogue by using visual modelling techniques to clarify issues and develop mutual understanding between stakeholders. A case study of the first application of Issues Mapping is presented, which engaged science and community protagonists in the genetic engineering debate in New Zealand. Participant and researcher evaluations suggest that Issues Mapping helped to break down stereotypes of both scientists and environmental activists; increased mutual understanding; reduced conflict; identified common ground; started building trust; and supported the emergence of policy options that all stakeholders in the room could live with. The paper ends with some reflections and priorities for further research.

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1. Problem structuring methods

Problem structuring methods (PSMs) involve participants in a discussion where they engage around models. These models help people who might initially have different perspectives on an issue to clarify and develop their understandings, and identify what actions can or should be taken.

Problem *structuring* methods can be contrasted with problem *solving* methods (Rosenhead & Mingers, 2001). The latter assume that, even if the problem is complicated, analysis can allow it to be understood objectively, and there is a correct or optimal solution to it. In contrast, PSMs start from the assumption that there may be multiple perspectives on what the problem is (Jackson, 2006). Likewise, what counts as an effective solution or an improvement depends on the framing used in an analysis and the values that inform that framing (Churchman, 1970; Midgley,

2000; Ulrich, 1983). With PSMs, it is therefore not possible to talk about 'optimal solutions' in the manner that is common in the OR problem solving literature (Checkland, 1985).

PSMs can also be differentiated from other approaches to enabling discussion, such as meetings with agendas and focus groups. A distinguishing feature of PSMs is the use of models as 'transitional objects' (temporary foci) to structure engagement (Eden & Ackermann, 2006; Eden & Sims, 1979). These models may use words, pictures and/or numbers to represent, for example, people's understandings of a problematic situation; the assumptions underpinning a particular stakeholder perspective; and/or the activities that might be needed to improve the situation. Typically, models are qualitative and are constructed collectively in a workshop, but sometimes they are brought in by a facilitator based on previous inputs from participants and are used to orientate engagement: "the model... plays a key role in driving the process of negotiation towards agreement through discussion and the development of a common understanding" (Eden & Ackermann, 2006, p. 766). However, a 'common understanding' does not necessarily imply consensus or agreement across the board: it may be an agreed

understanding of the differences between people's perspectives and what accommodations are possible in the circumstances (Checkland & Scholes, 1990).

Rosenhead and Mingers (2004), Rosenhead (2006) and Mingers (2011) argue that PSMs are particularly useful when it is necessary to address complex issues characterised by "multiple actors, differing perspectives, partially conflicting interests, significant intangibles, [and] perplexing uncertainties" (Rosenhead, 2006, p. 759). In the policy literature, these are sometimes called "wicked problems" (Rittel & Webber, 1973). PSMs are useful for addressing wicked problems because they support participants' *learning* about their own and other perspectives, as well as the broader problematic situation people find themselves in.

2. Dialogue

Importantly, the *quality* of the engagement between participants matters to the success of problem structuring. Franco (2006) contrasts different forms of conversation, such as persuasion and debate, with *dialogue* (also see Anderson, Baxter, & Cissna, 2004; Bohm, 1996; Buber, 1958; Gergen, McNamee, & Barrett, 2001; Tannen, 1998, for some earlier, seminal writings on this concept). Persuasion is when one party tries to unilaterally change the viewpoint of another, and debate happens when two parties enter a conversation with a view to defeating the arguments of the other. In contrast,

"...participants in a dialogue do not attempt to validate particular propositions or find weaknesses in them. Rather, participants listen to find strength and value in another's position and work together towards a mutual understanding... Dialogue involves the suspension of judgment or pre-conceptions, an equal participation in the conversation by the parties, empathetic listening, and the mutual probing of assumptions... The goal of dialogue is to jointly create meaning and shared understanding between participants..." (Franco, 2006, p. 814).

Franco makes the important point that problem structuring works best in the context of dialogue, rather than persuasion, debate or other lower-quality forms of engagement where listening to others is restricted. This echoes earlier research in systems/OR suggesting that problem structuring is most effective when open communication between participants with different perspectives is possible. In the context of coercion or manipulation (the pretence of open communication by some participants without the intention to really listen or act), it is difficult to improve mutual understanding with existing PSMs (Jackson, 1987a; Midgley, 1997).

Having stressed the value of dialogue to problem structuring, it is nevertheless important not to embrace a naïve understanding of dialogue. We have three concerns relating to this. First, while some writers (e.g., Bohm, 1996) stress the suspension of preconceptions, it is actually only possible for an individual to interpret a communication from someone else by employing concepts with existing meanings (Gregory, 1992; Maturana, 1988; Maturana & Varela, 1992; Von Foerster, 1979; Von Glasersfeld, 1985; Weimer, 1979). Therefore, preconceptions are inevitable. In our view, it is not the *absence* of preconceptions that characterises dialogue; rather, it is *openness to the questioning and revision of preconceptions*, whether they are ones own or another's.

A second, related issue with some understandings of dialogue is the assumption that dialogue communication is completely free from the effects of power relations. Bohm (1996), Habermas (1976, 1984) and others talk about eliminating the effects of power. This is problematic because power relations do not only take the form of one participant coercing another. Power can also be present in the form of the preconceptions discussed above,

and these can be reinforced or challenged through the selection of the participants and dialogue setting, and the construction of the process used. Foucault (1980) explains how today's preconceptions may be established through historical power relations, and they may constrain what it is considered legitimate to say or do (also see Flood, 1990; Brocklesby and Cummings, 1996, for discussions of the relevance of this to systems/OR). One commonly cited example is the privileged status accorded to scientific knowledge, which 'trumps' other forms of knowledge such as those that have been developed and used over multiple generations by indigenous people (McPhail, 2004; Smith, 1999). Often participants may not even be aware of the preconceptions, or assumptions, that they are taking for granted in a dialogue. Therefore, the critical point is that dialogue consists of open communication, free from the effects of *coercion* (rather than power in general), where all preconceptions are *in principle* available for scrutiny. In practice, however, it is not possible to scrutinise *all* preconceptions, and therefore eliminate the effects of power relations, because dialogue would have to be extended infinitely: every probing of preconceptions would involve the deployment of concepts based on further preconceptions, which would in turn need to be scrutinised, ad infinitum (Ulrich, 1983). Arguably, a more reasonable indicator of dialogue is that it enables explorations of *boundaries*: who should participate in discussions; what issues and forms of knowledge should be included, excluded or marginalised; and what values should drive processes of inclusion, exclusion and marginalization (Midgley, 2000; Ulrich, 1983). In other words, *a dialogue involves openness to reflection on the conditions that constitute it*, even if that reflection can never be comprehensive.

Our third concern arises around the need for facilitation. Bohm's (1996) dialogue method assembles a group of 20–40 people in a circle, normally without a facilitator or a topic, and allows the conversation to simply emerge. He assumes that an "impersonal fellowship", involving authentic trust and openness, can develop in a group, even without the participants having a shared history (Bohm, 1996: x). In contrast, more recent writers on dialogue (e.g., Franco, 2006) do not make such an assumption. Rather, they rely substantially on expert facilitation to overcome problems of dominance by some participants, and to maintain an etiquette of dialogue (Cronin, 2007): i.e. to foster mutual respect and affirmation, and to focus the discussion on questions of inquiry rather than assertions or 'win-lose' dynamics (Gergen et al., 2001).

We suggest that an approach to dialogue which allows for the facilitated questioning of taken-for-granted framings without assuming that this will entirely eliminate power relations fits well with the use of PSMs. The latter are often deployed in 'real world' situations that impose constraints on the extent and duration of stakeholder and citizen participation. High quality problem structuring in the context of dialogue therefore involves critical reflection on these constraints alongside the mutual exploration of assumptions, leading to the identification of new ways forward for action.

3. Science and technology conflicts

PSMs have been used in dialogue to address a wide range of complex issues (Rosenhead & Mingers, 2004). However, they appear to have been underutilized in the context of science and technology conflicts: only a few case studies can be found in the literature (Kartowisastro & Kijima, 1994; Nakagawa, Shiroyama, Kuroda, & Suzuki, 2010). This is arguably because the field of science and technology conflict has historically been dominated by the discourse of risk communication, and until recently there has been little exchange between the risk communication and problem structuring research communities.