



## Boundary Organizations

# Boundary Organizations: Strategies for Linking Knowledge to Action

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Boundary organizations are organizations that sit, at least metaphorically, in the territory between science and politics—interfacing or bridging the pursuit of scientific research with policy decisions and public action. Conceptually, boundary organizations were initially analyzed structurally, as organizations that sit on the boundary between science and politics and that are, thus, subject to the authority of each. This analytic framework, which was derived in the context of US politics, which tends toward strict purification of scientific and political organizational forms, tends to portray boundary organizations as precarious entities, strongly constrained by the requirements of operating in a manner viewed as credible and authoritative on both sides of the boundary (Guston 2000). Such organizations, such as scientific advisory bodies or policy-relevant research institutes, the theory suggests, tend to have narrowly constrained mandates and difficult relationships with both the broader scientific community and the broader world of politics (one thinks, here, e.g., of EPA's internal research laboratories in Jasanoff, 1990).

The focus of this workshop, by contrast, and the larger project of which it is a part, was on a broader range of organizations that do not appear quite so narrowly constrained. In part, I think, the apparent ability of boundary organizations discussed at this workshop to operate relatively more freely stems from the focus of the workshop on the internal dynamics and activities of these organizations rather than their external structural context. Viewed from the inside, it seems these organizations may have more options available than it might appear from the outside to approach their task. At the same time, the lessening of constraint also appears to derive from their setting in international as opposed to US politics. While ideal visions of science and politics as distinct forms of social organization and life exist in international settings (not least because of the strong presence of US actors and ideas in world affairs), they do not seem to be quite as strongly pushed up against one another nor do they seem to be quite as intensely purified (Miller 2001) as in US regulatory contexts. The greater spacing between scientific and political activity can, of course, mean that boundary organizations have a greater distance to span in their work, but it can also mean that they have greater freedom to operate in innovative ways. At the same time, the lesser degree of purification may mean that an important role for boundary organizations may be as much to create and stabilize boundaries between technical and political activities as it is to bridge them.

The objective of this paper is to examine the tasks undertaken by boundary organizations, as discussed at the workshop, and to lay out a set of preliminary ideas to guide the data collection and analysis work of the larger project. The first section describes the work done by boundary organizations, in terms of what work gets done, in what ways, and how that work might be evaluated. The second section then describes some tentative ideas that were put forward regarding what would make for good design criteria for boundary organizations, as well as some obvious pitfalls to avoid.

## **I. The Work of Boundary Organizations**

What kinds of work are done by boundary organizations? What kinds of strategies are used to pursue that work? How might the work of boundary organizations be evaluated? In this section, we seek to combine insights from observation of and participation in boundary organizations with science studies and science policy scholarship to answer these questions. We begin by identifying five key kinds of work that occur in boundary organizations. We then discuss, generically, some of the methods and approaches they use to pursue their work. Finally, we discuss two dimensions of evaluating their work.

### Classifying Tasks

*Reconciling supply of and demand for knowledge.* Sarewitz and Pielke (2007) suggest that one of the central problems in contemporary science policy is the failure to reconcile the supply of knowledge by science with the demand for knowledge by policy seeking to enhance societal outcomes. The problem here, they argue, is simple. Most research is driven not by societal need but by researcher curiosity. Hence, the research that is done—although it often gets rhetorically justified in terms of societal benefit—fails to speak directly to the questions posed by policymakers or the needs of society to actually achieve those benefits. Thus, perhaps not surprisingly, both NSF and NIH have become increasingly active in pushing researchers, especially associated with large research centers, to find ways to translate their research into concrete practical medical or business applications. Still, such connections are rare. Meanwhile, on issues like climate change, billions of dollars of research continue to be pursued, much of which does little to advance climate change policy.

One potential role for boundary organizations may be, therefore, to reconcile the supply and demand of knowledge. According to Sarewitz and Pielke, “better science portfolios ... would be achieved if science policy decisions reflected knowledge about the supply of science, the demand for science, and relationships between the two.” Hence, one possible task for boundary organizations might be to provide this knowledge, analyzing the supply and demand functions. Such knowledge might be used to bring the supply of science more closely into align with demand by identifying gaps in the available science and also excesses. Of course, a symmetric view would note that a mismatch in supply and demand might also imply an improperly aligned demand function. There is no reason, a priori, to assume that it is the supply-side that is necessarily misaligned in any particular context. Boundary organizations might therefore also strive to find ways to encourage demand for science where policymakers seem to be failing to take advantage of available science or to tamp down demand where policymakers are seeking answers to questions that science is not equipped to answer.

*Constructing and managing hybrids.* A second task pursued by boundary organizations—the construction and management of hybrids—was identified by Miller (2001). Hybrids are “objects” that contain elements derived from both science and society or policy. Miller’s example was the standardized methods used to compile greenhouse gas emissions inventories (the inventories themselves are also hybrid objects). These methods have obvious technical elements: emissions factors, for example, that relate the quantity

of an emissions source (acreage of rice, head of cattle) to emissions of greenhouse gases. These emissions factors are generally the work of extensive scientific research. At the same time, these methods also have important normative elements: e.g., rules regarding which emissions a nation must count in its inventory and which emissions it might leave out. Thus, standards at one point included methane emissions from some ruminant animals (cows) but excluded them from others (deer), under the argument that nations are responsible for agricultural emissions but not for emissions from wild animals (never mind deer farms or the fact that deer populations are, at least in the US, strictly controlled by the availability of hunting licenses from state game and fish departments). Other forms of hybrids include: standards, methods, indicators, contracts of payments for ecosystem services, specification of water rights, the CALFED water accounts, ILRI's poverty maps, etc.

Boundary organizations are frequently involved in the construction and management of hybrids. In the case of greenhouse gas inventory methods, the Framework Convention's Subsidiary Body for Scientific and Technical Advice (SBSTA) was central to the work, as was the Intergovernmental Panel on Climate Change (IPCC)—both boundary organizations. This work entails several distinct dimensions, as delineated by Miller. First, *hybridization*: the fusing together of technical and social/policy elements. This work is often highly controversial and detailed. In the climate case, it began in 1989 and continues today. Second, *deconstruction*: the analysis of hybrids to identify and reveal their technical and social/policy elements. While this often happens informally, especially when groups analyze the proposals of other groups involved in the process, it can also be an explicit objective. One is reminded of the work done by commissions of inquiry after accidents, for example. Analysis of the Challenger explosion inquired into both the technical and the managerial elements of the launch decision, seeking to identify where the decision had gone wrong (Vaughn ?; Gieryn ?). The third and fourth dimensions of hybrid management described by Miller—*boundary work* and *jurisdictional orchestration*—are described in the next section.

*Boundary work and jurisdictional orchestration.* The classic definition of boundary organizations describes them as perched on the boundary between science and politics. This definition probably too narrowly circumscribes the possible contextual geography in which boundary organizations exist, however. Miller (2001) describes the boundary not as a “fine line” but as a borderland, but in some cases the context may be even greyer than that. In Foucault's characteristic analysis of the 19<sup>th</sup> century asylum and prison, for example, science and policy worked together as a single functioning agency to order the work of these institutions. No boundary was needed or possible between their political and epistemological dimensions.

To fully encompass the range of possible context in which boundary organizations may find themselves operating, therefore, it may be useful to focus more closely on the boundary work done than on the boundary, per se. Boundary work has been described, conceptually, as the work carried out to create the appearance of distinction between scientific and non-scientific work (Gieryn 1983, 1996; Jasanoff 1990). Some of this work is clearly rhetorical, when certain kinds of activities are labeled as science or non-science.

This rhetoric often relies, however, on the development of specific criteria of demarcation. In other words, one might see statements like: “activity that meets this criteria will be deemed scientific, while activity that does not will be deemed political.” Beyond these criteria, differentiation can acquire structural characteristics. Think of boundaries between nations. Such boundaries are not natural and, indeed, are essentially conceptual, yet they can become highly institutionalized and even militarized, with careful policing by both sides.

Once boundary organizations have instilled appropriate boundaries, or when they are operating in the context of clearly delineated social spaces, a key task can become cross-jurisdictional coordination. To return to the example of setting greenhouse gas emissions inventory methods, there were numerous moments where the standards work stalled. At that point, a key role played by SBSTA was to differentiate the issue in question into scientific and/or policy elements and request clarification from appropriate entities. Similarly, early on, the OECD and the IPCC played important roles in convening experts and soliciting initial inventories from governments, together enabling the working of building standards to begin. Put simply, the work of hybridization, deconstruction, and boundary work frequently demands that scientific work or political work also be done, and boundary organizations can help to ensure that this work being done outside the boundary organization is appropriately identified, launched, and coordinated.

We should also attend to the notion that boundary work may involve more than just creating or sustaining boundaries. It may be that a boundary needs to be moved, for example, in order to arrive at an acceptable solution. Steve Epstein’s account (1996) of AIDS activists and their demands on the NIH AIDS research enterprise is illustrative. In that context, many AIDS patients were initially excluded from drug trials on the grounds that including them would result in bad science. Over a period of several years, however, boundary organizations such as ACT UP found ways to work closely with both scientists and activists to identify new ways of conducting trials that included patient communities as active partners. In this way, the boundary of science was moved to include a whole new arena of potential activities and actors that previously were considered as part of the world of politics and society.

Boundaries might also need to be dissolved, at least within the boundary organization’s own work. At least two workshop participants discussed illustrations where their own boundary organizations had succeeded in part because they were able to create and maintain spaces in which the boundaries between science and politics were blurred so that scientists and policymakers could work together to collectively negotiate products. This kind of situation was described by Bill Clark in his work on *The State of the Nation’s Ecosystems* report. Indeed, Jasanoff (1990) argues that work at the boundary at EPA and FDA almost always depended on the existence of spaces in which technical and political aspects of the problem were simultaneously negotiated. Often, once the work was done, significant boundary work was required to make it appear as if science and politics had been separate all along, despite the impossibility of maintaining that clear boundary for effective work to be done.

A key aspect of boundary work carried out by boundary organizations is the work of translation, negotiation, and communication among multiple parties on both sides of the science-policy nexus (Cash et al, PNAS). While a great deal of attention has been focused on the role of this work in communicating scientific work to policy audiences, less attention has been paid to the reverse. Yet, translating and communicating ideas from policymakers to technical audiences is equally if not more important in many cases, especially in efforts to reconcile knowledge supply and demand.

*Reflexive analysis.* A fourth category of work done in boundary organizations is reflexive policy analysis (including research policy analysis). During the workshop, this was primarily discussed in terms of achieving the ‘ends’ of boundary work, but I think that depiction mislabels what is really a form of analytic task carried out by boundary organizations. Policy analysis, as traditionally understood, focuses on the challenge of identifying and analyzing policy problems using methods such as cost-benefit analysis, microeconomic policy analysis, and other approaches. This is, in its basic form, a means of applying knowledge to policy, and reflects aspects of the ideas discussed at the workshop, including elucidating and illuminating policy options and stakeholder preferences, analyzing the consequences of choices, and presenting the results to decisionmakers. The problem with much policy analysis, at least as it is traditionally taught in policy schools, is its lack of reflexivity—analysts are frequently taught to frame problems in terms of market failures, e.g., rather than looking carefully at multiple possible problem frames. Analyses also often fail to fully account for uncertainties and tacit assumptions built into data and models, or to account for power relationships.

Integrating greater reflexivity into analyses means to attend carefully to uncertainties and tacit assumptions inherent in all data and models, to seek alternative problem framings, to identify and integrate multiple ways of knowing. Not all boundary organizations pursue reflexive analyses, as described here, to be sure. Approaches to reflexivity may include expanding review mechanisms to involve groups beyond scientists, establishing multiple assessments operating with different methodologies or ways of knowing, efforts to integrate or bring multiple ways of knowing into dialogue and exchange with one another, comparing organizational work to work being done by other relevant organizations, conducting research on how to improve performance, and building indicators of organizational success, using them to identify problems, and then addressing those problems. Reflexive approaches will generally continually reexamine and reevaluate the foundational assumptions on which their work is based, such as whether they have the appropriate stakeholders represented in processes, whether their models are adequately describing the phenomena in question, and whether their problem framing is satisfactory.

*Capacity building.* The final task frequently pursued by boundary organizations is that of capacity building. Capacity building takes many forms, but for our purposes, the key question is whether communities have the capacity to link knowledge to action over the long terms in contexts where they face complex social and ecological problems. Ideally, once the particular problem they are grappling with is addressed, boundary organizations will leave communities better off to deal with the next one. The need for capacity

building is particularly acute in communities where capacity for boundary work is low to begin with. Always, however, there is a need for careful assessment of just why capacity is low—or even if it is. Too, often, for example, social capacity is misunderstood because it fails to look similar to the capacity that exists in another community. As a result, efforts to build capacity may fail because they do not fit a particular political culture or because they do not take advantage of existing strengths. Consider, for example, the differences between settlers in the Northern and Southern Great Plains during the dust bowl years. Both were displaced in large numbers. Northern settlers returned by and large to the cities they had arrived from, scattering throughout the East and West coasts. Southern settlers on the other hand went, as a group, to southern California. Both survived, but using very different approaches.

Useful concepts to use in thinking about capacity building across distinct communities may be *political culture* and *civic epistemology*. Political culture refers to the organization of political structures, institutions, and values. Civic epistemology refers, in turn, to the systems and standards of evidence, warrant, and review that a community has developed to guide its technical reasoning about policy problems (Miller 2004, 2005; Jasanoff 2005). Thus, the context in which boundary organizations operate is shaped by cultural specifics with regard to both knowledge and action. Surprisingly, at least to me, a great deal of development scholarship treats culture as a barrier (e.g., Grindle 1997) to good governance rather than as a tool to be taken advantage of, thus, I think, making capacity building significantly harder—solely to avoid, it would seem, detailed cultural analyses of knowledge-making and policy-making. The Millennium Ecosystem Assessment, on the other hand, pursued an approach to capacity building that sought to capitalize on local particularities. Sub-global assessments were required to develop analyses of tradeoffs among ecosystem services and to establish relationships with local policy agencies, but they were left to select their own specific methodologies and to identify their own relevant policy officials. Cross-fertilization and exchange of ideas was encouraged, however, albeit through frequent meetings rather than transfer of putatively universal standards of good practice.

### Evaluating Boundary Organizations' Work

This section will be short, at least preliminarily. Essentially, there are two basic methods for evaluating boundary work. The first involves *internal criteria*. Essentially, are boundary organizations pursuing the tasks they have chosen to pursue among those described above in an effective fashion? Do they have good technique in their boundary work? Are they doing a good job of building capacity? Are they effectively reconciling the supply and demand of knowledge? The second approach involves *external criteria*. Are the policy problems to which the boundary organization is directed being lessened or solved? Are communities developing or reducing their vulnerability to climatic shocks? Is violence reducing? External criteria are more difficult to use. Obviously, many things influence policy success or failure that the boundary organization may not directly control. Thus, causality can be very difficult to assess. At the same time, good capacity building for knowledge-action linkage is rather meaningless if the community is wiped out by an expanding civil war. In short, societal outcomes are what ultimately matters.

Ensuring they contribute to enhanced societal outcomes may require a great deal of reflexivity on the part of the boundary organization with regard to the large societal context in which its work is situated—including recognizing when knowledge-action linkages are not the issue or when its own work is contributing to larger problems rather than solving them.

## II. Design Criteria for Good Boundary Organizations

This section of the workshop was decidedly less well thought through than the first section, with fewer people in the room who were in a position to do much besides speculate about what makes for well designed boundary organizations. What follows is the list of ideas discussed that should be considered hypotheses, at best:

- *Pluralism and decentralization*: As discussed above, both political culture and civic epistemologies can impact the knowledge-action linkage. As a consequence, it may be the case that a decentralized approach that allows different communities to use locally tailored designs for boundary organizations may have an advantage, at least in linking local knowledge to local action. Cross-scale linkages will inevitably be more complex using this approach, but then again, complexity may be inherent in boundary work.
- *Value learning*: It seems unlikely that any community or boundary organization has everything worked out regarding how to link knowledge and action effectively. Certainly the US, having tried perhaps as hard as anyone to get it right, still makes regular, serious mistakes. As a consequence, it seems obvious that learning be emphasized, in the sense of innovation, experimentation, communication, and capacity building. Indeed, it may be important to provide incentives for learning among all participants and boundary organization staff. The sociologist of science Robert Merton once argued that a defining characteristic of science was organized skepticism, and many boundary organizations and communities could deal with a hefty dose of similar skepticism toward their own claims. This seems especially important in the face of the rapid changes being wrought today by processes such as globalization and technological change.
- *Work reflexively and iteratively*: One important approach to valuing learning is to operate in a reflexive and iterative fashion. Iterative approaches allow for lessons learned in one iteration to be applied to the next, while reflexivity ensures that each iteration will be the subject of careful and thoughtful analysis about what went right, what wrong, and why. More generally, reflexivity seems to be a key to avoiding an array of knowledge-action failures, although it is also fair to say at this point that we have only a basic conceptual framework regarding practices of reflexivity and no evaluation of what kinds of reflexive practices are already in use, by whom, and with what success, nor much in the way of theory that would predict which alternative practices might work better if used.
- *Breakdown knowledge stereotypes*: Often, there is a tendency for both those who produce and consume knowledge to exhibit stereotypes about what is known and what knowledge is needed in a particular policy context. Several accounts were given that suggested that efforts to break down those stereotypes are important to



the success of boundary organizations. This could involve simply replacing one knowledge frame with another, but it might be even better if it could induce a greater practice of skepticism within the community about simply accepting factual claims, problem framings, or model relevance at face value. Recognition of the importance of teasing out uncertainties and tacit assumptions in any knowledge claim would potentially make both producers and consumers of knowledge more informed and effective in their interactions.

- *Engage all known relevant stakeholders early (and bring newly recognized ones in as soon as possible)*: This hypothesis links the one previous—breaking down knowledge stereotypes—with the one subsequent—building ownership. Put simply, the earlier a stakeholder group is involved, the earlier one can acquire key information from that group, incorporate it into boundary organization practices, and communicate it to others, and the earlier that the stakeholders can begin to build relationships and learn from their involvement in the boundary work. Also key are issues of credibility, legitimacy, saliency, and trust. How can one satisfy any of these demands if one is not working closely with the community one is seeking to engage to ascertain what they take as credible, legitimate, and salient. And, early exclusion is a potential source of mistrust. Not all stakeholders may be immediately obvious, however, nor will they necessarily be well organized. Indeed, careful attention may need to be paid to organizing voices that can speak for loosely organized groups of potential stakeholders. Careful attention may need to also be paid to ongoing relationships between learning taking place among active stakeholder representatives and broader stakeholder communities that are less frequently participating (if at all). Strategies need to be pursued that ensure that learning occurs broadly among stakeholder groups.
- *Build ownership*: Several active members of boundary organizations indicated the importance that stakeholder groups (presumably of both the knowledge producer and consumer varieties) feel collective ownership of the process. This can be accomplished in a variety of ways, e.g., by transferring the knowledge-action linkage activity to stakeholders directly, by full and complete participation, or by developing accountability relationships that ensure full input and/or control over the process.
- *Multiple accountability*: A key aspect of ownership is accountability, but this can be difficult to accomplish in a way that satisfies all parties. Donors are often in a position to exert financial leverage, and the commitment of scientists to peer review frequently means that boundary organizations have at least that much accountability to knowledge producers. Often, however, organizations fail to establish appropriate accountability relationships to knowledge consumers. The Consulting Group on International Agricultural Research, for example, has an oversight committee of scientists but it does not have a similar committee composed of representatives of developing countries. Similarly, the International Research Institute for Climate Prediction set up a scientific committee to review their models for accuracy but no user committee to review their models on grounds of usability.

- *Be explicit about normative commitments:* Part of building trust is ensuring that all participants are cognizant of the normative commitments of the boundary organization, including who they are accountable to and for what objectives.
- *Distinguish role as boundary organization from advocating action:* This is a frequently heard refrain regarding boundary organizations, although it is unclear how important it is. Some recent research suggests that this norm is itself a stereotype that needs breaking down. Moreover, linking knowledge to action is itself an action and, therefore, an inherent normative commitment and form of advocacy. Certainly, the notion of reconciling knowledge supply and demand is a highly normative commitment. That said, it does seem to me more likely that advocacy will only appear legitimate when it is a product of the boundary organization's work of building knowledge-action linkages among engaged stakeholders, rather than the boundary organization working on its own or with a select range of stakeholders. It also seems more likely to be received well if the boundary organization pursues its advocacy in a reflective, iterative fashion: "It seems to us, after working closely with you, that this might be a good approach. Does it seem that way to you, too? No. What do you see as problematic?"
- *Use language that is neutral for stakeholders:* Nothing seems more likely to persuade stakeholders not to fully engage than if the language used to frame the problem and develop the analyses appears stacked in favor of another stakeholder from the outset. A great deal of reflexivity may be required to assess the neutrality of language, however, especially with regard to technical discourses.
- *Invest in capacity building:* Never assume that capacity exists or that capacity building will occur without intentionality. Capacity building requires investment. At the same time, don't leave capacity building to that second grant that you hope to get next year. Plan and budget for it. Teachers know that teaching good learning habits will have far greater impacts on a student's life than will learning today's content lesson for almost all lessons. Yet, too often, pressures to perform hyper-efficiently and to derive short-term outcomes mean that capacity building is relegated to a distant second place.
- *Strive for efficiency:* That said, lower transaction costs are likely to ensure that knowledge producers and consumers alike remain willing to invest in ongoing dialogue and engagement. Low transaction costs are important to participation, but so are perceived outcomes. People will invest greater if they see that the boundary organization is producing significant increases in social welfare and wellbeing.
- *Make knowledge to action linkages routine and regular:* Regularization, too, must be weighed against strict efficiency. More frequent and routine linkages help to develop not only capacity for linking well but also sensibilities regarding the importance of linking knowledge and action.
- *Select manageable problems that will have good outcomes:* Give considerable attention to problem selection for a balance of manageability and outcomes. Some refer to this as "picking low-hanging fruit." Especially at the beginning, trust and regularization will be enhanced if the project appears successful and low cost. Complex problems can be addressed part-by-part, or later, after participants have established good relationships.

- *Don't foreclose problem framing too early:* Several of the design criteria above play into this one. Indeed, this may be the most common failure mode for boundary organizations.
- *Let scientists get comfortable with advice before engaging decisionmakers:* This seems insufficiently specified, especially when brought up against several other of the hypotheses described above. How can one engage all stakeholders early if one engages knowledge producers before consumers? Won't comfort levels among scientists require closure around a framing—and won't that often be premature? Perhaps what I would say instead is that effective boundary work will often require episodic periods of close engagement between knowledge producers and consumers, with other periods in which boundaries are maintained, so as to allow for activities within the various communities to be pursued following each's own distinct rules of social behavior.