**Appendix S1. STS Primer**

Over the past 40 years, Science and Technology Studies (STS) research has investigated what legitimacy means in numerous cases. Scholars have demonstrated that the legitimacy of scientific and technical knowledge derives from social processes, such as the work of scientists to demarcate themselves from other producers of knowledge (Sismondo, 2009; Hackett et al., 2008). This work is obscured by popular images of science as uncovering universally true principles in nature, yielding objective and apolitical knowledge, and being done by scientists who can be trusted because they adhere to the scientific method. As many scientists now acknowledge, science is a more protean phenomenon, containing diverse domains of knowledge and changing relations between scientists and their societies (Galison and Stump, 1996; Gieryn, 1999). Scientific and technical knowledge are also resources that social actors can strategically deploy in political and civic debate (Ezrahi, 1990), and that reflect ‘buried’ path-dependent histories (cf. Braun et al., 1997) that scientists may not fully recognize.

Broadly, STS suggests that personal, political, and social conditions pervade (but do not undermine) the practice of science and technology (Latour and Woolgar, 1979; Shapin, 2010). For example, a scientist embodies a personal history that reflects her gender, race, class, education, and beliefs, inevitably shaping her interests and imagination. These moorings will shape the choices a scientist makes regarding what research to pursue, how to interpret data, and which evidence will warrant conclusions. At a wider social level, the historical development of research disciplines, scientific institutions, and funding agencies will affect the training and incentives of scientists. Universities, industry, and governments encourage particular research directions through their evolving priorities, while larger political and economic developments, such as the Cold War, globalization, or climate change, re-aligns the underlying political economy of science. These collectively create the path-dependent outcomes that make today’s dominant knowledges seem normal while others seem abnormal. To unpack such complex influences on knowledge, STS scholars study the ‘boundary work’ that people engage in when deciding on what constitutes science. (See **Box 1**.)

Such social influences do not mean that the resulting knowledge is deficient or lacking in objectivity. Accounting for their existence can help us understand, for example, the ways that technical knowledge may be epistemologically partial and historically contingent, thus improving its objectivity rather than concealing such influences. It can shed light on the incentives and assumptions that lead to ‘undone science’ (Frickel et al., 2010; Hess, 2009), that is, research not being done but arguably required to meet pressing societal concerns. Equally important, explicitly acknowledging the existence of social influences allows us to recognize that scientists are embedded in, not apart from, their societies.

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| **Box 1: Boundary Work**Credibility challenges pervade both science and society. Who is a scientist? What is scientific? Whose knowledge can be trusted? People endlessly debate these questions in talking about topics from sustainable food to fracking and from biodiversity loss to ocean acidification. Boundary work is “the discursive attribution of selected qualities to scientists, scientific methods, and scientific claims for the purpose of drawing a rhetorical boundary between science and some less authoritative residual non-science” (Gieryn, 1999, p. 4). People create cognitive maps with landmarks and coordinates relating to where they believe truth, reliability, and other key epistemic qualities are to be found. Using these maps, they can reach conclusions about who to listen to – and what evidence to trust in – when deciding whether or not ‘feeding the world’ calls for agroecology, industrial farming, classical breeding, or GMOs. People learn about what science ‘is’ in spatial terms: seeing what is far from or near science – by finding out about how to visit science and anticipating the costs of getting lost. Science can be metamorphosed into a cultural map that relies on contrasts between ‘outside’ and ‘inside’ – for example, between fringe science and accepted science, or between pure and applied science. When studying boundary work, STS scholars typically look at the players (who claims features on the map, against whom, and for whom) and their strategies of making the map (e.g., using the media, testifying in legislative hearings, claims in scientific papers, allocating research grants). They also look at the arenas where players are active.Gieryn (1999) notes that boundary work always leads to winners and losers: the stakes can be high. Losers can be excluded from having epistemic authority, access to resources, and political power. Their explanation of soil erosion causes may be sidelined in favor of the winner’s version, leading to changes in policy and land management. People can be expelled from science; science can be expanded to integrate new topics; and scientists can assert their freedom from societal oversight. Scientists traditionally assert principal authority over what qualifies as ‘science’. Only scientists, they say, can correctly judge their colleagues’ publications and grant proposals against prevailing disciplinary criteria. In contemporary science politics, these boundaries may, however, be supported – or disputed – by other social actors in laying claim to scientific authority for their own purposes and stakes. They, too, want a say in what science encompasses. |