

“The Political Context of Scientific Data: Understanding the Value Public Officials Place on Knowledge (SciValue)” Kimberly Douglass, Suzie Allard, Carol Tenopir (SIS), and Michael Fitzgerald (Political Science/Howard Baker, Jr. Center for Public Policy)

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The Context: Sustained scientific advancement and innovation are important to facilitate the United States’ competitive edge and to improve the quality of life for citizens (American Competitiveness Initiative, 2006). However, science and technology do not simply unfold because of intellect and creativity (Inter-agency Working Group on Digital Data, 2009). Rather science and technology are defined and fostered by a host of inter-dependent legal, social, economic, and political institutions. These criteria suggest that continued science and technology development faces the following two challenges:

1. Members of the U.S. Congress do not have the tools to coordinate science and technology policy decisions across the range of stakeholders and to conduct forward thinking assessments of large-scale scientific innovations. This situation grows more pronounced as grand challenge science demands increasingly innovative scientific approaches such as cyberinfrastructures that can negotiate data intensive environments.
2. Members of the U.S. Congress are at the interface between science and policy yet they do not have sufficient decision making tools to identify and use authoritative data to make evidence based decisions. Science, Technology, and Society (STS) literature speaks authoritatively about what information Congress and other legislative bodies should be using to make decisions on issues such as infrastructure development. However, it is unclear about whether or not members actually consult those sources.

Studying the U.S. Congress is of particular interest because Congress has the authority to pass laws about research practices or to delegate its lawmaking authority to other federal entities. Also, Congress can use its budget making authority to articulate national interests.

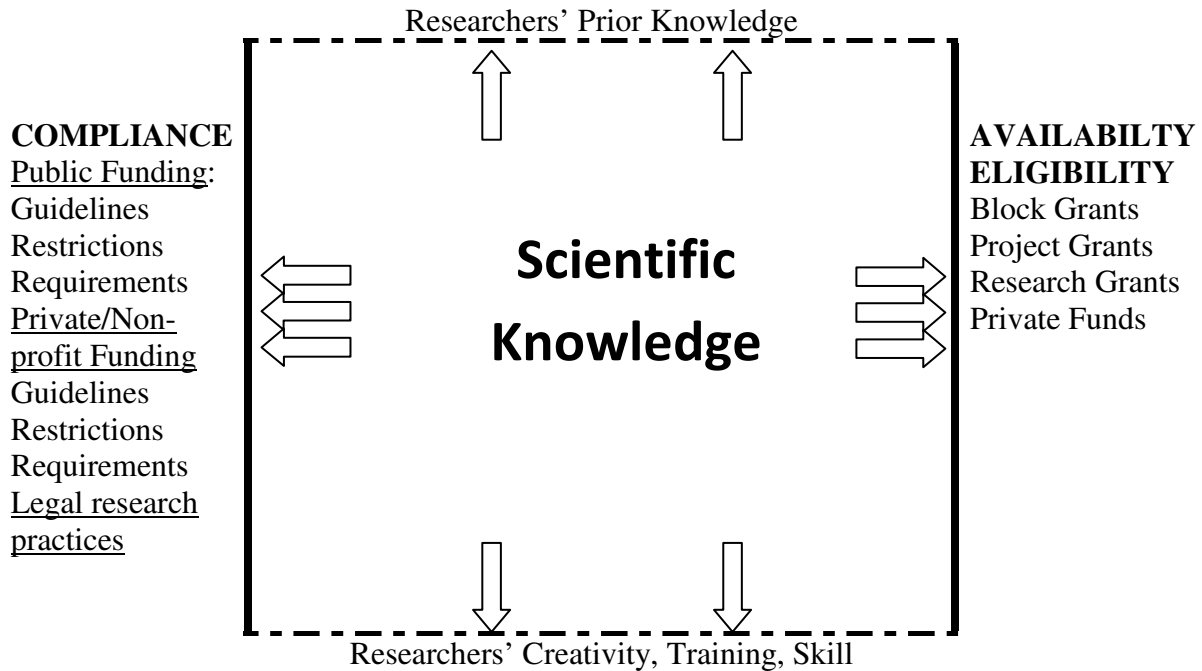
“The Political Context of Scientific Data: Understanding the Value Public Officials Place on Knowledge (SciValue)” will address three research questions: (1) how does the U.S. Congress coordinate science and technology policy decisions across the range of stakeholders?; (2) how does the U.S. Congress conduct forward thinking assessments of large-scale scientific innovations?; and (3) what

sources do members of Congress consult when formulating science and technology policy? The project's attention to the relationship between policymaking and large-scale scientific infrastructures distinguishes it from previous attempts to understand decision making processes. A grant proposal for the project is currently under review at the National Science Foundation.

What the Literature Tells Us: The STS literature provides a solid framework for discussing the relationship between policy decisions and scientific and technological outcomes. Scholars have reached a consensus in the STS literature that science and technology are socially constructed (Williams and Edge, 1996). In the mainstream the notion persists, however, that all a researcher needs is ability and drive to discover and innovate. The reverse logic is that when people fail to innovate, they fail because of their own shortcomings. What is missing from the equation is the impact of the support system of inter-dependent legal, social, economic, and political institutions (Edwards, *et.al.*, 2007) fostering particular discoveries and innovations. Since the evidence linking policy to technological outcomes to these institutions remains largely anecdotal, this study will systematically examine this relationship.

The STS literature notes that legal, social, economic, and political institutions protect their interests by guarding the boundaries of scientific knowledge (Edwards, *et.al.*, 2007). As shown in Figure 1, the federal government helps construct the boundaries of science and technology in two ways. First, federal laws define legal and illegal research practices by placing conditions on the money allocated for scientific and technological development. Second, the federal government has increased its support for research and development at an average annual rate of 3.5% over the past 42 years. These contributions now account for about 31% of spending on research and development (Congressional Budget Office, 2007). As a result, the federal government not only influences individual and organizational research methods, but also signifies what research is relevant, important, or even possible.

Figure1. Factors that Determine the Boundaries of Scientific Knowledge in the United States



Such conditions illustrate the importance of understanding both the overarching system (Edwards, *et.al.*, 2007) of scientific and technological policy and the social contexts in which policy is made. The social construction of technology (SCOT) theory suggests that policy is constructed through processes and choices. SCOT explains the processes through which “new paradigms and trajectories” emerge in technology (Bruun and Hukkinen, 2003:102). Attention, effort, and resources devoted to large scientific data cyber infrastructures, such as DataONE, constitute a whole new way of thinking about how scientific data should be handled. For example, DataONE’s goal is to create a global data network that provides universal access to data about life on Earth and the environment that sustains it (dataone.org).

In what constitutes a new paradigm for science and technology (Atkins, 2003), cyber infrastructures will provide scientists access to vast amounts of data through data networks that place together, for example, different datasets about the same watershed. Such access and proximity create opportunities for scientists to think about new ways to use old data (U.S. House, 1998). The access and proximity will also make it easier for scientists to merge multi-disciplinary datasets, thus providing scientists the tools to answer broader research questions. However, the large scientific data infrastructures, including DataONE, that are currently underway were born in a political climate that considered such infrastructures important enough to national interests to warrant short-term funding and year to year tax credits (U.S. House of Representatives, 1998). However, large-scale data infrastructures

require long-term, expensive commitments and often delay gratification (President's Council of Advisors on Science and Technology, 2007; NSB, 2001).

Methods: SciValue investigators will conduct a qualitative analysis of Congressional budget hearings/sub-committee and committee proceeding transcripts as well as conduct interviews of key policy actors. Investigators will use content analyses of both to identify key themes that arise in decision making processes related to cyberinfrastructure projects.

Investigators will develop an interview protocol with the assistance of the Howard Baker, Jr. Center for Public Policy. The Baker Center will also help identify policy actors for those interviews. SciValue investigators will interview chairpersons (or their staff) of key science committees such as the Senate Agriculture, Nutrition, and Forestry Committee; the Senate Appropriations Committee; and Senate Commerce, Science, and Transportation. Investigators will also interview think tanks/interest group staff and staff from federal agencies who testify before Congress on these issues. A model for this activity comes from the scoping exercises conducted by the Keystone Center with the Woodrow Wilson International Center for Scholars (Adler, *et.al.*, 2008). Investigators will identify themes that emerge from these interviews.

Investigators want to understand: (1) the political interests and values that compete with data infrastructure for funding. Competition may stem from the Members' own values, organized interests, public opinion in general, or the specific interests of the people who elected them; (2) the members' view of science itself. Is scientific discovery valuable when the end product is a. technological innovation, academic investigation, and/or c. regulation?; (3) the members' long-range views of information infrastructures.;(4) the members' willingness to fund multi-disciplinary, scientific data infrastructures in the short-and long-term.

Research Directions: By understanding Congressional institutions and applying SCOT theory, we can address the overarching question, what does current science and technology policymaking suggest about the long-term sustainability of scientific data infrastructures? The policies in question here are the laws passed by the U.S. Congress, which has the authority to impact all segments of society. Understanding these contexts will contribute to improving the development and sustainability of large-scale projects such as DataONE and will also fill a gap in the STS literature. The relationship between federal policymaking in the United States and the sustainability of large national and international-scientific cyber infrastructures needs to be explored. This research is a first step. There are additional approaches to explore this: (1) assess the political will that exists among key members of the U.S. Congress to plan and sustain large-scale scientific data infrastructures and (2) align the interest groups literature with insights about the sources members consult when making decisions regarding large-scale projects.

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