A Recap—The Role of Intermediaries in Communicating Science: A Synthesis

Asheley R. Landrum

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Abstract and Keywords

Intermediaries serve several crucial roles in bridging scientists and society. Intrinsic to many of them are challenges key to science communication. These include determining how intermediaries can increase awareness of their organization and their messages, how intermediaries can increase their trustworthiness, how to present information to different types of audiences while retaining their credibility, and how to engage the broader public in issues of policy-relevant science. This chapter describes the five common goals, or roles, that intermediaries take on, and then briefly summarizes the various intermediaries covered in this section of the handbook. The chapter concludes by highlighting and expanding on several themes and challenges that are relevant to the communicative roles of intermediaries.

Keywords: Scientific Institutions, Professional Societies, Museums, Foundations, Scholarly Presses and Journals, Government Regulatory Agencies, Social Networking Sites, Public Engagement, Trust and Credibility

The previous section of the handbook discusses specific cases in which scientific issues were addressed and integrated into public policy. In Part IV, we turned to focus on intermediaries[1]—various organizational structures that serve key roles in facilitating this process. These include institutions that are embedded in the scientific community as well as institutions that do not exist solely to serve science but nonetheless play key roles in bridging science and society.

Indeed, all of the intermediaries covered in this section serve consequential, communicative functions that can be grouped into five main goals, or roles:

1. To increase and direct research inquiry;
2. To synthesize what is known from science;

3. To disseminate what is known from science to stakeholders including other scientists and expert and lay publics;
4. To incorporate what is known from science into policy decisions, where relevant; and
5. To engage (or to encourage the engagement of) other stakeholders in this process.

The goals are of course interconnected, and most intermediaries serve more than one function. The chapters in this section discuss in detail the multiple roles each intermediary undertakes and the challenges they encounter in enacting and balancing them. In particular, these challenges include the need for intermediaries to increase their reach and their trustworthiness, to determine what information should be presented to different audiences and how to do so while retaining credibility, and to determine how to effectively engage the broader public in issues of policy-relevant science. In this synthesis, I first summarize the diverse intermediaries covered in this handbook and the roles that they serve. Then I expand upon the aforementioned challenges that are particular to intermediaries.

(p. 254) Scientific Institutions as Intermediaries

Scientific institutions are organizations that are rooted in the scientific community and developed to serve many of the functions listed previously. The first set of chapters in Part IV explicate five such institutions: professional societies, scholarly presses and journals, museums, private foundations, and government agencies. Although some of these intermediaries' goals overlap one another, each uniquely contributes to the scientific process.

Professional Societies

Professional societies, sometimes called learned societies or professional associations (Platt 2015), are member-based organizations that provide a forum for their members to share and discuss research findings and to engage with other stakeholders, such as policymakers, other experts, and the public. Moreover, these professional societies vary in scope, with some associations catering to narrow subdisciplines (e.g., cognitive development, environmental communication) and others representing wider fields of science and learning.

The American Association for the Advancement of Science (AAAS) and the National Academies of Sciences, Engineering, and Medicine (NASEM) are two elite professional societies that are broader in scope. Tiffany Lohwater and Martin Storksdiek (Chapter 19) describe the multiple roles shouldered by these two associations. In addition to facilitating communication among their members and fellows, both societies synthesize and disseminate research to the broader public (goals 2 and 3) and serve as a public face

of science. NASEM, for example, creates working groups that develop consensus reports, synthesizing what is known about a topic and providing recommendations for what more is needed to better inform decision-making. AAAS, on the other hand, has a broader membership and more expansive landscape of goals, ranging from promoting and defending the integrity of science to fostering education and increasing public engagement with science (goal 5). Both organizations confront the challenge of conveying information in a way that is understandable to various target audiences while at the same time ensuring that scientific knowledge is conveyed intelligibly without sacrificing the nuance associated with its complexities and uncertainties.

Scholarly Presses and Journals

Scholarly presses and journals specialize in publishing and disseminating scholarly material, which allows for scientists to build on previous research to advance knowledge (goals 2 and 3). In many cases, these publishing houses are subsidized by professional society memberships, but as Barbara Kline Pope and Elizabeth Marincola (Chapter 20) point out, business models for academic publishing are changing in part due to advancements brought about by the Internet and in part due to changes in the culture of science, like new initiatives to engage in open and transparent research practices, open access publishing, and calls to critically evaluate the process of peer review and the importance of impact factors.

Museums

Museums also mediate science knowledge, serving as a way of disseminating knowledge (goal 3) and a way of engaging the public and other stakeholders in science (goal 5). The International Council of Museums defines museums as nonprofit institutions that serve society, are open to the public, and conserve, create, research, communicate, and exhibit material for the purposes of education, study, and enjoyment (Alexander and Alexander 2007). Victoria Cain and Karen Rader (Chapter 22) discuss how the role of the museum has shifted over time. In addition, they suggest that museums struggle to balance their dual commitments to increasing knowledge and outreach. Cultivating new audiences, appealing to less expert publics, and attracting donors can lead museums to more closely resemble theme parks than institutions of learning (p. 205). And because some scientific issues invite controversy, museums grapple with whether—and if so, when and how—to engage the public in such controversial conversations.

Private Foundations

Private foundations, like other funding institutions, direct research inquiry by providing grant money for targeted areas of study (goal 1). Foundations, Elizabeth Good Christopherson (Chapter 23) argues, are uniquely free from the restrictions that both

government and business face, making it possible for them to pursue riskier ventures with longer time horizons. She notes, however, that more research needs to be done to investigate the efficacy of the work foundations do in promoting science.

Governmental Regulatory Agencies

Government agencies, like the Food and Drug Administration (FDA), the US Department of Agriculture (USDA), and the Environmental Protection Agency (EPA), engage in *regulatory* science (or regulatory analysis, e.g., McGarity 2005) in which risk-relevant research is synthesized (goal 2) (p. 255) and incorporated into policy decisions (goal 4). Specifically, the regulatory function of this form of intermediary involves promulgating and enforcing standards consistent with Congressional mandates designed to protect the public from some forms of risk. Jeffery Morris (Chapter 21) argues that a number of factors complicate the process of translating risk-relevant research into public policy. Among them is that stakeholders desire unattainable levels of proof and certainty regarding the existence of risk and that policy decisions involve many factors beyond risk, including economic, ethical, legal, and social issues (ELSI) and considerations.

Other Intermediaries

In addition to the previously described scientific institutions, there are also intermediaries that exert influence on science, but it is not their raison de’être.

University Information Offices

University information offices, also called university media offices or press offices (and not to be confused with university presses), are not discussed in these chapters but are the subject of scrutiny in Part II of the handbook on engaging with the press. These offices are primarily responsible for the promotion of the university as a whole and handle everything from sporting events to scandals (Brass and Rowe 2009), but they also disseminate scholarly information produced at their own institutions (goal 2; Fassin 2000). In some ways, these offices are better equipped than other outlets to compress the complexities of scientific research into a format more digestible for the public: because they are the intermediary between researchers and the media, university information offices often have the initial say in how new research is framed (Sumner et al. 2014). But as alluded to in Part II of this handbook, even university information offices are guilty of hype and other types of irresponsible reporting. Like the other intermediaries, these offices struggle with balancing multiple roles, such as promoting their university’s research to broad audiences and presenting information accurately (Rowe and Brass

2011; Brass and Rowe 2009). Much more research is needed to examine the roles of university information offices as intermediaries.

Social Networks and Social Networking Sites

Social networking sites (SNS) also serve a crucial role in science communication. SNS are dedicated websites or web applications that allow individuals to construct a public or semipublic profile, specify a list of users with whom they would like to connect, and share information either publically or with specific connections (Ellison 2007). Brian Southwell (Chapter 24) discusses how online social networks, more generally, serve as intermediaries with both positive and negative effects. For instance, scientists can create otherwise unlikely collaboration by engaging other scientists via these networks, thus increasing research inquiry (goal 1). In addition, scientists can share work with others over SNS, or social media accounts, such as Facebook and Twitter (goal 3). Lay publics, too, can engage with science through their online social networks (goal 5), but this is a double-edged sword. Although scientific information can be shared beyond the pages of elite research journals, by encouraging both the dissemination of and engagement with science, SNS can undermine scientific authority, complicate policy decision-making, and fuel the propagation of rumors and misinformation.

Informing Public Policy with Science

Together, these various intermediaries influence the direction of scientific progress. Importantly, however, society would not invest the time, money, and resources into science unless there was some tangible benefit beyond fulfilling curiosity. There is an expectation that society will use what is known from science to inform policy decisions. Yet, as is alluded to by Morris, science is only one consideration: embedded in many public policy decisions are ELSI implications that extend beyond the scope of what science can answer. When determining how to best integrate science into policy, then, it is important to get more than just the scientists at the table; other stakeholders must be involved in decision-making.

Public Engagement

Public engagement is an important component of informing policy with science because public policy decisions often require weighing empirical evidence with ELSI considerations, which benefit from public oversight or input. John Gastil (Chapter 25) defined the various means for public engagement including *participatory engagement*, which invites the public to ask questions and express concerns about a specific public policy issue, and *public deliberation*, which invites citizens to meet with experts and policymakers to discuss issues and arrive at considered judgment (goal 5). Gastil argues that although public deliberation is important for making policy decisions, effective deliberation can be impeded by sociocultural factors and passionate convictions. He concludes by (p. 256) suggesting some key features that researchers and policymakers should consider moving forward, including, for example, the diversity of the participating citizens, the quality of the public deliberation, the policy impact of the outputs from the deliberation, and the wider impact of conducting the deliberation.

Translating Science into Evidence-Based Policy

Translating science into public policy is a multifaceted process. Jason Gallo (Chapter 26) discusses evidence-based policymaking, a process by which scientific evidence is incorporated into policy decisions (goal 4). Like Morris and Gastil, Gallo stresses that these decisions more often than not involve multiple considerations—beyond science—and can lead to different outcomes for different stakeholders. He argues that because evidence is embedded in social and political processes that determine how evidence is used, empirical evidence is not good, bad, or neutral in and of itself. Thus the availability of evidence alone is not sufficient for ensuring that the best possible decisions are reached.

Common Themes and Challenges for Science Communication

In pursuing these five goals, intermediaries confront at least four challenges as they seek to both uphold the values of science and engage the public and policy making process:

1. Raising public awareness of the identity, authority, and messaging of the elite scientific professional societies;
2. Increasing trust in organizations that are the custodians of scientific knowledge;
3. Avoiding perceptions of bias and maintaining credibility; and
4. Engaging various stakeholders in issues of policy-relevant science.

Raising Public Awareness of the Identity, Authority, and Messaging of Elite Scientific Associations

Elite professional societies, as NASEM and AAAS (Chapter 19), as well as governmental organizations and regulatory agencies (Chapter 21) synthesize what is known from science and disseminate this information to multiple stakeholders, including the general public. As described by Lohwater and Strorksdieck in Chapter 19, the reach and efficacy of the NASEM consensus reports (and their shorter executive summaries) need to be examined. Despite having existed since the Civil War, nationally representative data from the Annenberg Public Policy Center (2016), for instance, shows that less than half of survey respondents are familiar with the National Academies.[2]

It is unsurprising, then, that despite extensive coverage in the media only 18% of respondents reported hearing about the May 17, 2016, consensus report on genetically-modified organisms (GMOs) titled “Genetically-Engineered Crops: Experiences and Prospects” (National Academies of Sciences and Medicine 2016b). Significantly fewer respondents (2%) reported being aware of the June 8, 2016, consensus report on gene drives titled “Gene Drives on the Horizon: Advancing Science, Navigating Uncertainty, and Aligning Research with Public Values” (National Academies of Sciences and Medicine 2016a). Future research should examine effective ways of increasing the visibility and trustworthiness of these organizations and their messages, as well as the methods that are currently being employed.

Cultivating Trust in Custodians of Scientific Knowledge

Assuming that various groups of stakeholders are aware of the organizations that act as custodians of knowledge, it is also important that these organizations are perceived as trustworthy; for example, the organizations are perceived as competent and likely to act with integrity (Landrum, Eaves, and Shafto 2015, Hendriks, Kienhues, and Bromme 2016). However, the extent to which the public perceives scientific institutions such as the governmental agencies that regulate risk as trustworthy varies. When, for example, such an entity offers mistaken reassurance as the Centers for Disease Control and Prevention (CDC) did when its director told the nation that hospitals were prepared to deal with Ebola patients, the credibility of that agency can suffer (Dutton et al. 2014). Trust in agencies that share a regulatory task can differ as well. For instance, recent surveys from the Annenberg Public Policy Center asked respondents how much trust they have in various agencies (i.e., federal government, state government, local government, EPA, USDA, and FDA) when it comes to regulating GMOs. Whereas about 60% of respondents expressed a great deal or a fair amount of trust in the USDA and FDA, around 55% expressed a great deal or fair amount of trust in the EPA, and only around 42% (p. 257) to 45% expressed as much trust in the local, state, and federal government (Annenberg Public Policy Center 2016).

Avoiding the Perception of Bias and Maintaining Credibility

Much research has focused on whether communicators are effective when informing or persuading audiences about a particular issue. However, there is a related challenge that often is less examined: How do the choices about what information is selected, and how it is presented, change the perceptions of credibility and bias of the sources and how much those sources are trusted (e.g., Landrum et al. 2015; Hovland and Weiss 1951)? Intermediaries such as museums, media outlets, and so on must balance the need to accurately represent science information with the desire to be perceived as unbiased and trustworthy. For instance, there is an assumption among audiences and communicators that unbiased sources present multiple, often conflicting, viewpoints (e.g., Entman 1990, 30). However, this bias in and of itself can misrepresent the relative weights of the evidence (e.g., Kohl et al. 2016; Dixon and Clarke 2013; Boykoff and Boykoff 2004). For instance, Cain and Rader describe how one museum was accused of advocacy for displaying photographs of the Arctic Wildlife Refuge that were subsequently used in congressional debates over Alaskan drilling. One solution to deflecting perceptions of bias, Cain and Rader note, is to emphasize the process-orientated nature of science when discussing controversial topics. Building on this work, and work on social cognition, opportunities for future research include investigating ways in which intermediaries can communicate science information about contentious topics while maintaining their credibility.

Engaging Various Stakeholders in Issues of Policy-Relevant Science

Science’s role in policymaking is limited. As the introduction to this handbook and several of the chapters in this section note, policy decisions involve multiple considerations, including social, economic, and environmental impact; legal and ethical obligations; differing moral considerations; and balancing the needs of the various stakeholders (recognizing that any decision is likely to lead to different outcomes for different groups of people). Some hold out the hope that having all stakeholders involved in decision-making should help society arrive at more ethical and beneficial policy judgments. However, research is still needed to examine the extent to which this is actually the case in practice; how to engage diverse groups of stakeholders, what processes lead to most effective outputs, and how these engagement efforts should be incorporated into policymaking decisions.

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Notes:

(1.) In some parts of the literature, some of these intermediaries are referred to as boundary organizations (Smith et al. 2016; Guston 2001, Miller 2001). However, in this handbook, we are using a broader definition that encompasses boundary organizations as well as other types of intermediaries.

(2.) In contrast, about 80% to 86% of respondents are familiar with the CDC, FDA, EPA, and USDA.

Ashley R. Landrum

Asheley R. Landrum is an assistant professor of strategic science communication in the College of Media and Communication at Texas Tech University and a former Howard Deshong Postdoctoral Fellow at the Annenberg Public Policy Center. Her

research examines the role of values and beliefs in perceptions of science and emerging technology, and how such perceptions develop across the lifespan.