Researchers are from Mars; Policymakers are from Venus:
Collaboration across the System

Matthew Gaudreau and Marc Saner

University of Ottawa

uOttawa

issp.uottawa.ca

Note from the Series Editor

This policy brief, part of a series by the Institute for Science, Society and Policy (ISSP) at the University of Ottawa, is supported by a SSHRC Public Outreach grant (#604-2011-0007). The goal of the series is to mobilize academic research beyond the walls of universities. The series is directed at public servants operating at the science/policy interface in Canada and abroad. It has been designed to bring forth some themes and findings in academic studies for the purpose of synthesis, knowledge transfer and discussion. This brief is the first in the series. The ISSP also carries out adjacent activities on the topics covered in these briefs. We hope they will be well received and are looking forward to any feedback you may have. You may reach me directly at msaner@uottawa.ca.

Marc Saner
Director, ISSP

Titles in this Series

(1) (Policy Brief) Researchers are from Mars; Policymakers are from Venus: *Collaboration across the System* – by Matthew Gaudreau and Marc Saner
(2) (Policy Brief) From Many to One: *Integration of Knowledge and Values in Decision Making* – by Matthew Gaudreau and Marc Saner
(3) (Policy Brief) Dealing with Not Knowing: *Evaluating and Communicating Uncertainty at the Science/Policy Interface* – by Matthew Gaudreau, Michael Bordt and Marc Saner
(4) (Workshop Backgrounder) Making it Work: *Improving the Interface Between Scientists and Policy Makers: Management Incentives* – by Sasha Kebo and Marc Saner
(5) (Workshop Report) The Top Five Management Incentives for Improving the Interface Between Scientists and Policy Makers – by Michael Bordt and Marc Saner
(6) (Policy Brief) A Map of the Interface between Science and Policy by Marc Saner (update of a Staff Paper, Council of Canadian Academies, 2007)
(7) (Policy Brief) The Role And Responsibilities Of The Scientist In Public Policy by Bill Jarvis (republication of a Discussion Paper, Public Policy Forum, 1998; with permission of the Public Policy Forum and the Author)
(8) (Policy Brief) A Question of Balance: *New Approaches for Science Based Regulations* (republication of a Policy Brief, Public Policy Forum, 1998; with permission of the Public Policy Forum and the Author)

Please visit www.issp.uottawa.ca for PDF versions of these documents.

ISSP

About the Authors

Matthew Gaudreau

Holds an MA in Globalization and International Development from the University of Ottawa. His interdisciplinary academic training includes economics, political studies, and human geography, with exposure to environmental science. His MA research focused on the sharing of ecological information between environmental actors in civil society, particularly in the context of China. In addition, he has strong research interests in the concept and application of interdisciplinary research within the social sciences and between the social and natural sciences. He is a Research Consultant with the Institute for Science, Society and Policy and a PhD student at the Balsillie School of International Affairs, in the Faculty of Environment at the University of Waterloo.

Marc Saner

Dr. Marc Saner is the inaugural Director of the Institute for Science, Society and Policy, and an Associate Professor in the University of Ottawa, Department of Geography. Prior to this appointment, he served as Executive Director, Regulatory Governance Initiative, School of Public Policy and Administration, at Carleton University, and Director of Assessments and Executive Vice-President of the Council of Canadian Academies. Previously, Dr. Saner was a Director at the Institute on Governance where he built the Ethics and Risk Management Sector and co-managed the Technology and Governance Program. His primary interest has been multi-disciplinary work at the intersection of science, ethics and governance. He holds a PhD in applied ecology from the University of Basel, Switzerland (1991) as well as an MA in applied ethics from Carleton University (1999). Dr. Saner publishes in peer-reviewed journals in the areas of technology ethics, bioethics, risk management, biotechnology and ecology and has been invited to speak at seminars, workshops and international conferences around the world.

ISSP

Acknowledgments

ISSP

Researchers are from Mars;
Policymakers are from Venus[1]:
Collaboration across the System

Introduction

The above title strikes at the heart of an issue that has gained increasing pertinence since the Second World War. Scientists receive different training and often have different objectives in terms of performing their tasks than policymakers do. In addition they both operate under different constraints and concerns. While the many producers of knowledge within the public service and universities feed knowledge into the policy development and regulatory decision making process, collaboration and understanding between the two remains, at times, elusive. The results produced by research may be available to inform policy, but it is not always the case that the information is successfully used (as intended by scientists) as a basis for policy development, and conversely, it is not always the case that scientists appreciate the additional factors being weighed by policymakers (Nutley, Walter, & Davies, 2007). In fact, there may be significant gaps between scientists and policymakers which affect their ability to collaborate and interact with each other.

As part of a series of policy briefs initiated by the Institute for Science, Society and Policy (ISSP) we are seeking to translate key academic knowledge on issues at the interface between science and policy into an accessible form (as described in the box below). In this brief, we seek to address questions of collaboration between the scientific researcher and the policymaker. We are dealing with a complex management problem for which there is no simple answer. Indeed, as those operating at this interface will no doubt agree, approaches to developing successful collaboration can be highly contextual. The purpose of this brief is to help to better understand existing literature on the subject and the most commonly cited parameters surrounding the issue.

Approach and Method

This "state of knowledge" review is the result of an examination of 77 articles and books that relate to science/policy interfaces and organization theory. Of these academic works, this policy brief cites 25 papers that are closely related to issues in scientist-policymaker collaboration.

Please note that many literatures are relevant to this context (organizational studies, risk management, philosophy of science and technology, public administration etc.) – no serious attempt at comprehensiveness could be made at this stage. Further, there is literature in political science emphasizing that evidence and collaboration alone are not sufficient to enact policy change which is not directly addressed in this series. Some of these literatures find greater representation in later instalments of this collection.

---

[1] This title is borrowed from Feldman, Nadash & Gursen (2001).

ISSP

Key Themes Debated in Academia

Early debates regarding science/policy collaboration began as an engineering-inspired understanding of a unidirectional, assembly-line, model where scientific knowledge is produced to be assembled into policy (various terms have been used to describe this model including "linear" and "decisionist") (Bush, 1949; Crona & Parker, 2011; Majone, 1989). Subsequently, more critical approaches focused on philosophical differences between scientific and policymaking communities in terms of both the way that they interpret information and their priorities in the way information is used (Keren, 1983; Majone, 1989; Snow, 1961; Webber, 1986). Currently, socio-organizational structure and culture have been the major focus with regard to understanding and facilitating successful collaboration between scientists and policymakers, where organizations provide an environment (or don't provide, as the case may be) within which scientists and policymakers interact. Where there is often a deficiency in credibility and trust between scientists and policymakers, better understanding of successful organizational arrangements to encourage collaboration is imperative for bridging existing gaps (Brown, 2010).

> *The non-scientists have a rooted impression that scientists are shallowly optimistic, unaware of man`s condition. On the other hand, the scientists believe that the literary intellectuals are totally lacking in foresight, particularly unconcerned with their brother men, in a deep sense anti-intellectual, anxious to restrict art to the existential moment.* (Snow, 1961)

In this vein, there is a goal in the literature to understand what organizational traits and values facilitate effective collaboration, including an assessment of the habits, structure and leadership culture at the organizational interface between scientists and policymakers. In general, discussions regarding collaboration also lead to a necessary understanding of the system of organizations at play in a given context (that is to say, is it a single organization that needs better collaboration, does collaboration need to take place between two or more organizations, or is it the case of a "boundary" organization that spans/connects other organizations?). These types of arrangements make a difference in terms of organizational design that effectively influences successful collaboration, in addition to differentiating types of changes in organizational structures that range from top-down changes to bottom-up changes (Tsang & Zahra, 2008).

Though our analysis uncovered many themes, the two most often mentioned are **communication** and **leadership** (and related structural aspects). Each provides insight into aspects at different organizational levels through which collaboration takes place between scientists and policymakers, focusing particularly within single organizations, but also accounting for interactions between organizations. Further, while collaboration involves communication and dialogue, there is a difference in intensity between communicative activities and full-fledged collaboration. These elements touch both the social and structural elements of organizational interaction.

ISSP

Communication: Translation, Simplification and Selection

Communication is an extremely important element of successful collaboration between scientists and policymakers (Cherney & Head, 2010; Feldman, Nadash, & Gursen, 2001; Guldin, 2003; Leshner, 2012). Successful communication has the benefit of exchanging pertinent information between scientists and policymakers, while also creating cohesion between the two groups. Unsuccessful communication leads to frustration, poorly informed policy, and even the occurrence of whistleblowing (MacNab et al., 2007). As such, it is important to understand the basis for successful communication.

Successful communication involves understanding of the messages that are communicated as well as the context surrounding the message. Successful collaboration therefore requires the ability of professionals from different functional domains to understand the language with which messages are communicated (Leshner, 2012). In the context of information exchange, Guldin (2003) and Leshner (2012) note that the use of highly specialized language (both in terms of scientific jargon and policy-specific focus on economics or politics) can create gaps between scientists and policymakers. However, the use of specialized language also has its purpose and it is important to not render findings unclear, diluted or too general.

Miscommunication arises from differences in definitions, methodologies, and even objectives in terms of the function of scientists vs. policymakers (Poulos, Zwi, & Lord, 2007). Whereas scientists and researchers often see themselves as being focused on socially-neutral and objective testing of hypotheses, policy makers explicitly recognize that they do not operate in a socially-neutral environment and must make decisions based on a combination of scientific evidence, constituent demands, and resource constraints (Irvine, 2009; Majone, 1989). This difference in culture and function presents challenges in terms of fostering effective science/policy communication. Below, several case studies from varying contexts will be examined to draw on common themes in communication.

In two separate studies Hemsley-Brown (2004) and Poulos, Zwi & Lord (2007) both found that specialized language deterred the incorporation of scientific findings in policy making.

> **Key point:** Specialized language can deter the incorporation of scientific findings in policy making.

Hemsley-Brown (2004) conducted an extensive literature review from management, medicine and education on the dissemination of knowledge through academic journals. She indicates that academic research often misses the attention of practitioners through language used and a gap in the direction of research versus the needs of users. In an applied context, Poulos, Zwi & Lord (2007) observed meetings between researchers and decision makers at a science/policy *Translation Task Group* in Australia's public health sector. They found that researchers did not account for their audience's (policymakers) level of specialization which resulted in unsuccessful communication between the two groups, and similar to Hemsley-Brown (2004), found a gap in articulation of policy applicability. Poulos Zwi & Lord (2007) also describe frustration among scientists that policymakers were not up to date on scientific information, and had no system in place in order to keep up to date. In other words, these examples point to communication without dialogue, which leads to issues in overall collaboration.

ISSP

These studies complement one of Guldin's (2003) findings: that successful collaboration at the science/policy interface involves cases where some scientists demonstrate interest in policy formation, and learn to communicate effectively in the language of policymakers and managers. In addition, where applicable, he found that it is helpful to bring policymakers into the field or laboratory to communicate findings more effectively, and that the exercise helps to establish dialogue and trust. A knowledge translation metaphor is often used to describe scientist-policymaker communication to identify the knowledge or language gap that can help or hinder communications between both groups (Guldin, 2003; Leshner, 2012; Poulos et al., 2007; Söderman, Saarela, & Turnpenny, 2012). Similarly, in following the development of Canada's Wild Salmon Policy, Irvine (2009) discusses concepts similar to translation but places a greater emphasis on encouraging an understanding of policy making that involves considerations beyond the logical conclusions of findings in scientific studies. In effect, knowledge translators can broker knowledge across the gap by (a) translating science in the language of policy makers and (b) translating policy needs into language better understood by scientists.

> **Key point:** Better communication can be established by bringing scientists and policymakers together to discuss common issues.

From the point of view of organizational structure, some have found value in the creation of fora within and between organizations, which can help to bring scientists and policymakers together (Irvine, 2009). However, beyond occasional meetings, Guldin (2003) and Irvine (2009) state that collaboration is something that is created over time, requiring long-term engagement and exchange in order to build the necessary dialogue. This includes creating opportunity for discussion from the beginning of research projects right through to their completion and the incorporation of findings into policy processes (Guldin, 2003; Irvine, 2009; Poulos et al., 2007).

> **Key point:** Cross-training can facilitate collaboration by estabilishing mutual understanding of language and values.

Leadership: Facilitating Collaboration

In addition to the identification of communication as a factor that facilitates successful collaboration, multiple studies also indicate that the role of leadership is pivotal in developing collaboration. While leadership can be a quality that is difficult to define, case studies of science/policy interfaces find that a motivated individual or a "champion" is integral to fostering communication/translation and creating organizational structure and networks to facilitate collaboration (Cherney & Head, 2010; Godkin & Allcorn, 2008; Guldin, 2003; Hemsley-Brown, 2004; Lucas & Kline, 2008; Poulos et al., 2007). To make translation possible, leaders must first play bridging roles through establishing dialogue, acting as mediators, and in their central position, have the capacity to monitor and identify successful collaborative arrangements (Cherney & Head, 2010).

> **Key point:** An issue "champion" can take the lead in facilitiating communication and understanding to foster successful collaboration.

ISSP

Reviewing 16 case studies discussed at an international forest policy conference, Guldin (2003) describes the personal characteristics of certain researchers as being integral to fostering successful collaboration. These characteristics, which are themselves leadership characteristics, are: willingness to take the first step in engaging the science/policy interface and accept the risks, engage in two-way and flexible communication, and understanding the different needs of policymakers and scientists. This identifies leaders that are willing to engage both sides, and in doing so, to spend time understanding how best to facilitate the translation of the needs to each group. In identifying these traits, Guldin (2003) shares a concern with Pielke (2007) that a scientist or expert panel may be reluctant to engage at the interface in the more high-intensity form of collaboration for fear of becoming an "issue advocate"[2]. That is, being seen as taking sides on a particular outcome, rather than acting as an "honest broker" of policy options. This presents a perceived risk of losing independence and credibility, and also potentially to risking personal relationships with both scientists and policymakers. However, if done carefully and with "personal rules of engagement", the reward can far exceed the risk in terms of science/policy collaboration. Leaders can benefit from recognizing these issues.

> **Key point:** Leadership in facilitating research utilization is most effective when embedded in the roles of senior management.

Aside from leaders assisting in collaboration, studies also discusses their importance in transitioning towards new methods of organizational interaction. For example, a study of emergency medical services (EMS) workers integrating latest knowledge in their practice found that the successful transition to new methods of organization was attributed to people holding a leadership role in the organization (Lucas & Kline, 2008). These key individuals had the ability to convey a vision of the direction of change, and bring together unique cultures, thus facilitating translation. Similarly, research points to these traits present in transitional leaders, but also highlights their ability to mitigate negative reactions or anxiety of new organizational initiatives (Godkin & Allcorn, 2008).

Hemsley-Brown (2004) finds that successful leadership, in terms of facilitating research utilization, is most useful when support is given from the opinion leaders or prominent positions within an organization. The structural significance is that with direction from the "higher levels" comes a certain amount of legitimacy and authority. An example of an organization structurally introducing this type of leadership position to assist with science/policy translation is the introduction of Chief Scientists in UK government departments (Boaz, Grayson, Levitt, & Solesbury, 2008). Since 1990, the UK government has been researching more effective means of incorporating evidence-

---

[2] This term is used by Roger Pielke in his book "The Honest Broker" (2007) to describe one of four possible roles of scientists in the policy process. In brief, the four roles are:
1. **The Pure Scientist** focuses on research with absolutely no consideration for its use or utility, and thus in its purest form has no direct connection with decision-makers.
2. **The Issue Advocate** focuses on the implications of research for a particular political agenda.
3. **The Science Arbiter** seeks to stay removed from explicit consideration of policy and politics like the Pure Scientist, but recognizes that decision-makers may have specific questions that require the judgment of experts, so unlike the Pure Scientist the Science Arbiter has direct interactions with decision-makers.
4. **The Honest Broker of Policy Alternatives** engages in decision-making by clarifying and, at times, seeking to expand the scope of choice available to decision-makers.

ISSP

based decision making into government policy, where one of the results has been the creation of the position of Chief Scientist in relevant departments since the early 2000s (Doubleday & Wilsdon, 2013). However, this form of structural leadership support should not be confused with the leadership traits identified above (see Cherney & Head, 2010; Guldin, 2003). Note that in Canada, some federal departments had and have Chief Scientists. Canada also had a National Science Advisor from 2004-2008. The issue of the science policy interface (SPI) is normally part of the portfolio of duties of Chief Scientists, but their roles and activities have been less discussed in the academic literature.

Practical Implications

Options to Foster Communication and Leadership

While the academic literature does not often address the problem of policy design, the following policy prescriptions emerge from the review of case studies. In order to address the issue of potential miscommunication and to build successful ability to communicate, Poulos, Zwei & Lord (2007) suggest

> **Key point:** Funding for experimentation in collaborative workshops between scientistis and policymakers can support building lines of communication.

providing more grants that go toward experimenting with collaborative workshops between scientists and policymakers. Because applied efforts at collaborative arrangements are still new, making money available to actually undertake repeated gatherings can be of use in building lines of communication – of course, these may be among the first activities to be cut in times of austerity.

Related to this, Guldin (2003) suggests that it would be beneficial for interested parties to receive training to develop their policy skills as well as scientific skills. He compares this to bilingualism between cultures, where having access to both languages can facilitate cultural understanding. Offering policy training to scientists and scientific training to policymakers can have a mutually reinforcing effect that builds cultural understanding between the two. This brings us back to the title of this brief regarding two groups on different planets – or at least belonging to different cultures with different values. In essence, what is desired from cross-professional skills training is an understanding of what each group needs from the other, and how they can mutually assist each other based on these needs; teaching scientists to communicate their results and methods in a way that is meaningful to policymakers, and teaching policymakers to communicate their needs in ways that are "answerable" by scientists.

Together, the elements of funding, workshops, and mutual language acquisition courses which focus on the ability to communicate in a manner that addresses each other's needs may present a way forward to increasing capacity for collaboration. Of course, as indicated by the authors above, this also involves the crucial element of leadership at both the upper levels of an organization as well as at the larger organizational base in order to provide vision of collaboration and stimulate genuine interest. Whether this kind of funding and organizational direction can be achieved at a large scale remains to be seen.

ISSP

However, the current trend in many governments to reduce size and/or expenditure has led to increased outsourcing of studies. This may reduce the ability to foster collaboration as a result of the splintering of organizations (Elgin, Pattison, & Weible, 2012). For example, core research organizations within government are increasingly encouraged to divest work to universities and private companies. This may pose a risk for the ability to facilitate collaboration since core scientific competencies are reduced within departments and an increasing number of organizations must be coordinated with to achieve collaboration. Further, the relationship-building for effective collaboration requires repeated interactions with the same actors, which is at risk under these conditions (Engels, 2005).

> **Key point:** Outsourcing research may reduce the ability and opportunity for organizations to engage in collaboration.

Potential Issues at the Interface

Another issue involved in collaborative efforts, which is implied in the concept of miscommunication and the risk of taking leadership roles at the interface, is the political dimension of the science/policy interface (Davies, 2010). As mentioned by Guldin (2003) and Pielke (2007) it is possible to have negative consequences fall on scientists that become involved in policymaking. Although most authors quoted in this brief conclude (or assume) that collaboration is a good thing that will promote evidence based or evidence informed decision making, it can also pose a dilemma between the neutrality and independence of scientists and the ability of scientists to contribute to policymaking.

> **Key point:** Scientists risk credibility, neutrality and independence when involved too directly in policymaking.

For example, Carter (2010) suggests that policy-makers should be more involved in framing questions for systematic reviews to maximize the utility of results. This is echoed by Hemsley-Brown (2004) and Irvine (2009) who urge that research be of relevance to practitioners. This call for the need to provide value from research efforts is, of course, an echo of the very old question: how should we best balance basic with applied research? Furthermore, it touches on the equally difficult question of how to protect evidence from political distortion. For example, Davies (2010) discusses the case of David Nutt, former Chair of the UK's Advisory Council on the Misuse of Drugs. Nutt was fired for publicly offering policy insight based on scientific evidence that did not agree with the ethical judgements of his employers, the UK government. As such, there is a presence of power dynamics at the interface of science and policy, which presents real risks in terms of the engagement of scientists.

ISSP

Conclusion

Regardless of risks and challenges, most authors agree that there is value in promoting collaboration. In this sense, an issue of primary importance in the relationship between scientists and policymakers is the ability to understand the nature of each other's work and the constraints that come with each. How are multiple sources of knowledge actually integrated in decision making? How is uncertainty in scientific findings communicated within different disciplines, and how is this understood by policy makers? How is it communicated to the public? As the policy brief series continues, we will investigate these types of questions crucial to laying the groundwork for informed collaboration and, more generally, for having a better understanding and functioning of the science/policy interface.

Discussion Points

As mentioned in the introduction, we understand that successful collaboration at the science/policy interface is contextual. Along with sharing a summary of academic knowledge, this brief also has the objective of provoking thought on the subject at hand. To facilitate this, we have introduced as questions to encourage further reflection of the issues raised as they may pertain to your work context:

- Is it worthwhile to promote intra and inter organizational communication between scientists and policymakers? If so, what are some successful (or unsuccessful) practices in your own experience?
- Are communication and leadership enough to create better collaboration? What factors do you feel are also important in collaboration?
- Who would be your best champions (SPI leaders and knowledge brokers)?
- In your workplace, what kind of forums might help to improve the interface between researchers and policymakers (analysts, advisors and decision-makers)?
- What are the risks you perceive as either a scientist or a policymaker (or both) to collaborative activities? Are these risks something that concerns you?
- Are the two cultures really living on two different planets or are they rather not completely entwined?

While these questions are in part meant to stimulate individual reflection, we at the ISSP are also interested in hearing from readers of this series. Please feel free to e-mail us at issp@uottawa.ca with comments, responses, and/or questions.

ISSP

REFERENCES

Boaz, A., Grayson, L., Levitt, R., & Solesbury, W. (2008). Does evidence-based policy work? learning from the UK experience. *Evidence and Policy, 4*(2), 233-253.

Brown, J. D. (2010). Prospects for the open treatment of uncertainty in environmental research. *Progress in Physical Geography, 34*(1), 75-100.

Bush, V. (1949). *Modern arms and free men: A discussion of the role of science in preserving democracy.* New York: Simon and Schuster.

Carter, B. J. (2010). Evidence-based decision-making: Practical issues in the appraisal of evidence to inform policy and practice. *Australian Health Review, 34*, 435-440.

Cherney, A., & Head, B. (2010). Evidence-based policy and practice: Key challenges for improvement. *Australian Journal of Social Issues (Australian Council of Social Service), 45*(4), 509-526.

Crona, B. I., & Parker, J. N. (2011). Network determinants of knowledge utilization: Preliminary lessons from a boundary organization. *Science Communication, 33*(4), 448-471. doi:10.1177/1075547011408116

Davies, J. (2010). Exploring the science-policy interface. *Cell, 141*, 390-391.

Doubleday, R., & Wilsdon, J. (2013). *Future directions for scientific advice in Whitehall.* London: Alliance for Useful Evidence/Centre for Science and Policy/Institute for Government.

Elgin, D. J., Pattison, A., & Weible, C. M. (2012). Policy analytical capacity inside and outside of government: A case study of Colorado climate and energy issues. *Canadian Political Science Review, 6*(1), 101-116.

Engels, A. (2005). The science-policy interface. *The Integrated Assessment Journal, 5*(1), 7-26.

Feldman, P. H., Nadash, P., & Gursen, M. (2001). Improving communication between researchers and policy makers in long-term care or, researchers are from Mars; policy makers are from Venus. *The Gerontologist, 41*(3), 312-321.

Godkin, L., & Allcorn, S. (2008). Overcoming organizational inertia: A tripartite model for achieving strategic organizational change. *The Journal of Applied Business and Economics, 8*(1), 82-94.

Guldin, R. W. (2003). Forest science and forest policy in the Americas: Building bridges to a sustainable future. *Forest Policy and Economics, 5*(4), 329-337. doi:10.1016/S1389-9341(03)00042-X

Hemsley-Brown, J. (2004). Facilitating research utilization. A cross-sector review of research evidence. *The International Journal of Public Sector Management, 17*(6), 534-552.

ISSP

Irvine, J. R. (2009). The successful completion of scientific public policy: Lessons learned while developing Canada's wild salmon policy. *Environmental Science & Policy, 12*, 140-148.

Keren, M. (1983). Barriers to communication between scientists and policy makers. *Knowledge: Creation, Diffusion, Utilization, 5*(1), 84-98.

Leshner, A. I. (2012). Capably communicating science. *Science, 337*(6096), 777-777. doi:10.1126/science.1227898

Lucas, C., & Kline, T. (2008). Understanding the influence of organizational culture and group dynamics on organizational change and learning. *The Learning Organization, 15*(3), 277-287.

MacNab, B., Brislin, R., Worthley, R., Galperin, B. L., Jenner, S., Lituchy, T. R., . . . Turcotte, M. F. (2007). Culture and ethics management. whistle-blowing and internal reporting within a NAFTA country context. *International Journal of Cross Cultural Management, 7*(1), 5-28.

Majone, G. (1989). *Evidence, argument, and persuasion in the policy process*. New Haven and London: Yale University Press.

Nutley, S. M., Walter, I., & Davies, H. T. O. (2007). *Using evidence: How research can inform public services.* Bristol: The Policy Press.

Pielke, R. A. (2007). *The honest broker: Making sense of science in policy and politics.* New York, USA: Cambridge University Press.

Poulos, R. G., Zwi, A. B., & Lord, S. R. (2007). Towards enhancing national capacity for evidence-informed policy and practice in falls management: A role for a "Translation task group"? *Australia and New Zealand Health Policy, 4*, 6-12.

Snow, C. P. (1961). *The two cultures and the scientific revolution* (7th ed.). London: Cambridge University Press.

Söderman, T., Saarela, S., & Turnpenny, J. (2012). Knowledge brokerage at the science-policy interface: Case studies of tools and policy impact assessment. *Berlin Conference on the Human Dimensions of Global Environmental Change Evidence for Sustainable Development,* Berlin.

Tsang, E. W. K., & Zahra, S. A. (2008). Organizational unlearning. *Human Relations, 61*(10), 1435-1462.

Webber, D. J. (1986). Explaining policymaker's use of policy information: The relative importance of two community theory versus decision maker orientation. *Knowledge: Creation, Diffusion, Utilization, 7*(3), 249-290.

ISSP

The Institute for
Science, Society and Policy

The Institute for Science, Society and Policy offers a unique, holistic approach to understanding the social implications of science and technology. We're interested in how to use these different perspectives to inform science and technology policy.

Centered at the University of Ottawa, the ISSP carries out research, teaching and public outreach on the relationship between society and science, innovation and technology.

Institute for Science, Society and Policy
Desmarais Building, 10th Floor
55 Laurier Ave. East,
Ottawa, Ontario, Canada
K1N 6N5

Address inquiries and comments to:
issp@uottawa.ca

uOttawa

issp.uottawa.ca