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Workshop Backgrounder
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Making it Work:
Incentives to Improve the Science/Policy Interface

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Note from the Series Editor

This workshop backgrounder, 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 backgrounder is the fourth 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)
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Introduction

This Workshop Background Note covers an important sub-topic of the issue introduced in Brief #2 ("Integration of Knowledge and Values in Decision Making"). In the first section, we focus on three case studies that demonstrate the value of knowledge integration across disciplines. The case studies include instances of successful integration, as demonstrated by the development of Canada's Wild Salmon Policy, as well as instances where better understanding of the underlying ethical conflicts would have facilitated integration: the New York Watershed Controversy and the pesticide-induced decline of honeybees in France. In the second section we propose a list of management incentives as a discussion starter.

Statement of the Problem

In a world ever more affected by advancements in science and technology, public servants are increasingly compelled to integrate, scientific evidence when crafting public policy (Swierstra & Rip, 2007). The integration of science in policy remains one of the biggest needs and challenges in the policy-making process (Irvine, 2009; Stevens, Fraser, Mitchley, & Thomas, 2007). While the academic literature has identified specific incentives that have been successful in specific cases, no clear general guidelines have been suggested. Such guidelines could be useful to stimulate and promote the integration of science in decision making within organizations.

Appropriate integration can strengthen the relationship between scientists and policy makers and avoid undesirable outcomes, including people being labelled as whistleblowers, the perception that government decision-making often ignores evidence, distrust in government, and international trade obstacles. Practical advice is needed on how to integrate scientific and non-scientific information in policy making.

A careful review of relevant sources suggests that there might not be a generic approach to formulating such incentives and this is precisely what we attempt to address in the second half of the brief. The first half focuses on the aforementioned case studies.

Case study #1 - Canada's Wild Salmon Policy: The Value of Non-scientists and Social Scientists

The following is a summary of the article "The successful completion of scientific public policy: lessons learned while developing Canada's Wild Salmon Policy" (Irvine, 2009)

The Policy

The primary goal of this policy was to restore and maintain healthy and diverse salmon populations and their habitat for the benefit and enjoyment of the people of Canada for generations to come. Released in 2005 after 6 years of "drafting, consultation, debate, review, and re-drafting", this policy is an example of successful integration of science and policy on the Pacific coast of Canada.

From Issue Advocate to Honest Brokers

Government natural scientists were a dominating voice at the outset of the process. However, they quickly realized that they were acting as Issue Advocates [1] —the environmental dimension of the Wild Salmon Policy was only one factor among others considered by decision makers. Ultimately, they realized their role should be that of an Honest Broker: to provide a complete menu of policy options, including the evidence on risks and benefits with a realistic interpretation of what risk means.

> *"Social and economic considerations entwine with environmental issues and need to be carefully considered" (Irvine, 2009).*

These two key specific lessons were learned by the natural scientists working on Wild Salmon Policy:

Lesson #1: Social scientists are needed for deliberations on the social dimensions of environmental issues.

Social and economic dimensions, such as obligations to First Nations and regional employment security, were closely linked with this issue and these values had to be reflected in the policy. The natural scientists came to realize that the study of the societal

[1] 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 of 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.

impacts of the policy options should be left to social scientists. Otherwise, the policy risked being dominated by scientific values, thereby jeopardizing its implementation.

Lesson #2: Input from the non-scientists is invaluable.

Local knowledge provided by non-scientists was important because of the uncertainty of the existing scientific evidence. For example, First Nations representatives contributed traditional knowledge about salmon and increased overall understanding of the problem and led to a more inclusive consensus. These same non-scientists also served as peer reviewers because they processed the scientific research through a more local, contextual lens. This not only strengthened the science itself, but enhanced transparency, mutual learning, and collaboration.

Canada's Wild Salmon Policy: A Blueprint for Future Endeavours

The Wild Salmon Policy is considered a success for science/policy integration and has been used as a template for developing policy on Atlantic salmon from Canada's east coast and had guided other conservation policies on Canada's Pacific coast. It demonstrated the changing role of natural scientists in policy development, as well as the vitality of cross-disciplinary cooperation and inclusion of non-conventional forms of knowledge in making good decisions and developing good policy.

Case study #2 - The New York Watershed Controversy: Ethical Traditions at the Core of the Conflict

The following is a condensed summary of an article titled "Value-Laden Technocratic Management and Environmental Conflicts" (Glenna, 2010)

Background

Over the course of centuries, New York City (NYC) developed a municipal water supply system by building a complex network of distant upstream dams. The state legislature in 1893 granted NYC the authority to condemn and acquire lands adjacent to any stream, pond, or reservoir used for the city's water supply. The current NYC watershed, completed in 1966, spans over 4900 km^2 in eight counties.

A controversy emerged in the 1990s when the U.S. Environmental Protection Agency (EPA) ordered NYC to construct a water filtration system at an estimated cost of US $6-9 billion. The city instead petitioned the EPA to allow them to implement a plan to minimize water contamination at the source by imposing stricter regulations on septic systems and water runoff from upstream farms and businesses. This collided with the views of rural stakeholders, who felt this plan would place the economic burden of water protection on them.

The Controversy: Rural-Urban Tensions

The rural stakeholders (adherents to the "rights-based" ethical tradition[2]) felt that NYC representatives were labelling them as ignorant anti-environmentalists that needed to be scientifically enlightened on the importance of watershed management. Moreover, the rural residents felt the costs would be unfairly downloaded onto them via NYC's alternative plan. NYC on the other hand, followed the Home Rule[3] legislation, grounded in the "Utilitarian" ethical tradition, which further alienated them from their rural counterparts, thereby creating considerable tension in the process.

The Policy

> *"Failing to understand the underlying ethical issues can exacerbate [environmental] conflicts and undermine solutions." (Glenna, 2010)*

The resulting 1997 Memorandum of Agreement relied on environmental mediation to balance the social and environmental factors, while distributing benefits and responsibilities between NYC and the watershed towns. This policy was hailed as a great success and is still considered a model approach to environmental dispute resolution. However, science integration did not play a central role in solving the conflict; it was the successful (and indirect) tackling and management of underlying ethical issues.

The following two key lessons can be drawn from this case study:

Lesson #1: Ethical traditions were at the core of the conflict

This controversy showed that some environmental conflicts might be accurately framed as competing ethical perspectives and theories of justice (values) rather than scientific issues even when the underlying science is complex and incomplete. In this case study, according to Glenna, the competing sides adhered to fundamentally different ethical traditions. The recognition of this situation was a key reason for success.

Lesson #2: Policy ultimately addressed these ethical dimensions

The New York Watershed Controversy was ultimately resolved neither because the upstream residents came to realize the importance of science and natural ecosystems, nor because the NYC representatives' attitudes towards rural residents had changed. Rather, the negotiations established a common viewpoint and objectives, which resulted in a policy that integrated these values with the scientific evidence.

[2] The three prevailing ethical traditions are: utilitarian, duty-based, and virtue-based. Utilitarian ethics reasons than an action is right if it maximizes overall benefits. Duty-based ethics derives from principles of justice, rights and duties. Virtue-based ethics derives rightness or wrongness from the morality and motive of character.

[3] Home Rule gives regulatory power to local governments, giving the city extraordinary control over land use outside of its own jurisdiction.

CASE STUDY #3 - Pesticide-induced Decline of Honeybees in France: Stakeholders Influenced Interpretation of Evidence

The following is a condensed summary of an article titled "Uncertainty: Cause or effect of stakeholders' debates? Analysis of a case study: The risk for honeybees of the insecticide Gaucho®" (Maxim & Van der Sluijs, 2007)

Background and Policy

Gaucho® is an insecticide that offers long-lasting protection against insects for crops such as sunflower and maize. However, it also exposes non-target insects such as honeybees to the active substance (*imidacloprid*) via the contaminated pollen and nectar. Evidence of Gaucho's risks emerged in the late 1990s, involving beekeepers, farmers, Bayer (the company producing Gaucho), researchers, the ministry of agriculture, and civil society. Debate ensued after the honeybee population shrank, and both the sunflower honey harvest and the revenues of beekeepers plummeted. Bayer was asked to provide toxicity information about their product. During the following 10 year conflict, Bayer's official position remained unchanged, claiming that their product posed little risk to the honeybees. Some scientific studies supported the company's view while others refuted the causal link between the insecticide and the symptoms observed in honeybees.

As a result of the suspected toxicity, Gaucho was banned in France in 1999 (Benjamin, 2008). This case study showcased the first application of the precautionary principle[4] in France. Due to the lack of indisputable evidence, however, Gaucho is currently again under evaluation by the European Food Safety Authority for inclusion on their list of marketed substances within the European Union.

The Misuse of Evidence and Uncertainty among Stakeholders

This case study showed that risk assessments can be (mis)used as tools for power balance in the political arena particularly when the outcome of scientific risk assessment involves high economic and social stakes. Even when the scientific evidence and consensus became stronger, stakeholders still attempted to influence the interpretation of the evidence and the political processes in their best interest.

The following three lessons were implicit in this case study:

Lesson #1: Strategies to cope with uncertainties differ

This case study showed that the social, economic, and institutional stakes of the actors involved in the controversy strongly shaped the various approaches to interpreting

[4] The precautionary principle states that "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." (United Nations General Assembly, 1992).

scientific uncertainties. This resulted in the strategic and selective use of risk information, questionable regulatory approaches, the omission of local knowledge, the exclusion of key expertise, and the presentation of data irrelevant to the case in question.

Perhaps the application of "post-normal science" (See Box), early in the process could have led to a quicker and more agreeable resolution. This is an approach that manages uncertainty by acknowledging the many perspectives on a given problem and by including non-scientific stakeholders in understanding the debate and developing policies that address the key concerns.

> *"Post-normal science, a new practice, is now required when dealing with hard political pressure, disputed values, high decision stakes, epistemological and ethical uncertainties." (Maxim & Van der Sluijs, 2007)*

Lesson #2: Most recent and comprehensive information should be used

In cases where uncertainty is at the centre of a social debate and knowledge is being sought to support that debate, it is vital that all statements use the most recent information and include findings from sources other than one stakeholder's expertise. That is, information used in decision making must include all relevant current knowledge available to the given policy context.

Lesson #3: The influence of social and political context on risk governance

This case study challenged the dominant belief that the only reason for inappropriate management of environmental risks was the lack of scientific knowledge. This showed that stakeholders strategically apply evidence in public discourse and, in the process, perpetuate rather than resolve scientific uncertainties.

Learning from Case Studies and Moving Forward

These three case studies illustrate the inherent complexity behind science/policy integration and the extent to which resolution depends on cooperation between conflicting parties. The path forward was never obvious at the outset nor did the sheer volume of scientific evidence necessarily motivate the policy in the desired direction. That is, merely placing science at centre stage did not result in integration. Incentives to improve the science/policy interface must therefore acknowledge this reality by striving to be inclusive, cut across disciplines, and at the same time bridge the gap between scientists and policy makers.

Incentives: Implementation Considerations

It should now be clear that current mechanisms and institutional frameworks, dominated by adversarial approaches that pit science against politics and interest group against interest group are inadequate to achieve a successful integration of not only sciences, but values, and interests (Karl, Susskind, & Wallace, 2007). Moreover, missing pieces of evidence, poor transmission of research findings to those responsible for implementation, and limited skills of administrators and policymakers for interpreting research all contribute to the failure of research to adequately inform practice (Poulos, Zwi, & Lord, 2007).

Incentives for addressing these realities and improving the interface between scientists and decision makers are not often explicit in the literature, nor is there a generic way to apply those that are mentioned to all organizations. Although crafting good incentives remains a challenge, the following suggestions are intended stimulate further discussion. They are presented in no particular order.

1. STIMULATE ACTIVE AND IN-PERSON SHARING OF REPORTS AND FINDINGS

Reports are invaluable and many exist passively as printed and electronic material. But when disseminated actively (e.g. via “Lunch and Learn” or seminar series), the impact and uptake can be increased (Cherney & Head, 2010). Such interactive ways of information sharing are also an ideal opportunity to rate and assess the material at hand. For example, allowing participants to attach simple stamps or tags on this material (e.g. *“This is good”*; *“9 out of 10 people prefer this methodology”*) (Holmes & Clark, 2008) can increase (or decrease if the ratings are negative) the credibility of the report while simultaneously fostering internal collaboration and participation.

2. REWARD POLICY-MAKERS FOR ASKING “BETTER” QUESTIONS

Scientists ask different questions than policy makers be those at the political level or at the level of senior administrators. Specifically, policy makers tend to ask questions that are “big” and short-term compared to scientists. Policy makers should be rewarded when they propose several versions of the question they wish to direct to the scientists. Scientists may find some to be more answerable than others. Better defined questions will more appropriately reflect scientific uncertainties in subsequent policy formulation (Holmes & Clark, 2008).

3. Encourage, identify, and cultivate champions

External experts (including researchers, consultants and experts in other government departments and agencies) are an important source of scientific advice for policy makers. Policy makers may find it difficult to know who the experts are on an issue, particularly if the issue is new to their team (Holmes & Clark, 2008). Champions can act as mediators between such different bodies of knowledge and play a bridging role (Cherney & Head, 2010). They can also assume the role of opinion leaders and activate their peer networks to initiate changes. Champions can also help steer the process through the government system and be endorsed by senior officials (Irvine, 2009), as credibility is important and impact is stronger where there is endorsement from opinion leaders. Generally, dense communication networks and a large number of individuals in boundary-spanning roles who legitimately bring in new ideas will facilitate research use (Hemsley-Brown, 2004).

4. Establish science interpreters

Science interpreters are able to describe to policy makers the implications of research findings and reports (Holmes & Clark, 2008). These individuals are generally strong communicators with a background in both sciences and policy. Economists have tended to work on larger scales and to dominate planning and thinking (Stevens et al., 2007). Science interpreters could offset this imbalance by contributing a science perspective.

5. Persuade social and natural scientists to work in tandem

Trust, a key component of collaboration, can be enhanced by involving social scientists in projects headed by natural scientists and vice-versa. This may be more effective at project conceptualization and throughout subsequent stages; not merely at the end. This interaction needs to begin with increased involvement of social scientists in the problem definition and information gathering stage of the research process (Karl et al., 2007; Stevens et al., 2007). By doing this, these two groups are more likely to consult each other regularly and with purpose, thus facilitating interaction and adaptive feedback.

6. Promote collaboration and in-house research

Researchers sometimes feel the need to assert their importance when they sense diminishing control over their own work (Fine, 2007). Collaborative research can demonstrate that increased acceptance and relevance of the results is well worth any perceived loss of control (Lucas & Kline, 2008). Researchers should also be encouraged, within mutually-agreed limits, to pursue pet projects despite high risks of failure. Providing training and creating opportunities for sharing information also improves research utilization (Hemsley-Brown, 2004).

7. IDENTIFY VALUE DIFFERENCES EARLY AND EXPLICITLY

Unaddressable or so-called “wicked” problems are issues where neither the causes nor the solution are well-understood and conflicting values are prominent (Howlett, 2009). The prime example of a wicked problem is climate change (Hulme, 2009). Such problems also plague areas of public planning and policy. They do not lend themselves to straightforward integration of science and require more inclusive and adaptive approaches to develop appropriate policies. Pielke (2007) calls these cases “abortion politics” since they are characterized by high uncertainty and lack of values consensus. A focus on the underlying values deserves as much (if not more) merit as the focus on the underlying science (Douglas, 2009).

8. RECOGNIZE THE INFLUENCE OF WORKPLACE BOUNDARIES AND STRUCTURE

Compartmentalized information, knowledge and experience within an organization are commonplace and this tendency is likely to persist (Fine, 2007). In some cases, rigid external boundaries can help establish a sense of cohesion. Yet boundaries that are too rigid can hinder collaboration across boundaries, prevent new information from being taken into account and impede beneficial organizational changes (Lucas & Kline, 2008). Decentralized, less formalized organizations are more likely to integrate research findings from other organizations, whereas highly centralized organizations may not be as enthusiastic. Highly-centralized organizations should consider at which stages of science policy integration a decentralized process would be beneficial (e.g., interdepartmental, stakeholder or public consultations; inter-agency working groups; or external peer review).

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