CSTA

Council of
Science and
Technology
Advisors

SCOPE

Science Communications and Opportunities for Public Engagement

A Report to the Government of Canada
April 2003

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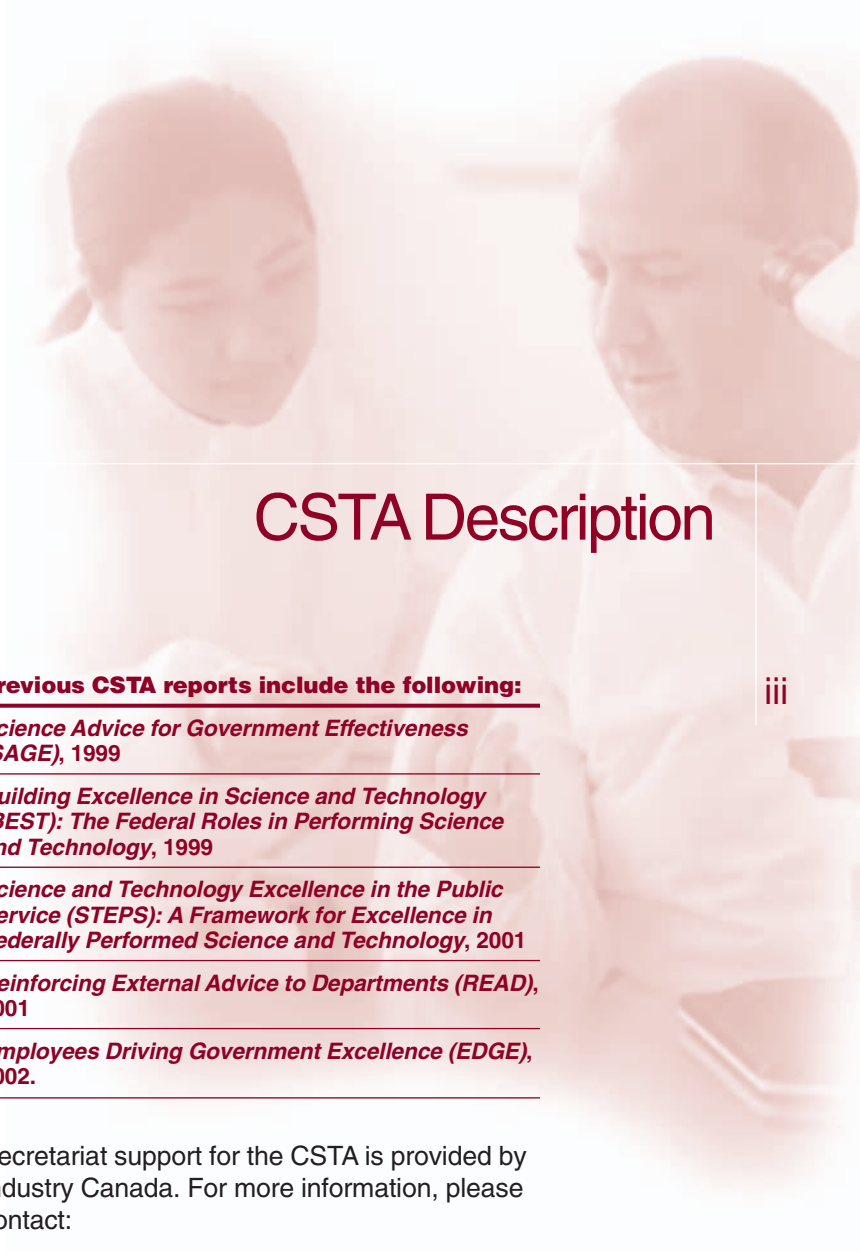
Aussi offert en français sous le titre *CSSP Les Communications scientifiques et la participation du public.*

This report has been produced by the CSTA, with the financial assistance of the Government of Canada. The views expressed in this report are not necessarily those of the Government of Canada.

Cat. No. Iu4-40/2003
ISBN 0-662-33856-1
53922B



CSTA Description

The Council of Science and Technology Advisors (CSTA) is an external, expert advisory body that provides advice to the federal Cabinet on the strategic management of the Government of Canada's internal science and technology enterprise. The CSTA was created in 1998, in response to the 1996 federal science and technology strategy, *Science and Technology for the New Century*, which called for greater government reliance on external advice.

CSTA membership is drawn from the academic, private and not-for-profit sectors, and reflects the diversity of science and technology-based disciplines. Council members are nominated by the federal science-based departments and agencies, and contribute their time and expertise to the external science advisory bodies of these organizations. The CSTA promotes excellence in the management of federal science and technology by examining issues that cut across science-based departments and agencies, and highlighting opportunities for synergy and joint action.

After Cabinet review, the CSTA's advice is shared publicly through reports such as this. *Science Communications and Opportunities for Public Engagement (SCOPE)* is the Council's sixth publication.

Previous CSTA reports include the following:

- ***Science Advice for Government Effectiveness (SAGE)*, 1999**
- ***Building Excellence in Science and Technology (BEST): The Federal Roles in Performing Science and Technology*, 1999**
- ***Science and Technology Excellence in the Public Service (STEPS): A Framework for Excellence in Federally Performed Science and Technology*, 2001**
- ***Reinforcing External Advice to Departments (READ)*, 2001**
- ***Employees Driving Government Excellence (EDGE)*, 2002.**

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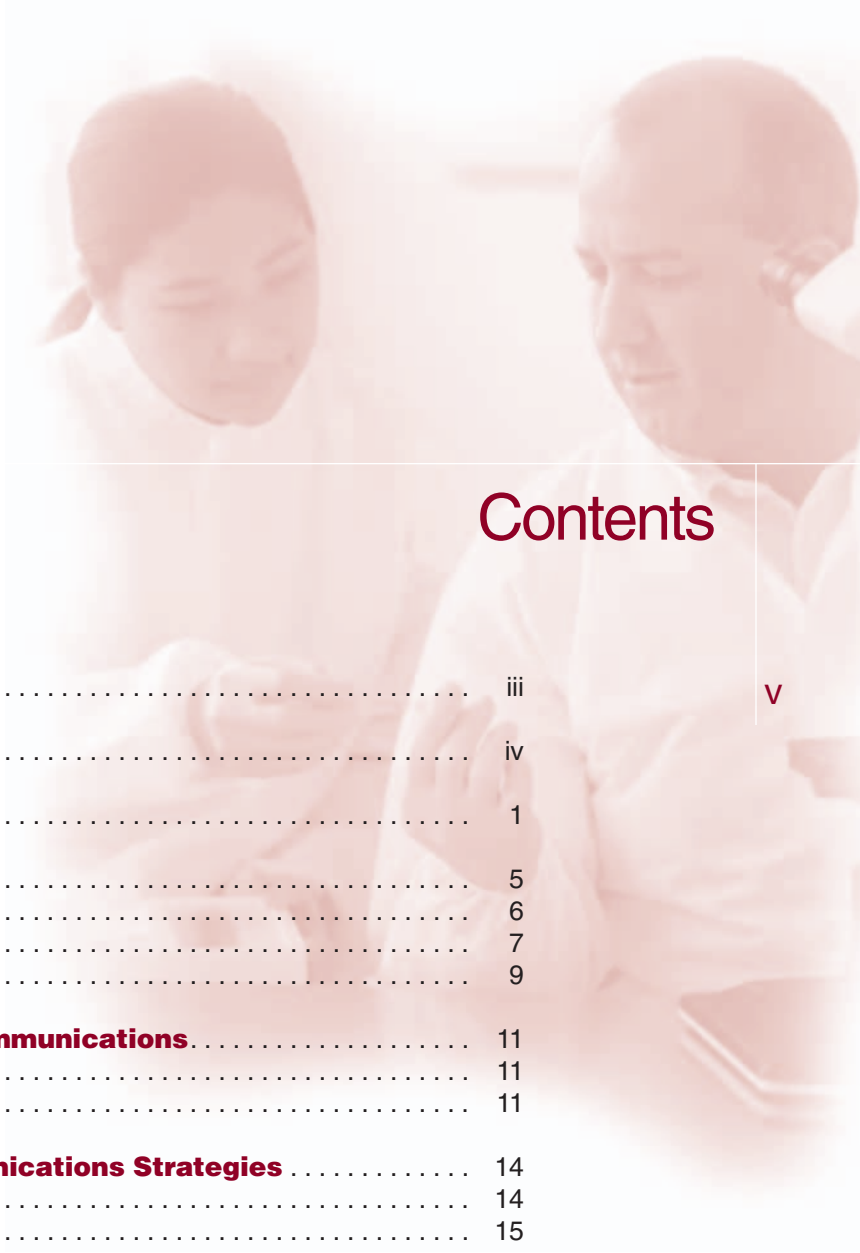

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Executive Summary

Science and technology (S&T) are vital elements of today's society. Exciting advances in S&T have become a fixture of our everyday lives; few aspects of our country's social and economic health remain totally unaffected by S&T. More and more parties — from individuals to the largest organizations — rely on S&T information for critical decision making. S&T also plays an increasingly critical role in informing government policy and decision making about issues that impact on society, from climate change to stem cell research. This accelerating demand for S&T information means that there is an increasing role for S&T communications.

In June 2001, the Cabinet Committee for the Economic Union (CCEU) asked the Council of Science and Technology Advisors (CSTA) to conduct an examination of federal S&T communications. Specifically, we were asked to explore the unique challenges facing government with respect to its communication of federally performed S&T and to propose recommendations and mechanisms to improve the effectiveness of federal S&T communications. In response, this report focuses on communications about federally performed S&T, exploring the fundamentals of effective federal S&T communications and key factors to consider in the development of departmental S&T communications strategies.

Setting the Stage

Traditionally, communications in government has tended to be interpreted as a uni-directional action: communicating *to* an audience in order to increase awareness, educate and persuade. Increasingly, however, the conception of communications must be expanded to encompass the notion of communicating *with* citizens, engaging them in dialogue, deliberation and decision making. Thus, government communications can inform (educate or make someone aware of something), persuade (convince someone to form an opinion or take an action) and engage (involve someone in an issue, discussion or decision). *Effective* communications can cultivate an environment where these actions — informing, persuading and especially engaging — thrive and where people see communicating *with* others as an integral part of their organization.

The government can realize many benefits from communicating about its S&T, especially in light of this more participatory conception of communications. It is important that the federal government communicate effectively about its S&T, in order to inform government policy by drawing on experience and perspectives from a variety of sources; foster an S&T culture in Canada by contributing to public understanding of S&T and S&T-related issues, and enhancing public confidence in government S&T; excite Canadian youth about S&T, and thereby generate more S&T-literate future leaders of government, industry and academia; nurture linkages among sectors of the national innovation system to improve collaboration and strengthen the system as a whole; and make S&T more valuable to society through "knowledge mobilization" that both transmits knowledge and creates opportunities to generate new knowledge.

The federal government faces a number of unique challenges in communicating about its S&T and S&T-informed policy. These challenges are rooted in characteristics that distinguish federal government S&T communications from the S&T communications of other sectors in the national innovation system, and from federal government communications around other subject areas. The nature of scientific uncertainty and risk also generates challenges for the government in communicating about its S&T and S&T-informed policy.

Fundamentals of Effective Federal S&T Communications

To foster excellence in the federal government's S&T communications, we have identified two key foundations and six principles and best practices which we feel are fundamental to effectiveness.

Effective S&T communications are built on a foundation of **well-articulated and understood S&T objectives**. First and foremost, each science-based department and agency (SBDA) must fundamentally understand and articulate why it exists and what it is in business to do. Following from this "self-awareness", S&T communications, like the S&T itself, should be aligned with the SBDA's mandates, priorities and programs, as well as those of the government at large. Effective S&T communications also requires a fundamental **commitment to communication goals and processes**. Senior managers must embrace communications as an integral part of the management and conduct of S&T and S&T-informed policy. This means that communications planning must be integrated early in the S&T cycle, and that employees should be motivated to adopt S&T communications activities as an integral part of their duties.

These foundations are complemented by the following key principles and best practices that should guide all government S&T communications.

- The government should **build its S&T communications around issues that are informed by S&T**, rather than around the specifics of the S&T itself. Furthermore, these S&T-related issues should be positioned in the context of the public agenda and linked to broader economic, social, environmental and other concerns, to help people see the relevance of S&T issues in the broader context of their personal lives, communities and society.
- The government must **be transparent about the mechanisms and processes it employs in the management and conduct of its S&T and S&T-informed policy**, and about the processes by which decisions are reached.
- The government must **practice openness in its S&T communications**, defined as the willingness to put information, ideas and debate in the public realm. Openness implies that authorized government employees be empowered to communicate freely with the public and other target audiences about S&T issues and activities.
- The government has a responsibility to **ensure that all S&T communications emanating from all internal sources are appropriate and accurate**, as departments and agencies are ultimately **accountable** for both the content and the impact of communications. Even democratic governments must retain the ability to restrict the release of information in the public interest, when full disclosure will jeopardize national security, violate personal privacy, break an intellectual property agreement or pose undue risk to the public. In attempting to balance transparency, openness and accountability, generally speaking, **the government should choose the practice of transparency and openness**. The government's right to restrict disclosure of information is a serious responsibility granted only because it is in the public interest.

- The dialogue and engagement inherent in effective participatory communications require that the government **build relationships with its stakeholders in communicating about its S&T**, striving to foster mutual confidence and respect. This relationship building requires that the government be inclusive, representing and incorporating the diverse perspectives and "local" expertise of different sectors, cultures and geographic areas, and that it practice "active listening".
- The government should **seek continual improvement through evaluation of its S&T communications strategies**. The knowledge gained through evaluation can be applied to enrich the processes, practices and content of ongoing S&T communications.

Development of Departmental S&T Communications Strategies

Making communications an integral part of the management and conduct of S&T requires the integration of communications planning early in the S&T cycle, through the development of comprehensive communications strategies. Each SBDA should design its S&T communications strategies around its respective departmental mandates, key issues or specific programs and projects, tailoring each strategy to accommodate its particular needs and interests. In developing these strategies, SBDAs should address issues that include communications objectives, target audiences, appropriate communicators, communications messages and vehicles, and evaluation. The following are guidelines that SBDAs should consider in relation to these issues.

- Articulate clear objectives for an S&T communications strategy that fit the mandate, context and needs of the SBDA, avoiding ambiguity and ensuring clarity in identifying what the target stakeholders should know and contribute, and what action they should take.
- Identify and segment target audiences appropriately.
- Research and understand target audiences and tailor communications activities accordingly to foster productive dialogue. Ensure that S&T communications are appropriate to the levels of science literacy of target audiences, responsive to their needs and interests, and sensitive to their cultural norms.
- Develop policies for interacting with stakeholders and the media on sensitive S&T issues. These policies should include information disclosure guidelines identifying those employees who are authorized to communicate and the type of information that can be discussed openly.
- Make more use of scientists to communicate on S&T issues.
- Ensure close links among scientists, S&T policy analysts and communications experts, to ensure that the relevant experience and expertise of each are brought to bear.
- Match the appropriate person to the appropriate task, ensuring that innate skills and training are used to the best advantage.
- Provide communications, consultation and media training to those scientists and policy analysts engaged in S&T communications activities.
- Assess the uncertainty and risk related to the S&T at issue and incorporate the communication of these elements into the strategy.
- Identify other players who are focusing on the same S&T issues and, where warranted, consult and coordinate with them before communicating with stakeholders. On major, horizontal issues that have a significant impact on Canadian society (e.g. climate change), consider convening interdepartmental coordinating groups, with designated departmental leads, to manage communications related to these issues.

- Employ a variety of communications vehicles, matching the advantages of each to the specific S&T communications objectives, audiences and messages.
- Explore innovative ways to use information and communications technologies in communicating with audiences, while remaining sensitive to the issue of access to these technologies.
- Develop a strong evaluation framework to assess the effectiveness of S&T communications strategies, using both formative and summative evaluations and both quantitative and qualitative measures.

Summary of Recommendations

Recognizing the fundamental importance of effective S&T communications, the CSTA recommends to the government that its science-based departments and agencies:

- **Embrace the concept of participatory S&T communications**, whereby audiences are engaged in dialogue, deliberation and decision making, acknowledging the value of the diverse perspectives and "local" expertise of different sectors, cultures and geographic areas.
- **Adopt communications as an integral part of the management and conduct of S&T and S&T-informed policy**, integrating communications planning early in the S&T cycle.
- **Develop comprehensive S&T communications strategies** to complement and support the conduct of S&T, respecting the principles and best practices outlined herein of building communications around issues informed by S&T; balancing transparency, openness and accountability; building relationships with target audiences; and seeking continual improvement through evaluation.
- **Invest in S&T communications planning, training and delivery** to foster excellence in S&T communications.

Setting the Stage

Science and technology (S&T) are vital elements of today's society. Exciting advances in S&T have become a fixture of our everyday lives; few aspects of our country's social and economic health remain totally unaffected by S&T. Various parties increasingly rely on S&T information for critical decision making, from individuals making personal health decisions to industry executives making corporate investment decisions. S&T also plays an increasingly critical role in informing government policy and decision making about issues that impact on society, from climate change to stem cell research.

This accelerating demand for S&T information means that the need for effective communications is becoming that much greater. As a key performer and user of S&T, the federal government has a responsibility to provide Canadians with information on its S&T, its S&T-informed policies and regulations, and the risks and opportunities created by S&T. The challenge for government is great — the complexity of the subject matter, the proliferation of mass media and the push for greater accountability are just some of the factors that combine to place increasing demands on the government and its scientists to communicate what they are doing and the implications and impact of their work.

For the federal government, this increased role for S&T communications is particularly relevant in the context of *Canada's Innovation Strategy*. Released by the federal government in February 2002, the Innovation Strategy establishes a target of ranking among the world's top five countries in research and development (R&D) performance by 2010.[1] Advancing the creation and application of new knowledge to achieve this target will require much more than "business as usual". Between now and 2010, Canadians and Canadian organizations, as active players in Canada's innovation system, will have to nurture the attitudes, priorities and approaches that are required for Canada to make the leap from its current position of 15th place into the top five. With S&T being a critical element of both innovation generally and the Innovation Strategy specifically, the demand for effective S&T communications has never been greater.

The Council of Science and Technology Advisors (CSTA) has noted the importance of federal S&T communications in its earlier studies. In our first report, *Science Advice for Government Effectiveness (SAGE)*, we discussed communication issues extensively in relation to inclusiveness, openness, scientific risk and uncertainty, and the early identification of issues requiring science advice. In *Building Excellence in Science and Technology (BEST)*, we identified public outreach and communications as functions tied to the four roles of government that are supported by S&T. More recently, in *Science and Technology Excellence in the Public Service (STEPS)*, we identified communications as part of the S&T continuum and included it as part of our framework for excellence in government S&T.

1. The federal government's Innovation Strategy is presented in two documents. *Achieving Excellence: Investing in People, Knowledge and Opportunity* focuses on how to strengthen Canada's science and research capacity and how to ensure that this knowledge contributes to building an innovative economy. *Knowledge Matters: Skills and Learning for Canadians* examines what Canada can do to strengthen learning, develop people's talent and provide opportunity for all.

In June 2001, the Cabinet Committee for the Economic Union (CCEU) asked the CSTA to build on this work and conduct an examination of federal S&T communications. Specifically, we were asked to explore the unique challenges facing government with respect to its communication of federally performed S&T and to propose recommendations and mechanisms to improve the effectiveness of federal S&T communications.

In response, this report focuses on communications about federally performed S&T, communications related to why the government does science, how it does science and how it uses science. The report addresses this subject in the context of the roles that we identified in *BEST* (which we reiterate here in the section entitled "The Challenges of Communicating Federal S&T"), exploring the fundamentals of effective federal S&T communications and key factors to consider in the development of departmental S&T communication strategies. Although developing a well-articulated approach to communicating around crises is an important component of federal government S&T communications, this report does not address this issue specifically, as the unique characteristics of crises may require special consideration.

Federal S&T Communications Defined

Traditionally, communications in government has tended to be interpreted as a uni-directional action: communicating *to* an audience in order to increase awareness, educate and persuade. Increasingly, however, the conception of communications must be expanded to encompass the notion of communicating *with* citizens, engaging them in dialogue, deliberation and decision making. This perspective on communications reflects the importance of a key value for democratic governments — inclusiveness. The perception of expertise is changing, as we noted in *Science Advice for Government Effectiveness (SAGE)*. "Local" knowledge residing in geographic, cultural or interest-based communities is increasingly being recognized as important. This type of participatory communications with citizens embraces an approach whereby all types of expertise are sought and considered. Thus, government communications can inform (educate or make someone aware of something), persuade (convince someone to form an opinion or take an action) and engage (involve someone in an issue, discussion or decision). *Effective* communications can cultivate an environment where these actions — informing, persuading and especially engaging — thrive and where people see communicating *with* others as an integral part of their organization.

S&T communications occurs around a series of related activities that take place throughout the S&T process. These activities do not necessarily occur in a linear fashion, but unfold in a dynamic, evolving manner. They include foresight, formal consultation, communication of findings and evaluation. Foresight, the process of identifying and anticipating emerging S&T topics and the communications issues around them, facilitates planning and can help mitigate potential crises. Formal consultation elicits a diversity of views that can contribute to informed decision making about S&T issues and the management of federal S&T. Communication of S&T findings and results facilitates the sharing and further advancement of knowledge. The review and evaluation of federal S&T issues can result in a solid understanding of successes and failures which in turn feeds into the identification of new issues, challenges and opportunities. Integral to the effectiveness of all these S&T communications activities is the maintenance of ongoing dialogue and engagement with stakeholders. This is particularly critical for governments that derive their mandate and authority from a democratic process.

Throughout this report, we use the terms "audiences", "citizens" and "stakeholders" interchangeably, to refer to those, both internally and externally, with whom the government communicates. Use of these terms is meant to encompass all parties with whom the government communicates, including the general public and segmented groups such as industry, interest groups and First Peoples communities, among others. We found that no one word adequately and accurately captured our intent. For example, the term "audience" typically implies one-way communication *to* rather than *with* citizens and as such does not wholly reflect our intended meaning.

Federal government S&T communications is not only about communicating with external audiences but also about the practice of good *internal* communications: within and between science-based departments and agencies (SBDAs), between scientists and policy makers, between scientists and parliamentarians, and between Ottawa and the regions. Effective internal communications can facilitate effective external communications. Conversely, internal communications failures can generate external communications failures (e.g. employees confused by internal communications can, in turn, relay disjointed messages externally).

Nowhere is the practice of effective internal communications more important than in relation to the government's policy-making process. As we noted in *Science Advice for Government Effectiveness (SAGE)*, the effective use of science advice can position the government to take advantage of opportunities presented by advances in S&T, while reducing science-related crises of public confidence. The communication of scientific theories, data, findings and conclusions to inform policy and regulatory decision making is fundamental to the business of public policy. This demands effective communications between government scientists on the one hand and policy analysts and decision makers on the other.

The Importance of Communicating Federal S&T

The government can realize many benefits from communicating about its S&T, especially in light of the more participatory conception of communications defined herein. It is important that the federal government communicate effectively about its S&T in order to achieve the following objectives.

- **Inform government policy**
  Communications that engage stakeholders in discourse can result in more inclusive, informed government policies. Responsible decision making draws on advice, expertise and experience not only from government scientists, but also from a variety of sources external to government. Participatory communications serves to introduce fresh, new perspectives into the policy-making process, particularly if groups that have traditionally had less access to government are included. This type of inclusiveness can enhance debate and ensure that multiple viewpoints are considered, enriching the policy-making process and outcomes. Although an increased number of parties can make it more difficult to reach a consensus on a particular issue, the policy that is adopted after broad consultation is likely to have been thoroughly examined and may be more easily accepted and therefore implemented.

- **Foster an S&T culture**
  Government communications about and around its S&T can contribute to public understanding of the basic content and processes of S&T and the nature of S&T-related issues. An informed public will be better equipped both to contribute to discussions around and to make personal decisions about S&T-related issues. This does not mean that disagreements over government S&T activities and the nature and application of government science will be eliminated, or that the public will necessarily be equipped to assess the merits of specific scientific evidence on complex subjects. However, an informed public tends to be more supportive of S&T, which can translate into both public acceptance of the need for government to engage in S&T and confidence in the role that government plays in S&T. This public acceptance and confidence are important to the health of government's relationship with its citizens on S&T-related issues, particularly during times of crisis, when public confidence in government assumes increasing importance. An S&T culture will thrive when all parties — government, the public, industry, academia and so on — understand S&T and the role of S&T in society, earn each other's respect and confidence, and collaboratively engage each other to pursue opportunities and overcome challenges.

- **Invest for the future**
  S&T communications can also serve to inform and excite Canadian youth about S&T. This will help young Canadians feel more comfortable with the role that S&T plays in their everyday lives and better equip them to make personal decisions about, and contribute to public discourse on, S&T-related issues. They might also pursue further S&T learning opportunities or explore related career possibilities. This will generate more future leaders of government, industry, academia and the non-profit sector who are interested and trained in S&T, helping Canada to continue to excel as a country.

- **Nurture linkages among sectors**
  Effective S&T communications fosters improved linkages with other players in the innovation system, both nationally and internationally. S&T is increasingly conducted collaboratively by organizations in various sectors. In *Building Excellence in Science and Technology (BEST)*, we noted that S&T performed by the federal government must be linked with that performed by the other sectors in the national innovation system and with the global pool of knowledge and technology. These linkages help ensure that federal performance of S&T capitalizes on the best available inputs, regardless of their source, and that overlap and duplication are minimized, thereby contributing to excellent government science.

- **Make S&T more valuable to society**
  Only through communicating can we ensure that S&T information is in the hands of those who can use it, thus making S&T more valuable to society. Engagement processes enable the federal government to hear from citizens about how its S&T is relevant to their needs, thus helping the government decide what S&T to perform, which applications of its S&T to pursue, and how S&T should inform its policies, standards and other decisions. Furthermore, the process of sharing information, "knowledge mobilization", creates an information flow among all players that both transmits knowledge and creates opportunities to generate new knowledge. This type of knowledge mobilization, with the creation, modification and application of knowledge, informs and enriches the policy-making and regulatory process. It also ensures that those with the appropriate resources can capitalize on opportunities to innovate. The commercialization of research, for example, takes basic research from governments and universities into the private sector, where companies, often in collaboration with the source of the research, can turn fundamental discoveries into marketable products and applications.

In communicating effectively about its S&T, the government will not only realize these benefits, but it will also mitigate or avoid the negative repercussions associated with poor communications. With the information "explosion" fed by the development of the Internet, citizens have access to a wide variety of information from multiple sources. In the absence of quality control of the Internet, there is a considerable amount of misinformation in circulation. The public must be able to rely on the government as a source of credible information. If the government fails to communicate effectively about its S&T, it becomes part of the problem rather than part of the solution. Furthermore, failure to communicate effectively and responsibly can feed S&T-related crises, impacting negatively both on the immediate issue and on the longer-term credibility of government and its science. The saga of mad cow disease in Britain is a high-profile example of failure in government S&T-related communications.

The Challenges of Communicating Federal S&T

The CSTA was asked to examine, in part, unique challenges facing the communication of federally performed S&T. We believe that these challenges are rooted in the characteristics that distinguish federal government S&T communications from the S&T communications of other sectors in the national innovation system and from federal government communications around other subject areas. The nature of scientific uncertainty and risk also generates challenges for the government in communicating about its S&T and S&T-informed policy.

The Federal Government's S&T Communications vis-à-vis Other Sectors' S&T Communications

Distinguishing federal government S&T communications from the S&T communications of other sectors begins with those characteristics that distinguish government science itself from the S&T of other sectors. In *Building Excellence in Science and Technology (BEST)*, we identified the following four key roles for the federal government in performing S&T:

- support for decision making, policy development and regulations (e.g. Arctic climate measurement to inform responses to global warming);
- development and management of standards (e.g. research and evaluation services that support the development of national building codes);
- support for public health, safety, environmental and/or defence needs (e.g. the development of new technologies for Canada's military and security forces, to improve the safety and security of Canadians); and
- enabling of economic and social development (e.g. agricultural and agri-food research, with the private sector, that is readily transferable to companies for the generation of new business and economic growth).

These roles involve a broader range of S&T activities than do those in industry, academia or elsewhere. They encompass not only R&D (basic and applied research and development), but also related scientific activities (RSA) not typically conducted by universities or private companies.[2] Not only does the federal government engage in both R&D and RSA, but federal scientists and technologists also work at laboratories and research facilities across the country and study an extremely wide range of subject areas, from agricultural biotechnology to polar science to remote sensing. Furthermore, government has a broader and more diverse audience for its S&T than do the other sectors of the national innovation system. This audience includes both internal groups (e.g. parliamentarians, policy makers, managers and scientists) and external groups (e.g. the public, the media, industry, academia and non-profit organizations). Many of these groups are further segmented (e.g. youth, First Peoples communities and issue-oriented interest groups). Given this diversity of federal government S&T, the use of S&T communications to clarify, describe and consult on S&T roles, priorities, issues and activities is all the more important.

Federal government S&T communications is also distinguished by the fact that the government has a responsibility to its citizens which obliges it to communicate to an extent not necessarily required by industry and academia. Furthermore, government sometimes finds itself in the position of having to communicate unpleasant news to its citizens, who expect solutions to the problems identified. Both of these factors heighten the government's responsibility and accountability for S&T communications.

2. The term "related scientific activities (RSA)", or "science for service", includes activities that complement and extend R&D by contributing to the generation, dissemination and application of S&T knowledge (e.g. monitoring and disease surveillance, weather forecasting). See the CSTA's *BEST* report, p. 7.

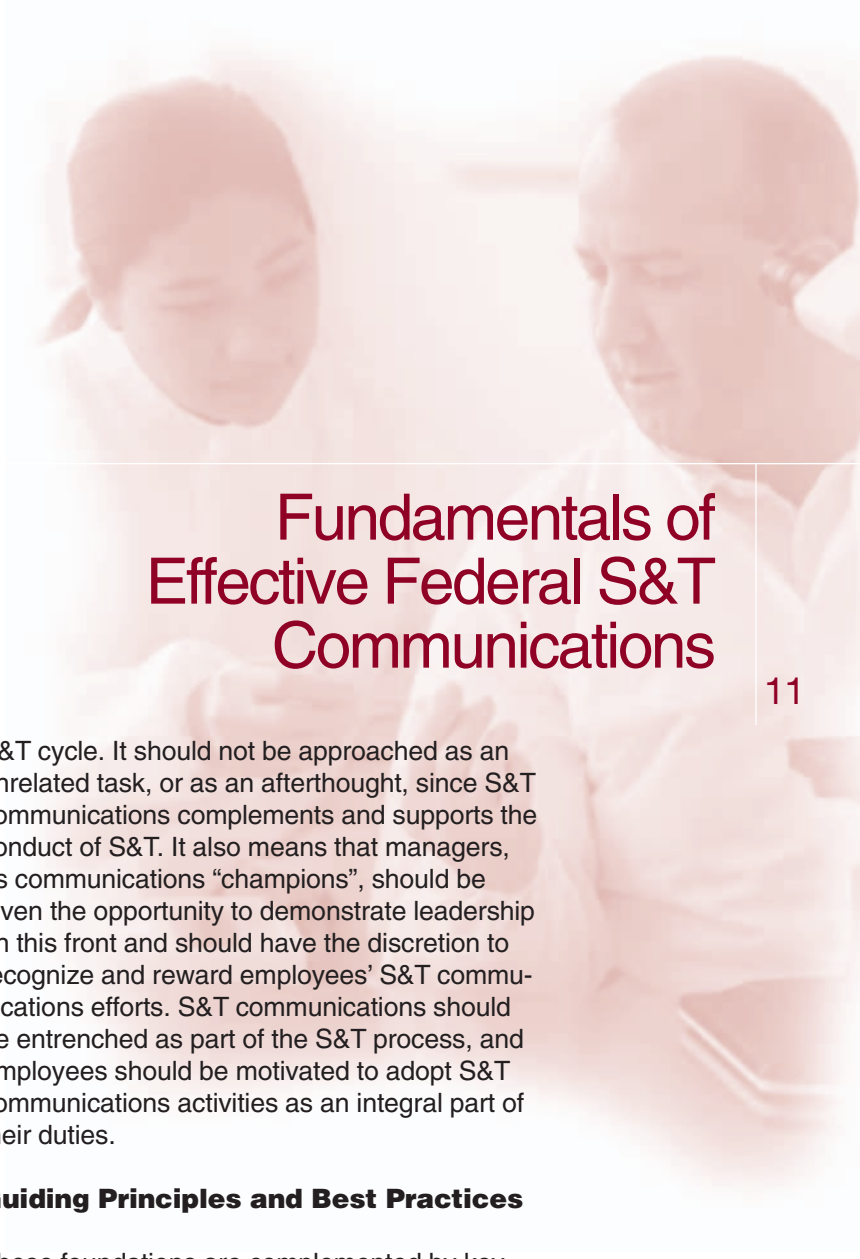
The Government's S&T Communications vis-à-vis its Communications on Other Issues

The key factors that distinguish the government's S&T communications from its communications on other issues relate to the nature of the subject matter itself. S&T information tends to be highly specialized and complex; understanding and evaluating scientific evidence to contribute to discussion and decision making often require a level of expertise not shared by target audiences. This complexity makes dialogue with citizens that much more challenging. Separating "facts" from "values" in the discussion of science-related issues further complicates the communications process. Both play a valid role in the discussion of science-related issues, but, in communicating both internally and externally, it is important to distinguish between the two and recognize how they influence discussions and decisions.

Scientific Uncertainty and Risk

Government S&T, like all S&T, entails uncertainty and risk. Science involves a process of discovery that leads to an evolving understanding of nature; it frequently does not provide definitive answers or absolute truths. Sometimes, the findings of a study are inconclusive or subject to interpretation, raising more questions to be answered through additional research. Furthermore, there are potential risks associated with the application of S&T and the impact of S&T-related policies and regulatory decisions — risks such as the adverse side-effects of newly approved drugs or contamination of freshwater supplies.

This inherent uncertainty and risk associated with science and its applications make government S&T communications all the more challenging. The federal government's responsibility to its citizens (as described above) demands that the government integrate the communication of scientific uncertainty and risk into its S&T communications in a responsible, conscientious manner. Presenting all scientific conclusions as "fact" only serves to perpetuate the myth that science is infallible. Effective communication about uncertainty and risk can engage the public and stakeholders in discourse about acceptable collective risks, enable individuals to make better-informed choices about personal risks and potentially mitigate panic or crisis situations.



Fundamentals of Effective Federal S&T Communications

S&T communications, conceived herein as informing, persuading and engaging citizens, should increasingly be acknowledged as a key component of the federal government's management of its S&T enterprise. The need for effective S&T communications is becoming greater as the task is becoming more challenging. To foster excellence in the federal government's S&T communications, we have identified key foundations and guiding principles and best practices that we view as fundamental to effectiveness.

Foundations

There are two foundations that we believe lay the groundwork for effective S&T communications. These foundations contribute to an environment where excellence can thrive.

Well-Articulated S&T Objectives

Effective S&T communications follow from well-articulated and understood S&T objectives. First and foremost, each SBDA must fundamentally understand and articulate why it exists and what it is in business to do. Following from this "self-awareness", S&T communications, like the S&T itself, should be aligned with the SBDA's mandates, priorities and programs, as well as those of the government at large.

Commitment to Communications

Effective S&T communications requires a fundamental commitment to communications goals and processes. Senior managers must embrace communications as an integral part of the management and conduct of S&T and S&T-informed policy. This means that communications planning must be integrated early in the S&T cycle. It should not be approached as an unrelated task, or as an afterthought, since S&T communications complements and supports the conduct of S&T. It also means that managers, as communications "champions", should be given the opportunity to demonstrate leadership on this front and should have the discretion to recognize and reward employees' S&T communications efforts. S&T communications should be entrenched as part of the S&T process, and employees should be motivated to adopt S&T communications activities as an integral part of their duties.

Guiding Principles and Best Practices

These foundations are complemented by key principles and best practices that should guide all government S&T communications. These principles and best practices are a reflection of organizational values as they apply to the broad objectives of federal S&T communications. Excellence in federal S&T communications requires that all communications activities be conducted in a manner consistent with these principles and best practices.

The Big Picture

The government should build its S&T communications around issues that are informed by S&T, rather than around the specifics of the S&T itself. Furthermore, these S&T-related issues should be positioned in the context of the public agenda and linked to broader economic, social, environmental and other concerns, to help people see the relevance of S&T issues in the broader context of their personal lives, communities and society. Citizens should be able to "connect" with the subject matter of S&T communications. For the S&T itself and for S&T-informed policies to resonate with audiences, it is critical to communicate about the way in which S&T relates to larger issues, as this will convey the context for government S&T activities and policies. This type of communication is more likely to generate interest and engagement among audiences, as they will more easily grasp the relevance of the S&T to them. Communicating the broader impacts paints a bigger picture for government S&T, making it less esoteric and more accessible.

Transparency

The government must be transparent about the mechanisms and processes it employs in the management and conduct of its S&T and S&T-informed policy, and about the processes by which decisions are reached. Previous CSTA reports have identified transparency as critical to excellent federal S&T. From planning, through implementation, to assessment of results, government must communicate about its S&T processes and decisions so that they are visible to citizens. Generally speaking, the more complex and multidisciplinary the issue and the S&T underpinning it, and the more numerous the players accountable for that issue and that S&T, the greater the need for transparency. The practice of transparency helps distinguish the science and the science advice which contribute to government policy making from the many other considerations and factors that inform policy, and provides clarity about the manner in which the S&T is informing policy and regulations. This contributes to a clearer understanding of the role of science and science advice, and the nature and rationale of each policy decision.

Openness

The government must practice openness in its S&T communications, here defined as the willingness to put information, ideas and debate in the public realm. Openness implies that authorized government employees be empowered to communicate freely with the public and other target audiences about S&T issues and activities. In a knowledge-based society, information is power; in a democracy, a lack of openness means that those who elect and empower governments lack information and therefore lack power. Empowering citizens through the practice of openness contributes to their understanding of science and its accompanying uncertainty and risk, allowing them to make informed personal decisions about issues that affect their well-being. It also offers them the opportunity to engage in discussion not only about the specifics of a particular science-based issue, but more broadly about the directions in which government science should go and the appropriate application of scientific discoveries and the ethical issues surrounding them. The concept of openness has assumed new dimensions in the post-September 11, 2001 environment. The response to the threat of terrorism and concerns about making sensitive information available to terrorists have the potential to significantly disrupt the free flow of S&T information. The government must be particularly vigilant about practicing openness in this environment.

Accountability

The government has a responsibility to ensure that all S&T communications emanating from all internal sources are appropriate and accurate. Despite the fact that communications activities are publicly manifested by individual employees, all departments and agencies, as represented by senior managers and, in the end, ministers, are ultimately accountable both for what is said and for impacts resulting from the communications. We acknowledge that even democratic governments must retain the ability to restrict the release of information in the public interest, when full disclosure will jeopardize national security, violate personal privacy, break an intellectual property agreement or pose undue risk to the public. However, it must be recognized that the government's right to limit information is a serious responsibility, granted only because it is in the public interest.

Balancing Transparency, Openness and Accountability

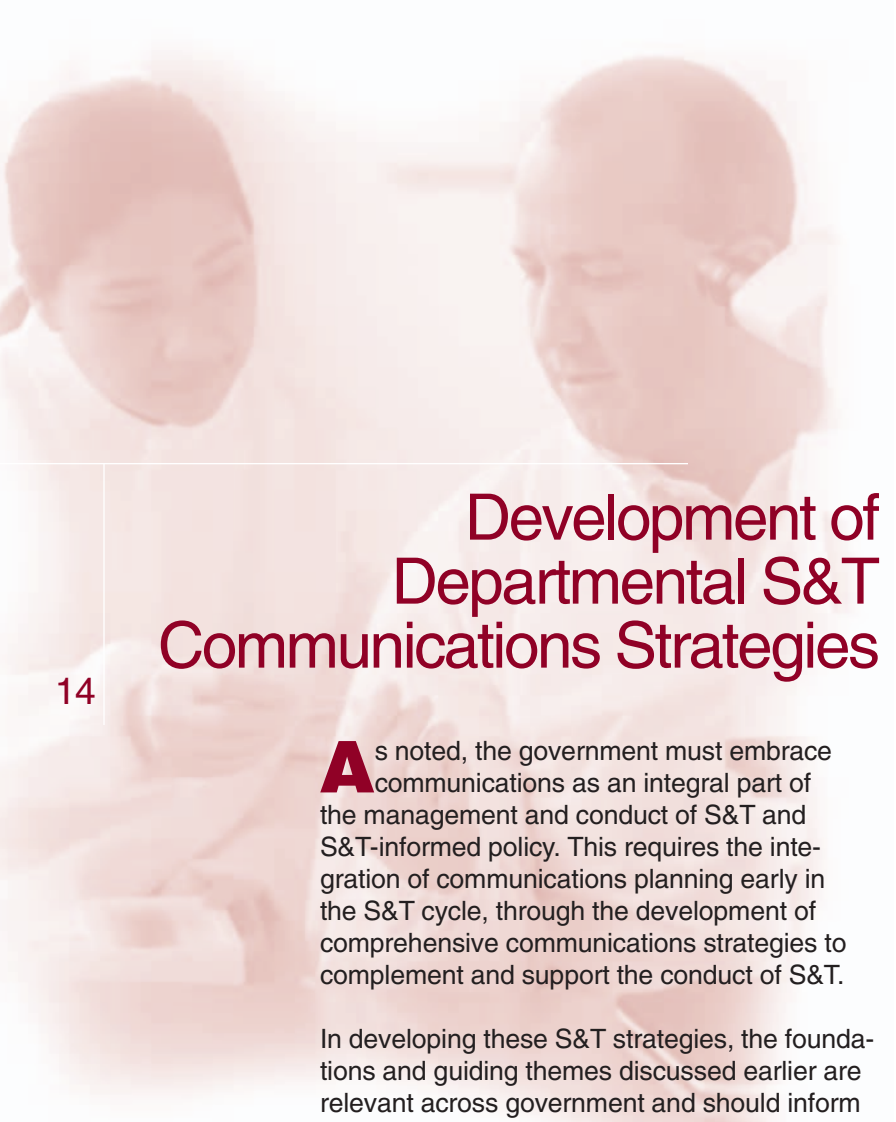
Departments and agencies are responsible for pursuing effective communications management policies, and ensuring the accurate and appropriate synthesis and communication of scientific information and perspectives. Although the principles of transparency and openness are critical to effective federal S&T communications, sometimes sensitive information cannot be released, as noted above, for reasons related to national security, privacy, proprietary rights or public safety. Although these important exceptions must be respected, generally speaking, ***the government should choose the practice of transparency and openness.*** Even in cases where limited disclosure of information is justified, the government must maintain an element of transparency by explaining when and why it is unable to reveal certain information. It must be clear that concerns for national security, privacy, proprietary rights or public risk exist, and that they warrant withholding information. As stated, the government's right to restrict disclosure of information is a serious responsibility granted only because it is in the public interest. The government must hold itself to the strictest standard when deciding to limit information disclosure.

Relationship Building

The dialogue and engagement inherent in effective participatory communications require that government build relationships with its stakeholders in communicating about S&T, striving to foster mutual confidence and respect. This relationship building — from S&T partnerships with industry to collaborative decision making with the public — requires that the government be inclusive, representing and incorporating the diverse perspectives and "local" expertise of different sectors, cultures and geographic areas. It also requires "active listening" by government — the willingness to listen, to seek to understand and to consider the views expressed by citizens. This does not require that the government incorporate all feedback, but demands that the government be receptive to all input, prepared to seriously consider what it hears from its constituents.

Continual Improvement

The government should seek continual improvement through evaluation to strengthen S&T communications strategies and practices. A rigorous evaluation framework should include identification of S&T communications goals and accompanying indicators to measure success in achieving these goals. Evaluation of S&T communications effectiveness can contribute to organizational learning, and the knowledge gained through evaluation can be applied to enrich the processes, practices and content of ongoing S&T communications.



Development of Departmental S&T Communications Strategies

As noted, the government must embrace communications as an integral part of the management and conduct of S&T and S&T-informed policy. This requires the integration of communications planning early in the S&T cycle, through the development of comprehensive communications strategies to complement and support the conduct of S&T.

In developing these S&T strategies, the foundations and guiding themes discussed earlier are relevant across government and should inform all federal S&T communications. However, we recognize that the federal government is not a monolith. As a large, diverse bureaucracy, it has a multitude of different mandates and objectives at the department/agency and unit levels. Each science-based department and agency (SBDA) should design its own S&T communications strategies around its respective departmental mandates, key issues, or specific programs and projects, tailoring each strategy to accommodate its particular needs and interests. That being said, it is important that these S&T strategies be conceived in the context of the government's broader themes and priorities, to ensure consistency with, and relevance to, the public agenda.

What follows is not intended to be a comprehensive, expert guide to communications planning, but rather a series of suggested guidelines that SBDAs might consider in preparing their S&T communications strategies.

S&T Communications Objectives

Central to any S&T communications strategy is the identification of communications objectives. The objectives of a communications strategy will be specific to the department's mandate and to the S&T at issue. In identifying objectives, departments should also be sensitive to the existing "environmental" context — to issues that are prominent on the public agenda, to the prevailing mood of the public, and so on. Most S&T communications objectives will remain fairly consistent over time, while others will evolve as dialogue with stakeholders unfolds.

Guideline:

- **Articulate clear objectives for an S&T communications strategy** that fit the mandate, context and needs of the SBDA. Avoid ambiguity, ensuring clarity in identifying what the target stakeholders should know and contribute, and what action they should take. Well-articulated communications objectives are predicated on clearly understood objectives of the S&T itself.

Target Audiences

As noted earlier, the federal government has perhaps the broadest and most diverse set of potential audiences for its S&T communications. Understanding these audiences is one of the essential tasks in all communications, but it is particularly relevant to S&T communications, given the complexity and sophistication of the subject matter.

It is important to gauge the extent of stakeholders' understanding of the terminology, concepts and context of the S&T at issue. As important as it is not to communicate excessive complexity, it is also critical not to underestimate the audience. Furthermore, it is important to understand the needs, interests and sensitivities of stakeholders. Their existing perspectives can influence their reaction both to efforts to engage them in dialogue and to the substance of the information being communicated. Finally, it is important to be aware of and sensitive to the cultural norms of the target audiences. Different cultural perspectives can influence communications patterns. For example, one cannot assume that silence necessarily implies understanding or concurrence among all target audiences, while translation of S&T messages can create challenges both conceptually and linguistically.

Guidelines:

- **Identify and segment target audiences appropriately.**
- **Research and understand target audiences and tailor communications activities accordingly to foster productive dialogue.** Although the substance of the messages should remain consistent across all segments of the audience, the methods and means by which these messages are communicated might differ. Ensure that S&T communications are appropriate to the levels of science literacy of target audiences, responsive to their needs and interests, and sensitive to their cultural norms.

Identification of Appropriate Communicators

Referring again to the principles of openness and accountability, it is important that each SBDA identify those in the organization who are authorized to communicate with the public and stakeholders about various issues, particularly sensitive ones. These decisions must be understood equally by managers and employees. Although these decisions can be made only by each SBDA, we reiterate that every effort should be made to respect the principle of openness so valued in democratic societies.

It is also critically important to select the most appropriate, effective spokespeople, whether they be scientists, S&T policy analysts, communications experts or some combination thereof. Communicators are the public face of an organization and contribute, positively or negatively, to an organization's credibility. Whether informing, persuading or engaging citizens on S&T issues, it is important to identify communicators who marry knowledge of the science and the issues with communication skills. Numerous polls and reports have shown that scientists are regarded as very credible, especially by the public, but some may lack communication skills. Policy analysts, who work at the interface between government scientists and decision makers, are often well positioned to discuss the broader context in which the S&T exists. Although communications specialists tend to be less acquainted with sophisticated S&T issues, they have specific skills and experience that are invaluable to the communications process.

Those engaging in S&T communications must have the appropriate skills in order to execute their responsibilities effectively. Formal training will help hone existing skills, as well as introduce scientists to some of the more powerful communications and consultation strategies and practices. Mentoring and other informal training activities can also provide the opportunity for regular collaboration among scientists, policy analysts and communications specialists.

Guidelines:

- **Develop policies for interacting with stakeholders and the media on sensitive S&T issues. These policies should include information disclosure guidelines**, which identify those employees who are authorized to communicate and the type of information that can be discussed openly.
- **Make more use of scientists to communicate on S&T issues.** Identify those scientists who exhibit a natural talent for communications and/or an interest in a specific stakeholder group. Use these scientists on a continuous, long-term basis in order for them to gain experience and credibility over time.

Using Scientists to Communicate S&T

Environment Canada produces biweekly tip sheets to alert the media to scientific issues, providing direct contact to scientists working on the issues.

The University of Toronto's "Blue Book" is a searchable list of academic experts that the media and others can contact for information on various science-related topics.

- **Ensure close links among scientists, S&T policy analysts and communications experts.** Collaboration can ensure that the relevant experience and expertise of each are brought to bear on communications activities.
- **Match the appropriate person to the appropriate task**, ensuring that innate skills, training and experience are used to the best advantage. The person best equipped to address foresight, for example, might be different from the one best suited to undertake formal consultations or to communicate S&T findings and results.
- **Provide communications, consultation and media training to those scientists and policy analysts engaged in S&T communications activities.**

S&T Communications Messages

As discussed in the section entitled "Guiding Principles and Best Practices", it is important that the audience be able to "connect" with the subject matter of federal S&T communications. One way to accomplish this is to focus on communicating information that is relevant and usable — i.e., information that people can apply to activities and decisions in their personal and professional lives. It is also important to acknowledge that science and its applications entail uncertainty and risk, and consider how best to incorporate discussion of uncertainty and risk into an S&T communications strategy.

Different organizations may have different and sometimes competing views on the same S&T issue. The views of both parties may be informed by science, but given scientific uncertainty, differences may not be resolvable through the victory of one piece of evidence over another. The challenge in the communications context is to manage differences that could generate inconsistent or contradictory messages and thereby result in confusion among citizens. In cases such as these, transparency becomes particularly important.

Communicating Information that is Relevant and Usable

Natural Resources Canada turned 30 years of cumulative climate and atmospheric data into plant hardiness zone maps that help Canadian gardeners.

The National Research Council Canada provides periodic tables of the elements and star charts of the heavens to Canadian science students.

The U.S. Environmental Protection Agency maintains a Web-based "Window to My Environment" tool that provides federal, state and local information about environmental conditions and features (e.g. toxic waste sites) searchable by zip code or geographic location.

Guidelines:

- **Focus on issues that are informed by S&T and relate these S&T issues to broader economic, social, environmental and other issues, making the information relevant and usable for target audiences.**
- **Assess the uncertainty and risk of the S&T at issue and incorporate communication of these into the strategy.** The treatment of S&T uncertainty and risk should be consistent with the principle of openness, although in cases where full disclosure might threaten public safety or national security, carefully considered restrictions on information may be warranted.

Communicating Risk

The Canadian Chemical Producers' Association "Responsible Care" program includes communication practices based on the principle of dialogue with communities. Member companies' communications are informed by the principle of communicating to neighbouring communities about the risks associated with the operation of chemical plants, on the presumption that they have the right to know.

- **Identify other players (federal government SBDAs/units or external partners) who are focusing on the same S&T issues and, where warranted, consult and coordinate with them before communicating with stakeholders.** On major, horizontal issues that have a significant impact on Canadian society (e.g. climate change), **consider convening interdepartmental coordinating groups, with designated departmental leads, to manage communications related to these issues.**

S&T Communications Vehicles

There is a significant variety of sophisticated communications vehicles available to the government today. Many allow the opportunity not just to communicate *to* audiences, but also to communicate *with* them and engage them in ongoing dialogue. These vehicles include popular or mass media (newspapers, radio and television), multimedia and information technologies, science media, academic journals, and literature from non-profit organizations, conferences and educational institutions, to name but a few. Different vehicles are best suited to different purposes and audiences, according to their particular characteristics. Academic journals, for example, tend to be prestigious and credible but attract a relatively limited and specialized readership. New media such as the Internet provide a wealth of information and are particularly suited to the S&T context, but at the same time pose challenges in terms of access (the "digital divide") and credibility (a great deal of information on the Internet is false or misleading).[3] Information and communications technologies (ICTs) offer novel opportunities for engagement.

Guidelines:

- **Employ a variety of communications vehicles**, matching the advantages of each to the specific S&T communications objectives, audiences and messages.

Using a Variety of Communications Vehicles

The American Association for the Advancement of Science (AAAS) maintains *EurekAlert!*, an Internet resource of science stories for journalists.

The Pembina Institute provides a multimedia package for classrooms, *Climate Change Awareness and Action*, covering scientific and social issues surrounding climate change.

The federal government's 5NR Working Group produces *Earthtone Vignettes* with the Discovery Channel, profiling government science and scientists.

- **Explore innovative ways to use ICTs** in communicating with audiences, while remaining sensitive to the issue of access to these technologies.

3. The "digital divide" refers to the divide between those with and those without ICT access. This divide has arisen because of obstacles related to acquiring the technology or skill set required to take advantage of ICTs.

Evaluation

Evaluation plans must be built into every S&T communications strategy, as much can be learned through the development and execution of communications initiatives. It is vital to know the extent to which communicators have succeeded in reaching the various target audiences. Analysis should reveal how communications have affected perceptions, increased knowledge, garnered feedback or influenced actions surrounding S&T issues. Put to use, knowledge acquired through evaluation can inform and strengthen the effectiveness of ongoing and future communications activities.

Evaluation of communications strategies should be both formative and summative. Formative evaluation focuses on the ongoing communications process, analysing strengths and weaknesses with a view to improving the communications campaign as it unfolds. Summative evaluation is primarily retrospective, measuring the impacts and outcomes of the campaign, to determine if objectives were met. In addition, a comprehensive evaluation framework should include a mix of both quantitative and qualitative methods. Selection criteria for both research methods and data collection tools should take into account the communications objectives and the contexts of the target audiences.

Guideline:

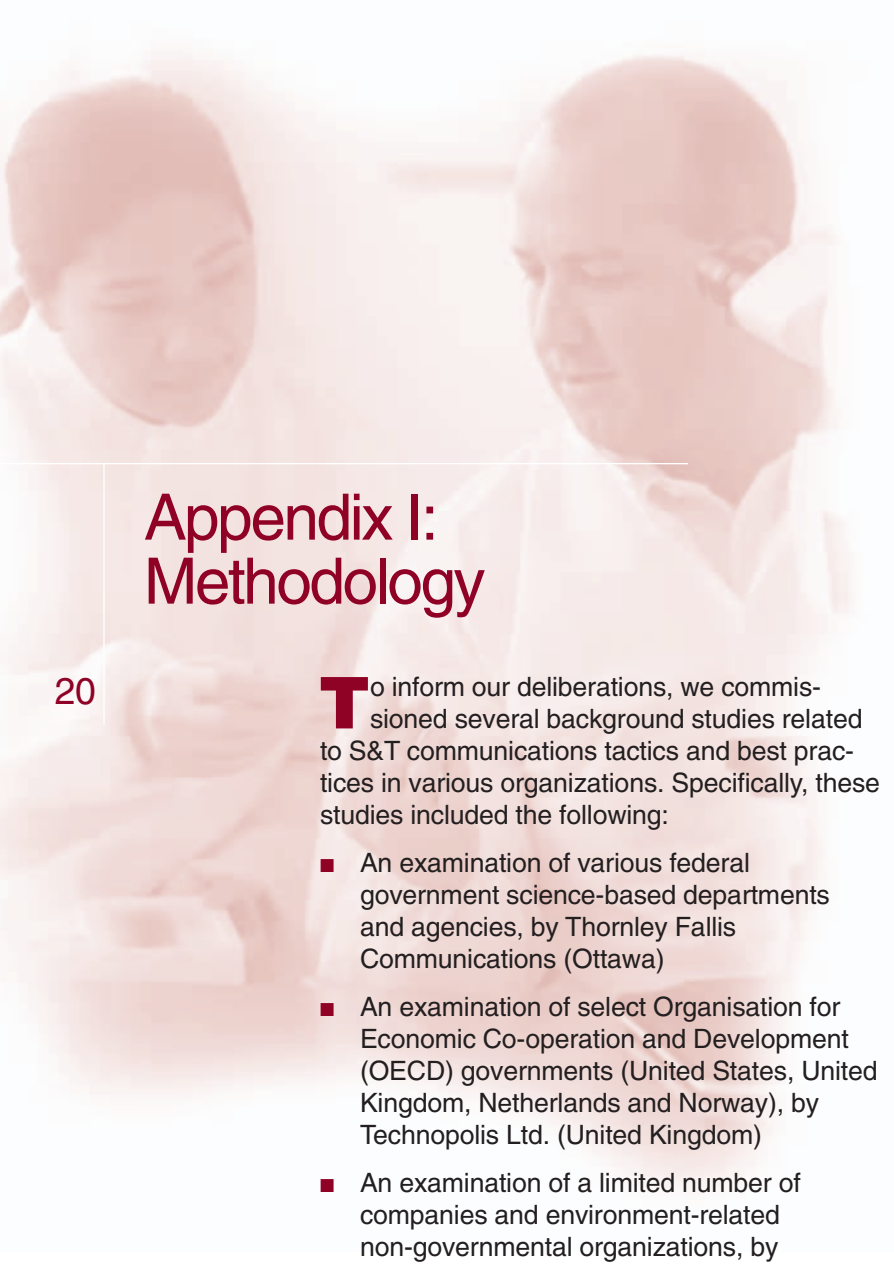
- **Develop a strong evaluation framework to assess the effectiveness of S&T communications strategies**, using both formative and summative evaluations, and both quantitative and qualitative measures.

Summary of Recommendations

Government and society increasingly rely on S&T information for critical decision making related to all aspects of life. Thus, the effective communication of S&T information and issues is fundamental to Canada's economic and social well-being. As a key player in the national innovation system and as a democratic government responsible to its citizens, the federal government has a duty to communicate openly and effectively about its S&T. The rewards can be great: more informed, inclusive government policy; a more robust S&T culture in Canada, with more young people pursuing career opportunities in S&T-related fields; closer linkages with other players in the innovation system; and the collaborative creation, modification and application of knowledge to make S&T more valuable to society.

Recognizing the fundamental importance of effective S&T communications, the CSTA recommends to the government that its science-based departments and agencies:

- **Embrace the concept of participatory S&T communications**, whereby audiences are engaged in dialogue, deliberation and decision making, acknowledging the value of the diverse perspectives and "local" expertise of different sectors, cultures and geographic areas.
- **Adopt communications as an integral part of the management and conduct of S&T and S&T-informed policy**, integrating communications planning early in the S&T cycle.
- **Develop comprehensive S&T communications strategies** to complement and support the conduct of S&T, respecting the principles and best practices outlined herein of building communications around issues informed by S&T; balancing transparency, openness and accountability; building relationships with target audiences; and seeking continual improvement through evaluation.
- **Invest in S&T communications planning, training and delivery** to foster excellence in S&T communications.



Appendix I: Methodology

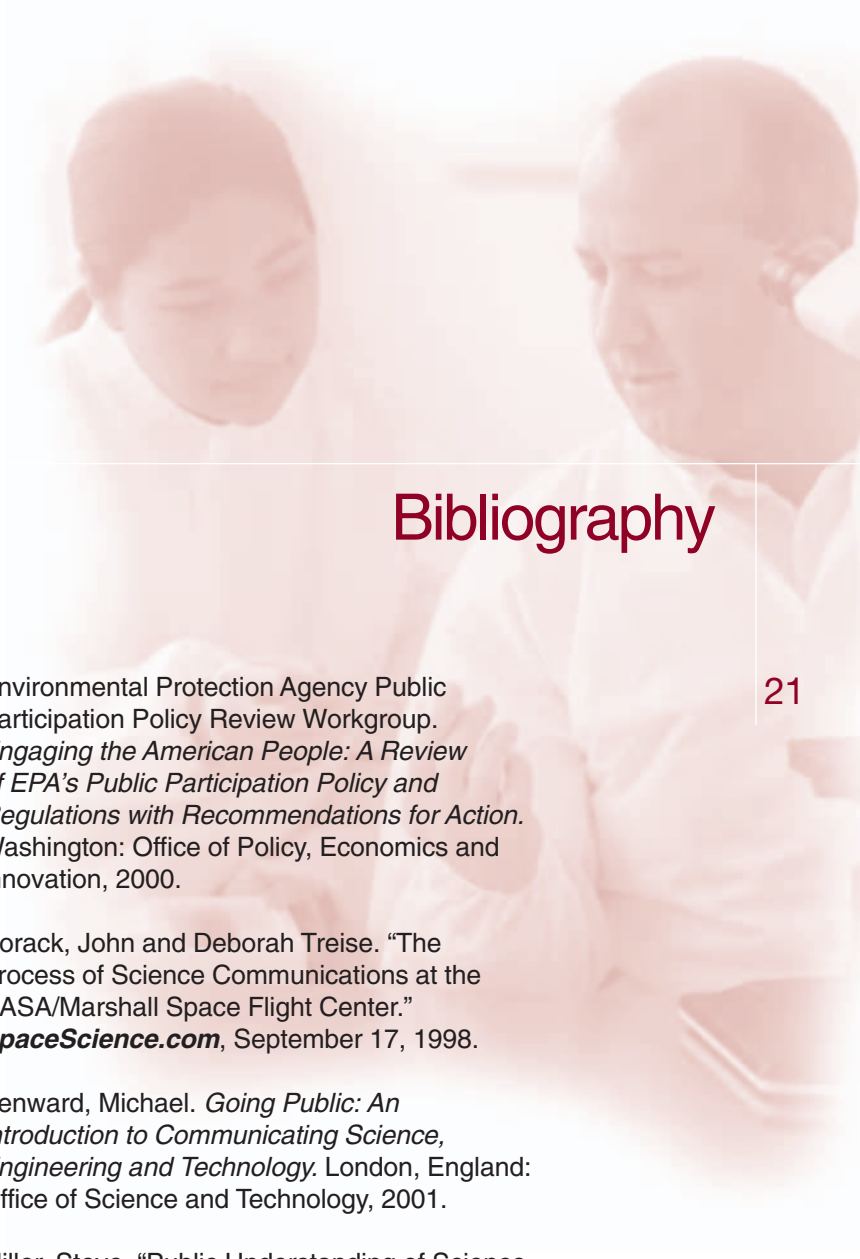
To inform our deliberations, we commissioned several background studies related to S&T communications tactics and best practices in various organizations. Specifically, these studies included the following:

- An examination of various federal government science-based departments and agencies, by Thornley Fallis Communications (Ottawa)
- An examination of select Organisation for Economic Co-operation and Development (OECD) governments (United States, United Kingdom, Netherlands and Norway), by Technopolis Ltd. (United Kingdom)
- An examination of a limited number of companies and environment-related non-governmental organizations, by Dr. Edna Einsiedel (University of Calgary).

To complement this research, we also commissioned a focused case study by Dr. Lorna Roth (Queen's University) on the federal government's S&T communications practices with a specific target audience: First Peoples.

Background research was also undertaken by the CSTA Secretariat on S&T communications practices among Canadian provincial governments, Canadian health-related non-governmental organizations and Canadian universities.

All of these background studies are available on the CSTA Web site (**www.csta-cest.ca**).



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4. All studies commissioned by the CSTA are available on the CSTA Web site (**www.csta-cest.ca**).