

Building Excellence

Expert Panel on Leading Practices for Transforming Canadian Science Through Infrastructure

Context

Science conducted by the federal government is essential to support the health, security, and well-being of people in Canada. This undertaking requires world-class science and technology (S&T) infrastructure that supports the needs of government scientists in delivering on their mandates. In Budget 2018, the Government of Canada committed \$2.8 billion to renew its science laboratories. This will support the construction of multi-purpose, collaborative facilities that bring together federal scientists from different departments and agencies to pursue science that supports evidence-based decision-making.

Charge to the Council of Canadian Academies

What is known about leading practices for evaluating proposals for science and technology infrastructure investments that is relevant to Canadian federal science for the future?

- What processes and advisory structures have been used for reviewing proposals for significant science infrastructure investments, and what is known about their strengths and weaknesses?*
- What guiding principles and criteria can help assess proposals that support the federal vision for science in Canada, including, for example, interdisciplinarity?*

Approach Taken and Evidence Considered

To answer the charge, the CCA convened an Expert Panel to review the evidence and provide insight. In support of their work, the Panel held a one-day workshop with 13 participants with a broad range of expertise, including research and research administration, scientific facility management, sociology of scientific collaboration, and innovation systems.

The Panel also looked to organizations from around the world that evaluate proposals for research infrastructure dedicated to basic discovery-oriented research, including large-scale big science facilities:



Australia (NCRIS)



Germany (BMBF)



Canada (CFI)



United Kingdom (STFC)



Denmark (NUFI)



United States (MREFC)



European Union (ESFRI)



Key Finding: Guiding Principles and Criteria

Leading practices in decision-making for S&T infrastructure investments take into consideration four principles: **scientific excellence, collaboration, feasibility, and broader impacts.**

- **Evaluations of scientific excellence for government S&T infrastructure investments differ from those in academia or industry because they must include consideration of government mandates.** Because mandates can change over time, considerations for future needs can be addressed through flexibility, connectivity, and modularity of facility design.
- **S&T infrastructure that supports collaboration can amplify science outcomes and lead to solutions for complex challenges.** Collaborative S&T infrastructure proposals highlight the ways that new users can find opportunities for engagement within a facility, and support building relationships by addressing potential barriers to access.
- **Assessing the long-term feasibility of proposed S&T infrastructure requires consideration of ownership, governance, and management, particularly for shared facilities.** A stage-gated process allows for the evaluation of various aspects of feasibility (e.g., technical, financial, managerial, social, regulatory, environmental) by scientific and non-scientific professionals.
- **The broad economic and social impacts of proposed large-scale S&T infrastructure projects are typically included in the evaluation process.** Though future impacts are difficult to assess, proposals can be evaluated on the credibility and logic of the pathways to expected impacts.

Key Finding: Decision-Making Processes and Advisory Structures

A “middle-out” approach to developing proposals facilitates relationship building from the outset of the proposal process and can ensure the success of collaborative S&T infrastructure. This approach allows the S&T community to co-create promising proposals that meet government needs.

A clear vision and strategy for prioritizing S&T infrastructure investments (e.g., roadmapping) is critical to the decision-making process. If it is co-created with stakeholders, a roadmap can also provide an opportunity to develop collaborative relationships.