2025 Canadian Science Policy Conference Symposium Report

Major Research Infrastructures: Engines for collaboration, innovation and national resilience

Symposium Organizers:

LABORATORIES CANADA | LABORATOIRES CANADA TRIUMF OCEAN TRACKING NETWORK

We gratefully acknowledge Dr. Janet King and Ms. Janet Halliwell for their outstanding leadership in shaping and guiding the symposium on research infrastructure, whose vision and dedication were key to its success.

CSPC Symposium Date: November 19, 2025

This report was authored by Public Services and Procurement Canada's **Laboratories Canada**.

Preamble:

This symposium report is intended to stimulate further discussion, and action, on how Canada can better position its major research infrastructures as engines for collaboration, innovation and national resilience - essential strategic assets for Canada's success in a time of significant economic and geopolitical challenges. This report will be made publicly available to research-infrastructure stakeholders, in particular policymakers, funders, and managers, for their awareness and consideration.

Symposium Overview:

Major Research Infrastructures: Engines for collaboration, innovation and national resilience

Canada's research infrastructures are strategic assets that provide critical capacity to address the challenges of today and the future. This symposium outlined a vision for a more competitive and resilient research infrastructure ecosystem in Canada through three connected perspectives: how Canada's national infrastructures are addressing the challenges of a changing Arctic; how global large-scale infrastructures can create ecosystems that generate economic, social, and strategic benefits; how Canada can learn from the European and United Kingdom approaches. The symposium closed with an interactive session to solicit perspectives on barriers to collaboration and opportunities for optimizing benefits of Canada's national research infrastructure.

Symposium Key Messages

Panel 1: The importance of National Research Infrastructures in solving grand challenges in the Arctic (Organized by: Ocean Tracking Network)

Abstract: The Arctic is a key area of political and economic interest, particularly with increasing commercial activity and fisheries. Canada's national research infrastructures (NRIs) are providing the equipment, training, and expertise needed to understand the rapidly changing Arctic and inform policies to safeguard it from environmental and political threats. Canada's NRIs are also advancing monitoring efforts and engaging Arctic communities in decision-making to address the pressing challenges related to a shifting Arctic landscape and its resources.

Moderator: Monica Engel, Social Scientist, Torngat Wildlife Plants & Fisheries Secretariat

Panelists:

- Robert Lennox, Scientific Director, Ocean Tracking Network/Dalhousie University (OTN)
- Philippe Archambault, Scientific Director, ArcticNet, Takuvik, Université Laval
- Benoît Pirenne, Chief Innovation & Technology Officer, Ocean Networks Canada (ONC)
- Bernard Vigneault, Director General, Fisheries and Oceans Canada

Key Messages:

This first panel brought together panelists from Torngat Wildlife Plants & Fisheries Secretariat, Fisheries and Oceans Canada, ONC, OTN, and ArcticNet to discuss how their organizations

contribute to Arctic conservation, monitoring, and research. Panelists represented or worked with several national research infrastructures that are key to enabling researchers to access Arctic and sub-Arctic regions in order to carry out critical scientific investigations. Canada's national research infrastructures, ranging from marine autonomous vehicles/gliders, cabled networks (e.g. ONC), acoustic receiver networks (e.g. OTN), and icebreakers, drive essential research for fisheries management, defence and national security, climate observation, marine conservation, and economic development.

The panelists emphasized in their discussion that no single institution can operate in the Arctic alone, and that collaboration is necessary to maintain a meaningful scientific presence in such a remote and vast region as Canada's Arctic. The role of NRIs includes training local talent with scientific equipment, building local research capacity, engaging in meaningful co-development with Indigenous communities, braiding multiple knowledge systems, and developing research infrastructure networks and partnerships in the North that support equitable co-management and security. The panelists also discussed the importance of data collection, sharing, and sovereignty which can be achieved through community science programs, the use of data systems and remotely deployed technologies, with examples including cabled networks, autonomous vehicles, and acoustic receivers for tracking changes in the Arctic. The panel emphasized the role of NRIs in the support for researchers to maintain data principles (i.e. FAIR principle), and Indigenous data sovereignty (i.e. CARE principle).

Conducting research in the Arctic requires working with all sectors, including universities and colleges, government, local Northern and Indigenous communities, and Indigenous governments. For example, through a network of partnerships, Université Laval's ArcticNet is transforming how research is conducted in the North by bringing together scientists from various fields, Indigenous knowledge holders, northern communities, government agencies and the private sector to leverage NRIs and enable the study of impacts and opportunities of climate and socio-economic change in the Arctic.

The panel further highlighted how national research infrastructures in the Arctic, along with their research and monitoring activities, actively support Canada's position as a global leader, Arctic sovereignty, and diplomatic efforts. Arctic research requires international collaboration and partnerships with other countries, as interest in the Arctic grows.

Finally, the panel addressed some of the challenges facing Arctic research, including rapid environmental changes driven by climate change including the melting of ice, growing geopolitical interests such as the presence of foreign vessels, and the sheer scale of the Arctic, which demands extensive coordination and collaboration.

Panel 2: Global Large-Scale Research Infrastructures and Their Role in Driving Innovation (Organized by: TRIUMF)

Abstract: Global Large Research Infrastructures (LRIs) play a critical role in the international science, technology and innovation ecosystem, yet the underlying mechanisms of their impacts aren't broadly understood in Canada. This panel convenes leaders of global LRIs to share how these facilities drive economic, social, and strategic benefits globally—and how Canada can better leverage its national assets. The discussion will inform current reviews of Canada's major research facilities, focusing on the value of lifecycle approaches, enabling mission-driven research, and enhancing national resiliency through science infrastructure.

Moderator: David Castle, Professor, University of Victoria

Panelists:

- Mark Thomson, Director-General Designate, CERN (France-Switzerland)
- Nigel Smith, Executive Director and CEO, TRIUMF (Canada)
- Marcella Grasso, Scientific Director, Institut National de Physique Nucléaire et de Physique des Particules (CNRS) (France)
- Shoji Asai. Director General, KEK high energy accelerator research organization (Japan)

Key Messages:

The panel discussion brought together leaders from UVictoria, CERN, TRIUMF, CNRS, and KEK to explore how large-scale research infrastructures (LRIs), like the ones they represent, advance scientific discovery and innovation on a global scale. The panelists emphasized that LRIs drive scientific breakthroughs and fundamental discoveries, cutting-edge technological innovations, economic competitiveness, and broader societal benefits.

For example, discoveries from the LRIs represented in this panel have led to applications in structural biology, medical imaging, and battery development. A recurring theme throughout the discussion was the need for long-term, stable funding. Many of these complex facilities require major upgrades that can take decades of planning, design, and construction, making sustained funding essential throughout their life cycle.

The importance of effective governance structures and strategic planning for LRIs was also highlighted. Facilities like CERN, for instance, operate under international treaty-based governance with multiple member countries, enabling long-term planning. Furthermore, national research infrastructure roadmaps and priority-setting play a critical role in planning for LRIs, as illustrated by CNRS and France's national strategy for research infrastructures. In contrast, Canada currently lacks a national strategy and roadmap for both science and research infrastructure, a gap that was underscored during the discussion.

Finally, the panelists emphasized that international and national collaboration and partnerships are the foundation of success for LRIs. Many of these facilities engage international communities of thousands of researchers who collaborate on complex global experiments, involving students, researchers, facilities, industry and commercial partners, universities, and colleges both nationally and worldwide.

Panel 3: Transforming Canada's Research Infrastructure Landscape: Lessons from Europe's Approach and How They can be Applied in Canada (Organized by: Laboratories Canada)

Abstract: The panel will examine how Canada's research infrastructure ecosystem could evolve by providing a comparison to collaborative European initiatives, such as United Kingdom Research and Innovation (UKRI) and the European Strategy Forum on Research Infrastructures (ESFRI). Contrasting Canada's decentralized federal-provincial-academic dynamics with Europe's harmonized, cross-border coordination and pan-European roadmap, the discussion will focus on reducing jurisdictional barriers and promoting impactful co-investment. Panelists will explore the adoption of European practices such as open-access facilities, researcher mobility, and shared resources to enhance Canadian R&D capacity. The session will also consider the benefits of developing a national strategic infrastructure roadmap to strengthen Canada's research sovereignty, innovation networks, and global competitiveness.

Moderators:

- Duncan Retson, Assistant Deputy Minister, Laboratories Canada, Public Services and Procurement Canada
- Janet Halliwell, Chair, Canadian Science Policy Centre (CSPC) Board of Directors

Panelists:

- Claire Devereux, Director, Infrastructure Fund, UK Research and Innovation (UKRI)
- Marco Blouin, Director General of Science and Partnerships, Ministère de l'Économie, de l'Innovation et de l'Énergie (Gouvernement du Québec)
- Sylvain Charbonneau, President and CEO, Canada Foundation for Innovation (CFI)
- Yoan St-Onge, Acting Deputy Director, Science, Technology and Innovation Strategy and Partnerships Division, Global Affairs Canada (GAC)

Key Messages:

The final panel brought together representatives from Laboratories Canada, CSPC, UKRI, the Gouvernement du Québec, CFI, and GAC to discuss Canada's research infrastructure landscape and how it can be transformed using lessons and best practices from European models. The panelists highlighted collaborative initiatives such as ESFRI and UKRI, which provide useful models for the strategic execution and long-term planning of national research infrastructure. For example, UKRI shared that bringing research councils together has enabled greater coordination, coherence, and a unified voice. Similarly, collaborative structures like ESFRI create mechanisms for international cooperation on national research infrastructure, such as through the European Research Infrastructure Consortium (ERIC), a legal mechanism for creating collaborative infrastructures between ESFRI member states.

The discussion also noted that Canada's research infrastructure landscape is fragmented, with multiple organizations at both the federal and provincial levels and across many sectors funding national research infrastructure. This fragmentation presents challenges, such as a lack of

coordination and funding alignment, but this decentralization from a provincial perspective, for example, can also allow provinces to address their own local/regional science priorities.

Panelists emphasized the need for a national research infrastructure strategy or roadmap to guide strategic and long-term planning. They also discussed the importance of portfolio and life-cycle management of national research infrastructures, including CFI's new Major Research Facilities (MRF) framework.

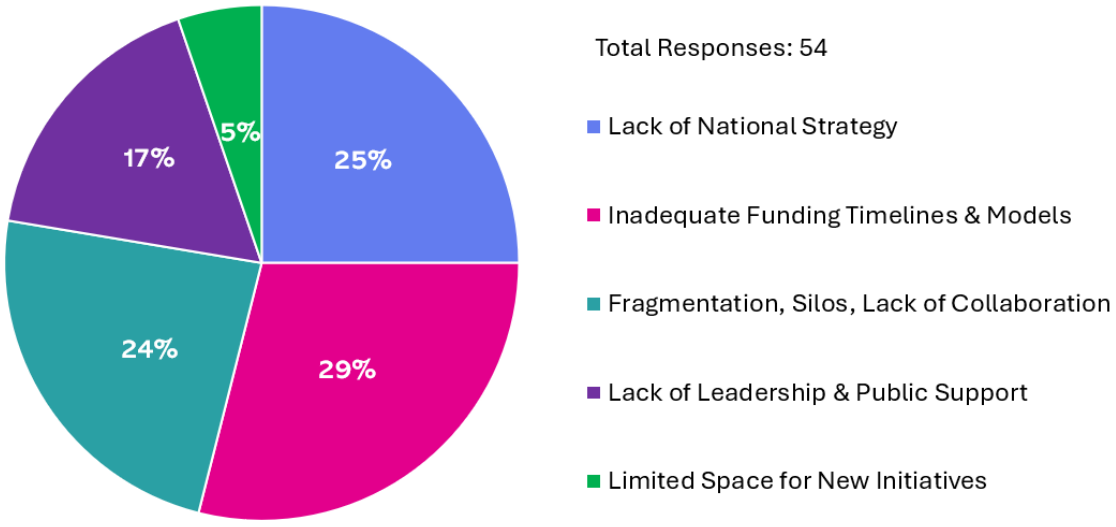
Finally, the panel highlighted the importance of national research infrastructures in fostering international partnerships and advancing Canada's science diplomacy efforts. These infrastructures serve as hubs for talent exchange and research mobility, attract global talent, and provide spaces for countries to collaborate on areas of mutual interest.

Q&A & Closing Remarks/Interactive Session

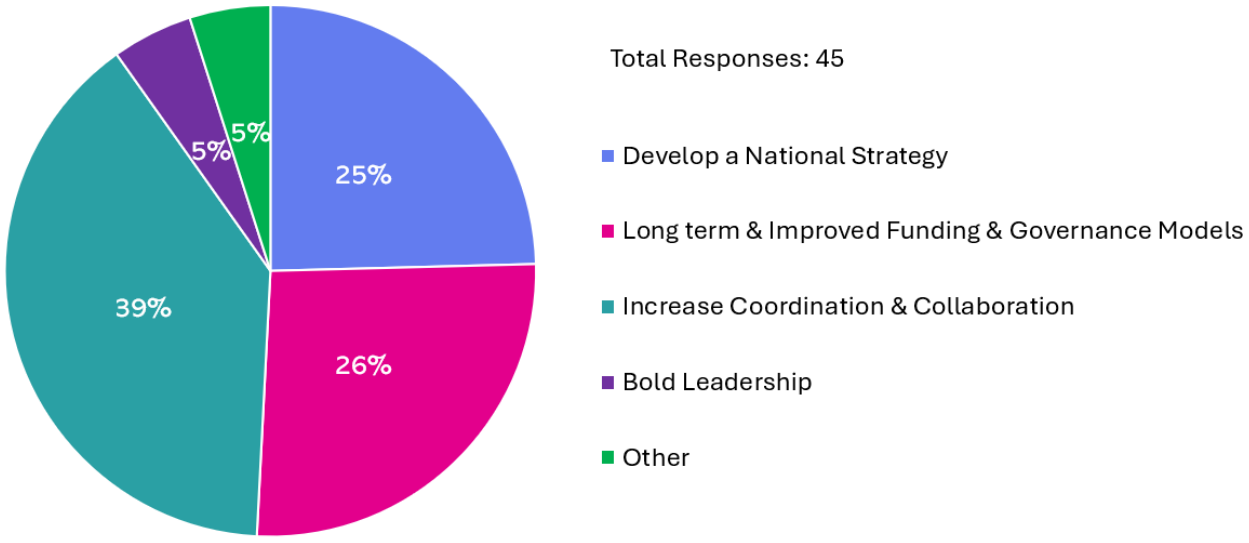
Moderator: **Dr. Janet King,** Canadian Science Policy Centre, Board of Directors

Following the three panel discussions, the audience was invited to respond (via the Slido platform) to two questions relevant to the current Council of Canadian Academies (CCA) Assessment: How can Canada optimize its national-scale research infrastructure, encompassing large-scale facilities, digital platforms, and collaborative networks, to effectively support current and future needs.

Question 1: What do you consider to be the most significant barriers to optimizing the impacts of Canada's national research infrastructure and their benefits for Canadians?



Question 2: What are the one or two most important actions that Canada could take to optimize its national research infrastructure ecosystem to support the country's current and future needs?



Key Takeaways from the Symposium

1. **Need for a National Research Infrastructure Strategy**

The importance and need of a coordinated, long-term approach to research infrastructure in Canada. A strategy or roadmap could help set national priorities, guide investments, and improve alignment across Canada's decentralized ecosystem, and could potentially draw inspiration from international models like ESFRI and UKRI.

2. **Value of Long-Term, Stable Funding and Governance Structures**

The value of predictable funding mechanisms and governance structures that support the full life cycle of research infrastructures, from planning and construction to operation, renewal, upgrades, and disposal. Long-term stability is crucial for enabling scientific breakthroughs, fostering innovation, attracting talent, and maintaining global competitiveness.

3. **Collaboration across all levels and Ecosystem Approaches**

Coordination across local, regional, and national levels such as between federal, provinces/territories, academic research institutions, and Indigenous communities can help improve alignment and reduce fragmentation within the ecosystem. Cross-sectoral projects, shared platforms, facilities, equipment, and data, can enhance knowledge sharing, support talent mobility and training, and foster innovation.

4. **Opportunities for International Partnerships and Science Diplomacy**

Research infrastructures are positioned as important tools for strengthening international engagements, collaboration, and science diplomacy in key research domains. Strengthening international partnerships and including research infrastructure in Canada's science and technology agreements are ways to connect researchers and facilities to global networks.

Organizers' Reflections

Duncan Retson
Assistant Deputy Minister
Laboratories Canada PSPC

Nigel Smith
CEO, Executive Director
TRIUMF

Robert Lennox
Scientific Director
OTN

Janet King
Board of Director
CSPC

"*Canada's research infrastructures are national assets that are engines for collaboration innovation and national resilience. These facilities are essential for maintaining Canada's competitiveness, sovereignty, innovation capability, while advancing science diplomacy and strengthening Canada's presence on the global stage. As the world changes and new challenges emerge, our research infrastructures have the potential to position the country as a leading hub for science and innovation, attracting top talent, accelerating discovery and technology development and in-turn shaping a more prosperous and resilient future for Canada."*