

2024 CANADIAN SCIENCE POLICY CONFERENCE (CSPC) SESSION REPORT



Positioning Canada's National Research Infrastructure for Impact: Implementing the Major Research Facility Policy

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CSPC 2024 Conference Session Report

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Organized by: Canadian Light Source (CLS)

Panelists



Moderator



Session Overview

The 2024 Canadian Science Policy Conference session on positioning Canada's National Research Infrastructures for impact brought together policy experts, science administrators, researchers, and other stakeholders to discuss the implementation of the new decision-making and funding framework for Major Research Facilities (MRFs). This session, sponsored by the Canadian Light Source, built on the foundation laid by the 2023 CSPC session on the prospect of such a framework. That prior discussion articulated some basic principles which the community considered critical for the success of a framework. With the decision to implement that framework now formally announced, the 2024 session focused on the overarching strategic elements required for the MRF Framework's successful implementation. The discussion was informed by a [consultation paper](#) that articulated questions on how the portfolio-based and lifecycle approaches to managing national research infrastructures to meet Canada's needs over the next 10-20 years can be successfully enacted.

The standing-room-only session prompted a lively discussion on research needs and priorities. What emerged was the shared view that Canada is now at a critical point when it comes to supporting important research at the national level. Decisive action must be taken to maximize the benefits our citizens receive from decades of investment in what we will term here national research infrastructures (NRIs)ⁱ in order to reflect that this group includes not just brick-and-mortar facilities and those currently designated as MRFs. Underlying the discussions was a deep appreciation that Canada's NRIs play a critical role on a number of fronts: advancing the development of science and technology; training young scientists to create highly qualified personnel; and generating critical data and maintaining it for reuse across different scientific applications. In addition to their impacts on research and innovation, NRIs generate deep economic and societal impacts. Panelists and participants articulated specific, action-oriented recommendations for the MRF Framework implementation. The resulting 17 recommendations focus on both the research ecosystem and program management. At the ecosystem level, they articulate the need for coordinated stewardship, an inclusive and timely portfolio road-mapping approach, and partnership and sustainability. For managing individual NRIs, they focus on adaptability, lifecycle funding, resiliency and opportunity, and collaboration and coordination.

Essential Elements of Agreement

Context

Canada has built a remarkable set of research infrastructures in physics, material science, ocean science, social science and more that serve national social and economic needs as essential facilities, platforms, networks, and enablers of research, technology, and innovation. These National Assets have a high degree of strategic, national, and international importance. They have been established through peer review processes that determined where Canada could excel on the global stage. And excel we have: work conducted at Canada's NRIs has directly contributed to two Canadians receiving the Nobel Prize in Physics in 1994 (Dr. Bertram Brockhouse at Chalk River Laboratories) and 2015 (Dr. Arthur McDonald at SNOLAB).

These NRIs serve as hubs for essential disciplinary and multidisciplinary collaboration. They support the development of new discoveries, approaches, and products. They provide data, insights, and capabilities to solve critical challenges important for Canadians. They play a vital role in training top scientists and in promoting an innovation culture. They train and inspire those who will become capable developers and users of science, technology, innovation, data, and evidence in a vast array of careers outside of frontier research. And, in today's knowledge economy, the data, data products, and data capabilities they enable are critical to securing and guarding Canada's position as a global leader.

According to a [recent G7 study](#) on large research infrastructures, while Canada has invested a great deal in its NRIs, other countries have surged ahead in both investment and strategic intent. Other G7 nations have exponentially increased their investments in research infrastructures, especially since 2005. This study also showed an average economic multiplier on investment of 2.64, approaching 5 for some facilities. Nations like China are making significant strides toward establishing large-scale facilities staffed with highly skilled, internationally trained researchers. Without urgent and coherent action, Canada risks losing its capacity to support cutting-edge scientific research, and failing to realize the full benefits of its prior investments.

Existing infrastructure assets within Canada, despite their continuing nature, have been funded as time-limited projects, rather than from a lifecycle or portfolio mindset. As such, they were created and funded without a long-term, coordinated national strategy that seeks to optimize benefits for Canada, with attention to value and budgetary constraints. Provinces are expected to co-fund these National Assets without consideration of their capacity or priorities. Often the burden of full operational responsibility has fallen on university consortia, which are typically key stakeholders in NRIs, without a more complete perspective from the government across these investments over their long lifespans. This fragmented funding and management approach has resulted in gaps in support and missed opportunities for national and international impact. The current framework designates a small subset of NRIs from among all funded by the Canada Foundation for Innovation (CFI) Major Science Initiatives (MSI) program as MRFs. These facilities will be subject to a different funding and decision-making framework, which may further fragment the system unless the broader assets are more fully considered in road-mapping and portfolio planning.

RECOMMENDATIONS

Session participants commended the government on moving forward together with CFI to implement a framework for MRFs as National Assets. The transition from managing these facilities as projects to both a lifecycle and portfolio approach is overdue. However, much remains to be done for effective implementation. Strategic action is required at two levels: (1) the research ecosystem and (2) program management.

Strategic Action Needed – Research Ecosystem Level

- **Coordinated Stewardship:**

- Recommendation 1: Ensure close coordination between ISED, CFI, and the new Capstone organization working in concert with provinces, government departments, and other essential partners to facilitate effective alignment.
- Recommendation 2: Given that CFI provides funding for the majority of research equipment and is the principal funder of NRIs, strategic coordination and stewardship of NRIs are key elements of overall research funding, so CFI should be closely coordinated with NSERC, SSHRC and CIHR. There are strong arguments for incorporating CFI in the Capstone organization directly. In the meantime, a strong coordination committee should be created with external representation as per Recommendation 3.
- Recommendation 3: Include scientific experts from outside of government on the committee that will coordinate between the Capstone organization and CFI to complement the government perspective with that of active scientists.
- Recommendation 4: Place a Secretariat for NRIs within ISED such that the government takes responsibility for maximizing their benefit for the country.

- **Portfolio Approach:**

- Recommendation 5: Commence without delay a thorough road-mapping exercise to identify clusters of scientific excellence, capability, and need in areas of strength and strategic importance to Canada. This exercise is required to implement a true portfolio approach. Road-mapping should be inclusive of a diverse range of research disciplines, domains, and methodologies to ensure broad national impact. It should also include both existing and planned investments domestically and internationally to encourage complementarity between infrastructures, avoid duplication, and maximize impact. This road-mapping exercise could be undertaken by a strategic oversight committee for the NRI program and could be part of the national Advisory Committee on Science and Innovation announced in April 2024.
- Recommendation 6: Recognizing that not all large, NRIs operate as ‘facilities’, include domain and disciplinary national digital research infrastructures alongside brick-and-mortar facilities in the portfolio.
- Recommendation 7: Begin planning for a roll-out of a full portfolio approach and road-mapping now, while initiating the first phase of development of the MRF Framework, rather than waiting for a subsequent phase five years from now.
- Recommendation 8: Use road-mapping to identify and consider platforms that are likely to emerge as National Assets in the future. Thought should be given to how to provide support, strategic planning, and clear pathways and criteria that must be met to be included. In some cases, large-scale international experiments to be sited at existing or new facilities are on the same scale as the facilities themselves and should be included in ISED oversight processes in the same way as the facilities.

- **Partnership and Sustainability:**

- Recommendation 9: Include in the MRF Framework an approach to pursue international partnerships, in cases where Canada does not have domestic capabilities and where the provision of such capabilities is cost-effective. This entails formal agreements through which Canadians can contribute to instrument development and provide operating funds in exchange for guaranteed access.
- Recommendation 10: Recognizing that NRIs are National Assets, ensure that the necessary resources are provided to the affiliated Canadian academic community to enable Canadian scientists to provide leadership in the success of these National Assets, thereby providing full benefits to Canada, including training the next generation of scientific leaders in these areas that have been recognized as places where Canada can excel.

Strategic Action Needed – Program Management-Level

- **One-Size Does Not Fit All:**

Recognize structural diversity among NRIs and tailor support accordingly. Bespoke elements include:

- Recommendation 11: Expectations for matching funding should be adjusted to reflect the extent to which the NRI is important to the national interest, regional benefits, and the feasibility of accessing matching funding.
- Recommendation 12: Tailor the nature of operational support according to the nature of the NRI, with some being capital-intensive and others relying more heavily on intensive data management and personnel with technical expertise.
- Recommendation 13: The threshold level for MRF designation should be defined by considering domain-specific indicators of size, reach and impact. The capacity to act as significant national and international convenors and connectors of specialized technical expertise is also key. Prioritization in terms of significance is important, but this significance should not be defined by arbitrary financial thresholds.

- **Lifecycle Funding Approach:**

- Recommendation 14: Provide consistency and predictability of funding throughout the NRI's lifecycle to ensure facilities and technical infrastructures are being maintained, used, and adapted to their full potential. NRIs should be able to have confidence that they can hire personnel and enter into international projects and agreements that extend beyond current project funding cycles.
- Recommendation 15: Tailor peer review to emphasize the ability of individual NRI to support top-level research activities in their fields, the importance of their role as a National Asset, and the return on investment. This approach to peer review should be based on international comparisons and on an assessment against the needs within Canada. This is distinct from the competitive project-based approach employed for smaller infrastructures where projects are reviewed against other unrelated domestic projects.

- **Resiliency and Opportunity:**

- Recommendation 16: Provide a mechanism to deal with emergencies that could not have been predicted and emergent opportunities that fall outside of the regular funding cycle for NRIs. Budgets that contain fixed numbers for long periods without

review are not fit for the reality of dynamically changing scientific and societal environments.

- **Collaboration and Coordination:**

- Recommendation 17: Encourage stronger collaboration between NRIs within the national and international portfolio to maximize shared resources, expertise, and capabilities, leverage complementary strengths, and reduce costs.

Other Areas for Action:

- CFI has asked the community to help develop a narrative that more clearly demonstrates how NRIs align with national interests and economic productivity. This should include clearly and simply articulating their value proposition to Canadian society (e.g., continuing Canadian leadership in certain scientific and innovation areas, training, supporting important government decisions with data, economic growth, solving societal problems, etc.).

ⁱ NRIs are large or major RIs of national value that include facilities and instrumentation but also knowledge-based resources such as archives or data and sample collections. The 'infrastructure' is contemporarily understood to include the human resources and expertise required to run the infrastructure. See various definitions: European Commission: https://research-and-innovation.ec.europa.eu/strategy/strategy-research-and-innovation/our-digital-future/european-research-infrastructures_en, Australia: <https://www.education.gov.au/national-research-infrastructure>, UK: <https://www.ukri.org/what-we-do/creating-world-class-research-and-innovation-infrastructure/what-is-research-and-innovation-infrastructure/>.