

Enhancing Canada's National-Scale Research Infrastructure

An Expert Panel Report





THE CHARGE

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?

- Strategic factors
- International best practices, recognizing Canadian context
- SWOT analysis
- Perspectives of facility managers



Expert Panel on Enhancing Canada's National-Scale Research Infrastructure



Janet King
(Chair)



Andrew
Applejohn



Frédéric
Bouchard



Marcela
Carena



Jodi
Cooley



Jonathan
Dewar



Kathryn
Graham



Janet E.
Halliwell



Natalie
Harrower



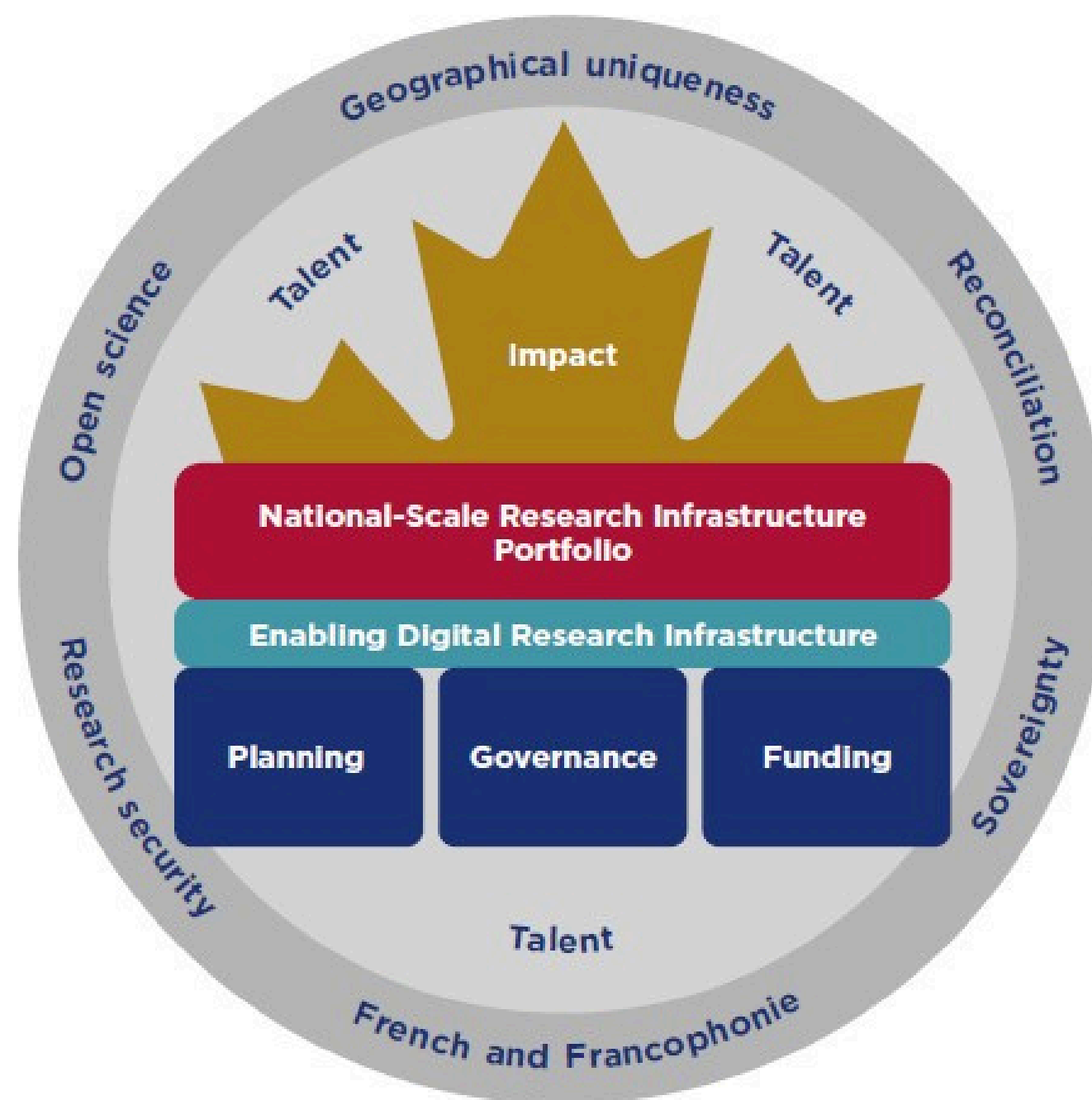
Eric
Siegel



John
Womersley



A FRAMEWORK





PLANNING AND STRATEGY

- Many comparator countries take a **strategic, portfolio-based approach** based on broader S&T priorities and strategies and developed through landscape analyses and roadmapping exercises
- Canada lacks a **national strategic framework** for planning, developing, and supporting national-scale RI, despite decades of reports recommending one
- There is **little systemic federal / provincial / territorial coordination** on national-scale RI in Canada
- The lack of strategic planning complicates or precludes Canadian **participation in international RI** and creates barriers for foreign participation in Canadian national-scale RI



GOVERNANCE

- ***System-level governance is fragmented*** across loosely connected actors, with no clear coordination mechanism (e.g., a capstone-like entity); in other countries, governance is often managed by specialized bodies or government departments
- Canada lacks a recognized high-level voice to represent it and provide lead responsibility for involvement in international research collaborations
- Indigenous engagement in governance is essential to ensure that research reflects shared interests and priorities and Indigenous rights, knowledges, and perspectives
- ***Institution-level governance is diverse***, and no single governance structure is applicable to all national-scale RI in Canada



FUNDING MECHANISMS

- The **funding landscape is fragmented**, lacking alignment and consistency across funding streams for capital, operations, etc.
 - No dedicated funding mechanism to support access to international RI
- Funding across **the full lifecycle** of national-scale RI, including decommissioning, is neither consistent nor predictable, but can help ensure they meet their national mandates, and are properly maintained, utilized, and adapted beyond current project cycles
- **Matching funding requirements** can detract from the national mandate of national-scale RI and create tensions with provincial and institutional partners
 - Related transaction costs can overwhelm pursuit of the infrastructure's research mission, diverting time, attention, and resources



DIGITAL

- Digital research infrastructure (DRI) is now leading, informing, and shaping research, and serves as **a foundational asset** for the entire national research community, providing connectivity, computing resources, research software tools and platforms, and research data management
- Despite recent initiatives and investments, **Canada's DRI challenges** include low investment in advanced research computing compared to peer countries, an ad hoc approach to research software, and fragmented data governance and management
- Canada is beginning to recognize **Indigenous data sovereignty**, but more work is needed
- Some international jurisdictions fund DRI as **a core infrastructure capacity** in a national portfolio, rather than through project-based funding



PERFORMANCE MONITORING AND IMPACT ASSESSMENT

- **Performance monitoring and impact assessment** are of growing interest and importance for sustaining, improving, and transforming national-scale RI
- Canada's **current efforts** remain largely retrospective, time-bounded, and difficult to aggregate at the ecosystem level
- A **system-level impact framework** would help Canada assess national-scale RI more consistently and support evidence-based decision-making
 - Factors such as an RI's purpose, lifecycle, scope, and organizational model necessarily affect impact assessment methodologies
 - A broader, more holistic understanding of impact can help Canada capture scientific, social, economic, policy, innovation, training, and ecosystem effects



CRITICAL ASPECTS FOR OPTIMIZATION

- **Talent** is a critical input to and an output of national-scale RI; optimizing RI requires attention to the people who design, manage, operate, and use them
- National-scale RI vitally contributes to Canada's scientific **sovereignty**
- **Open science** enables optimization but considerations include research security, privacy, and Indigenous data sovereignty
- Optimizing **Northern RI** presents an opportunity to strengthen Canada's leadership in Arctic, ocean, and climate research, while addressing challenges of geopolitics, climate impacts, high logistics costs, and fragmented coordination
- Canada's **bilingual research capacity** is a strategic lever for optimizing national-scale RI, enhancing visibility, strengthening Francophone communities, and advancing international engagement through science diplomacy



REFLECTIONS

- Canada has an **opportunity to leverage** its considerable strengths, strategic investments, and dynamic research ecosystem to build prosperity and resilience
- The system that supports national-scale RI is **not yet fit for purpose**, but there is broad agreement on what needs to be done
- A **tailored approach grounded in Canada's strengths** would ensure that an optimized national-scale RI ecosystem can effectively:
 - address Canada's most pressing challenges and opportunities,
 - participate in international collaborations, and
 - maintain global competitiveness, long-term capacity, and resilience



REFLECTIONS

- Incremental adjustment is insufficient; **optimizing national-scale RI** would require:
 - national strategic, portfolio-based planning based on landscape analysis and roadmapping;
 - coordinated governance, potentially through a capstone-like entity;
 - lifecycle funding mechanisms, and reconsideration of matching requirements;
 - coordinated strategy and investment in an expanded DRI capacity, as an essential underpinning of the broader national-scale RI ecosystem;
 - consistent integration of performance monitoring and impact assessment; and
 - a pointed focus on talent to enable continued excellence, alignment with national priorities, and an ability to respond to emerging challenges



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