

Executive Summary

EXECUTIVE SUMMARY

Scientific platforms are professionally managed organizations dedicated to facilitating research through access to scientific infrastructure, research data, expertise and/or services. Typically, their mandate includes 1) training of highly qualified personnel (HQP), 2) maintaining expertise with rapidly advancing technology. 3) renewing and extending the life of infrastructure through efficient processes for upgrades, maintenance and repairs, 4) fostering collaboration between academics, private sector and public sector and 5) maximizing the impact of research infrastructure investments by ensuring appropriate and equitable access. Services offered at scientific platforms include support for experimental design, technological development and innovation, high power computing, data management and security, data analytics and interpretation. There is ample evidence showing that the institutions with well-established platforms and core facility programs typically have better success in national and international competitions.

The concept and models of operation of scientific platforms are perfectly suited to achieving all CFI and Government of Canada objectives listed in the Strategic road map presented for this community consultation. They are also suited to support the trends of convergence, international collaboration and promotion of diversity identified in the road map. Infact, scientific platforms align with all five themes for which CFI is requesting feedback from the community. More specifically:

- ‘The Science of Tomorrow’ is addressed by these research hubs staffed by expert platform scientists that offer universities a solution to keeping pace with rapid advances in technology.*
- ‘Future Prosperity and Healthy Communities’ are facilitated through the anchoring of research collaborations and multisector partnerships to address economic and social problems at the local, national and international level.*
- ‘A Sustainable Future’ is addressed by expert platform scientists who decrease dependence on expensive service contracts, while continuing to enable the extended use of infrastructure for training and exploratory research. Placing infrastructure in scientific platforms minimizes duplication of infrastructure in multiple individual laboratories and optimizes the impact of CFI investments.*
- ‘The Next Generation’ is supported by dedicated platform scientists who train, collaborate with, and support researchers with special attention to graduate students and non-expert researchers. These high quality services are offered at an affordable cost, which is invaluable for early-career researchers with limited resources, contributing to the attraction and retention of the next generation of scientists. Finally,*

- *'Delivering for the Community' is facilitated by scientific platforms serving as hubs for innovation that meet the needs of industry and the public sector that can attract research contracts and investments and contribute to socio-economic development.*

Having a strong foundation of infrastructure and expertise will ensure Canada can respond to virtually any global challenge. Investments in sustaining the lifespan of state-of-the-art infrastructure with streamlined application processes will improve value on investments and will reduce the environmental impact of research infrastructure. Scientific platforms serve to recruit and retain top researchers and train the next generation of HQP, relieve researchers from the burden of maintenance, quality management and updates of infrastructure and serve as test sites for the innovation. They can generate an ecosystem of innovation in their region if properly funded through a well-defined process.

Given that scientific platforms address all five themes of the CFI call for consultations they should be a central part of the strategic plan for 2023-2028. A dedicated funding mechanism for scientific platforms is required to ensure research infrastructure investments are used to their full potential enabling equitable access and innovation.

The Science of Tomorrow

- Future-oriented and emerging science, technology, and innovation, promising areas for research and science and novel areas.
- Where research can lead Canada and the world in the coming years is critical for the CFI to be able to respond to new and developing priorities of Canadian science.

Discussion Questions

1. Emerging areas of science and research (near- to medium-term (five to fifteen years)? Support needed?
2. Which type of partnership should be prioritized in research funding (e.g. domestic, international; private-sector, not-for-profit, public-sector)?
3. Should participation in large international projects be privileged over domestic projects? No? Encouraged?
4. Should the CFI evaluate differently projects in emerging, high-risk areas of science?

1. *Science of the 21st century tackles complex problems that need to be addressed through collaboration and access to state-of-the-art infrastructure, training programs and dedicated expert personnel, whether domain experts or highly specialized technical experts who can partner with individual research teams. The science of tomorrow will be determined by scientific breakthroughs, social and governmental priorities and a multitude of other factors, but will need to tackle problems of a complexity that was unimaginable even in the last decades of the 20th century. Canada requires a fresh look at the way research infrastructure is funded to enable researchers to address such complex problems*

in collaborative transdisciplinary teams while keeping pace with rapid advances in research technology. Housing infrastructure in scientific platform research hubs staffed by expert platform scientists offers a solution, internationally demonstrated to be effective (e.g. EuroBioImaging, Microscopy Australia), for addressing these issues. It removes the burden of infrastructure administration, upkeep, quality management and troubleshooting, innovation through technology development and dissemination, recruitment and retention of platform scientists and technical staff from individual researchers allowing them to focus on addressing fundamental research questions.

- 2. All types of partnerships should be considered within the merit of research project goals and the strength of the research teams to drive funding decisions. Partnerships with the private sector require accelerated timelines and frequent application cycles to ensure innovative ideas are rapidly funded. To ensure the rapid adoption of new technological innovation, specific types of 'beta testing' and pilot project industry partnership options should be prioritized to ensure accelerated discoveries securing Canada's position as a world leader.*
- 3. There is a need to balance investments in Canada while offering support for international projects. Investments in networks such as the Canadian Network of Scientific Platforms, and Canada BioImaging that liaise with international networks (e.g. Core Technologies for Life Sciences, Global BioImaging) would provide a tremendous value to Canada. Network interactions allow Canada to be at the table and exchange experience and expertise with global leaders to expand our influence and impact on a global scale and learn from our international counterparts. New and innovative models of science may also emerge from these international networks that can be applied in Canada. Currently, these networks rely on volunteer work and without dedicated staff cannot realize their full potential.*
- 4. Funding should be targeted to foundational research in all areas of science and engineering. Fundamental science and engineering have suffered at the expense of highly targeted funding for decades, eroding the foundation that emerging, high-risk research requires for success. For example, fundamental Canadian led research to develop stable reproducibly lipid nanoparticles was essential for development of the COVID-19 mRNA vaccines.*

Funding fundamental science and technology in partnership with well-established scientific platforms improves the likelihood that high risk emerging research areas will succeed. Scientific platforms bring together researchers from different career stages and areas of expertise and create a crucial nexus for creating interfaces that allow for unique and unanticipated collaborations that can drive potentially disruptive discoveries and innovations.

Future Prosperity and Healthy Communities

- The theme concentrates on finding ways to target, develop, support and sustain promising multisector partnerships in research at the local level and non-academic research sites and institutions.
- Challenges that confront Canada and the globe and how science and research contribute to local, regional and national wellbeing and prosperity.

Discussion Questions

1. Should research infrastructure support be directed to responding to the challenges of the global community?
2. How can science and research funding contribute to social and economic well being locally, regionally and across Canada? Should the CFI assess social and economic impacts as part of its evaluation of a project's benefit to Canada?
3. Should the CFI assess the potential for the commercialization of research outcomes as part of the evaluation of projects, when applicable and relevant?
4. Should the CFI encourage partnerships between research facilities and small and large businesses? What can be done, in addition to the CFI's Research Facilities Navigator, to bring small businesses to institutional labs, and how can researchers be more readily welcomed in larger industries?
5. In the context of limited funding, how can the CFI best support established research programs in world-class institutions, while supporting the development of new ideas and research organizations? How can/do/should universities, colleges and research organizations collaborate?
6. How can the CFI enable and enhance the contribution of research facilities and investments to social and economic wellbeing in your community?
7. Should the CFI evaluate projects for their community impacts differently from projects without evident or specific community impacts?

1. *Funding national networks to engage with the international community and identify challenges around research infrastructure (e.g. maintenance, training, education) will ensure CFI stays aligned with global challenges. Ensuring all projects align with the UN 17 Sustainable Development Goals would be one way to ensure that support is directed to globally agreed upon challenges.*

2. *The social and economic benefits resulting from scientific research are important indicators to measure the success of the funded research program, but most often, true benefits are derived from efficient knowledge exchange or translation activities that are outside the realm of expertise of scientists. In addition, many typical indicators relate mostly to applied research rather than fundamental research. While there are measurable ways to assess benefits of funding research platforms or instruments destined to a platform, the impact of platform scientists on developing careers of early-career researchers or researchers from underrepresented groups is difficult to measure on a project-by-project basis. Therefore, we recommend caution with evaluating social and*

economic benefits as part of the evaluation of a proposal. Impact evaluation requires resources and expertise to gather data over time. It cannot be done as a side activity especially for small institutions and remote areas that lack institutional support to do so. Such evaluations done by third-party independent entities should be prioritized. If it is decided that such benefits need to be measured, it should not be part of the initial evaluation but more as a budget item in the proposal.

3. *Yes, if applicable but this should not be a focus or requirement.*
4. *Scientific platforms are the perfect hubs for academic corporate partnerships. Funding pilot projects in collaboration with platforms could provide opportunities for innovative and high-risk ideas to be tested at an early stage. Funding platform scientists for internships in companies would facilitate the development of innovative applications, workflows and methods linked to CFI infrastructure. Funding is needed for connecting scientific platforms with corporate partners that need their expertise. While a list of items and capabilities exist in the Navigator, people need to connect and establish working relationships for productive partnerships to take place. Ensuring the connection with the private sector requires resources and cannot be a side activity. Including funding for staff to develop these connections is essential, whether directly in the institutions or through independent third parties expert in scientific platform capabilities. Moreover this cannot be on a by-project basis but preferably from a strategic planning approach.*
5. *Scientific platforms provide the best value for investments and enable equitable access to all regardless of the area of research. New ideas can quickly be developed with ready access to platforms' infrastructure and expert platform scientists. Funding for national networks of scientific platforms will enable universities, colleges and research organizations to identify common challenges, solutions, expertise, gaps and build collaborations and community of practices to remove any roadblocks.*
6. *Sustainable funding for scientific platforms is essential to the development of long-term, durable impact in communities. Platforms ensure continuity and serve as community centres and repositories of knowledge. Tangible benefits for society take time and investments in organizations that are designed to sustain the research enterprise within their community over the long-term is a way to ensure social and economic well being., Other ways include a comprehensive, open and easily searchable database of all infrastructure and expertise available in Canada and the support of mechanisms for making links and starting new collaborations*
7. *All research whether fundamental, or applied has the potential to impact the communities. While some impacts are seen earlier, others may take longer to realize. Unless there are robust ways to measure such impact and resources to collect such data, it should not be a criteria to evaluate the projects. It may be useful to have a section to add the potential impact of the project on communities giving opportunities to applicants to think farther into the future.*

A Sustainable Future

- Doing research and development in a sustainable manner and being conscious of limiting the consumption of energy and working to make every project as sustainable as possible.

Discussion Questions

1. Should science and research in Canada prioritize current and future global challenges? Which ones, and how might this be addressed in competitions? Should a statement on how this project might contribute to sustainability through its goals or methodology be requested with each application?
 2. How can inter-institutional collaborations be leveraged to achieve more sustainable research? Can shared facilities contribute to sustainable research? How would this impact success in your research?
 3. Does your institution have an environment and/or sustainability plan? Does this strategy encompass research activities? Should the CFI request inclusion of a plan?
 4. Should research into sustainability be enabled through a thematic competition?
 5. Should the CFI evaluate projects for their impacts on the environment and sustainability? Should projects receive an additional contribution to enable investments in research equipment that would itself be more sustainable or energy efficient?
 6. Should a percentage of the Innovation Fund be set aside to finance renewal and refurbishments of existing facilities, extending their life?
1. *Support for scientific platforms sustains a foundational base of research infrastructure and expertise that are ready to pivot and address any future global challenge. There is no need to identify the challenge ahead of time but there is a need to invest in world class infrastructure and to recruit, retain and value expert platform scientists. These investments will ensure the infrastructure is in place and expert platform scientists can pivot, adapt and rapidly respond to any global challenge Canada might face.*
 2. *The national network of scientific platforms help build inter-institutional connections and community of practices amongst the user groups with common expertise in research infrastructure, technologies and services. Shared expertise will ensure all Canadian researchers have access to the latest technologies and methods. Scientific platforms provide equitable access for all Canadian researchers to succeed.*

Knowledge of the Canadian research ecosystem is needed so that if infrastructure is decommissioned it can be donated to other Canadian institutions. Funding to develop an indepth “smart” instrument database linking together researchers with the same infrastructure can facilitate these user groups and places where decommissioned instruments might be reused or used for parts. If there are no Canadian laboratories in need of the instruments then partnering with foundations like Howard Hughes Medical Institute (HHMI), Chan Zuckerberg Initiative (CZI) and the Gates Foundation to decommission and donate infrastructure for continued use will improve sustainability and facilitate research success in developing nations. In this case there is a need for logistical support and funds for decommissioning, moving and reinstalling systems.

- 3. Ideally, every institution would have a comprehensive plan of their infrastructure life cycle and reduce duplication, and redundancies. CFI could help support the comprehensive life cycle analysis of the environmental impact of infrastructure from its manufacturer to disposal to understand the full environmental impact. This could be weighed against the cost and environmental impact of investing in keeping existing infrastructure in good working condition or upgrading it as needed.*

Equipment maintenance and repair has a large cost associated with it and over the past decade, the maintenance cost has grown two to threefold. Renewal of service contracts and small repairs for infrastructure should be included on existing CFI applications but sometimes they are not aligned with a specific research program. Separate funding calls are needed specifically to renew existing infrastructure where applicants can show the current usage and projects supported by the infrastructure rather than presenting a comprehensive research program. This would significantly enhance the lifecycle of an existing infrastructure and reduce the environmental impact of repairable equipment disposal (due to lack of available funding for repairs).

Priority should be given to institutions with comprehensive centralized research infrastructure plans, institutional support for scientific platforms and mechanisms for ongoing review of infrastructure status, gaps and technology areas that need further investment or are outdated and need to be sunset. There is a need for logical support and funds for decommissioning, moving and reinstalling systems.

- 4. 5. The priority should be on building sustainability into all aspects of CFI infrastructure funding including extended lifetime of infrastructure, maintenance, equitable and extensive use through scientific platforms and a reduction in redundancy of technologies by housing them in centralized platforms.*
- 6. Further investment in infrastructure beyond 5-years will improve the life cycle of infrastructure and allow for strategic spending on new and novel infrastructure while maintaining existing infrastructure for as long as possible before sending it to the landfill. Although the useful lifetime of infrastructure is variable, a 10-year useful lifetime is not uncommon.*

For a similar investment, the CFI could extend the life of 10 instruments instead of buying one new one. This would extend the life cycle, keep infrastructure out of the landfill and keep it in operation longer. Putting infrastructure in scientific platforms with expert platform scientists will ensure they stay well functioning and extend their lifetime.

Funding for institutions to have a team of dedicated technicians/engineers on staff to support infrastructure maintenance and repair would be a better use of CFI funds to reduce dependency on expensive service contracts and warranties.

The Next Generation

- How investments in science and research can support the development, recruitment and retention of promising domestic and international research talent, Indigenous people and other underrepresented groups.
- This theme is also about ensuring how best to support and build this capacity across all regions and, in particular, organizations that have not benefited from CFI support previously.
- principles of equity, diversity and inclusion and emphasizes how we can make all researchers from every background feel welcome and supported throughout their entire career.

Discussion Questions

1. CFI funds are used to attract and retain outstanding researchers. Do you have any suggestions for ways the funding might be adapted to be even more effective and supportive toward that goal?
2. What can be done to ensure that research facilities and spaces are more inclusive?
3. What can be done to ensure that research facilities and spaces foster the development of research talent among Indigenous people and other underrepresented groups?
4. How can research facilities further contribute to developing skills and competencies that are in demand in the labour market?
5. How can the CFI's programs better contribute to developing, recruiting and retaining high-potential talent and highly qualified personnel?
6. Should the CFI evaluate projects for their potential to develop skills and competencies that will support economic development, help train the next generation of researchers, and provide the talent necessary for industry?

1. Platform scientists are outstanding researchers. Their expertise is required to operate research infrastructure at the highest possible level. They are an integral part of the entire research team and are essential to attract and retain outstanding PIs and they provide customized, often one-on-one high quality training to thousands of HQP at all career stages. Funding platform scientists so they have stable positions will function to attract and retain the world's best technology experts. World class scientific platforms with state-of-the-art infrastructure and expertise will attract and retain outstanding graduate students and PIs.
2. By design, scientific platforms are open to everyone - equitable access to all HQP and researchers. Infrastructure placed into an individual lab is not accessible to all researchers who might need it. Scientific platforms offer clear management structures, accommodating instrument booking systems, expert advice for all researchers and solve many of the challenges of providing equitable access. A 2017 CNSP survey (https://cnsp-rcps.ca/wp-content/uploads/2021/05/CNSP-RCPS_Submission_Federal_Finance_Committee-July2017-FINAL.pdf) showed that women make up 47% of scientific platform scientists, managers, directors and administrators. So support for scientific platforms equals support for women in science. For example, investments in platform scientists will ensure new PIs can access platform infrastructure and expertise for a rapid start to their research laboratory while they work on setting up their own laboratory.
3. Training and education are a big part of what scientific platforms do. Inclusive opportunities for training and education should enable underrepresented groups to feel welcome and included. Direct support for platforms would allow for the expansion of their training programs and initiatives and educational and mentoring opportunities for Indigenous and underrepresented communities or individuals with special needs.
4. Scientific platforms offer highly specialized and customized training for HQP. They are also in close contact with corporate partners (instrument manufacturers, biotech companies using the infrastructure) so platform scientists are up-to-date on the latest technologies and applications relevant for the labor market. PIs typically don't have time to dedicate to in-depth training and may not have the necessary technical expertise. Scientific platforms can address issues of access and HQP training in remote geographic areas. For example, infrastructure could be centralized in scientific platforms in remote regions, researchers in remote areas could have virtual interactions with experts, transport their samples to scientific platforms and gain virtual access and remote control of infrastructure, Finally, virtual training and/or mobility funding for researchers in remote areas to visit scientific platforms in larger centres would enable cutting edge research.
5. Financial investments for platform scientist salaries, **incentives for institutions to have clear stable career paths for platform scientists** in place and requirement of demonstrated expertise (in place or to be hired) for any new CFI funding - JELF or Innovation Fund. These initiatives are required for recruitment and retention of expertise in the platforms who will move on to other opportunities if they don't have a stable and a clearly defined career path. Further,

there are no current funding opportunities for platform scientists to gain necessary skills required to succeed in their position. CFI funding opportunities specifically to support training, skill building for platform scientists (who may not have a faculty designation) will bridge the current gap and be beneficial to help platforms reach their full potential.

- 6. If applicable to the proposed project. This should be one of the elements for the “Benefits for Canada” section of CFI proposals. This should not be in opposition to projects that are more fundamental, where the link with economic development and talent for industry is not realistic in the short term.*

Delivering for Community

- How CFI can better structure its activities to meet the needs of the research community that it supports at a time of change in how institutions and their funders operate?

Discussion Questions

1. When new programs are created for funding by the tri-agency, should the federal government automatically make a 15 percent grant to the CFI which could enable the acquisition of equipment and facilities to support research in the targeted or prioritized areas?
2. The CFI is currently working with partners including MITACs, Genome Canada and Labs Canada. Should the CFI seek to develop more extensive funding partnerships with other organizations to provide integrated support to science and research? If so, please offer some suggestions and examples.

- 1. It would be more straightforward for PIs if they could put more significant infrastructure costs in their tri-agency operating grant budgets for small pieces of equipment, upgrades or repairs. The need for that infrastructure could be judged in the context of their research projects rather than targeted/prioritized areas. In fact, if scientific platforms are healthy and thriving it should be rare that additional infrastructure is needed.*

The use of technology reviewers for CFI and tri-agency grants would ensure the need for technologies is justified and allow for the determination if they are appropriate for the proposed work.

- 2. The CFI should continue these partnerships but make sure they don't result in increased complexity and administration of research grant applications, administration of funds and reporting.*

The CFI should initiate new collaborations and work closely with the CNSP. The CNSP is a community of experts, has a national presence, has a comprehensive understanding of

the research infrastructure and expertise landscape and with sustainable funding for core staff, the network could quickly grow to include all scientific platforms in Canada, grow partnerships, and make links between research infrastructure and expertise and those that need to access it (i.e. academics, non-profits, industry).

The CNSP could facilitate increased collaboration between scientific platforms at different institutions, could have partnerships with smaller institutions (colleges, CEGEPs, institutes) so they can access infrastructure and expertise instead of giving expensive infrastructure to smaller institutions that may not have the resources or expert scientists to support the infrastructure. Smaller institutions could be provided with funding to facilitate projects/partnerships/collaborations with scientific platforms at other institutions. The CNSP can work directly with institutions and scientific platforms to create awareness about what infrastructure, services and expertise is available, make connections between different groups and develop national best practices for platform management, finances, recruitment, retention, training and education.

There is a need for an annual program similar to the CFI Major Science Infrastructure (MSI) for regional or distributed national infrastructure platforms that are not necessarily as large as MSI networks. What works for the MSI facilities will work at different scales. Medium and smaller scale platforms have international reach, work with industry and perform world class innovative research.