

National Facilities and Platforms: A Smart Way to Fund Research Infrastructure

By Gordon Harling

Published on November 21, 2018

The Canada Foundation for Innovation's (CFI) funding support for research infrastructure is vital for universities and colleges in Canada. Canada's Federal Budget 2018 included an increase and long-term stability in funding for CFI – a smart move. How might this new CFI funding be used to address current program challenges?

Since the creation of CFI in 1997 we in the research community have learned a lot about specifying, purchasing, and commissioning scientific instruments. First, some of the equipment most vital to generating high-quality research outcomes (publications, trained personnel, R&D innovations in companies) isn't bleeding edge or state-of-the-art but foundational, general-purpose infrastructure.

Second, whether state-of-the-art or mainstream, some of these instruments can only be justified if they can be procured, commissioned and managed as infrastructure shared among a large group of users. In this scenario, sharing amplifies the research outcomes from any single investment of capital and operating funds—a definite win. In certain cases, this shared infrastructure takes the form of large, custom-designed and custom-built equipment. Often a multi-disciplinary team of researchers will work collaboratively to specify a technology platform with customizable elements that allow it to be easily adapted to address a range of specific research needs. Exploiting modular and reusable components, these customizable platforms again allow a single investment to satisfy a broad range of research needs and interests across the Canadian research community.

Third, funding the purchase of equipment is one challenge, while funding the operating costs to continue benefiting from the equipment is another. Whether their installations be large or small, many institutions struggle to secure the ongoing operating resources to benefit fully from CFI capital investments. It is not uncommon for equipment to be out of commission for extended periods solely for want of repair or replacement of a missing piece, or that a specialized instrument lies idle due to the lack of funds to pay an experienced technician to run it.

One approach to addressing the operating resource challenge, particularly for shared instruments, is to consolidate these installations into a core facility: physically co-locating equipment for operating efficiencies and greater usage by professors and students in a given institution or region. Concentrating support realizes economies of scale and the speedy development of deep technical expertise to maximize efficient use of the equipment and accelerate research outcomes.

Canada's Fundamental Science Review (the 2017 Naylor report) identified a subset of these core facilities, such as Canada's National Design Network (CNDN), as Major Research Facilities (MRFs) delivering pan-Canadian impact. CFI's Major Science Initiatives (MSI) program in turn recognizes 17 national facilities as MSIs. Whether designated MRFs, MSIs or not, these facilities greatly reduce

Serving Canada's science, technology, innovation and investment community with in-depth reports and analysis. the cost of infrastructure and make it available to researchers across Canada for whom it may otherwise be unaffordable.

In the case of the CNDN, for example, elements of the infrastructure are geographically distributed but the true power of sharing becomes evident when researchers, exploiting the digital infrastructure provided by CANARIE and its provincial and territorial partners, secure online access to centralized infrastructure elements to transfer data and/or run experiments from anywhere in the country. Overcoming geographic barriers to access and levelling the research playing field across the country increases the value that can be realized, both for academic and industrial research.

Given the success of the CFI program, the outcomes of CFI's discussions, and the Federal endorsement of CFI in terms of stable funding, the time is right for implementing improvements. CFI should make changes to both the Innovation Fund (IF) and MSI programs to better enable the development and operation of core facilities, particularly those with a national mandate. These types of facilities aim to serve a very large number of research projects, employ economies of scale for generating extraordinary impact, are critical to a broad set of disciplines, and are essential to a diverse community of users, including early career or those operating in regional centers running relatively small research programs.

But what do these changes look like? The nature of the current adjudication process employed in IF competitions is optimized to reward relatively small, high profile research projects. An international review committee is commissioned to assess, on a globally competitive basis, the anticipated extraordinary research outcomes from a small group specializing in a narrow topic area. The proposed infrastructure may be so leading edge and scarce that only a few such instruments are installed in the world. OK, that's great, but what about instances of broadly applicable, critically needed, but less exotic equipment of national platforms? There are options:

- To encourage dialog on sharing equipment and reducing duplication at a national level, projects that can demonstrate they are national in scope should be exempt from drawing on CFI's institutional envelopes for Innovation Fund competitions.
- To address national facilities, some of which are at immediate risk due to insufficient operating funds, CFI should implement the recommendations in the Naylor Report and increase its operating contribution for MRFs from 40 to 60 per cent beginning April 2019.
- To better leverage the core facility approach, CFI should implement a new program to resource regional and national facilities with funds for both capital and operating at the same time. The August 2018 report prepared by CFI, "2018 MSI Consultation Summary Report and Action Plan", contains some encouraging recommendations. We understand the proposed changes are the subject of CFI negotiations with government. Their implementation would be well received.

Regional and national core facilities, MSIs and MRFs are a smart way to equip universities in Canada with the tools and technologies critically needed for both research and training of highly

RESEARCH MONEY

Serving Canada's science, technology, innovation and investment community with in-depth reports and analysis. They lower barriers for researchers and provide researchers with equal access to the tools they need to achieve excellent results, independent of their geographic location or availability of local support resources; this improves Canada's competitiveness. Changes to CFI's competition funding parameters could stimulate more of these facilities – and increase the overall benefits to Canada.

Gordon Harling is the President and CEO at CMC Microsystems