

Technology Access Centres: A Decade of Success!

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Introduction

The 10th anniversary of the Canadian college-affiliated Technology Access Centres (TACs), launched in 2012, is an excellent opportunity to look back and reflect. The 2000s saw an expansion of college involvement in private sector innovation, with several studies showing that colleges have great demonstrated potential to support the economy^{1,2,3}. Nearly 95 % of the Canadian population lives within 50 km of a college, which means that these institutions are ideally situated to help small and medium-sized enterprises across Canada by providing skilled R&D staff, state-of-the-art equipment, and a dedicated student body. There are currently 60 TACs operating across Canada with diverse areas of innovation expertise. But what do TACs do? Who are they? How do they benefit industry? How do they contribute to Canada's innovation ecosystem and enable a thriving economy?



History

To better understand TACs, it is only fitting that we outline the evolution of applied research at Canadian colleges. Instead of basic research, colleges mainly focus on applied, business-oriented research to help bridge the gap between innovative ideas and commercialization success.

Compared to the long-standing university research tradition, the advent of applied research in Canadian colleges is relatively recent, with modest beginnings in the 1970s. Several research projects emerged from specific initiatives by innovative educators, and it took several years before we saw the momentum that we see today. However, the colleges gradually built a portfolio of successful collaborations, highlighting the potential of applied college research. This led to the first Centres collégiaux de transfert de technologie (CCTT) in Quebec in 1983.

In June 1998, the Canada Foundation for Innovation (CFI) launched a \$10 million fund to help Canadian colleges, institutes and affiliated



research facilities develop and upgrade their research infrastructure. That program awarded \$15 million in two competitions.

Intrigued by this successful initiative, in the fall of 2002, senior management from the Natural Sciences and Engineering Research Council (NSERC) visited 19 community colleges across the country to learn more about the nature and scope of applied research in Canadian colleges. These visits led NSERC to introduce the College and Community Innovation (CCI) pilot program in 2004, a visionary and ground-breaking investment that exclusively supports applied college research. Six colleges received \$100,000 annually for three years to evaluate the potential of this endeavour through collaborative applied research projects with industry. The successful pilot was made permanent in 2008 with \$15 million in annual funding.



Canadian innovation...

We often hear about the importance of innovation to economic development, which is important to clarify the term. The *Conference Board* of Canada defines it as such: "Innovation is the process by which economic or social value is extracted from knowledge - through the creation, dissemination and transformation of ideas - to produce new or improved products, services and processes."⁴ Innovation is not invention, and it isn't research or development. Innovation is an idea turned into a new product or service that successfully reaches its users⁵.

Corporate innovation in Canada has been characterized as weak in recent years. Rankings based on the Innovation Index show Canada lagging in the innovation universe: 11th out of 16 countries, with a C rating, and ranked 21st worldwide according to Bloomberg⁶. Even more worrisome is that, apart from Ontario and Quebec, which have similar levels of innovation to Canada, the rest of the provinces are rated D and even D-⁴. Canada is a highly educated nation, with significant investments in scientific infrastructure and a sizable volume of high-impact publications and even patents. Experts agree that increased private sector investment in research and development is key to fuelling innovation, since Canada has the weakest private sector investment in research and development in the G7⁶.



Over the years, matching annual funding of nearly \$75 million from the Canada Foundation for Innovation (CFI) and the Social Sciences and Humanities Research Council (SSHRC) evolved into a federal commitment to applied research at colleges. As a result, there are now 108 public colleges eligible to apply for funding, supporting thousands of industry collaborators. This creates a robust cross-country network of college applied research.

The CCI pilot initially offered a five-year non-renewable “Innovation Enhancement (IE)” grant to help colleges build applied research capacity in specific areas. The program then expanded to include specific initiatives that provide funding for operations, applied research projects, and even the purchase of state-of-the-art equipment. All have had considerable influence on communities across the country. One of the initiatives in the College and Community Innovation program is the Technology Access Centre grant. This five-year, renewable, stable, and predictable funding supports and expands a college’s applied research within a specialization of economic importance to their region. The grant builds on Quebec’s CCTT model, which has operated successfully for 40 years.

The Organisation for Economic Co-operation and Development (OECD) completed a 2019 case study on the Technology Access Centre grant in Canada, which concluded that Canada’s college sector is ideally positioned to contribute to the success of small businesses, so many of whom lack in-house R&D capacity⁷.

Since 2012, the number of TACs has gradually increased from 9 to 60 by 2019, rewarding applied research expertise and capacity built through prior CCI investments. There are now 60 TACs, with over 2,000 specialized innovation experts, located in all Canadian provinces (except Newfoundland) and the Northwest Territories. TACs actively support critical industrial areas in their regions: aerospace, agriculture, automotive, biotechnology, construction, cyber-security, energy, mining, advanced manufacturing, forestry, ocean engineering, food innovation, social innovation, digital media, chemicals and plastics, environmental technologies, medical technologies, and telecommunications.





What is a TAC?

A TAC is a state-of-the-art applied research and innovation centre affiliated with a Canadian college or CEGEP, specializing in a particular field of expertise and providing applied research, technical services, and training/knowledge mobilization (see box). Technology Access Centres also provide opportunities for workforce training and regional economic development.

TAC clients are primarily businesses (mostly SMEs) and organizations (non-profit or public). TACs boost industry capacity for innovation and competitive advantage by offering SMEs access to the expertise, equipment, and financing they need to get their novel innovation closer to market or adopt new technologies to become more productive and competitive.

R&D activities, however, carry significant risks for small businesses: innovation needs concrete and tangible investments, and results are not guaranteed. TACs decrease this risk with access to infrastructure, expertise, and government funding. Customers carry the cost of the services, which can be partially offset by public sources that foster corporate innovation. Public financial support is direct (e.g., grants awarded directly to the centres) or indirect (e.g., grants awarded to companies and organizations, tax credits for scientific research and experimental development).

It should be noted that, by design, a TAC is a long-lasting endeavour in a specific field; it is not a project with a limited time frame. A TAC can plan and adjust its development in response to changes in its internal and external environment and must adapt to meet the needs of all stakeholders (industry, educational institutions, students, governments, funding agencies, employees) as best as possible. The organization has sufficient internal governance mechanisms to be agile and quickly respond to changing stakeholder requirements.

Considering the public support and its assigned mandate, Technology Access Centres strive to avoid undue competition with private companies and complement the work of other innovation agents, especially by avoiding unnecessary duplication. As part of its mandate, a TAC occupies a specific niche in the innovation ecosystem. Therefore, it will actively collaborate with other available expert resources (e.g., other TACs, universities, private and public research centres, specialized consultants, etc.) to benefit clients and partners. This means that the TAC can more efficiently and effectively serve its clients, accelerating wealth creation in Canada.

Some TACs function as a department or operating division of their affiliated college. Some are incorporated as a not-for-profit corporations separate from their affiliate college, with varying degrees of control by the college. While different operating realities exist in different regions, TACs share a consistent role and purpose and operate a common TAC model.



The TAC Service Model

Applied research

Applied research services support innovative companies by developing, implementing, and performing applied research projects focused specifically on the company's needs. These multi-disciplinary team-based projects are delivered with the expertise and resources of the Centre, in close collaboration with its partners. Applied research projects can be carried out over a variable timeframe, based on the company's objectives and complexity of the research (generally between 2 and 24 months).

Technical services

Technical services provide shorter-term, ad hoc technical and scientific support in response to specific client needs. The technological uncertainty of this support is typically less than it would be for applied research services. Technical services draw from all parts of the Centre and can include expert advice, information research and technology monitoring, in-company diagnostics, technology assessments, equipment rental, non-routine tests/trials/analyses, personnel deployment, and can occasionally go as far as manufacturing prototypes or pre-commercial batches.



Training and Knowledge Mobilization

Because of its close connection to its affiliated college, TACs are mandated to support training, including paid research internships and the integration of research projects into the curriculum. As Innovation Drivers, TACs facilitate knowledge transfer through networking activities such as industry visits, demonstration days, symposia, and conferences. They are also skilled at outreach through the publication of articles, news, and social media posts. The centre's specialists are occasionally used to provide companies and their employees with short-term technical training.



Tech-Access Canada: The TAC Network

The TACs are nationally-recognized research centres with a shared purpose that operate independently from each other. Together, however, they form a highly cohesive system, which is essential to the TAC model. This strong network maintains each member centre's independence and is essential for consistency at local, regional, and national levels. The main benefit of this decentralized governance is that it facilitates a more responsive approach to customer needs and geographic considerations. The power of the network is to assist and encourage its members toward constant improvement.

To support this, the Centres organized themselves as a formal network, Tech-Access Canada, a non-profit organization where each TAC is a member. This pan-Canadian network aims to harness the capacity of 60 Technology Access Centres, all operating under the same model, to offer critical resources to small businesses that reduce the risks associated with innovation, commercialization, and technology adoption. By combining best practices, the network ensures that clients working with a TAC in Alberta have the same pleasant experience as those who work with a TAC in Quebec or Nova Scotia.

The network promotes collaborations between TACs, develops and exchanges best business practices, and collects data and performance indicators. The network is also responsible for organizing events to ensure the continued excellence of all TACs.

As Canada's 60 TACs are intended to be reliable resources for innovation, the network constantly explores new opportunities to foster business innovation. Tech-Access Canada oversees a range of initiatives allowing TACs to proactively respond to companies, including a highly successful Interactive Visits program in collaboration with the National Research Council (NRC), which offers Canadian small businesses quick access to any of the TACs to address their innovation needs.

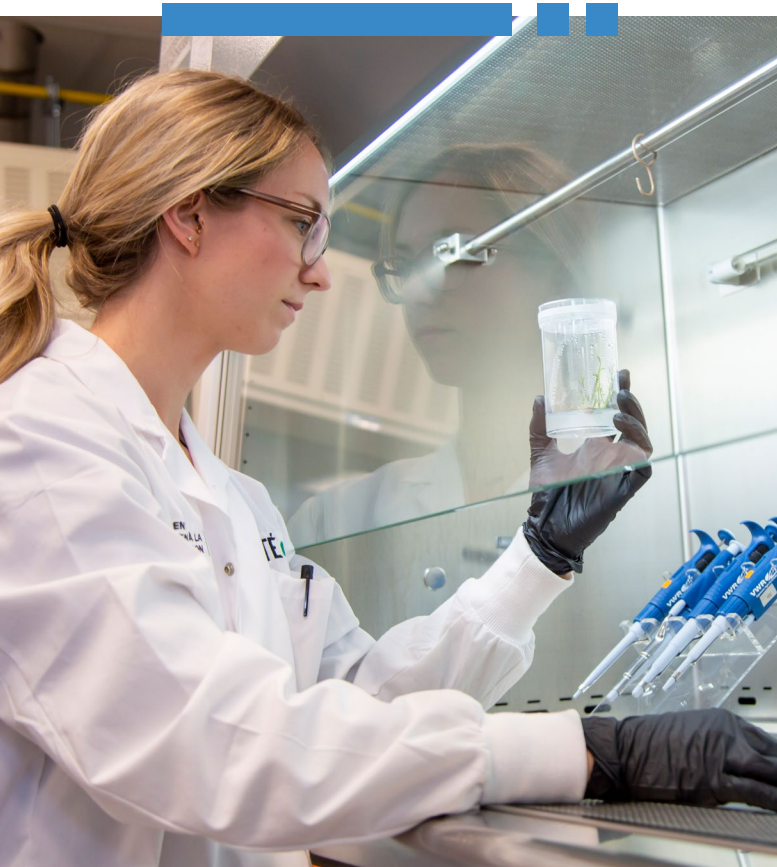


Making a difference in Canada

The Council of Canadian Academies' Expert Panel on Business Innovation reports that corporate R&D spending is a measure of corporate commitment to advancing and marketing new concepts. The most recent report shows that Canada, traditionally a nation of small businesses, has 1.1 million SMEs (fewer than 500 employees). While they account for 98% of all companies, they represent only 27% of total R&D expenditures, which have declined steadily over the past few years. This decline has persisted despite several warning signs from expert panels and studies regarding Canada's lacklustre innovation record⁹.

The TACs seek to reverse this trend by stimulating R&D investment in SMEs. Over the past year, TACs have collaborated with over 5,000 clients and partners, of which 81% were small and medium-sized enterprises. The TAC teams have more than 2,000 full- and part-time innovation specialists. In addition, over 2,300 post-secondary students participated in paid work placements at TACs, 79% from colleges and 21% from universities. The TACs also leveraged \$58 million in applied research revenue, 53% of which comes from private sector cash. These private sector R&D expenditures represent a 4X return on the \$14 million base funding the 60 TACs receive from NSERC.

A recent survey on the Interactive Visits program found that almost 80% of respondents said the Interactive Visit positively impacted their business, by introducing new products or services to market, expanding R&D spending, reducing the costs of adopting new processes/technologies, enhancing product and service revenues, safeguarding existing jobs, and recruiting new employees. Sixty percent of the companies have had further collaborations with TACs, with a majority undertaking longer-term R&D projects.



Conclusion

Technology Access Centres are innovation drivers for private companies and key contributors to Canada's innovation culture. After ten years of service, the TAC model has lived up to its promise. Several TACs have been internationally recognized for excellence, with World Federation of Colleges and Polytechnics awards. By supporting thousands of innovation projects with Canadian SMEs and developing leading-edge expertise for thousands of students, TACs play a valuable and unique part in Canadian innovation.

Two critical issues remain, despite these obvious impacts: 1) How can we sustain applied research at the TACs and the wider college sector? Despite the positive results, this model is decidedly fragile; 2) How do we maximize its growth potential? This is not a minor issue, as many college-based applied research initiatives were eliminated due to lack of funding, both

the ability to award new TACs and large-scale collaborative R&D projects. Canada needs a robust innovation support system, and the consensus among experts is that this will require private sector R&D investments coupled with enabling mechanisms. Technology Access Centres are one vehicle for achieving this goal. Without a process to ensure sustainability and continued growth of the TAC network, previous public investments by the federal and provincial governments in developing the TAC model, including specialized infrastructure and leading-edge expertise, will be in vain. In the end, it will be innovative small Canadian companies that suffer, losing a trusted innovation intermediary for their commercialization journey. We believe that the time is right to act and revitalize a vision for the future of TACs.



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