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NSERC 2030 discussion papers

# Colleges, CEGEPS and polytechnics and Canada's research and innovation ecosystem

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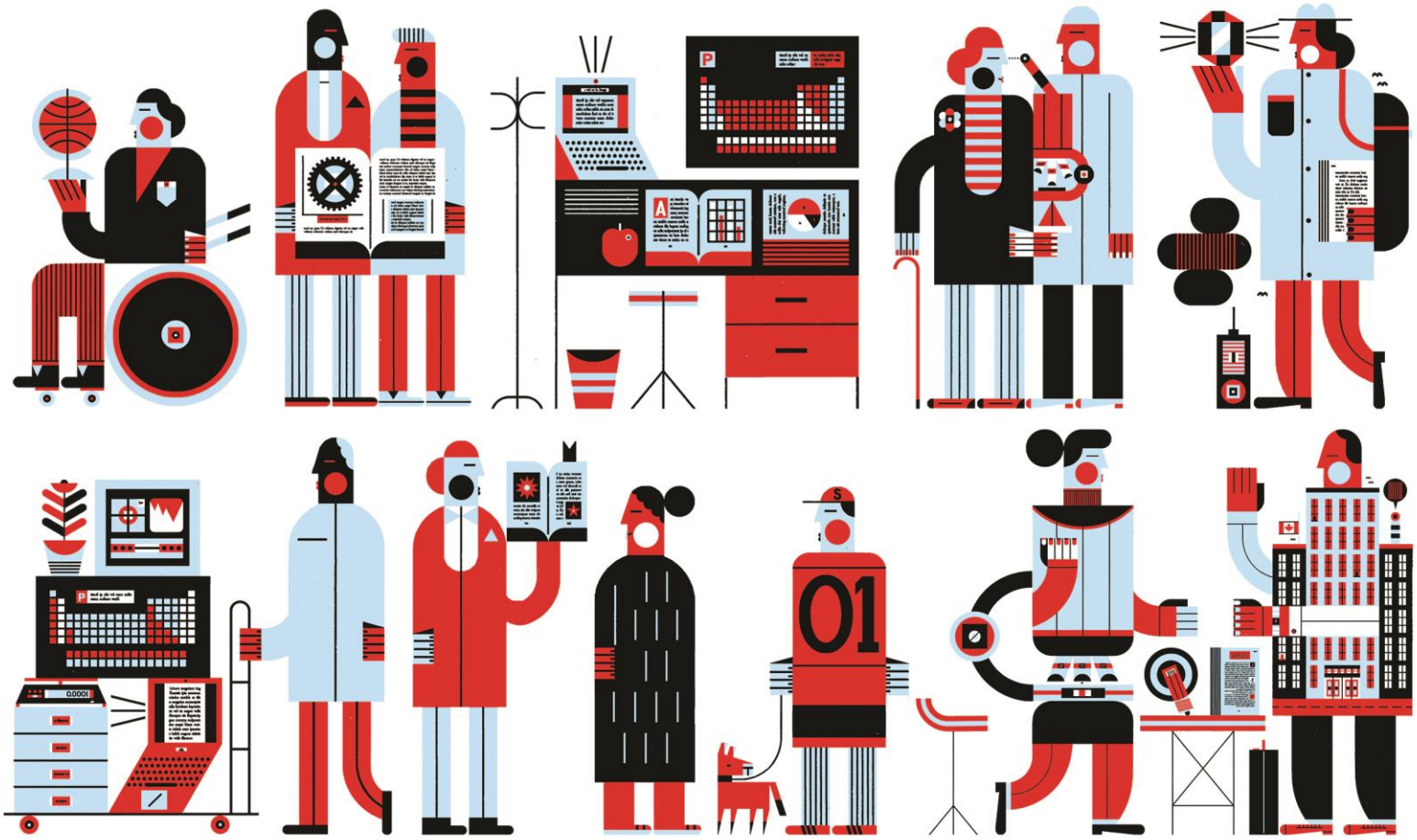


Natural Sciences and Engineering Research Council of Canada
Conseil de recherches en sciences naturelles et en génie du Canada

Canada

# Colleges, CEGEPS and polytechnics and Canada's research and innovation ecosystem

This document is one of a series of discussion papers generated by NSERC staff to foster discussion during the development of the *NSERC 2030* strategic plan. Items presented do not represent policy directions; they are meant to elicit discussion among NSERC's stakeholders. Similarly, all themes discussed in these papers are cost-neutral: they would not require new program funding or cuts to existing programming in order to fund new initiatives.

## Overview

The research and innovation ecosystem is a continuum involving various organizations, including universities, colleges, CEGEPS, polytechnics, teaching hospitals, research institutes, funders, small to medium-sized enterprises (SMEs), not-for-profit organizations and multinational companies, each making unique contributions to research and development. A productive ecosystem must involve all participants, leverage their strengths and promote mechanisms to advance the innovation process.

According to the College Applied Research Taskforce (2019) a total of 95% of all Canadians, and 86% of Indigenous Peoples, live within 50 km of a CEGEP and/or polytechnic (hereafter, colleges). Colleges have distinct knowledge, skill sets and connections. Their position in the research landscape is also distinct. As a result, college-based applied research fosters community innovation and responds to the needs of partners in unique ways. Leveraging these institutions and their researchers increases the awareness of the benefits of academic research across all research domains, enhances inclusion and connection between researchers and end-users, and leads to richer outcomes for Canada.

## College and Community Innovation program

The College and Community Innovation (CCI) program, a Tri-Agency (NSERC, the Social Sciences and Humanities Research Council [SSHRC] and the Canadian Institutes of Health Research [CIHR]) program administered by NSERC, focuses on funding applied research in colleges. Compared to programs oriented to universities, the CCI program is generally less known within the Tri-Agency and among other actors in the research ecosystem. However, the federal government has repeatedly recognized the program as a key driver of partner-led research and development projects. Since NSERC's goal is to fund academic research that delivers tangible benefits to Canada, while training the next generation of researchers, CCI serves as an interface for:

- supporting natural sciences and engineering research as well as social and health innovation
- fostering interagency collaboration among the Tri-Agency as well as the Canadian Foundation for Innovation (CFI) to offer support for college research
- raising awareness among government funders of the importance of investments in research and development (R&D) and talent
- training the next generation of researchers and integrating highly skilled talent into college-based research positions and future community-based careers
- making research accessible in urban and rural centres
- bridging fundamental and applied research
- boosting the Canadian economy via partner businesses participation in applied research at academic institutions

## Opportunities

Leveraging the unique role of colleges in the ecosystem can be achieved through better integration of college-based applied research across research domains and among researchers. Supporting college-based applied research and the opportunities to enhance its impact, described below, allows research results to move along the R&D spectrum, within communities, and toward end-users.

NSERC's departmental plan aims to mobilize knowledge generated through the transformation of Canada's natural sciences and engineering research into results for the benefit of all Canadians. Since CCI is a Tri-Agency program, these aims further extend to social and health innovation. Outcomes would be furthered by facilitating colleges' involvement in other Tri-Agency programs, using the particular strengths of colleges to transform technology for real-world applications and commercialization. To improve outcomes, NSERC could integrate colleges and their partners as collaborators in a broader base of funding programs to leverage their distinct yet complementary strengths. Greater understanding of the colleges' unique role in the research ecosystem would facilitate their engagement in the innovation process, maximizing economic impacts and successes for other research players**.** This would offer benefits to Canada, such as more opportunities for students to access higher education, enhanced skill sets needed by businesses and community partners, a facilitated pathway from knowledge and technology creation to its adaptation and an increase in commercialized intellectual property to benefit the Canadian economy. Yet the relatively modest human and capital infrastructure dedicated to applied research in colleges limits the technology and commercialization services that their research offices can offer.

Colleges often have strong ties with rural communities, local industry, not-for-profit organizations and regional governments. While colleges are situated in urban

environments, they have a greater involvement in rural environments than universities. Colleges often hire course instructors from among industry representatives, train students to work in local businesses and not-for-profit organizations and are located close to their partners. Thus, they have strong relationships within their own communities, and their capabilities are well-known to partners both locally and regionally. This community focus enhances expertise relevant to partners, facilitates skills training for students and promotes economic growth, job creation and competitiveness via business partners. The resulting community connection helps retain experienced trainees in smaller regions, thus increasing social inclusion. In Quebec, there is a large network of CEGEPs and Centres for the Transfer of Technologies and Innovative Social Practices (CCTTs). The CCTTs consist of about 1,500 professionals in technological and social innovation that enable businesses and other organizations to increase their effectiveness, productivity and competitiveness (Synchronex, n.d.). Elsewhere in Canada, the equivalent to Quebec's CCTTs is the network of 60 Technology Access Centres.

Stronger connections between fundamental and applied research can be made through colleges. Their niche expertise in conducting short-term projects and transforming research results into marketable products is typically less interesting to university-based researchers, as it does not align with timelines needed for graduate-level training. Currently, funding of projects involving collaboration between colleges and universities is part of the CCI program. Some universities have commented that an opportunity exists to increased support for these collaborations. The community and partner connections of colleges boost the Canadian economy via partner businesses' participation in applied research at academic institutions. There remains a need to enhance awareness of the research conducted at colleges and its benefits to Canada's research ecosystem. Stakeholders, such as funding agencies and provincial governments, need a better understanding of what research in a college context entails. This includes understanding the capabilities of colleges, how their unique strengths complement other investments and how to recognize, integrate and leverage their expertise to drive innovation for the benefit of Canadians.

## Considerations

Colleges fill a unique niche in partner-driven research. With no internally driven research agenda, colleges tackle applied research projects that focus exclusively on the needs of partners. Without these research contributions, there would be gaps or delays in the development of innovative products, reduced productivity gains and, consequently, a slowdown of economic growth. This is particularly relevant to SMEs, which often require short-term applied research solutions. The culture in colleges is for the intellectual property (IP) to stay with the industrial partner, with the goal of

commercializing the product. This is somewhat different from the approach and culture elsewhere in the research ecosystem (e.g. emphasis on publications in high-impact journals). It is important for Canadians to maintain its competitive edge of high-quality knowledge advancements. However, missed opportunities to apply this knowledge in the way that college-based research projects do can lead to adverse effects on the Canadian economy, including low rates of commercialization and lack of properly trained staff.

The presence of colleges throughout Canada is another unique consideration. The strong connection with local businesses and governments, along with community partners, serves to bring research results to end-users. Otherwise, research and research outcomes would be less accessible in many non-urban centres and communities, including to Indigenous Peoples.

College-based applied research is highly impactful and requires ongoing, targeted support to continue. With a focus on partner-driven, short-term and market-speed projects, colleges are unlikely to publish in academic journals, limiting their competitiveness in programs targeted to university-based researchers. There is a risk that these contributors to the research and innovation ecosystem cannot be integrated without a more inclusive appreciation for research output beyond traditional forms of contributions.

## Discussion questions

- How do we highlight the complementary role of various players, such as universities and colleges, in the research ecosystem? What are the opportunities for improved complementarity?
- Considering the niche that colleges fill in making research accessible within communities and in making research results market-ready, what is NSERC’s role in helping colleges to further develop and leverage their unique role in the research and innovation ecosystem?
- Once the ecosystem has achieved improved complementarity and collaborations between universities and colleges, and improved college-based research training (see the discussion paper Building the next generation of research talent), what is the next frontier for colleges in the research ecosystem?

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