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Investing Today
in the Power of Applied Research at Canadian Colleges and Institutes:
A Key Strategy to Support Our Country's Socio-Economic Development

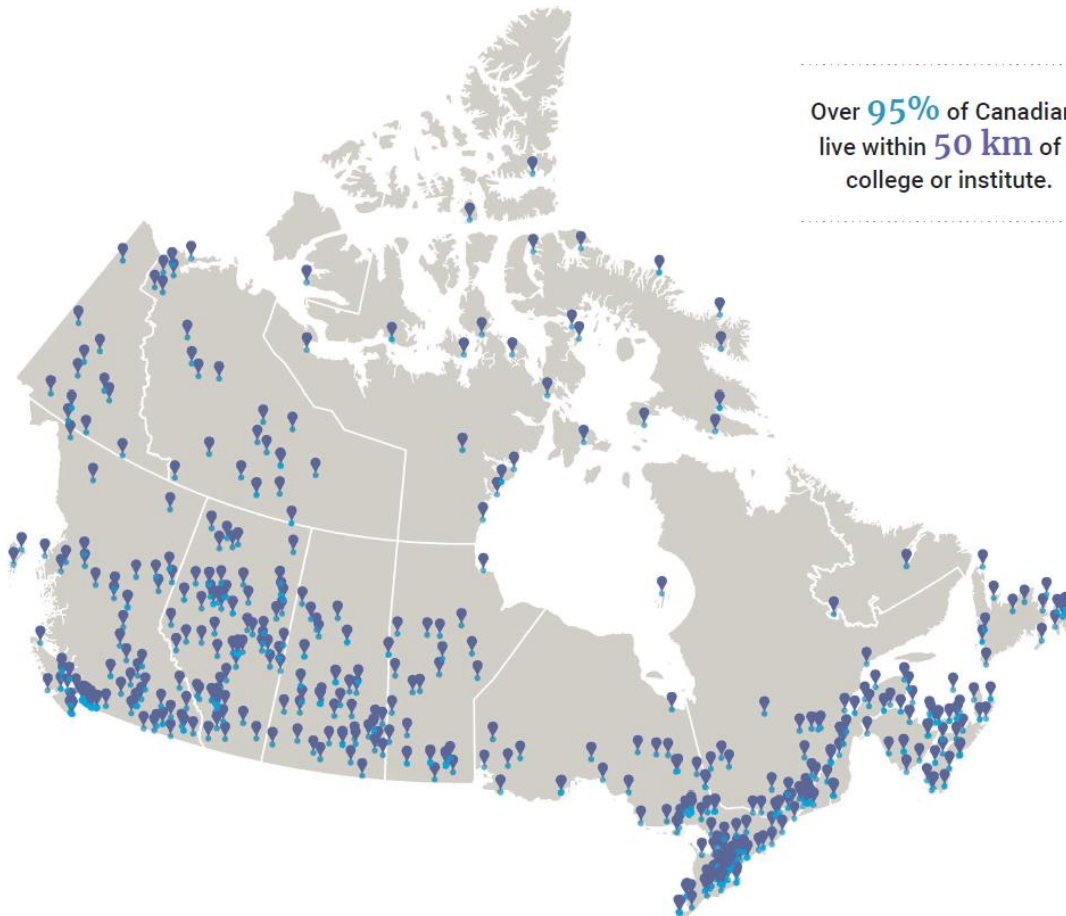


Table of Contents

1	Introduction	3
2	Investing UPSTREAM to foster the development of high-value projects	4
2.1	Background	4
2.2	What exactly are research centres in colleges and institutes?	4
2.3	Current funding model for research centres in colleges and institutes	5
2.4	Objective of the application	5
2.4.1	<i>Reduce internal risks associated with the early stages of projects</i>	6
2.4.2	<i>Coordinate logistics chains and sectors in carrying out pre-competitive research</i>	6
2.4.3	<i>Unite and mobilize communities to develop shared societal solutions</i>	6
2.4.4	<i>Strengthen relationships with universities to reduce time to market</i>	6
2.4.5	<i>Strengthen international relationships to find ideal partners and boost our economy</i>	6
2.4.6	<i>Develop sustainable solutions</i>	7
2.4.7	<i>Adapt to market needs</i>	7
2.5	Amount requested and fund allocation	8
3	Investing DOWNSTREAM to build an innovative, strong and competitive Canada	9
3.1	Background	9
3.2	Amount requested and fund allocation	9
3.2.1	<i>RECOMMENDATION: \$40M for rapid-response Engage Grants</i>	9
3.2.2	<i>RECOMMENDATION: \$15M to reduce company leverage requirements for regular College and Community Innovation Program (CCIP) Grants</i>	9
3.2.3	<i>RECOMMENDATION: \$20M for new projects across all CCIP grant types to enable digital adoption by SMEs as they retool their operations</i>	10
3.2.4	<i>RECOMMENDATION: \$10M for ARTI grants to retool applied research facilities and equip applied research staff to meet physical distancing requirements</i>	10
3.2.5	<i>RECOMMENDATION: Open the funding opportunities created by these new investments to partners from all sectors</i>	10
3.3	Applied research—background information	11
3.4	Applied research at colleges and institutes: current issues	14

1 Introduction

Colleges and Institutes Canada (CICan), Polytechnics Canada, Tech-Access Canada and Synchronex (Quebec's network of college centres for technology transfer and innovative social practices (CCTTs)), are four associations representing key players in applied research at Canadian post-secondary institutions. For several years now, they have been working together to promote the value of applied research and to highlight its impact on the socio-economic development of every region of this country. CICan regularly organizes and hosts the National Research Advisory Committee, which works to improve the coordination of applied research activities and practices throughout Canada.

In the past two weeks, two funding requests were submitted to the Government of Canada. This funding would allow Canadian institutes' and colleges' applied research centres (the "Centres") to step up their work with Canadian businesses and organizations and safeguard our country's economy, both during and after the COVID-19 pandemic. The first request is for an injection of \$80 million to coordinate stakeholders and underwrite the design and harmonization of multiparty projects. The second request is for \$85 million to carry out these projects.

Due to time constraints, these two complementary funding requests were submitted separately by the same stakeholders. They are presented in a single document below. This money is urgently needed. It will not only allow the Centres to maintain their current activities; when Canadian businesses are ready to restart their operations, it will help fund the creation of sustainable, productive and competitive Canadian supply chains in sectors that are essential to our country's security, including agriculture, energy, medical supplies and health services.

Denise Amyot, President and CEO
CICan (Ottawa, ON)
Email: damyot@collegesinstitutes.ca
Mobile: 613 866-0906

Marie Gagné
CEO
SYNCHRONEX
Email: mgagne@synchronex.ca
Mobile: 581 308-6763

Sarah Watts-Rynard, CEO
Polytechnics Canada
Email: sarah@polytechnicscanada.ca
Mobile: 613 688-0899

Ken Doyle, Executive Director
Tech-Access Canada
Email: kdoyle@tech-access.ca
Mobile: 613 218-3267

2 Investing UPSTREAM to foster the development of high-value projects

2.1 Background

The OECD's website poses a question that every country must now answer:

*What are the impacts and consequences of the coronavirus pandemic on our lives and our societies — and what are some of the solutions we can find to boost our healthcare systems, secure our businesses, maintain our jobs and education, and stabilise financial markets and economies?*¹

Canada and Quebec must be ready with solutions in place. The applied research centres on Canada's college and institute campuses (the Centres), including Quebec's college centres for technology transfer and innovative social practices (CCTTs), are valuable resources. They merit increased support to boost their regional and sectoral presence and unleash their potential to develop concrete, innovative solutions that will allow Canadian businesses and organizations to better position themselves both during and after the COVID-19 pandemic.

2.2 What exactly are research centres in colleges and institutes?

Applied research centres at Canada's colleges and institutes are technological and social innovation hubs that conduct applied research and provide technical support, training and information to Canadian businesses and organizations. They help improve practices, processes and products and enhance competitiveness, productivity and quality of life. These Centres are well acquainted with the issues and needs of their regions and sectors, and operate throughout the country. In fact, 95% of Canada's population lives within 50 km of a college or institute.

Each Centre specializes in a specific area, such as health, education, agriculture, aerospace, energy (including renewable energy), biotechnology, maritime industries, forestry, mining (extraction and recovery), innovative manufacturing (production, artificial intelligence, robotics, imaging, etc.), environmental technologies, tourism, sustainable development, advanced materials, immigrant integration, people with disabilities, and marginalized populations.

Firmly rooted in their academic institutions, the Centres also serve as training grounds. They help educate a highly qualified and innovative workforce, capable of mastering cutting-edge technologies and practices in any number of fields, and equipping their graduates to drive innovation in businesses and organizations. The Centres specialize in developing social and technological solutions that respond to real-world challenges faced by businesses, organizations and communities.

The Centres also boast state-of-the-art facilities within their academic environments, giving them the ability to develop prototypes and scale up processes while pursuing their research activities.

The Centres develop more than 4,400 new processes, products, prototypes and services every year, engaging nearly 30,000 students in their research projects. As a result, Canadian colleges attract investments of over \$296 million for applied research annually.² In Quebec alone, each year the Centres undertake 10,000 projects in partnership with more than 5,000 companies, representing a yearly investment of over \$130 million in applied research. This activity produces close to \$210 million in economic spinoffs for partner companies³ and generates tax revenues of nearly \$233 million for the provincial and federal governments.

¹ <http://www.oecd.org/coronavirus/en/>

² Colleges and Institutes Canada. 2017–2018 Applied Research Survey.

³ KPMG. Rapport sur la contribution des cégeps et des CCTT, November 2014.

Over time, the Centres have developed an agility and responsiveness that make them ideal partners for driving innovation in businesses and organizations. Moreover, many of these Centres are playing an important role during the COVID-19 pandemic, carrying out research and providing technical assistance to meet pressing needs. Here are a few examples:

- Characterization of conditions for distance education and dropout risk factors (ÉCOBES research and knowledge transfer – Jonquière, Quebec)
- [Involvement of the textile industry in producing sanitary equipment](#)
- Development of a design and production method for protective visors, development of a design and prototype for a UV sterilization oven (Camosun Technology Access Centre (CTAC) – Victoria, British Columbia)
- [Development of antiviral paper for use in thermoformed masks](#)
- [Development of strain production processes as part of a cooperative effort to create a vaccine](#)
- [Development of protocols and certification procedures for masks and gowns](#)
- [Development of rapid solutions to provide telecommuters with access to bandwidth](#)
- Development of a hand sanitizer production process for a distillery (BC Beverage Technology Access Centre – Kelowna, British Columbia)
- Development of a hand sanitizer production process for a brewer (Bioindustrial Process Research Centre – Sarnia, Ontario)
- [Production of videos to help support seniors during the pandemic.](#)

2.3 Current funding model for research centres in colleges and institutes

At universities, government funding subsidizes both teaching and research. While colleges and institutes form part of the higher learning ecosystem, public funding is used primarily to underwrite teaching, although research is a recognized part of institutions mandate. This situation persists, despite our governments' acknowledgement of the important role that college and institute research plays in Canada's economic and social development, as evidenced by the Tri-Council programs (NSERC, SSHRC and CIHR) dedicated to colleges and institutes.

The Centres must therefore use a self-funded model to support their research activities, with the cost of human resources financed by individual projects. These resources include researchers, professionals and technicians, as well as teachers who contribute their knowledge and/or supervise student interns. Like at any company, college and institute research incurs additional costs, such as those associated with physical occupancy and digital infrastructure, developing and maintaining leading-edge research facilities, accessing scientific literature, upholding best research practices (intellectual property management, human and animal ethics, conflicts of interest, etc.), and attracting and retaining qualified personnel.

In Canada, 80% of our industry consists of small- and medium-sized enterprises (SMEs). Resources are scarce (as they are everywhere), and this self-financing model forces Centres to curtail business development in favour of reducing risk and maximizing cash flow. As a result, the Centres have little time to develop projects and must prioritize companies and organizations with a proven capacity to innovate, in order to ration the innovation support they provide to their clients.

2.4 Objective of the application

The Centres' current funding model limits their capacity for action and intervention. For most of the SMEs and organizations that make up the Canadian economy, their survival will depend on their ability to react quickly to the new challenges of a changing world. Right now, the Centres are limited in the support they can offer to their respective regions and sectors. Their organizational agility is hampered by their precarious financial sustainability, despite their essential role in regional development and in the growth of their activity sectors.

This application is seeking special funding over two years, to enable each Centre to capitalize on its research and innovation capacity and invest time and expertise in advance of the project phase. This will allow the Centres to undertake complementary and supplementary activities with high added value, for the benefit of businesses and organizations in their regions and sectors. With this additional funding, the Centres will be able to carry out the following activities, all of which will be critical to Canada's post COVID-19 economic recovery.

2.4.1 *Reduce internal risks associated with the early stages of projects*

During the pandemic, businesses and organizations have been forced to use cash to continue their operations, despite their loss of revenue. As a result, their ability to invest in innovation is now limited. To help these businesses and organizations innovate and develop new products, processes and practices in order to secure and maintain their market share, the Centres must be able to offer their clients groundbreaking solutions with exceptionally low risk levels. This means that the Centres must carry out proof-of-concept and validation in a “semi-autonomous” mode before receiving financial and/or human resource commitments from their partners, moving forward only once results prove conclusive. This additional funding will make it possible to undertake these activities, which are essential for the development of our economy as we emerge from the pandemic.

2.4.2 *Coordinate logistics chains and sectors in carrying out pre-competitive research*

A common threat can sometimes serve as a catalyst for collaboration among businesses and organizations; pooling resources has proven to be effective in solving problems such as labour shortages or challenges related to energy access (including gas). In this regard, the current pandemic offers a unique opportunity to unite industry players and supply and logistics chains around common issues. This could generate solutions that will spur the growth of homegrown supply chains and allow stakeholders to enter new markets, develop new sectors, share resources, and more. The result will be a strengthening of regional innovation ecosystems and industries. Nevertheless, bringing partners together to solve widespread and/or shared technological and scientific issues is a time-consuming process, representing non-billable hours for which the Centres must find financing. This additional funding would provide room for this process to take place.

2.4.3 *Unite and mobilize communities to develop shared societal solutions*

While the past few weeks of lockdown have exposed the challenges of implementing behavioural changes, we have also seen how effective it can be to mobilize multiple stakeholders around a single issue. That said, it takes intense coordination to align visions, identify common needs and jointly build multiparty projects — activities that must be undertaken upstream of the project phase and require a major time investment. Although Centres specializing in social innovation understand the value of this approach, they currently do not have the financial resources to commit to it. Collective action is needed on a number of issues: integrating immigrants and marginalized groups (including Indigenous peoples), assisting seniors, integrating persons with disabilities, adopting healthy lifestyles, and improving digital literacy among certain populations. These activities would be made possible by these additional funds.

2.4.4 *Strengthen relationships with universities to reduce time to market*

Canadian businesses and organizations continue to see a dwindling of their competitive advantage; this must be countered by shortening the transition from concept to market as much as possible. Currently, many of the steps needed to transform research results into commercialized products or processes take longer than they should, due to a lack of funding for the transitional stages between basic and applied research. Developing prototypes, scaling up, identifying industrial and commercial partners to host and nurture innovations — these important activities are difficult to finance, delaying the transfer of knowledge to companies and organizations. This additional funding would allow these steps to take place.

2.4.5 *Strengthen international relationships to find ideal partners and boost our economy*

With their modern facilities and cutting-edge expertise, the Centres have a great capacity to develop international partnerships; these alliances generate new knowledge and practices for Canadian businesses and society in the short term. This additional funding would allow these activities to take place.

2.4.6 *Develop sustainable solutions*

While the pandemic has had a positive impact on the environment, it has also underscored the importance of retaining sovereignty over strategic resources and revealed a need for shorter chains of production. We must take a sustainable, cyclical approach to restarting our economy. Canada enjoys an enviable fourth place ranking on the *Global Cleantech 100* list, and we have built a thriving green economy with great potential. Still, developing eco-friendly, competitive projects will require more time and expertise than companies will be able to afford as they emerge from the pandemic, despite the benefits of ecological solutions. Access to additional funding will make it possible to pool the scientific and technical resources needed to migrate from more traditional projects to those that are cleaner and more sustainable.

2.4.7 *Adapt to market needs*

To identify opportunities, market research must be undertaken to pinpoint weak signals (SEWS⁴) and areas of growth potential. Carrying out these studies in the early stages of an innovation project can better position its output, whether that be a product, process or practice. This research must take place in advance of opportunity and feasibility studies, and its financing is not usually part of a project's budget. It is therefore dependent on special funding (if and when it is available) and is often left out of the equation. This increases risks considerably and can cause additional challenges and delays for innovation projects. Access to this additional funding would make it possible to engage external experts for preliminary market analyses, thereby reducing risks, avoiding setbacks when developing innovations and speeding their entry to market.

⁴ ANSOFF, Igor. Strategic Early Warning System (SEWS), 1970.

2.5 Amount requested and fund allocation

The additional funds requested total \$80 million over a two-year period ending March 31, 2022. Given that the majority of Canadian colleges and institutes have access to Tri-Council project funding (NSERC, SSHRC and CIHR), we intend to follow an allocation method tied to Tri-Council funding received, as a reflection of each college or institute's capacity to deliver services and to work with regional and sectoral partners, while boosting the Centres' capacity overall.

We will use the latest three-year average of each college/institute's Tri-Council grants to determine their proportion of the envelope. Those institutions that have received little or no funding from the three councils in the past three years will be allocated 0.5% of the total envelope (the minimum threshold).

3 Investing DOWNSTREAM to build an innovative, strong and competitive Canada

3.1 Background

Canada has been investing in colleges and institutes for many years now, developing strong applied research expertise to help Canadian businesses and organizations boost their innovation, productivity and competitiveness.

Because of the pandemic, this well-established funding ecosystem is now being threatened across multiple regions and sectors due to a lack of liquidity among customers. Short-term measures are urgently needed to help these Centres maintain and accelerate their innovation activities.

Businesses and organizations are all seeking help to reopen safely and adapt their operations to the new reality of the pandemic and its effects.

To respond to this need and sustain applied research capacity, college and institute applied research offices and centres need flexible, nimble access to existing grant mechanisms, along with funding increases to assist partners who have suffered severe revenue losses, laid off key personnel and are facing a changed and uncertain business environment that threatens their survival.

3.2 Amount requested and fund allocation

Colleges and Institutes Canada (CICan) is recommending an investment of **\$85 million in applied research over two years** to help up to 2,000 businesses and organizations survive the challenges of the COVID-19 pandemic and pivot to meet the needs of a strong economic recovery.

This funding will help SMEs and community organizations to:

- rapidly transition to online operations, redesign physical space, and introduce new work methods and modes of service delivery to reduce risks for employees and clients;
- support recovery and ensure growth in the medium term by accelerating digital and technology adoption, retooling equipment, automating processes and developing new lines of business.

The investment will also ensure that the applied research capacity of colleges and institutes, built up over the past two decades and enhanced with new investments since 2015, is available to help meet longer-term economic and social goals in all regions of Canada.

3.2.1 *RECOMMENDATION: \$40M for rapid-response Engage Grants*

- Equip the Centres to respond quickly to industry and community partners that require innovation services to reopen, begin recovery and plan for growth.
- Reduce costs and wait times associated with application and approval processes for company partners and Centres by bundling multiple Engage Grants in a single application.
- Enable partners in all sectors to address the impacts of the COVID-19 pandemic through college applied research.
- 135 grants totalling \$300,000 would support 1,300 projects at \$30,000 each over two years.

3.2.2 *RECOMMENDATION: \$15M to reduce company leverage requirements for regular College and Community Innovation Program (CCIP) Grants*

- Maintain and strengthen the pipeline of new projects by reducing cash and in-kind contribution requirements for partners working with the Centres on applications in the regular funding cycle.

- Top-up project budgets with grant funds in situations where partners are no longer able to meet their contribution commitments and where shortfalls negatively impact the scope and outcomes of a project.
- Allow flexibility within CCIP to lift or lighten cash leverage requirements for companies that can no longer pay.

COVID-19 Relief required by SMEs

In a May 8 conversation with the online newspaper *The Logic*, federal Minister of Small Business Export Promotion and International Trade, Mary Ng told webinar participants that since the release of the Canada Emergency Business Account program, 600,000 firms (one in 15 SMEs) have received a total of \$20.7 billion.

Despite the government's response, many needs remain unmet. The President of the Canadian Federation of Independent Businesses (CFIB), Dan Kelly, recently noted that "nearly 80% of small businesses are fully or partially closed due to COVID-19 with little or no revenue coming in, while their bills continue to pile up."

3.2.3 **RECOMMENDATION: \$20M for new projects across all CCIP grant types to enable digital adoption by SMEs as they retool their operations**

- Ensure SME survival as the shift to online and digital platforms becomes more urgent and essential.⁵
- Capitalize on the Centres' expertise in technology transfer to meet the increasing demand from companies and other partners for digital services.

Many businesses are proving resilient in adapting to the crisis by altering products, services and production methods. The data shows a large increase in e-commerce, as well as many firms testing working at home practices.

[Canadian Chamber of Commerce](#), Results of the Major Survey on Business Conditions

3.2.4 **RECOMMENDATION: \$10M for ARTI grants to retool applied research facilities and equip applied research staff to meet physical distancing requirements**

- Acquire new personal protective equipment (PPE) and other equipment to protect staff, students and visitors.
- Reconfigure the layout of labs and facilities, retrofit alternative space and implement new lab and equipment protocols to allow for proper physical distancing.

3.2.5 **RECOMMENDATION: Open the funding opportunities created by these new investments to partners from all sectors**

- The benefits of the investments recommended above will flow primarily to SMEs, which constitute over 60% of the Centres' applied research partners.
- To address the full breadth of the pandemic's economic and social repercussions, eligibility must extend to businesses and organizations including non-profit organizations, municipalities, agencies and cooperatives, as well as to projects that improve services and quality of care for vulnerable groups such as seniors, persons with disabilities, Indigenous people and newcomers.

⁵ Shopify, an Ottawa-based company, took in \$470 million (USD) in revenue in the first three months of 2020, up from \$320 million in the same period a year ago as more companies move their operations online: <https://www.cbc.ca/news/business/shopify-earnings-1.5557473>

- The demand for grants through the recent CCIP COVID-19 Rapid Response and College and Community Social Innovation Fund competitions demonstrate the strong need for college and institute support in these areas.

Mobilizing NSERC Applied Research Rapid Response to COVID-19

At **Vestechpro**, a research and innovation centre specializing in the development of intelligent clothing and textiles affiliated with the **Cégep Marie-Victorin**, the team is [mobilizing its partners to develop new models for medical protective equipment and clothing](#) to meet the needs of hospital workers and effectively combat infection.

The COVID-19 pandemic has underscored the vital need for an innovation ecosystem capable of rapid technology transfer. In an economy dominated by SMEs distributed over a vast geographical area and operating in a wide array of industries, the ability of colleges and institutes to adapt has never been more important. In their joint Budget 2020 submission, CIGan and college and institute applied research stakeholders across the country recommended an additional annual investment of \$40 million, to dramatically increase SMEs' access to the Centres' R&D activities. This investment would ensure the sustained viability of colleges and institutes and cement their role in supporting regional economic development. CIGan and its partners will continue to vigorously advance this priority as the government assesses medium- and long-term needs for a full recovery and future growth.

3.3 Applied research—background information

- Canada is a nation of small- and medium-sized businesses. Many SMEs lack the capacity, resources and networks needed to invest in research and business development. According to Statistics Canada, as of December 2017 there were 1.18 million employer businesses in Canada. Of these, 99.8% were SMEs. In total, “SMEs employ 89.6% (10.7 million) of the private sector workforce, which highlights the important role SMEs play in employing Canadians.”
- Colleges and institutes have a mandate to contribute to the economic development of their communities and regions, and this extends to their applied research activities. Over 95% of the Canadian population and 86% of Indigenous people live within 50 km of a college or institute campus. This reach will enable applied research centres to support post-pandemic recovery and the resumption of activities in various communities across the country, including in rural and Northern regions.

Indigenous-owned and visible minority-owned businesses have tested or used R&D at a higher rate (11.1% and 8.6%) than the national average (5.7%).

Canadian Survey on Business Conditions, Statistics Canada and Chamber of Commerce

- Colleges and institute students play an integral role in applied research, working alongside faculty and researchers to support business and community partners through internships, work-integrated learning placements and capstone projects. In 2017-18, 29,000 students participated in applied research activities and a further 24,000 participated in entrepreneurship activities. In addition, 4,300 faculty and research staff were engaged in applied research activities in 2017-18.⁶

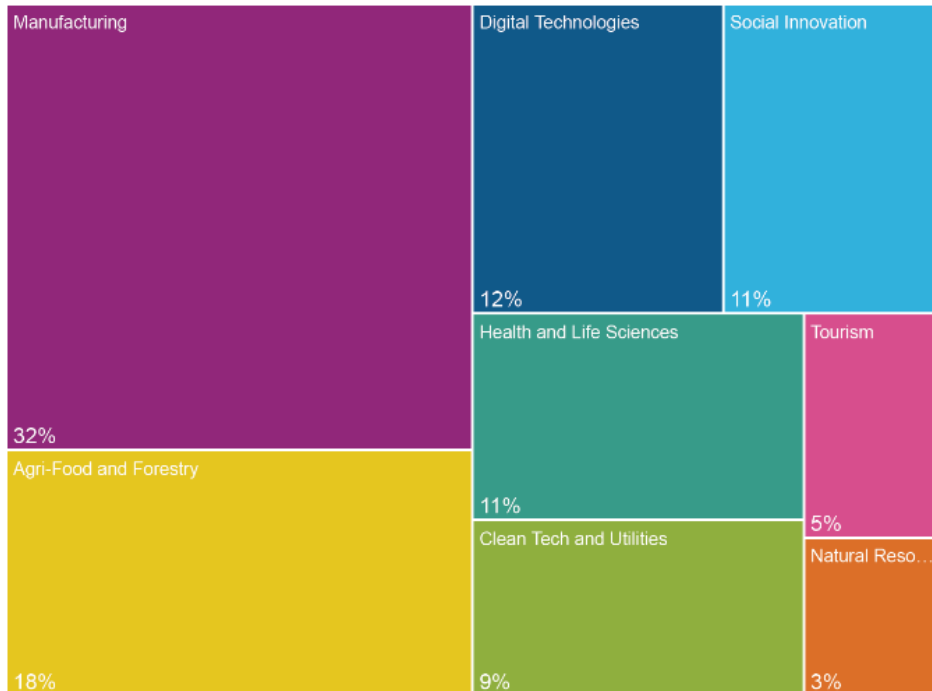
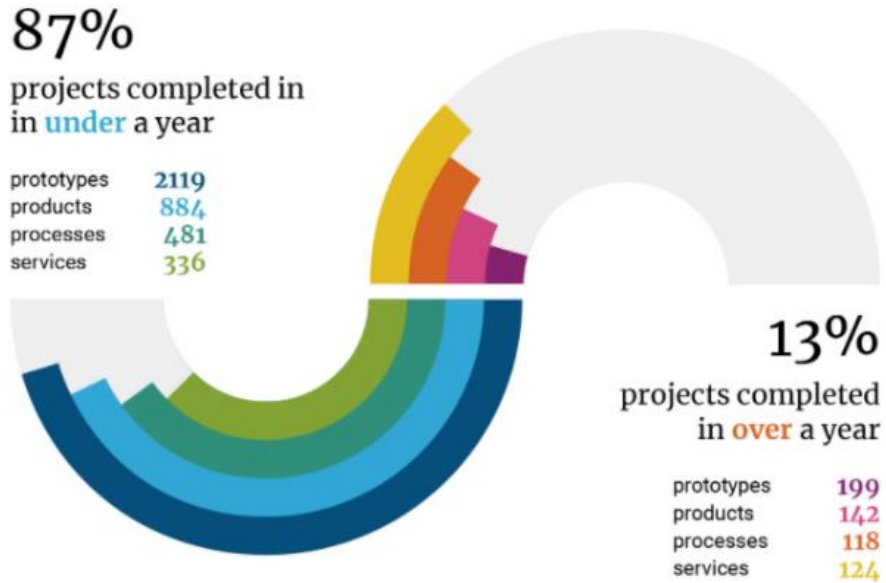
**Applied Research Impact on Regional Economic Development:
Southern Ontario Network for Advanced Manufacturing Innovation (SONAMI).**

SONAMI was created in 2016 by FedDev Ontario as a network of six colleges and one university, led by Niagara College, that matches the resources and expertise of its members to the R&D needs of small manufacturers. Participating companies have grown and diversified their markets, becoming more competitive by adopting cutting-edge technologies, increasing productivity, and creating new products. In its first three years, SONAMI partnered with 110 businesses, more than doubling project funding through direct investment and leading to the commercialization of 144 products. It developed more than 500 prototypes, trained 165 student researchers to be career-ready, helped create 190 jobs, and had an economic impact of more than \$25 million.

- Each year, college and institute applied research develops innovative solutions to thousands of real-world challenges faced by business and community partners. The latest CICan data available is for 2017-18, when colleges reported 7,300 research partnerships, of which 64% were with SMEs.
- College applied research tackles practical problems by applying and adapting the latest technology and knowledge to create or improve products, services, and processes. In 2017–2018, research activity at colleges and institutes led to more than 4,400 new processes, products, prototypes and services, and 87% of these results were achieved in less than one year.

⁶ CICan AR Survey, 2017-18.

Applied Research Delivers Tangible Results in One Year



- SMEs, community organizations, and other Canadian enterprises see their competitiveness, efficacy, and sustainability enhanced through their partnerships with colleges' applied research offices.
- According to the most recent evaluation of the College and Community Innovation Program, "almost a third (29%) of surveyed TAC (Technology Access Centre) clients who had completed an applied R&D or technical and business service project indicated that their revenue increased."⁷

NSERC's assessment of Winnipeg's Red River College's CCI partnerships found 81% of the institution's partners developed or improved a prototype, process, or service, while 69% saw their project and development capabilities improved.

- For more than a decade, the federal government has invested in applied research at Canada's colleges and institutes. These investments increased from \$78 million in 2015–2016 to \$99.24 million in 2018–2019.⁸

Strong Demand for Innovation from SMEs

Each fiscal year, Saskatchewan Polytechnic receives funding from 22 Industrial Research Assistance Programs through the IRAP-CTO (Contribution to Organization) grant mechanism. As of April 1, 2020, the first day of the new fiscal year, its applied research office had already made 13 allocations, representing 59% of the total amount. Saskatchewan Polytechnic has also seen a strong increase in demand for CCIP Engage grants over 2019-20 with four projects approved, one application under review and another 10 in the process of being finalized.

3.4 Applied research at colleges and institutes: current issues

Like all Canadian sectors, college applied research has been affected by COVID-19 in several ways, with this impact varying across provinces and territories. In consultation with CIGan's National Research Advisory Committee, comprised of applied research leaders from across Canada, Tech-Access Canada and Synchronex, as well as Polytechnics Canada, CIGan has identified the following common issues and challenges:

- Institutions are limited in their ability to access labs and equipment due to physical distancing measures. The return to labs will require reorganizing physical layout, implementing access and movement protocols, and purchasing appropriate personal protective equipment to ensure the safety of staff, students and partners.
- Applied research offices have implemented extensive work-from-home arrangements, leading to an increased reliance on technology to maintain operations.
- Although many offices have been able to maintain staffing levels, this is not a universal experience and uncertainty remains about how long this situation can be sustained. Applied research offices face the possibility of staff furloughs or layoffs depending on how long college and institute campuses remain closed and the ability of their current and potential partners to resume research activities.

⁷ Final Report—Evaluation of the College and Community Innovation Program and SSHRC's Community & College Social Innovation Fund. September 2018.

⁸ CIGan AR surveys, 2015-16 and 2017-18.

- While some colleges report that new partners have emerged, recent business surveys confirm the reduced capacity of many SMEs in terms of cashflow and staffing levels. A CFIB survey found that small businesses reported losses in excess of \$200,000 due to the pandemic.⁹ The Statistics Canada survey for the Canadian Chamber of Commerce confirms that a large number are working with reduced staff.¹⁰
- Under the current parameters of the College and Community Innovation Program (CCIP), which requires cash contributions from company partners and a lengthy grant application process, many SMEs are unable to engage with colleges and institutes to adapt their businesses for resumption and recovery.
- The current grant framework does not provide the flexibility or nimbleness that applied research offices need to meet the urgent short-term needs of business and community partners at this stage of the pandemic and as we move into the recovery phase.
- Applied research offices are reporting sustained demand for the faster turnaround grant types within CCIP, notably Engage and Applied Research and Development Grants.

⁹ Investigating the impact of COVID-19 on independent business, CFIB's April 23, 2020 survey of members found the average cost of COVID-19 on small business so far is \$214,915: <https://www.cfib-fcei.ca/en/research/survey-results/investigating-the-impact-of-covid-19-on-independent-business>.

¹⁰ Statistics Canada's "Canadian Survey on Business Conditions: Impact of COVID-19 on businesses in Canada, March 2020" found that 12,000 businesses reported that they had reduced staff hours or shifts, while 40.5% reported they had laid off staff. Nearly one fifth (18.3%) of all businesses laid off 80% or more of their workforce: <https://www150.statcan.gc.ca/n1/daily-quotidien/200429/dq200429a-eng.htm>