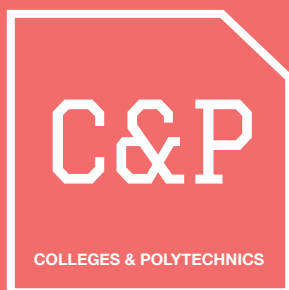


Guide to Research Partnerships

with Canada's Colleges & Polytechnics



**GUIDE TO
RESEARCH
PARTNERSHIPS**

C&P
COLLEGES &
POLYTECHNICS

Prepared by



**BUSINESS/
HIGHER EDUCATION
ROUNDTABLE**



POLYTECHNICSCANADA

Disclaimer

The information in this document is intended to provide a high-level overview of research partnerships at Canadian Colleges. No part of this document should be interpreted as representing the policies of an individual institution or constituting the terms an institution might be willing to agree to in any specific case. Furthermore, this document does not constitute legal advice. Please contact a College's research partnership office for institution-specific information.

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Industry-College¹ Research Partnerships

Colleges across the country partner with industry on applied research and innovation projects that enable firms to innovate, grow and increase competitiveness. Colleges work with companies from a broad range of sectors² that range in size from start-up, to small, to large enterprises and multi-nationals. Colleges tend to focus on collaborating with Canadian companies, but some also partner with firms conducting applied research abroad. College research is motivated by industry needs (industry “pull” rather than institution or researcher “push” model)—industry comes to the college with an identified business challenge, and the college provides access to talent, state-of-the-art facilities and their extended networks to help deliver a solution. As such, these industry-focused collaborations provide practical solutions for firms in a cost effective, collaborative and timely manner.

Partnership Example:

The Food Innovation and Research Studio (FIRSt) at George Brown College is a Technology Access Centre located in Toronto, Ontario. FIRSt accelerates new food and beverage ideas “from concept to commercialization”, by offering industry access to business and consumer intelligence, technical and scientific resources, state of the art culinary research facilities, and high-value networking opportunities.



Research partnerships have many outcomes. They may move the industrial partner further along the research and development (R&D) continuum towards commercialization by developing, improving upon or assessing prototypes, products and services, or provide essential business/market validation and intelligence, or enable the partner to cut costs by optimizing processes, or enable industry to adopt and integrate new technology into their business model. Through these collaborations industry partners work with highly qualified, skilled and creative faculty and students. Partners also gain access to talented new graduates with a range of undergraduate credentials including applied bachelors degrees, diplomas, certificates, and apprenticeship and professional graduate certificates.

¹For reasons of space, “colleges” will hereafter refer to publicly-funded colleges, institutes, polytechnics, and cégeps depending upon each provincial/territorial designation.

²Colleges work with diverse sectors of the economy, including but not limited to: agriculture, apparel, aerospace, construction, environment, food and beverage, forestry and fisheries, information and communications technology, life sciences and health, manufacturing, natural resources, renewable energy and conservation, social innovation, and transportation.

Many colleges have specialized research centres for industry to access specific applied research, technical, consultation and training services. For example Sheridan College's Centre for Elder Research in Brampton, Ontario, the British Columbia Institute of Technology's Make+ product development centre in Burnaby, British Columbia, the Northern Alberta Institute of Technology's Centre for Oil Sands Sustainability in Edmonton, Alberta. There are also College Centres of Technology Transfer³ (CCTT) in Quebec, and Technology Access Centres⁴ (TAC) across Canada, which have centre operations and staff funded through government programs.

Colleges adhere to the principle that intellectual property (IP) is better exploited by the private sector. Typically, colleges do not claim ownership of the IP for research collaborations and/or grant royalty-free commercial rights to their partner firm.

The key motivations for colleges to pursue industry research partnerships and collaborations are:

- to contribute to economic development;
- to deepen their connections with industry, which enables colleges to stay relevant and to respond to labour market demand; and
- to provide students with high value experiential learning opportunities that often lead to jobs for students and graduates.

Partnership Example:

Agrinova, the Center for Research and Innovation in Agriculture, is a College Centre for Technology transfer located at Collège d'Alma in Quebec. Agrinova provides services throughout the province to improve dairy companies' access to new technologies and assisting them with the adoption of innovative new technologies and practices. Colleges across the country have specialized research centres ready to meet industry needs.



³ Réseau Trans-tech is the network representing the College Centres of Technology Transfer. Visit reseautranstech.qc.ca to learn more.

⁴ Tech-Access Canada is a national network representing the Technology Access Centres. Visit tech-access.ca to learn more.

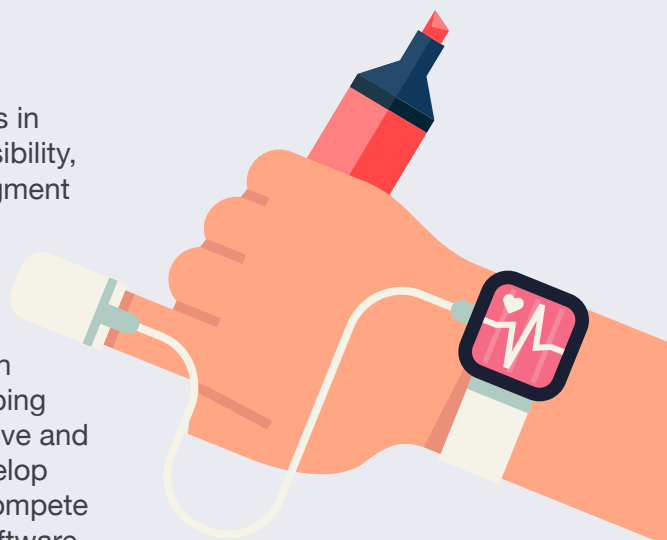
Types of College Research Partnerships

Collaborative Research

Collaborative research projects are jointly carried out by a college and an external partner. The goal of these collaborations is for an industry partner to solve an identified challenge, through access to the talent and research infrastructure at the college. Collaborative partnerships often result in intellectual property that the business commercializes. Typically, grant monies are leveraged to help fund the collaborative research project, with the external partner providing a matching contribution (comprised of cash and/or in-kind support). Collaborative projects may also occur as part of a capstone/in-class project or with multiple partners.

Collaborative Research Example

RoweBots Research Inc. assists Canadian organizations in the development of wearable devices for sports, accessibility, health monitoring and security. This growing market segment offers significant opportunities for the development of new products and technologies. George Brown College's Fashion Exchange collaborated with RoweBots to design, create and test custom smart bracelets. RoweBots leveraged the college's expertise in jewellery design, wearables, metalsmithing and prototyping to create unique designs that enable invisible, unobtrusive and intelligent devices. This work allowed RoweBots to develop smart bracelets for manufacturing in Canada that will compete in the mass market and provided both hardware and software packages for RoweBots' clients (custom jewellers) to enable creation of their own high-end jewellery at competitive prices.



Capstone/in-class

A capstone project, also known as a culminating project or experience, is a research project that allows a senior student (at the undergraduate level) to demonstrate their learning. Capstone, and other 'in-class' projects, often involve external partners as part of the experiential learning process. Typically, such projects are delivered without grant funding, as the student research activity is considered part of their classroom/program-related work.



Capstone/in-class Example

The final assignment for Sheridan College's Architectural Technology students, to demonstrate their learning through course work, was to create ChocoSola social enterprise in the learning community and a chocolate producer in downtown Toronto, an energy-efficient architectural building design that would provide both an educational commons for the fair-trade chocolate industry and function as a chocolate production facility. The Emerging Building Technologies class focused on energy-efficient technologies and sustainable design to meet Chocosol's vision and values. The winning design touted a two-storey store-front building at St. Clair and Dufferin and received special recognition in the Ontario Association for Applied Architectural Sciences newsletter.

Multiple Partners

As colleges are key players in regional and national innovation ecosystems, they readily collaborate with multiple partners including industry, community organizations, government agencies, or other colleges and universities. The projects may be catalyzed by relationships with industry associations, networks or clusters.



Multiple Partner Example

Zero-emission battery-electric propulsion transit buses are expected to significantly reduce greenhouse gas and smog-causing emissions. In Manitoba, where the electrical grid is highly renewable, the use of electric propulsion buses is expected to translate to an estimated reduction of 160 tonnes of greenhouse gas emissions, per bus, per year. In a project collaboration involving Red River College, the City of Winnipeg, the Province of Manitoba, Manitoba Hydro, New Flyer Industries, Mitsubishi Heavy Industries and Sustainable Development Technology Canada, Winnipeg Transit is now using four New Flyer Xcelsior® battery-electric transit buses in daily service as part of an electric bus demonstration operating in Winnipeg's normal and severe climate conditions. Red River College redeveloped the Mitsubishi battery packs to be installed in two of the SDTC buses. This all-electric bus was developed over a three-year period at a cost of \$3 million. The 100% battery powered bus is the first of its kind in Canada, with an ability to run for 4 hours over an 80 kilometer distance on one 40 minute charge.

Internships

Internships enable industry to solve a challenge by adding a talented student to their team for a period of time. Internships are of great benefit to industry in order to augment their talent pool, solve a challenge and assess potential new hires.

Internship Example

Chatman's Bakery, a family owned and operated business, has grown from a small retail store into a wholesale company supplying products to larger retail chains such as Loblaw's and Costco. Chatman's was challenged to innovate their labour-intensive production system to meet customer demand and to maintain a highly skilled workforce, as their rural area is characterized by an aging demographic. Increasing productivity, quality and capacity of their cookie bar square cutting operation through new technology adoption was key to enabling process improvements required to remain competitive and grow markets nationally with their major retail partners. College of the North Atlantic assisted Chatman's by engaging students from multiple programs via co-op placements, post-grad internships and capstone projects. The students designed, prototyped and tested a new system, applied classroom learning, and developed multiple skill sets required on an engineering project. The cookie bar cutter system implemented through this project is currently in full operation and Chatman's filled a skills gap by hiring graduates who worked on the solution.



Contract Research

Distinct from collaborative research, contract research projects require the industry partner to pay cash for the R&D rather than leveraging grant funds. This type of collaboration facilitates a quicker project completion. The focus of these projects is on applied research rather than routine advisory services.



Contract Research Example

VMAC on Vancouver Island is a leader in mobile compressed air innovation, designing and manufacturing the most innovative mobile air compressors and multi-power systems available. VMAC was challenged by their welding process, which increased their overall production time and produced significant rejected final welds. The Camosun College Technology Access Centre in Victoria, BC, recommended they try a cold metal transfer welding system which has revolutionized the welding of dissimilar metals and thicker materials by producing improved weld bead aesthetics with controlled metal deposition and low heat-input. Camosun had recently purchased this costly infrastructure and arranged for a demonstration of the system for VMAX. VMAX purchased the system and decreased their manufacturing time by 25% and decreased significantly unsuccessful welded parts.

Connecting with Colleges

The first point of contact for an applied research project is the college's Office of Applied Research⁵. Offices of Applied Research have staff that administer and manage all aspects of research projects, including fostering and managing industry partnerships. Staff in a research office have deep knowledge of both the institution's strengths and industry sector's needs, and will help to manage the expectations of both parties to enable a good working relationship.

⁵Applied research structures vary at colleges across the provinces and territories. Most have offices or departments of research, applied research or research and innovation, and in Quebec centralized services are available through the CCTT. For the purpose of this guide "Office of Applied Research" is used to refer to all centralized industry-facing structures.

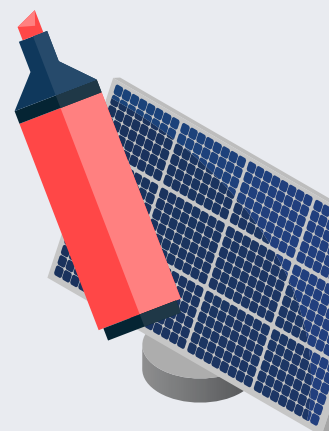
Intellectual Property

Industry-college collaborations often generate intellectual property (IP), such as inventions, literary and artistic works, designs and symbols, names, and images. Colleges believe that IP is best exploited by the private sector and therefore have similar industry-friendly IP policies and practices in place. Colleges sign simple legal contracts (typically research or collaborative agreements) setting out the rights and responsibilities between the college and external partner for their research collaboration. In general, these agreements:

- Assign “foreground IP”⁶ created during the project, or provide royalty-free commercial rights to the forward IP to the partner;
- Describe the use and ownership of existing or “background IP”⁷;
- Require the partner to exploit the research results and to protect IP arising from the project (when appropriate);
- Enable the college to use the research results for academic purposes;
- Outline how the parties will agree to maintain the secrecy of each other’s confidential information;
- Describe how publicity for the project/collaboration and publications will be handled⁸;
- Enable students to acknowledge their participation on their resumes and when relevant include the results within their academic works.

Partnership Example:

The Southern Alberta Institute of Technology’s Green Buildings Technology (GBT) team is working with GP JOULE, a German-based renewable energy provider with a Canadian subsidiary in Toronto, and ENMAX Energy to test a single-axis solar tracker, the Phlegon® tracker in the harsh Alberta climate. Unlike a more typical fixed-array solar system that remains in a fixed position, the Phlegon® tracks the sun, which generates solar energy earlier and later in the day and remains at full power longer. To simulate 20 years of operation, the GBT ran the Phlegon® 24 hours-a-day over 19 days. During the test, they subjected the Phlegon® to rain, ice, and other weather representing operating conditions in Alberta. Just to ensure they had truly run the system through its paces, they ran the experiment twice, providing GP JOULE with test results showing that the system handled Alberta weather conditions with minimal maintenance costs.



⁶Foreground IP refers to new IP created within a research project. Foreground IP is typically assigned or provided with royalty-free commercial rights to the firm.

⁷Background IP refers to pre-existing IP used within a research project. Background IP remains with the party bringing it into the project unless it is required to enable the use of Foreground IP. In this case a license may be granted to the holder of the Background IP on terms negotiated between the parties.

⁸Subject to confidentiality, colleges specifically would like to publicize the collaboration and/or publish results. Project details may need to be shared with funding agencies for reporting purposes.

There are numerous advantages to college IP policy and practice commonalities. IP ownership issues do not create barriers to industry-academic collaboration; therefore industry engagement grows. Industry can exploit IP unencumbered by the partnership with the college. Business partners working with multiple colleges tend to find similar practices dealing with IP. The time to negotiate project agreements is minimized, resulting in faster turnaround and lower legal fees for both parties.

Government Funding for Industry-College Collaborations

Industry-focused applied research with colleges is supported through various federal, provincial/territorial and municipal programs, and other organizations such as industry associations and foundations. College research offices have staff who understand the funding options available and can advise industry on the best options. They also help industry apply for grants.

Industry Role in Collaborative Projects

The company's role on a project depends on the nature of the collaboration (collaborative, contract, capstone/in-class, and multiple partners). The business partner is an active member of the applied research team, working alongside the college team in key roles. The partner will also attend project meetings and be a key decision-maker on the project. Partners provide cash and/or in-kind support to projects. The details of the contribution will be outlined in the project budget. Industry partners are also required to complete reports for government funds when receiving grant support for such programs. These include periodic in-kind contribution statements, progress and outcomes reports. The Applied Research Office will ensure that partners are aware of their responsibilities at the start of the project.

Research Project Lifecycle

Establishing the Partnership

Colleges have staff within their Research Offices who help to establish partnerships with industry (called an “industry liaison” for the purpose of this guide). The industry liaison works with the business partner through a number of meetings, and provides tours of facilities and faculties to:

- Understand the industry partner’s line of business, objectives, challenges, resources, budget and timeline;
- Assess the feasibility of the project;
- Prepare a mutually-agreeable scope of work;
- Determine how the project will be funded and the partner’s contributions (cash and/or in-kind);
- Negotiate the terms of the project and legal agreements, such as the confidentiality/non-disclosure agreement and the research agreement.

Partnership Example:

Purdy’s Chocolatier is a Canadian-owned and family-operated business with 72 stores in Canada and a manufacturing plant in Vancouver BC that needed to increase capacity and improve efficiency in its chocolate manufacturing process.

Purdy’s came to BCIT for assistance. The project started with an operations assessment by the BCIT School of Business Operations Management program in BCIT’s School of Business. The assessment determined that automating the manual packaging process would provide the greatest operational benefit to the company. BCIT’s MAKE+ applied research group was then brought in to solve the difficult challenge of automating the process by designing the machine elements of an automated packaging machine. Several techniques were explored to find a solution for the final machine design, with a variety of prototype devices conceived, designed, constructed and tested in the BCIT CARI lab. The final successful design also incorporated precision positioning devices manufactured by Zaber Technologies of Vancouver.



Managing the Project

College Applied Research Offices are equipped with staff who manage or coordinate research projects with partners (called “project managers” for the purpose of this document). The project manager (PM) will:

- Develop a project plan and budget in collaboration with the industry partner;
- Complete administrative tasks, such as managing the budget, hiring project resources, purchasing project materials and supplies, and ensuring infrastructure is available for the project;

- Monitor project progress, identify project risks and facilitate solutions;
- If necessary, assist with research ethics approvals, environmental clearances, and data management policy;
- Facilitate communication with the industry partner;
- Facilitate the transfer of technology and delivery of other results to the partner.

Student, Faculty and Staff Participation

A college faculty or staff member (“principal investigator”) will lead the research activities, in close collaboration with the industry partners, and provide guidance to the student researchers. College faculty tend to be dual professionals having both industry and academic experience. Many have entrepreneurial experience and/or continue to work in industry as well as teach. College faculty bring technical and scientific know-how to research partners, but having worked in industry they also understand how business works and how business leaders think.

The principal investigator will use his/her subject matter expertise to address any research related issues, barriers and risks that may arise during the project. Student researchers, under the supervision and mentorship of the principal investigator, will conduct applied research tasks, attend project meetings and discuss the execution of the research project. Dedicated research staff from the college, such as scientists, technologists and technicians, may also be involved in the applied research project.

Applied research performed outside of the classroom will require remuneration for students, faculty and dedicated research staff. The research office at the college will secure resources for the project to ensure appropriate remuneration for these services. Full-time college faculty do not have research time included in their standard job descriptions (in comparison to full time university faculty), and therefore must be released from teaching duties to participate in applied research projects. To ensure courses continue to be taught, the college will hire a replacement instructor for the release time, and attribute this cost to the project. Part-time faculty members, students and dedicated research staff are paid for their time directly from the project budget at the rate set by provincial/territorial wage laws and college policy.

Closing the Project

Technology Transfer

Ensuring that new technology is effectively transferred to the external partner is a key deliverable in any project. External partners will normally receive the research results and related intellectual property rights and/or royalty-free commercial rights for their use. There is generally a final team meeting or other opportunity for the external partner to go over reports and other documentation to ensure understanding of the findings.

Knowledge Dissemination

The college, through its faculty and students, can promote dissemination of the new knowledge generated from a research project through such means as presentations, publication, and by sharing their learnings with other faculty and students.

Reporting to Funding Agency(s)

Each funding agency has their own specific reporting requirements. It is important to understand from the outset of the project what information will need to be reported at the project close, to ensure it is captured properly.

Success Story

Following the successful conclusion of a project, the college may wish to use the story of the project as a means to demonstrate the usefulness of college applied research collaborations. Success stories highlight the opportunity for students to learn in a real-world setting while promoting the benefits of partnerships between the college and industry partner.

Example

This mild mannered commuter transforms into an off-road beast when things get gnarly. “We are making a new class of vehicle,” says Roshan Thomas, founder and CEO of Biktrix in Saskatoon. “We want to give the customer the flexibility of riding 200-plus kilometres on a charge as a pedal assist bike—the largest range ever on an ebike—or switch to off-road mode and ride it as the most powerful electric dirt bike.” Thomas is working with Saskatchewan Polytechnic’s program head of Mechanical and Engineering programs. The project challenge is to design, prototype and test the numerous parts of the bike that must work in concert, from frame and saddle to brakes and power system. Biktrix’s existing line of pedal-assist bikes deliver a maximum of 500 watts. The goal is to be able to switch on the fly to dirt bike mode, with 5-10 kilowatts—10 to 20 times the power. “This has never been done before with this much dynamic range,” Thomas says. Backed with funding from the National Research Council’s Industrial Research Assistance Program, initial prototyping work will take advantage of Saskatchewan Polytechnic’s 3D printer and CNC lathe capabilities.



Example of Research Partnership Agreement

Term Section Headings

Purpose

Principles

Intellectual Property

Roles and
Responsibilities

Confidentiality

Payment Schedule

Organizational
Signatories and
Contacts

Project Description
including the
Deliverables and
Timeline Budget

Term Section Headings

Budget

Partner contributions
(cash and in-kind)

Funding Agency
Agreement (if applicable)

FAQs

How fast can I get my project started?

It depends – if the business partner is fully funding the costs associated with the project and college faculty and students with relevant expertise have been identified and are available to work, the project can get started immediately after all required agreements have been signed. If the partner is partially funding the costs associated with the project and applying for funding to cover any remaining costs, the project start date will depend on funder timelines, which could range anywhere from six weeks to six months or more depending on the size and scale of the project, and depending on the funding agency. If the partner is not funding the costs associated with the project, but would like students to work on it as part of their academic program, the project start date will depend on academic calendar timelines. Classroom projects usually begin in September, January or occasionally May and run for a period of 16 weeks.

How long does it take to sign an agreement?

Once a project agreement has been drafted in accordance with the requirements of all parties, an agreement can be signed fairly quickly – usually within ten business days.

Can we use our own contracts (confidentiality/non-disclosure) and agreements?

We recommend that partners use standard college contracts and agreements because they have already been vetted and approved by college legal staff, so turnaround time for signing an agreement is relatively quick. Partners can use their own contracts and agreements, but these have to be vetted by college legal staff which can take some time. Timelines for review of non-standard contracts vary depending on the scale and scope of the project, and the college legal team's prior obligations.

Who can sign the research agreement?

The research agreement has to be signed by someone with signing authority for the business or organization entering into the agreement. For colleges, this person is usually a Vice President or their designate. For businesses or organizations, this is usually the owner, President, CEO or equivalent, or their designate.

What is eligible in-kind?

Eligible in-kind contributions are cash-equivalent goods or services that a partner organization would not normally incur and would have to be purchased by project funds if they were not donated, including special equipment, access to data, and the time of the partner organization's technical or expert staff who provide direction to and participate in the project. These are usually clearly defined in funder guidelines. Eligible in-kind contributions are considered essential to carry out project work and must be thoroughly documented and justified in the project agreement and in any subsequent reporting.

When will I get my project results?

Most often, partners will get their project results upon completion of the project. Occasionally project results may be made available earlier; in these cases, the timeline for when project results will be available would be defined in the project agreement. Results of a national survey on college applied research activity indicate that most projects are completed in less than one year.

How do I know that students will maintain confidentiality?

All students working on applied research projects are required to sign confidentiality agreements. A college staff member explains the content of the agreement to the student before they sign it to ensure that they understand the agreement and what signing it means.

Why do I need to report to funders?

Funders aren't obliged to commit money to projects—they do so because they believe in the economic, social, cultural or environmental value of applied research. College funding for applied research is often public, i.e. is supported by the taxpayer. We have a responsibility to our funders to report on the activities that they fund in order to be accountable for the work that we do and to demonstrate the impact of a funder's contributions to the public. This helps to ensure that we are honouring our commitments, and that funding continues to be committed to college-led applied research initiatives in future.

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