

## **APPLIED RESEARCH in CANADIAN COLLEGES**

The following are a series of four articles about applied research in Canadian colleges, originally written in 2014 by Ray Hoemsen for the Canadian Association of University Research Administrators (now the Canadian Association of Research Administrators).

The series, from the college point-of-view, addresses topics such as:

- applied research;
- intellectual property management;
- community/industry engagement and partnering models; and
- faculty/student engagement and curriculum integration.

### **COLLEGE APPLIED RESEARCH SERIES: Article #1: Colleges & Applied Research**

Colleges and polytechnics have become an integral part of Canada's innovation environment; with a growing number of supports for college-specific applied research at the federal and/or provincial level, as well as by the colleges themselves.

### **COLLEGE APPLIED RESEARCH SERIES: Article #2: Community/Industry Engagement & Partnerships**

Community-based economic development is a key driver of applied research in the college system, which supports industry innovation, productivity, and competitiveness. Therefore, most college applied research is industry and/or community focussed.

### **COLLEGE APPLIED RESEARCH SERIES: Article #3- Intellectual Property**

There is a strong desire by colleges to see research results used for economic benefit in the community, rather than as a source of royalty revenue, coupled with minimal interest in patenting by the institution. Industry finds colleges and polytechnics to be very "IP friendly" and agreements on applied research projects are normally negotiated and signed rapidly.

### **COLLEGE APPLIED RESEARCH SERIES: Article #4 – Students, Faculty & Curriculum**

Applied research – which is driven by community needs – in Canada's colleges and polytechnics enhances the applied learning experience of the students (all undergraduates), broadens and deepens the experience of the instructors and serves to enhance the curriculum; while adding value in (and benefit to) the local economy.

**THIS PAGE IS INTENTIONALLY BLANK**

## **COLLEGE APPLIED RESEARCH SERIES - Article #1: Colleges & Applied Research**

*January 2014: Ray Hoemsen, P. Eng., Director, Applied Research & Commercialization, Red River College*

This article is the first of a series which will, from the college point-of-view, address topics such as:

- applied research;
- intellectual property management;
- community/industry engagement and partnering models; and
- faculty/student engagement and curriculum integration.

Over the last decade, colleges and polytechnics have become an integral part of Canada's innovation environment; with a growing number of supports for college-specific applied research at the federal and/or provincial level – as well as by the colleges themselves.

Targetted investments by the Tri-Councils through the College and Community Innovation program in college-based applied research programs have grown from ~\$3M in 2004 to ~\$48M in 2014. These investments are intended to increase community and/or regional level innovation by building capacity within the college sector to work with local companies, especially Small- and Medium-Sized Enterprises (SMEs); as well as to support applied research and collaborations *“that facilitate commercialization, technology transfer, adaptation and adoption of new technologies.”*. Concurrently, Tri-Council investment in university-based research partnerships have grown. For example, NSERC's university-focussed partnerships program have grown from ~180M in 2004 to ~300M for 2014.

At the same time, the number of NSERC-eligible colleges has expanded from literally a handful to nearly 100 institutions from sea to sea to sea.

Community-based economic development is a key driver of applied research in the college system, which supports industry innovation, productivity, and competitiveness.

“Applied Research” is generally considered to be the application of knowledge, focussed on the resolution of a problem or need (usually identified by industry or other organizations within the community) with the objective of delivering a satisfactory resolution or result. This is distinct from the “basic” or “discovery” research (and related timelines) associated with the university sector. In Colleges, the focus is more on the “how” than the “why”.

Applied research is carried out on a group basis, with students often playing a key role since applied research (especially in the polytechnic model of education) is an integral component of the applied learning experience.

Commercial rights to research results are routinely assigned to industry partners, while the College retains rights for further research and education purposes. Most colleges do not typically engage in the traditional academic “patent and license” model.

Technology “diffusion” (adoption and adaption of technology) is of greater relevance than technology “commercialization” – since college-based applied research is often responding to an industry-specific product-, process- or service need.

In Canadian colleges, the role of the “applied research” office encompasses those which would normally be found in the typical university research services, technology transfer and industry liaison offices. Partnership and relationship development and maintenance are integral aspects of the job for applied research office personnel.

With the ever-increasing expectation of public investments in research to create impact, not just benefit; the colleges and universities have a complementary and, more often, a collaborative role to play supporting local and regional economic development.

**COLLEGE APPLIED RESEARCH SERIES - Article #2: Community/Industry Engagement & Partnerships**  
***March 2014: Ray Hoemsen, P. Eng., Director, Applied Research & Commercialization, Red River College***

***“Private Sector Partnerships with Colleges & Institutes Spike as Applied Research Solutions Fuel Economic Benefits”*** was the headline of the March 5, 2014 News Release<sup>1</sup> by the Association of Canadian Community Colleges. A recent environmental scan revealed a 19% increase in applied research partnerships over the previous year (and 51% over the last five years), with nearly 5,500 industry partnerships reported – along with an increase in private sector funding of college applied research of 21% to \$72 million. Business and industrial research accounted for 96% of external funding. The majority of these partnerships (86%) were small- and medium-sized enterprises (78%) or micro-enterprises (8%). And, over 800 social innovation partnerships with community organizations and companies were reported; as well as nearly 50 international partnerships (an emerging area of interest) in 21 countries.

Community-based economic development is a key driver of applied research in the college system, which supports industry innovation, productivity, and competitiveness. Students are an integral element in applied research, enabling them to gain practical experience as part of their applied learning experience. Technology diffusion (adoption and adaption of technology) is of greater relevance than technology commercialization. Colleges are driven by market needs (or pull) of the community, especially industry. Since most applied research activities are directed towards a particular client need; institutions such as Red River College routinely assign commercial rights to the client/partner, while retaining rights for research and education purposes. As a result, patenting (by the institution) is a relatively rare occurrence; most colleges do not typically engage in the traditional academic “patent and license” model.

Polytechnics Canada’s submission<sup>2</sup> to the Government of Canada’s consultation on Science Technology and Innovation Strategy has reinforced this point-of-view: ***“College applied research is motivated by building Canadian talent, not by driving discovery, nor by attracting world-class talent. Applied research is driven by solving Canadian industry problems, involves students in applied research and is characterized by industry-friendly intellectual property policies.”***

Key factors/elements in industry/community engagement and partnerships for colleges include:

- Economic development as a mandate of the college, often explicitly stated in the Vision or Mission.
- Strong community connections, especially with fourth pillar organizations (such as the National Research Council’s Industrial Research Assistance Program), SMEs, economic development agencies, and Program Advisory Committees (typically one for EVERY academic program offered by a college).
- Government policy which has encouraged/driven the academic community to undertake more industry-relevant research and development, especially with SMEs; resulting in new initiatives like NSERC’s well-received “ARD” (college) and “ENGAGE” (university) programs which have helped to catalyze industry partnerships. A Social Innovation pilot program for colleges was just announced.
- Strong desire by colleges to see research results used for economic benefit in the community, rather than as a source of royalty revenue; coupled with minimal interest in patenting by the institution, hence little need to negotiate licenses or royalties, which can be a very time consuming (and often irritating) exercise for little (potential) return.
- Industry-experienced faculty who broaden/deepen their experience/knowledge with applied research.
- Student engagement through class projects, capstone courses, business and entrepreneurship case studies, cooperative and term employment as well as internships (NSERC’s I-USRA program is now open to college students enrolled in degree programs), and integration of research into curriculum.
- Flexible and nimble approaches to applied research, which can be inter-disciplinary in nature and often utilize a team or group approach with a relatively fast turnaround time.
- Mutual needs and benefits – which are the key to successful partnerships.
- Applied research offices are a “one-stop-shop” for industry liaison, research services, technology diffusion and knowledge transfer – and can offer practical, timely and cost-effective solutions.

---

<sup>1</sup> <http://www.acc.ca/xp/index.php/en/comm/news-releases/827-nr-20140305>

<sup>2</sup> [http://www.polytechnicscanada.ca/sites/default/files/PC\\_B\\_Submission\\_STIConsultation.pdf](http://www.polytechnicscanada.ca/sites/default/files/PC_B_Submission_STIConsultation.pdf)

### **COLLEGE APPLIED RESEARCH SERIES - Article #3- Intellectual Property**

**May 2014: Ray Hoensen, P. Eng., Director, Applied Research & Commercialization, Red River College**

Community-based economic development is a key driver of applied research in the college system, which supports industry innovation, productivity, and competitiveness. Technology diffusion (adoption and adaptation of technology) is of greater relevance than technology commercialization. Most colleges do little, if any, curiosity-driven research. Therefore, most college applied research is industry focused.

Many industry applied research projects are supported by funding from the Tri-Council, most often the Natural Sciences and Engineering Research Council (NSERC). Intellectual Property (IP) can be an integral component of the research results - in which case NSERC policy does not make any claim to the IP, while generally expecting benefits to accrue in Canada. However, NSERC does expect/require that:

- industry partners have the ability to use the research results for commercial purposes;
- institutions and their researchers are able to use the research results for academic purposes; and
- students are able to publish their thesis and acknowledge their participation on their resumes.

With the support of NSERC, the Association of Canadian Community Colleges has developed an “**IP Toolkit**”<sup>1</sup> which contains college-based IP-related practices and agreement exemplars. In contrast to the university sector, Canadian colleges tend to have relatively similar IP policies<sup>2,3</sup>, which generally exhibit the following characteristics:

- mandatory institutional ownership of IP developed with college resources;
- mandatory disclosure of inventions; and
- equitable sharing of any net returns from commercialization activity.

However, since there is a strong desire by colleges to see research results used for economic benefit in the community, rather than as a source of royalty revenue, coupled with minimal interest in patenting by the institution; there is little need to negotiate licenses or royalties, which can be a very time consuming (and often irritating) exercise for little (potential) return for all concerned.

As a result, colleges frequently grant commercial rights to research results to their industry partners, while retaining rights for academic (research and education) purposes. For example, under Red River College’s Intellectual Property Policy (A10), the College has mandatory institutional ownership of IP (to enable maximum clarity if a licensing situation may arise), including any IP which is created by students employed on the project. The policy is flexible enough to accommodate transfer of ownership, in the event the private-sector partner(s) require ownership. The College’s normal practise is to grant private sector partners commercial rights (royalty free), while the College retains rights for further research and education. As a result, there have never been any IP-related problems or issues between the College and industry since this practise was instituted in 2004. Industry finds the College to be very “IP friendly” and agreements on applied research projects are normally negotiated and signed rapidly.

There are several advantages to such college-based IP policy and practise commonalities, such as:

- industry partners working with multiple colleges tend to find similar practises dealing with IP;
- there is clarity with respect to IP ownership, in the event a licensing situation arises;
- IP does not create barriers to collaboration, fostering greater industry engagement;
- institutional IP protection (and thus legal) costs are non-existent or greatly minimized, since patenting by the institution is relatively rare;
- the time to negotiate project agreements is minimized, resulting in faster turnaround; and
- **IP is NOT an impediment to industry-academic research collaborations!**

---

<sup>1</sup> <http://www.collegesinstitutes.ca/what-we-do/applied-research/ip-toolkit/>

<sup>2</sup> Intellectual Property Policies in Colleges and Institutes. Ray Hoensen, P. Eng., Red River College. Presentation to the Association of Canadian Community Colleges Applied Research Symposium, Edmonton AB. February 27, 2008.

<sup>3</sup> National Model of Intellectual Property (IP) Practices in College/Institute Applied Research Projects. Association of Canadian Community Colleges IP Working Group. Report for NSERC. March 2012.

**COLLEGE APPLIED RESEARCH SERIES - Article #4 – Students, Faculty & Curriculum**

**September 2014: Ray Hoemsen, P. Eng., Director, Applied Research & Commercialization, Red River College**

Applied research – which is driven by community needs – in Canada’s colleges and polytechnics enhances the applied learning experience of the students (all undergraduates), broadens and deepens the experience of the instructors and serves to enhance the curriculum; while adding value in (and benefit to) the local economy.

Since most full-time instructors generally have 20 or so contact hours per week, they themselves have limited time to dedicate to applied research. Therefore, students play an integral role in applied research since they are often hired (at rates which can exceed what a postdoctoral student would receive from a granting council) to carry out applied research (under the supervision of the instructor or a dedicated research professional). And, of course, more and more students have the opportunity to undertake classroom-based applied research activities – especially in capstone courses. Student engagement also results in the availability of highly-qualified skilled personnel for the workforce; and enhances the accessibility for SMEs who may not have in-house R&D capabilities.

Colleges routinely grant their applied research clients commercial rights to project research results, while retaining rights for further research and education purposes (this is also an expectation of the Tri-Council). Therefore, there is ample opportunity to integrate learnings into curriculum – be it an existing or new course, a workshop, or customized training. This is normally led by the Schools (or Faculties).

Colleges and Institutes Canada<sup>1</sup> reported that in 2012-13 more than 29,000 students were involved in applied research – a ten-fold increase in participation over the last five years. This translates to nearly 13 students for every faculty, staff, industrial expert and technician involved in applied research. And Polytechnics Canada<sup>2</sup> data shows that since 2007/08 nearly 46,000 students have been involved in hands-on applied research projects, supplementing the efforts of more than 5,200 staff and faculty; servicing the needs of nearly 7,000 Canadian companies (93% of which were SMEs).

Some best practices<sup>3</sup> for supporting college faculty and student engagement in applied research are:

- faculty release time and/or salary top-up;
- student salary or research grant (direct to student);
- student placement salary support (direct to employer);
- provision of materials, supplies, equipment and facility access; and
- enabling technology diffusion and transfer, including travel to conferences and workshops.

In this regard, the lessons learned (over the last decade) at Red River College include:

- flexible intellectual property policy incents industry engagement;
- students and instructors are integral and essential components in responding to community needs;
- supportive government policies and programs have helped to build college applied research capacity, but there are limited supports for non-degree college student engagement (other than the Tri-Council’s College and Community Innovation Program);
- employ students (at market rates) to work on industry applied research projects;
- use internal and external grants to engage students, as well as capstone projects and competitions;
- partner with other academic institutions; and
- hire students in the applied research office (i.e. “walk the talk”).

In closing, at CAURA’s Got Talent! (June 2014), the panel on student engagement in applied research in the colleges and polytechnics identified key outcomes as *“increased skill acquisition and development; the ability to apply learning to real world contexts; and increased employability (and employment)”*.

---

<sup>1</sup> Applied Research at Colleges and Institutes 2012-13. Colleges and Institutes Canada. <http://www.collegesinstitutes.ca/what-we-do/appliedresearch-2/scan-2012-13/> downloaded September 11, 2014.

<sup>2</sup> Polytechnics Canada Applied Research Metrics 2013/14. July 1, 2014.

<sup>3</sup> Eligible costs under the Tri-Council’s College and Community Innovation Program, administered by NSERC.