

University intellectual property and technology transfer

Universities Canada's submission to
the Standing Committee on Industry,
Science and Technology

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Introduction:

Universities Canada welcomes the opportunity to respond to the Standing Committee on Industry, Science and Technology's review of intellectual property (IP) and technology transfer in post-secondary education. University research and development is a major driver of Canadian innovation and economic growth. Canada's universities conduct 41 per cent of Canada's R&D. It is estimated that post-secondary institutions produce over \$55 billion annually in economic activity and support around 680,000 direct and indirect jobs.¹ Universities are a key partner in industrial R&D by conducting over \$1 billion in research for business annually.²

University research transforms lives, strengthens communities and finds solutions to the most pressing challenges facing our world. Technology transfer and commercialization are some of the important ways that universities enhance Canada's economic growth and innovation. The process through which the benefits of university teaching and research are actively spread to society is known as "knowledge mobilization" and includes not only generating new patents and licensing revenue but, equally as important, developing highly qualified personnel through talented graduates; open access publications; new public research datasets and data trials; the creation of high tech start-ups; and providing new technologies and research-based solutions to small and large businesses. Canada's universities offer over 275 entrepreneurship courses, programs, centres and other entrepreneurial activities. It is through these diverse means of knowledge mobilization that universities serve as anchor institutions in Canada's innovative future.

Knowledge mobilization activities are spearheaded by university innovation and strategic partnership offices which coordinate technology transfer by facilitating large-scale collaboration between the private and public sectors, negotiating contracts with industry, and building strategic alliances with key innovation partners. These offices carry out multiple functions to ensure universities are dynamic and supportive partners in helping businesses and not-for-profit organizations solve their problems.

There is no single path for innovation – success will vary by sector and by region. In one sector the need to stimulate innovation may be most acute in the start-up phase, while in another it may be during a high growth phase. Each region will require a unique mix of collaboration between higher education institutions, government, and private and non-profit sectors. Canada has a rich network of university-business research partnerships – you will find some interesting examples throughout the right-hand side of this document. Guiding the development of these partnerships are institutional IP policies, which are tailored to the innovation contexts they serve. To this end, university innovation activity varies greatly: it can take the form of new spin-offs and licensing agreements; new social innovation practices with the non-profit sector; and commercialization through open science initiatives. A flexible, responsive and nimble IP environment is critical as no one-size-fits-all policy will suit the diverse needs and capabilities of Canada's different sectors and regions.

¹ The Conference Board of Canada, *The Economic Impact of Post-Secondary Education in Canada*, 2013.

² Statistics Canada, *Gross Domestic Expenditures on Research and Development in Canada*, 2015.



The opportunity:

Universities are recognized as key players in Canada's research and innovation landscape. Universities Canada welcomed the major federal investments in a national innovation agenda from Budget 2017. Through university involvement in the development of innovation superclusters, additional investments for work-integrated learning opportunities through Mitacs and other federal programs, the creation of Innovation Canada to help coordinate and strengthen federal business innovation supports, or investing in sector-focused science initiatives like clean tech, advanced manufacturing and ag-food, the government acknowledged the critical role that university partnerships play in generating innovative economic growth in Canada.

Budget 2017 announced the creation of a national IP strategy to streamline supports for the development of IP and accelerate the patent processes for Canadian R&D. The strategy will offer the opportunity to benchmark Canada's IP ecosystem to international best practices and ensure Canada's IP regime positions the country to compete in a global marketplace.

Budget 2017 investments and new programmatic initiatives are welcome. That said, there is an opportunity to build stronger supports to increase the benefits that university knowledge mobilization brings to the Canadian economy and further leverage Canadian university research strengths for enhanced private sector collaboration and technology transfer. Additional investments in mechanisms which encourage knowledge mobilization will empower new R&D partnerships to drive innovation and increase economic growth.

We have four recommendations for the committee about how best to leverage university knowledge mobilization:

Recommendation 1:

Urgently invest in Canada's fundamental research system

Canada's research ecosystem is fertile ground for tomorrow's market leading innovations. Government action in Budget 2018 on the recommendations of the April 2017 Fundamental Science Review Panel report – most importantly, the top financial recommendation for significant re-investment in discovery research – will be a critical next step in further strengthening the foundation for innovation and prosperity in Canada. There is an urgent and significant opportunity to build up Canada's capacity for innovation from the ground floor. Discovery research is the foundation of university collaboration with industry. Acting on the report's key recommendations will unlock Canada's innovative potential in commercialization and knowledge mobilization.

Open science: The Structural Genomics Consortium

The Structural Genomics Consortium (SGC) is a not-for-profit organization formed in 2004 to examine three-dimensional structures of medical proteins. While international in scope, its Canadian arm is funded through 13 organizations (including federal and provincial governments, industry partners and participating universities). The SGC is one of two major "open science" initiatives in Canada; companies provide \$8M to be active members of the partnership and freely receive all research data from the SGC's more than 200 scientists, leading to new commercial opportunities and commercial partnerships. The consortium currently boasts eight major pharmaceutical companies.



Recommendation 2:

Maintain a flexible IP policy ecosystem for Canadian universities

Flexible IP policies are a key element in universities' ability to innovate and bring university-generated IP to market. A flexible policy system allows universities to set and update their policies depending on specific regional, sectoral and industry needs, and adopt appropriate strategies to deal with the different types of IP that are being produced. Given the patchwork nature of different agency policies on IP, institutional flexibility also allows universities to meet the various requirements of funding partners, leading to a greater number of successful collaborations.

Diverse IP policies have been at the center of many different types of technology transfer successes in Canada. Canadian universities employ a range of different IP policies, ranging from creator-owned to institution-based ownership, with most adopting a hybrid of the two:

Creator-owned policies:

- The Waterloo region is one of the most dynamic sources of high-tech activity in the country, boasting many companies involved in either the production or facilitation of high technology. The **University of Waterloo** employs a strong creator-owned IP policy for its students and faculty, which some have argued has been the biggest contributing factor to the growth of start-ups in the region.
- Both the **University of Victoria** and **Dalhousie University** employ creator-owned policies with royalties from commercialization income split evenly between all stakeholders involved. These types of policies are designed to foster supportive climates for the development of IP with services to help researchers in their commercialization pursuits. In 2011, Dalhousie's Industry Liaison Office helped to negotiate a partnership with American multi-national airplane giant Boeing totalling more than \$7 million. This partnership produced novel IP, brought new applied research projects to Dalhousie's faculty, and created new opportunities for trainees in the manufacturing and engineering sectors.

Institution-owned policies:

- In 2015, the **University of British Columbia** licensed a promising new treatment for prostate cancer to pharmaceutical giant Roche. This deal was negotiated through the University-Industry Liaison Office, which had a history of working with Roche in previous partnerships due to UBC's institution-owned IP policy.

Hybrid models:

- One of the largest grossing IP developments in Canada's history came from the **Université de Sherbrooke's** engineering Professor Pierre Adoul's voice transmission computer chip. The university's regulations on royalties, which splits income evenly between institution and inventor, allowed the two to partner in the technology's

Technology transfer through networked collaboration: CMC Microsystems

CMC Microsystems has worked with researchers and industry across Canada since 1984 to provide access to world-class tools and expertise for innovations in microsystems and nanotechnologies. Funded primarily through NSERC and the Canada Foundation for Innovation, CMC's membership now includes over 46 post-secondary institutions, 27 companies, and over 3,100 faculty and graduate students. It is estimated that over the last five years, the organization provided \$342 million in R&D activity and has led to substantial enhancements to Canada's innovation ecosystem, such the Kingston Nano-Fabrication Lab which gives academics and companies access to leading-edge services for creating and testing advanced micro-technologies.



expansion, allowing the chip to be widely used across the globe in cell phones and computers.

- In 1990, the **University of Toronto** adopted a new “hybrid IP” policy to provide researchers with the choice of whether to bring their inventions to the university or commercialize independently. Prior to this, the institution had employed strict regulations on IP ownership and commercialization. The change was a key driver for the increase in the number of invention disclosures brought forward by faculty, and by 2013 the institution was the top university for disclosures in Canada.

As these examples indicate, there is no single path for innovation – success will vary by region and by sector. Both creator-owned and institution-owned policies can drive patents and commercialization, and the growing movement towards open science, which aims to make all scientific research, data and dissemination accessible to all levels of society, will decrease university patents while increasing the adoption of university IP by the private sector. Fully harnessing the potential of university-created IP requires adequately resourced and flexible IP ecosystems that are open to risk and experimentation.

Recommendation 3:

Establish funding programs dedicated to technology and knowledge transfer activities at Canadian universities

Unlike several other comparator countries in the OECD, Canada does not have a stand-alone fund dedicated to supporting university IP development or its private-sector uptake. An important program that had filled this role in the past was the Intellectual Property Mobilization (IPM) program. The IPM program was a tri-council initiative established in 1995 and initially funded by the Natural Sciences and Engineering Research Council of Canada (with Canadian Institutes of Health Research and the Social Sciences and Humanities Research Council of Canada joining in 2001). Throughout the 14 years of the program more than 107 institutions participated in over 100 grants, totalling \$59 million.

The IPM program was specifically designed to encourage collaboration between technology transfer offices in order to facilitate sharing expertise between institutions. It led to a number of enhancements to the Canadian IP ecosystem, including:

- an increase in universities partnering with small companies lacking expertise in IP development;
- the development of the Quebec commercialization hub, the Société de valorisation des applications de la recherche (SOVAR);
- the creation of the WestLink program, a network internship training program which places graduates into institutional technology transfer offices, venture capital firms, and technology companies in the prairies; and
- the establishment of the Springboard commercialization network in Atlantic Canada.

Streamlining collaboration and IP negotiation: space research in Québec

CRIAQ, or the Consortium for Research and Innovation in Aerospace, is a Québec non-profit organization which includes 21 universities/research institutes and 57 companies. Since its creation the partnership has organized 128 projects with a total value of \$127M. In 2003, the CRIAQ board required all projects to have at least two industrial partners and two research partners. The consortium provides a standardized framework for collaboration through a common IP agreement that all partners must agree to. The organization estimates that businesses see a one-dollar return on every 25 cents invested, and industrial partners receive an exclusive worldwide royalty-free license for aerospace applications. CRIAQ played a key role in the creation of GARDN, the Green Aviation Research & Development Network, which was one of Canada's first Business-Led Networks of Centres of Excellence.



In 2009, the IPM program was discontinued despite evidence that demand for the program's funding had increased and the initiatives it supported had allowed more researchers to be involved in technology transfer activities than ever before.³ After this period, staffing for university commercialization declined while the growth that Canada had enjoyed in knowledge translation slowed.⁴

A dedicated funding envelope for technology transfer and knowledge mobilization provides a powerful opportunity to build from our country's established strength in academic research and basic science. Universities across the globe engage in many different forms of knowledge mobilization and there are international models that could be adapted to fit the Canadian context (**Appendix A**). Drawing from these examples, elements of a successful program could include: requiring competitive proposals, the development of institutional knowledge exchange strategies, and an emphasis on experimentation with novel solutions to technology transfer.

Recommendation 4:

Create a national IP concierge service with specific tools and initiatives that promote university technology and knowledge mobilization

We understand a prominent recommendation from the innovation community has been the creation of a national IP concierge service. We believe that such a hub could leverage university knowledge mobilization for the benefit of business users or partners. The creation of a central IP hub which coordinates Canada's national strategy on IP development, promotion and education could offer unique supports to strengthen the technology transfer from universities to the private sector.

For example, this service could work with government, universities, law societies, and bar associations **to create a database of pro-bono legal services** at no cost to institutions or innovators. The IP Osgoode Innovation Clinic at York University serves as an excellent model: the clinic is staffed by student volunteers from the law school who are supervised by lawyers from Norton Rose Fulbright Canada LLP. A national database of legal services could ensure that all areas across Canada, including rural regions with less IP expertise, would be matched with appropriate education resources.

A concierge service could also streamline industry-university partnerships by **creating IP toolkits with template collaboration agreements**. Toolkits provide universities and industry with the optimal balance between standardization and flexibility, and can serve as a one-stop-shop for educating industry and universities on resources for knowledge mobilization best practices. Both the Australian IP Toolkit for Collaboration and the U.K.'s Lambert Toolkit are good models of government initiatives. These models were created after consultation with academia and industry and are administered on the government's website, allowing them to receive wide

³ The Natural Sciences and Engineering Research Council of Canada, *Evaluation of the Intellectual Property Mobilization Program*, 2008.

⁴ Universities Canada's calculations based on annual AUTM Licensing Activity Survey data.



visibility; in a recent review of the Lambert Toolkit more than two-thirds of the survey respondents (university and private sector technology managers) were aware of the templates. The toolkit was used by 69 per cent of these respondents, suggesting high uptake among the research community.⁵ There is already a national precedent of using templates in Canada: in 2009, during a review of its IP policy, NSERC developed a set of illustrative sample clauses which institutions could embed into collaborative research agreements.

Conclusions:

Universities Canada is committed to working with the government to help build a balanced, productive, well-supported and world-class IP ecosystem. We share the vision of mobilizing university IP with targeted investments to strengthen innovation, grow universities' economic impact, and unlock the private sector's R&D potential. The recent Fundamental Science Review Panel's report emphasizes that we need to maintain Canada as a world leader in creating new knowledge with enhanced investments for discovery research, thereby ensuring that our ecosystem is well primed for knowledge mobilization. Maintaining space for flexible IP policies ensures that universities are free to support a range of private and public-sector needs. A dedicated funding envelope for knowledge mobilization would incentivize greater technology transfer for the benefit of the Canadian economy. Finally, a national concierge service would centralize supports for IP nationally.

Universities Canada would be glad to provide further detail on any of the above recommendations. We look forward to participating in forthcoming parliamentary committee hearings and consultations on university intellectual property.

Contact:

Wendy Therrien

Director of Research and Policy

Universities Canada

350 Albert Street, suite 1710

Ottawa, ON K1R 1B1

613 563-1236 (278)

wtherrien@univcan.ca

⁵ IP Pragmatics Limited/The Intellectual Property Office, *Collaborative Research between Business and Universities: The Lambert Toolkit 8 Years On*, 2013.



Appendix A

International models of higher education innovation funding envelopes

The United Kingdom's Higher Education Innovation Fund (HEIF), administered through the Higher Education Funding Council for England, is an annual \$220M CAD initiative intended to support a broad range of innovative interactions between UK universities and international partners, including business and industry. Allocations are decided competitively based on innovation impact metrics with universities receiving an annual performance-based envelope to carry out approved pan-institutional "knowledge exchange" strategies. The HEIF program fosters greater alignment between university and government growth priorities while supporting local and regional economies through the development of skills, entrepreneurship and innovative people. A crude analysis of the impact of the HEIF demonstrated that every £1 of HEIF funding returned £7.9 of knowledge exchange income between 2006 and 2014.

Sweden's Governmental Agency for Innovation Systems, or Vinnova, spends \$365M CAD annually on various initiatives designed to promote greater collaboration between companies, universities, research institutes and the public sector. One of Vinnova's central programs, The Knowledge Triangle, works to strengthen technology mobility with industry, supporting commercialization, concept verification, and the career mobility of university technology transfer staff. A recent impact study of seed financing for technology-based companies shows that Vinnova support had a significant impact on company growth, leading to quicker growth and greater success by its start-ups in securing additional funding.

Switzerland's Commission for Technology and Innovation (CTI) is a central funding agency specializing in supporting innovation partnerships between industry, academia and Swiss start-ups. The CTI's nearly \$195M CAD per year envelope funds a suite of programs which includes joint innovation projects between higher education and the private sector, general partnership building between key players in the R&D ecosystem, patent searches, and innovation projects with international involvement. The CTI is currently conducting an impact study to determine its return on investment for Swiss innovation, however interest in the program continues to grow and in 2015 alone the organization received over 900 R&D applications for funding, more than double the amount from 2008.

In the **United States, the I-Corps program** helps commercialize research supported by the National Science Foundation by providing robust entrepreneurship training and support to promising teams of academic entrepreneurs. I-Corps focuses on exposing scientists to thinking and processes that can turn their research and discoveries into commercial products. Each scientist teams up with an entrepreneur and a graduate student to manage the team's lab, and together they work on learning what it takes to bring a product to market. The I-Corps program is already starting to expand into Canada, with Dalhousie as the first Canadian site as of May 2017. Dalhousie University's I-Corps program will be open to academics across Atlantic Canada, and the university has partnered with Washington, DC's George Washington University to provide training to I-Corps' staff and kick-off the pilot program.