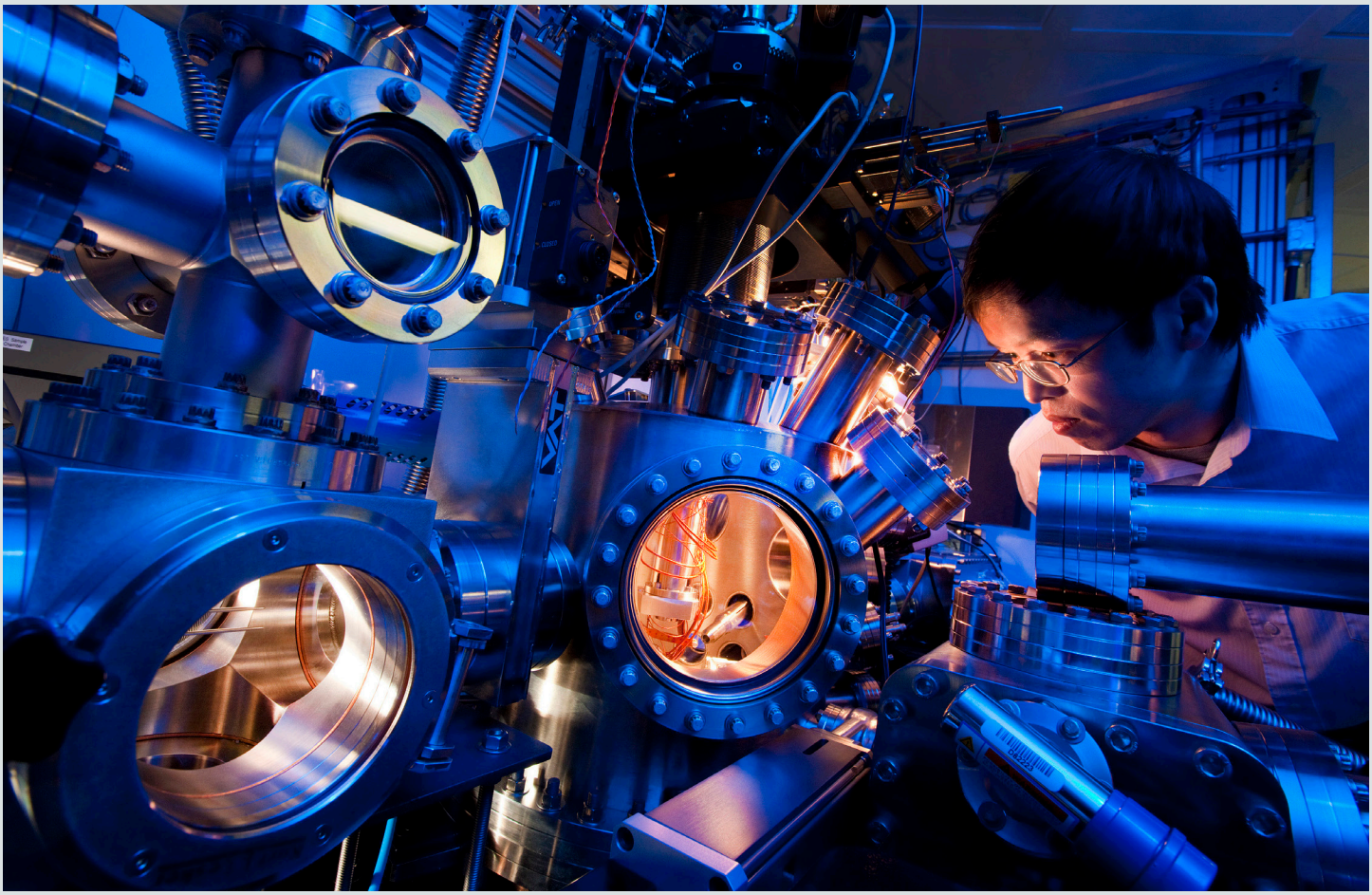
Mobilizing people and ideas for Canada's innovative future

Universities Canada.

Universities Canada's submission to the Innovation Agenda Consultations
September 2016



Canada's universities are committed to developing an innovative, inclusive and prosperous Canada. In communities across the nation, universities are engines of innovation, contributing to a thriving and just society through the mobilization of people and ideas.

In today's challenging and competitive environment – with global demographic shifts and a slow-paced global economy – Canada needs an Innovation Agenda that drives growth, creates jobs economy-wide and improves the lives of Canadians. To paraphrase Prime Minister Trudeau from the World Economic Forum earlier this year, it is our resourcefulness that must drive our future prosperity.

Canada's universities are committed to helping advance this agenda. They are dedicated to their role in driving economic growth and innovation in their communities, training the next generation of entrepreneurs and innovators, and conducting research that can be leveraged for long-term prosperity, social cohesion and job creation. It is through these multiple roles, and diverse means of knowledge mobilization, that universities serve as anchor institutions in Canada's innovative future.

The Innovation Agenda offers a tremendous opportunity to harness Canada's creativity and be ambitious about our future, drawing on the skills and knowledge of talented university students, researchers and entrepreneurs across the country to advance a broad innovation strategy.

Be it implementing a new or significantly improved commercial product or process, or a social innovation that offers a novel and effective solution to a social problem, Canada's universities make critical contributions to innovation dynamics from across the natural sciences, engineering, health sciences, social sciences, arts, humanities and design. Through training talented graduates, conducting cutting-edge discoveries, and participating in multisectoral research partnerships focused on discovery and innovation, universities provide critical contributions to Canada's long-term and sustainable economic growth.

Building on Canada's research excellence

Canada's universities are known for conducting world-class research. We punch above our weight in output by ranking sixth among top scientific countries in terms of average citation levels across all fields, and by producing four per cent of the world's scientific papers while only representing one per cent of the world's population.

The ground-breaking ideas and game-changing discoveries that are capable of driving innovation and growing economies come from the combination of strong discovery and applied research capabilities – and connections – at Canada's universities. Sustained support for our science capacity and research infrastructure is critical to Canada's innovative potential.

We must capitalize on our existing strengths. Over the last two decades, Canada has made remarkable strides in creating a new generation of world-class researchers working in state-of-the-art research facilities. Canada is globally competitive in a diverse range of research areas. Past investments in research and the enabling environment for research excellence are now bearing fruit. Canadian researchers were awarded 24 major international scientific awards in 2015, including the Nobel Prize.

However, the pace of these research investments has slowed considerably in recent years and our relative strength is slipping. Between 2006 and 2014, Canadian higher education expenditures on research and development (HERD) as a percentage of GDP fell from third to seventh among OECD nations.

- **We recommend that the government provide sustained and transformative investments in discovery research through the federal research granting councils to ensure Canada returns to globally competitive funding levels and is making significant progress towards reclaiming third place in the OECD for HERD investment.**

Eroding competitive advantage in R&D investment
R&D expenditures by sector as a share of Gross Domestic Product (GDP), 2006 & 2014

	Higher education	Business enterprise	Total
2006	3rd	18th	16th
2014	7th	25th	24th

Research Intensity measures from the OECD Main Science and Technology Indicators (2006, 2014)

"Education is one of the most important drivers of a country's competitiveness. In this increasingly globalized world, ensuring that Canadian university students have access, not only to the best education in the world but also to the best international students in the world, is crucial for our long-term competitiveness and success."

Dominic Barton, Global Managing Director, McKinsey & Company, and Chair of the Advisory Council on Economic Growth

The ability to conduct world-class research that fuels the development of innovative products and services requires sustained, predictable and balanced support for all four elements of the university research and innovation ecosystem: developing, attracting and retaining highly-qualified research talent; operating cutting-edge research infrastructure and facilities; producing new ideas through discovery research programs; and institutional support for the full costs of research.

In recent decades, important investments have been made by the Government of Canada into world-class research facilities for big science projects in astronomy, health, physics, ocean and Arctic research. However, as new opportunities and requests for collaboration from international partners continue to emerge, Canada needs a national strategy to guide our country's approach to big science.

- **A competitive innovation strategy for Canada should include consideration of sustained, multi-year funding for the Canada Foundation for Innovation to support its current suite of programs and a mandate for CFI to lead the development and implementation of a national strategy for big science.**

An innovation strategy based on global research excellence also must include support that enables greater cross-border and cross-disciplinary collaboration. Many of the most pressing challenges facing our country and world – and with the greatest innovation potential, such as climate change, infectious diseases, and social cohesion around inequality – sit at the intersection of funding agencies. Currently, there are significant barriers facing Canadian researchers wishing to undertake such work.

- **A supportive toolkit of approaches is needed that combines dedicated funding envelopes to enable researchers to be both multidisciplinary and international in their research, and for granting councils to have aligned approaches and flexible policies that facilitate and support such integrative and collaborative research efforts.**

Innovation performance depends on strong discovery and applied research capabilities, which requires a vibrant and healthy research ecosystem that supports all types of research. Across the country, research into the natural sciences, engineering, health sciences, social sciences, arts, humanities and design produces knowledge that drives scientific and technological developments, while also helping better understand human behaviour that leads to adopting innovative practices and processes.

"Discovery research…is very important because it turns out that if you attempt to only do direct commercializable research, then you find that you run out of ideas fairly quickly."

Dr. Arthur B. McDonald, Nobel laureate in physics and professor emeritus of Queen's University, interview with Universities Canada, January 21, 2016.

Training the next generation of innovators and entrepreneurs

To develop a sustained and inclusive Innovation Agenda, Canada must advance a talent strategy that strategically leverages our greatest assets: people and ideas.

In Canada's sesquicentennial year, over one million undergraduates are entering university halls across the country. These students are the foundation of Canada's innovative future. Canada's universities are committed to equipping *all* students with the skills and knowledge they need to flourish in work and life, empowering them to contribute to Canada's economic and social success.

We need to do better as a country to meet the aspirations and unlock the potential of Indigenous youth – their community's future leaders, innovators and entrepreneurs. Currently, only 11 per cent of Indigenous peoples aged 25 to 34 in Canada have a university degree, compared to 33 per cent of non-Indigenous Canadians in the same age group.

- **We aspire to significantly reduce the gap between the university participation rate of Indigenous and non-Indigenous Canadians within the next ten years, by increasing federal financial assistance to Indigenous students and institutional efforts.**
- **Universities Canada also recommends supporting more Indigenous students to pursue graduate and post-doctoral studies, growing the cohort of Indigenous university faculty and researchers and boosting their engagement in Canada's innovative future.**

Through work-integrated learning, hands-on research training, and global experiences, Canadian university graduates are educated in a culture of innovation and prepared with 21st century skills including flexibility, adaptability, and an openness to risk-taking. For example, students are learning entrepreneurial skills in about 275 entrepreneurship courses, programs, centres, and other entrepreneurial activities, such as competitions, workshops, internships, and mentorships on offer at Canada's universities. These entrepreneurial skills are then being put to the test through close to 60 incubators, accelerators and start-up programs offered on Canadian university campuses across the country. For example, DMZ Ryerson, TEC Edmonton and Innovate Calgary supported over 100 start-ups in 2015 alone with an average of five new jobs per start-up.

Students want to develop their skills for innovation through work-integrated learning. Currently, 55 per cent of undergraduate students graduate with an experiential learning experience, such as co-ops, internships, or research placements. However, student demand continues to grow and outpaces supply.

We support the call by the Canadian Business/Higher Education Roundtable for access to work-integrated learning for 100 per cent of Canadian postsecondary students.

- **To support this goal, Universities Canada, along with national business and student groups, recommends investment in new federal measures, such as vouchers and tax credits, to incentivize employers – particularly in small- and medium-sized enterprises and not-for-profit organizations – to create more paid co-op and internship placements across disciplines and address the barriers employers face in offering such placements.**

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For Canada to be a global innovation nation, we also need young Canadians to understand other countries and other cultures. Open minds mean open borders for trade, immigration and ideas. Yet only three per cent of Canadian university students (approximately 25,000) go abroad in any given year, despite 97 per cent of universities offering international experiences. Canada's universities aspire to enable all Canadian university students to develop greater risk-taking, adaptability, flexibility, language and intercultural skills, as well as knowledge of global markets before they graduate.

- **To celebrate Canada's 150th, we should invest in our next generation of leaders by increasing the outbound mobility of university students to 50,000 students abroad per year by 2022. Doing so, particularly by exposing our students to cross-border learning opportunities in emerging economic powers and strategic partners, will sharpen Canada's competitive edge.**

At the same time, we need smart immigration policies and best-in-class processes to support the attraction and retention of international talent. As the government looks to substantially increase the levels of immigration into Canada, universities in communities across the country are important hubs for attracting and integrating top talent. Universities play a critical role in drawing top researchers to our communities, directly boosting our innovative potential and strengthening our international research connections. Universities also draw some of the best and brightest international students, who contribute well over $10 billion to the Canadian economy each year. Many of these students would like to remain after their studies, transitioning into productive members of the Canadian labour force with valuable people-to-people ties that assist in trade linkages, foreign direct investment and private sector partnerships. Our immigration policies must position Canada as a global magnet for this top talent. We recommend the following:

- **Facilitate the flow of international talent to Canada's universities through a simplified process for temporary work permits under the International Mobility Program.**
- **Given that a large portion of foreign academics are already Labour Market Impact Assessment-exempt under the International Mobility Program, we recommend extending this exemption to *all* hiring by universities for positions that support the academic enterprise, including faculty, researchers, research associates, academic physicians and senior university administrators.**
- **Eliminate the LMIA requirement in the Express Entry points system and/or lower the value of points awarded for the LMIA-supported job offer and allow for greater value to be placed on the human capital criteria to adequately recognize Permanent Resident candidates such as foreign university faculty and international graduates of Canada's universities.**
- **Allocate resources to ensure that study permit processing times are globally competitive in order to position Canada as the destination of choice for top talent.**

"Young people understand that we're in a globalized world right now, and the more we can challenge ourselves to understand different realities, different perspectives, different cultures, the more we discover about ourselves and our place in an increasingly complex world. The more we can engage in the kinds of dynamic learning that solid exchanges between countries [foster], the better it will be for young people and for our countries as well."

Prime Minister Justin Trudeau, 2016.

Driving knowledge mobilization

Canada's universities are dynamic and supportive partners in helping businesses and not-for-profit organizations solve their problems. One of the greatest contributions Canada's universities make to innovation is equipping their graduates with the skills, knowledge and mindset to contribute to our 21st century economy. Through a range of knowledge mobilization activities – hands-on learning experiences of co-op students and graduates, community service and outreach, public policy engagement, inter-sectoral partnerships, and the commercialization of research – universities contribute to innovation, prosperity and the quality of life in Canada. Such a flexible approach is needed as no one-size-fits-all approach will suit the diverse needs and capabilities across Canada's regions.

Commercialization contributions are made by universities as valued research partners and through knowledge spillovers in the form of spin-off companies.

- **Canada's universities have proven themselves to be prolific generators of new ideas and designs, but R&D assistance is needed in the start-up phase to bridge the capital and financing gap between the initial idea and venture capital stages of the commercialization wave.**
- **Targeted support should also be provided to encourage incubation and acceleration on university campuses, and to facilitate access to risk capital. Our graduates abound with ideas, but help is needed to develop strong and nimble start-ups that can grow into globally competitive companies.**

Universities can also provide support to young companies by helping educate business talent in areas where we know Canada needs improvement – training executive talent with the ability to scale-up small start-ups, and building knowledge of sales into the business curriculum to assist small companies to grow. The government may also wish to review procurement policies, either in becoming the critical first buyer for emerging Canadian products and services, or through incentives for others to take on this commercial risk.

Despite the research strengths of our universities, private sector collaboration with universities remains under-leveraged in Canada. From 2006 to 2014, Canada' global ranking in business expenditures on R&D (BERD) decreased from 18th to 25th. Moreover, from 2008 to 2013, there was a 12 per cent decline in the business R&D workforce.

- **To encourage more companies to work with universities and pull the research expertise and generation of new ideas into the market place, the government should revisit the balance of direct and indirect supports, with an expansion of voucher programs that help the business sector overcome their lack of internal R&D capacity.**

As these various means of knowledge mobilization indicate, there is no single path for innovation – this will vary by region and by sector. The needs for stimulating innovation in one region may be most acute in the start-up phase, while in another they may be in the scale-up phase. The needs in the energy sector will be different than in the health sector. And many of the most pressing areas for innovation require social innovation to enable breakthrough technologies to get to scale. Canada's universities have developed a variety of policies and programs to respond to the multi-faceted commercialization process, and the diverse needs and interests of the community. For example, rather than employing one standard model, institutions

Simon Fraser University's 4D LABS
Housing $40 million worth of state-of-the-art research equipment and technology, Simon Fraser University's 4D LABS collaborates with industry to generate new products and ideas in a range of fields, including clean energy, information technology, health, nano-technology and telecommunications. The goal-oriented environment fosters intellectual freedom and creativity, which are critical for breakthrough research. Since beginning operations in 2007, hundreds of academic, industry, medical and government innovators and researchers from across Canada and around the world have worked in the materials science research facility to develop and test their ideas under real-world conditions, greatly reducing the time to market.

have developed intellectual property policies that respond to the needs of their respective local/regional context, best serving their private sector partners. Universities are committed partners in this respect and remain dedicated to their role in driving growth and innovation in their communities.

Building world-leading clusters and partnerships for dynamic communities

In working in partnership with universities across the country and around the world, Canada's universities harness faculty creativity and research strengths to bridge gaps in expertise, advance the frontier of knowledge and drive innovation. By capitalizing on and connecting existing research strengths across the country, Canada can be a hotbed of innovation.

Canada's universities are also dedicated to being vital partners in innovation clusters and to exploring new means to drive growth and collaboration within their respective regional economies. Each region has its own place-based assets and strengths and there is no single approach to developing a healthy cluster ecosystem. Supports for clusters must be sufficiently supple to target the unique challenges and opportunities that exist within any given cluster, while accommodating regional variations in economic structure, industry maturity, inter-sectoral relationships, and the historical context.

As locally engaged institutions, many of Canada's universities have developed strategic ways to participate in and support their local innovation clusters, through research partnerships, incubator supports, or in targeted professional development programs. These activities further universities' roles as dynamic anchor institutions in sustainable and high-performing clusters across the country.

- **Given the fundamental role that universities play in clusters, a national cluster strategy should require all relevant actors – businesses, universities, governments – be a part of competitive applications to identify appropriate supports.**
- **Criteria used to identify clusters for support must also be open and inclusive (not geographically or institutionally pre-determined) and may need to consider specialized criteria to ensure emerging clusters with potential to be globally competitive are considered, particularly those in smaller regional agglomerations.**

To fully participate in such partnerships and strengthen global connections, Canada must be at the forefront of digital developments. Canada's universities are embracing digital technologies to support teaching, learning and research, and to provide 21st century facilities for students and researchers. By capitalizing on current and emerging digital technologies, universities can contribute to the development of strong digital skills and literacy among students, increase ICT talent, support digital scholarship, and foster innovation.

A coordinated digital research infrastructure strategy is required to establish a strong digital ecosystem. Canada's current DRI system is complex and fragmented, due in part to a diffuse delivery system with unaligned funding structures, and a lack of coherent system-wide planning. For Canada's universities to be globally competitive and for graduates to develop the necessary digital skills, Canada needs to develop a DRI strategy that: is data-centric; restructures and streamlines the DRI delivery system; and has a governance structure focused on collective and coordinated action. This will need to include alignment and cohesion among a broad spectrum of players, and policy and planning for the overall digital research environment system.

General Motors Expands R&D with Universities

General Motors will expand its Canadian engineering base to reach a total of approximately 1,000 positions over the next few years. Mark Reuss, executive vice-president, global product development for GM said that Canada was chosen for this expansion, "because of its clear capacity for innovation, proven talent and strong ecosystem of great universities, startups and innovative suppliers". General Motors Canada will partner with nine universities on this R&D expansion.

It is our hope that the concurrent reviews into Canada's economic future (the Economic Growth Advisory Panel), and the funding of research in Canada (the Fundamental Science Review Panel) will provide additional insights into the fundamental importance of Canada's universities to building an inclusive, innovative and prosperous Canada.

Canada's universities are committed to advancing this agenda through collaboration and partnership with the private sector, communities, government, and other educational institutions in Canada and around the world. Through pursuing excellence in all aspects of learning, discovery and community engagement, Canada's universities can continue to play a leading role in Canada's future prosperity. With government investments that will strengthen our research enterprise and support connections between the private sector and universities, we can unlock Canada's innovative potential. When these investments are combined with the government's support for increasing work-integrated learning opportunities for all students, expanding outbound mobility, and streamlining immigration policies to attract and retain talent, Canada's innovative future can be bright.

Pari Johnston
Vice-President,
Policy and Public Affairs

613 563-1236 (253)
pjohnston@univcan.ca

Universities Canada
350 Albert Street, suite 1710
Ottawa, ON K1R 1B1

univcan.ca
@univcan