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CANADA 2030

Making Canada the most innovative country in the world

July 2015

U15

Group of Canadian Research Universities

Regroupement des universités de recherche du Canada

Note to reader:

With Canada's sesquicentennial on the horizon, the U15 Group of Canadian Research Universities has been discussing an idea that has captured our imagination – making Canada the most innovative country in the world by 2030. This is a broad thought piece about the actions, activities and initiatives that Canada could take to help get us there.

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Cover photo: Mark Ferguson, Canadian Light Source, University of Saskatchewan

In 2017, Canada turns 150. As we approach this milestone in our country's history, the U15 Group of Canadian Research Universities is focusing not solely on the foundation for prosperity that we have built in the past, but rather on what Canada can accomplish in the future. As research-intensive universities, we have concentrated on our role and what we can contribute to improving the lives of Canadians, and solving the national and global challenges that offer us opportunities to shine.

From that perspective, we have committed ourselves to an ambitious vision for Canada: to be the most innovative country in the world by 2030.

Becoming the most innovative country in the world extends beyond economic development driven by the right combination of education and skills that fuel competitive businesses and create high-quality jobs. Our vision of innovation relies upon dynamic academic, social and governmental sectors and a strong civil society that work together to become world-leaders in all aspects of public and private-sector growth and well-being.

Achieving this national vision will require a strategic focus by all sectors of Canadian society, each with its own role and unique strengths to contribute.

This document is intended to encourage a conversation with these partners about how we can work together to achieve this vision and create long-term, sustainable – but not static – prosperity for all Canadians.

Successful innovation starts with ideas, products, services, policies, technology and social trends and movements that evolve and change as they encounter each other and the world. We offer our ideas and this vision in that spirit. We understand and welcome readers who disagree with certain of our ideas or our emphasis, or who believe we have left out important concepts or have not gone far enough. We encourage you to consider our ideas and propose your own. This document is intended to start a dialogue, not to end it.

U15 universities are eager to play our part in making Canada the most innovative country in the world – in the unshakeable conviction that we can achieve this vision, together.

Feridun Hamdullahpur
Chair, U15

Suzanne Corbeil
Executive Director, U15

Photo courtesy of Dalhousie University

INTRODUCTION

Canada is a nation of innovators. We have built our lives, and our society, on a foundation of knowledge and discovery. Not content to rest on that foundation, we have used it as a springboard to create breakthrough technologies, visionary enterprises and a prosperous country. Our success is built on important contributions from many different parts of the Canadian economy and society, including businesses, non-profit organizations, governments, and research universities. By international standards, Canada has done relatively well and is ranked 11th and 12th on the two major rankings of the most innovative countries in the world[1]. As Canada prepares to celebrate the 150th anniversary of Confederation in 2017, we have much to be proud of.

However, looking to our sesquicentennial and beyond, we must recognize that our competitive environment is changing:

- New industries are rapidly emerging from new discoveries;
- Markets are more global, niches more accessible and the global middle-class is growing;
- Global supply chains are evolving due to newly emerging markets, changing global cost structures, and lower barriers to entry;
- Advanced robotics, 3D printing and other discoveries are changing manufacturing;
- Resource prices are volatile; and,
- Canada's workforce is aging.

[1] Canada was ranked 11th on the Bloomberg Most Innovative Countries in the World Ranking 2014, and 12th on the on the 2014 Global Innovation Index.

To prosper in this dynamic global economic environment, we must aggressively develop new long-term competitive advantages. In a world where innovative techniques, technologies and businesses created anywhere disrupt markets everywhere, we can protect and enhance our economy and quality of life only by turning our innovation ecosystem into our core competitive advantage.

Accordingly, we believe that Canada's goal should be to become the most innovative country in the world by 2030.

As the most innovative nation in the world, by 2030 Canada would be home to:

- fast-growing new ventures and increasingly innovative Canadian companies that are equipped to compete globally and create more high-quality jobs;
- a well-educated, increasingly productive, entrepreneurial and adaptable workforce that attracts investment from top Canadian and international companies;
- greater immigration of highly mobile top professionals, scholars, researchers and students;
- a vibrant research environment that celebrates and invests in all forms of research including discovery-driven research;
- a government sector that innovates in partnership with the academic sector to identify and adopt best practices that increase efficiency and better meet Canadians' needs;
- a creative, exciting social sector that works in partnership with academia and industry to create a culture of social entrepreneurship, nurtured in part on our university campuses; and
- educational institutions that provide world-class programs to meet the diverse and evolving needs of Canada's students, economy and society.

> "…fruits of innovation are the tools that will ensure Canada's success in the twenty-first century."
>
> Jenkins report

These benefits are available only if we all actively work together to become the most innovative country in the world. We can start by learning from the research and implementing many of the recommendations from the Science Technology and Innovation Council, the Canadian Council of the Academies, the Canadian Council of Chief Executives, the Canadian Chamber of Commerce, the Jenkins expert panel, the Chakma advisory panel, Seizing Canada's Moment: Moving Forward in Science, Technology and Innovation 2014, the International Education Strategy and the contributions of many other innovation experts.

As the Jenkins report points out, the "fruits of innovation are the tools that will ensure Canada's success in the twenty-first century." To harvest those fruits, we need to undertake a coordinated effort that involves government, academia, and the private and non-profit sectors. We also need to recognize that the significant gap between business innovation in Canada and in other countries affects both the competitiveness of our private sector and our quality of life. Canada requires a shared, national commitment to increase private-sector innovation, as well as to attract and retain world-class talent and to generate new ideas, products and services that will transform our society and our economy.

Photo courtesy of the University of Toronto Engineering Strategic Communications

GETTING TO 2030

Our national objectives

Becoming the most innovative country in the world by 2030 will require Canada to build on the pillars that have served us well in the past and to adhere to several key principles:

- **WE MUST BE STRATEGIC.** The exponential advances in digital technology, our aging demographics, and pressing social, environmental, health and economic challenges mean competing globally will require new strategies and a new focus. With the increasing pace and unpredictable nature of discovery and innovation, this means focusing on initiatives that will allow the innovation ecosystem to flourish over the long-term and across sectors and disciplines.
- **WE MUST MOVE QUICKLY.** Our international competitors, including China, India, Brazil, Japan, South Korea, France, Israel, the United Kingdom, the United States, and Germany are investing significantly in their innovation ecosystems in order to take a leadership position in the global knowledge economy. We cannot afford to be left behind.

> "It is important that Canada have a policy environment that drives discovery and research."
>
> Russell Williams, President of Canada's Research-Based Pharmaceutical Companies (Rx&D)

- **WE MUST ALL PLAY A PART.** All sectors must bring new focus, creativity, strategy, drive and improved coordination to build a stronger research, discovery and innovation ecosystem. This will require sectors themselves to take leadership on some initiatives, even as they support efforts lead by others. As some of Canada's largest creators of new knowledge and as major educators of the highly qualified personnel essential to a prosperous, knowledge-based economy, we at the U15 Group of Canadian Research Universities recognize our role in achieving this ambitious goal.

- WE MUST BE ACCOUNTABLE FOR OUR PROGRESS. To achieve a goal this ambitious, with contributions from so many different parts of our society and economy, we must track and be accountable for our progress using a range of measures. These measures should consider inputs (such as funding levels) and outputs (such as the percentage of the workforce that has received training over the last two years). Statistics Canada should report the results in a timely manner. The specific metrics could be inspired by the Bloomberg Rankings, the Global Innovation Index and some of the reports listed above.

The role research-intensive universities can play, in partnership with the federal government and the private and social sectors, will be the central focus of the rest of this document.

The role of Canada's research-intensive universities

A sustained federal commitment to the foundations of university-based research has made our universities critical assets; they are the cradles of innovation. In partnership with governments, civil society, the private sector and international partners, they nurture the talented and creative individuals who are our greatest strength. As a critical part of our nation's intellectual infrastructure, our graduates and the students and scholars at our research-intensive universities are essential if we are to increase Canada's global competitiveness and expand our economy. Their original ideas, methods and multi-disciplinary partnerships result in the game-changing discoveries, products, policies, services and processes essential to confronting the world's challenges.

In considering how to make Canada the most innovative country in the world by 2030, we must first recognize the policies, investments and hard work that have succeeded in making our research-intensive universities drivers of innovation and a competitive advantage. The pillars of our current success include:

- the foundational federal agencies (Natural Sciences and Engineering Research Council of Canada, Social Sciences and Humanities Research Council, Canadian Institutes of Health Research and the Canada Foundation for Innovation) and provincial funding programs;
- excellence programs (the Canada First Research Excellence Fund, Canada Excellence Research Chairs, Canada Research Chairs, and Centres of Excellence for Commercialization and Research);
- periodic strategic investments in our research ecosystem (the Knowledge Infrastructure Program, and other targeted or sector-specific investments);
- not-for-profit agencies and charities that fund significant amounts of Canadian research; and,
- major reports and studies that identify important ways to strengthen Canada's innovation ecosystem (e.g. Innovation Canada: A Call to Action; The State of Science and Technology in Canada, 2012; International Education: A Key Driver of Canada's Future Prosperity; various Council of the Canadian Academies reports).

The contribution of research universities

To achieve the goal of making Canada the most innovative country in the world, all sectors will need to work together to develop sector-specific contributions that combine to provide Canada with previously unimagined competitive advantages. To maximize the contribution of research-intensive universities to this ambitious goal, we must consciously adopt the principles, build the government-academic-industry partnerships, and take the actions required to strengthen a culture of innovation and research excellence at our research- intensive universities. This document outlines additional contributions research-intensive universities can make. While some of these new contributions will require new investments and new partnerships, our sector can undertake many actions on its own.

To make Canada the most innovative country in the world by 2030, research universities will take action in four major areas:

1) Developing the most talented, innovative and adaptable workforce;
2) Sharpening our focus on research excellence;
3) Leveraging knowledge and science through partnerships; and,
4) Strengthening Canada's culture of innovation and entrepreneurship.

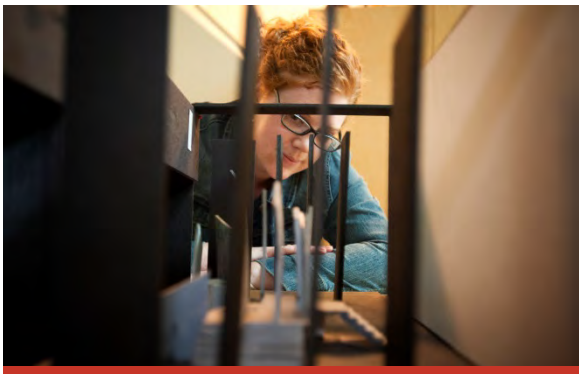

Photo credit: Richard Siemens, University of Alberta

Developing the most talented, innovative and adaptable workforce

To become the most innovative country by 2030, we must attract and retain the world's most talented individuals and ensure they are able to achieve their ambitions in Canada. We need to attract smart, creative, and driven people, whose vision inspires their peers and ignites collaborations. To attract, retain and unleash this top talent, research universities, governments, non-profit organizations, and the private sector each have a role to play.

> "The global talent pool has never been larger, and its rate of growth has never been faster. To stay in the game – to attract jobs and investment, and provide our citizens with a high standard of living – Canada must recommit itself to having the world's best-educated, most innovative workforce."
>
> The Honourable John Manley – Convocation Address, June 18, 2015

With support from other sectors, research universities will lead initiatives to:

- increase experiential learning opportunities and high-quality paid internships for students;
- increase the number of university graduates, especially PhDs, and opportunities for post-doctoral fellowships, by making these opportunities more economically accessible for greater numbers of people, especially from under-represented communities;

- ensure PhD candidates continue to have clear, rewarding, academic and non-academic career paths;
- expand international joint programs and exchanges for faculty, students and professional staff to increase the number of Canadians with international experience and networks that can help initiate and grow international research collaborations and markets; and,
- expand the promotion of Canada to international students to help recruit the best and brightest from around the world to study here. While we hope these talented individuals will settle in Canada, the networks they forge and the understanding of Canada they gain will create valuable, long-term benefits for the Canadian economy even if they depart.

With support from research universities and others, we recommend that the federal government, working with the provinces, lead efforts to:

- build a comprehensive system of training, skills upgrading and life-long learning opportunities to ensure Canada's labour force is able to adapt to and exploit disruptive technologies and rapidly emerging opportunities;
- improve labour market information, so that students, parents, employees and employers can make more informed decisions about education, skills, recruiting, training and careers;
- ensure smooth transitions into the Canadian workplace and Canadian society for top-tier international scholars and graduate students by having a welcoming environment, responsive immigration policies and fewer barriers, such as visa restrictions; and
- create more opportunities to expand meaningful collaborations among top graduate students, PhD candidates and postdocs and the private, public and not-for-profit sectors through programs such as some of those Mitacs offers.

Sharpening the focus on research excellence

To make Canada the most innovative country in the world, we must sharpen our focus on investing in research excellence and areas of strength. Canada does not need, and cannot afford, to make every post-secondary institution a world-class research intensive university. Equally, we do not need and cannot afford to provide world-class trades training at every post-secondary institution. Canada needs a wide array of educational options, with every institution relentlessly pursuing world-class excellence in its unique niche.

Photo credit: Daniela Rossetto/Tanya Harrison, Western University

For research-intensive universities, that means a teaching and learning environment that is tightly integrated with research excellence. We must generate world-class, breakthrough discoveries and transformative ideas that open new avenues of research or build on the ground-breaking work of

others. As a result of the investments made to date, research at Canadian universities punches well above its weight by producing nearly five percent of the world's most frequently cited papers despite having only 0.5 percent of the world's population[2]. To move past our current successes and become the most innovative country in the world by 2030, research universities will lead efforts to:

- take full advantage of the Canada First Research Excellence Fund to generate globally significant research that builds Canada's reputation as a leading innovator in research excellence;
- continue to make strategic investments in world-class, innovative projects that can attract researchers from around the world and become the centre of public-private innovation clusters;
- prioritize creating a system of open access to data arising from publicly funded research to increase research transparency, efficiency and the velocity of new Canadian discoveries across all sectors;
- celebrate Canada's research internationally to ensure Canada's brand is a beacon for the world's top researchers;
- recognize and support discovery-driven research across all disciplines as intrinsically valuable and an essential building block for commercial innovation;
- ensure strong, autonomous leadership and governance at research-intensive universities; and,
- pursue a sustainable, highly differentiated post-secondary education system where the unique strengths, contributions and value propositions of different institutions and types of institutions provide Canadians with world-class options and employers with a diverse workforce.

Research universities would look to the federal government to lead initiatives to:

- adopt an "own-the-podium" approach to equipping our top researchers to compete and collaborate on equal footing with leading researchers in other countries, positioning Canada as the destination for top domestic and international researchers. This requires supporting top researchers at all stages of their career, and ensuring they have access to world-class research infrastructure and the resources necessary to make significant contributions to international collaborations;
- invest in digital research infrastructure so our researchers can take full advantage of opportunities emerging and evolving quickly as a result of game-changing technological tools like big data, cloud computing, mobile technology, and the Internet of Things;
- ensure the value of awards designed to attract and retain talented researchers (e.g. Canada Research Chairs) is sufficient to attract top international researchers and retain Canada's best and brightest; and,
- fund the foundational programs (Tri-Council, CFI) in a predictable, sustainable and indexed manner, to allow for highly strategic, long-term planning and investments.

[2] Canadian Council of the Academies, The State of Science and Technology in Canada, 2012

Leveraging knowledge and science through partnerships

For Canada to become the most innovative country in the world by 2030, we must do a better job at mobilizing knowledge through inter-organizational, inter-sectoral and international partnerships so it invigorates our economy and inspires society. While the highest-impact mobilization of knowledge occurs indirectly through the contributions that researchers and graduates make to their communities, colleagues, companies and the broader economy, Canada must also relentlessly and creatively pursue more direct or strategic approaches to leveraging our research investments. We must promote the growth of a thriving innovation ecosystem that includes private firms capable of commercializing university research and universities, with the capacity to both spin off new ventures from their own discoveries and fulfil the "market pull" research demands of industry.

Photo courtesy of the University of Waterloo

In addition to traditional approaches like intellectual property, publications or graduate- and researcher-founded start-up enterprises, Canada's investment in research and science can be leveraged to build stronger bilateral relationships, to amplify the impact of trade agreements, and to increase foreign direct investment. To mobilize and leverage Canada's investments in research, discovery and innovation fully, research university-led initiatives will:

- ensure that university processes, timelines, IP policies and technology transfer offices respond to the evolving needs of business, governmental, or non-profit research partners, to encourage more demand for university research;
- deepen business interactions with leading researchers by expanding university-affiliated research and innovation parks and commercialization hubs, to promote long-term business-university relationships and clear research commercialization paths;
- work with the private sector to develop a more comprehensive, symbiotic research partnership model that extends well beyond the fee-for-service paradigm;
- increase regular interaction among research universities and the private, public, and not-for-profit sectors to create greater opportunities for the exchange of ideas, discoveries, innovations and talented individuals; and,
- encourage international collaboration and mobility for researchers.

Research universities look to the federal government to lead initiatives to:

- promote Canada as a top international destination for companies to build cutting-edge R&D facilities and establish research partnerships with research-intensive universities;
- work with the provinces/territories, non-profit sector, and universities to find opportunities to develop deeper research partnerships among top researchers, governments and the non-profit sector; and,
- involve research universities as key stakeholders throughout trade agreement negotiations, building international research initiatives and incorporating research and innovation into future and renegotiated international trade agreements. This approach would foster increased researcher, student and faculty mobility and cross-border exchange of ideas, and could be incorporated into the next round of NAFTA negotiations, where Canada could propose the establishment of a pan-North American research council, similar to the European Research Council.

Strengthening the culture of innovation and entrepreneurship

Strengthening the culture of innovation in all aspects of Canadian society, including the academic, government, private and social sectors, is an essential precondition to unleashing researchers, policy makers, social entrepreneurs and the private sector. They must be encouraged to take risks, to learn from failure, and to generate the ideas, products, services, policies, jobs and opportunities that will engage and excite Canadians and our international partners. For innovation to be a long-term competitive advantage, we must ensure a passion for knowledge, discovery and innovation also energizes Canada's youth. To build a culture of innovation that will help make Canada the most innovative country in the world, research universities will lead initiatives to:

- increase the awareness of the value and impact of graduate education among prospective students, employers and the entire Canadian economy;
- work with governments to increase awareness of the discoveries made in Canada's labs and make them accessible to non-scientific audiences through community events, and outreach to print, broadcast and social media;
- encourage and support student, recent graduate- and faculty-led social and commercial enterprises to create fast-growing companies and to develop entrepreneurial and innovative talent for Canada's workforce; and,
- ensure strong linkages among campus based start-up incubators and angel investors.

Photo courtesy of the University of Calgary

Research universities will look to the federal government to:

- create a senior Cabinet ministerial position to streamline and champion science, technology and innovation policies and programs at the federal level and to coordinate innovation policy with provincial governments;
- create an arms-length Industrial Research and Innovation Council responsible for funding and delivering all of the federal government's business research, development and innovation programs, as per the Jenkins Report;
- foster increased business investment in innovation by addressing the reasons Canadian companies choose to adopt innovation or not (such as those identified in the Canadian Council of Academies' report, Innovation and Business Strategy: Why Canada Falls Short);
- launch a national "Canada Innovates" campaign that creates age-appropriate experiential opportunities for youth of all ages to explore new ideas, build critical and creative thinking skills, develop a love for science, and get youth thinking about a career in research, science and innovation, similar to the Actua and Let's Talk Science campaigns; and,
- work with the provinces to ensure our education system emphasizes numeracy, literacy, digital proficiency, and an appreciation of research, science and lifelong learning throughout primary, secondary and post-secondary education.

Photo courtesy of McGill University

CONCLUSION

Becoming the most innovative country in the world by 2030 is an ambitious goal, but one the U15 Group of Canadian Research Universities believes Canada should pursue. Our success will depend upon the willingness of governments, businesses, non-profit organizations and research universities to coalesce around a shared vision, to agree upon core principles and to work together to co-ordinate our activities. As a country, we have already done much of the analysis and identified many of the investments and activities necessary to develop a world-leading knowledge economy. Now it is time for all of us to act on this advice.

Strengthened recruitment of top international and domestic talent and ensuring these individuals are able to thrive in Canada will fuel the creation of exciting new ideas and discoveries. Strong partnerships and new ways to connect all sectors will ensure those ideas and discoveries spread, for the benefit of all. Deepening interaction among businesses and researchers, creating multiple pathways for research mobilization, and ensuring our research-intensive universities can continue to respond to the demand-pull of industry will help close Canada's business innovation gap and ensure ideas and discoveries create jobs in Canada.

Creating an even stronger culture of innovation that permeates all sectors of Canadian society and celebrates and disseminates Canadian ideas and discoveries will take commitment and leadership from all sectors. We are confident that if all of our partners take up this challenge for the next decade and a half, Canada will earn a global reputation as the most innovative country in the world.


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