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U15 submission

to

**Standing Committee on Finance
Pre-budget Consultations**

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Group of Canadian Research Universities

Regroupement des universités de recherche du Canada

Introduction

The U15 Group of Canadian Research Universities is pleased to respond to the Standing Committee on Finance's pre-budget consultation. We would first like to thank the federal government for the creation of the Canada First Research Excellence Fund (CFREF) in Budget 2014. By focusing CFREF on world-class research excellence, this important program will help research universities increase our contributions to Canada and the Canadian economy despite increasing global competition.

While research universities make many important contributions to Canada, which we would be pleased to discuss during the Committee's hearings, this submission will respond to the "increasing the competitiveness of Canadian businesses through research, development, innovation and commercialization" topic. Specifically, we will focus on research-intensive universities' current contributions and additional opportunities to:

- a. increase competitiveness through knowledge mobilization;
- b. increase the global reach of Canadian business; and
- c. build new national, digital competitive advantages.

When considering the economic contributions of university research, it is important to examine both the short-term impact of applied research and the long-term impact of discovery-driven research. In a knowledge-based economy, discovery-driven research opens new frontiers of opportunity while applied research is essential to realize those opportunities. In 1980, the idea of quantum computing was first proposed; in the early 1970s, scientists were just discovering how map the genome of bacterial viruses. These formerly theoretical discoveries, along with countless others in all areas of research, are having profound and increasing economic and social impact across the globe.

During the 2015 pre-budget consultations, the Committee will also hear proposals from other organizations about ways to strengthen Canada's research ecosystem, many of which the U15 supports.

The Essential Foundation of Research Excellence in Canada

Central to any discussion of research, development, innovation and commercialization in Canada, is understanding the critical role the federal government plays in supporting the full spectrum of discovery and applied research and in training highly qualified people. Our comprehensive system of research granting councils, the Canada Foundation for Innovation (CFI) and other agencies provide us with a strong foundation on which to build. That foundation depends upon sustained funding for four critical elements: the tools and equipment that support research; grants to researchers; access to essential digital tools; and the indirect costs of research. In the excitement generated by CFREF, we must remember that Canada's granting councils and CFI require sustained, predictable investments to maintain this indispensable foundation for research excellence.

Increasing business competitiveness through knowledge mobilization

The Need

With global competition in all sectors increasingly occurring on the basis of knowledge and innovation, it is critical for Canada's innovation ecosystem to become even more dynamic. Strengthening Canada's innovative capacity requires world-class human capital, research and development (R&D), and commercialization.

While Canada has much to be proud of in these areas, significant challenges remain, such as inadequate business investment in R&D and a lower percentage of our population with university degrees than the percentage in the United States, the United Kingdom, Israel, and Korea¹.

Programs such as NSERC's industrial partnerships, the Canada Accelerator and Incubator Program, and Mitacs make important contributions to mobilizing knowledge from research-intensive universities into the broader economy.

How research-intensive universities help build business competitiveness

Human capital – Research-intensive universities' biggest contribution to Canada's innovation ecosystem and to knowledge mobilization is the development of a talented and innovative workforce. For example:

- U15 institutions alone graduate more than 110,000 people annually²;
- more than half of Canada's Masters and more than 75 percent of PhDs graduate from U15 universities³; and
- between May 2008 and May 2014, almost 900,000 net new jobs were created for university graduates.⁴

R&D – Businesses turn to research-intensive universities to help them develop new products and services through faculty consulting, the use of the state-of-the-art facilities available on campus and contract research. U15 institutions conduct more than 80 percent of private-sector contracted university research⁵.

Commercialization – In addition to contracted research, universities are heavily involved in commercialization. U15 institutions:

- were issued 94 percent of university US patents⁶;
- created 82 percent of university spin-offs⁷;

¹ OECD, Education Indicators at a Glance 2013. P 35.

² U15 Data

³ U15 Data; Statistics Canada. Table 477-0034

⁴ AUCC, Back to School Quick Facts 2014

⁵ CAUBO, Financial Information of Universities and Colleges 2012-13

⁶ AUTM, Canadian Licensing Activity Survey FY2012. Published 2014.

www.autm.net/FY2012_Licensing_Activity_Survey/12357.htm

⁷ Ibid

- hold almost 2900 active technology licences⁸; and
- build significant entrepreneurship supports to help students and recent graduates mobilize the knowledge and networks they develop during their studies.

Opportunities for Canada

For Canadian businesses to benefit from knowledge mobilization, we must ensure that Canada continues to be a world leader in the highly competitive pursuit of research excellence. If we fall behind in this race, the talent, R&D and discoveries available to Canadian businesses will diminish. Canada’s research excellence strength allows Canada to increase business competitiveness by:

- working with university-based start-up incubators and accelerators to identify and share best practices that encourage graduate entrepreneurship and help new firms achieve profitability. In addition, increased investment in accelerators and incubators could create a significant economic return.
- investing in trials of new, progressive approaches to IP commercialization, such as those being implemented by some U15 institutions, in order to identify best practices and improve outcomes.
- supporting Mitacs and similar programs, as well as in-program internship and experiential learning opportunities for students in all disciplines.

Increase the global reach of Canadian business

The Need

As a trading nation, Canada needs to ensure our businesses continue to have access to a world-class workforce that can help companies enter, compete and grow in global markets. Our brand as a knowledge-based economy helps open doors internationally, but to succeed in those markets, businesses need employees with the right knowledge and networks to support doing business around the globe. Unsurprisingly, an OECD study found that lack of contacts and knowledge were major barriers to internationalization among SMEs⁹.

How research-intensive universities help build business competitiveness

Building networks and strengthening Canada’s knowledge brand – Research-intensive universities develop rich international networks of students, alumni, faculty, researchers and institutions, through research collaborations and partnerships and through student, faculty and researcher mobility. For example:

⁸ Ibid

⁹ OECD, “Top Barriers and Drivers to SME Internationalisation”, Report by the OECD Working Party on SMEs and Entrepreneurship, OECD.

- In 2012, U15 institutions welcomed more than 70,000 international students from over 200 countries¹⁰.
- U15 institutions' extensive international research collaborations and partnerships create and strengthen networks at the individual, institutional, and national level.
- U15 members receive more than \$110 million annually in grants and contracts from international governments¹¹¹².

These global networks and the export of research services strengthens and spreads Canada's brand as a leading knowledge economy and can create channels for Canadian businesses to take their products and services into new markets.

Developing talent with an international perspective – In addition to building international networks, U15 institutions help equip Canada's workforce with:

- a global perspective students develop through courses and interactions with international faculty, researchers and other students; and
- international experience that students develop through opportunities to research and study abroad, research collaborations and partnerships, and faculty and researcher mobility.

These international collaborations, networks and experiences help build the workforce that Canada's businesses need to compete internationally.

Opportunities for Canada

Central to providing businesses with this essential competitive asset is Canada's continued support for research excellence. World-class research excellence is what allows U15 institutions to create these critical international networks and opportunities. To capitalize on these national assets and help Canadian businesses compete, the government could:

- advance initiatives announced in *Canada's International Education Strategy* and contained in *International Education: A Key Driver of Canada's Future Prosperity*.
- encourage more Canadian students to complete some of their studies and/or research internationally, to strengthen networks and Canada's brand. This could include tapping into programs other countries create and fund.
- ensure Canada's current and future immigration policies (e.g. the Temporary Foreign Workers and the Express Entry programs) are responsive to the unique requirements for recruiting top international talent and achieving the objectives laid out in the International Education Strategy.

¹⁰ U15 Data

¹¹ CAUBO, Financial Information of Universities and Colleges 2012-13

¹² This includes grants and contracts from international granting agencies.

Build new national, digital competitive advantages

The Need

Canada is now fully immersed in the digital age with data and computationally intensive applications such as simulations, real-time analytics, text-mining and geographic information systems revolutionizing every aspect of research, business and society. Participating is no longer a luxury; we must develop a strong sense of urgency about building digitally based competitive advantages.

Building digitally based advantages requires more than simply increasing Canada's supply of ICT workers. It requires building a workforce where individuals have subject-matter expertise and the ability to leverage cutting-edge technology from both technical and strategic perspectives.

Canada has real challenges with regards to our ICT infrastructure and business investment. For example:

- Canada's fastest computer is currently ranked 109th in the world with 16 other countries having faster computers¹³.
- The Conference Board of Canada found that Canada's ICT investment¹⁴¹⁵ is below average and ranks 8th out of 15 peer countries.
- About 30 percent of Canadian businesses cite "lack of technical expertise and skilled personnel in-house" as a barrier to further integrating ICT¹⁶

The government's *Digital Canada 150* strategy, the granting councils, CFI, CANARIE, Compute Canada, the Leadership Council and many others have made or proposed important investments in digital tools that would help Canadian businesses compete.

How research-intensive universities help build business competitiveness

Digital Tools – University-based research is pushing the frontier of big data and high performance computing. This is creating new tools, methods and opportunities for Canadian businesses, such as the Southern Ontario Smart Computing Innovation Platform (SOSCIP), a research consortium two U15 institutions lead that features Canada's fastest super computer. SMEs are project partners on over half of the projects at SOSCIP¹⁷.

Reusable Data – Publicly funded university research creates a wealth of data that, with some improvements in Canada's digital infrastructure and policy framework, would

¹³ Top500.org, June 2014 list - <http://top500.org/list/2014/06/>

¹⁴ Conference Board of Canada, "How Canada Performs: ICT Investment", www.conferenceboard.ca/hcp/details/innovation/ict.aspx

¹⁵ .As measured by as a percentage of non-residential gross fixed capital formation.

¹⁶ Statistics Canada, CANSIM Table 358-0232

¹⁷ SOSCIP, "Smart Computing for Innovation: 2014 Impact Report"

provide businesses with exciting opportunities to accelerate the creation of new products and services and improve existing ones.

Talent Development – Universities provide an ideal place to ensure the Canadian workforce has a “Discipline + Digital” talent set. By ensuring that Canadian students at all levels and in all disciplines use state-of-the-art digital tools throughout their studies, all sectors of the Canadian economy will benefit by gaining access to employees who can leverage technology from technical and strategic perspectives.

Opportunities for Canada

To help Canadian businesses capitalize on research excellence to build digitally based competitive advantages, the government could:

- address the identified gaps in Canada’s digital infrastructure (e.g. the supply of HQP, high performance computing and networking, digital scholarship and research data storage and sharing) to provide researchers, governments, non-profits and the private sector with a critical productivity boost.
- work with provinces to set a national sesquicentennial goal that all Canadian students and researchers at public post-secondary institutions have access to state-of-the-art digital technology as a regular part of their studies and a powerful enabler of their research. This will help ensure Canada is equipped with the kind of highly qualified personnel that all private, non-profit and governmental sectors will require.

Conclusion

We thank the Committee for this opportunity to highlight the ways that research-intensive universities increase the competitiveness of Canadian businesses and to expand on some opportunities for an even greater impact over the longer-term. While this submission focused on only one of the Committee’s topics, we would be happy to discuss, during the Committee’s hearings, the full range of economic and societal contributions and opportunities strong research-intensive universities create.

Reflecting the cultural and intellectual breadth of our nation, Canada’s 15 research-intensive universities bring distinguished minds to bear on the most profound challenges our nation and our world face. Our institutions undertake 80 percent of all competitive university research in Canada, rank among the world’s premier institutions, and represent a research enterprise valued at more than \$5.3 billion annually.