Canadian Light Source Submission
to the House of Commons Standing Committee on Finance
Priorities for the 2015 Federal Budget
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Executive Summary

Continued investments in internationally competitive and state-of-the-art scientific infrastructure and highly qualified people will ensure that Canada remains a global leader in innovation.

Big Science investments help to train the next generation of highly qualified people, provide access to advanced research and development capacity for industry, and ultimately create jobs and prosperity through the commercialization of new products, techniques, processes, and services.

Therefore, the Government of Canada should continue to invest in science and technology.

The Canadian Light Source

The Canadian Light Source (CLS) is one of the country's key engines of innovation and discovery for industrial and academic research. Research performed at the CLS has a direct impact on Canada's competitiveness in strategic areas as environmental science and technology, energy and natural resources, and health and life sciences.

Industrial usage has averaged around 10 percent, the highest of any synchrotron in the world and almost twice as much as the next most-used facility.

The CLS is the top-rated research facility cited by Canadian S&T experts in the 2012 Council for Canadian Academies Report on the State of S&T in Canada (page 131).

Since welcoming its first user in 2005, the CLS has:

- Hosted more than 2,700 researchers from academic institutions, government, and industry, resulting in more than 1,000 peer-reviewed scientific publications
- Serviced over 50 industry clients and partners, resulting in more than 200 fee-for-service and collaborative projects with industry
- Led development of a particle accelerator-based method of producing medical isotopes used for tagging radiopharmaceuticals that will meet the needs of Saskatchewan and Manitoba
- Attracted top research talent to Canada, including numerous Canada Research Chairs to universities across the country

Recent scientific discoveries include:

- **Health:** Mapped the structure of RNA for the first time, identified effects of mercury on human vision, identified ways to control C. difficile hospital infections, and conducted innovative science on cancer, heart disease, and medical imaging
- **Natural resources**: Developed better crops, improved mine tailings and diamond deposits research, and improved oil sands extraction methods
- **Advanced materials**: Developed better airplane components

- **New technologies**: Determined ways to build cheaper and more efficient fuel cells, identified innovative techniques that could affect how all the world's synchrotrons operate

What CLS does for Canadian industry:

- Enables the translation of ideas into products to grow Canadian companies
- Creates scientific capacity for Canadian SMEs and multi-national companies by building partnerships to conduct leading-edge research and development
- Provides Canada with a unique opportunity to develop novel technologies in many different industry sectors

A recent economic impact study found:

- CLS operations directly contributed almost $90 million to Canadian GDP—for every dollar of operating funding, CLS operations contributed three to the Canadian economy
- CLS operating funds spent in Saskatchewan generated more than $33 million in GDP for the province.

Supporting families and helping vulnerable Canadians by focusing on health, education and training

A robust and vibrant basic research environment will make Canadian universities and research institutes attractive to the best and the brightest scientists, engineers and technicians in the world. The Canada Research Chair Program has been very successful in advancing this goal.

In addition, a number of visionary federal government investments have greatly improved Canada's research infrastructure, i.e. the creation of the Canada Foundation for Innovation has contributed to the establishment of world-leading research infrastructure. One of the essential requirements to attract leading scientific and engineering talent is access to state-of-the-art research and development infrastructure, such as the Canadian Light Source. In our view, it is imperative to ensure their long-term sustainability as a magnet for international talent and as an anchor for domestic expertise.

Given the competition for world-leading research talent, it may be appropriate to consider a specialized immigration initiative for highly skilled scientific and engineering personnel. Such a dedicated stream exists for academic appointments, but not for scientific staff at national research facilities. Additionally, by facilitating entry to Canada for graduate and post-doctoral students, talented young people would be encouraged to stay in Canada.

Increasing the competiveness of Canadian businesses through research, development, innovation and commercialization

Research and development investments are essential to the generation of new ideas, technologies and products that enable Canadian industry to capture and hold world-leading market leadership. The government has an important role in the innovation cycle by sharing the cost and distributing the risk of research and development, particularly at a time when financial resources from private sector and academic sources are constrained. By supporting government / industry / academia partnerships, the government can leverage current and future investments and broaden collaborations along the value chain.

It may be appropriate to consider further expansion of programs like IRAP – both in terms of available funding to enable technology development and its transfer to the private sector. This could well extend the benefits of technology partnership programs to more businesses, enhance opportunities to create additional SMEs focused on innovation and further facilitate access to Canada's research infrastructure. The eligibility criteria for Industry Canada's flagship R&D partnership program, the Strategic Aerospace and Defence Initiative (SADI), could be broadened to again include "Enabling Technologies", which would accommodate new investments in research and innovation across the Canadian economy. Also, the Industrial and Regional Benefits Program (IRBs) could be more directly targeted to encourage innovation by requiring that a minimum proportion of IRB commitments be specifically directed at research and development initiatives undertaken through industry / public research consortia.

Canada should work towards becoming a leader in R&D investments, both through funding projects, industry-academic collaborations, as well as building and maintaining world-class scientific infrastructure. An important component of innovation is so-called "Big Science" infrastructure, which cannot be borne by a single institution or entity. These large institutional investments can enhance the future competitiveness and innovative capacity of home-grown industries and broaden opportunities for international collaboration and market presence.

Other mechanisms that could incentivize industry-academic collaborations include further increases to the multipliers applied through the Industrial and Regional Benefits (IRB) policy, an expansion of relevant tax incentives and the creation or expansion of entities such as Mitacs (http://www.mitacs.ca/), CRIAQ (http://www.creaq.org/) or Auto21 (https://www.auto21.ca/en/) – all of which have had a positive impact solving industrial challenges collaboratively with academia and national laboratories.

Building academia-business sector consortia around large national science infrastructure would also help leverage the investments made in this important national infrastructure. These facilities, like the Canadian Light Source (CLS), play an increasingly important role in technology transfer and collaboration. They have become a melting pot for industry, government and academic research ideas and innovation - a place where shared knowledge can converge, be challenged and advanced.

Ultimately, industrial research can be greatly enhanced through exposure to a robust academic research environment. The skills, the equipment and research focus of academic endeavor is often what attracts industry to a community, and entities like CLS can facilitate and enable productive interactions between industry and academia.

Maximizing the number and types of jobs for Canadians.

The commercialization of knowledge has long been identified as an area for additional government attention. It is often very difficult in Canada for start-ups to get funding due to limited availability of venture capital. The government has taken some important steps already to provide more support to entrepreneurs, and to enhance overall awareness of the available mechanisms of support. Additional investment in this area will further contribute to the transfer of knowledge and opportunity from academic settings to the market.

It is important for the private sector to do its own R&D, but industry needs access to emerging technologies coming out of our public institutions to remain competitive. Government incentives for

companies to collaborate with public research institutions would increase business R&D activity and contribute to commercialization opportunities.

One of the most significant impediments to business-university partnership is the cultural chasm that exists between academia's focus on public disclosure of research and industry's emphasis on protecting the outputs of research and development for market exploitation. Industry-academia partnership would be greatly improved through the adoption of more flexible Intellectual Property policies and procedures that would seamlessly address both requirements. Again, collaborative entities like Mitacs, CRIAQ and Auto21 can help to bridge this gap.

It is also important to encourage, wherever possible, the integration of science and business skills at Canadian Universities to facilitate the transition of young graduates into the work environment. Often, many entrepreneurial scientists will try to commercialize technologies and products in the absence of channels to the private sector. Industry / academia collaboration can provide opportunities for interaction at an under-graduate level that can translate into both research and innovation cooperation and, over time, to commercial success.

Ensuring prosperous and secure communities, including through support for infrastructure

It's very important to leverage existing investments. As an example, large capital investments have been made in Canada's leading edge national science facilities, and this has been recognized and addressed through the design of a dedicated system to fund their long-term operations.

Unquestionably, ensuring the long term sustainability of these facilities is key to Canada retaining its status as a world leader in discovery-driven research. Equally important is to continue to reinvest in capital infrastructure so that these facilities remain state-of-the-art.

The Government of Canada's suite of programs designed to best support research excellence should include funding to address capital needs and upgrades, as well as long term, secure, and robust operating funding for national research facilities like the CLS.

Funding programs like IRAP and SADI are examples of efforts that have been successful in bridging gaps between public research and private commercialization. Expanding these and other programs would encourage partnerships with provincial programs and further extend benefits to business, enhance the creation of SMEs, and facilitate their access to Canada's research infrastructure.

The Industrial and Regional Benefit program (IRB) could also be modified to play a larger role in encouraging innovation, by requiring a portion of the IRB funds to be specifically directed at research and development through industry/public research partnerships. This would encourage IRB obligors to invest in innovation, thereby further supporting the future competitiveness of Canadian businesses and research institutions.

The Scientific Research and Experimental Development **(**SR&ED), is an important vehicle to encourage private sector investment in R&D. A simplification of the qualifying criteria for access to SRED should result in more widespread use of these incentives.

Lastly, recent government grants have included intellectual property policy requirements which are difficult to administer. Intellectual property is often built upon myriad sources, making the traceability of

associated original funding extremely difficult to identify. It would likely be a better long term investment to allow IP and related profits associated with government grants to be spun out into the private sector.

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