



House of Commons Standing Committee on Finance – Pre-budget Consultations 2013

This brief is submitted by:

Institute for Quantum Computing

an organization

Organization name: \_\_\_\_\_

or

an individual

Name: \_\_\_\_\_

Topic: Innovation and commercialization



**\*Recommendation 1: Please provide a short summary of your recommendation.**

The Institute for Quantum Computing (IQC) requests renewed support from the Government of Canada in Canada's Economic Action Plan 2014 at an investment similar to the one provided in 2009. A renewed commitment of \$55.5 million over 7 years will continue to allow IQC to attract the best and the brightest researchers in the field of quantum information science and to continue to be the heart of Canada's Quantum Valley where the birth of game changing technologies are spawning an entirely new industry - quantum information technology.

**Expected cost or savings:** From the pull-down menus, please indicate the expected cost or savings of your recommendation to the federal government and the period of time to which the expected cost or savings is related.

\$10 million-\$99.9 million



5 or more years



**Federal funding:** Please provide a precise indication of how the federal government could fund your recommendation. For example, indicate what federal spending should be reallocated, what federal tax measure(s) should be introduced, eliminated or changed, etc.

In Budget 2009, the Government of Canada invested \$50 million over 5 years in IQC. The province of Ontario also invested at a similar level. Renewed federal (and anticipated provincial) funding will enable IQC to continue to build a world-leading centre for research and innovation. IQC leveraged the funding it received from the federal government with over \$100 million in private sector capital. A further \$100 million commitment to commercialization by IQC's original benefactors was recently announced - bringing over \$200 million in planned investments to the quantum sector in Waterloo Region.

**Intended beneficiaries:** Please indicate the groups of individuals, the sector(s) and/or the regions that would benefit by implementation of your recommendation.

- Individual Canadians: new quantum devices and sensors promise transformational efficiencies in areas such as personal medicine, resource exploration and information security.  
- Industry and security establishments: ultra-secure communication infrastructure including a new global satellite-based quantum transmission network.  
- Industry: a general-purpose quantum computer to develop a new generation of materials for construction, drug design and energy transportation.  
- Waterloo Region: Canadian leadership in a strategically important emerging field

**General impacts:** Depending on the nature of your recommendation, please indicate how the standard of living of Canadians would be improved, jobs would be created, people would be trained, etc.

The initial funding provided to IQC in 2009 helped establish Waterloo as a world-class centre for research in quantum technologies and its applications. The result: IQC is a magnet for highly qualified personnel in the field and among the world leaders in quantum information research. According to David Wineland, 2012 Nobel Laureate in Physics, and many others, IQC's infrastructure is unparalleled globally. IQC's goals for 2014-2021 are to continue to be a world leader in this field and the first to build a comprehensive innovation ecosystem in quantum information technologies.

**Topic:** Please select from the pull-down menu

**Recommendation 2: Please provide a short summary of your recommendation.**

**Expected cost or savings:** From the pull-down menus, please indicate the expected cost or savings of your recommendation to the federal government and the period of time to which the expected cost or savings is related.

Please select from the drop down menu

Please select from the drop down menu

**Federal funding:** Please provide a precise indication of how the federal government could fund your recommendation. For example, indicate what federal spending should be reallocated, what federal tax measure(s) should be introduced, eliminated or changed, etc.

**Intended beneficiaries:** Please indicate the groups of individuals, the sector(s) and/or the regions that would benefit by implementation of your recommendation.

**General impacts:** Depending on the nature of your recommendation, please indicate how the standard of living of Canadians would be improved, jobs would be created, people would be trained, etc.

**Topic:** Please select from the pull-down menu

**Recommendation 3: Please provide a short summary of your recommendation.**

**Expected cost or savings:** From the pull-down menus, please indicate the expected cost or savings of your recommendation to the federal government and the period of time to which the expected cost or savings is related.

Please select from the drop down menu

Please select from the drop down menu

**Federal funding:** Please provide a precise indication of how the federal government could fund your recommendation. For example, indicate what federal spending should be reallocated, what federal tax measure(s) should be introduced, eliminated or changed, etc.

**Intended beneficiaries:** Please indicate the groups of individuals, the sector(s) and/or the regions that would benefit by implementation of your recommendation.

**General impacts:** Depending on the nature of your recommendation, please indicate how the standard of living of Canadians would be improved, jobs would be created, people would be trained, etc.

Please use this page if you wish to provide more explanation about your recommendation(s).

IQC was established by the University of Waterloo in 2002 with funding from the Canada Foundation for Innovation, the Ontario Innovation Trust and from Mike and Ophelia Lazaridis. The Lazaridis family's support for the institute has amounted to over \$100 million since inception. The Province of Ontario also invested \$68 million. Successful public-private partnerships have leveraged federal funding by more than 3 to 1.

With this investment, and in just a short 10 years, IQC has become a world leader in the field of quantum information research, a magnet for highly qualified personnel in the field of quantum information and a place for global collaboration and innovation. The world's leading researchers choose IQC as a place to conduct research, embark on significant discoveries and commercialize new technologies. IQC has a strong track record and has achieved outstanding results with significant discoveries being made by faculty members and published in the most prestigious journals in the world.

#### IQC Vision

Throughout history, society has been continually transformed by humankind's curiosity and ability to control the world around us. We have seen the industrial revolution driven by controlling steam, the information revolution by controlling electromagnetism. Now we aim to control the quantum world - the fundamental building blocks of nature - to drive the quantum revolution.

Quantum information research will harness these building blocks for tremendous innovation in information technology, sensing and beyond. The quest for a general purpose quantum computer, a computer that can tackle the most difficult problems otherwise intractable with today's technology, has led us to discover additional uses for quantum information technology. Quantum sensors and devices promise unparalleled precision, accuracy, selectivity and robustness. These quantum devices will have important impacts in areas such as health care, communications systems, resource discovery and information security.

IQC was created to take advantage of an extraordinary opportunity - an opportunity to yet again harness the world around us for the betterment of society. We have already seen incredible impact in the discoveries and innovations leading from quantum research. A renewed commitment from the Government of Canada of \$55.5 million over 7 years will allow IQC to continue this significant trajectory, to build on its success and continue to lead the field of quantum information research.

\*Please note that at least one recommendation must be provided

