

# Submission to the Standing Committee on Finance of the House of Commons Parliament of Canada

## EXECUTIVE SUMMARY

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Innovation is at the heart of the elements that will allow Canada to stand out on the international stage and increase its capacity for growth.

- The direction to clearly support applied research to rapidly commercialize innovation, is crucial and should be continued and accelerated. When compared to the United States, Business enterprise R&D spending continue to lag in Canada. According to the [Institute for Competitiveness & Prosperity Report](#), the provinces that do the most R&D, Ontario and Quebec, trail leading states like California and Massachusetts by a large margin;

The National Optics Institute (INO), through its positioning on the innovation chain (see Annex 1), has been making commercialization a priority since its creation, 29 years ago. The attached roadmap shows our results (see Annex 2).

This positioning is characterized upstream through collaborations with organizations working in basic research and downstream by dozens of weekly meetings with industry. Based on the inputs received, INO develops expertise, platforms and intellectual property that allow it to carry out technology transfers and sign agreements with businesses to improve their competitive positioning. Some of these transfers have also been to start-ups: over the course of 29 years, INO has contributed to the creation of 32 new businesses that count now more than 2,000 well-paid jobs in Canada. In addition, INO has completed more than 6,000 contracts and transferred more than 69 technologies to existing companies.

In its 2016-2017 budget, the Government of Canada renewed INO's financing base and has underlined its success in supporting business innovation through optics and photonics. *"The National Optics Institute [...] provides research and development support and technical assistance to businesses in the areas of optics and photonics. With applications as diverse as manufacturing, biomedicine, the life sciences, defence and aerospace, the Institute is helping Canadian companies to enhance their competitiveness and reach out to new markets."*

Because of this success, the federal government has financially supported INO since its beginnings. Moreover, in the recent years, INO has been in talks with the Government of Canada to increase its scientific presence in Ontario and Western Canada in advanced fields in these provinces' industrial ecosystems such as advanced manufacturing, biomedical and clean tech. This strategy aims to serve more clients and interact with them more proactively and effectively. This move will also allow INO to interact rapidly with the

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<sup>1</sup>Budget 2016, Chapter 2 - Growth for the Middle Class, <http://www.budget.gc.ca/2016/docs/plan/ch2-en.html>

deployment of the supercluster chosen by the Canadian government which should be announced in December 2017.

Furthermore, INO is a leader in optics and photonics, which has applications in all sectors of the economy. This field receives a solid financial support in all industrialized countries and a majority of emerging economies. INO also has the potential to create an "innovation hub" in Canada such as the Silicon Valley and Boston. INO's approach is in some ways similar to the Fraunhofer Society in the German network of government-backed research institutes that have helped make Germany one of the leading exporters of high-tech manufactured goods, despite the country's relatively high wages and high levels of regulation. In the U.S., major investments were made recently in the optics and photonics field. A research centre, based on INO's model, was launched in October 2016, in the city of Rochester, New York, with an investment of \$615 million. This centre will mainly work on technologies to improve advanced manufacturing and defence. We need Canada to take similar action in order to remain a world leader in the optics-photonics field.

Therefore, to increase the competitiveness of Canadian businesses by commercializing innovation more rapidly, we recommend:

To finance INO's Canadian expansion plan in order to double the number of clients having access to key enabling platforms such as shown on Annex 3. This move will also allow to link INO's expertise to the deployment of superclusters activities foreseen to start at the beginning of 2018. This expansion plan will require 27 million dollars worth of investment from the federal government over the next five years.

## SUGGESTED PRIORITIES FOR THE FEDERAL BUDGET

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On behalf of the Board of Directors of INO, I am pleased to share our comments as part of the 2017 federal budget consultations. Please find attached a summary of our history and achievements.

Our comments will focus on "increasing the competitiveness of Canadian businesses through research, development, innovation and commercialization."

We feel it is important to first define innovation.

Innovation comes from the development of new knowledge or technologies that, when integrated by an industrial organization, create a more competitive positioning of products commercialized by the organization or operational efficiencies that make it more competitive.

Our positioning on the innovation chain is between universities and/or basic research centres and industry. On the one hand, we have collaborative agreements with stakeholders in basic research and try to influence their choice of projects so that they respond to advances that ultimately serve industry. On the other hand, we meet with dozens of industry players each week that present their needs to us to improve their competitive positioning (see Annex 1).

Our positioning is exactly where the Americans call the "Valley of Death" because it is very difficult for organizations like universities to carry out both their primary goal to provide education and their role to serve industry. In general, university researchers want to be published in order to be recognized by their peers.

Based on upstream and downstream information, we start expertise and platform development projects that relate directly to the needs of Canadian industry. These projects are supported by an intellectual property strategy that ultimately ensures our industrial client competitive exclusivity. Moreover, because the intellectual property belongs to INO, technology transfers can be done easily and rapidly.

It is therefore crucial for Canada to have organizations such as INO that can rapidly commercialize innovation.

The three recent case stories that follow illustrate the results of our actions.

### FlyScan, an Entrepreneur in Residence's Success

FlyScan Systems is the fruit of INO's Entrepreneur-in-Residence program, an initiative established with the City of Quebec, in collaboration with Angers Quebec. Coordinated by INO, this program gives entrepreneurs a better chance of successfully establishing new businesses derived from optics or photonics research and to help them go through the period known as the "Valley of Death".

Founded by Eric Bergeron, the entrepreneur behind the success of OptoSecurity, this business will offer remote detection services to detect oil leaks in underground pipelines. The systems that FlyScan will offer are based on a lidar benzene detection system developed at INO. It will be mounted on an airborne vehicle, that will fly over a pipeline, will be able to locate leaks that are currently undetectable with existing technology. This will enable pipeline operators to take swift action and avoid environmental damages.

## SwiftSure,INO's First Spin-off in Western Canada

With the Swiftsure Spatial Systems launch, its first spin-off in British Columbia, INO sets foot in Western Canada, asserting its position as Canada's leader in optics/photonics. Through complex signal data processing, Swiftsure develops imagery solutions for detection, recognition, surveillance and decision-making. The optronic computing technology developed by INO reduces the systems' complexity and the associated processing time. Swiftsure can therefore offer advanced remote sensing capacities for terrestrial, air, marine and space environment.

## NanoRetina: Light Delivery System for Retinal Implant

To address retinal degenerative diseases, such as age-related macular degeneration, INO's client, Nano Retina, has developed a revolutionary product: an artificial retina that mimics the functionality of photoreceptor cells and translates electric impulses through the functional retinal layer to the optic nerve. In partnership with Nano Retina, INO developed a custom infrared light delivery system that can supply power and optical communication to the eye implant with both certainty and adjustability over a very large range of anthropometric variations while accommodating large relative eye motions in the patient. Intelligent optical design of this light delivery system allows optimal and robust clinical assessment and system optimization post implantation.

INO is leading the way in a relatively new science, optics and photonics, which uses the properties of light and turns them into innovation. It is a transverse science that now has applications in all economic sectors. The development of lasers and fibre optics, in particular, has revolutionized many areas, including telecommunications and medicine.

29 years ago, INO was a global pioneer in developing this science. Canada, Quebec, and particularly the Quebec City region are now seen by the international scientific community as world leaders in this field.

However, all industrialized countries and most emerging countries are now investing huge sums in this area.

For example, the United States has identified optics and photonics as a key technology for the nation in supporting the following areas: information technology, advanced manufacturing, defence and security, health care and energy. The recent investment of 615 million dollars in a research centre in Rochester testifies to this country's desire to become a leader in the field.

Despite Canada's efforts across several programs, we believe it is urgent that Canada gives its support and financial assistance to this science in a clear, systematic way that is tied directly to Canadian priorities. At the same time, and given its past successes and positioning on the innovation chain that directly reflect the recommendations of the Jenkins report, we believe that INO should be the national standard-bearer to maximize synergies and optimize results. It is for that reason that in its 2016-17 budget, the Government of Canada has underlined the success of INO in supporting business innovation through optics and photonics and renewed its financing base. *"The National Optics Institute [...] provides research and development support and technical assistance to businesses in the areas of optics and photonics. With applications as diverse as manufacturing, biomedicine, the life sciences, defence and aerospace, the Institute is helping Canadian companies to enhance their competitiveness and reach out to new markets."*

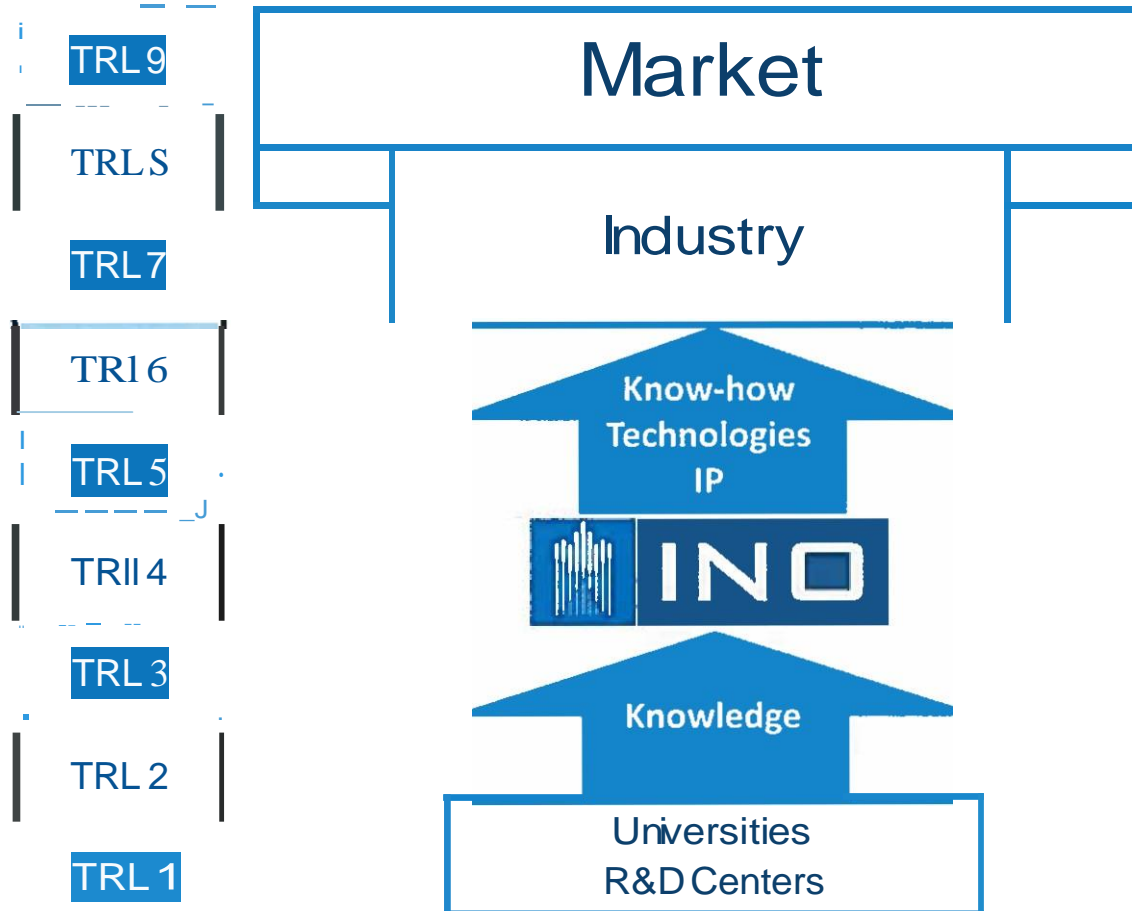
To this end, we have held talks over several months with the federal government to intensify, through its possible support, our scientific presence in Ontario and Western Canada. With this strategy, we strongly believe we will be able to serve more clients and interact with them more proactively and effectively (see Annex 3). This move will also allow JNO to interact rapidly with the deployment of the supercluster chosen by the Canadian government.

Therefore, to increase the competitiveness of Canadian businesses by commercializing innovation more rapidly, we recommend:

To finance INO's Canadian expansion plan in order to double the number of clients having access to key enabling platforms such as shown on Annex 3. This move will also allow to link INO's expertise to the deployment of superclusters activities foreseen to start in 2018. This expansion plan will require 27 million dollars worth of investment from the federal government over the next five years.

MARCCORRIVEAU, CA, CMA, MSc  
President & CEO  
July 28, 2017

# Annex 1: Business Model and Value Proposition



## Annex 2: What is INO

- A technologization with a complete range or integrated services in all fields of optics/photonics
- The largest concentration of skills in the field in Canada
- Clients of all size across Canada and around the world

### Key facts:

- 200 employees
- \$38M annual revenues

### Locations:

- Quebec City (HO)
- Hamilton ON



### Financing of INO's In-House Research Program since its inception:

- 50% Federal
- 50% Provincial

Because of its legal status, INO does not have access to any other government financing program available to research centres and universities nor to tax credits available to high tech firms.

**>50%**

Revenues from  
the industry

**6,000**

R&D  
contracts

**259**

Patents  
(83 pending)

**69**

Technology  
transfers

**32**

Spin-offs

# Annex 3: A Nation Wide Reach



## Providing access to innovation

Symbiosis with the local ecosystem  
Develop strong customer intimacy

## Customers base to build on



INO is working with Inuktun Inc. to develop an improved camera to be mounted on underwater drones for pipe inspections.

## Targeted application fields

### Biomedical Photonics

Biomedical integration  
Diagnostic tools (point-of-care)  
Endoscope

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### Photonics for industry 4.0

Quality control  
Advanced manufacturing  
Advanced robotics

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### Photonics for cleantech

Environmental monitoring  
Utilities management  
Smart lighting  
LED/OLEO

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