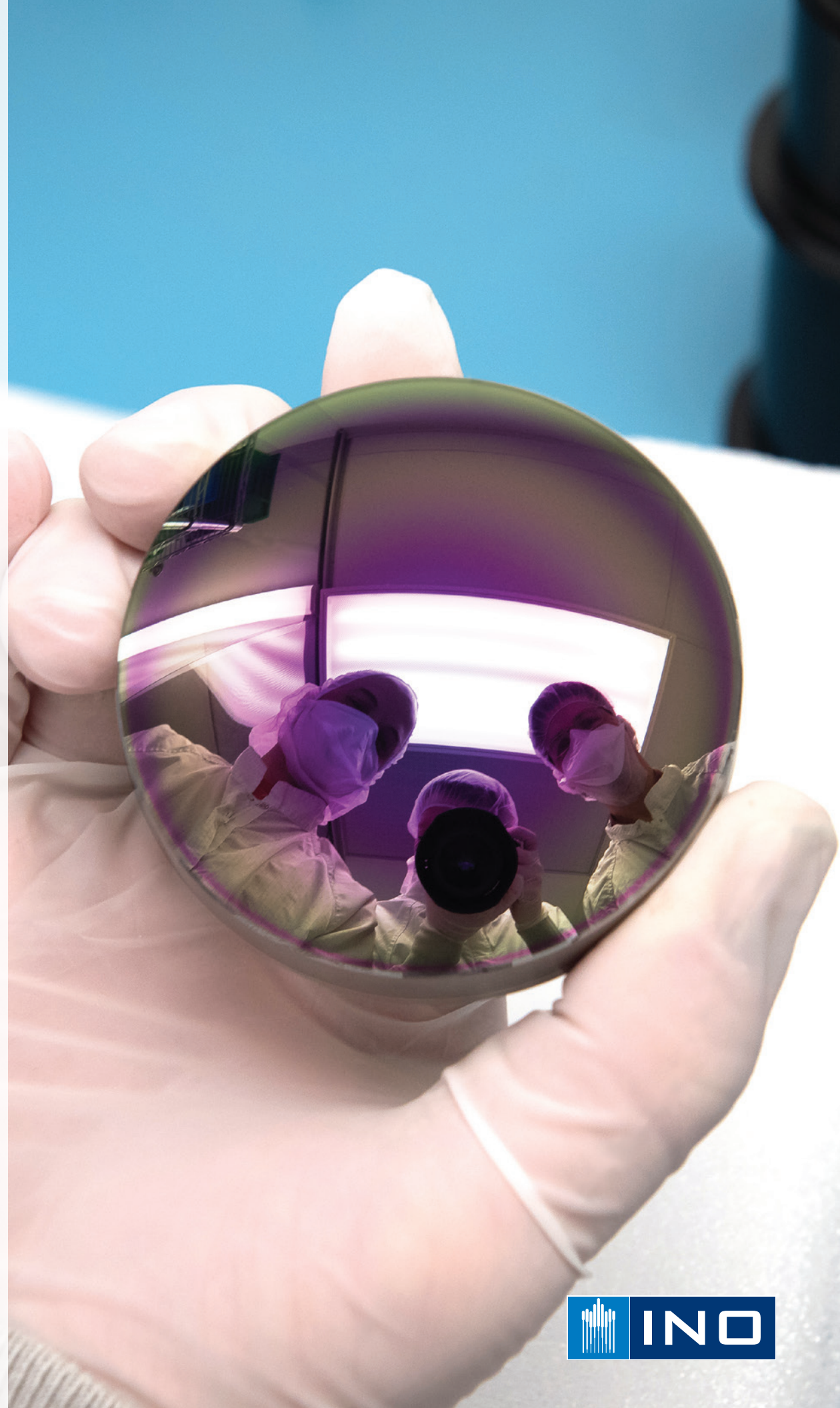
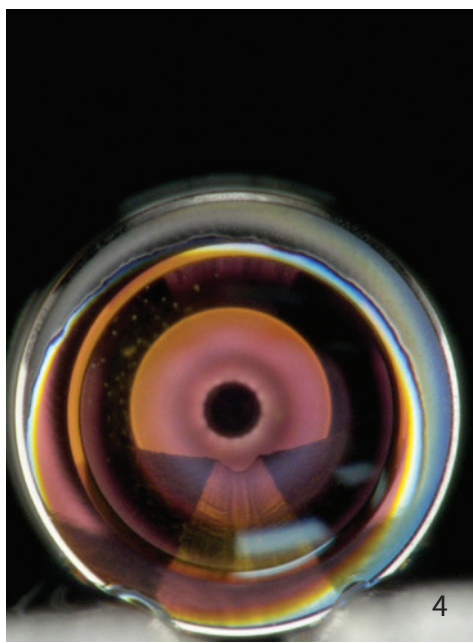
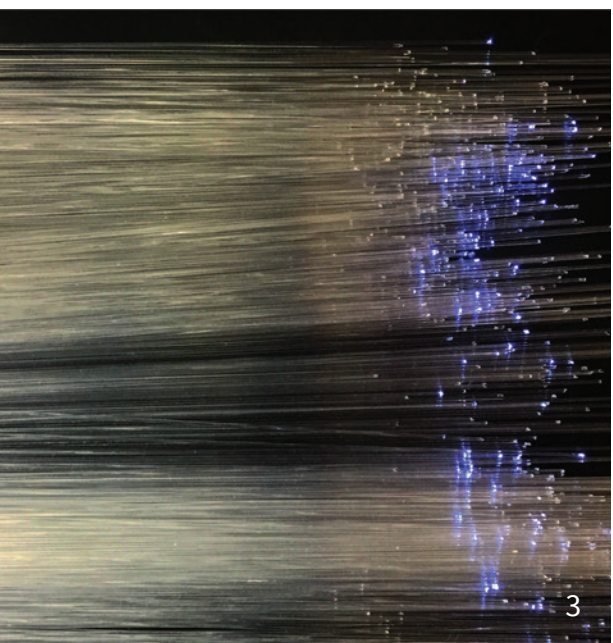
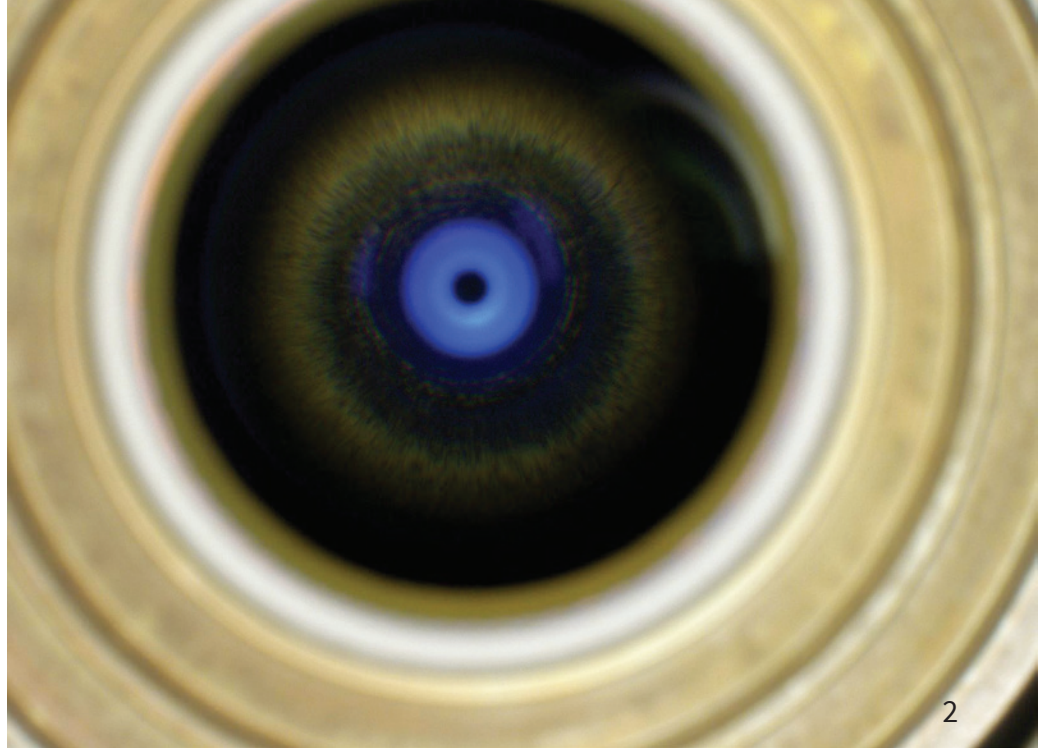
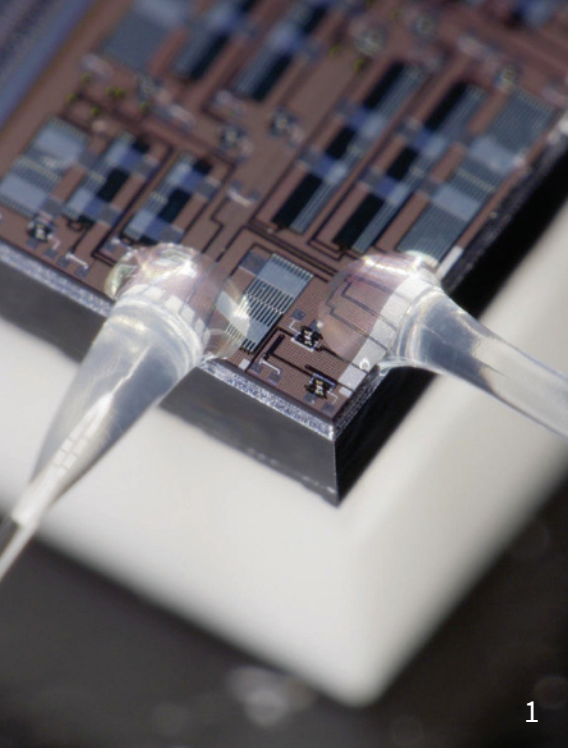


# ANNUAL REPORT 16-17







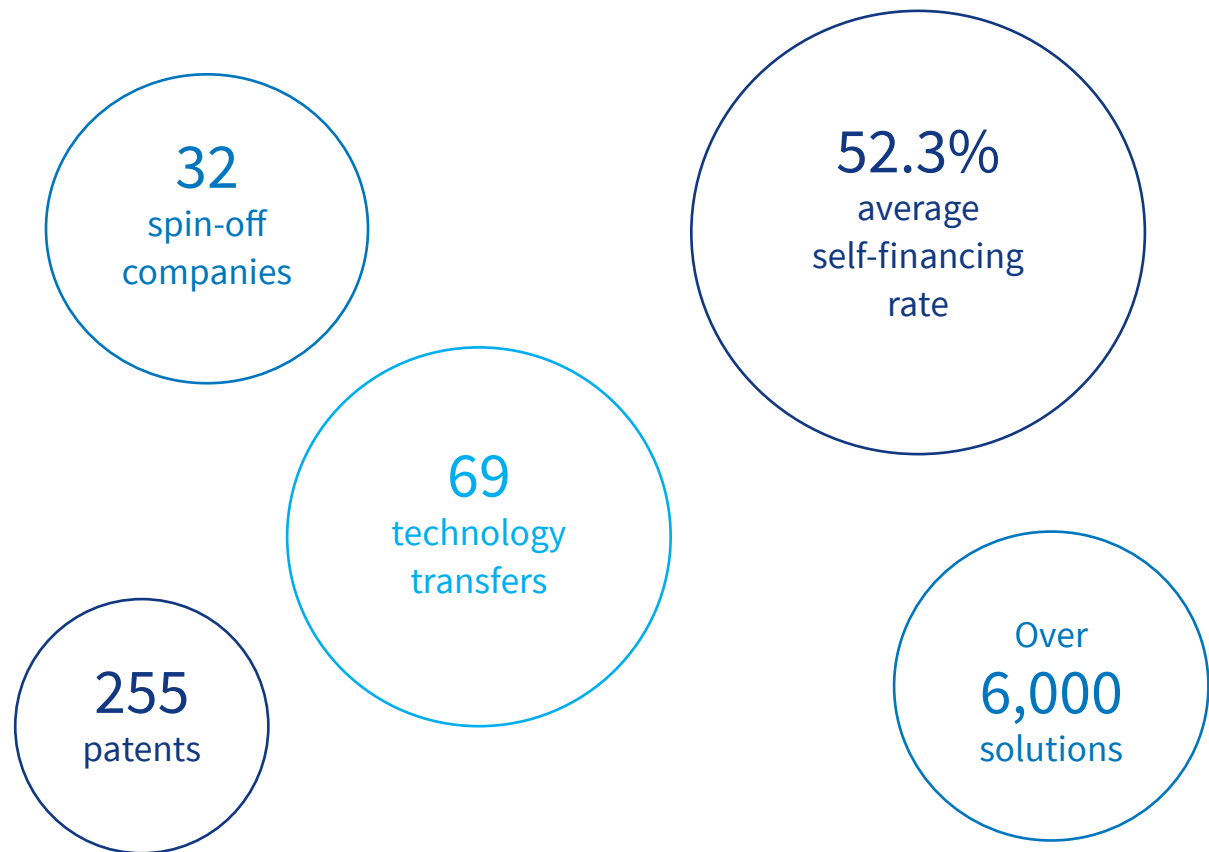
- 1 - Precision bonding of two optical fibers for coupling light to an integrated photonic chip, Alex Paquet
  - 2 - ExoMars mission rover navigation and location camera lens, Maxime Savard
  - 3 - Optical fibers, Philippe Boivin
  - 4 - Bonding of an antireflection coated small lens, 1 mm diameter, into an aluminum v-groove, Alex Paquet
  - 5 - Moon, Jonathan Lavoie
- Cover - Cleanroom staff reflection, through a midwave infrared lens for the Canadian Wildfire Monitoring System, Louis Buteau-Vaillancourt



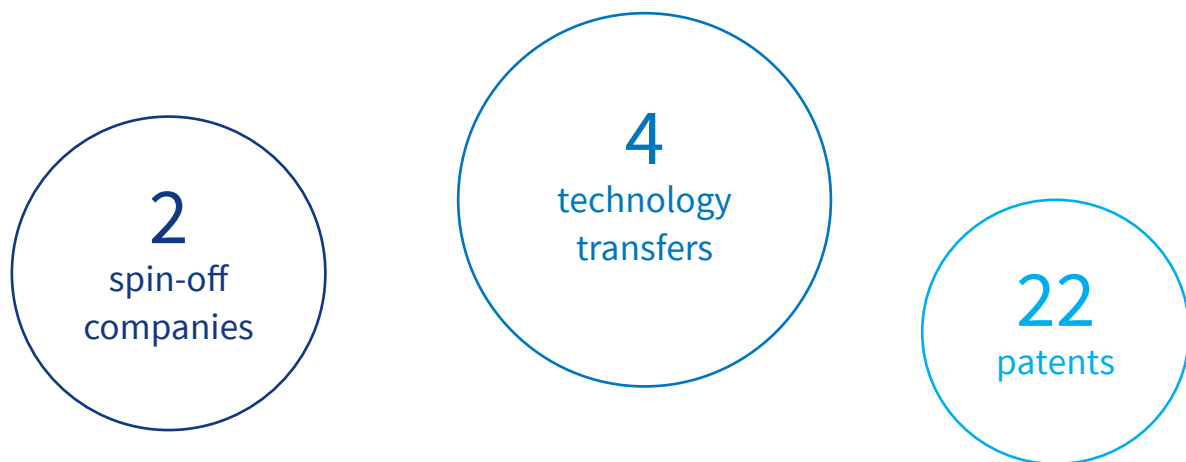
# INO: creating wealth since 1988

## KEY NUMBERS SINCE 1988

As at March 31, 2017



## In 2016-2017...





# A Year for Innovation

The fiscal year 2016–2017 represents a turning point for INO, focused on innovation, a key point in Canada's economic growth. In its report published in February 2017, the Advisory Council on Economic Growth recommended that the Canadian government harness innovation to increase productivity and help new businesses develop more rapidly. The significant investments in innovating technology announced by both levels of government last spring attest to our leaders' commitment to make innovation a priority and a pillar of wealth creation and employment. Moreover, the additional \$25 million over 5 years from the Government of Quebec will enable INO not only to hire new resources and speed up its flagship projects, namely those related to advanced robotics, the Internet of Things and additive manufacturing, but also to establish an office in Montreal to facilitate closer interaction with the region's innovating businesses, particularly those in manufacturing.

Of course, our government partners' interest in innovation finds an echo in INO, as we have aimed, since the beginning of our operations in 1988, to be a catalyst of driving forces in innovation, at the service of businesses. INO's service offering puts us in a position to be a leading partner for ambitious entrepreneurs. This year's two spin-offs are proof of successful networking between INO's researchers and entrepreneurs. The first, FlyScan, is the fruit of our Entrepreneur-in-Residence program, and will establish itself in the Quebec City area whereas the second, Swiftsure, is our organization's first spin-off in Western Canada.

This spin-off in British Columbia is a testimony to INO's capacity to serve its clients across Canada. For this reason, our organization is actively working with its federal partner to ensure a \$25 million funding over 5 years in order to expand our operations in Ontario and in Western Canada.



*Announcement of the renewal of the funding agreements by federal and provincial governments' officials*

This year, in addition to contributing to economic growth with its spin-offs, INO carried out 4 technology transfers and added 22 patents to its portfolio. Its external revenues reached \$15.7 million, representing a self-financing rate of 50%.

One of this year's accomplishments is the use of a thermal camera image by the magazine *Science* in May 2016. The image of the city of Vancouver, captured with our HRXCAM-16K camera, shows the loss of heat from some buildings that are poorly insulated.

Thanks to another of its innovations, INO could soon change the way sewers and water mains are inspected. Through a 3D sensor mounted on a robot, it will be possible, during the inspection, to measure and locate defaults in the pipes such as cracks or geometry defects (e.g. out of roundness). This technology, ready to be

transferred, will provide quality data enabling inspection automation and facilitating work prioritization for municipalities, which have to inspect kilometres of water lines each year.

Creating scientific innovation relies on several factors, one that should not be underestimated is the passion of the upcoming generation, which will leverage knowledge. For this reason, this year again, INO took to heart to foster an interest in science among young people, through engaging in activities such as *Les filles et les sciences* (Girls and sciences) and the *Boîte à science's* Science Fair, as well as sponsoring numerous educational activities. These young people, tomorrow's scientists, represent our organization's future vitality, and through them, we will continue to contribute to a dynamic economy.



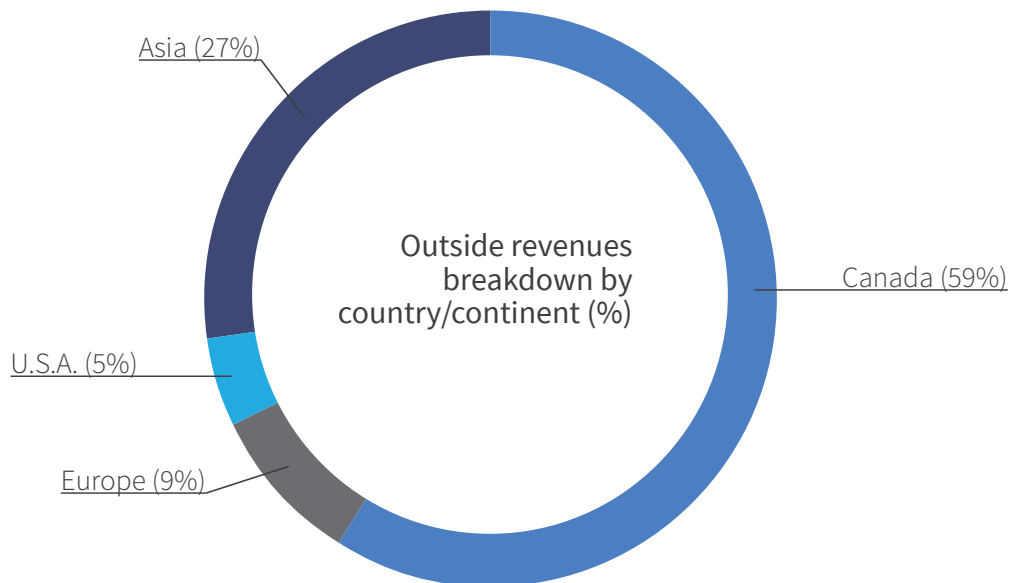
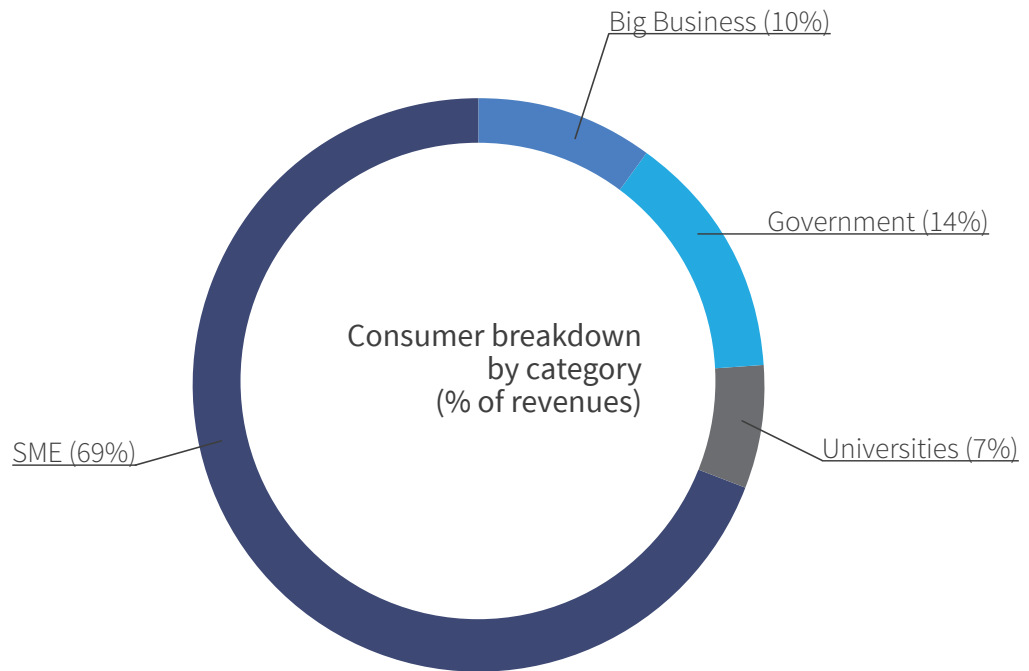
Jean-Guy Paquet,  
Chairman of the Board of Directors

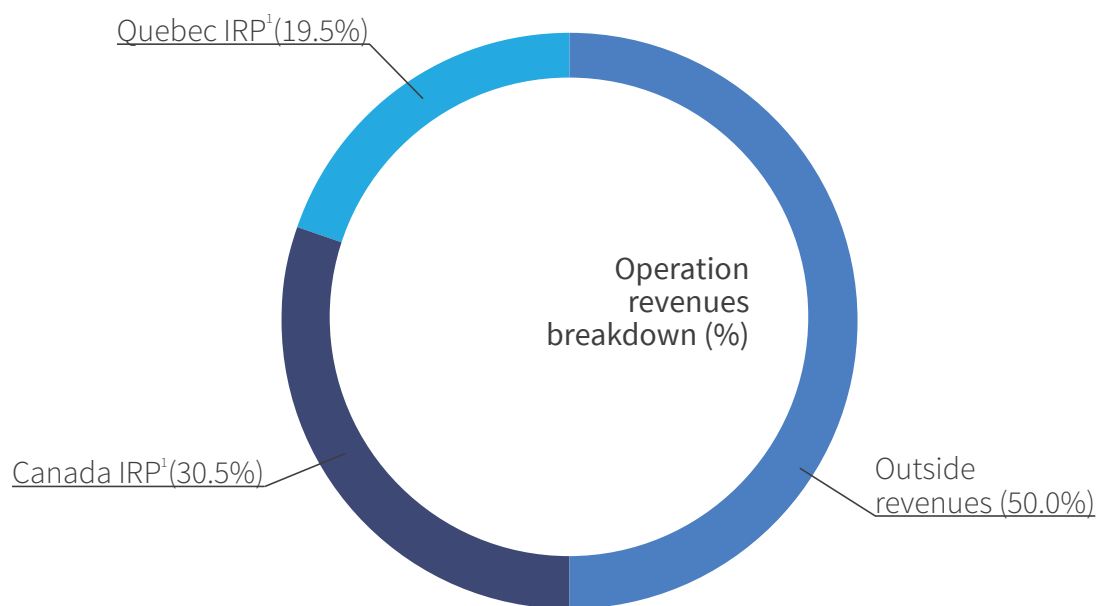
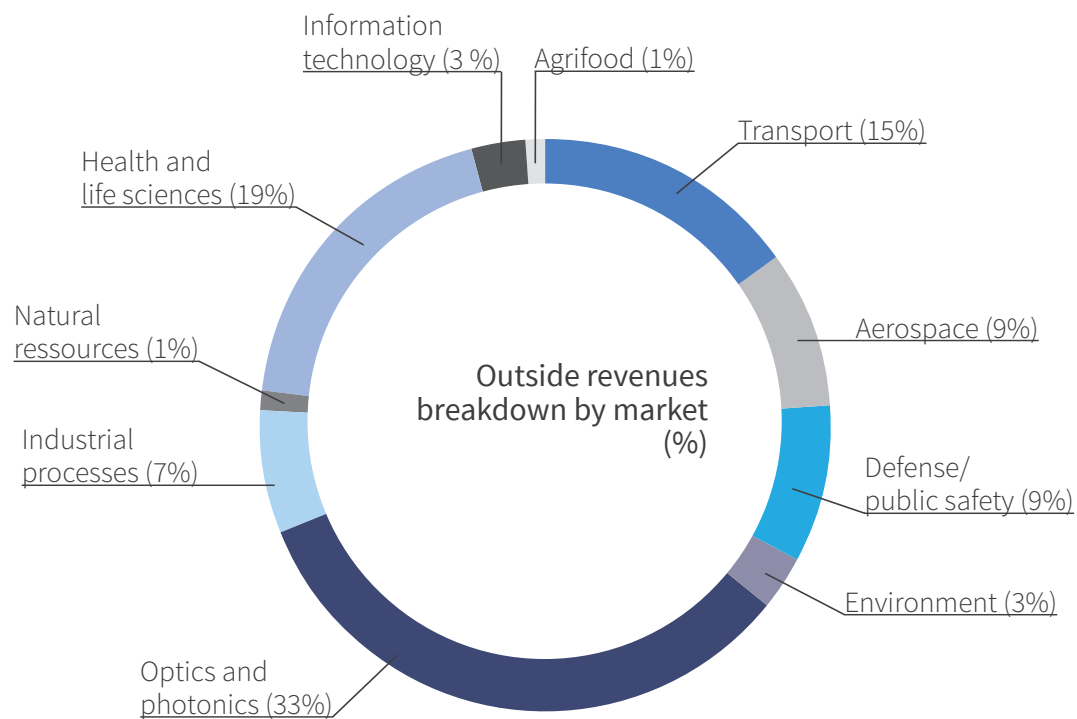


Jean-Yves Roy,  
President and CEO



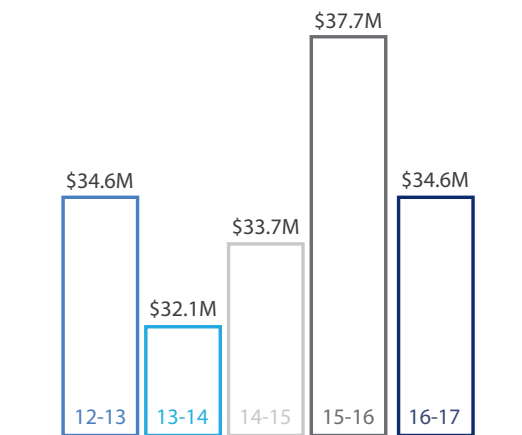
# The Year 2016-2017 in Numbers



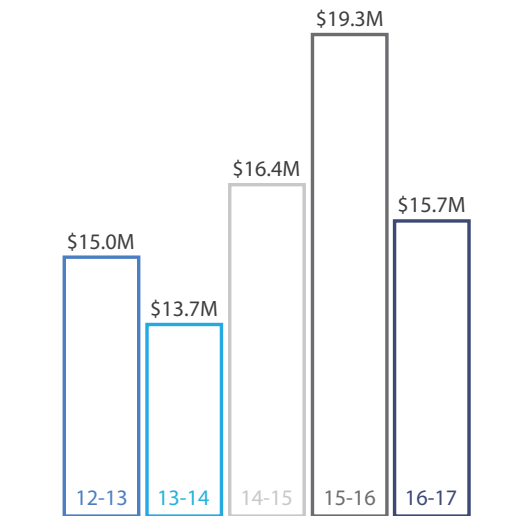


<sup>1</sup> Government financial support for the Internal Research Program operating expenses

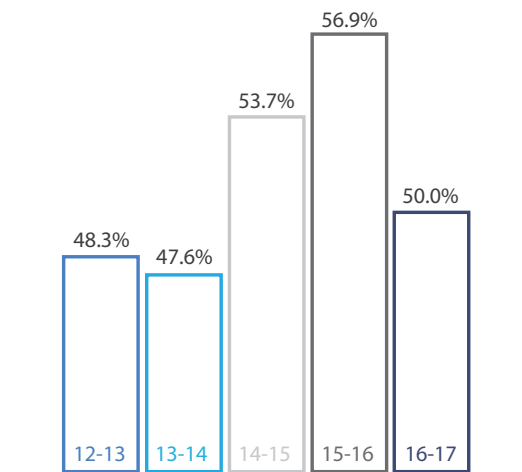
# Year-to-year Revenues



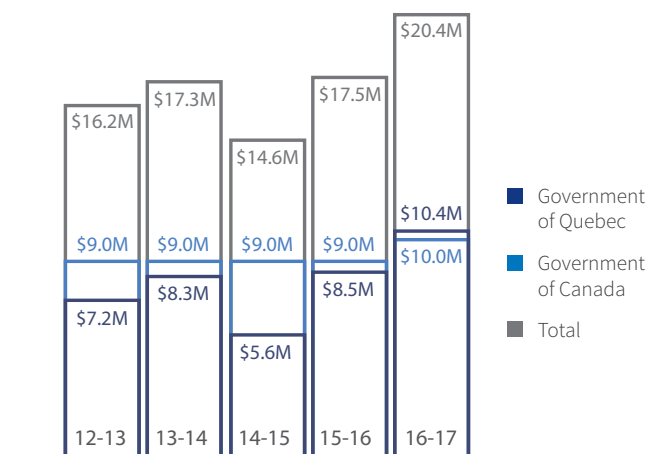
**Year-to-year overall revenues**  
(outside revenues, governments financial support and diverse revenues)



**Year-to-year breakdown of outside revenues**  
(R & D contracts, sales, transfer counterparts, royalties)



**Year-to-year self-financing rate**



**Year-to-year breakdown of governments financial support**



# INO, Present in its Community

Each year, INO staff members make a difference in their community by getting involved in numerous ways. Thanks to their enthusiasm, hard work and commitment, nearly \$36,000 was given to organizations in the community this year.

## Chefs' Lunch for Light the Night Walk

During the fall of 2016, several members of INO's team rolled up their sleeves and prepared a feast with international flavours for the Chefs' Lunch. This event was an occasion not only to discover dishes from around the world, but also to raise funds for Leukemia & Lymphoma Society of Canada's Light the Night Walk.

## The "Boîte à chansons" for Cystic Fibrosis Canada

The "Boîte à chansons", a biennial event where employees share their passion for music with their colleagues and families, showed once again that our organization abounds with talents—scientific as well as artistic ones.



**Centraide**  
**Québec et**  
**Chaudière-Appalaches**  
**Nous tous, ici**

## 2016 Centraide Campaign

This year again, many of INO's employees participated to Centraide Québec and Chaudière-Appalaches's annual campaign. Their donations reached the \$33,000 objective; the funds will support 13 projects and 200 organizations offering services to people in a vulnerable position in the region.

## 2017 Pentathlon des Neiges

With 25 employees participating in the event, INO was well represented once again this year. All five teams finished in the top tier and team INO-1 performed remarkably well, reaching the podium's second step.



# Research Activities Review

For a second successive year, the Entrepreneur-in-Residence program, the result of a partnership between the City of Quebec and INO, has marked our organization's technological developments. In addition to completing the development of a mail inspection system based on terahertz imagery (THz), INO's researchers have completed the preliminary design of an airborne pipeline surveillance system by targeting benzene to detect leaks. This new milestone led to the creation of INO's 31<sup>st</sup> spin-off, FlyScan. INO's 32<sup>nd</sup> spin-off, Swiftsure, results from a technology transfer in the field of optical processors for synthetic aperture images.

On top of its significant efforts toward the Entrepreneur-in-Residence program, INO managed to maintain its level of excellency in the optics/photonics' key sectors for the industry, and to initiate the development of new platforms that will provide a significant competitive edge to our clients in the future.

In Microfabrication, low-temperature packaging processes have been developed, allowing an efficient production of very broadband THz and infrared (IR) sensors. In Lasers and Specialty Optical Fibers, a taper fiber was developed for high optical quality and high average power applications. Optical fiber ribbons cleaving processes were developed and were part of a technology transfer during the course of the year. These fiber ribbons are becoming the standard in data centers because of the enormous increase in demand for information storage.

In Optical Design and in Vision, two programs that contribute significantly to other programs, it is important to mention the modelling of the misdisplacements of the fibers after packaging of the assembly, which helped anticipate and prevent offset, and the return of application development for the agrifood industry, an essential sector for our economy and the well-being of our community.



*Infrared view of the City of Vancouver, Science*





360 degrees 3D sensors for pipe inspection

In Biophotonics, the completion of an analytical microscope for high content screening was a turning point. The objective is to fast track new drug discovery through the study of live cell protein-protein interactions.

In Defense and Security, we cannot ignore the establishment of two businesses in two years, nor the recognition represented by the publication of INO's IR image of the city of Vancouver on the front cover of *Science* magazine.

The 3D sensor development, which makes cylindrical interior surface characterization possible, will pave the way to numerous applications in Environment as well as in Energy and Natural Resources.

The emergence of the Internet of Things, 3D printing and advanced robotics will create a significant demand for very low cost miniature autonomous sensors. Technologies such as printable photonics are very suitable for producing this type of components. These technologies will allow us to skillfully and efficiently manage resources and infrastructure, paving the way to a renewed prosperity.

All these accomplishments and many others are the fruit of our team's ingenuity and commitment and for this, we are immensely thankful.



# Business Creation

In 2016–2017, two spin-offs were launched at INO. One of those is a testimony to the Entrepreneur-in-Residence program's success, and the other confirms INO's position as Canada's leader in optics/photonics from coast to coast.

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

FlyScan Systems is the fruit of our Entrepreneur-in-Residence program, an initiative established by INO with the City of Quebec, in collaboration with Angés Québec. 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”, the critical period between a start-up's initial capital contribution and the time it starts generating revenues.

Founded by Éric Bergeron, the entrepreneur behind the success of OptoSecurity, this business, based in Québec City, 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 (plane, helicopter, even drones in the future), that will fly over a pipeline, will be able to locate leaks (even underground ones), that are currently undetectable with existing technology. This will enable pipeline operators to take swift action and avoid environmental damages.

Our second Entrepreneur-in-Residence, Dragan Tubic, is continuing his work on his mobile robotics surveillance system and should present a prototype during the coming year.

*Éric Bergeron,  
President and Chief Executive Officer,  
FlyScan Systems*



### Swiftsure, 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.

*"We're very excited about the future of our company, which is directly attributable to the exceptional people and technology at INO. We're proud to be part of the INO family."*

Dennett Woodland, Chief Executive Officer, Swiftsure Spatial Systems



**Swiftsure Spatial Systems**

*"There isn't a day that goes by that I'm not in awe at the creative geniuses that created the optronic SA processor. The elegance of the solution. The fusion of optics, computational geometry, the representation and manipulation of information through optics... each aspect of your creation is a personal joy for me to explore."*

James R. Plant, Chief Technology Officer, Swiftsure Spatial Systems



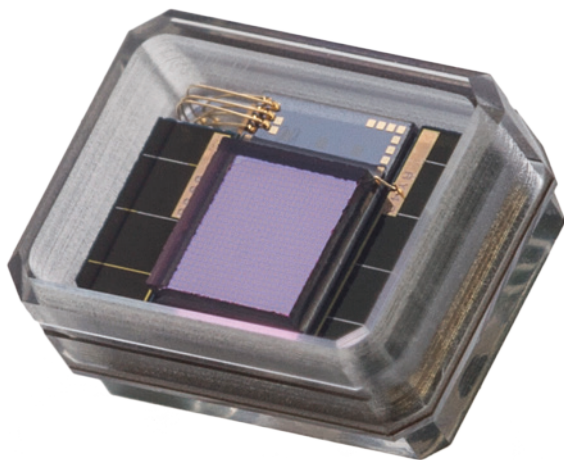
Henry Kucera, COO; Dennett Woodland, CEO; James R. Plant, CTO, Swiftsure Spatial Systems

# Examples of achievements: Nano Retina

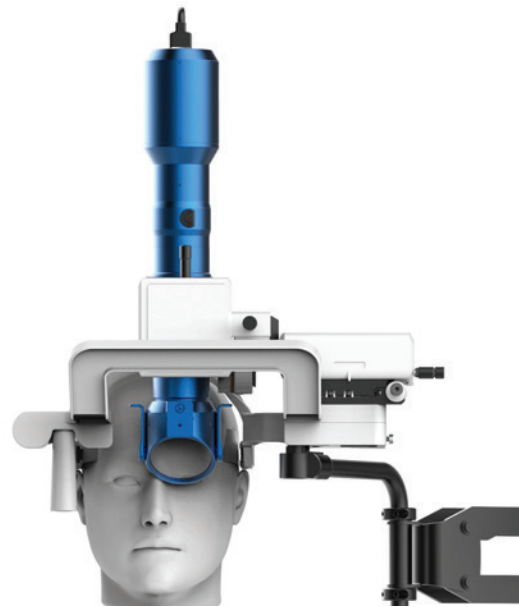
## Restoring vision, restoring independence

Retinal degenerative diseases, such as age-related macular degeneration (AMD), cause vision to grow progressively blurry and distorted, ultimately leading to total blindness in afflicted individuals. According to the World Health Organization, about 200 million people suffer from blindness or low vision, and as the aging population grows, many more will be affected by debilitating vision diseases. To address this global health challenge, significant hurdles must be overcome, including the disease's specificity to many types of retinal degeneration and the delivery of personalized solutions.

Our 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. Nano Retina's sophisticated device, the NR 600, is a miniature chip implanted into the eye, along with a digital imager and an array of penetrating electrodes that translates the image to an electrical stimulation on targeted healthy retinal layers. The chip is coupled with an intelligent infrared laser system to provide power and precise control tailored individually to the patient. Nano Retina's comprehensive cutting edge technology package restores visual perception to people who have lost their sight due to a retinal degenerative disease.



Courtesy: Nano Retina



Courtesy: Nano Retina

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.

This light delivery solution combines the best of smart design and interfacing of optics and optomechanics with ergonomics that provide not only maximum flexibility for the physician (optimized to custom stimulation parameters) but also maximum patient comfort during clinical procedures.

*Restoring vision, restoring independence* – INO's ophthalmic contribution is enabling Nano Retina's mission.



# SureShot Solutions

## A Splash of Optics in your Favorite Coffee

For quick-serve coffee shops, the time between when a customer makes and receives their order is crucial. More efficient, faster service means happier clients, more orders processed, and more profit.

Used in coffee shops all across the country, SureShot Solution's dispensers make life easier for thousands of workers by automating the process of adding dairy, sweeteners, and flavorings to beverages. As a pioneer in the dispensing industry, SureShot strives to keep its competitive advantage by constantly improving its technology and offering simpler, more efficient solutions to its clients.

In older models, refilling dispensing stations could be a time-consuming process, due to the limitations in level measuring technology. Workers had to fill the tanks at specific times, which meant workflow interruptions that delayed service to customers.

Developing level sensing solutions is one of INO's many areas of expertise, and it has already created lidar sensors for natural gas and grain elevators. However, these technologies are usually expensive. The challenge with SureShot was to find a precise and effective device at low cost.

INO's team of researchers devised a system based on light reflection to efficiently and continuously measure the level of liquid left in each tank of the dispenser. This level sensing device, which is adapted to the type of

dairy stored in each tank (e.g., cream or milk), provides accurate, real-time information. Freeing up coffee shop employees from having to fill the dispenser according to a set schedule saves precious time and allows for quicker customer service.

Even a change as small as this one can have a big impact on a business's yearly profits. To further improve their products and increase their client's productivity, SureShot continues its work with INO's team, adding a splash of optics into everyone's favorite coffee.



# INOvation Awards

INO has been honouring its most innovative employees every year since 2009 with the INOvation Awards-4 annual prizes recognizing accomplishments of the last 12 months, and a special prize awarded every 5 years. This is an opportunity to highlight the significance of innovation and recognize our employees' expertise, creative minds and commitment. Here are the 2016 winning teams.



## EURÊKA!

The EURÊKA! award is presented to the project or team whose invention disclosure holds the greatest potential to create economic value outside of INO. This year, the prize was awarded to the optical fiber microbiopsy team. This new concept results from the collaboration between researchers in biophotonics and optical fiber specialists to create optical fiber biopsy probes that could be simple and disposable. The concept offers better control of light-tissue interactions and aims to improve the biopsy process quality by improving sample adequacy and adding pre-diagnostic information at the time of biopsy. Applications could include biopsy screenings in thyroid and lymph nodes.

Congratulations to:

- Christophe Rivière
- Jessie Weber



## SYNERGY!

The SYNERGY! award is given to the team whose project made use of several technological platforms and favoured their reuse, leading to an innovative solution. The honours went to the MailSecur team for the development of two beta units of an autonomous terahertz (THz) mail inspection station. The key concept of the station is based on INO's THz technology, which allows us to see through envelopes and small packages in real time.

Congratulations to:

- Alain Bergeron
- Guy Bergeron
- Yvon Bilodeau
- Nathalie Blanchard
- Pascal Bourqui
- Mario Cantin
- Michel Doucet
- François Duchesne
- Luc Favreau
- Bruno Fisette
- Lucie Gagnon
- Marc Girard
- Michel Jacob
- Julie Lambert  
(absent from photo)
- Frédéric Lévesque
- Linda E. Marchese
- Luc Mercier
- Martin Otis
- Stéphane Rochefort
- Marc Terroux
- Manon Thibault
- Carl Vachon





### **MORE with LESS!**

The MORE with LESS! award is presented to the project team or individuals whose innovative method was adopted, resulted in real time and money savings, and has growth potential. The selective offset plasma etching team won this prize because of their modification of plasma equipment, which produces a selective etching to liberate microbolometers. The modification led to a significant productivity gain and cost reduction for Microfabrication.

Congratulations to:

- Martin Bolduc
- Francis Provençal



### **ALL for ONE!**

The ALL for ONE! award is given to the project team that had high engagement and commitment levels and drew on a variety of expertise to implement a novel and successful solution. The SuPerMixer team won the award in this category in 2016. SuPerMixer is an automated system that prepares biological samples. Developed for the Canadian Space Agency, it aims to supplement bioanalysis flow cytometry in space (with Microflow). System functionality and the integrity of cellular and molecular samples prepared with SuPerMixer have been tested in zero gravity during parabolic flights.

Congratulations to:

- |                     |                         |                      |
|---------------------|-------------------------|----------------------|
| • Robert Brown      | • Mathieu Legros        | • Christophe Rivière |
| • Sylvain Dubois    | • Ozzy Mermut           | • Stéphane Rochefort |
| • Paul Grenier      | (absent from photo)     | • Jessie Weber       |
| (absent from photo) | • Paul-François Paradis |                      |



# INO Members

## GOVERNMENT MEMBERS

**Government of Quebec**

**Government of Canada**

## AFFILIATE MEMBERS

**Bell Canada**

Montreal (Quebec)

**Communications Research Centre Canada**

Ottawa (Ontario)

**Industrial Alliance**

Quebec (Quebec)

**Thales Canada**

Saint-Laurent (Quebec)

## ASSOCIATE MEMBERS

**ABB**

Quebec (Quebec)

**B-Con Engineering**

Nepean (Ontario)

**Airbus Defence and Space Canada**

Ottawa (Ontario)

**Celestica International**

Toronto (Ontario)

**CorActive High-Tech**

Quebec (Quebec)

**EXFO**

Quebec (Quebec)

**Faculty of Engineering and Design**

**Carleton University**

Ottawa (Ontario)

**Gentec Electro-Optics**

Quebec (Quebec)

**LeddarTech**

Quebec (Quebec)

**Telops**

Quebec (Quebec)

**TeraXion**

Quebec (Quebec)

**Université Laval**

Quebec (Quebec)

# Spin-offs

## **Swiftsure Spatial Systems**

Optronic synthetic aperture processor, 2017

## **FlyScan Systems**

Lidar for benzene detection, 2016

## **RaySecur**

Terahertz technology to detect letter bombs, 2015

## **Technologies and services INOOXX**

LiDAR measurement of Brasque level, and laser triangulation technology to measure truck load volume, 2013

## **handyem**

Compact cytometer, 2011

## **Opti Rythmix**

Virtuo library, 2011

## **Company in the environment domain**

Confidential, 2010

## **Pavemetrics Systems**

Machine vision systems for transport infrastructure inspection, 2009

## **RealTraffic Technologies**

Image analysis technologies, 2008

## **Hedzopt**

Thermal weapon sight, 2007

## **LeddarTech**

LEDs for detection and distance measurement, 2007

## **Quantum BioMedical (QBM)**

Endoscopic probe for intravascular diagnosis, 2006

## **IRphotonics**

Fluoride glass and fibers, 2004

## **Neoptix**

Fiber optic temperature sensors, 2004

## **OpSens**

Fiber sensors, 2004

## **Optosecurity**

Optical correlator, 2004

## **PyroPhotonics Lasers**

PEFL laser technology, 2004

## **Cybiocare**

Hypoglycemia sensor and glucose measurement, 2003

## **Obzerv Technologies**

Vision systems, 2002

## **NEKS Technologies**

Color-based gingival tartar detection, 2001

## **TeraXion**

Optical components, 2000

## **CorActive High-Tech**

Specialty fibers, 1998

## **Pierre Langlois Consultant**

Diffraction optics consulting, 1997

## **P&P Optica**

Optics engineering shop, 1995

## **FISO Technologies**

Fiber optic sensors, 1994

## **Lentilles Doric**

Microlenses, 1994

## **Optiwave Corporation**

Integrated optics software, 1994

## **AEREX Avionique**

Optoelectronics consulting, 1993

## **I/FO Technologies**

Fiber optic technology consulting, 1993

## **Optel Vision**

Optical instrumentation, 1992

## **Instruments Régent**

Optical instrumentation, 1990

## **Nortech Fibronic**

Optical instrumentation, 1989



# Technology Transfers

**ABB**

Pyramid wavefront sensor

**Arcane Technologies**

Computing library – Amazone

**Asian enterprise**

Bolometers

**Asian enterprise**

Bolometers

**Asian enterprise**

Fiber components

**Asian enterprise**

Fiber laser cleaving with a CO<sub>2</sub> laser

**Asian enterprise**

Reading circuit

**Asian enterprise**

Terahertz imaging

**Asian integrator**

MOPAW laser

**Asian Research Institute**

Bolometers

**Autolog**

3D imaging calibration software

Planovision

Source code

**Avensys/Bragg Photonics**

All-fiber photo-induced filters

**Brio Conseils**

Development process management innovation

**Bristol Aerospace**

Infrared detector

**Canadian enterprise**

Bolometers

**Canadian enterprise**

Infrared imaging

**Communication Research Center Canada**

Integrated processes system - SPI

**CorActive High-Tech**

Triple-clad specialty optical fiber

**CTEX**

Bolometers

**Cybiocare**

Hypoglycemia sensor and glucose measurement

**Dellux Technologies**

LED lights

**FISO Technologies**

End-of-service indicator for respiratory protective device

Fiber optic sensors for temperature, constraint and pressure

**FlyScan**

Lidar for benzene detection

**Gentec Electro-Optics**

Holographic wave sampler

**handyem**

Flow cytometry

**Hedzopt**

Thermal weapon sight

**Industries Maibec**

Features detection on cedar wood shingles

**Instruments Régent**

Optical instrumentation

**iOmniscient**

Classification module

**IRphotonics**

Fluoride fibers

**Krispy Kernels**

Hyperspectral system for automatic sorting of contaminants

**Lasiris**

Diffraction optical elements

**LeddarTech**

LEDs for detection and distance measurement

# Technology Transfers

**Lentilles Doric**

Refraction index gradient microlens

**Microsphere**

Optical correlator for inspection of plastic components

**MPB**

Infrared spectrometer

**NEKS Technologies**

Color-based gingival tartar detection

**Netcorp**

Optical switch

**Normand PROJEX**

Inspection system for 3D verification of hardwood floor mortise and tenon dimensions

**Nortech Fibronic**

Fiber optics temperature sensors  
Tunable fiber laser

**Obzerv Technologies**

DALIS™ laser illuminator

**Opti Rythmix**

Virtuo library

**Optiwave Corporation**

Integrated optics software

**Optosecurity**

INOSegmenter - Image segmentation software  
Numerical optical correlator technology  
Optical correlator

**Pavemetrics Systems**

Machine vision systems for transport infrastructure inspection  
Machine vision systems for a new field of views

**Petroleum sector enterprise**

Fiber sensor technology

**PyroPhotonics Lasers**

PEFL laser technology  
PYFL fiber laser unfolded cavity configuration

**Quantum Biomedical (QBM)**

Fiber endoscope for intravascular diagnosis

**RealTraffic Technologies**

Image analysis technologies

**RaySecur**

Terahertz technology

**Searidge Technologies**

Video monitoring technology  
Video surveillance and video processing technology and source codes

**Seastar Optics**

Erbium fiber laser

**Solvision**

Structured light projector

**STAS**

Hydrogen fluoride detector

**Swiftsure**

Optronic synthetic aperture processor

**SYGIF International**

Integrated processes system - SPI

**Symbiotech Medical**

Intra-arterial analysis and detection

**Teledyne Dalsa**

Bolometers

**Telops**

Integrated processes system - SPI

**West Coast petroleum sector enterprise**

Fiber sensor technology

# Board of Directors

**Michel Audet<sup>1</sup>**

Corporate Director  
Montreal (Quebec)

**Monique L. Bégin<sup>2</sup>**

Corporate Director  
Quebec (Quebec)

**André Bolduc**

Director - Account Management  
Bell Canada  
Montreal (Quebec)

**Normand R. Bourque<sup>2</sup>**

Corporate Director  
Lorraine (Quebec)

**Denis Faubert**

President, CEO  
CRIAQ  
Montreal (Quebec)

**François Giroux<sup>2,3</sup>**

President  
Gentec  
Quebec (Quebec)

**Simon Jacques**

President  
Airbus Defence and Space Canada  
Ottawa (Ontario)

**Guy Laberge<sup>1</sup>**

Corporate Director  
Quebec (Quebec)

**Liliane Laverdière**

Corporate Director  
Quebec (Quebec)

**Jean-Guy Paquet<sup>1,3</sup>**

Chairman of the Board of Directors  
INO  
Quebec (Quebec)

**Jean Pronovost<sup>1,2</sup>**

Corporate Director  
Quebec (Quebec)

**Jean-Yves Roy<sup>1</sup>**

President, CEO  
INO  
Quebec (Quebec)

**Hugues St-Pierre<sup>1</sup>**

Corporate Director,  
President of MAXXAB  
Rimouski (Quebec)

**Jacques Topping<sup>1,3</sup>**

Corporate Director  
Quebec (Quebec)

**Jean-Marie Toulouse**

Professor Emeritus  
HEC Montreal  
Montreal (Quebec)

<sup>1</sup> Executive Committee Members

<sup>2</sup> Audit Committee Members

<sup>3</sup> Investment Committee Members



# R & D Advisory Committee

**Michel Arseneault**

IRAP-NRC  
Quebec (Quebec)

**Eugene G. Arthurs**

SPIE  
Bellingham (Washington)

**Michel Bélanger**

Ciena Corporation  
Ottawa (Ontario)

**Richard Boudreault**

Polar Knowledge Canada  
Ottawa (Ontario)

**Sylvain Charbonneau**

University of Ottawa  
Ottawa (Ontario)

**André Fougères**

INO  
Quebec (Quebec)

**Pierre Galarneau**

INO  
Quebec (Quebec)

**Jean Giroux**

Telops  
Quebec (Quebec)

**Marie-France Laporte**

ABB  
Quebec (Quebec)

**Jean Maheux**

DRDC-Valcartier  
Quebec (Quebec)

**Martin Maltais**

UQAR  
Levis (Quebec)

**Michel Piché**

Center for Optics, Photonics and Lasers (COPL)  
Quebec (Quebec)

**Ruth Rayman**

NRC  
Ottawa (Ontario)

**Antonio Scandella**

Bell Canada  
Montreal (Quebec)

**Michael Schmidt**

Friedrich-Alexander Universität  
Erlangen-Nürnberg (Germany)

**Brian Wilson**

University Health Network  
Toronto (Ontario)

# Management Committee

**Jean-Yves Roy**

President and Chief Executive Officer

**Philippe Boivin**

Vice-President, Corporate Affairs

**André Fougères**

Vice-President, Business Development and Operations

**Pierre Galarneau**

Vice-President and Chief Technology Officer

**Martin Larrivée**

Vice-President, Finance

# Associate Researchers

**Jacques Albert**

Carleton University

**Claudine Allen**

Université Laval

**Gideon Avigad**

Vineland

**Hamed Pishvai Barzargani**

Institut national de la recherche scientifique (INRS)

**Frédéric Bernardin**

CEREMA, Clermont-Ferrand, France

**Magella Bilodeau**

Canmet Mining

**Jean-Pierre Blanchet**

Université du Québec à Montréal (UQAM)

**Robert Campbell**

University of Alberta

**Lukas Chrostowski**

University of British Columbia

**Sylvain Cloutier**

École de technologie supérieure (ÉTS)

**Michael Daly**

York University

**Sylvie Daniel**

Université Laval

**Ronald Dekker**

Philips

**Yves de Koninck**

Université Laval

**Jocelyn Faubert**

Université de Montréal

**Tigran Galstian**

Université Laval

**Philippe Giguère**

Université Laval

**Clément Gosselin**

Université Laval

**Knut Gottfried**

Fraunhofer ENAS, Germany

**Florent Goutailler**

ENSEA, France

**Ashraf A. Ismail**

McGill University

**Steffen Kurth**

Fraunhofer ENAS, Germany

**Jean-François Lalonde**

Université Laval

**Frédéric Leblond**

Polytechnique Montréal

**Mario Leclerc**

Université Laval

**Ming Li**

Chinese Academy of Sciences, China

**Odile Liboiron-Ladouceur**

McGill University

**Matthias Mecklenburg**

Hamburg University of Technology, Germany

**Marco Meinig**

Fraunhofer ENAS, Germany

**Michel Piché**

Université Laval

**Steve Prescott**

University of Toronto

**Eric Rehm**

Université Laval



**Alexandra Rink**  
University of Toronto

**Patrick Rochette**  
Université Laval

**Stephan Roth**  
BLZ, Germany

**Jean Rouat**  
Université de Sherbrooke

**Safieddin Safari-Naeini**  
University of Waterloo

**Armen Saghatelian**  
Université Laval

**Alireza Saïdi**  
ICI, Collège Ahuntsic

**Yves Saint-Amant**  
Université Laval

**Michael Schmidt**  
SAOT, University Erlangen, Germany

**Daria Smazna**  
Technische Fakultät – Christian-Albrechts-Universität zu Kiel,  
Germany

**Vivek Subramanian**  
University of California at Berkeley, United States

**Simon Thibault**  
Université Laval

**Christine Tremblay**  
École de technologie supérieure (ÉTS)

**Réal Vallée**  
Université Laval

**Jean-Pierre Véran**  
NRC Herzberg

**Brian Wilson**  
University of Toronto

**Yeni Yucel**  
Ryerson University

# Summary Financial Statements

March 31, 2017



June 8, 2017

## Report of the independent auditor on the summary financial statements

### To the Members of the National Optics Institute

The accompanying summary financial statements, which comprise the summary statement of financial position as at March 31, 2017 and the summary statements of operations, changes in net assets and cash flows for the year then ended, and related notes, are derived from the audited financial statements of the National Optics Institute for the year ended March 31, 2017. We expressed an unmodified audit opinion on those financial statements in our report dated June 8, 2017.

The summary financial statements do not contain all the disclosures required by Canadian accounting standards for not-for-profit organizations. Reading the summary financial statements, therefore, is not a substitute for reading the audited financial statements of the National Optics Institute that are available from the organization.

### Management's responsibility for the summary financial statements

Management is responsible for the preparation of a summary of the audited financial statements.

### Auditor's responsibility

Our responsibility is to express an opinion on the summary financial statements based on our procedures, which were conducted in accordance with Canadian Auditing Standard (CAS) 810, *Engagements to Report on Summary Financial Statements*.

### Opinion

In our opinion, the summary financial statements derived from the audited financial statements of the National Optics Institute for the year ended March 31, 2017 are a fair summary of those financial statements.

*PricewaterhouseCoopers s.r.l./s.e.n.c.r.l.<sup>1</sup>*

<sup>1</sup> CPA auditor, CA, public accountancy permit No. A118597

# Summary Statement of Financial Position

As at March 31, 2017

	2017 \$	2016 \$
<b>ASSETS</b>		
<b>Current assets</b>		
Cash and cash equivalents	1,036,372	1,398,976
Accounts receivable	2,950,139	3,189,753
Financial support receivable related to Internal Research Program (note 2a)	2,967,033	900,000
Tangible capital assets and intangible assets (note 2b, i)	626,852	626,956
Inventories	2,593,982	2,478,094
Research contracts in progress	1,137,714	899,954
Prepaid expenses	796,240	792,830
Net investment in a finance lease	104,524	134,593
	<b>12,212,856</b>	<b>10,421,156</b>
<b>Term deposit at 0.95% maturing on April 2, 2018</b>	<b>22,000,000</b>	<b>-</b>
<b>Investments in private companies</b>	<b>229,233</b>	<b>229,233</b>
<b>Net investment in a finance lease</b>	<b>-</b>	<b>104,524</b>
<b>Financial support receivable related to tangible capital assets and intangible assets (note 2b, i)</b>	<b>-</b>	<b>1,662,121</b>
<b>Financial support related to the building (note 2c)</b>	<b>70,732</b>	<b>205,353</b>
<b>Tangible capital assets</b>	<b>24,847,412</b>	<b>24,116,719</b>
<b>Intangible assets</b>	<b>131,488</b>	<b>146,582</b>
	<b>59,491,721</b>	<b>36,885,688</b>
<b>LIABILITIES</b>		
<b>Current liabilities</b>		
Bank loans	1,210,514	548,781
Accounts payable and accrued liabilities	5,672,157	9,758,326
Deferred revenues and advances on contracts	1,698,469	2,040,378
Current portion of long-term debt	729,817	679,533
	<b>9,310,957</b>	<b>13,027,018</b>
<b>Long-term debt</b>	<b>368,956</b>	<b>626,852</b>
<b>Employee future benefit obligations (note 3)</b>	<b>5,949,443</b>	<b>4,957,000</b>
<b>Deferred financial support related to</b>		
Tangible capital assets and intangible assets (note 2b, ii)	18,784,778	17,549,595
Business and Regional Growth / Innovation Program (note 2d)	16,248	48,741
Additional financial support program (note 2a)	25,000,000	-
	<b>59,430,382</b>	<b>36,209,206</b>
<b>NET ASSETS</b>	<b>61,339</b>	<b>676,482</b>
	<b>59,491,721</b>	<b>36,885,688</b>

Approved by the Boards of Directors,



Director



Director

The accompanying notes are an integral part of these summary financial statements.



# Summary Statement of Operations and Changes in Net Assets

For the year ended March 31, 2017

	2017 \$	2016 \$
<b>REVENUES</b>		
Financial support related to		
Internal Research Program (note 2a)	16,400,000	15,400,000
Tangible capital assets and intangible assets (note 2b, ii)	1,764,772	1,863,922
Financing costs (note 2b, iii)	26,853	55,405
Business and Regional Growth / Innovation Program (note 2d)	32,493	32,495
Sales and contracts	14,998,421	16,356,699
Royalties	110,716	98,226
Technology transfer agreements and other agreements	587,457	2,895,469
Rent and other revenues	612,750	488,434
Gain on disposal of assets	39,467	381,396
Members' contributions	53,000	63,100
Foreign exchange gain	-	89,056
	<b>34,625,929</b>	<b>37,724,202</b>
<b>EXPENSES</b>		
Salaries and fringe benefits (note 3)	18,231,643	20,133,398
Cost of goods and services pertaining to project completion	6,218,655	6,559,285
Other operating expenses	6,742,531	7,065,015
Foreign exchange loss	107,432	-
Interest on long-term debt	31,842	75,220
Interest and bank charges	155,074	99,978
Depreciation of tangible capital assets	2,490,168	2,575,669
Amortization of intangible assets	66,526	82,644
	<b>34,043,871</b>	<b>36,591,209</b>
<b>EXCESS OF REVENUES OVER EXPENSES FOR THE YEAR</b>	<b>582,058</b>	<b>1,132,993</b>
<b>NET ASSETS – BEGINNING OF YEAR</b>	<b>676,482</b>	<b>4,397,088</b>
Excess of revenues over expenses for the year	582,058	1,132,993
	<b>1,258,540</b>	<b>5,530,081</b>
Remeasurements and other items (note 3)	(1,197,201)	(4,853,599)
<b>NET ASSETS – END OF YEAR</b>	<b>61,339</b>	<b>676,482</b>

The accompanying notes are an integral part of these summary financial statements.

# Summary Statement of Cash Flows

For the year ended March 31, 2017

	2017 \$	2016 \$
<b>CASH FLOWS FROM OPERATING ACTIVITIES</b>		
Excess of revenues over expenses for the year	582,058	1,132,993
Items not affecting cash		
Depreciation of tangible capital assets	2,490,168	2,575,669
Amortization of intangible assets	66,526	82,644
Adjustment related to employee future benefits	(204,758)	(438,400)
Financial support related to tangible capital assets and intangible assets (note 2b and c)	(1,797,265)	(1,896,417)
Capitalized interest on financial support repayable	-	15,949
Gain on disposal of assets	(39,467)	(381,396)
	1,097,262	1,091,042
Changes in non-cash working capital items	(3,831,566)	4,146,071
	(2,734,304)	5,237,113
<b>CASH FLOWS FROM FINANCING ACTIVITIES</b>		
Change in bank loans	661,733	(216,102)
Long-term debt contracted	514,822	-
Repayment of long-term debt	(95,478)	(285,078)
Financial support received as an advance	26,469,283	-
	27,550,360	(501,180)
<b>CASH FLOWS FROM INVESTING ACTIVITIES</b>		
Acquisition of tangible capital assets	(3,312,002)	(3,769,016)
Acquisition of intangible assets	(40,718)	(43,926)
Proceeds from disposal of tangible capital assets	39,467	1,457,087
Finance lease, net of repayments	134,593	(239,117)
Acquisition of a term deposit	(22,000,000)	-
	(25,178,660)	(2,594,972)
<b>NET CHANGE IN CASH AND CASH EQUIVALENTS DURING THE YEAR</b>	(362,604)	2,140,961
<b>CASH AND CASH EQUIVALENTS (EXCESS OF OUTSTANDING CHEQUES OVER BANK BALANCES) – BEGINNING OF YEAR</b>	1,398,976	(741,985)
<b>CASH AND CASH EQUIVALENTS – END OF YEAR</b>	1,036,372	1,398,976

The accompanying notes are an integral part of these summary financial statements.

# Notes to Summary Financial Statements

March 31, 2017

## 1. STATUTES AND NATURE OF ACTIVITIES

The National Optics Institute (INO) was incorporated on December 13, 1985 under Part II of the Canada Corporations Act and continued on September 11, 2013 under the Canada Not-for-profit Corporations Act. Its mandate is to provide the Canadian optics industry with research and development support and the technical assistance necessary to sustain its growth and to play a leading role in the development and application of optics in Canada.

As a non-profit organization, INO is exempt from income tax.

## 2. FINANCIAL SUPPORT

### a) Financial support – Internal Research Program

The financial support that INO receives as part of the Internal Research Program is as follows:

	Total support (from 2017 to 2022) \$	Remaining support available as at March 31, 2017 \$	Revenues	
			2017 \$	2016 \$
Government of Canada Canada Economic Development	50,000,000	40,000,000	10,000,000	9,000,000
Government of Quebec Financial support – Internal Research Program	57,000,000	50,600,000	6,400,000	6,400,000
	<b>107,000,000</b>	<b>90,600,000</b>	<b>16,400,000</b>	15,400,000

#### Government of Canada

In August 2016, the Government of Canada, through the Business and Regional Growth Program of Canada Economic Development, granted INO financial support of up to \$50,000,000 for the five-year period ending on March 31, 2021, for its Internal Research Program. As at March 31, 2017, an amount of \$2,967,033 (\$900,000 as at March 31, 2016) was still receivable on the first tranche of \$10,000,000 allocated for the year.

#### Government of Quebec

In July 2016, the Government of Quebec granted INO financial support of \$32,000,000 over 5 years, ending on March 31, 2021 for INO's Internal Research Program. The amount of \$6,400,000 allocated for the year was received in full as at March 31, 2017.

In addition, in March 2017, the Government of Quebec granted INO additional financial support of \$25,000,000 for the period from April 1, 2017 to March 31, 2022 to carry out its research activities and develop its expertise in the areas of IoT (Internet of things), advanced robotics and 3D printing, as well as to establish an office in the Montreal area. This financial support was received in full as at March 31, 2017 and is presented on the Statement of Financial Position under "Deferred financial support related to – Additional financial support program".

# Notes to Summary Financial Statements

March 31, 2017

## b) Support program for the purchase of research equipment – Government of Quebec

i) Financial support related to tangible capital assets and intangible assets

The financial support receivable pertains to the following items:

	2017	2016
	\$	\$
Term loan of an original amount of \$1,880,868 *	626,852	1,253,808
Purchase of research equipment **	-	1,035,269
	<u>626,852</u>	<u>2,289,077</u>
Less: Current portion	626,852	626,956
	<u>-</u>	<u>1,662,121</u>

\* This loan was contracted for tangible capital assets and intangible assets and payments on this loan (principal and interest) are made directly by the Government of Quebec to the lending financial institution. As a result, financial support receivable is recorded for an amount equal to the principal of the corresponding debt.

\*\* Under the financial support agreement, the Government of Quebec repays INO directly for 80% of the acquisition cost of equipment up to a maximum of \$3,989,463 (\$2,059,287 in 2016). As at March 31, 2017, an amount of \$1,469,283 had been received as an advance (note 2b, ii).

ii) Deferred financial support related to tangible capital assets and intangible assets

	2017	2016
	\$	\$
Balance – Beginning of year	17,549,595	17,194,357
Financial support related to the purchase of tangible capital assets and intangible assets for the year	1,124,409	1,859,269
Financial support related to the building for the year	406,263	359,891
Financial support received as an advance (note 2b, i)	1,469,283	-
Transfer to the revenues for the year to offset the corresponding depreciation and amortization	<u>(1,764,772)</u>	<u>(1,863,922)</u>
Balance – End of year	<u>18,784,778</u>	<u>17,549,595</u>

iii) Financial support related to financing costs

INO receives financial support for the interest charges related to certain long-term debt items. The financial support received for this purpose amounts to \$26,853 (\$55,405 in 2016) and has been included in revenues.

## c) Financial support related to the building

In 2016, the Government of Quebec granted INO financial support of up to \$772,691 for major work on the building. Financial support is paid as disbursements are made by INO. As at March 31, 2017, an amount of \$70,732 (\$205,353 in 2016) was receivable for the disbursements made during the year, and work is in progress.



# Notes to Summary Financial Statements

March 31, 2017

## d) Business and Regional Growth / Innovation Program

In 2009, INO obtained special financial support through the Business and Regional Growth / Innovation Program of Canada Economic Development for the purpose of improving its ability to market the technology and technological know-how produced by its Internal Research Program.

The deferred financial support related to tangible capital assets and intangible assets is broken down as follows:

	2017 \$	2016 \$
Balance – Beginning of year	48,741	81,236
Transfer to the revenues for the year to offset the corresponding depreciation and amortization	(32,493)	(32,495)
Balance – End of year	16,248	48,741

## 3. EMPLOYEE FUTURE BENEFITS

INO offers employee future benefit plans, including a defined benefit plan guaranteeing the payment of pension benefits to some of its employees.

### Defined benefit pension plan

The most recent complete actuarial valuation of the pension plan was performed on December 31, 2015 and was extrapolated as at March 31, 2017. Information related to the defined benefit pension plan is as follows:

	2017 \$	2016 \$
Defined benefit obligations	(43,694,500)	(39,358,700)
Fair value of plan assets	38,346,200	34,527,500
Defined benefit liability	(5,348,300)	(4,831,200)

As at March 31, 2017, the employee future benefit obligations were as follows:

	2017 \$	2016 \$
Defined benefit pension plan	5,348,300	4,831,200
Other employee future benefits	601,143	125,800
	5,949,443	4,957,000