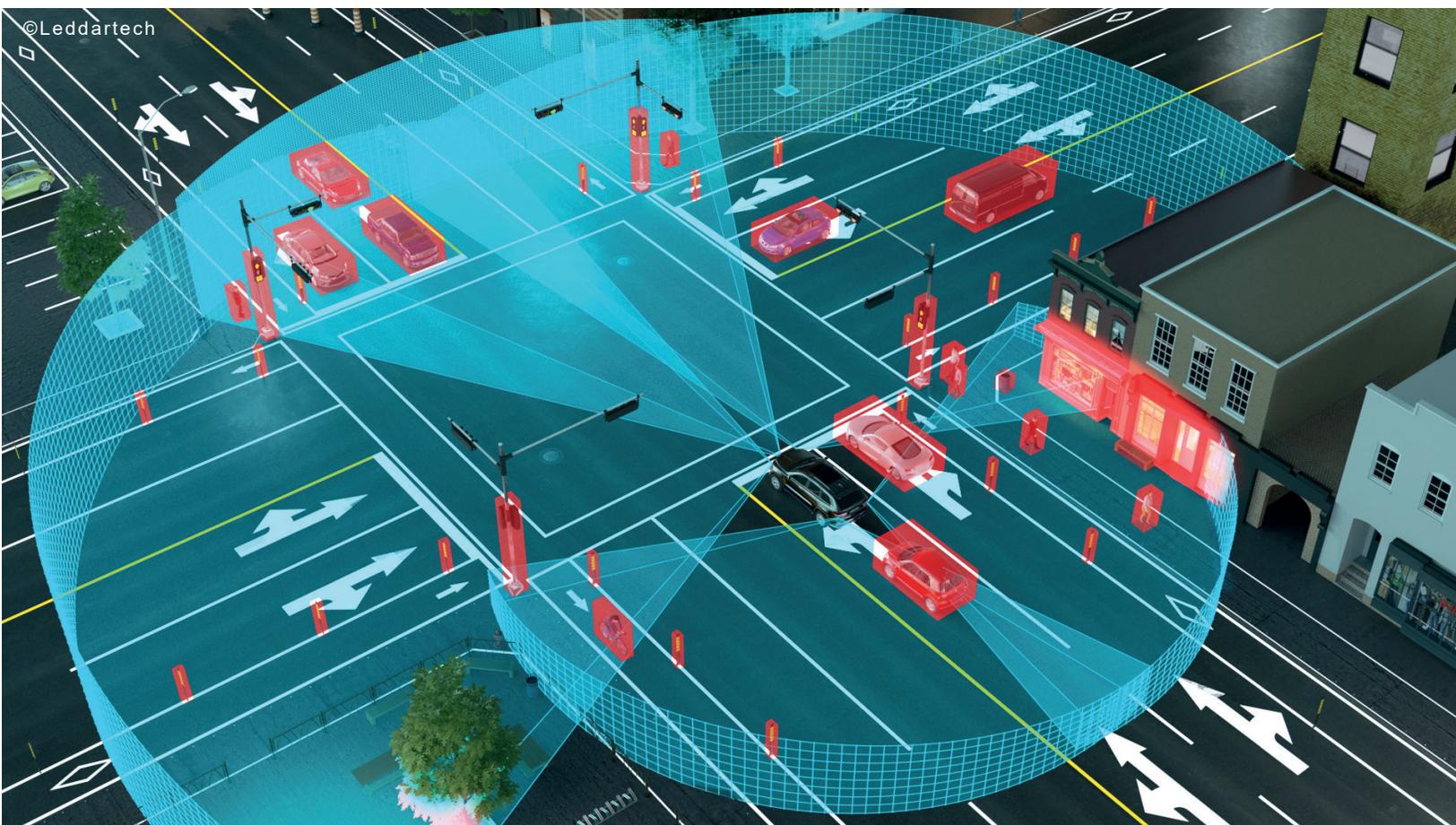




MiQro Innovation
Collaborative Centre

2017-2018 HIGHLIGHTS REPORT

April 1, 2017 to March 31, 2018



Gouvernement du Canada
Réseaux de centres
d'excellence

Government of Canada
Networks of Centres
of Excellence



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MESSAGE FROM THE CHAIRMAN OF THE BOARD



I have the great privilege, as Chairman of the Board, to accompany the MiQro Innovation Collaborative Centre (C2MI) in its constant progress. Growth continues, offering new challenges, both business-wise and technology-wise.

The expertise of the Centre's scientists is now part of the Canadian digital landscape. C2MI collaborates and works on a growing number of products and processes that meet the demands of a multitude of our economy sectors. C2MI supports Canadian innovators in all spheres of the economy from activities related to electronic components in our automobile to artificial intelligence, for the development of multi aspect devices for life sciences or for the commercialization of green technologies that help optimize energy efficiency.

Our entry into the digital era is well underway!

I want to thank the entire C2MI team, employees, management and board members for their dedication and hard work that ensures the continued success of our great organization.

And all my gratitude to our customers and partners, who inspire us to excel.

Good journey!

A handwritten signature in blue ink that reads "Louis Labelle". The signature is written in a cursive, flowing style.

MESSAGE FROM THE CHIEF EXECUTIVE OFFICER



“Excellence isn’t an aptitude,
it’s an attitude”

Ralph Marston

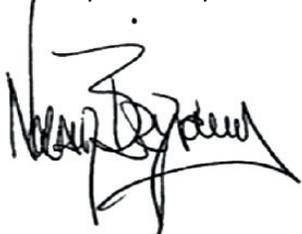
At C2MI, we rely on a perseverant team where initiative spirit is ubiquitous! In 2017–2018, the number of projects and processes developed at C2MI experienced a strong growth. Numerous industrial projects carried out in collaboration with the academic network allowed to train Highly Qualified Personnel (HQP) annually by project-based learning in an industrial environment.

C2MI is a unique infrastructure, and we don’t minimize any effort to ensure that the Centre can meet the new technological advances. The equipment roadmap is re-evaluated on a regular basis through technology monitoring activities, to ensure the Centre has new capabilities that meet the requirements of digital breakthroughs.

In 2017–2018, C2MI Business Development team has taken actions that immediately had positive impacts. Nearly 50 IRAP technical advisers had the privilege to discover C2MI’s unique capabilities and seized countless technological opportunities. Focused training activities have also been offered to members and partners to maintain and to enhance their level of technical expertise.

As success never comes alone, it’s important for me to recognize the outstanding contribution of the C2MI team. The scientists and technical professionals that define C2MI’s expertise can be very proud of their achievements. They’re the Centre greatest asset and their attitude and their pursuit of excellence are the key to our growing success.

We are proud to present the 2017-2018 results !

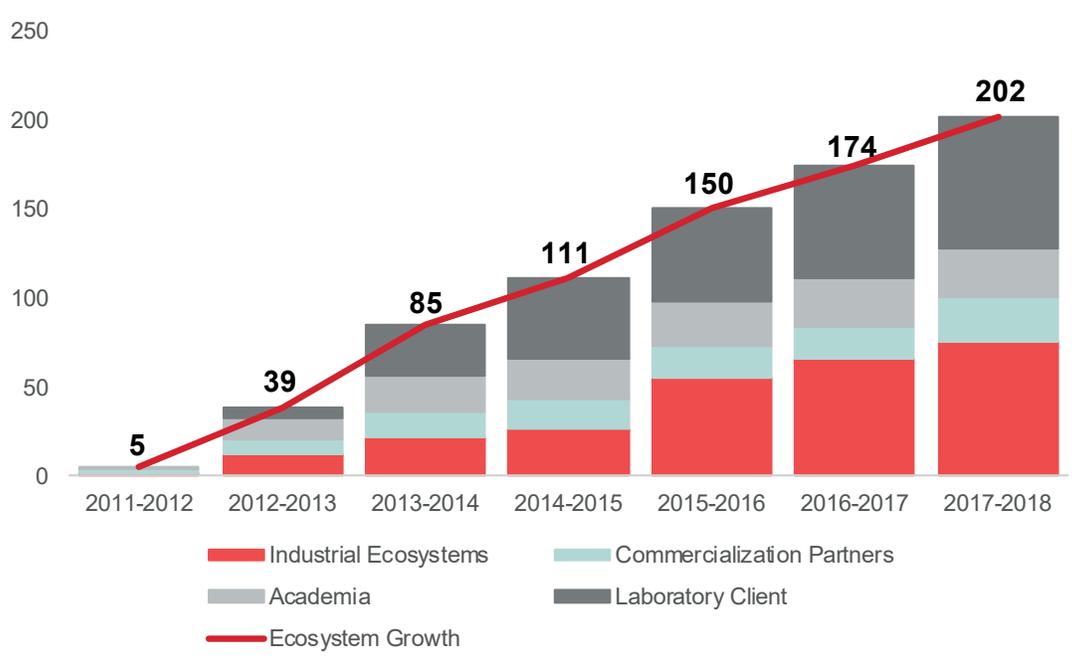


A CONTINUOUS GROWTH

C2MI supports its members and its clients from research to commercialization. In fact, the C2MI ecosystem has been growing steadily since its creation in 2010. Several factors explain this evolution and among them the increasing demand for digital technologies in a multitude of business sectors supported by C2MI activities. Moreover, by 2020, between 25 and 30 billion objects will be connected to each other, generating tens of thousands of data exabits. The resulting data will help to better understand the environment and thus simplify the lives of all the world’s citizens.

On the other hand, to support this evolution, it’s necessary to ensure accessibility to financial support and state-of-the-art infrastructure for the development of new technologies. With its continuous growth, C2MI is positioned to support its members, partners and customers to secure an advantageous position in the global market with its state-of-the-art infrastructure and dedicated technical team.

Ecosystem Evolution



In addition to its varied ecosystem, C2MI can count on the support of more than twenty research centres and associations.

C2MI GROWTH STRATEGY

C2MI's growth strategy consists of 3 axes defining the orientations, setting the objectives, and dictating the future actions of the Centre of Excellence in Commercialization and Research (CECR). These axes are interrelated and determine the forces to put in place to allow C2MI to grow at a steady pace since activities started in 2010.



2017-2018 FUNDED PROJECTS

Applications for projects financed by CECR funds have steadily increased in recent years. As announced last year, the start-ups support is at the heart of our decisions, because these technological projects have a strong potential for commercialization and therefore wealth creation. Applications were rigorously analyzed through the Commercialization Committee, and the projects are selected on their recommendations. C2MI received and evaluated 7 projects during the 2017–2018 year. All submitted projects were accepted based on their innovative aspects. The organizations funded were AceAge, Aeponyx, IBM, Lumentum, Stratuscent and TritonWear. C2MI granted a total of \$675,000.

C2MI FIGURES 2017-2018



INVESTMENTS

\$15M in capital investments

\$40,9M invested in R&D



PATENTS

28 patents and industrial secrets obtained

11 pending patents



PROJECTS

279 new products developed

76 industrial projects

18 industry-university collaboration projects

worth **\$13,5M**



RELATED JOBS

1922 related jobs associated with the new product development

26 professors associated with the project development

123 HQP* industry trained



NEW MARKETS ADDRESSED

305 new markets addressed such as

- Printed Electronic
- Telecommunication
- Optical Fiber

*highly qualified personnel

ECONOMIC IMPACT 2010-2018

The C2MI's economic impact¹ over the years is no longer a secret. As a Centre of Excellence in Commercialization and Research (CECR), C2MI contributes to Canadian innovation on a sustained basis. In a society where digital is ubiquitous, the expertise developed by the Centre and its ecosystem regrouping more than 200 organizations is a key element in commercialization successes.



\$63,3M in capital investments
\$272,6M invested in R&D



More than **570** markets addressed

More than **610** person-years HQP and professors involved in industrial projects



98 industry-university collaboration projects worth **\$29,7M**



213 patents and industrial secrets obtained



387 innovative industrial projects

40 intellectual property agreement



724 new products associated with more than **6434** person-year jobs



¹C2MI data nov. 2010 to march 2018

C2MI'S LABORATORIES

C2MI is the largest centre for research and innovation in microelectronics in Canada. Offering state-of-the-art equipment dedicated mainly to advanced packaging and micro-electromechanical systems (MEMS), the Centre also brings together more than 250 scientists in research and development (R & D).

Semiconductor Assembly Laboratory (LAS)

C2MI offers a wide range of equipment to conduct the advanced packaging of semiconductors as a finished product on a substrate ready for assembly to the card. C2MI's facilities allow thinning and dicing of 200mm and 300mm wafers, flip chip or wire bonding with positioning accuracy of up to 1 μm for all types of integrated circuit components or optoelectronics.



Analytical Laboratory

The analytical laboratory plays a dual role within C2MI as it is contributing to both development support of new technologies / products / processes as well as to the development of uniformity control of the production processes over time. These analyses are performed to achieve a high quality standard for processes and products.

Laboratory of Integration of Microsystems (LIMS)



C2MI MEMS laboratory has class 10 (ISO 4) cleanrooms. The infrastructure is suitable for the micro-machining of surface layer as well as for silicon. C2MI features production lines for fabrication and wafer level packaging of MEMS on 200mm wafers.

Reliability Laboratory

Technological pressures on the entire electronics industry constantly aim to reduce the size and cost of the transistor while increasing the number of transistors per chip. However, those deemed critical expectations go against the long-term product reliability. To ensure product reliability over a period of life, the industry has implemented standardized tests. These tests are required to qualify new products and processes and thus control product consistency by simulating the life of products in an accelerated mode.

AN INTEGRATED CHAIN FOR DIGITAL PROSPERITY



The Integrated Chain for Digital Prosperity aims to create a dynamic research and innovation ecosystem. The program enables the creation of numerous research and development projects in microelectronics, the training of a highly qualified personnel, and the creation of new technological products. It brings together several state-of-the-art research infrastructures including the Quantum Institute, the MiQro Innovation Collaborative Centre (C2MI) and the Interdisciplinary Institute for Technological Innovation (3IT).

This initiative targets the innovative manufacturing expansion, the artificial intelligence development, and the training of a specialized workforce to secure a world-class position in these fields. The C2MI, as a high-tech infrastructure, enables the production of microsystems prototypes and the support during commercialization of new products.



3IT - Sherbrooke



C2MI - Bromont

SUCCESSFUL PROJECTS

Lumentum: Silicon Photonics For Optical Communications

Develop a platform capable of manufacturing micron scale Planar Light Circuits in Silicon (Si-PLC) using standard bulk micromachining processes in Silicon on Insulator (SOI) 8" wafers.

Technological Challenges

Lumentum is engaged in exploratory projects that aim at expanding the application space of the processes used for MEMS. Lumentum is working on developing a dynamic ROADM Networking which could also provide significant cost and performance benefits for future products in telecommunications. Some key challenges need to be overcome for success of this approach:

1. A method to produce smooth sidewalls with surface roughness of single-digit nanometres.
2. A process flow that allows manufacturing of three level structures.
3. Developing a robust modelling capability to design the building blocks needed for ROADM applications.
4. Developing characterization and testing equipment to assess the quality of the devices.

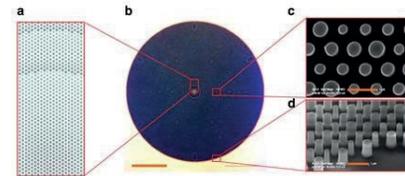
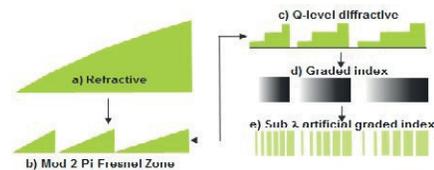
Developed Solution

For micron scale silicon photonics

- A two level self-aligned process.
- A design library of building blocks with different functionalities.
- Different methods for improving the sidewall surface roughness.

For diffractive optic elements (DOE)

- A proprietary design with a single mask process that allows manufacturing of high efficiency 1D and 2D DOEs.



Goal

In addition, several interesting applications are being envisioned of bulk micromachined devices for Dynamic ROADM Networking, which could also provide significant cost and performance benefits for future products within other business units in Lumentum.

	Funded amount 100K		Job created person-year/ 2 years 8
	Projected revenues / 2 years \$10M		Capital investments / 2 years \$500K

This project is an active collaboration between

EVENTS 2017-2018

Each year, C2MI attends to or hosts several events to ensure the promotion of its service offer, but also to discover the latest technological advances in the industry. During 2017-2018, C2MI attended to or welcomed the following events:

MAY 2017

OCE Discovery 2017

Marie-Josée Turgeon, Vice President, Business Development at C2MI was on May 15 and 16 at Discovery 2017 to present the C2MI's service offer. The fair brought together over 3,000 participants at the Metro Toronto Convention Centre in Toronto.



ÉlectRIEonique Lunch: Plan for Innovation and Competency

On May 16, 2017, C2MI welcomed Julie Insley for the ÉlectRIEonique Lunch organized by the RIE. Under the theme "Plan for Innovation and Competency", participants discussed the content of the 2017 Federal Budget.



Open Innovation Week

Normand Bourbonnais, CEO of C2MI, participated as a speaker at the Open Innovation Week of Eureka that took place in Barcelona, Spain. His lecture focused on the printed electronics and piezoelectric materials in microsystems (MEMS).



JUNE 2017

Transducers'17

During the Transducers 2017 conference in Kaoshing, Taiwan, Pascal Newby of C2MI presented his results from some research done at the Université de Sherbrooke: *Calibration-less method for measuring pressure with microfabricated Pirani gauges.*



Sensors Expo & Conference

Annie Dallaire, Director, Business Development, took part in Sensors Expo & Conference 2017 in San Jose, California from June 27 to 29. The C2MI presented its service offer accompanied by Teledyne Dalsa.



JULY 2017

Visit of the Bordeaux delegation

C2MI welcomed a delegation from Bordeaux on the last day of the 7th LN2 conference in Estrimont. The delegation had the opportunity to visit C2MI's installations as well as attended to a presentation on the Wafer Level Packaging at C2MI given by Sébastien Michel from Teledyne Dalsa.



SEPTEMBER 2017

Startup Canada : Provincial Finals

During this ceremony highlighting Canadian entrepreneurship, C2MI won the Entrepreneur Support Award for its implication with start-ups through all its activities.



Innovation 360

During the 2017 Innovation 360, C2MI proudly contributed to the Canadian event as a GOLD sponsor. Normand Bourbonnais, CEO of C2MI was one of the invited speakers. Also, the C2MI had a booth to show its service offer.



Lab2Fab: Integration for Innovation

The two-day event hosted by C2MI allowed all the participants to work together to find solutions for R&D challenges. The participants also had the opportunity to visit the C2MI facilities.



OCTOBER 2017

Université Laval: Work Fair

Marie-Josée Turgeon, C2MI's Vice-President, Business Development was there to introduce future graduates to career opportunities at C2MI.



NOVEMBER 2017

MEMS & Sensors Executive Congress

During this training, exchange and networking event, a C2MI representative was there to talk about services and opportunities that C2MI can offer to companies.



Visit of the IRAP advisors team

On November 23, C2MI received an IRAP advisors team. During the meeting, they visited the laboratories which enabled them to understand all the capacities and expertise developed by the Centre.



DECEMBER 2017

L-Edit/MEMSPRO Training

C2MI in collaboration with Élexpertise and the Commission des partenaires du travail provided an advanced training on MEMS design software. Participants benefited from the expertise of Mary-Ann Maher, MEMS development and design professionals, to enhance their knowledge and optimize their use of the software.



“Protégéons Bromont”

C2MI welcomed on December 6, 2017, the participants of the happy hour held for the Parc des Sommets Bromont development projects. C2MI also joined the other contributors with a donation of \$5, 000 for the creation of the park and thereby the development of a work-leisure balance in the landscape of Bromont.



MARCH 2018

IMAPS: Device Packaging

At the 14th International Conference and Exhibition on Device Packaging, Catherine Marsan-Loyer from C2MI presented an article written in collaboration with her colleague Thomas Dequivre named *Effective Method for Wire Bonds Rework using Conductive Epoxy* in the form of a technical poster.



Élexpertise Discovery Day

For the occasion, the C2MI welcomed Cégep de Sherbrooke's students in electronics and computer science who could speak with industry professionals from the electrical and electronics industry.





Reinventing innovation

MiQro Innovation Collaborative Centre

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