



CPIC - Canadian Photonic Industry Consortium / Consortium photonique de l'industrie canadienne

Pre-Budget Submission to the House of Commons Standing Committee on Finances

Photonics- A Strategic Economic Asset

Photonics is the science of light — how to produce it, detect it, manipulate it, employ it and analyze it.

Photonics is a \$CDN 650 billion global industry that impacts every sector of the economy and the daily lives of every Canadian. The Canadian Photonic Industry Consortium (CPIC) conducted a study on photonics in Canada in 2015 and demonstrated the ubiquitous aspect of photonics with applications in important economic sectors such as aerospace, automobile, communications, defense and security, energy, health and medical, microelectronics, and natural resources, each having a strong domestic demand for photonics solutions. As demonstrated in the Horizon 2020 program in Europe, an effective Innovation and clusters policy should focus on main industrial assets and challenges and identify key technologies that would be beneficial for all industrial segments, photonics being definitively one of these key technologies for the future of Canada.

The Canadian Photonic Industry Consortium, also known as Photons Canada has been created in 2012 to assist Canadian companies to optimize operations and improve profits by facilitating and accelerating the application of photonic technologies that improve quality, productivity and profitability. CPIC is an industry-led photonics knowledge exchange organization, applying photonic technologies to industry problems and opportunities.

In 2015, CPIC conducted a study of photonics in Canada. In addition to a global survey, CPIC organized eight application workshops distributed all over the Country. This study has demonstrated that this technology has great potential to be a significant engine for national economic growth. Given greater public and industry awareness, and greater focus on potential key applications in such sectors as aerospace, automobile, communications and microelectronics, defense and security, energy, health and medical, natural resources and pharmaceuticals, each with a strong domestic demand for photonics solutions, Canada would be well-positioned to leverage its photonic expertise by providing solutions to the various economic sectors and by creating companies with global opportunities.

The report on the study entitled “Light Technologies- A Strategic Economic Asset” is available on the Photons Canada web site: (<http://photonscanada.ca/en/publications/cpic-report/>). This study concludes with five specific recommendations which would help strengthening the Canadian industry through photonics:

- 1- Improve Photonics Education and Awareness
- 2- Engage the User community Domestically and Abroad
- 3- Increase Commercialization of Canadian Technology
- 4- Focus R&D on Strategic Sectors
- 5- Expand the Cluster Model

CPIC is presently financed by membership which is not sufficient to cover these required activities which are important for the future of the industry while it does not have access to a federal program which could be used as a source of funding.

In order to proceed with these recommendations in a timely manner, the CPIC financial ask from the federal government is \$250K per year over four years for a total of \$1M.

Background

Canada has approximately 400 photonics companies that employ more than 25,000 people and collectively generate \$4.6 billion annually with an average growth of 10%. Our photonic industry exported \$3.6 billion in 2015 while imports of photonic goods reached \$7.6 billion which indicates the increased potential for the Canadian photonic industry.

The nation's core photonics producer sector is firmly rooted in small and medium enterprises (SMEs) and start-ups with revenues in the \$1–10 million range and up to 50 employees (although there are a handful of larger companies or divisions). These companies range from developers and components manufacturers (e.g., of lasers, fibre optics) to complete photonics-based instruments (fibre lasers, sensors, cameras, projectors, scanning microscopes, etc.).

The Canadian photonic companies need support to innovate further and to increase commercialization of their products in Canada as well as in the global market. They need to hire highly qualified personnel, to access new photonic technologies and to reach potential Canadian partners as well as end-users.

USA and Europe are developing their photonic strategy focusing on their own economy. It is becoming critical for Canada to ensure the growth of its photonic industry as well as to accelerate the use of photonics by the companies in the many industrial sectors which are keys to the Canadian economy. The Federal Government invests approximately \$120 million annually on optics, photonics and lasers-related research in universities, government laboratories and other R&D centres while the US Government invests more than US\$1.1 billion in photonics each year. In Europe, the European Commission reserves, within its Horizon 2020 program, 100 million EUROS each year to photonics as a key enabling technology. In addition, each European Countries invest in photonic research. As examples, UK supports research in Optoelectronics Research Centre and many universities, France supports laboratories such as CNRS, CEA LETI, ONERA and CNES while the Fraunhofer and Max-Planck institutes are financially supported by Germany.

Since photonics is key to the future growth of the Canadian industry, the NSERC investment in photonics collaborative projects is critical to provide novel solutions to the industry and to ensure

creation of world-class photonics physicists and engineers, since a shortage of photonics technicians and application engineers hampers the industry's growth. Despite the investment in photonics partnership R&D and the presence of INO, a world-class research & technology organization in the eco system, technology flow and transfer between the scientific discoveries and the industrial sectors is still inadequate. The federal Government should continue and even increase funding of photonics R&D Centres and laboratories to accelerate the technology transfers. The European Horizon 2020 Program in Europe has demonstrated the value of partnership. We have many examples of focused investments in key areas of photonics in other countries: the integrated photonics manufacturing institute in USA, the flat panel displays in Korea, the high power laser processing in Germany, the photonics electronics systems convergence technologies in Japan and the association of industrial laser users (AILU) in UK. Canada needs a photonics strategy group that includes industry and academics to focus the investment on a few key sectors that are judged to be of global significance in the next ten years and where Canada has the photonics skills to make a difference.

The presence of strong photonics cluster activity encourages the incubation and development of a balanced distribution of photonics companies. Due to its size, two levels of clusters are important for Canada, the first one being regional photonics clusters who would organize local activities, promote Canadian photonics capabilities to local end-users and develop networking opportunities. To network these regional clusters, we need a national photonics cluster to develop partnership between the regional clusters and to organize national and international activities. Such structure needs base funding at the national level to complement membership fees. The Innovation, Science and Economic Development department should have a program to support the national clusters while the funding of the regional clusters would be shared with the Provincial Governments.

The Build in Canada Innovation Program is an excellent tool to accelerate the growth of SMEs. This program covers pre-commercial, that is products development at technology readiness levels (TRL) 7-9 which are very close to commercialization. For a good while, the US have had a similar program called Small Business Innovation Research (SBIR) which covers TRL 4-9 therefore also supporting early stages of development which are also called the valley of death for innovative technologies. When a Canadian SME competes with an US SME, the American company has the advantage of having been financially supported in its product development through the SBIR program. Extending the Canadian BCIP program to cover TRL 4-9 would help SMEs to compete by reducing time to market and therefore would better support Canadian SMEs.

The Canadian photonics sector is now at that tipping-point, where we have come, over 20 years from not knowing what photonics was, to realizing it pervades all aspects of our society. Canada can, and should play an important role in future global Photonics development and manufacture. It cannot do so, without taking a more strategic view of this domain. The Canadian Photonic Industry Consortium is uniquely positioned, both in expertise, and impartiality to assist in this mission.