



Ocean Networks Canada Submission to the Expert Panel on the Federal Support of R&D

Summary Statement

Ocean Networks Canada (ONC) welcomes this opportunity to respond to questions posed in the Expert Panel Consultation Paper prepared for the Review of Federal Support to Research and Development. Our comments are framed by ONC's mandate and responsibility for one of Canada's major science initiatives and by our experience in hosting a CECR program and the related partnerships with SMEs which dominate the marine S&T sector.

The main points of our submission are:

- We emphasize under 'climate for new ventures' the importance of a vibrant research environment in Canada as an engine for business innovation. In our own case, we point to the federal and provincial investment in building world-leading capacity in unique ocean observing systems whereby science challenges are pushing marine and ICT technology development. This is one case in point of how investing in major science facilities creates unprecedented commercial opportunities from which Canadian companies are already enhancing their global competitiveness.
- UILOs lack capacity and expertise over the full domain of university research and lack the ability to connect with the breadth of industries on a national scale.
- Programs like CECRs and Industrial Research Chairs are ideally suited to provide domain expertise and facilitate academic/industry connections to turn inventions into innovations.
- Funding mechanisms are essential to provide capital to reduce the inherent risks of R&D and encourage innovation. Programs like IRAP and SR&ED are essential to encourage this process. Maintaining elevated IRAP funding levels would be highly recommended.
- Consideration of programs in other countries (especially those with higher performance than Canada) would be instructive. In the US programs such as SBIRs and NOPPs are interesting mechanisms. Providing full funding levels, first buyer market and industry ownership of IP are further incentives used by these programs.

Sincerely,

S. Martin Taylor, PhD
President and CEO
Ocean Networks Canada

Ocean Networks Canada Submission to the Expert Panel on the Federal Support of R&D

Ocean Networks Canada (ONC) welcomes this opportunity to respond to questions posed in the Expert Panel Consultation Paper prepared for the Review of Federal Support to Research and Development.

ONC is the not for profit organization created by the University of Victoria in 2007 to manage and develop the VENUS and NEPTUNE Canada cabled ocean networks. In 2009, ONC was awarded a CECR grant to establish the ONC Centre for Enterprise and Engagement. The Centre's mandate is to stimulate commercial opportunities and increase economic competitiveness for companies, principally in the marine S&T sector, which can benefit from the unique technology development advantage afforded by ONC's world leading ocean observatory.

While of broader application, the comments provided here are framed by ONC's mandate and responsibility for one of Canada's major science initiatives and by our early experience in hosting a CECR program. Our comments also reflect the fact that our primary interactions and partnerships are with SMEs which dominate the marine S&T sector and operate in a global marketplace.

We respond to selected questions among the 15 listed in the Consultation Paper.

Responses to Selected Consultation Questions

Q2. Does Figure 2, the model of business innovation presented above, capture the key structural factors and inputs to innovation? If not, what is missing?

The model is cast at a very high level and stated in very general terms. We want to emphasize under 'climate for new ventures' the importance of a vibrant research environment in Canada as an engine for business innovation. In our own case, we point to the federal and provincial investment in building world-leading capacity in unique ocean observing systems whereby science challenges are pushing marine and ICT technology development to meet the challenges of conducting research in hostile coastal and deep ocean environments. This is one case in point of how investing in major science facilities creates unprecedented commercial opportunities from which Canadian companies are already enhancing their global competitiveness.

Q4. Regarding ideas and knowledge, do you believe it is important for Canadian firms to perform their own R&D and, if so, what do you believe are the key factors that have been limiting business R&D activity in Canada?

SMEs typically have limited resources and capacity to undertake substantial in-house R&D. Their ability to be nationally and globally competitive can and should be advanced by drawing upon the substantial federal research investments in the universities. Sectors that serve the research community globally (e.g., oceanographic instrument technologies) are especially well placed to integrate and adapt technologies from universities and other research institutions since this is both the source of new technology ideas and inventions, but also an important part of their market.

If, however, inventions are too far removed from their potential application in industry, the ability to recognize a possible innovation is reduced at the same time as the cost to adapt it increases. Engaging universities more

directly in the needs of industry would help fill this critical gap. Moreover, providing stronger university merit incentives to researchers beyond publications would incentivize connecting research to industry needs.

While it is important to balance investment in R&D programs across the continuum from more basic to more applied activity, there is a strong case to be made for creating mechanisms and incentives for researcher engagement with industry needs that apply to upstream as well as downstream research. Industrial research chairs are one mechanism. CECRs are another. Graduate student placements in industry-linked programs like MITACS also play a key role. Creating partnerships and dialog between academics and industry stimulates the exchange of knowledge and ideas to encourage further interaction. The process is more straightforward if the research field is more directly connected to specific industry needs and more challenging if private sector receptors are spread over a wide range of R&D fields and industry categories.

Q5. Regarding networks, collaborations and linkages, what are the main impediments to successful business-university or business-college partnerships? Does the postsecondary education system have the right capacity, approaches, and policies for effective partnerships with business?

Investments in mechanisms to facilitate industry-academic interactions have had uneven success. University Industry Liaison Offices (UILOs) created to facilitate these interactions are a case in point. How they interact, how they are staffed and how many subject matter experts they have on staff are key factors. Is the interaction effective and efficient? Can a single office realistically cover and service the interactions between hundreds of researchers across a broad range of fields with industry of varying size, location and application? More focused programs, such as industrial research chairs and CECRs are arguably better placed to foster productive and domain specific interactions matching expertise on both the academic and industry side.

Academics are promoted based on publication records and merit of scientific research. Interactions with industry must also be seen as measure of merit, not a distraction. Researchers often have a difficult enough time writing grant proposals, teaching, supervising students, doing research and writing papers in their primary field of research to consider how it could be adapted or applied to meet industry needs. More narrowly focused sector specific facilitators need to be in place to enable interaction with less effort on both the industry and academic side. Interacting with specific industries as a cluster also can help by providing links to many companies as a group. In this regard, research parks provide a locus and focus for the development of industry clusters and the creation of critical mass of expertise in a collaborative environment.

Q6. Regarding the creation of demand for business innovation, what role, if any, do you believe that government should play in being a “first customer” for R&D investments in Canada?

This seems to be quite effective in the US under the SBIR program. This provides up to \$750k to develop a prototype system to meet a government department need. However a government need does not mean there is a market for the product. With a large gap between the prototype and commercial product, plus no

guarantee of a follow on market, situations can occur where companies may continue developments under the program without ever creating viable products.

Although sector specific, the National Ocean Partnership Program (NOPP) seems to be very effective for the oceanographic research sector. Here partnerships between the industry, academic and government sectors are encouraged to meet strategic needs identified by key US government departments. Developments are funded at the multi-million dollar level (Canadian companies are fully eligible to participate). This type of program is effective at creating enough product development and market pull to generate new innovative products. Note that these programs are fully funded so there is no required contribution from industry, thus reducing the financial barrier to engage in this type of project. Not only do these projects stimulate the development of new technologies, they encourage interaction with academia which can create lasting partnerships well beyond the life of the project.

Q7.Regarding talent, is Canada producing sufficient numbers of graduates with the right skills to drive business innovation and productivity growth? If not, what changes are needed? Where demand for advanced skills is low, what are the reasons and what changes, if any, are needed?

Canada suffers from a serious under-production of highly qualified personnel in S&T fields which are most directly related to business innovation and this problem is especially acute at the graduate level. Universities such as UVic and Waterloo have been proactive in addressing this problem through the creation of strong coop programs at the graduate and undergraduate levels, and indeed have in certain programs made coop mandatory (e.g., in the UVic Engineering program). The success of these pioneer programs has led other universities to follow suit. Nevertheless, there are limits to what these programs can generate and the incentives for industry to provide coop placements are not always strong, especially during periods of economic downturn. This is where more focused mechanisms are crucial with the IDRI program, for which MITACS now has principal administrative responsibility, being a successful example with applications over a broad range of university-industry linkages.

Q9.With which federal programs supporting business or commercially oriented R&D in 17
Canada do you have direct experience and knowledge? In your view:

- a. Which of these programs are working, and why?
- b. Which programs are not working, and why not?

The collective experience of our ONC team has been with the CECR, IRAP, and SR&ED programs. The IRAP and SRED programs are well established and widely recognized as very successful and thereby deserving sustained federal support, including extension of the elevated funding levels for IRAP.

The CECR program is relatively new program initiated in 2007 with the first Centres starting in 2008. The objective of this program is to advance research and facilitate the commercialization of technologies aligned

with priority areas within Canada's S&T Strategy. Central to that strategy is creating synergies among the three 'S&T advantages' – the 'entrepreneurial', 'knowledge' and 'people' components'. The CECR model is a potentially very effective means to that end. CECRs have varying models but impact the Business Innovation Process at various levels in ways that enhance existing programs and maximize impacts for specific sectors.

The ONC Centre for Enterprise and Engagement (ONCCEE), for example, is a unique Centre focusing on the ocean technology sector. It leverages the CFI funded infrastructure in cabled ocean observing systems - the Ocean Networks Canada Observatory which includes the VENUS and NEPTUNE Canada networks led by the University of Victoria. The Observatory acts as a primary research engine and facility for demonstrating new Canadian technologies before an international community consisting of hundreds of leading researchers and potential customers through public access to the systems. In a sector dominated by SMEs competing in a global marketplace, with limited regional and national industry organization, it is an ideal sector for a CECR to facilitate sector growth and stimulate further R&D.

ONCCEE focuses on four areas within the ocean technology sector: sensor and instrument technologies; ocean observing technologies; information and communication technologies (ICT); and education and public engagement. It offers facilities to demonstrate new products live on the Internet using the Observatory infrastructure and advanced ICT technology. ONCCEE supports cluster development and enhancement, bringing new opportunities and programs to regional clusters. ONCCEE is also facilitating the networking of the regional clusters into a national entity to further exchanges of knowledge and ideas.

Organized with an expert business development officer as a lead in each of the Centre's focus areas, new technology ideas and needs from the Observatory research facility can be more effectively placed within appropriate industry receptors. The Centre can also accelerate industry technology development by providing expert consulting from our team or placement of graduate students through a partnership with the MITACS Accelerate Program. The entire program is complemented by education and public engagement programs targeted at exciting students to choose careers in science and technology. With these programs the Centre acts as an external enabler providing support for three out of the four key inputs businesses need for innovation activities.

Q10. If you have direct experience and knowledge of the SR&ED tax credit, what are your views?

Suffice to comment that the SR&ED program is a very significant incentive for industry to invest in R&D and allows capital to be invested in additional activities such as marketing to help translate R&D successes into innovations.

Q11. How could the Government of Canada lighten the administration requirements of its programs on recipients and improve outreach to business?

One low cost initiative would be to create a centralized "Innovate Canada" website providing connections and information on the range of programs available for technology development and demonstrations through

various agencies and programs NCE, NSERC, IRAP, SR&ED, PWGSC, etc. This would serve as an effective and comprehensive source to help direct companies to the programs that best fit their needs.

Q12.How could the Government of Canada be more innovative and responsive to meet new needs or opportunities, and try alternative service delivery-approaches in its programs?

R&D is by definition a risky venture such that reducing the costs and barriers to assuming risk, and thereby encouraging innovation, is a central issue. Accordingly, the Government should carefully evaluate the costs and benefits of the level of industry matching required in several of its R&D programs. Similarly, IP provisions need to be examined so that disincentives to commercialization are not introduced for either the research or industry partners. US programs are instructive in this regard.

Q13.Are there any gaps in the Government of Canada's support to business and commercially-oriented R&D? Do firms performing R&D in other countries have an advantage over Canadian firms because of access to programs that are not available in Canada? What would be the principal features of new programming to fill these gaps?

US R&D programs appear to offer significantly greater incentives to industry - no or lower levels of cost matching, stronger IP rights, more inducements to partner (e.g., under the NOPP program academic partnerships are required and government partnerships are encouraged). However, SBIR and NOPP programs are government directed, unlike SR&ED and IRAP which are self directed.

Q15.Is there a difference between R&D and innovation? If yes, how are they different?

Should government focus on R&D or Innovation? What should the balance be?

R&D is a process of developing new technologies, processes or services. Innovation occurs when R&D results are successfully adopted by the market. Not all R&D results in innovation. R&D is risky but the process generates new ideas and experience that can be applied to future developments. Government funding of R&D helps encourage industry to take risks. IRAP is an excellent and well subscribed example of a successful program to stimulate R&D.

Innovation would be much more difficult to fund. Innovation is largely a function of marketing (product requirements, target markets, competitive analysis, pricing, etc.) and results when the R&D is properly focused. It might be possible to create incentives for innovation but creating a successful innovation is a significant reward in itself.