

Canadian Innovation News

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What is CIN?

Canadian Innovation News reports on Canadian innovation and international collaboration opportunities.

Our mission is to provide actionable information, promote engaged communities and facilitate new linkages between the private sector, academia and government within Canada and internationally. We keep our readers up to date on the latest opportunities to collaborate and develop cutting-edge innovations in today's rapidly evolving, globally-connected world.

Jeffrey Crelinsten

Publisher

Rebecca Melville

Business Manager

Debbie Lawes

Editor

Annie Patiño-Marín

Graphic Designer

Content Partners



Chris Mathis
President and CEO
Springboard Atlantic Inc.
cmathis@springboardatlantic.ca
1-902-476-1641

Contributing Partners



Scott McLean
Director
Ocean Networks Canada
Innovation Centre
sdmclean@uvic.ca
P: 1-250-853-3961
FAX: 1-250-472-4760



Christine Misquitta
Vice President, Administration
and Communications
Centre for the
Commercialization of
Antibodies and Biologics
(CCAB)
elizabeth.shilts@Innovation.ca
P: 1-647-715-2305
M: 1-647-405-6145
FAX: 1-416-593-0225



Avvey Peters
Vice President, Partnerships
Communitech
avvey.peters@communitech.ca
P: 1-519-888-9944 ext. 2028



info@cybernb.ca

Distribution Partners



Colleges and Institutes Canada
Collèges et instituts Canada

Julien Abord-Babin
Senior Strategic
Communications Officer,
Communications and
Stakeholder Engagement
Colleges and Institutes Canada
jabord-babin@collegesinstitutes.ca
1-613-746-2222 ext. 3131



Global Affairs
Canada

Affaires mondiales
Canada

Contact Us

Canadian Innovation News
@ Centre for Social Innovation
215 Spadina Avenue, Suite 400
Toronto ON M5T 2C7
Canada

416-481-7070

For advertising inquiries contact:

[Rebecca Melville](#)

For editorial inquiries contact:

[Debbie Lawes](#)

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Message from the Publisher

Welcome to the inaugural edition of Canadian Innovation News, your window into the best of Canadian innovation. Our mission is to connect the world to Canadian innovators and to foster collaboration in the development of cutting-edge innovations and competitive solutions that enrich the future for all of us.

Canada is a large country geographically. We're three times the size of India, a little bigger than China, almost the same size of all of Europe, more than half the size of South America and about one third the landmass of Africa. Yet by population, at about 35 million strong, we're a small country. In order to connect and service citizens from disparate cultures and geographies, Canadians have had to innovate.

The 19th century saw the construction of railways, including the transcontinental railway built in the 1880s. The first successful braking system was developed in Canada, as was the rotary snowplough that made possible safe, reliable train travel in Canadian winters. One of the chief architects of the global system of time zones was

Sir Francis Fleming, a Canadian. Throughout the 20th century, Canada was a leader in the field of satellite communications, being the first country to establish its own communications system using a geostationary satellite (Anik).

The list goes on: from the discovery of insulin and the mapping of the brain's visual cortex to the development of computerized weather forecasting systems and the discovery of stem cells.

This issue shines a spotlight on the research and innovation taking place in the eastern reaches of our vast country – Atlantic Canada. In emerging fields such as ocean science and technology, smart cities and cybersecurity, this region is working with partners across Canada—and globally—to build the critical mass of talent and infrastructure needed to tackle complex challenges. The Ocean Frontier Institute, for example, is working with 19 industry partners and eight international collaborators, including four of the top five global ocean institutes.

If we are to find viable and sustainable solutions to the world's social and economic challenges,

collaboration and cooperation among experts and stakeholders from different disciplines, industries, geographies and cultures is essential. Atlantic Canada has developed a unique approach to innovation, turning cooperation into a competitive advantage. Springboard Atlantic, a virtual technology transfer office for 19 universities and colleges in the region, matches the expertise in academia with the needs of industry and government. Together, they have built a dynamic, flexible and entrepreneurial innovation ecosystem.

You will see the same spirit of collaboration for competitive advantage throughout the stories you read in this issue. Cooperation and creativity are hallmarks of Canada's approach to innovation. I invite you to explore the following pages and connect with the innovators developing the solutions for tomorrow.

Jeffrey Crelinsten

Springboard Atlantic: Your one-stop shop for industry academic collaboration

Springboard Atlantic (Springboard) was created by the post-secondary education institutions and the Atlantic Canada Opportunities Agency (through the Atlantic Innovation Fund in 2005) to help drive Atlantic Canada's economy through technology transfer and commercialization. Springboard is the only commercialization network in Canada that benefits from both [college and universities](#) working together under one common member mandate.

Springboard acts as an organization and network to value-add the region's increasing research activity and works to drive industry-academic collaboration, creating new and improved products, processes and services while improving Atlantic Canada's overall competitiveness on the global stage. The result is a solid base of researchers and collaborations happening in the region that benefit the Canadian economy. We are #springboarding commercialization and competitiveness.

Springboard can boost a number of successful world class partnerships in key areas like [Smart](#)

[Grid](#) and [sustainable energy](#), [energy storage](#), [cyber-security](#), [ocean technology](#) and injecting new and innovative practices into traditional resource industries like [fisheries](#) and [mining](#). The Springboard network is enabling the creation of world class companies in multiple sectors in the region. One such sector example are the multiple success stories emerging from the high tech and clean technology sectors like [Eigen Innovations](#), [CarbonCure](#), [TruLeaf](#), and FinTech companies like [Verafin](#) to name but a few.

From simple first engagements like a 25% increase in production at [GE Barbour's](#) by the [Collège communautaire du Nouveau-Brunswick](#), to regional startups like [Meta Materials](#) doing partnerships with advanced materials faculty in our region, to new world-changing investments that have created facilities like the [Ocean Frontiers Institute](#), Springboard makes a difference for companies.

Springboard works hand in hand with our member institutions and engages the provincial

and federal governments to help drive cohesion in the region around the [Atlantic Growth Strategy](#). This regionally focused effort will have a solid impact in the region, from increasing immigration to student attraction and retention.

In short, thanks to the continued evolution of Springboard Atlantic and its strategic partners, Atlantic Canada is a great place to start, grow and do business.



Chris Mathis
President and CEO
Springboard Atlantic Inc.

A global hub for ocean science is born

An historic global partnership may be our best hope for saving the ocean

By Debbie Lawes

The [Ocean Frontier Institute](#) (OFI) is poised to become one of the world's leading research efforts to understand the complex changes happening in the most vulnerable ocean regions, and find solutions to ensure their safe and sustainable development for future generations.

Nearly a quarter of a billion dollars went into creating the OFI—an unprecedented investment and collaboration that creates and builds upon a critical mass of talent and [infrastructure](#) in ocean research. The OFI is built on world-class Canadian expertise at [Dalhousie University](#), [Memorial University](#) and the [University of Prince Edward Island](#), working in partnership with three provinces, three federal departments, the [Royal Canadian Navy](#), the [National Film Board of Canada](#), 19 industry partners and eight international collaborators, including four of the top five global ocean institutes.

Dalhousie president Dr. Richard Florizone described OFI as “a new global partnership that



The Ocean Tracking Network (OTN), a partner within OFI, received \$11.4 million from the Canada Foundation for Innovation in January. The OTN is developing next-generation technologies to track ocean animals and ocean conditions, including a glider that can be operated from a computer, seen here with OTN scientific director Dr. Sara Iverson. Self-propelled by wave action and powered by solar panels, the wave glider has travelled over 38,000 km since piloting began in 2011. (Photo: Nick Pearce/Dalhousie University)

brings together the best of this region with the best of the world.”

“These partnerships allow us to undertake research at a scale that has never been realized before. The issues of the ocean are too big for any one university to tackle on their own. In fact, they’re too big for one country to tackle on its own,” he told a [gathering](#) of business leaders in December.

The challenges also cut across multiple scientific fields. The OFI’s interdisciplinary approach allows ocean-focused natural scientists, as well as experts in data science, governance, law, social sciences and other fields to take a coordinated and holistic approach to issues like climate change, global food production and access to the Arctic.

“This is different from most science projects in that our goal is to produce outputs that have direct and measurable impact on society. We can achieve that through a new invention, or patent, for example or by providing useful advice that can guide policy. It’s trying to pull together the basic science with applied science towards the betterment of human existence,” says Dr. Paul Snelgrove, OFI’s associate scientific director and a biological oceanographer at Memorial University in Newfoundland.

Three of OFI’s [priorities](#) are sustainable fisheries and aquaculture; better understanding of ocean change; and delivering new ocean data and technology products to end users. This research is expected to improve prediction and mitigation of major storm impacts, help better manage the ocean’s living resources, improve aquaculture’s potential to meet global seafood demand,

strengthen marine transportation policy and risk reduction, and transform how we monitor the ocean with new data capture and IT tools.

The main study area is the Northwest Atlantic Ocean and adjacent Canadian Arctic Gateway, a key player in global ocean circulation systems. It is also one of the few places on Earth where ocean changes are already happening first and happening fast, making it a hotspot for climate change and an epicenter of international scientific interest. “Ocean scientists see this as a sentinel area

Earth system for its role in “breathing in” oxygen from the atmosphere and transporting it to the deep ocean, which is critical to the survival of ecosystems in the ocean. The area is also one of the largest ocean sinks for climate-warming carbon dioxide. However, freshwater flowing in from the melting of ice in the Arctic and Greenland is altering both of these processes.

“The [Intergovernmental Panel on Climate Change](#) has to come up with is climate projections, and a key piece of that projection is understanding

“The very survival of humanity—the air we breathe, the food we eat—depends on a vibrant and healthy ocean... (The Ocean Frontier Institute) is a new international partnership that brings together the best of this region with the best of the world.”

Dr. Richard Florizone, President, Dalhousie University (Dec. 14, 2016 [speech](#) to Halifax Chamber of Commerce)

for trying to understand the pace, cause and consequences of ocean change. This is where we’re starting and where we will focus for at least the next seven years,” says OFI CEO Dr. Wendy Watson-Wright, who previously led [UNESCO’s Intergovernmental Oceanographic Commission](#).

The Labrador Sea, located between Canada and Greenland, has been described as a lung in the

how much carbon dioxide the ocean takes up and where it is transported,” says Snelgrove.

Growing the ocean economy

In addition to advancing scientific knowledge, the OFI hopes to drive economic growth in Atlantic Canada in sectors such as aquaculture, fisheries, shipbuilding and offshore energy



sectors. Marine trade alone employs about 250,000 Canadians and injects more than \$25 billion into Canada’s economy each year.

One of the first beneficiaries could be aquaculture, a sector under pressure to meet the growing global demand for seafood at a time of stagnation in wild fisheries. It’s also an industry ripe for innovation, particularly when it comes to environmental sustainability, food safety, traceability and productivity. For example, OFI researchers are looking at ways to diversify food sources for fish, primarily farmed Atlantic salmon, “because there’s concern now that we’re basically harvesting fish to feed fish,” says Snelgrove.

“The low hanging fruit (for technological innovation) is aquaculture,” he notes. “If we can expand that industry and make it more efficient and effective, that means jobs—often jobs in rural areas that don’t always have other forms of employment.”

As oil exploration, fishing and shipping activities increase in the harsh waters of the North Atlantic, marine safety is another priority. “If we can improve those sorts of challenges then we can utilize the North Atlantic more effectively, reduce the number of incidents we see and increase the operating conditions under which we can undertake economically beneficial activities,” adds Snelgrove.

The OFI will also work with its academic and industry partners to commercialize new technologies. For example, sensors and robots designed for ocean monitoring could be adapted



Prime Minister Justin Trudeau announces the government’s Oceans Protection Plan in Vancouver in November. (Photo: Government of Canada)

Nearly a quarter of a billion dollars went into creating the Ocean Frontier Institute, including a \$94 million contribution from the federal government—the largest grant in the history of the three Canadian partner universities. OFI has also attracted \$125 million from provincial governments and partners, including a gift of \$25 million from entrepreneur and philanthropist John Risley (see Q&A interview).

OFI’s Research Programs

- Sustainable fisheries
- Sustainable aquaculture
- Marine safety
- Ocean data & tech
- Atmosphere-ocean interaction
- Shifting ecosystems



for inspecting or monitoring aquaculture cages, underwater fibre optic cables or oil rigs.

OFI will support the growth of ocean start-ups and established companies through its collaboration with the [OceansAdvance](#) marine tech cluster in St. John's NL, and the new [Centre for Ocean Ventures and Entrepreneurship \(COVE\)](#) incubator led by the [Nova Scotia Community College](#) in collaboration with Dalhousie. COVE, which received \$19.7 million in federal and provincial funding last year, brings together global leaders in ocean science with start-ups, R&D-intensive companies, industry and Nova Scotia post-secondary institutions to create a cluster of marine innovation and commercialization. COVE is set to open in 2018 on a retired Coast Guard site in Dartmouth, across the harbour from OFI in Halifax.

“OFI also provides marketing and business development support for Canadian industry. For example, (OFI Scientific Director) Dr. Marlon Lewis recently travelled to New England with the premier of Nova Scotia for this purpose,” says Watson-Wright. “And international organizations are starting to take notice of OFI. The chair of the OFI Executive Council, Martha Crago, and I recently were invited to an OECD workshop in Paris on fostering the ocean economy where we spoke about how Canada and the OFI are leading on these issues.”

Education and training are another priority. Watson-Wright says she's particularly excited about the [Ocean School](#) program, one of several training opportunities that will be offered through the OFI.

Canadian Partners

Universities: Dalhousie University, Memorial University and University of Prince Edward Island

Federal government: Fisheries and Oceans Canada, the Canadian Coast Guard, Defence Research and Development Canada, Environment and Climate Change Canada, the Royal Canadian Navy and the National Film Board of Canada

“It's an educational and engagement initiative for youth in Grades 6-9, led by Dalhousie biology professor Dr. Boris Worm, in collaboration with the National Film Board of Canada. The goal is to encourage more young people to become involved in science, using ocean science to attract them, and to improve ocean literacy” she says.

Watson-Wright wants to see the program offered nationally and internationally, adding that it has already attracted interest from France and the Intergovernmental Oceanographic Commission.

Protecting the ocean emerged as a national priority in Canada last November with the launch of the \$1.5-billion [Oceans Protection Plan](#). The five-year

International Partners:

[Alfred Wegener Institute \(Germany\)](#)

[Christian-Albrechts-Universität zu Kiel \(Germany\)](#)

[GEOMAR Helmholtz Centre for Oceans Research \(Germany\)](#)

[Institute of Marine Research \(Norway\)](#)

[LabexMER \(France\)](#)

[Lamont-Doherty Earth Observatory \(New York\)](#)

[Marine Institute, Galway \(Ireland\)](#)

[Woods Hole Oceanographic Institution \(Massachusetts\)](#)

initiative aims to create a marine safety system that improves responsible shipping, restores marine ecosystems and invests in oil spill cleanup research.

Likewise, Europe has adopted the “[Blue Growth](#)” strategy to create sustainable economic growth and employment in the marine and maritime



economy. In Europe, the “blue” economy represents roughly 5.4 million jobs and a gross added value of just under €500 billion a year. Globally, the ocean economy is projected to double in size by 2030, according to a 2016 OECD [study](#).

“The opportunity in the Blue Economy is huge for Canada,” Florizone told the Halifax business group. “The ocean economy represents about 5% of global GDP and that’s forecast to double in the next 15 years. But in Canada it’s only about 2% of our GDP so the opportunity is there. OFI creates the research and the partnerships for us to advance it for this region.”



(Photo: Dalhousie University)

Ocean-related Economic Activities in Atlantic Canada

- Major exploited ecosystems
- Ocean-related tourism
- Shipbuilding
- Maritime defense
- Major international shipping routes
- New shipping routes (to Arctic)
- Expanding resource export (LNG, minerals)
- Growing deep-water oil/gas development
- Increasing aquaculture development
- Ocean observation technology

Source: [A Canadian Contribution to an Integrated Atlantic Ocean Observing System, 2014](#)



(Photo: Dalhousie University)

Atlantic marine life facing oxygen crisis



Lead researcher
Dr. Catherine Brennan,
now at the [Bedford
Institute of Oceanography](#)

Although there is a range of environmental conditions in which an animal can survive, there is an even smaller range of conditions in which it can thrive.

New research from the national Marine Environmental Observation Prediction and Response (MEOPAR) Network finds that low oxygen levels may stress, or even kill, a

number of marine fish and invertebrates off Eastern Canada in the next 50 years.

The Eastern Canadian fisheries of the Gulf of St. Lawrence and the Scotian Shelf are globally important fisheries. But the effects of climate change, such as increasing temperatures, increasing acidity, and lowered oxygen levels, are placing stress on marine fish and invertebrates, which could affect the fisheries' future viability.

The study, led by Dr. Catherine Brennan while a MEOPAR-funded postdoctoral fellow at Dalhousie University,

used computers to model currents and physical characteristics, such as salinity and temperature, of the Gulf of St. Lawrence and Scotian Shelf.

The study concludes that if the current trends of increasing temperature and decreasing oxygen continue, “many species will encounter unsuitable temperature or oxygen conditions within the next century,” and that some will do so in the next 50 years.

“Each species has a thermal limit, a maximum temperature above which they are not able to thrive,” explains Brennan. “For example, Atlantic Cod, which inhabit the western Scotian Shelf, are at the upper boundary of their thermal limit, so any bit of warming that occurs in this region is going to be too warm for them.”

The researchers hope others will use and expand the open access dataset they compiled to better our understanding of the regional effects of climate change.

The study, [Putting Temperature and Oxygen Thresholds of Marine Animals in Context of Environmental Change: A Regional Perspective for the Scotian Shelf and Gulf of St. Lawrence](#), was published in open access journal PLOS ONE,

here. To access the dataset, go to the supporting information of the paper.

MEOPAR is a national Network of Centre of Excellence hosted at Dalhousie University that sees academic researchers and students, government scientists, and partners in the private, NGO and community sectors working together to reduce vulnerability and strengthen opportunity in Canada's marine environment.



Atlantic cod (Photo: © Hans Hillewaert)

Source: MEOPAR

Ocean Tech

CANADIAN TECH AT THE LEADING EDGE

Canada is a global leader in ocean science and technology. One of its greatest technological feats was the development and installation of the VENUS coastal observatory in the Salish Sea. This world-first cabled seafloor observatory, which began operations in 2006, enables researchers anywhere to connect in real time to undersea experiments and observations.

This was followed by the installation of NEPTUNE, the world's largest cabled ocean observatory, spanning from Vancouver Island across the continental shelf into the deep sea. Operations began in 2009 and over 130 instruments on NEPTUNE are now providing real-time data over the Internet.

Operated by the University of Victoria's Ocean Networks Canada, the observatories provide ocean-observing expertise to industry, academia and governments across Canada and around the world.

ONC's Innovation Centre also offers Canadian marine technology companies commercialization expertise and the opportunity to demonstrate their sensors and instruments to potential clients around the world.

“Seeing” the ocean like never before

Countries around the world are spending billions of dollars on the “blue economy” – including monitoring their ocean environment. This is a long and expensive process that requires sourcing equipment and systems from multiple companies and big data management—unless you purchase what you need from Canada.

Canada is a global leader in ocean technologies and is now offering a one-stop-shop for governments, port authorities, companies, research institutions and other groups planning to build their own ocean observatories. Called [Smart Ocean Systems™](#), the package features technologies from across Canada that have been tried, tested and integrated into the University of Victoria’s [Ocean Networks Canada](#)’s world-leading cabled seafloor observatories.

The observatories stream live data from instruments on the ocean floor, in the water column, and on shore to anyone with an Internet connection. A key part of the infrastructure is [Oceans 2.0](#), a powerful data management system combined with high-performance computing



(Photo: University of Victoria)

Smart Oceans Systems™

that turns a firehose of long-term, continuous scientific data from the observatories into ocean analytics that help researchers, communities, industry and policymakers here, and around the world, make evidence-based decisions.

In Canada, for example, the system provides valuable data to improve public and marine safety and environmental monitoring, including early alerts of offshore earthquakes, landslides and tsunamis and their impact on coastal communities.

ONC's Smart Ocean Systems™ suite of products and services includes remote sensor systems for measuring temperature, current, CO2 levels, seismometer readings, and more; observatory infrastructure, including fibre optic cable, servers and storage; digital infrastructure and data management system; and data analytics and modeling.

ONC collaborates with 30 [industry partners](#), as well as research institutes in several countries, including Germany, Brazil, China, UK, Spain, Turkey, Korea, and Italy.



In 2011, Popular Science named Ocean Networks Canada one of the '10 Most Ambitious experiments in the universe'. Today, ONC is even bigger with six ocean observatories, over 400 instruments online, over 5000 science sensors, 850 km of cable, and 230 gigabytes of data distributed daily.

Did you know? Canada is a global steward of the sea, with three world-class science clusters (British Columbia, Quebec and Atlantic Canada) and the longest coastline in the world.

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AN INITIATIVE OF  University
of Victoria



(Photo: Joan Lopez)

COMPANY SPOTLIGHT

Drowning in Sound

A Halifax company is helping ports protect whales by reducing undersea noise

By Debbie Lawes

The ocean is getting noisier and that's making it more difficult for whales, dolphins and other marine mammals to forage for food, find a mate, keep track of their young and listen for predators. This growing threat is prompting governments around the world to take action to reduce undersea noise, and the global shipping industry is under increasing pressure to respond.

The [European Union's Marine Strategy Framework Directive](#) calls on member countries to meet new environmental standards by 2020, including

a reduction of undersea noise. In 2014, the International Marine Organization adopted voluntary [guidelines](#) aimed at reducing underwater noise from commercial shipping. The issue has also been championed by the Convention on Biological Diversity, the Convention on Migratory Species and the International Whaling Commission.

But it's in Canada where real on-the-ground action is happening, prompted by ongoing threats to endangered orca populations. The Trudeau government's approval last November of the

Kinder Morgan expansion of its Trans Mountain Pipeline is projected to bring nearly 300 more oil tankers to the Port of Vancouver every year. That same month, the government launched a \$1.5 billion national [Oceans Protection Plan](#) to improve marine safety and responsible shipping and protect Canada's marine environment.

A new technology developed by a Halifax company promises to help with that effort. [JASCO Applied Systems](#), a 30-year veteran in the field of marine acoustics, has developed the Autonomous



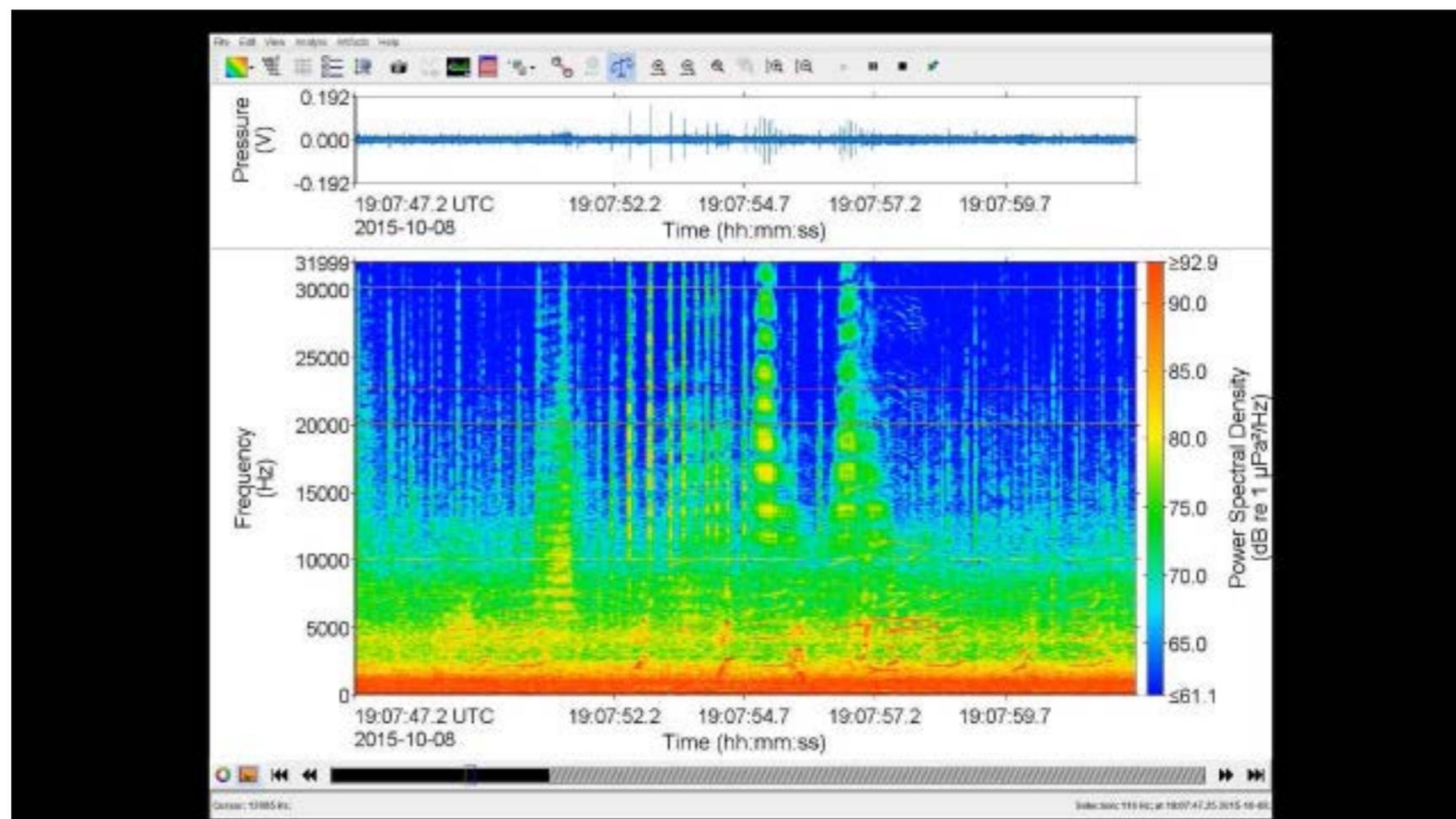
Multichannel Acoustic Recorder (AMAR)— a highly advanced hydrophone monitoring system — and the PortListen™ software system that automatically measures and analyzes ship noise, and detects and tracks marine mammals including cetaceans as well as pinnipeds (seals and sea lions).

The technology has been installed on the University of Victoria’s Ocean Networks Canada cabled undersea observatory off the coast of British Columbia. Data are streamed in real-time back to JASCO’s computers where the information is automatically analyzed and the results posted on a web portal for immediate use.

The first customer for this system is the Vancouver Fraser Port Authority. Hydrophones installed on the approach to the port monitor the acoustic characteristics of incoming ships. The project is part of the port’s [Enhancing Cetacean Habitat and Observation \(ECHO\) Program](#), a collaboration between JASCO, [Transport Canada](#) and [Ocean Networks Canada \(ONC\)](#).

In January, the port authority [announced](#) that it would cut docking fees for quieter ships by nearly half. This makes Canada the first country in the world with a marine noise reduction incentive.

“Our technology makes it possible for the port authority to do this,” says David Hannay,



Listen to the sounds of whales and ships picked up by JASCO’s underwater listening station in the Strait of Georgia, BC.

[CLICK TO PLAY](#)

JASCO’s chief science officer. “Users simply logon to a website and look at the sound levels from individual vessels as they enter the port, essentially in real time. That will allow the port to provide a discount to fees immediately based on the measurement of that particular vessel.”

JASCO’s earlier systems required technicians to travel to a site to deploy the equipment, have

vessels pass by the hydrophones, retrieve and bring the equipment back to their labs, download and analyze the data and then write a report. The whole process would often take several weeks.

PortListen™ automates the process, enabling data to be made available to decision makers within minutes in the form of “noise report cards”. “We now have a system that is well tested and very easy





David Hannay (right), Chief Science Officer at JASCO Applied Sciences Ltd, presents information on the development of the Strait of Georgia Underwater Listening Station to Transportation Minister Marc Garneau at the launch of the ECHO Program in January. (Photo: JASCO Applied Sciences Ltd.)

for entities like ports to install and to be able to get results immediately and at lower cost.”

JASCO, which employs 60 people in Nova Scotia and Victoria BC, and another 15 in Australia, the U.S. and U.K., has begun marketing AMARs and PortListen™ to port authorities worldwide. In addition to the Port of Vancouver, JASCO’s technology was recently installed on the [Fundy Ocean Research Centre for Energy \(FORCE\)](#), a test centre for in-stream tidal energy technology located in Nova Scotia’s Bay of Fundy. The company also finalized its first export with the Port of Dublin’s [Alexandra Basin Extension Project](#) which is happening in an area that is also home to dolphins and minke whales.

JASCO’s product is among several made-in-Canada technologies that comprise ONC’s [Smart Ocean Systems™](#), a turnkey package of technologies and services that measure everything from ocean temperature and salinity to dissolved oxygen, currents, weather—and now acoustics. “Acoustics is our expertise and that fits quite nicely into the package because it adds a new measurement that was not available previously.”

Hannay says another advantage to PortListen™ is its ability to be deployed anywhere, including the Saint Lawrence Seaway, home to 13 different species of cetaceans; the high-traffic waters off



Atlantic Canada: Where cooperation is a competitive advantage

By Debbie Lawes

Universities and colleges in Atlantic Canada have discovered the secret to winning huge research mandates and partnerships with major multinationals like IBM, Siemens, Cisco, Royal DSM and Lockheed Martin. Compete less and cooperate more.

Around the world, post-secondary institutions fiercely compete against each other for top students, esteemed scientists, research grants and industry partners. While that approach may still work for large institutions, schools in Atlantic Canada realized a different approach was needed to get noticed on the global stage.

“It took a lot of courage. Universities are very competitive by nature, not collaborative, but we now have major projects with universities working together in areas such as smart grids and renewable energy, network security, ocean technologies, aquaculture, natural products and more specific areas like biomedical engineering and geodesy and geomatics. It’s about leveraging our collective strengths to tackle complex problems



MEOPAR is one of Atlantic Canada’s best examples of R&D cooperation. Headquartered at Dalhousie University, this national Network of Centres of Excellence facilitates collaborations between academia and more than 100 partners, including government, insurance industry, oil and gas sector, marine transportation sector, ocean technology firms, coastal communities and NGOs to reduce Canada’s vulnerability to marine hazards and emergencies. One of those partners is Irving Shipbuilding, which provided \$1 million to MEOPAR’s research program as part of their National Shipbuilding Strategy Value Proposition commitment. (Photo: MEOPAR)



and make our region a global centre of research excellence and entrepreneurship,” says Chris Mathis, President and CEO of Springboard Atlantic.

Launched in 2004, Springboard Atlantic works with its 19 university and college members to create one large “virtual” tech transfer office that pools and coordinates resources regionally to offer services not always available at small or mid-sized institutions, such as mentoring, proof of concepts, patents, marketing and links to investors. In January, it received \$9.2 million in renewed funding from the federal government’s Atlantic Canada Opportunities Agency.

Mathis notes that about 15 years ago, not many academic institutions in the region were doing research, let alone exploiting opportunities to commercialize that research.

“There has been a sea change since then. Today, we have strong collaborations with large multinational companies and in helping those companies link to SMEs (small- and medium-sized enterprises) and researchers in the region,” says Mathis. “I credit this success to our ability to work cooperatively and our solid entrepreneurial culture, as well as the fact that Atlantic Canadians are pretty easy to deal with.”

More than 20% of all private sector R&D in Atlantic Canada is conducted in partnership with post-secondary institutions compared to five percent in the rest of Canada. Over the past decade, Springboard members have helped create 126 new companies with associated sales revenue of \$240 million.

The network represents more than \$400 million in annual R&D activity from the institutions, with a large portion of that through industry and community collaborations. For example, the last few years have seen significant government and partner investments in large-scale research programs, including: the Ocean Frontier Institute (\$244 million); two Canada Excellence Research Chairs (\$40 million); Marine Environmental Observation Prediction and Response Network of Centre of Excellence (MEOPAR) (\$30 million); and two national commercialization centres, Natural Products Canada (\$23 million) and LOOKNorth (\$18 million).

Springboard’s collaborative approach is catching on with governments as well. Last year, the federal government and Atlantic provinces teamed up to launch the [Atlantic Growth Strategy](#)—a pan-Atlantic approach to spur research, innovation, entrepreneurship and job creation.

Mathis says the strategy aligns with Springboard Atlantic’s mandate and goals. “Whether it’s the immigration pilot, the initiative around international student retention, start-up support, technology transfer, research commercialization, clean energy, or the Post-Secondary Education Strategic Infrastructure Fund, the Springboard network is positioned to assist government in driving this agenda forward.”



“You wouldn’t think of Halifax as perhaps the beating heart of Canada’s tech future. Think again. I met dozens of entrepreneurial companies and entrepreneurs, interesting companies having to do with oceans and big data... Even in a place like Halifax, there’s that spirit. There are young investors and young entrepreneurs. What we’re lacking is an international network that’s coming in to jump on that bandwagon and help these companies reach the world, so we’re really excited about Canada.”

Jon Medved, serial entrepreneur and Founder and CEO of OurCrowd, a global equity crowdfunding platform headquartered in Israel (Source: Business News Network [interview](#) in Halifax, October 31, 2016)

Partners in Innovation



By Denise Amyot
President and CEO
Colleges and Institutes
Canada

Canada's colleges and institutes are generally regarded as some of the best post-secondary institutions in the world when it comes to equipping students with the skills, knowledge and experiences they'll need to quickly and successfully start a career. Not quite as well known is the fact that they are also actively engaged in research projects and occupy a key, yet often misunderstood, place in Canada's innovation ecosystem.

In 2014-15 alone, members of Colleges and Institutes Canada (CICan), worked with over 6,000 companies and community organizations to conduct applied research projects in a wide variety of fields, from healthcare to renewable energies and many more. These partnerships, that involve faculty and students working alongside industry, which provides at least 50% of funding, generated overwhelmingly positive results, including many new or improved products, processes and services.

For example, a partnership between Red River College, Manitoba Hydro and Mitsubishi Heavy Industries was created to test electric buses and develop a charging system adapted to Manitoba's cold winter climate. Other projects were launched to

test new construction materials, improve health care, develop sustainable farming practices and much more.

Our members have long understood that innovation is based on collaboration. This way of thinking is at the heart of their teaching model, but also their approach to applied research, which has been on an upward trend in institutions across Canada. It has allowed them to evolve into true innovation hubs, where the innovators of today, as well as those of tomorrow, can access essential resources they will need to realize their vision through what we like to call partnered innovation.

In fact, applied research at colleges and institutes is always partner driven, which means that the projects are conceived from the get-go to tackle real life challenges encountered by Canadian companies. Another clear advantage for them, is that the partner always keeps the intellectual property for new products generated through these research partnerships.

This model is particularly important for small and medium-sized enterprises who make up over 97% of all Canadian businesses and play an essential role in the country's innovation ecosystem. However, they often have very limited access to the resources necessary, including laboratories, equipment, and dedicated researchers. This is why working with colleges, which can provide expertise, facilities as well as the contribution and energy of student researchers is

so valuable. It's no surprise then that SMEs represent over 75% of our members' private sector partners, with another 8% falling in the micro-enterprise category. With over 760 research centers and labs, Canadian colleges and institutes can provide access to expertise and specialized equipment that smaller companies would not be able to afford otherwise. This makes their contribution all the more important as they support incremental innovation based on the everyday needs of small business and employers.



(Photo: St. Clair College)



Dasha Atamanchuk showing the SeaCycler to Treasury Board president Scott Brison. (Photo: Dalhousie University)

Unraveling the magnitude of changing ocean chemistry

RESEARCHER SPOTLIGHT

A desire to expand her area of expertise and gain experience made Dr. Dasha Atamanchuk's decision to join Dalhousie University's [CERC.OCEAN](#) group an easy one.

After completing her PhD studies in Sweden, she became a postdoctoral fellow with the group. Led by [Dr. Douglas Wallace](#), Canada Excellence Research Chair in Ocean Science and Technology,

CERC.OCEAN was established in 2011, and uses new technology to study biogeochemical and ecological changes in the global ocean.

“Luckily Doug was looking for someone who knew carbonate chemistry, was familiar with ocean measurement techniques and had experience working with sensors and autonomous platforms,” says Atamanchuk, who

is originally from the Ukraine. “Honestly, I never thought twice about taking this position.”

Postdoctoral fellows like Atamanchuk are a prime example of how the CERC program is attracting global talent to Canada.

With a strong interest in carbon chemistry and the ocean's carbon and oxygen cycles, Atamanchuk

is currently tracking carbon dioxide in the ocean, to better understand its biogeochemical processes. One project involves the [SeaCycler](#), a new oceanographic mooring system that offers a unique perspective on the annual biogeochemical cycle in difficult-to-access places, like the Labrador Sea. Unlike most existing technology, the SeaCycler is designed to withstand intense ocean currents and storm waves, allowing it to take measurements near the ocean's surface over long periods of time. The direct measurements it produces will serve to validate models and satellite-based data, the most common data products scientists currently use. The data will complement measures currently being made by the project's partners at GEOMAR in Germany.

"I'm using sensors and submersible instruments for my measurements," she says. "At the same time, I'm working on developing and improving these instruments to make data coming from them more reliable and trustworthy."

Atamanchuk's work will help equip moorings, gliders, buoys and ferry-boxes with multiple new sensor technologies that are more robust and better suited for unsupervised operation. At this point, the sensor package is still a custom product. Creating something that is modular and easy to operate and service will be a huge advantage.

Atamanchuk's hope is that the ferry-box systems become something that any ship engineer would agree to install onboard. The system would be certified, with the idea of increasing the underused, comparatively cheap resource of data that numerous containerships, ferries, supply vessels, ships and boats could provide.

"I've always been concerned about the applicability of the science I'm doing," says Atamanchuk. "It's important for me to know about the impact that my work is having. In light of global warming and ocean acidification, my goal is to increase the awareness of this threat."

Source: Canada Excellence Research Chairs Program and Social Sciences and Humanities Research Council

The Canada Excellence Research Chairs (CERC) Program supports Canadian universities in their efforts to build on Canada's growing reputation as a global leader in research and innovation. CERC.OCEAN is Chairholder Doug Wallace's research group in ocean S&T at Dalhousie, focused on developing new approaches to observe the changing ocean and study ocean processes.

Focus on Cybersecurity and Smart Grids

New Brunswick Brings Cyber Essentials to Canada for Small and Medium Enterprises

In May 2016, Opportunities NB (ONB) launched Canada's first comprehensive cybersecurity strategy – CyberNB, under the direction of Allen Dillon. In less than a year, CyberNB will deliver a Canadianized version of [Cyber Essentials](#) for small and medium enterprises.

This is yet another step towards solidifying New Brunswick as the Canadian epicentre in mitigating global cyber risks and threats. Via CyberNB, New Brunswick is executing a deliberate action plan to build upon our world-class industry cluster and enhance workforce development, education, and cybersecurity research through our five comprehensive components.

One of the significant issues for CyberNB is the increase in attacks on small and medium-sized enterprises (SMEs). With approximately 77% of global cybercrime targeted at SMEs, including Canadian businesses, Cyber Essentials can help businesses identify key areas that need to be addressed, as well as monitor changes on-going in the business.

Cyber Essentials focuses on Internet originated attacks against an organization's IT systems.

Small and medium-sized enterprises often forgo ISO 27001 due to cost and time. The Cyber Highway, through Cyber Essentials, offers a

Cyber Essentials concentrates on five key controls:

Boundary firewalls and internet gateways — devices designed to prevent unauthorized access to or from private networks, but good setup of these devices either in hardware or software form is important for them to be fully effective.

Secure configuration — ensuring that systems are configured in the most secure way for the needs of the organisation.

Access control — ensuring only those who should have access to systems to have access and at the appropriate level.

Malware protection — ensuring that virus and malware protection is installed and is up-to-date.

Patch management — ensuring the latest supported version of applications is used and all necessary patches supplied by the vendor have been applied.

cost-effective approach for SMEs to assess their organization and take steps to mitigate cyber risk. The Cyber Highway has been designed for non-technical resources to input, monitor and assess their progress and risk. This user-friendly tool is cost-effective and its visuals clearly indicate your success or areas of improvement.

Becoming Certified

Organizations can take the steps necessary to obtain certification meeting best practices via The Cyber Highway. Certification further validates that your organization has and is taking the steps necessary to protect your data, your client's data, your employees and your overall supply chain.

The CE Basic Compliance Program requires organizations to successfully answer a list of questions which are then audited by a third party before certification is awarded. This audit is conducted by a Certifying Body, which has been approved by the Canadian Accreditation Body CyberNB and is intended to verify that the information provided is correct and actions are provable.

The CE Plus (CE+) Program includes basic CE compliance, together with a requirement for businesses to have a third party carry out a successful vulnerability assessment and penetration test before certification can be awarded.

With this announcement, CyberNB will be Canadianizing Cyber Essentials and be ready to roll out to Canadian businesses this spring.

For a look at CyberNB, [click here to watch the interview with Allen Dillon, Managing Director.](#)

Looking for a Solution to Reduce Cyber Risk and Common Cyber Attacks?

Leverage The Cyber Highway for a streamlined route to Cyber Essentials Certification.



To learn more about how you can become Cyber Essentials Certified or to become a Certification Body, visit CyberNB.ca

OpportunitiesNB

CyberNB is an economic development initiative of Opportunities NB.

CYBERNB
CYBERSECURITY EPICENTRE
FOR CANADA

Siemens and NB Power growing smart grid innovation cluster

By Debbie Lawes

Sometimes it takes a looming challenge to spur innovation. That's what happened in New Brunswick about seven years ago when a strategic review revealed that the province's century-old utility would be unable to generate enough electricity, or purchase enough from neighbouring utilities, to meet customer needs by 2027.

It's a similar story for aging electrical systems around the world. The traditional fix would see utilities borrowing billions of dollars to upgrade generation, transmission and distribution systems. But the publicly -owned [NB Power](#) was already carrying \$5 billion in debt and politicians were rightly worried that adding more red ink would increase electricity costs for the utility's 394,000 customers.

A more disruptive approach was needed—one that would transform the electromechanical grid into an automated digital system that manages power distribution in a more flexible, intelligent and efficient way, while providing customers with more control over how and when they use electricity. The results: a low-carbon smart grid that helps consumers manage their electricity consumption and reduces the need for future infrastructure spending. It became known as NB Power's "burning platform for change".



Brad Wasson, NB Power (Photo: Garrett Elliott, LaunchLab)



“We realized we had reached a point of no return and had to do things completely differently or we weren’t going to withstand the transformation happening with the industry very well,” says Brad Wasson, director of product development at NB Power. “We also saw it as an opportunity to be a leader in this smart grid space and spur some economic benefit for the region.”

That business need spurred an unprecedented collaboration between NB Power, [Siemens Canada](#), the provincial and federal governments, the [University of New Brunswick \(UNB\)](#) and tech companies from across the country. The objective was to develop and/or integrate innovative smart grid technologies that would reduce electricity consumption, better incorporate renewable energy like solar and wind, and shift customer demand for power from on-peak to off-peak periods.

For example, NB Power is looking at how smart water tanks can be remotely controlled to heat up water before and after peak hours, thus reducing the peak power. This would save consumers money and reduce greenhouse gas emissions as utilities rely more on fossil fuel-burning plants during peak periods.

Fortunately for NB Power, UNB has been graduating top talent across the smart grid innovation spectrum, from microelectronics, power systems and software to technology management, big data analytics, security and economics. This breadth of expertise and talent is available to NB Power. In addition, local IT companies, management consultancies and industries can provide expertise to NB Power as it integrates the

There are currently about a dozen smart grid initiatives underway at NB Power in the Fredericton region, including development of virtual power plant technology, which NB Power refers to as the “Intelligent Load Management software system,” to reduce and shift electricity demand from peak to non-peak hours.

technologies, processes and organizational changes needed to transition to a smart grid architecture.

Access to job-ready graduates also enabled Siemens to open a global product development lab which develops smart grid software for international customers. Siemens

currently has dozens of employees, including engineers working in Fredericton, NB. “I was astonished when we started here,” says Robert Hardt, president and CEO, Siemens Canada. “We thought it would be difficult to find the talent inside such a relatively small province like New Brunswick. We soon realized it wouldn’t be a problem. As a global company you always look to big countries like the United States, or India or European countries, but we were really astonished that we have here in Canada and in New Brunswick such a potential of intellectual capabilities.”

In addition to being a research partner, NB Power is also a global reference customer for Siemens, which helps the company market proven experience to other utilities.

“We have a lot of reference customers but none like NB Power,” says Richard Wunderlich,

“An important ingredient in the success of our work is that all of the key stakeholders are very close together. We can talk to the innovators in the marketplace, the leaders at the university, the executives of the utility and to the provincial and municipal governments — and do all of that in one day.”

Richard Wunderlich, Siemens Canada



head of Siemens Canada's Power Technologies International consultancy division. "There is no partnership that is quite as deep and strategic for Siemens (in the area of smart grids)."

A "living lab": from concept to market

The region's reputation as a hotbed for smart grid innovation was solidified in 2016 with the establishment of the [Smart Grid Innovation Network](#). UNB, Siemens Canada and NB Power, with financial support from the [Atlantic Canada Opportunities Agency](#) and [Opportunities New Brunswick](#), invested \$8 million to launch SGIN. This "living lab" brings new ideas and new skill sets to NB Power, particularly in the areas of information technology and fundamental research. "The problems we're trying to resolve go far beyond power engineering," says Wasson. "They span the world of customer interaction, data communications, big data, security ... and even public education and literacy building around energy."

SGIN is comprised of three labs that help innovators and entrepreneurs design, develop and test smart grid-related products and services, from the lab right through to the grid.

"There is normally a lag between innovation and adoption and the Smart Grid Innovation Network's objective is to reduce that lag to market," says Wunderlich. "The work we're doing at the network is about enabling an ecosystem of innovation where anyone can bring forward a good idea and then work together from idea conceptualization to commercialization."

Step one for early-stage technologies is the Smart Grid Research Lab at UNB which provides a research platform for developing new smart grid concepts, models and algorithms. Assuming the product or service is technically viable, it moves next to the Siemens Interoperability Lab where it is tested simulating the live "grid-connected" environment.

It's where these technologies move next that is attracting global attention. NB Power's Products and Services Lab does something few, if any, utilities would dare — test these technologies on a live electrical grid.

"What we have with the living lab in New Brunswick is an opportunity to develop solutions, to deploy them directly into the real grid and understand how to grow them up for larger utilities or down for smaller utilities," says Wunderlich. "We're hoping to get solutions based here in New Brunswick that enable the entire global utility sector."

"We had global interest in the lab almost immediately after launching," adds Wasson. "People from around the world were intrigued by this idea that you could connect to grid resource through a system of labs, because most utilities won't let you do that."

Partnering with small companies

SGIN also provides companies, particularly small firms, with an opportunity to validate their technology in partnership with a large utility and a multinational company. For example, Waterloo ON-based [FleetCarma](#) led a \$1.3-million demonstration project that used SGIN to test the company's

smart charging system. Its connected-car platform gathers driving and charging data from electric vehicles, and communicates with smart-charging stations that allow utilities to adjust the charging speed to alleviate pressure on the electrical grid. It was a cross-Canada collaboration that included NB Power, Siemens Canada, [Burlington Hydro \(Ontario\)](#) and [Powertech Labs \(British Columbia\)](#). Other major utilities are also getting in on the action. In January, [Emera Inc.](#)—the parent company of Nova Scotia Power—announced a \$6.2-million investment to establish the Emera & NB Power Research Centre for Smart Grid Technologies. The contribution will support an Emera Chair in Smart Grid Technologies at UNB, as well as provide direct funding for smart grid research.

The resulting innovations will not only be put to use in Canada. Emera owns utility companies in Florida, New Mexico and the Caribbean and both Emera and NB Power sell electricity to utilities in the northeastern United States.

Wasson says he hopes other utilities from across Canada and globally will take advantage of this growing innovation cluster in Atlantic Canada. "This is a national and international phenomenon. The need for this is global and we can't solve these problems alone, so we need to collaborate with other utilities nationally and internationally."

Want to know more:

Checkout the Siemens Video Case study [here](#).

And the case study report on the case study [report](#) on the Siemens-NB Power collaboration

Meet Canada's Cybercrime Fighters

By Debbie Lawes

Training the next generation to build the world's safest internet

Hackers beware. A small city of just 58,000 nestled between the great Acadian forest and the mighty Saint John River in Atlantic Canada is emerging as a global crime-fighting epicentre for Internet security.

Cybercrime costs the global economy about US\$455 billion annually, and these costs are projected to rise exponentially with increasing globalization and the coming tsunami of machine-to-machine interconnections. Analysts forecast there will be tens of billions of connected devices for cybercriminals to exploit by 2020.

And with accusations of Russia "hacking the vote" in the recent U.S. election, it's fearfully clear that no company, government or individual is immune.

"The internet is an easy thing to hack. It was never designed to build our companies on and build our lives around," says Allen Dillon, managing director of [CyberNB](#), an agency tasked with supporting the creation of an IT security-related cluster in the province.

"We're dealing with everything from national state-sponsored hacking down

FOCUS ON CYBERSECURITY AND SMART GRIDS



The research team at the Canadian Institute for Cybersecurity. (Photo: Rob Blanchard /UNB)



to local criminal types. This is a world disorder issue and it's a big social problem.”

It is also turning into an economic opportunity for both New Brunswick and Canada. In May 2016, New Brunswick became the first province to develop a comprehensive [strategy](#) on cybersecurity and cyber innovation, developed in partnership with academia, government and industry leaders like IBM.

One of the key pillars of that strategy is the newly launched [Canadian Institute for Cybersecurity](#) (CIC) at the University of New Brunswick (UNB), home to the largest network security research group in the nation. The institute's core team consists of 27 researchers, post-doctoral fellows, graduate students and co-op students—the majority of whom came to Canada from all reaches of the world, including the United States, Brazil, Malaysia, Bangladesh, India, Mexico, Saudi Arabia and Iran.

The CIC evolved from the university's [Information Security Centre of Excellence](#), which focused primarily on using machine learning, artificial intelligence and IT to make networks more secure. As Dillon explains, the new institute is taking both a national and multidisciplinary approach to the problem, one that includes working with partners from across Canada and internationally, and with experts from fields such as law, business, engineering, psychology and sociology, as well as computer science.

“We've seen this type of approach work in other places,” says Sandy Bird, chief technology officer at [IBM Security](#) in Fredericton. “We have a lot

Recent and ongoing CIC projects

- ACES, an anti-child exploitation system for Bulletproof Solutions, Inc.
- High-speed DDOS attack detection with Heimdall Networks
- Botnet detection, analysis and visualization with IBM, Communications Research Centre Canada, the RCMP and the University of Victoria
- Simulation of network attacks with IBM

of people in Israel, for example, where we've seen this kind of partnership between the Ben-Gurion University and IBM and it's been very successful. We're sure we can build that here.”

Seeking solutions from all disciplines

Dillon says the key to building a successful cybersecurity cluster—and a safer internet for Canada and other countries—is to create an ecosystem of expertise that spans technology as well as public policy. “That requires a purpose-built plan that aligns your security vision across multiple jurisdictions, and a multidisciplinary approach,” explains Dillon. “These threats are not just a science problem. They're a legal problem, a social problem and a criminology problem. You need experts coming at this from multiple angles.” Governments, academics and the private sector agree new solutions are needed to fight against increasingly sophisticated cyberheists.

“In today's society, we trust highly confidential and private information to systems that are constantly under attack. The Canadian Institute for Cybersecurity is poised to alter the cyberwarfare landscape by propelling research, training and collaboration with governments and industry to new levels.”

Dr. Ali Ghorbani, founding director, Canadian Institute for Cybersecurity



“There are so many aspects to all the cybersecurity problems,” says Bird. “You have the guy writing the malware, but he sticks that malware in an email that is socially engineered so you will click on it. Why do you click on it? How do

they manipulate you to get you to do those types of things? Being able to drill into that stuff is critical to staying ahead of the hackers.”

IBM is CIC’s first R&D partner; it’s also the largest IT security company in the province.



Dr. Ali Ghorbani, Director, Canadian Institute for Cybersecurity.
(Photo: Joy Cummings /UNB)

The multinational significantly ramped up its operations there in 2011 with the purchase of Q1 Labs, whose [QRadar Security Intelligence Platform](#) was developed in partnership with UNB. That acquisition was a catalyst for IBM to form its security division—now a \$2-billion business employing over 8,000 researchers, developers and security experts across 133 countries. Last year IBM announced that it would be adding 250 jobs over the next three years, in addition to the 150 employees already there, to create a hub of IT and security technology expertise in New Brunswick. “Our location in Fredericton is one of IBM’s major innovation hubs in tackling cybersecurity challenges across the globe,” says Bird, co-founder of Q1 Labs and a UNB graduate. Between 5-7% of IBM’s security group’s assets globally are based in the province.

The business case for R&D

CIC’s goal is to become financially self-sufficient within five years through a combination of membership fees and revenue from intellectual property (IP) and training programs. Under its [model](#), academic institutions can join for free (they bring their own research grant money) and three levels of corporate membership are available to industry, public institutions and government departments. Top tier members, like IBM, pay \$100,000 annually to carry out continuous R&D in cybersecurity, working alongside two or three assigned graduate students and post-doctoral fellows. In addition to cash, IBM is providing in-kind contributions such as technical and management resources to provide project oversight and mentorship for students.

“Being able to do more joint research with (CIC) is a key aspect of this partnership,” says Bird.

“Strategic members” pay \$30,000 annually in return for about 15 hours each month of hands-on technical support. At \$5,000 annually, “supporting members” receive about four hours each month of company-specific advisory and consulting services. CIC also received nearly \$4.6 million in seed funding from the Government of Canada, the [Canada Foundation for Innovation](#), the Province of New Brunswick and UNB.

Build it and they will come

CIC is taking a three-pronged approach to fighting cybercrime: training, R&D and commercialization. Programs are designed for students and working professionals of various skill levels—ranging from one-week boot camps and certificate programs to masters and doctoral degrees.

The institute’s founding director, Dr. Ali Ghorbani, says there will also be a concerted effort to turn technological solutions into commercial products and new companies.

“Don’t ask me how many companies we will be working with,” says Ghorbani, a [Canada Research Chair in Cybersecurity](#) at UNB. “Instead, ask me how many companies like Q1 Labs we will build and how much IP we will generate. We’re not waiting and hoping that companies will come here. Build it ourselves and others will come to buy from you.”

For example, Ghorbani’s team developed risk assessment and management tools which IBM

is now selling. The group has also spun off a company in the area of online advertising fraud detection. A current research focus is mobile banking malware—a growing concern for financial institutions. Not surprisingly, CIC has begun talks with major banks to bring them on board.

One of the biggest challenges for network and cybersecurity research is access to real-world datasets which researchers need to test and validate their solutions. Few companies or organizations are willing to share their confidential data.

“One of the hardest problems for any research institute working in the area of cybersecurity is finding real data to work with,” says Bird. “But there’s this huge potential for the institute to build that living lab type of experience between the universities and its industry partners.” Until recently, researchers relied on datasets created in the late 1990s by the U.S. Army. Since 2012, the UNB centre has created seven datasets that have been used by about 1,000 universities, companies and research groups around the world. Says Ghorbani: “That has brought huge international recognition to our centre.”

A new accelerator for emerging technologies

[The University of New Brunswick \(UNB\)](#) has launched a new start-up accelerator to advance opportunities in the cybersecurity, cleantech, energy and smart grid sectors.

[Energia Ventures](#), based in the provincial capital of Fredericton, is backed by nearly \$1 million in support from the Canadian government, [Siemens Canada](#) and UNB.

“This is an important moment for us,” UNB president Dr. Eddy Campbell said at Energia’s launch last December.

“The launch of Energia Ventures keeps the University of New Brunswick at the cutting edge of fostering entrepreneurial activity,” he said. “Given its unique focus on accelerating start-ups involved in clean tech, sustainable energy, smart grid and cybersecurity, Energia has tremendous synergy with our innovation agenda.”

Energia builds on the university’s reputation as a hub for invention, innovation and start-up enterprise. With a long history of success and various centres, institutes and accelerators dedicated to fostering new technologies and businesses, [Startup Canada](#) has declared UNB Canada’s [most entrepreneurial university](#).

Ed Rodriguez, managing director of Energia, has vast experience in both the public and private sectors. He outlines an ambitious vision for the accelerator, including plans to extend its reach not only across Canada but internationally as well. “Energia isn’t just about coaching founders toward entrepreneurial success. It’s not just about transforming ideas and technological innovation into useful products and services to be sold in the marketplace for a profit,” Rodriguez said.

“Sure, these are all important aspects of what we work to achieve at Energia. But at the end of the day, this is also about broad social and environmental impact. It’s about leveraging innovation and commercialization to advance a more secure, sustainable and prosperous future — locally to globally.”

[Watch Dhirendra Shukla, Chair of the J. Herbert Smith Centre for Technology Management, chat with Ed Rodriguez, Managing Director of Energia Ventures, as UNB launches the Energia Ventures accelerator](#)



(From left) Emmanuel Albert, Ed Rodriguez and Dhirendra Shukla of Energia Ventures at the new start-up accelerator at the University of New Brunswick. (Photo: Rob Blanchard /UNB)

Leveraging ocean science as an innovation engine for Atlantic Canada

Talking to Innovators:
Clearwater Seafood's
John Risley

John Risley is Nova Scotia's widely-recognized seafood baron and one of the province's most influential corporate citizens — founder of [Clearwater Seafoods](#), Ocean Nutrition Canada, and Columbus Communications. Clearwater is one of Canada's largest publicly-traded seafood companies with the majority of its products sold for export. Risley has been a long-time champion of Atlantic Canada's ocean science research expertise and has led efforts to establish an innovation ecosystem driven by collaboration between academia, government and industry.

Last year, Risley made a \$25-million gift to the Ocean Frontier Institute (OFI) that

"It is enormously important the community appreciate the extent to which the Ocean Frontier Institute has and will bring together so many partners across the Atlantic Canadian scene. I have every confidence the OFI can become an engine for regional economic growth and firmly establish us as global leaders in ocean science."

John Risley, business leader, entrepreneur and philanthropist



was recently established at Dalhousie Univ with [\\$94 million in funding from the Canada First Research Excellence Fund](#), the largest research grant in Dalhousie's history. The OFI is an unprecedented partnership between [Dalhousie University](#), [Memorial University](#) and the [University of Prince Edward Island](#). [The Canada First Research Excellence Fund](#) provided \$94 million to the Institute, with an additional \$125 million committed from its various partners, including Risley.

OFI links Atlantic Canada's ocean expertise with national and international partners, including four of the world's top five ocean research institutes. It is on track to become one of the world's most significant ocean science collaborations. (See article on [page 12](#))

Canadian Innovation News reporter Mark Henderson recently spoke to Risley about Atlantic Canada's collaborative strengths and prospects for becoming a global innovation hub of ocean-related science.

CIN: When it comes to R&D, commercialization and innovation, why should the rest of Canada and the world take notice of what's happening in Atlantic Canada, particularly in the area of ocean science?

Risley: First, we have the largest coastline in the world. Two, climate change is having an enormous impact on a huge component of that coastline, i.e. northern Canada. Yet we have very little understanding, if any, of the



John Risley

impact of climate change on our northern frontiers, all of which are coastal areas. Third, we have the second largest concentration of ocean-related PhDs in the world in Halifax. It's high time that we tried to generate some real commercial value. I don't want to be dismissive of the research value resident in the work that's being done by that community in the Halifax-Dartmouth area. But that work is largely focused on basic research. What we need to do is reorient some of that work around commercially attractive research. Then we need to build a start-up community and other commercial opportunities that arise out of that commercially interesting research.

CIN: I attended a [Canadian Science Policy Conference](#) panel in 2014 where you and former New Brunswick Premier Frank McKenna discussed the challenges facing Atlantic Canada's weak innovation performance and the need for businesses to engage more in collaborations with academia. Two years later, are you more optimistic?

Risley: Yes I am. There are a number of things that are coming together to support a big picture opportunity in Atlantic Canada. One is this focus on ocean research—more than ever before—as an area with some very interesting commercial opportunities. You've got small countries like Iceland punching above their weight and you've got the Norwegians who have made enormous leaps and bounds in this area. It's just amazing what the Norwegians, a community the size of Toronto, have been able to accomplish. All of the interesting technology that has grown the world's aquaculture



industry has come out of Norway. Norwegian commercial interests are present around the world—they're here in Canada, the US and in South America. We don't have to be the pioneers of that model. That model is alive and working incredibly well in other jurisdictions around the world.

Another reason is that the business community generally is more border agnostic than it ever has been in the past. If you were talking about doing something in Atlantic Canada 10 years ago you really had to rely on the Atlantic business community to be the initiators of whatever that initiative was. Today, if they don't see the opportunity there are lots of other people around the world who will and they will come here.

Finally, the start-up community in the region is breathtaking. It's awesome to see the successes and the financing that's being attracted by really smart young people with some great ideas. What's really encouraging is that it has happened without anything other than a generic focus. The start-up community here is not really built around any particular industrial focus. It's all over the place. So just imagine what would happen if we became really world-class in commercially interesting research of some sort or another. The idea of the Ocean Frontier Institute is to focus on a couple of initiatives in the ocean sector that have real commercial prospects. The fact that the research is taking place here and it's globally important and is being contributed to by global players is going to spawn a whole acceleration of the start-up community in Atlantic Canada.

CIN: What are some of the business opportunities you see flowing from the OFI once it starts generating the type of research that's expected?

Risley: Provide the opportunities and the entrepreneurs will come. Take aquaculture and the Norwegian model. Going back more than 30 years ago, you had what was then a state-owned company that sponsored all the original research into salmon aquaculture. Out of that research the Norwegians built an industry which they took globally. Today, the farmed salmon industry is worth billions of dollars, and that was a result of the research that was done in Norway decades ago by a state-sponsored firm.

I'm a firm believer in build it and they will come. I don't think you can run around stirring the pot of would be entrepreneurs and the corporate community and make all sorts of noise until you've actually built it. In addition to building it, you have to have the right kinds of commercialization agents, the development officers who know how to broadcast the value of that research to the global business community so people actually know what you're doing.

CIN: So it seems like the requisite components of a vibrant innovation ecosystem are starting to coalesce in the region?

Risley: Absolutely and it's great to see.

Editor's note: Questions and answers have been condensed and edited for clarity.

The power of the virtual cluster

Making Canada the Silicon Valley of natural products

By Debbie Lawes

What if a nation's entire research and commercialization capacity pulled together to help your company get new natural products and technologies to market faster, cheaper and more efficiently?

That one-stop dream has been realized with the launch in 2016 of [Natural Products Canada \(NPC\)](#), a \$23-million industry-led network that brings together a national ecosystem of companies, universities, regulatory experts, business consultants and investors. Together, they are working with companies to turn ideas and technologies into products that benefit the health of humans, animals and the planet.

“Until now there's been no organizing structure to align disparate resources across the country towards commercialization,” says Rory Francis, executive director of the [PEI BioAlliance](#), one of four regional clusters participating in NPC. “NPC pulls together all the pieces including multinationals and their supply chains.”

NPC was established in 2016 as a federally funded [Centre of Excellence for Commercialization and Research](#) with regional nodes in PEI, Saskatchewan (Ag-West Bio), Ontario (University of Guelph) and Quebec (Institute of Nutraceuticals and Functional Foods). NPC defines natural products broadly, encompassing personal health products such as nutraceuticals, cosmeceuticals, functional foods and functional ingredients, as well as agricultural feeds, biopesticides and green replacements for traditional chemicals.

“Take biocomposites,” adds Shelley King, CEO of NPC. “If we can replace all the carbon products in a car with biocomposites, it could make them 400 to 800 pounds lighter. Think about the fuel usage if your car or truck is 800 pounds lighter.”

The NPC investment program is designed to inject capital into high-potential companies, while de-risking the investment of private investors. Its first investee company is a Napanee, Ontario start-up founded on a technology developed by



Natural Products Canada is investing in FireRein, an Ontario start-up that has developed a bio-based gelling agent that smothers fires up to 55% faster while using 60% less water. (Photo: FireRein)



a team of firefighters, scientists and business professionals. FireRein Inc. has created Eco-Gel™, an effective and non-toxic water additive that can “knock down” fires up to 55% faster while using up to 60% less water. Made from bio-renewable, food-grade ingredients, Eco-Gel™ is safe for the firefighter and the environment. “The investment by NPC was a catalyst for our ability to secure interest and funding from angel and private investors,” says Rui Resendes, CEO, FireRein. “NPC’s endorsement, coupled with input and advice on the business strategy, was a tremendous asset in helping us raise sufficient capital to scale up production and increase sales.” NPC’s primary focus is commercialization—providing companies with the technology, business, regulatory and investment support to bring new products to market faster, cheaper and more efficiently.

“Nationally, we have great research capabilities, regulatory and clinical trial expertise, dozens of incubators and accelerators, as well as an abundance of raw materials, including agriculture, aquaculture, forestry and fisheries,” says King. “We are aligning and optimizing all those assets across Canada so that a company in PEI, for example, can access relevant scale up expertise or resources in Saskatoon, and vice versa.”

“It is not about enticing companies to move from one province to another,” she adds. “It’s enabling them to find the key clusters of expertise, infrastructure or mentorship that will help them achieve their business goals... We

also want to connect smaller companies with larger supply chains so we can create more hundred million dollar companies in Canada.”

Operating under four pillars: Connect, Evaluate, Invest and Accelerate —

NPC will enable Canadian natural products firms, universities and research organizations to build competitive advantages by applying scientific knowledge, commercialization expertise, mentoring, strategic marketing and targeted investment.

Consumer demand for natural products has increased exponentially over the last decade. Global sales are predicted to rise to nearly US\$188 billion by 2019, according to New York-based Transparency Market Research.

These products include human (non-pharmaceutical) and animal health, as well as in agricultural ingredients, fish feed stocks, food and sectors where companies are seeking alternatives to petroleum. Consumers are increasingly demanding products derived from natural sources based on

their health and environmental benefits. Until now, much of this demand has been filled by imports. “Canada’s natural product sector is poised to benefit from the growing global demand for healthy and sustainable products,” says NPC board chair, Robert Orr. “NPC’s international connections, collaborative approach, and effective mix of advisory services and investment programming, are key tools to help Canadian companies compete on the world stage.”



PEI emerging as one of Canada's fastest growing bioclusters

Prince Edward Island may be Canada's smallest province with just 146,000 residents, but it is emerging as one of the country's fastest growing bioscience clusters.

"We couldn't have done this 15 years ago," says Rory Francis, executive director of the [PEI BioAlliance](#). "That is the power of the cluster. You have to have relationships among business, research and government, along with a coordinated strategy... This cluster didn't exist 10 years ago. Today's it's a significant part of our economy."

The 48 bioscience companies in the province employ about 1,500 employees, including some 200 PhDs. High profile companies working in PEI include [BioVectra](#), [Elanco](#) and [Sekisui Diagnostics](#). Revenue earned by PEI bioscience companies surpassed \$200 million in 2015.

Similar bioclusters exist across Canada and in 2015, the PEI BioAlliance took the lead in developing a proposal to link these regional pockets of expertise to create a national Centre of Excellence for Commercialization and Research. The proposal



Researchers at the University of Moncton are studying the efficacy of plant-based alternatives to fish oils, whose sustainability is questionable. Here, postdoctoral fellow Dr. Natalie Lefort and Dr. Marc Surette, professor in the Department of Chemistry and Biochemistry, hold a bottle of Ahiflower, a vegetable oil produced by Nature's Crops International in PEI and the UK. Their studies found that Ahiflower offers a safe and effective substitute to traditional fish oil. (Photo: University of Moncton)



won \$14 million in a federal competition last year, leading to the launch of National Products Canada.

Dr. Russ Kerr, CEO of [Nautilus Bioscience Canada](#), a marine natural products discovery company, and chair of the BioAlliance board, says NPC will open a range of new product opportunities for Canadian businesses.

“With applications in personal care products, cosmetics, natural health products, veterinary health and nutrition, agricultural and food products, and environmental remediation, the market for more sustainably-produced, natural product chemistry-based ingredients is growing very quickly,” says Kerr, who is also a [Canada Research Chair](#) at the [University of Prince Edward Island](#).

Francis says PEI’s biocluster is anchored by strong academic and federal science, including the University of PEI’s [Atlantic Veterinary College](#), [Holland College](#), [National Research Council](#), [Agriculture Agri-Food Canada](#) and the [Canadian Food Inspection Agency](#). These labs work with companies to move early stage technologies to market. Several of these companies have benefited from PEI’s virtual bioscience business incubator, EmerGence, which provides mentoring and specialized commercialization services to early stage companies.

“That is the hard work and that is where I think we established a track record of success that is getting international attention from companies and

businesses who at PEI and Canada as a platform to access North American markets,” he said.

One company to take advantage of PEI’s virtual incubator has been Nature’s Crops International. The Winston-Salem, North Carolina-based company established a facility in PEI that extracts and refines oil from locally grown oilseed crops for industrial, personal care and nutritional markets. One of its products, called [Ahiflower](#), is an affordable and sustainable alternative to omega-3 fish oil that was developed in partnership with scientists at the [University of Moncton](#) and the National Research Council. The product is now being sold in the US and EU and is expected to be available in Canada this year.

“What Nature’s Crops saw in PEI and Atlantic Canada was an opportunity to take advantage of our capacity to de-risk both the science and the business plan,” says Francis. “They also had access to the growers, and high quality bioscience graduates coming out of our colleges and universities.”





Carl Brothers, General Manager of Frontier Power Systems explains the control system on one of the company's completely redesigned wind turbines. (From left) Lawrence MacAulay, Minister of Agriculture and Agri-Food; Carl Brothers; and Heath MacDonald, Minister of Economic Development and Tourism. Photo Credit: Aila Arsenault

COMPANY SPOTLIGHT

Frontier Power Systems — A new approach to powering the north

Carl Brothers wants to help remote, northern communities keep the lights on. Literally.

Brothers is the general manager of Frontier Power Systems, a Prince Edward Island company that is developing next-generation energy systems to provide sustainable power to off-the-grid communities in the far north.

“Our engineers have spent the last 15 years developing wind energy technology for remote locations and we have established ourselves as industry leaders in the sector,” he says.

The need is real. Many northern communities rely solely on diesel-fueled community generators. These generators are costly to run, challenging to maintain, and are under increasing pressure to meet the rising energy demands of growing village populations. And an overloaded generator is an unreliable generator. Delivering fuel to remote areas in extreme arctic weather is difficult at best, impossible at worst, and expensive all the time. Diesel systems also pose a number of environmental concerns, and leave a significant carbon footprint.

Frontier Power Systems is pioneering a new approach to provide off-the-grid communities with energy security in the form of smart grid technology and a three-tiered renewable energy system incorporating wind, diesel and an advanced battery storage system. The result is reliable, affordable, renewable power delivered by

technology specifically designed for arctic use. This system includes redesigned wind turbines, variable speed diesel generators and an advanced battery storage system—all engineered to work seamlessly together for uninterrupted power delivery. Meaning that the lights—and the heat—will stay on in places that need them the most.

With a \$1.8-million investment from the Atlantic Canada Opportunities Agency (ACOA), Frontier Power Systems will continue its work to bring this innovative technology to both Canadian and international markets, with a goal of providing an accessible, affordable energy solution for remote communities around the world.

Source: ACOA



Is big data the next big thing in healthcare?

Newfoundland and Labrador represents a rare opportunity for genetics research.

The province includes a high incidence of rare and complex diseases and multi-generational families whose clinical histories have been well-documented by provincial electronic health records.

[Sequence Bio](#), a data-driven biotechnology company in St. John's, hopes to take this information and turn it into better healthcare. "Modern drug discovery relies on the right kind of information," says Sequence Bio's co-founder and president, Chris Gardner. "And while this information isn't found everywhere, it is found in Newfoundland and Labrador. This is an incredible opportunity to potentially change the way healthcare is delivered and deliver benefits back to the people who live here."

The company is applying to the provincial Health Research Ethics Board (HREB), for permission to conduct health research



Chris Gardner, President, Sequence Bio



Why Newfoundland and Labrador?

Modern drug discovery relies on the right kind of information: real-world patient data that integrates pan-omics with well-characterized phenotypic information. And while this information isn't found everywhere, it is found in Newfoundland and Labrador.

unique isolated population

high incidence of rare and complex diseases

comprehensive electronic health records

extended family pedigrees

in this province. Pending HREB approval, they hope to leverage powerful computing, analytics, machine learning, and artificial intelligence to build the world's most powerful big data resource for drug discovery.

Thanks to federal financial support through the [Atlantic Canada Opportunities Agency's Business Development Program](#), as well as US \$3 million in seed-stage financing led by U.S. venture capital firm, [Data Collective](#), Sequence Bio continues to advance and expand its technical capabilities as it moves forward with the development and commercialization of valuable biomedical products and resources. The company expects to generate over \$1 million in mostly export-based revenues by the end of 2017.

“Our vision is better, safer drugs that deliver more healthcare value,” says Gardner. “With our unique network of talent, advisors, and expertise in big data supporting us, we have never been better positioned for success in drug discovery and precision medicine.” Sequence Bio is looking for partnerships with companies that understand the value of human genetics as a platform for drug discovery. For more information, visit [Sequence Bio](#).

Source: ACOA

Big Science
in a
Big Country

Harvesting power from the world's highest tides

At over 16 metres, the Bay of Fundy has the highest tidal range in the world. This unique site has also the potential to supply thousands of homes with clean and renewable energy, if the unequalled power of the tides could be harnessed.

That's the goal of the Fundy Ocean Research Center for Energy (FORCE), which recently began providing power to businesses in Nova Scotia with Canada's first grid-connected in-stream tidal turbine.

A two-megawatt turbine was deployed late last year at the FORCE test site near Parrsboro by Cape Sharp Tidal, a partnership between Emera Inc., the parent company of Nova Scotia Power, and Open Hydro/DCNS, an Irish company with R&D operations in Nova Scotia.

This milestone marks a turning point for Canada's renewable energy sector. It is the first time clean, renewable in-stream tidal power has successfully been generated from the Bay of Fundy, and the first time a



Cape Sharp Tidal's 2MW turbine is now generating power to the Nova Scotia power grid at FORCE. (Photo: FORCE)



turbine has been grid-connected at FORCE. The demonstration open-centre turbine, designed and manufactured by OpenHydro, uses a fraction of the estimated 7,000 megawatt potential of the Minas Passage to power the equivalent of about 500 Nova Scotia homes with energy from tides. A second turbine, planned for deployment in 2017, will make Cape Sharp Tidal one of the largest generating arrays in the world.

The completed four-megawatt demonstration project will displace the need to burn about 2,000 tonnes of coal, and eliminate 6,000 tonnes of greenhouse gas emissions, the equivalent of taking 1,000 cars off the road each year.

FORCE has invested \$30 million in onshore and offshore electrical infrastructure to allow demonstration turbines to connect to the power grid. Already more than 300 people are working on this project, and more than 250 Nova Scotia companies are involved in the tidal supply chain. Nova Scotia's tidal energy industry has the potential to create up to 22,000 jobs and contribute as much 1.7 billion dollars to the economy.

FORCE is also developing environmental monitoring systems that integrate Oceans 2.0, a sophisticated data acquisition, archiving and visualization system developed by the University of Victoria's Ocean Networks Canada for long-term scientific monitoring of Canada's oceans, including its NEPTUNE and VENUS cabled seafloor observatories.

Watch the power of FORCE



[CLICK TO PLAY](#)
[VIEW ONLINE](#)



INNOVATION SPOTLIGHT

Toronto boosts efforts to attract FDI

Three levels of government have committed \$19.5 million over three years to Toronto Global, a new agency with a mandate to enhance and promote the business value proposition of the Toronto region as a location for foreign direct investment (FDI). Toronto Global is being structured as an arms-length, not-for-profit corporation to attract FDI from targeted industries around the world. The Toronto region generates 20% of Canadian GDP and is home to 40% of Canadian business headquarters.

Honda receives \$83.6M for facility upgrade

[Honda Canada Inc.](#) is receiving \$83.6 million from the federal and Ontario governments to build a new paint shop that will significantly reduce greenhouse gas emissions. The project is part of a \$500-million upgrade to Honda's Alliston ON plant which produces the popular Honda Civic and four-cylinder engine blocks.

New Atlantic aerospace association forming

The Atlantic Canada Opportunities Agency (ACOA) is investing \$3 million in a new [Atlantic Aerospace and Defence Association \(ACADA\)](#) to promote the sector's capabilities and develop value-added activities, with an emphasis on small- and medium-sized enterprises in Atlantic Canada. ACADA represents nearly 200 aerospace, defence, security and marine companies with a focus on supply chain management, workforce development, career promotion and commercialization.



Tweed approved for marijuana research

Cannabis producer [Tweed Inc.](#), Smith Falls ON, has received a dealer's licence that will allow the company to focus on strategic research-intensive activities beyond its existing operational scope. Tweed, a wholly owned subsidiary of Canopy Growth Corp., will undertake its licensed activities under the name Canopy Health Innovations in a purpose-built area of its facility constructed to Good Manufacture Practice (GMP) specifications. Tweed is developing new products in anticipation of the legalization in Canada of recreational marijuana, which is expected in either 2017 or 2018. The company also intends to pursue export of its products into jurisdictions that also allow recreational marijuana. The firm is currently restricted to serving the medical marijuana market.

New drug discovery labs open in Montreal

[The Institute for Research in Immunology and Cancer \(IRIC\)](#) has opened new laboratories for its medicinal core facility that will increase drug discovery capacity and accelerate the expansion of its chemical compounds library with the installation of a robotics suite. Located at the University of Montreal, IRIC's new labs coincide with the launch of Phase II clinical trials for a molecule jointly identified by IRIC and [Bristol-Myers Squibb](#). The drug candidate is being studied for the treatment of thrombotic diseases to inhibit the protease-activated receptor type 4. Several hospitals across Canada and internationally will participate in the trial.

Battery researcher wins \$1 million medal



(Photo: Dalhousie University)

Dalhousie University's Dr. Jeff Dahn has won the [Gerhard Herzberg Canada Gold Medal for Science and Engineering](#)—Canada's top science prize for his pioneering research on lithium-ion batteries that are commonplace in today's mobile technology. Last year, Dahn partnered with Tesla Motors to form the NSERC/Tesla Canada Industrial Research Chair, with Dahn as the chairholder. This is the first and, to date, only time the company has partnered with a university researcher. The collaboration aims to develop lithium-ion batteries for automobiles and grid energy storage that are cheaper, more powerful and longer lasting, thus helping to ensure the wider adoption of electric vehicles and renewable energy.

Microbion Corp received US\$25M in venture funding

Vancouver and Bozeman MT-based [Microbion Corp.](#) has received US\$25-million in venture capital to further develop its lead compound for the treatment of antibiotic-resistant infections. The funding is being provided by the [Global Health Sciences Venture Fund](#), a US\$500-million joint venture between Vancouver's Quark Venture Inc and GF Securities, a Hong Kong-based investment bank. The fund was established in late 2016 to invest in biotechnology and health sciences companies addressing unmet medical conditions and innovations in drug development, medical devices, health IT and emerging convergent technologies.



Prime Minister Justin Trudeau at Blackberry's funding announcement in December
(Photo: Government of Canada)

Blackberry opens self-driving research centre in Ottawa

Blackberry Ltd. is investing \$100 million to refocus its Kanata-based QNX division towards autonomous vehicles (AV) and establish a Blackberry QNX Autonomous Vehicle Innovation Centre with an emphasis on industry and academic partnerships. ([Watch the video.](#)) The City of Ottawa's innovation and economic development arm – Invest Ottawa – is also leading the region's bid for a provincial AV Centre of Excellence. Ottawa is also home to several multinational telecommunications firms that could strengthen an AV cluster, including Ericsson, Nokia and Huawei.



(Photo: Alvesgaspar, Creative Commons)

Using nuclear reactors, not insecticides, to fight crop pest

A high-tech form of insect birth control connected to nuclear power could solve a devastating pest problem for Ontario farmers. [Bruce Power](#), the world's largest operating nuclear facility located in Tiverton, ON, and [Nordion](#), a global health science company, are funding a multi-year study led by [University of Guelph](#) researcher Dr. Cynthia Scott-Dupree on sterilizing pepper weevils using Cobalt-60 produced in four of Bruce Power's eight nuclear reactors. The researchers hope the Sterile Insect Technique (SIT) will control pepper weevils, a type of beetle that can burrow into farmed peppers and destroy them from the inside. In Ontario alone last year, pepper weevils ruined \$83 million of crops. Scott-Dupree has also recently conducted research which has found that SIT has potential to control American serpentine leafminer, an insect pest that feeds primarily on chrysanthemums. Cobalt-60 harvested from Bruce Power's reactors is already used to help sterilize 40 per cent of the world's single-use medical devices and treat brain tumours.

Getting started on a collaborative model of innovation

By Anthony Reinhart
Director, Editorial Strategy,
Communitech

Throughout the year, curious executives and leaders from companies and governments from all over the world come to tour the [Communitech](#) Hub in Waterloo Region. Invariably, they are astounded by the mix of startups, mid-sized companies and large multinationals all working in the same building.

These visitors typically ask about intellectual property rights, where the offices are and how people have meetings. Given the openness of our space, it's difficult for them to comprehend. But, by the end of the tour, after talking to the lab directors who run our corporate outposts, the visitors are able to see the true opportunity that this collaborative model of innovation provides: By getting out of the office and talking to others, you will learn things that you never would have on your own.

True disruption from within is incredibly difficult, if not impossible, for most large organizations. There are many reasons for this, but most can

be summed up in two words: culture and process. The culture of the organization is often slow, risk-averse, hierarchical and methodical. Processes developed over many years have been built to slow things down and encourage thoughtfulness, but inherently result in redundancy. There are good reasons for these processes, but these same reasons can kill innovation activities within.

The [outpost lab model](#) enables large organizations to build teams inside an existing entrepreneurial ecosystem – and importantly, outside corporate walls – where they can develop their own cultures and processes. Although these new cultures are meant to disrupt their parent organizations, they must also be aligned to their goals to ensure the labs stay relevant and create long-term value. Collaborative innovation also enables you to see your business as others see it from the outside. At Communitech, more than 160 companies, from startups to large enterprises,

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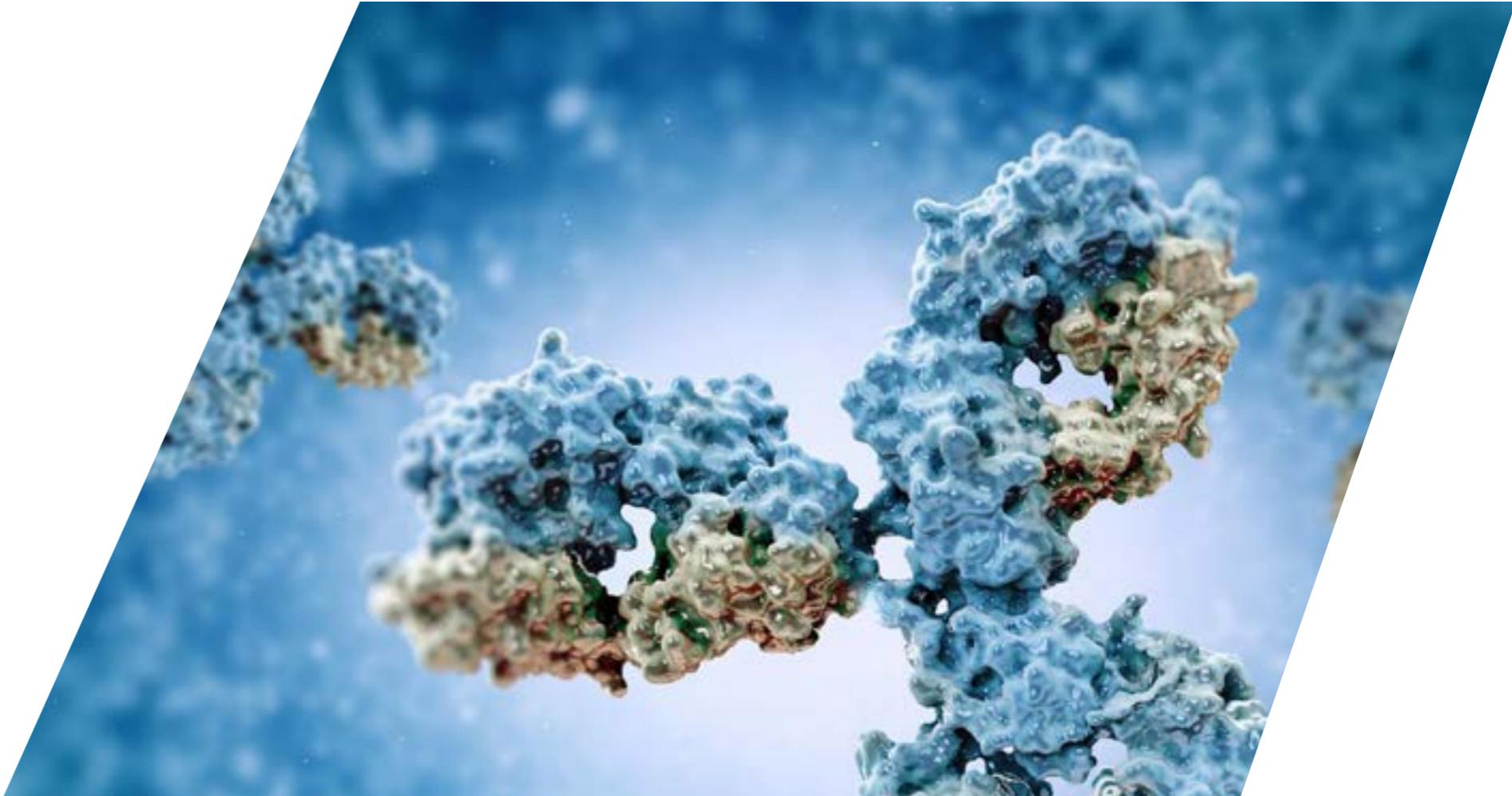
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simultaneously work together and separately to solve urgent problems for businesses. When large organizations immerse themselves in this diverse and dynamic environment, they see first-hand how startups and other companies view them. And because startups are by nature more nimble and experimental, they can provide fresh and critical insights into the state of your industry.

It's exciting and scary at the same time, but our enterprise partners need to see and learn from these interactions. As large organizations seek to understand how to keep up with the pace of change in their industries, they should make a collaborative model of innovation part of their strategy. If culture and process are inhibiting true change, slowing down idea generation, and destroying your company's ability to disrupt from within, then get outside your walls and find an ecosystem that can help accelerate your innovation agenda.



COMPANY SPOTLIGHT

CCAB – bridging Canadian academic R&D with the biotherapeutics economy

Each year, the Canadian government invests a significant amount of R&D funding in universities and colleges that, relative to the size of our economy, rivals any of the G7 nations. As a result, Canada has established an internationally recognized research community, supported by renowned Canadian scientists who consistently produce world-class discoveries and publish large numbers of high impact scientific articles each year. How does one translate quality research from this thriving scientific environment into consumer products or technologies that hold tremendous benefits to Canada and the rest of world? [The Centre for the Commercialization of Antibodies and Biologics \(CCAB\)](#) aims to achieve this goal in the field of biotherapeutics.

In 2015, the global market for [monoclonal antibodies](#) was valued at USD \$85 billion¹. With their selectivity and lack of significant toxicity, antibodies have become the first choice of treatment for many devastating diseases including cancer. In 2014, Dr. Sachdev Sidhu launched the CCAB with support from the federal [NCE CECR program](#) and various industry partners to tap into the enormous potential of synthetic antibody development at the [Toronto Recombinant Antibody Centre \(TRAC\)](#). The TRAC is an integrated laboratory for therapeutic-grade antibody and synthetic protein development located in the [Donnelly Centre](#) at the [University of Toronto](#). The TRAC currently has approximately 9000 antibodies against almost 600 targets, undergoing validation for various disease indications. Later this year, the CCAB will also harness the

power of CRISPR gene editing tools and cell engineering being developed at the Platform for Advanced Cell Engineering (PACE) under the direction of Dr. Jason Moffat. PACE technology will complement the TRAC through target identification, antibody validation and cellular selections, allowing the CCAB to advance more antibody candidates toward commercialization.

Drug development in Canada, with respect to R&D, has predominantly relied on academic laboratories rather than being industry-driven. In comparison to the US and other countries, academically-oriented R&D, along with the lack of external funding, often leads to fewer discoveries moving forward into clinical development in Canada. In recent years, there has been an increase in momentum of VC investment into the biotech sector. In 2015, the Canadian Department of Innovation, Science and Economic Development reported growth of VC investments in the life science industry to \$647 million, a 35% increase compared to the previous year². The CCAB intends to further strengthen the Canadian drug development landscape by moving exceptional academic R&D forward to clinical development, where it is ripe for investments from VCs or pharma partners and can increase Canada's contribution to the global biotherapeutic economy.

References

1. <https://www.grandviewresearch.com/press-release/global-monoclonal-antibodies-market>
2. https://www.ic.gc.ca/eic/site/lsg-pdsv.nsf/eng/h_hn01776.html



Cape Breton University and BRAC “Barefoot doctors” bring hope to South Sudan

South Sudan declared its independence from Sudan in 2011. After almost a half century of armed conflict and associated strife, the world’s youngest nation is in the process of rebuilding its shattered infrastructure and systems. Living conditions for the population are extremely difficult and many lack access to basic services, including health care, which is concentrated in urban areas. More than 90% of the population live in rural areas.

Less than 190 doctors and 1,800 nurses serve South Sudan – a nation of 10 million people. It will take time to educate enough doctors and nurses to meet South Sudan’s great need. In the meantime, some innovative solutions are being developed a world away by researchers at [Cape Breton University](#) in Nova Scotia. With funding from the Innovating for Maternal and Child Health in Africa initiative, the researchers are convinced that emergency aid must be accompanied by a long-term strategy in order for solutions to be sustainable.

Working with a variety of partners including the South Sudan’s Ministry of Health and



South Sudanese community health worker. (Photo: Alison Wright)





(Photo: Cape Breton University)

[BRAC](#), the world's largest non-governmental development organization, Dr. Kevin McKague and his team are exploring the potential of "social enterprise" models as a means to motivate, empower and mobilize South Sudanese people to fill the massive gap in health care services.

A social enterprise is a business that focuses on generating social profit, rather than just financial profit. For the South Sudan health care sector, such enterprises have enormous potential to save lives. Micro-investments in community health workers may be the answer to promoting this type of business. In a simple franchise model, recruits – typically women – are trained in the delivery of basic health care including treatment, medications, prevention, and education. They are also provided with products to sell. The profits from those sales generate modest revenues which sustain the health worker's activities.

In addition to having the highest maternal mortality rate in the world, South Sudan also ranks 9th in the world in terms of infant mortality rates.

"The South Sudan health worker incentives project aims to bring basic care into people's homes, through more than 1,500 community health workers who will be trained in the basics of primary health care.

Dr. Kevin McKague



Communicable diseases like measles, malaria and cholera are rampant among the 1.7 million South Sudanese who are internally displaced, living either in the bush or in overcrowded refugee camps, with only basic sanitation facilities and lacking clean water.

As more than half of the population (55%) lives beyond walking distance to a medical clinic, the community health workers, also known as “barefoot doctors,” become mobile mini-health clinics. With their kit in hand, they travel to villages and provide health care, medication and advice on disease prevention. The community health workers possess invaluable cultural knowledge, which enables them to forge strong relationships with clients and leverage these relationships to create healthier villagers.

The program is gaining ground, with approximately 3,000 community health workers taking part, earning a living and saving lives in the process. While they do not have the breadth of medical knowledge that a physician or nurse does, they are still filling a critical gap in South Sudan’s fragile health care system.

Dr. McKague and his team are now working to devise an evidence-based suite of incentives, both financial and non-financial, to entice more South Sudanese to enter the program and become vital components of their country’s health care system. Findings from the research will also help inform the Ministry of Health’s efforts to structure its community health program.

Cape Breton University is researching how social enterprise models can create opportunities for the world’s poor

[Innovating for Maternal and Child Health in Africa](#) initiative is co-funded by [Global Affairs Canada](#), [Canadian Institutes of Health Research](#) and the [International Development Research Centre](#), as well as [Grand Challenges Canada](#).

Source: Canadian Institutes of Health Research

[Watch the 10 minute documentary.](#)



Consider launching your start-up in Canada

Consistently ranked as one of the best countries to do business in the G20, and strategically located near other key global economic centers, Canada provides businesses with unparalleled access to the world's largest markets. Aside from the many tax benefits Canadian incorporation may bring, entrepreneurs may also benefit from a quick and cost-effective immigration process under Canada's [Start-Up Visa program](#).

Launched in April 2013, the Start-Up Visa program is a special immigration stream that caters to the needs of high-potential entrepreneurs. This program grants permanent resident visas to foreign entrepreneurs who intend to operate a business in Canada that has received at least one of the following:

An investment of at least \$75,000 from a designated angel investor group;

An investment of at least \$200,000 from a designated venture capital fund; or

Acceptance into a business incubator program by a [designated business incubator](#).



Successful applicants will receive their permanent residency in less than six months after submission. Applicants with urgent reasons to arrive and work in Canada prior to receiving permanent resident status may apply for a Start-Up Business Class Work Permit.

Canada's Start-Up Visa program has the capacity to accept 2,750 applicants per year. The program is currently in its pilot stage and demand for the program has been continuously increasing each year. The successful applicants come from a diverse range of countries, including Australia, China, Costa Rica, Egypt, India, Iran, South Africa and Uruguay, and across a number of industries, including technology, food product manufacturing, education, medical research, banking, human resources, and advertising.

For more information on the Start-Up Visa program, contact Canadian Acceleration and Business Innovation (CABI) at info@cabi.ca or visit www.cabi.ca.

This article was co-authored by Andre Garber, the Director of the Dentons Canada Startup Program & Kailin Che, the Director of CABI



In the news the news the

Pond, SNC-Lavalin partner on CO2 projects

[Pond Technologies Inc.](#), Markham ON, is partnering with global engineering and construction giant [SNC-Lavalin](#) to take its carbon dioxide conversion and recycling technology worldwide. Under the partnership, the two companies will design, propose and construct projects using Pond's technology, creating new industrial business opportunities. Pond recently [partnered](#) with the National Research Council's flagship algae carbon conversion program for a pilot project to convert the CO2 emissions from the St. Mary's Cement plant in Ontario into algal biomass that could potentially be used in a wide range of products and processes.

CCRM and the Univ of Queensland partner on neutropenia treatment

The University of Toronto-hosted [Centre for the Commercialization of Regenerative Medicine](#) (CCRM) has struck a licensing deal with [UniQuest](#), the commercialization arm of Brisbane AU-based University of Queensland (UQ) to commercialize a treatment for chemotherapy-induced neutropenia. The treatment, developed by researchers at UQ's Australian Institute for Bioengineering and Nanotechnology, provides a therapeutic dose of white blood cells to patients immediately after chemotherapy. The white blood cells are extracted from umbilical cord blood to produce a transfusion-ready dose to administer to patients. A member of the UQ research team — Dr. Nick Timmins — is now based at CCRM, which is a leader in commercializing regenerative medicine technologies and cell and gene therapies.



(Photo: Pond Technologies Inc.)

In the news

Microsoft acquires Waterloo-based AI start-up

Microsoft Corp has acquired [Maluuba](#), a [University of Waterloo](#) spin-off that utilizes deep learning and artificial intelligence to create literate machines that can think, reason and communicate like humans. The acquisition, for an undisclosed amount, caps six years of development since Maluuba was established in 2010 by two U ofW students — Sam Pasupalak and Kaheer Suleman — and incubated at the Communitech Hub as part of the U ofW’s [Velocity Program](#). As part of the agreement, Maluuba and the Microsoft Artificial Intelligence and Research group will be advised by Dr. Yoshua Bengio, a University of Montreal professor regarded as one of the godfathers of machine learning. Bengio recently announced the launch of a start-up incubator called [Element AI](#), which received seed funding from Microsoft Ventures, the tech titan’s venture capital arm.



From left: Kaheer Suleman (co-founder, Maluuba), Jay Shaw (director of Velocity) and Sam Pasupalak (co-founder, Maluuba). (Photo: Phil Froklage, Communitech)

Versant boosts Canadian presence with key appointments

[Versant Ventures](#) has made key appointments in Canada, the U.S. and Switzerland in advance of the launch of its sixth fund, which is expected to reach US\$400 million. The San Francisco-based venture fund has US\$2.3 billion under management and has been increasingly active in Canada, most recently teaming with Bayer AG to invest US\$225 in the Toronto-based life sciences start-up, [Blue Rock Therapeutics](#). The Canadian venture partners are Dr. Mary Haak-Frendscho (Toronto), CEO of [Blueline Bioscience](#) located at the MaRS Discovery District, and Lloyd Segal (Montreal) who will lead a new Canada-based series ‘A’ oncology start-up backed by Versant.

Quebec and Massachusetts form research council

Quebec and the State of Massachusetts have formed the [Quebec- Massachusetts Collaborative Research Council \(QMCRC\)](#) to foster cooperation between the two jurisdictions. The council will also help to showcase Quebec’s research expertise from academia and business with potential collaborations in clean energy, electric transportation, biotechnology and the environment. The 12-member QMCRC is the result of work undertaken by the Quebec-Massachusetts Parliamentary Association and will facilitate new relationships through targeted networking. Membership is split equally between the two jurisdictions and between academia, industry and government. Quebec chief scientist Dr. Rémi Quirion is among the six Quebec members.

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Multinationals launch national digital accelerator

Some of the world's biggest tech companies have launched [DXagents](#), a first-of-its-kind national digital transformation accelerator comprised of business leaders and technologists from leading private, public and not-for-profit organizations in Canada. The year-long partnership between [Deloitte](#), [SAP](#), [Amazon Web Services \(AWS\)](#), [Intel](#), [SUSE](#), CIO Association of Canada ([CIOCAN](#)), Financial Executives International Canada ([FEI Canada](#)), [TDWI](#) and [B2B News Network](#) aims to help Canadian CIOs, CFOs and other decision makers take advantage of digital transformation opportunities. To nominate a project and see a public sector example, visit [DXagents.com/Watchlist](#).

S&T to get boost under CETA deal

The European Union's parliament approved a trade deal with Canada in February that could drive more joint research between the two partners. [The Canada-European Union Comprehensive Economic and Trade Agreement](#) commits to enhanced cooperation in the area of science, technology, research, and innovation by all levels of government as well as by private sector, research, and civil society organizations. CETA is designed to enhance the 1996 Canada-EU Scientific and Technological Cooperation Agreement.



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