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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.

CIN is brought to you by RESEARCH MONEY, Canada's premiere source of science, technology and innovation policy and investment news and in-depth analysis.

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Message from the Publisher

Happy 150th Canada!

This issue of *Canadian Innovation News* celebrates a long tradition of innovation in our vast country, dating millennia before the formal creation of Canada 150 years ago. From the early snowshoes and amautis created by Indigenous innovators, and still used today, to the modern inventions of radiation therapy and the Ebola vaccine, the people living in the land we now call Canada have improved our lives through their ingenuity, resourcefulness and inclusiveness.



After all, innovation is about making our lives better – where we are, with what we’ve got. Canada includes towering mountains, verdant valleys, expansive plains, frozen tundra, flowing rivers, pristine lakes and lush forests – a diverse natural environment that places different demands on people’s ability to travel, feed themselves, build shelter and prosper. This geographical diversity is reflected in the diversity and ingenuity of our people, cultures and innovations. Many of these innovations are showcased at the Canada Science and Technology Museum in Ottawa,

our nation’s capital. As Canada celebrates 150 years as a modern nation, the museum is putting the finishing touches on a major upgrade or “reboot”, with a grand re-opening planned for November 2017. Our feature article highlights how the new museum will focus on past, present and future S&T and innovation, with an emphasis on youth, Indigenous innovation, the environment, as well as diversity and inclusiveness.

The museum is also at the forefront of the digital revolution that is transforming our world. For the first time, visitors from anywhere in the world will be able to view the museum’s entire collection of artifacts online.

As part of Canada’s anniversary fête, Canadians from all walks of life are showcasing Canadian innovation with projects across the country, some of which we feature in this issue. You’ll also enjoy our regular profiles of leading Canadian researchers, companies and new technologies—

from artificial intelligence and quantum computing to engineered protein targets and high tech sensors that integrate traditional Inuit knowledge to navigate sea ice.

Join our anniversary party, enjoy the stories and connect with Canada’s innovators to help make the world a better place.

A handwritten signature in black ink that reads "J. Crelinsten". The signature is written in a cursive, flowing style.

Jeffrey Crelinsten



Welcome Message from **Fernand Proulx**

Interim President and CEO, Ingenium – Canada's Museums of Science and Innovation

The most meaningful reward that I receive from my work is when people tell me that it was their childhood visits to the [Canada Science and Technology Museum](#) in Ottawa that inspired their lifelong passion for science. Many went on to careers in science or related subjects such as engineering and technology.

The Museum opened in 1967, Canada's centennial year. It was among the first science and tech museums anywhere to have hands-on and interactive exhibitions.

A lot has happened with the Museum in the intervening years, such as new exhibitions, programs, and digital outreach. Two other science and technology themed museums also opened: the [Canada Agriculture and Food Museum](#) and the [Canada Aviation and Space Museum](#). Through their artifacts, exhibitions, school programs, public demonstrations, and special events, all three museums tell the human stories of Canadian innovation.

The Museums, though, don't have a monopoly on talking about and explaining technology. That's why we created the [innovation150.ca](#) digital storybook in which all Canadians can share their own stories of innovation.



[Ingenium](#)'s push to become a digital organization has boosted our interconnectivity and our global reach. We have put our national collection and our internal working documents online, which encourages interaction and collaboration. An added benefit of being online is that the national collection is now available for those who cannot visit Ottawa.

But there is nothing like being in the presence of the real thing, which is why we are excited that after three years of renovations the Canada Science and Technology Museum will reopen in November and welcome back its loyal visitors and many new ones. It will offer brand new learning adventures to new generations of Canadian youth. There will be new galleries, new exhibitions, and more artifacts than ever on display.

While the Science and Tech Museum has been under renovation, its two affiliate Museums have been carrying the science and technology torch.

The Canada Agriculture and Food Museum – in the heart of Ottawa – is a combination museum and working demonstration farm where visitors explore the sights and sounds of farm life through the animal barns, exhibitions, treasures from the collection, hands-on activities, and food demonstrations.

In today's urbanized world, the look on children's faces when they see a cow being milked is priceless. "That's where milk comes from!?" they exclaim. But it's all about learning what goes on from 'farm to fork' – including [food literacy](#) – so that children and



adults better understand the science behind their food and how to make their own wise food choices.

Aviators opened up Canada's North; today aviation links Canadians coast to coast to coast.

Canadians can be proud to have one of the world's best aviation and aeronautical collections at the Canada Aviation and Space Museum. The timeline of history represented in these flying machines runs from the earliest days of human powered flight to Canada's exploits in space, as embodied by the iconic [Canadarm](#) that is on display.

We use science to explain our world, and we use technology to put science to use. Canada's youth will be the innovators of tomorrow. They will move technology forward to solve our problems and improve our lives. Through the recently launched [STEAM Horizon Awards](#), the Museums are working with partner organizations to recognize and reward outstanding Canadian youth who will be tomorrow's leaders in science, technology, engineering, arts, and mathematics (STEAM).

I am thrilled that the important work of my colleagues is featured in this issue of *Canadian Innovation News*. My colleagues and I hope you will visit the Museums soon, go online to see what we're all about, catch one of our travelling exhibitions that are crisscrossing the country, or download one of our apps.

Fernand Proulx
Interim President and CEO
Ingenium – Canada's Museums of
Science and Innovation



CELEBRATING CANADA 150+

Here's a test: Of the many innovations featured on the cover of this issue of *Canadian Innovation News*...

How many did you know were Canadian?

Science and tech gets a reboot for Canada's 150

By Debbie Lawes

No doubt, many of us would have read about Drs. Frederick Banting and Charles Best's discovery of insulin nearly a century ago.

But did you know that lamivudine, also known as 3TC, was created by McGill University virologist Dr. Mark Wainberg in collaboration with Montreal-based BioChem Pharma in 1989? Recognized as one of the safest and most effective treatments for HIV, this "blockbuster therapeutic" has saved millions of lives around the world.

Then there's the modern-day battery. Lewis Frederick Urry, a Canadian chemical engineer, created both the alkaline battery and lithium battery while working for the

Eveready Battery Company in Cleveland OH, building on earlier work by Thomas Edison. Sixty years later, at least 80% of the dry-cell batteries in the world are based on Urry's work. "It's remarkable to think that billions of smartphone users around the world depend on a Canadian's

innovation to power their device," says Fernand Proulx, interim president and CEO / chief operating officer of Ingenium – Canada's Museums of Science and Innovation. The three museums are: [Canada Science and Technology Museum](#), [Canada Agriculture and Food Museum](#) and [Canada Aviation and Space Museum](#).

"Incidentally, the digital camera technology in your smartphone was co-invented by another Canadian, Willard Boyle, for which he won the Nobel Prize in Physics."

Of course, technological innovation on this vast and rugged continent didn't begin with European explorers or Canadian confederation 150 years ago (thus the plus symbol for Canada



Canadian innovation today: The Canada Museum of Science and Technology's traveling exhibit, *Climate Change is Here*, showcases Canadian research in the field of climate change and technologies being developed to help mitigate it. One such technology developed by CarbonCure Technologies, Dartmouth, Nova Scotia, allows for concrete producers to permanently store CO² in concrete as solid limestone. This reduces the carbon footprint, creating affordable, greener and stronger concrete products. In April, Environment Minister Catherine McKenna (centre) joined a tour of Central Concrete in San Jose, CA, where CarbonCure's technology is installed. (Photo: CarbonCure Technologies)

150+). Indigenous people have been developing better ways to travel and live here for thousands of years. In just one example, many of those first explorers from Europe may never have survived had the Indigenous people not taught them to use boiled cedar needles to treat scurvy.

Yet, in characteristically Canadian fashion, we are reluctant to brag about our accomplishments. This despite the fact that three of our cities—Toronto, Montreal, and Vancouver—are ranked among the top 25 most innovative cities in the world, according to the [10th annual “Innovation Cities Index”](#).

Canada’s 150+ celebrations are providing new opportunities to break with that quiet and modest persona. Ingenium is one of the main groups leading this charge.

“I don’t think we, as Canadians, toot our own horn enough,” says Christina Tessier, director general of the Canada Science and Technology Museum. “Here at the museum we are ready to step up and let people know all the amazing things Canada and Canadians have done and share those stories. It’s time for us to take our credit where it’s due.”

Much of that horn blowing will be on display at the “rebooted” Canada Science and Technology Museum, which celebrates its 50th birthday on November 16. The Ottawa facility is putting the final touches on an \$80.5-million [renovation](#) that includes more than 7,400 m² of new exhibition space, enough to double the amount of artifacts on display. A new

\$156-million, 36,000 m² high-tech Collections Conservation Centre next door will mean more and improved artifact storage and laboratory space.

True to its name, new technologies will play a pivotal role in the new design, even before you enter the renewed Canada Science and Technology Museum. A giant LED screen on the building’s façade will project stories of Canadian S&T. Once inside, visitors can tour Artifact Alley, a main street of sorts that showcases close to 800 artifacts from the collection and includes an augmented reality experience that brings some of the artifacts to life.

The revamped building will also see the installation of 11 new exhibitions that will tell Canadian stories of ingenuity. Among them is **Technology in our Lives**, an exploration of how Canadian lives are shaped by daily interactions with technology.

Indigenous innovators

One notable change will be the increased focus on Indigenous innovations, which are traditionally displayed in other museums as cultural or historical artifacts.

“The Indigenous community has been at the forefront of technological change and has been a strong influence in the lives of Canadians,” says Proulx. “We didn’t believe in isolating these innovations in an Indigenous zone. Instead, we’ve weaved the importance of the Indigenous

technology innovations throughout the galleries.” One exhibition, called **Hidden Worlds**, looks at astronomy from an Indigenous perspective. Other artifacts illustrate how past Indigenous innovations, like snowshoes, are creating business opportunities today.

For its **Into the Great Outdoors** exhibition, the museum is working with the Huron-Wendat First Nation, a small community of about 2000 people near Québec City that is home to world leaders in snowshoe research, design and fabrication, including [GV Snowshoes](#), whose snowshoes will be on display at the museum.

STEM + Art = STEAM

The new Canada Science and Technology Museum will also expand its focus on STEM (science, technology, engineering, and mathematics) to include the arts and design, with an emphasis on experiential, hands-on learning.

Says Tessier: “We went from focusing on STEM to focusing on STEAM because we believe the arts are critical in creating that cycle of innovation and multidisciplinary teams,” as well as preparing today’s youth for the jobs of tomorrow.

Take the video game sector. Canada ranks third in the world for developing video games, behind the U.S. and Japan, according to the [Entertainment Software Association](#)

[of Canada](#). The Canadian sector's 472 studios employ more than 20,000 people and contribute \$3 billion annually to Canada's GDP.

Last fall, the museum launched **Game Changers**. Developed in partnership with the [Social Science and Humanities Research Council of Canada](#) and Burnaby, British Columbia-based [EA Vancouver](#), the travelling exhibit outlines how storytelling, gameplay, graphics, and audio merge to create compelling gaming experiences. The museum also collaborates with external partners to ensure its workshops and exhibits reflect the most up-to-date science.

"We're involved with academia, government departments and industry on current research," as well as scientists from Canada and around the world through a new demonstration stage that will have live broadcast capabilities, says Proulx. "It's important to have scientists interact with the next generation, to feed those inquiring minds. It's current science and inspiring future science." Work is underway to bring even more "future science" to the museum, particularly in areas where Canada excels, such as artificial intelligence and stem cell research.

"The average Canadian doesn't necessarily know these are Canadian strengths so we want to make sure those stories are told," says Tessier.

Beyond bricks and mortar

One of the museum's biggest global successes has been with gaming apps. Its newest free online game, [Ace Academy: Skies of Fury](#), based on First World War aviation, has been downloaded more than 500,000 times in 190 countries.

"We've made a conscious decision to go beyond the bricks and mortar to increase awareness of Canadian innovation internationally and what great partners we can be," says Proulx.



Canadian innovation today: Another homegrown technology on display in the museum's *Climate Change is Here* travelling exhibit was developed by Effenco Development Inc. The Montreal-based company invented the Active Stop-Start system that automatically shuts down the engine of a truck or bus when it's stationary, and restarts on demand, saving fuel and reducing CO² emissions. (Photo: Canada Science and Technology Museum)

As part of Canada's sesquicentennial celebrations, Ingenium is participating in other initiatives to expand the three museums' reach beyond Ottawa and Canada:

- **As of November, Ingenium's entire collection will be available online.**
- **[Ingenious](#): This new book, authored by Governor General David Johnston and National Research Council chair Tom Jenkins, features hundreds of Canadian innovations that have made the world a smarter, smaller, kinder, safer, healthier, wealthier, and happier place.**
- **[Innovation150](#): Five of Canada's leading science outreach organizations launched this national program which includes travelling science exhibitions (e.g. quantum computing), city-wide festivals, a touring MakerMobile, and a crowdsourced interactive digital storybook of Canadian innovation.**

150+ years of Indigenous innovation

A landmark report on the tragic legacy of Canada's Indian Residential School system has created new opportunities to showcase Indigenous innovation.

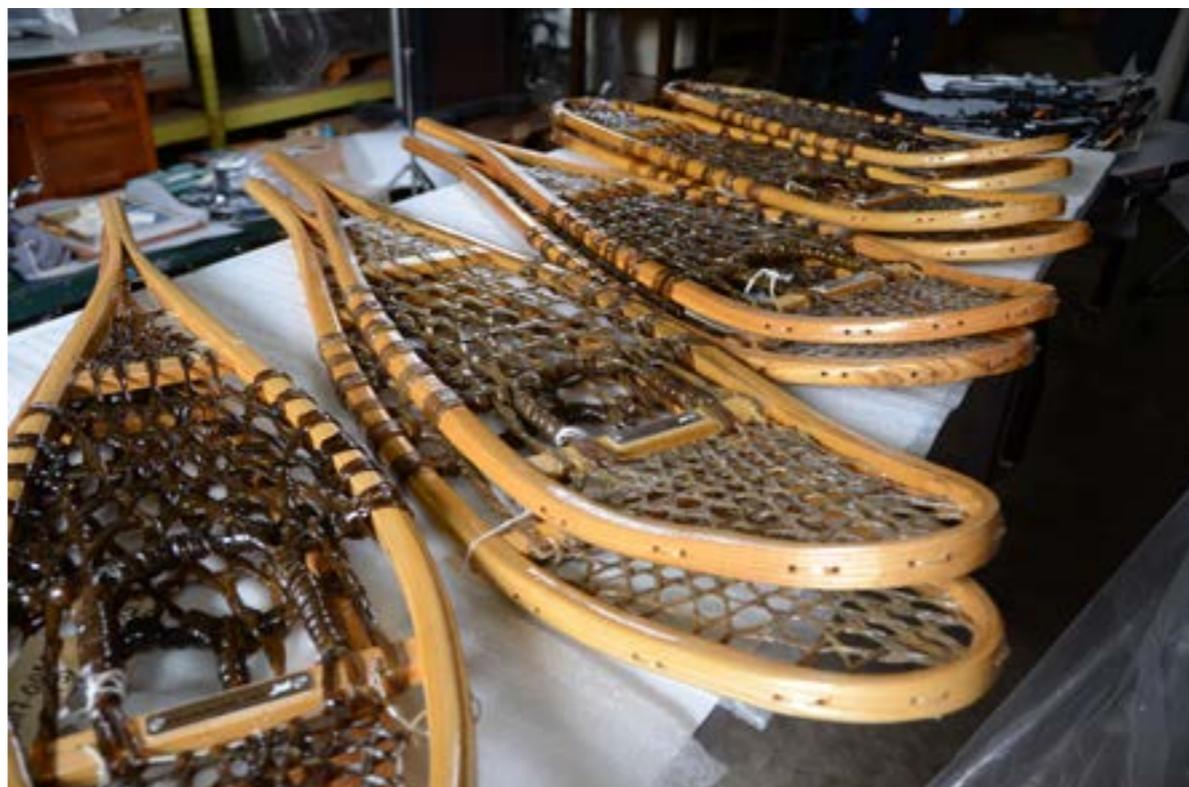
The [2015 Truth and Reconciliation Report](#) called for concrete action to repair the relationship between Indigenous people and the rest of Canada. It included 94 Calls to Action to facilitate reconciliation and address the legacy of residential schools, including ones related to museums and archives.

“Museums have an ethical responsibility to foster national reconciliation, and not simply tell one party's version of the past,” the report states.

More of that story will now be told when the revamped Canada Science and Technology Museum, which is located on unceded Algonquin territory, reopens this November. The new narrative of Canadian innovation will be expanded beyond the history of European science, nation building, and modernization, which focused primarily on exploration, settlement, urbanization, and industrialization.

“We started expanding this narrative about 15 years ago after the release of the Royal Commission [report](#) on Aboriginal Peoples, but began doing more after the release of the

Truth and Reconciliation report,” says Bryan Dewalt, director of the Curatorial Division. “It only makes sense. You can't tell the history of Indigenous people in Canada without



This tennis-racquet-like Huron snowshoe is from GV Snowshoes, an Indigenous-owned company based in Wendake, near Québec City. The 58-year-old company is the only manufacturer in the world to produce every type of snowshoe, from modern aluminum designs to the Huron model that was preferred by the first French settlers who came to New France in 1604. GV manufacturers everything in Quebec and exports globally. Its customers have included the Canadian, Norwegian, Finnish, Swedish, and Russian armies. (Photo: Canada Science and Technology Museum)

looking at technology because so much of the archeological record is fundamentally technological.”

The museum is also working with Indigenous communities to demonstrate how historical innovations influence current practice.

“Continuity is one of those really important words that we have to incorporate into the discourse about innovation. We want to show the continuity between past practice and current practice.

Indigenous innovation isn't something that is only in the past and then stopped after European contact,” says Dewalt.

After the Canada Science and Technology Museum reopens later this year, curators will turn their attention to including more Indigenous content in both the [Canada Agriculture and Food Museum](#) and the [Canada Aviation and Space Museum](#).

“We'll be looking at how we do this not just in exhibitions but in collections, programming, etc.,” he adds. “We have a draft strategy and will be fleshing that out over the next 12 months.”

Wilfred Buck: The Star Guy



Wilfred Buck teaches science from an Indigenous perspective. In this [video](#) he shares how he helps First Nations students to connect to their culture and to science. (Photo: MFNERC)

*A new Canada Science and Technology Museum exhibit, called **Hidden Worlds**, will look at the history of astronomy from an Indigenous perspective. It was developed in collaboration with Cree First Nations elder Wilfred Buck, a science facilitator at the [Manitoba First Nations Education Resource Centre](#), and Annette Lee, an astrophysicist and artist leading the [Native Skywatchers](#) research project in Minnesota.*

Move over Bill Nye the Science Guy, and make way for Wilfred Buck, Manitoba's very own Star Guy.

Buck is a science facilitator at the Manitoba First Nations Education Resource Centre (MFNERC). He works with First Nations schools to bring an Indigenous perspective to teaching science. Buck, who is from Opaskwayak Cree Nation, introduces students to a whole new universe. He takes his portable dome-shaped planetarium to communities to teach students about Cree constellations, such as Wesakaychak and Keewatin.

“I take this around to the various schools and show the students that their people knew about the stars just as well as anybody else,” he says.

To make his lessons even more intriguing, Buck shares star stories about First Nations, which he gathered from Cree, Ojibwe and Dakota nations. Students learn that it wasn't just the Romans and Greeks who studied the stars, and Buck helps them to develop an appreciation of First Nations mythology.

“Everybody has their stories about the sky, because everybody lives under the sky,” says Buck. “Initially, that's how we lived, by the sky and the objects in the sky.”

Buck continues to gather these stories told by various Elders and knowledge keepers. He looks forward to the day when First Nations astronomy is as universally recognized as mainstream mythology.

Source: [Manitoba First Nations Education Resource Centre Inc.](#)



Wilfred Buck takes his portable planetarium to First Nations communities. (Photo: MRNERC)

Let's Talk Energy

It's difficult these days to have a conversation about energy without also talking about the economy and the environment. That's why the Canada Science and Technology Museum launched **Let's Talk Energy**, an initiative that brings together a national network of partners and advisors to inform and engage Canadians on energy topics to support them in making informed choices.

Canadian Innovation News spoke with Jason Armstrong, who manages **Let's Talk Energy**, about how their approach to energy and innovation will change when the Canada Science and Technology Museum reopens in November.

CIN: *Is growing public concern over climate change having an influence on how the museum approaches the issue of energy?*

Armstrong: We have been talking about climate change since 2011, but starting around 2015 we saw a much bigger appetite for this type of information. People were asking more questions. They were more curious about the connections between how we produce and use energy and the climate.

CIN: *What new exhibits can we expect to see?*

Armstrong: While construction was still going on we launched a climate change exhibition called **Climate Change is Here**. The outdoor

travelling exhibit highlights Canadian research in the field of climate change and technologies developed to help mitigate it. After spending the summer in Ottawa, it arrived in Mexico

last October and will be back in Canada soon. Here at the museum, the first thing visitors will see is something on our building's front lawn that looks like a giant donut. It's a tidal turbine from



Melting Away: (One of the information panels from the *Climate Change is Here* exhibit) Albert Lukassen's world is melting around him. When the 64-year-old Inuit man was young, he could hunt by dog-sled on the frozen Uummannaq Fjord, on Greenland's west coast, until June. This photo shows him there in April 2015. Canada is warming at about twice the global rate because climate change has a greater impact on northern latitudes. A 2° C global increase means a 3 to 4° C increase for Canada. (Photo: Canada Science and Technology Museum)

[Clean Current](#) that was used in the Bay of Fundy (Nova Scotia) and on the west coast to research how to harness energy from the ocean. Full-sized ones are now operating in the Bay of Fundy.

CIN: *How else will the museum be sharing Canada's rich energy history?*

Armstrong: Energy is the lifeblood of modern society and Canada is rich in energy resources. We have significant oil, gas, uranium, wind, and hydroelectricity resources, and have done amazing research in these areas. One of our new exhibits will feature the tokamak reactor, the experimental fusion reactor that was operated by Hydro-Quebec. We also have a wind energy collection from the National Research Council that shows Canada's early leadership in wind energy research starting in the 1970s and 80s.

CIN: *One of the goals of **Let's Talk Energy** is to improve energy literacy. I assume then there is a strong focus on knowledge translation?*

Armstrong: As a museum, we take complex topics like energy and climate change and look at the latest research, innovations, and policies to help the general public understand what it all means. For example, we look at how you go about developing these resources. The decisions we make as a society have long-term economic, social, and environmental consequences. A hydroelectric dam could last 100 years, oil pipelines 50, and a refurbished nuclear power plant 30 years, so the choices we make to our energy system really matter.



Climate Change is Here exhibit in Mexico City: On October 27, Canada's Ambassador to Mexico, Pierre Alarie, accompanied by Jason Armstrong of the Canada Science and Technology Museum's *Let's Talk Energy* program, Rafael Martinez, Mexico's Assistant Director General for Climate Change Projects, and Luis Felipe Pérez, representative of the World Trade Center, inaugurated the *Climate Change is Here* exhibit outside the World Trade Center Mexico. The exhibit, which was seen by 160,747 people in Mexico, was developed in partnership with Climate Change Canada, Natural Resources Canada, and Sustainable Development Technology Canada, with most of the content licensed through National Geographic. (Photo: Canada Science and Technology Museum)

There's a lot of complexity in these issues and also a lot of rhetoric, so as a national museum that is looking at the science behind this, we provide factual information that helps people make informed decisions.

Museum puts the fun back into learning

The Canada Science and Technology Museum is about to get even more hands-on. And it's not just because the kids enjoy pulling levers and building things.

“Research has shown that children learn best through inquiry-based learning,” says Valerie Lefebvre, coordinator of education and interpretation at the museum, which receives an average of 312,000 visitors annually, more than 50% of whom are children.

Inquiry, or problem-based learning isn't new but it is seeing a resurgence globally as an alternative to the more structured, curriculum-centred framework of most schools. Inquiry-based learning emphasizes learning by doing and mirrors the work of scientists as they actively discover knowledge.

Lefebvre says it's also a better way to prepare children for skills they will need for 21st century jobs, particularly in the areas of science, technology, engineering, arts, and mathematics (STEAM).

“We're redoing all our school programs based on proven educational practices,” she says. “Our goal is to create programs that facilitate experiences for students – to get them questioning, making observations, and answering questions on their own to get that deeper understanding of how something works and how it's relevant to their lives.”

The museum consulted with teachers and tapped into the growing body of scientific literature on the role of museums in inquiry-based learning to develop curriculum-based workshops and exhibits that support school programming.

“As an informal learning institution, the museum has that opportunity to provide experiences and learning opportunities that aren't always available in a classroom setting,” says Lefebvre.

For example, the rebooted museum will feature a Makers Space where visitors can use 3D printers, laser cutters, and other sophisticated maker tools to experiment, design and create their own inventions.

Demystifying quantum computing

This December, the museum will be the final stop for the first-ever travelling show on quantum computing—



The ZOOMobile will be a central interactive zone in the museum's new children's gallery. (Photo: Canada Science and Technology Museum)

developed by the [Institute for Quantum Computing](#) at the University of Waterloo— one of several [Innovation150](#) initiatives supported by the federal government. The cross-Canada tour is exploring how researchers are merging quantum mechanics and information technology to revolutionize the future.

“Teachers told us one thing they have trouble teaching in physics is quantum,” says Lefebvre. “The museum is excited to offer school programs that will accompany the exhibit.”

The redesigned space will also feature a new children's gallery where the focus will be on inquiry-based play. A main attraction will be the new [ZOOMobile](#) station where kids can experiment with vehicle design and learn about the scientific process of building, testing, and trying again.

“We want the children to come in and find their own problems and solutions,” says Lefebvre. “It's really about the cycle of innovation and failure. We are hoping to encourage the next generation to fail, frankly, and to find out that failure is okay and should be encouraged.”

INVENTED IN CANADA

Canadarm & Canadarm 2



Canadian astronaut Dave Williams is seen here together with the Canadarm during a spacewalk in 2007. (Photo: NASA)

One of the defining moments in Canadian popular culture and in recent history was the viral Youtube video of Canadian Astronaut Chris Hadfield doing a cover of David Bowie's "Space Oddity" aboard the International Space Station (ISS). Hadfield had many great achievements during his time in the ISS. A highlight was connecting the Canadarm2 to the International Space Station in 2001. Canadarm2 is the aptly named second version of the original Canadarm which is "Canada's most famous robotic and technological achievement" according to the Canadian Space Agency's government webpage. The Canadarm and Canadarm2 are massive achievements in bringing Canada into the international stage as a country with talents to be shared.

Source: Kostyn Petrunick, Brock News, Brock University

INVENTED IN CANADA

Insulin extraction and purification

The University of Toronto is a prestigious institution which has made many critical scientific breakthroughs and discoveries and produced many great thinkers in every discipline of study. Though we as Canadians often claim the invention/discovery of insulin by researchers at U of T, this piece of historical data is contested internationally and it would be unfair for us to not acknowledge that all great works of invention and science are an international effort. In recognizing this, we can celebrate the fine work of four Canadian scientists at the University of Toronto: Drs. Frederick Banting, John J.R. Macleod, Charles Best, and James Collip who worked quickly and tirelessly to uncover the missing pancreatic secretion which would prevent diabetes — insulin — in 1921 allowing for the treatment of many who prior to this discovery, were subjected to fatal diagnoses.

Source: Kostyn Petrunick, Brock News



Charles Best (left) with Frederick Banting with a diabetic dog saved by insulin.



Dr. Rod McCormick, BC Innovation Chair in Aboriginal Health (Photo: Thomson Rivers University)

BC to host global Indigenous health research network

SPOTLIGHT ON INDIGENOUS INNOVATIONS

An international network of Indigenous health researchers and knowledge keepers now have a home at Thomson Rivers University in Kamloops, British Columbia thanks to a \$1-million Canadian Institutes of Health Research grant.

Led by [Dr. Rod McCormick](#) (Kaniienkehaka), BC Regional Innovation Chair in Aboriginal Health, the network provides Indigenous health graduate students and new researchers with opportunities to learn about traditional healing.

Called Ombaashi, an Ojibwe word meaning to soar upwards or to be lifted by the wind, this network of Indigenous research experts and mentors extends through Canada, Australia, Fiji, Mexico, Nicaragua, Norway, New Zealand, Samoa, Tonga, and the United States.

Through Ombaashi, Canada's regional networks will provide international Indigenous outreach and opportunities, including online workshops in Indigenous healing, and

workshops in Indigenous health research. The development of Ombaashi is based on the Calls to Action within the [Truth and Reconciliation Commission](#)'s final report, which asserts that in order to affect change, Canada must recognize the value of Indigenous healing practices.

“If you're going to work in Indigenous health you should have knowledge of traditional healing,” said McCormick, an international expert in First Nations mental health.



\$2.6M boosts Indigenous health research

An Indigenous-led, community-hospital-university-private sector partnership to enhance Indigenous maternal and child health will address some of

the underlying causes of health inequity through an innovative new action-research project.

part through [Merck for Mothers](#), a 10-year, US \$500-million initiative of Merck & Co., Inc. to help create a world where no woman dies giving life.



Chirfi Guindo, President and Managing Director, Merck Canada Inc.; Jennifer Chan, VP, Policy and Communications, Merck Canada Inc.; Sara Wolfe, Partner, Seventh Generation Midwives Toronto; Dr. Suzanne Stewart, Director, Waakebiness-Bryce Institute for Indigenous Health; Theresa Burning, Tenant Relations Worker, Nishwabe Homes Inc.; Dr. Janet Smylie, Director, Well Living House, St. Michael's Hospital; Dr. Howard Hu, Dean, Dalla Lana School of Public Health; Summer Faith Garcia, Indigenous mother; and Dr. Mary-Ann Etiebet, Executive Director, Merck for Mothers. (Photo: CNW Group/Merck Canada Inc.)

The “Kind Faces Sharing Places” project aims to address some of the social determinants of health and break the multi-generational impacts of family disruption in Toronto. The project is supported by \$2.6 million in funding from Merck Canada Inc. provided in

“We must break the unacceptable cycle of Indigenous family disruption using Indigenous values and practice to deliver family and community-centred, culturally-appropriate care to Indigenous families,” said Dr. Janet Smylie, director of the [Well Living House](#) Action Research Centre for Indigenous Infant, Child and Family Health and Wellbeing at St. Michael's Hospital.

The team research will draw on the success of the [Australian Stronger Families Program](#), which supports Indigenous families in Brisbane to keep children safely at home and cope with challenges.

11 innovations you may not have known were Indigenous

Canadian innovation didn't begin with the first settlers in the 1600s. It's been happening throughout the thousands of years that Indigenous people have lived on these lands. Here are just a few of the more known – and lesser known – Indigenous innovations and discoveries.

Baby carrier coat:

Women of the Eastern Arctic designed a special kind of parka, called an amauti, which had hoods large enough to carry a baby. These coats are still being made today.

Petroleum jelly:

First Nations used olefin hydrocarbons and methane to make petroleum jelly, and used it to hydrate and protect animal and human skin.

Pain relief:

The active ingredient in pain relievers such as Aspirin was known to First Nations for centuries. It is found in species of the willow tree, including the pussy willow.

Upset stomach remedies:

A tea made with the whole blackberry plant was used by First Nations to treat sicknesses such as dysentery, cholera and upset stomach.



Inuit women, such as Anautak Kululaposing, pictured here in 1950 in Quaqtqa, Nanuvik, wear the amautik (or amauti) to carry their babies, protecting them from the cold and aiding in bonding. This wearable technology is an ever evolving link between their ancestors and modern day Inuit. (Photo: Father Kees Verspeek, OMI. Father Kees Verspeek OMI fonds, Avataq Cultural Institute, IND-VER-197)

Snow goggles:

Inuit developed bone, antler and ivory goggles to prevent blinding snow glare while they hunted.



Traditional Inuit goggles made from caribou antler and tendons. (Photo: [Julian Idrobo](#), Winnipeg, under Creative Commons 2.0 Share and Share Alike generic licence.)

Cure for scurvy:

Indigenous people taught European explorer Jacques Cartier to use boiled cedar needles, which are high in vitamin C, to treat scurvy.

Canoes and kayaks:

Indigenous people made birch bark canoes that were lightweight, spacious and, as it later turned out, far superior to those made by Europeans –so much so that the Europeans adapted their own boats for exploration and the fur trade.

Lifejackets:

The Inuit were the first people to create life jackets. A special garment was made of dehaired sealskins, which was worn when the Inuit hunted whales.

Snowshoes:

Many kinds of snowshoes were developed by First Nations, Métis and Inuit. A very common style was made from spruce and rawhide thongs.

Cough syrup:

Pine trees were used by First Nations to make a tea that helped relieve coughs. Many cough syrups today use the same ingredient.

Bitumen for waterproofing:

Indigenous people used bitumen from the Athabaskan oil sands in Alberta, and then combined it with spruce gum to waterproof canoes, baskets and cloth.

Engineering program targets Indigenous youth

The University of Saskatchewan (U of S) has been awarded nearly \$150,000 in funding from the Natural Sciences and Engineering Research Council to teach Indigenous youth about engineering principles.

The new program, entitled Ancestral Engineering Design Activities, focuses on the engineering principles behind Indigenous technology and designs, such as the forces acting on an animal trap or the design principles behind choosing the materials for a canoe.

“Our ultimate goal is to inspire Indigenous youth to consider the possibilities of careers in engineering,” said U of S College of Engineering professor Sean Maw, who holds the Jerry G. Huff Chair in Innovative Teaching. “The knowledge that

their ancestors were excellent designers can instill pride and curiosity. It will also engender respect and appreciation from non-Indigenous people.”



(From left to right) U of S professor Sean Maw, Indigenous Peoples initiatives co-ordinator Matthew Dunn, and engineering undergraduate Connor Theoret. (Photo: University of Saskatchewan)

Indigenous businesses embracing innovation

Indigenous businesses are more innovative and more export-oriented than the broader Canadian small business sector, and are more likely to export beyond the United States, according to a June [report](#) released by the Canadian Council for Aboriginal Business in TD Economics.

Overall, the Indigenous business sector is feeling optimistic about its future growth, driven by the adoption of new products and processes and entry into new export markets, the report notes.

One of the biggest barriers is a shortage of talent. Government policies should help, as well as a changing demographic, the report notes. The population of Indigenous people is growing faster

than the Canadian population at large, and it is also younger. Other impediments can be dealt with through education, processes, and infrastructure spending, as well as procurement policies that support Indigenous businesses.

Canadian Council for
ABORIGINAL
BUSINESS



New Indigenous entrepreneurship institute to open in 2018

Algonquin College is on track to open a new \$44.9 million building next spring in Ottawa that will include an institute for Indigenous entrepreneurship, the first of its kind in an Ontario college.

The federal government is contributing \$21.9 million and the Ontario government \$2.9 million towards the Innovation, Entrepreneurship and Learning Centre and Institute for Indigenous Entrepreneurship.

The project will feature facilities for testing and development, simulations, competitions, collaborative project development, as well as entrepreneurial support in the growing field of

cyber security. The institute will be designed in consultation with Indigenous communities and be based on Indigenous business principles.



Ron McLester, Algonquin College's Executive Director of Indigenous initiatives (Photo: Algonquin College)

Discovery of stem cells



James Till

The field of stem cell research began in Canada in the 1960s through the pioneering work of Drs. James Till and Ernest McCulloch at the Princess Margaret Cancer Centre in Toronto. That foundational research trained a generation of world-class scientists who propelled Canada to the top of the charts in regenerative medicine. Today, Toronto continues to be a global hotbed for stem cell and regenerative medicine discoveries.

Source: Networks of Centres of Excellence

Snowmobiles



The Bombardier B12 snowmobile

In 1958 Joseph-Armand Bombardier designed what we know today as the snowmobile. And in 1959, Bombardier helped spread the idea by marketing and commercially producing this quick-moving snow vehicle for the public under the brand name “Ski-Doo.” Bombardier went on to receive patents in both Canada (1960) and the U.S. (1962) and was the first to successfully market snowmobiles. Today, the essential winter vehicle is used for recreation, as well as for search and rescue operations in parts of Canada, the U.S., Scandinavia, and mountainous parts of central Europe.

Key frame animation



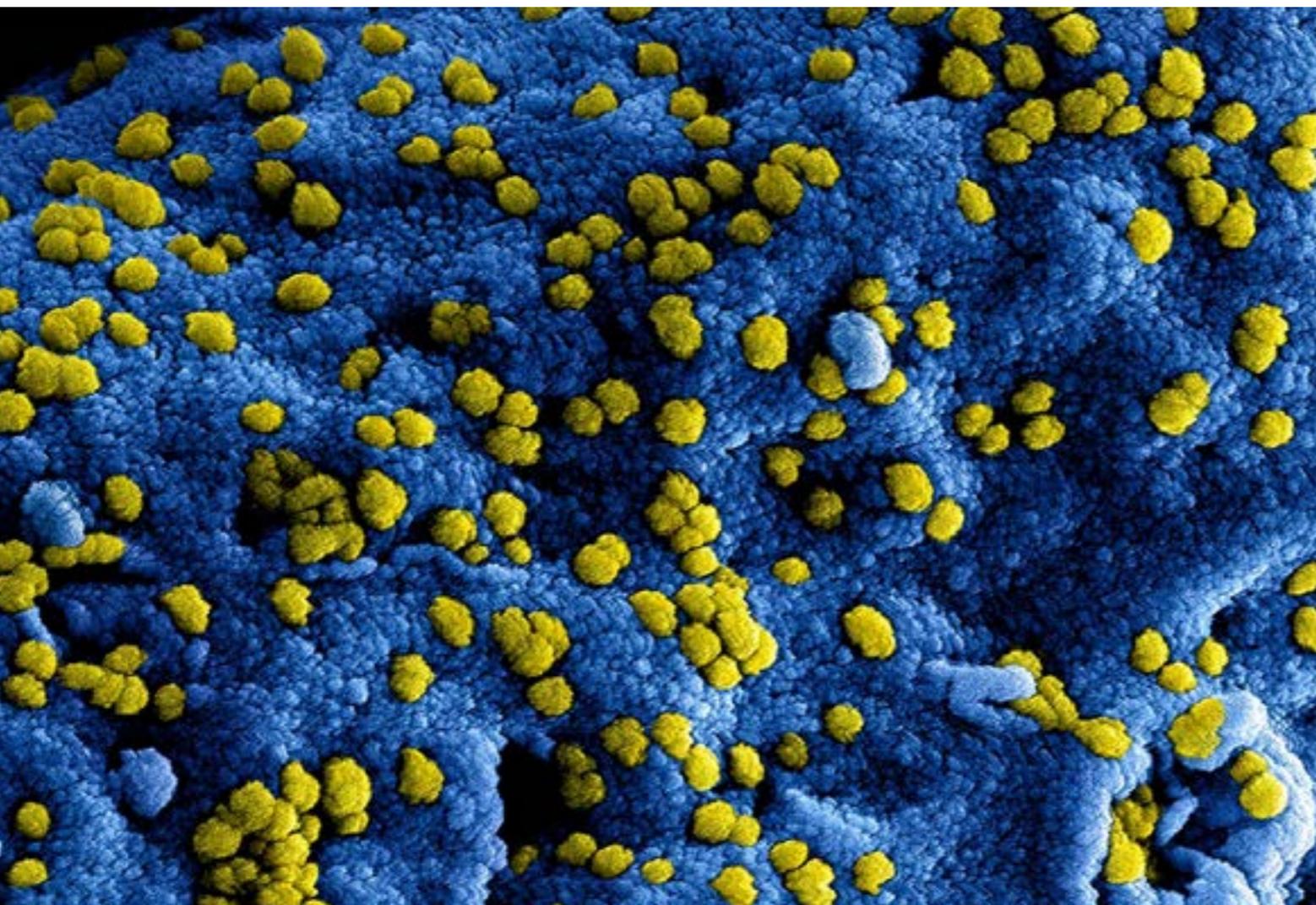
In 1997, NRC’s Nestor Burtnyk and Marceli Wein were honoured with an Academy Award for Technical Achievement recognizing their role as pioneers of animation key frame technology, which was demonstrated in the 1974 animation short, *Hunger (La faim)*. (Photo: National Research Council)

Two scientists working for the National Research Council of Canada, Drs. Nestor Burtnyk and Marceli Wein, studied at McGill University and began work on computer imaging in the late 1960s. After a 1969 presentation from a Disney animator discussing the creation of cartoons the men created the first key frame animation package in 1970 which allowed animators to draw keyframes from a sequence, instead of every frame. As a result, a computer program would fill in the rest of the movement.

Source: Kostyn Petrunick, Brock News

International
Collaborations

Engineered protein targets mysterious Middle East virus



MERS virus (Photo: Scienceside, WikiCommons)

By Jovana Drinjakovic

In June 2012, a 60 year-old man with flu-like symptoms walked into a private hospital in Jeddah, Saudi Arabia. Two weeks later, he died from multiple organ failure, becoming the first victim of a mysterious virus that came to be known as Middle East Respiratory Syndrome or MERS.

The World Health Organization (WHO) has identified MERS as an urgent threat with no vaccine or treatment in sight. This could change thanks to a new anti-viral tool, developed by University of Toronto researchers.

Writing in the journal [PLoS Pathogens](#), the team led by Dr. Sachdev Sidhu of the Donnelly Centre for Cellular and Biomolecular Research and Department of Molecular Genetics, describe how they turned ubiquitin, a staple protein in every cell, into a drug capable of thwarting MERS in cultured human cells. Because the technology can be applied to a wide range of pathogens, it could become a game-changer



in anti-viral therapeutics with implications for human health and the farming industry.

“Vaccines are important for prevention, but there is a great need for anti-viral medicines to treat people who have become infected,” says Dr. Wei Zhang, a postdoctoral research fellow in Sidhu’s lab who did most of the work on the study. The other collaborators included Dr. Marjolein Kikkert, of Leiden University Medical Centre in The Netherlands and Dr. Brian Mark at the University of Manitoba.



Dr. Sachdev Sidhu,
University of Toronto

MERS is similar to SARS, the virus that killed almost 800 people in a 2002 global epidemic. Both kill upwards of a third of people infected and, like many viruses, both emerged from animals—bats and camels in the case of MERS—after mutating into a form capable of infecting human

cells. Although MERS has so far been detected in 27 countries since the first case emerged in 2012, the outbreak has largely been contained within Saudi Arabia, according to the WHO.

Like many viruses, MERS works by hijacking the ubiquitin system in human cells, which are composed of hundreds of proteins that rely on ubiquitin to keep the cells alive and well. Upon infection, viral enzymes alter ubiquitin pathways in a way that allows the virus to evade the immune defense while multiplying and destroying the host tissue as it spreads in the body.

“Viruses have evolved proteins that allow them to hijack host proteins. We can now devise strategies to prevent this from happening,” says Zhang.

Zhang and colleagues engineered the human ubiquitin protein into a new form that paralyzes a key MERS enzyme, stopping the virus from replicating. These synthetic ubiquitin variants act quickly, completely eliminating MERS from cells in a dish within 24 hours.

The researchers also created UbVs that blocks the Crimean-Congo virus, the cause of a haemorrhagic fever that kills about 40 per cent of those infected.

And they’re designed to target only the virus – hopefully minimizing side effects in any future drug.

But before these engineered proteins can be developed into medicine, researchers first must find a way to deliver them into the right part of the body. For this, Zhang and Sidhu are working with Dr. Roman Melnyk, a biochemist in The Hospital for Sick Children and a world expert in protein delivery.

The team is also investigating the possibility of finding drugs that work in a similar manner but can already cross the cell membrane. It is likely that the proteins will be tested first in

Canada is recognized as a global leader in vaccine research.

In addition to developing vaccines for pertussis, diphtheria, polio and Ebola, Canadian researchers have done pioneering work on combination vaccines, including diphtheria, pertussis, tetanus, polio, and Haemophilus influenzae type b (Hib)

plants and animals where regulatory approvals are less strict than they are for human drugs. “We are also working with colleagues in Manitoba on an engineered ubiquitin that targets a corn virus responsible for destroying large swaths of corn fields in North America,” says Zhang.

In the meantime, Zhang will continue to improve delivery of his designer proteins to human cells that target not only MERS but also other viruses. He hopes others will follow suit.

“With our tool, we can quickly generate anti-viral medicine and we hope that our method will inspire other researchers to try it out against diverse pathogens,” says Zhang.

Source: University of Toronto



Quantum computing, brain research top list for new U.S.-Canada collaborations

By Debbie Lawes

President Donald Trump's push for major cuts to research funding in the U.S. are fueling even closer scientific ties between Canada and its



Dr. Rebecca Keiser, head, Office of International Science & Engineering, National Science Foundation (Photo: NSF/Sandy Schaeffer Photography)

southern neighbour. Preliminary talks have begun between the U.S. National Science Foundation and research funders in Canada to kickstart new research collaborations in quantum computing, the brain, biodiversity and the Arctic.

Recent meetings held in both Ottawa and Washington are expected, as a first step, to result in a Dear Colleague letter from the NSF encouraging its researchers to identify opportunities for joint projects in the rapidly evolving field of brain research. Similar Dear Colleague letters have been developed between the NSF and Japan ([big data](#)); Brazil ([cybersecurity](#)), European Union ([Graphene and 2D Layered Materials and Devices](#)) and Canada ([Arctic research](#)).

America's long history of scientific collaboration with Canada has been largely driven by individual investigators with established relationships, with few examples of top-down coordination at the political or granting agency levels.

That began to change earlier this year with Trump's [proposed 2018 budget](#), which if approved by Congress would see deep cuts at the NSF, the National Institutes of Health, the Environmental Protection Agency and other science agencies. The president has proposed cutting the NSF's budget by US\$776 million, or 11% and the NIH's budget by about a fifth, or US\$5.8 billion. The agencies won a temporary reprieve April 30 when Congress ignored the president's proposal and passed a US\$1-trillion spending deal that sees funding for science stay flat or even increase for the remainder of the 2017 budget year. However, there's no guarantee science budgets will be maintained or increased in 2018. As such, the NSF has begun drafting contingency plans in the event those cuts go ahead. Closer research ties with Canada are considered a top priority.

“With a budget like this we're focusing even more on international partnerships because we

need to have others bring money and resources to the table,” says Dr. Rebecca Keiser, head of the NSF’s Office of International Science and Engineering. Keiser was in Ottawa attending the annual meeting of the Global Research Council.

“For instance, it makes sense to think about working with Canada in quantum science because Canada is investing a billion dollars in this area.”

Boost international cooperation: Naylor Report

The Canadian government is currently considering its response to recommendations from the Advisory Panel on Federal Support for Fundamental Science. The [Naylor report](#) recommended that Canada’s tri-council research agencies and the Canada Foundation for Innovation (CFI) develop multi-agency strategies to support international research collaborations and modify existing funding programs to strengthen international partnerships.

Dr. Martha Crago, a member of the Naylor panel, says the political disruptions occurring in the U.S. and the UK are opening new opportunities for collaborating with Canada.

“At high levels there seems to be an appetite for increasing international collaborations,” says Crago, VP research and innovation at McGill University. “I think we’re in an inflection point ...

in terms of how countries are thinking about their relation to other countries, but it’s very important that at the science level we stay collaborative.”

Crago is confident that researcher-to-researcher collaborations will weather the political storms, but stressed that an overarching structure and more funding is needed to strengthen and expand those bilateral partnerships. “It’s suboptimal right now.”

Crago identified three new potential mechanisms for international research collaboration: sharing equipment costs; joint funding programs, including joint supervision of graduate students; and connecting research centres.

“We have some examples of shared infrastructure and very expensive equipment but we haven’t really tackled this as a systematic change,” says Crago. “CFI (Canada Foundation for Innovation) has always made the case that with their funding formula, 40%, 40% and 20% from industry, that the other 40% (traditionally contributed by provinces) could be met by other countries. We could do some very interesting things in terms of shared equipment, notably for Arctic research, but it requires some really good coordination



Dr. Martha Crago, VP research and innovation, McGill University

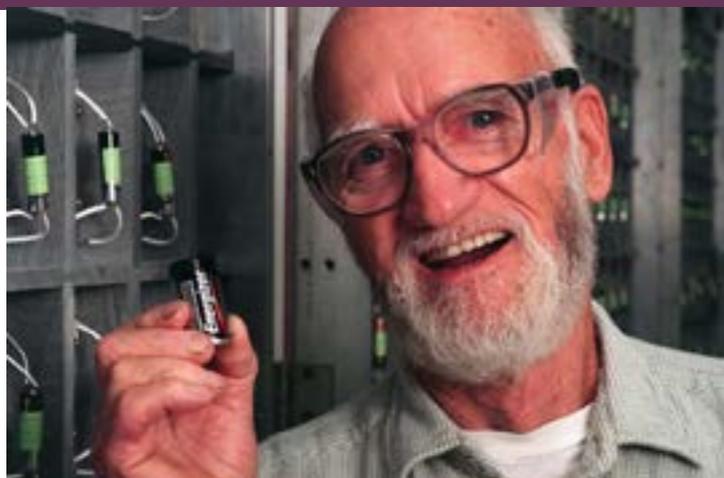
between countries, researchers and funders.” Keiser says collaborative opportunities with Canada are being identified, including quantum science and biodiversity research, as well as infrastructure sharing.

“We are talking to (CFI) about future collaboration, particularly related to the National Ecological Observatory Network (NEON). It’s a series of towers that we have around the U.S. that collect ecological information and we would love to see if additional towers could be built in Canada.”

[Subscribe](#) to [RESEARCH MONEY](#) to read the [longer version of this article](#), as well as a [Q&A](#) with Rebecca Keiser.

INVENTED IN CANADA

The modern alkaline dry battery



Lewis Urry gave his prototype alkaline battery to the Smithsonian Institution's National Museum of American History.

Unless it's plugged into a wall, the majority of devices we interact with on a day-to-day basis are battery-powered. Though our smart phones, cameras and portable gaming systems have moved beyond them, all of these and more were powered by alkaline dry batteries until recently, and most electronic children's toys and common household remotes still use them. This feat of engineering was the product of University of Toronto alumnus Dr. Lewis Urry who worked with Thomas Edison's first prototypes of alkaline batteries in an effort to improve the then used carbon-zinc battery. His work eventually led to the creation of the modern alkaline dry battery, the Energizer.

Source: Kostyn Petrunick, Brock News

Mosquito repellent



Muskol

For many Canadians, mosquitos are merely a tolerated summer nuisance, but in many countries around the world they carry diseases like malaria, West Nile and Zika. Help came in 1951 when Canadian inventor Colonel Charles Coll of Nova Scotia came up with a formulation after mixing some paint in his basement workshop. Eight years later, he registered the name Muskol. Today, the product is owned by Bayer Inc. who still manufactures the repellent in Canada at a factory near Toronto.

Java script



James Gosling (Photo: Peter Campbell, Creative Commons)

University of Calgary graduate James Gosling is credited with creating the powerful and popular Java programming language used to build much of the world's business software and Android mobile apps. He developed the program while at Sun Microsystems. This spring, the legendary computer scientist left Boeing Defence to become a distinguished engineer at Amazon Web Services. Today, Java is the force behind many smartphone apps, e-business solutions, and navigation tools.



The Atlantic Canada Start-up Ecosystem

“There’s never been a better time to be a start-up in Atlantic Canada,” says Doug Robertson, CEO of [Venn Innovation](#) in Moncton, New Brunswick. Venn – a globally recognized innovation hub – is a part of a growing group of Atlantic-based organizations committed to creating successful entrepreneurs and companies in the region.

Robertson’s position is not unique. In fact, it’s the [current sentiment](#) from many in the start-up ecosystem across [Atlantic Canada](#).

As Canada celebrates its 150th, we tend to reflect on the past to determine its impact on the future. Without a doubt, Atlantic Canada boasts a long and storied history of innovation, including: the key opening can (think canned sardines and corned beef), the hot and cold water faucet, the thermal window pane, the pipeless

furnace, and of course the snowblower. Perhaps that’s where the start-up ecosystem began – innovation driven by necessity and by the determination of a region to help itself move forward.

The modern-day start-up ecosystem didn’t get going until [a little later](#). In fact, just 20 years

ago there were only two centres focused on entrepreneurial start-ups emerging from research within the university ([the TME program at UNB](#) and [Genesis at Memorial](#)). That ecosystem has flourished over the past 10 years. Today the start-up network across Atlantic Canada boasts over [30 organizations](#) in the sandbox, garage, incubator and accelerator space.

There is a network of support that has been strategically created by government, academia and industry that is allowing entrepreneurship and the commercialization of ideas across the region.

There are also some unique characteristics that position Atlantic Canada differently than other start-up regions across North America.

Atlantic Canada boasts a collaborative model that has been truly embraced by the



start-up ecosystem. This model not only celebrates working together but also failing together. It then takes the learnings generated from these experiences to help propel the next start-up idea.

[Energia Ventures](#) is the newest accelerator in Atlantic Canada. Executive director [Edwin Rodriguez](#) says the difference between the start-up ecosystem in Atlantic Canada and in other places he's done business is the lack of Darwinian culture. "While there are many other successful start-up environments across North America, for every success there is numerous roadkill. In Atlantic Canada we are not driven by survival of the fittest but rather a culture of hands-on, higher quality support that has created a higher success ratio for our start-ups in Atlantic Canada."

As well, while Atlantic Canada may be [short on seed investment](#) it makes up for it with other types of programs and support networks (like [Springboard Atlantic](#)) that have been driven by industry in partnership with [government](#) and [post-secondary institutions](#). These give start-ups in this region the ability to compete on a global level.

Springboard Atlantic CEO Chris Mathis says that "in some respect, Springboard's greatest success is the planting of the seed that has changed the culture and sparked a belief that [entrepreneurship, stemming from the commercialization of research and ideas, is the basis for a sustainable region moving forward](#)." Finally, other trends are playing in Atlantic Canada's favour. Global connectivity means you can successfully

run a business from any corner of the world – especially a place as beautiful as Atlantic Canada.

And the housing boom in major urban centres has ensured our younger entrepreneurs won't be able to afford suitable housing there any time soon – so why not consider Atlantic Canada where your housing dollar gets you more?

In the end, Atlantic Canada's emergence onto the global start-up scene may be later coming, but it's an innovation renaissance that is as unique as the region itself and one that promises to continue moving the region and its players forward one success story at a time.

Source: Springboard Atlantic

Connect with Springboard Atlantic now

Canada to lead council of global research funders

By Debbie Lawes

Canada's profile on the global stage was bolstered in late May with news that Dr. Mario Pinto will take over as chair of the [Global Research Council \(GRC\)](#), a federation comprising the heads of 70 science and engineering funding councils from 50 countries. The Natural Sciences and Engineering Research Council (NSERC) president replaces Dr. Yuichiro Anzai, president of the Japan Society for the Promotion of Science, who now becomes vice-chair.

Pinto's leadership comes at an opportune time for Canada. Prime Minister Justin Trudeau has been criss-crossing the globe since his election extolling the benefits of investing in and partnering with Canada, including in the field of science.

During an interview at the GRC's annual gathering, held this year in Ottawa, Pinto said Canada's leadership of the GRC will make it easier to strengthen international linkages and form new partnerships.

"Having me chair the governing board signals that there's trust from the other partner countries, and at a time when the Canadian brand

for science and evidence-informed decision-making is really strong internationally," he said.

Formed in 2012, GRC's members represent 80% of all public research spending globally. Its mission is to promote the sharing of data and best practices for high-quality collaboration among funding agencies worldwide.

The group endorsed two major priorities for the next year: capacity building and connectivity among granting agencies worldwide, as well as the interplay between fundamental research and innovation.

As for the latter, Pinto urged delegates not to obsess on the differences between basic and applied research, describing them as "artificial boundaries". Instead, he touted Canada's efforts to develop "an ecosystem of research, development and delivery" (RD&D).

"Instead of setting up this natural tension between fundamental and applied research, you

present it as an ecosystem to governments so they can see how you have a natural flow between the three activities and continuous optimization. Think of it as a feedback loop."

Capacity building, particularly among developing countries, is another priority for the GRC. This year attracted the largest delegations yet from sub-Saharan Africa and South American countries, yet several poorer countries still lack the capacity to fully participate in research collaborations.

That's both a challenge and a responsibility for countries

like Canada, said Pinto. The recently released [report of the Advisory Panel on Federal Support for Fundamental Science](#) recommended



Dr. Mario Pinto

building more research collaborations between Canada and other countries.

“But how do you do that with developing countries that may not have the capacity or funding to collaborate with richer nations,” said Pinto. “One way is by sharing best practices so these countries can examine critically what works and what doesn’t work and develop their own policies that are congruent.”

Jean Saint-Vil, associate VP of the Networks of Centres of Excellence and a delegate at the GRC meeting, said the GRC can help these countries by better coordinating international consensus on issues like open access and peer review.

“And this applies to Canada as well,” he said. “In the last few years China overtook the U.K. as our second biggest international research

partner and they will likely pass the U.S. soon. That means you need to readjust how you consider who your partners might be. And for those collaborations to be fruitful, you need to have agreement on certain basic principles.”

Next year’s annual GRC meeting will be held in Moscow, Russia.



Global Research Council members in Ottawa in May (Photo: NSERC)

Creating value from oil sands waste

After oil sands are processed into bitumen, the by-product (a mix of water, sand and residual oil) is deposited into tailings ponds. Yet there's still some value to be found in this waste. Scott Nelson, president and [CEO of Titanium Corporation](#), explains how his clean tech company is recovering valuable minerals that would otherwise be lost—and reducing the carbon footprint of the oil sands industry.

The Calgary company is currently working with industry and government to commercialize its **Creating Value from Waste™** suite of technologies.



Titanium's bitumen recovery circuit (Photo: Titanium Corp.)

Q: *How does your technology fit into the oil sands process?*

Nelson: Our goal is to maximize the value existing in the waste material currently being

deposited in tailings ponds. The final stage of bitumen extraction occurs in what's called the froth treatment plant—but rather than letting the plant discharge directly into the tailings pond, we divert its pipeline to our facilities where we apply a second stage of treatment to the waste. Using a combination of industrial processes such as cycloning, floatation and gravitational separation, we can recover valuable commodities from the waste tailings, including residual bitumen, solvents and heavy minerals like zircon and titanium.

We like to say our technology offers a triple bottom line: it delivers economic, environmental and social responsibility improvements.

Q: *What sort of environmental benefits are we talking about?*

Nelson: By intercepting oil, solvents and other commodities before they reach the tailings ponds, our technology can reduce the ponds' volatile organic compound (VOC) emissions by about 70% and greenhouse gas (GHG) emissions by about 10%. And by improving the quality of water that's discharged into the tailings ponds, more of it can be recycled into oil sands operations, reducing the need to use fresh river water by about 20%.

Q: *What does all of that mean for Canadians?*

Nelson: Some people talk about 'greening' the oils sands—and this is certainly one part of the answer to the challenges we're facing here in Alberta. By using sustainable technology to reduce the environmental footprint of the oil sands industry and improve the way it delivers its product, we're helping make the case for Canadian oil to access more markets in the United States and around the world.

Q: *What's the coolest thing about this project?*

Nelson: Right now, the Athabasca oil sands are known for just one thing: producing oil. But most people don't know that they also have the potential become the world's greenest source of titanium, zircon and other minerals. The reason it's greener is because the minerals have already been extracted, so there's no mining involved. All we need to do is reach into the tailings and recover them—and in doing so, create a new mineral export industry for Canada.

Looking ahead

What is the biggest challenge facing Titanium Corporation? According to Nelson, it's the long development and commercialization cycle that comes with a large, complex industry like the oil sands. But after more than eight years of research and development—and more than \$80 million invested by shareholders and government partners, including Sustainable Development Technology Canada, Nelson says his technology is ready to go live.



Titanium president/CEO Scott Nelson with Dr. Kevin Moran, executive VP & CTO beside the company's solvent recovery technology unit (Photo: Titanium Corp.)

“We have just completed several years of demonstration piloting,” he says. “Now we're working with the oil sands operators to show them what would be involved in implementing our technology at their sites—and to figure out who will be the first adopter of this technology. This planning process will also take time, but we're very optimistic that we have a viable solution for a very important industry in Canada.”

2016 [scientific paper](#) on the technology

Source: Canadian Museum of Science and Technology Corp.'s [Let's Talk Energy Series](#)

Canola



(Photo: Canola Council of Canada)

In just a few decades, canola has become one of the world's most important oilseed crops and the most profitable commodity for Canadian farmers. It also produces the world's healthiest vegetable oil. Canola was developed by researchers from Agriculture and Agri-Food Canada and the University of Manitoba in the 1970s, using traditional plant breeding techniques. Canada exports 90% of its canola as seed, oil or meal to 50 markets around the world, bringing billions of dollars into Canada. The biggest buyer of canola oil and meal is the United States, accounting for about 65% of oil exports and 82% of meal exports in 2016. For raw seed, the most important destinations are China, Japan and Mexico.

Source: Canola Council of Canada

3TC for HIV and Hepatitis B



Francesco Bellini (Photo: Owen Egan, McGill University)

3TC is the most widely used drug in the world for treating HIV. It was developed in the 1980s by Drs. Francesco Bellini, Gervais Dionne, and Bernard Belleau, founders of Montreal-based BioChem Pharma. 3TC was later approved as an oral treatment for chronic hepatitis B (HBV). The drug is also used to treat children at risk of acquiring the virus through mother-to-child transmission during pregnancy, labour or breastfeeding. 3TC has saved and continues to save millions of people.

Polio vaccine



Jonas Salk

Canada played a critical role in the development, production, and licensing of the polio vaccine in 1955 - and the subsequent elimination of the disease. Under the efforts of U.S. researcher Dr. Jonas Salk, the Connaught Medical Research Laboratories at the University of Toronto enabled the polio virus to be cultivated and the vaccine produced in quantities large enough to facilitate Salk's massive trial, involving roughly 1.8 million children. Polio affected roughly 47,000 Canadians between 1927 and 1953. After the Salk vaccine was licensed in 1955, Canada reported its last case of polio infection in 1977.

CANADA 150 SIGNATURE PROJECTS

To celebrate Canada's 150th anniversary of Confederation, Canadian Heritage is supporting a series of Signature Projects — high impact projects with national reach.

This issue of *Canadian Innovation News* features three science-based projects. You can read about the other Signature Projects [here](#).

How a giant “nature selfie” is tackling a major conservation problem

As part of country’s 150th anniversary celebrations, BioBlitz Canada is crowd-sourcing information about species in Canada’s vast and diverse ecosystem

By Hayley Chazan and Richard Clark

On Canada’s 150th birthday, you might expect that experts have discovered pretty much all the species that roam the vast country. But according to James Pagé, the Canadian Wildlife Federation’s (CWF) species at risk and biodiversity program officer, scientists are aware of only about 50% of the animals, plants, and fungi that inhabit Canada’s diverse ecosystems.

“We know of about 70,000 species in Canada but estimates indicate that there are double that, so about 140,000 all together. That’s 70,000 that we don’t know.”

[BioBlitz Canada](#) aims to change that. A signature project featured as part of Canada’s 150th

anniversary celebrations, BioBlitz turns regular Canadians into ‘citizen scientists’ to help discover new species that scientists haven’t yet catalogued.

“Despite having a lot of good scientists in Canada and a lot of good people out there inventorying things, we actually don’t have a solid handle on all the biodiversity across Canada – it’s a pretty vast country with a lot of area to cover, so experts can’t be everywhere,” explained Pagé.

Thirty-five BioBlitz events will happen between April and September 2017. More than 10,000 Canadians and experts will work together to gather species data using a smartphone app called iNaturalist Canada. People will take photos of

species ranging from mammals, to insects, to plants that will then be uploaded to a central database. From there, scientists will use the photo timestamp and GPS coordinates, plus notes from the participant, to identify the species.

The CWF has organized five flagship BioBlitz events in urban centers, including Toronto, Vancouver, and Québec City. Ten of the events will target professionals and are located in rarer ecosystems that are more difficult to access. The rest are spread across the county and are focused on citizen scientists, including families with children.

But Pagé says Canadians don’t need to participate in an official BioBlitz to contribute.



“iNaturalist is available anytime of the year so anyone can use it anywhere. It’s about building a big database of species occurrences, which then allows us to answer questions about biodiversity.” Answering these questions is essential to preserving Canadian habitats for the next 150 years. The information will be publicly available for research, tracking global trends, understanding species distribution, monitoring wildlife patterns, and even combatting climate change.

Pagé wants the BioBlitz initiative to continue beyond the Canada 150 celebrations.

“We’re setting the stage for BioBlitz Canada to grow. We’re hoping to establish a snapshot of Canada’s biodiversity at Canada’s 150th birthday. It will provide a baseline of information that we can then use in the future to look back on.”

You can track progress or learn more about this Canada 150 Signature project at BioBlitzCanada.ca. You can also participate by downloading the app at <http://inaturalist.ca/>



Bioblitz Hill launch. MP Will Amos, Parliamentary Secretary for Science Kate Young, MP Richard Cannings, and insect-scientist Henri Goulet inspect a COSEWIC-listed pollinator tallied at the Parliament Hill Bioblitz in May. (Photo: Canadian Wildlife Federation)

Democratizing Citizenship: How big data are revealing what it means to be Canadian

By Hayley Chazan & Richard Clark

Canada prides itself at home and abroad for its diversity and its fundamental belief in multiculturalism. And with 10 provinces, three territories, two official languages, over 1.4 million Indigenous peoples, and more than six million citizens born in a different country, Canada has more than earned its claim to be a “cultural mosaic”.

As part of the country’s 150th anniversary celebrations, a Toronto company that combines digital media and data science is launching a new app that aims to foster understanding between people in different communities.

Clifton van der Linden is the founder and CEO of [Vox Pop Labs](#). He says digital engagement is the key to reaching Canadians from different backgrounds.

“The idea of Project Tessera is to try and celebrate and recognize the diversity of Canadian voices



(Photo: Vox Pop Labs)

and experiences in ways that help us relate to one another based on our individual narratives.”

Canadian Heritage has designated the initiative as a Signature Canada 150 project.

Although they got their start in Canada, Vox Pop Lab’s technology has gone global. Last year they partnered with Sky News to analyze British citizen’s attitudes towards the European Union prior to the Brexit referendum. And for last November’s U.S. presidential election, the company launched a tool that aimed to steer conversations away from divisive critiques of the candidates’ personalities and towards more substantive policy conversations. Van der Linden says the app being developed for Canada 150 is anchored around a survey.

“We’ll ask about Canadians’ experiences and perceptions of Canada. We will use a series of algorithms to give the user a real time result that gives them a sense of how their responses position them among their fellow citizens.”

The app’s algorithms use big data and the latest in artificial intelligence to compare and contrast individuals based on their demographics.

The archetypes that emerge as more Canadians participate will create a benchmark to assess the Canadian experience going forward. According to Van der Linden, it will also give Canadians a better idea of what they share in common with their fellow citizens – as well as what divides them.

“Tessera means one of the pieces of a mosaic. So a mosaic is comprised of a myriad of different pieces. But they also come together in a unique arrangement to form something more than the individual pieces. That’s the inspiration behind this project.”

According to van der Linden, one of the goals is to expose citizens to interpretations of the Canadian identity that they may otherwise not experience.

“We want to recognize and celebrate both the uniqueness of Canadians, but also to examine where we come together and where we don’t.”

— Clifton van der Linden, Founder of Vox Pop Labs

“We can’t bring every Canadian across the country together in person. But we can use the power of the Internet to try and facilitate that kind of experience.”

The excitement and challenges of science on Canada C3

By **Graham Larose**

A five-month journey of a lifetime around Canada's coastlines, [Canada C3](#), began June 1 and the Canadian Museum of Nature is sharing its scientific expertise along the way.

The expedition, which is carrying the flag of The Royal Canadian Geographical Society, is travelling from Toronto to Victoria via the Northwest Passage (see an interactive map [here](#)) and is designed around the four key themes of Canada 150: diversity and inclusion; reconciliation; youth engagement; and the environment.

To learn more about the science on this unique project led by the [Students on Ice Foundation](#), the museum sat down with its director of research and collections, Dr. Mark Graham, who is serving as the expedition's chief scientist.

Q: *What excites you most about Canada C3?*

Graham: One of the things that interests me is not only that it spans the Arctic, but also that it goes through the Northwest Passage, which is a historical



Mark Graham, Museum of Nature (Photo: Graham Larose, Canadian Museum of Nature)

piece of geography. It's always been a dream of mine to make that trip. But scientifically, it's also



(Photo: Students on Ice)

a chance to make a transect of samples around the country over one season, and I anticipate the resulting data will be very valuable for science.

Q: *What are the key areas of focus for the 22 studies being done on the ship?*

Graham: They focus on a few thematic areas. The first is surveying coastal biodiversity, but that includes a lot of things. Several projects are looking at wildlife observations, such as birds and mammals that interact with the surface of the ocean. But we also look at terrestrial plants, invertebrates, and micro-algae. Water quality is the second focus. Part of this involves studying underwater sound – not only animal noises but also industrial sounds

that could disrupt marine mammals. There will also be assessments of chemical signatures and levels of microplastics in the water. The third focus is looking at invasive species.

Q: *Will any new findings come from the expedition?*

Graham: A lot of the science is survey work, and so most of these projects are building databases to record the natural history of the marine environment around Canada, especially in the Arctic. We'll be adding a large amount of oceanographic data, so we're recording conductivity, temperature, salinity, chlorophyll and oxygen levels in literally hundreds of locations. This will add to what scientists know about how the ocean performs and the chemistry of the oceans around Canada.

Q: *What was one of the biggest challenges in preparing for Canada C3?*

Graham: I worked with Roger Bull (the museum's Coordinator of its Molecular Biodiversity Lab) to create two labs where there were no labs before, and it was a monumental task. Roger spent a week just unpacking and installing equipment. Dalhousie University got some money from the Canada Foundation for Innovation to create a portable lab from a regular shipping container. We also had to order 700 litres of

ethanol to store most of the plankton and benthic samples. Logistically it makes your head explode!

Q: *Once underway, what are some of the biggest challenges you expect?*

Graham: How about the things we can't plan for, like the weather! We have a beautiful itinerary and it's timed to the minute because the ship makes so many stops. If everyone has perfect health and the weather is ideal and the ice isn't too bad and all the equipment works we should be able to sample seven times a leg. But in reality, I am hoping for three to five samples per leg.

Source: Canadian Museum of Nature

INNOVATION150 STORIES

Ingenium – Canada’s Museums of Science and Innovation, has launched the first-ever crowdsourced digital storybook where Canadians can share stories of world-leading science, technology and innovation. The storybook is part of Innovation150, a nationwide partnership led by the Perimeter Institute that celebrates Canada’s innovative past and sparks ideas and ingenuity to propel our future.

Here are just four of the more than 400 featured stories that have influenced the shaping of Canada and the world. For more Innovation150 stories follow this [link](#).

Synthesizing insulin in Canada

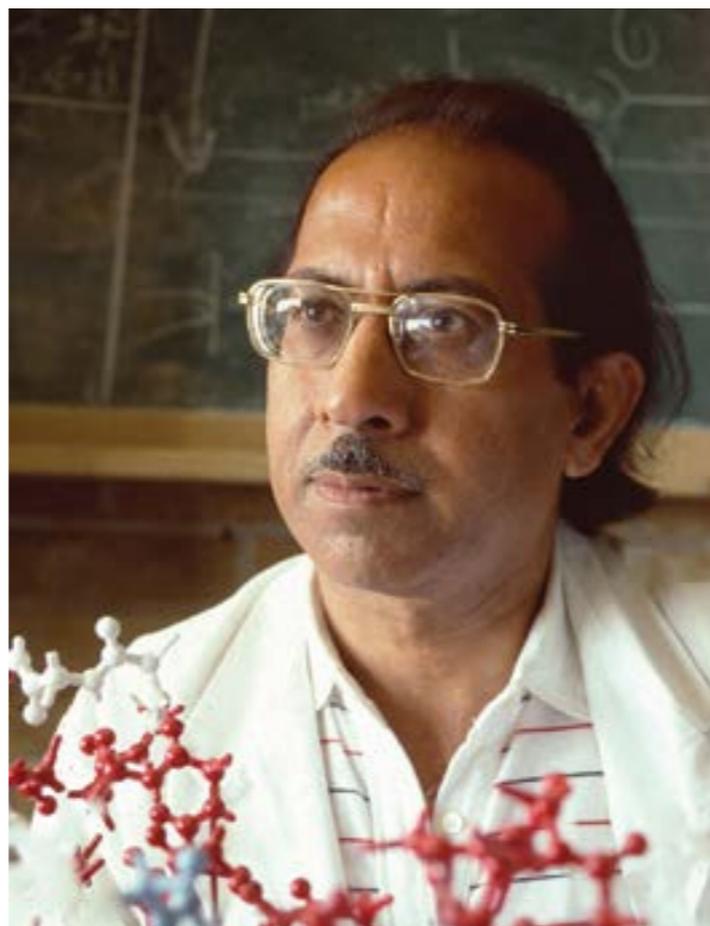
Some of the world's 415 million diabetics could not take Drs. Frederick Banting and Charles Best's animal-derived insulin. Another version was essential.

By Jassi Bedi

Synthesized insulin is a hormone used by 300 million people around the world to treat diseases like diabetes. But few people know that it was first synthesized in our nation's capital by the late Indo-Canadian scientist, Dr. Saran Narang.

To do this, Narang and his team at the National Research Council (NRC) used a process called recombinant DNA. DNA is a complex molecule that serves as instructions for cells to create proteins in an organism. Since all life is composed of proteins, DNA acts as blueprints for every living thing on Earth.

Recombinant DNA is a process by which two different strands of DNA are combined to create a new strand with the properties of both. This new strand can then be transplanted into a bacterium to essentially trick it into making whatever the scientists that engineered it desire. In the case of Narang and his team, their goal was to get the bacterium to create insulin – and they succeeded.



The NRC's Dr. Saran Narang is credited with the invention of synthetic insulin, which resulted in the drug Humulin, now used by approximately 300 million people worldwide.

In 1981 insulin was created in an Ottawa laboratory to benefit millions of people across the globe. Of course, insulin was always available before then. The problem was that it would be taken from animals. Most of the time the insulin was taken from pigs. About 15% of diabetics at the time were allergic to pigs so many people were left with limited treatment.

Narang his colleagues were able to bring insulin to the masses by removing the use of animals entirely, by their creation of artificial insulin through recombinant DNA. The synthetization of insulin eventually led to the creation of Humulin, a product that delivers doses of insulin from a pen.

From mobile labs to Ebola vaccines

By Jassi Bedi

In 2001 suspicious mail showed up in New Brunswick. People feared that it may have been laced with anthrax like the letters being sent to congressional offices in the U.S. at the time.

No one wanted to move the mail all the way to the National Microbiology Laboratory (NML) in Winnipeg, so scientists had to rush out with all their equipment on hand. NML took inspiration from this and considered a solution that had equipment on-the-go.

Analyzing a sample takes long enough as it is, and having to move the sample to a lab just makes things needlessly difficult. So, they decided to make the world's first mobile lab.

The NML is a world leader in microbiology and crucial to the progress of medicine. They study some of the most lethal infectious organisms and are one of few labs worldwide that has four laboratories.

Their venture into mobile research allows for them to set up shop wherever they're called. This lets them do tests immediately and shorten wait times significantly. Remote locations

really benefit because of their distance from laboratories.

Mobile labs as a concept are spreading worldwide. They were a great help in 2002 when diagnosing cases of Ebola in Western Africa. The symptoms of Ebola are very similar to malaria, so being able to do tests on site allowed cases of Ebola to be diagnosed more easily and, if needed, quarantined to prevent further propagation.

Ebola vaccine a game changer

The NML also made headlines globally last December with an experimental vaccine for Ebola that was found to offer full protection from infection when administered to someone within days of exposure to the virus. The results of a clinical trial held in Guinea in 2015, and [published](#) in the Lancet, were [hailed](#) by the World Health Organization as the first to prevent infection



Scientists at the National Microbiology Lab prepare the experimental Ebola vaccine for shipment in late 2014 to the WHO for use in clinical trials (Photo: CNW Group/Public Health Agency of Canada)

from one of the most lethal known pathogens.

“While these compelling results come too late for those who lost their lives during West Africa’s Ebola epidemic, they show that when the next Ebola outbreak hits, we will not be defenceless,” said Dr Marie-Paule Kieny, WHO’s Assistant Director-General for Health Systems and Innovation, and the study’s lead author.

Last year the vaccine’s manufacturer, Merck, Sharpe & Dohme, received Breakthrough Therapy Designation from the U.S. Food and Drug Administration and PRIME status from the European Medicines Agency, enabling faster regulatory review of the vaccine once it is submitted.

(With files from Debbie Lawes)

The polar bear and the volcano

When Environment and Climate Change Canada scientist emeritus Dr. Ian Stirling started polar bear research in western Hudson Bay in the 1980s, he never imagined that it would become the first research program in the world to demonstrate the effects of climate change on polar bears.

He and a small research team started with short two- to four-year studies.

Each year, they would capture a sample of bears, tag them and collect measurements and biological samples to analyze back in the lab.

As the amount of data collected grew, the researchers started to notice that the bears they captured were getting lighter. One hypothesis was that it was due to changes in the seal population, which is the main staple of the polar bear diet. But survey data of seals in western Hudson Bay didn't back this up.

And then, in 1992 and 1993, the body mass of polar bears increased significantly, as did the survival rate of individual bears, particularly cubs born in these years.



(Photo: Alysa McCall, University of Alberta)

As it turned out, the answer to the increase in the bears' weight and survival was found halfway around the world in the Philippines.

Mount Pinatubo had erupted in June 1991 and was one of the largest volcanic eruptions in the past century. It released a vast amount of

ash and other particles into the atmosphere, where the wind carried them around the globe. These particles scattered and absorbed incoming sunlight, cooling the earth, particularly in Arctic regions.

This was all the polar bears needed. A few more weeks of colder weather delayed the annual breakup of sea ice and gave them additional time out on the sea ice, hunting seals and packing on some extra pounds.

Although the benefit to polar bears from the cooling caused by Mount Pinatubo's eruption was temporary, it provided the team's first clue that their long-term data on polar bears could be extremely valuable in detecting large-scale ecosystem change, including the effects of climate change.

These days sea ice on Hudson Bay is breaking up in the spring 21 days earlier than it did when the research began in the early 1980s and refreezing 12 days later in the fall. Polar bears today have less time out on the ice to hunt seals and build the fat reserves they'll need to live off while on shore. Since the research program began, nearly 4,000 individual bears have been handled. While the core objective hasn't changed over the years, new research questions, technologies, and partnerships have allowed the program to expand.

Researchers are now studying the bears' genetics to understand whether they might be able to adapt to climate change. They're using hair samples to examine long-term stress levels associated with environmental change. And they're deploying GPS-linked satellite collars to study how polar bears choose their habitat and where they go out on the sea ice.

Elsewhere in Hudson Bay, the research team is using drones to study polar bears that are switching to terrestrial food sources like seabird eggs because their primary prey (seals) is harder to come by. And of course the team is still continuing the work started all those years ago, adding to a long-term data set that is the only one of its kind in the world.

Source: Science and Technology Branch, Environment and Climate Change Canada

The Waterloo Pump fills glasses worldwide

By Jassi Bedi

Heritage Minute [video](#)

Many developing nations still suffer from a lack of clean drinking water but an invention in 1978 lessened this problem to some degree.

Professors Alan Plumtree and Alfred Rudin designed a hand operated water pump at the University of Waterloo, called the Waterloo Pump. The project was requested of them by the International Development Research Centre and it took only six months to design.

They got their inspiration from the Mennonites of southwestern Ontario and the simplicity of the pumps they used in their communities. Plumtree and Rudin sought to create a pump that was versatile, intuitive and easily repaired.

The Waterloo Pump simulated a piston much like that of a combustion engine. Standard pumps at the time were made of steel or iron, which is rather expensive to smelt. These pumps would rust easily and break down within a year. Given how complex the machinery is they're really difficult and expensive to repair as well.

Plumtree and Rodin's solution to these problems was to substitute metal for plastic, especially since many developing countries have very few steel foundries. Molding technology, however, is common and relatively inexpensive. So the team settled on the use of polyvinylchloride (PVC) plastic since it's inexpensive, non-corrosive and could easily be produced within the country that needs the pump.

The simple design also meant it's easy to fix and parts can be glued together rather than welded. Some countries found ways to circumvent the need for certain new parts. While standard metal pumps can last up to a year without a repair the Waterloo Pump has a lifespan of eight years.

The Waterloo Pump not only remains relevant but is also still being iterated on. The most popular of these redesigns is the UNIMADE model, created by the University of Malaya, and is used in 13 countries.



Waterloo Pump

AI BRAINS WANTED

CANADIAN TECH AT THE LEADING EDGE



Canada aims to lure world's AI talent with new institute

By Mark Henderson

Geoff Hinton, Yoshua Bengio and Richard Sutton may not be household names, but in the world of artificial intelligence these Canadian researchers are global superstars. Ensuring these and other coveted AI researchers call Canada home has become a top priority for governments, academia and industry.

Enter the [Vector Institute \(VI\)](#), a bold play by the University of Toronto and an impressive group of AI companies tasked with producing, retaining and attracting the top talent needed to drive the commercialization and adoption of AI.

Launched March 30, VI has already attracted nearly \$100 million in public funding and close to \$90 million more from 34 companies eager to make Canada a global AI powerhouse in deep and machine learning.

“We wanted to create a magnet for talent and create companies around it doing and using artificial intelligence ... Government (federal, provincial, municipal), universities, researchers and venture capital are all aligned to seize the



Finance Minister Bill Morneau wears Accenture's AI-enabled DAQRI Smart Helmet during the launch of the Vector Institute for AI at the MaRS Discovery District in Toronto in March. (Photo: Canadian Press Images /J.P. Moczulski/CNW Group/Accenture)

opportunity,” says Jordan Jacobs, co-CEO & co-founder at [Layer 6 AI](#), a Toronto-based start-up developing deep learning products for financial institutions, e-commerce and media. Jacobs launched Layer 6 AI less than a year ago with U of T graduates who trained under the British-born Hinton, considered the godfather of deep learning. Jacobs and others recognized that the shortage of AI expertise, particularly in niche areas, was threatening Canada’s competitive leadership in the field. Skyrocketing salaries were favouring large, deep-pocketed firms like Google and Facebook, even luring Hinton away to Google although he splits his time between the tech giant and the U of T and is one of VI’s founding scientists.

The demand for talent is enormous; Canada alone needs up to 5,000 AI people but only produces about 500 a year. “We’ll focus on deep and machine learning and bring in graduates and hopefully leap ahead of the others,” says Jacobs.

The federal government is contributing \$125-million to establish a Pan-Canadian AI strategy to boost the fortunes of AI clusters in Toronto, Montreal and Edmonton. The strategy will be administered by the Canadian Institute for Advanced Research, which has made pioneering contributions to the field through its [Learning in Machines and Brains](#) program.

The Quebec and Ontario governments have also sweetened the pot, injecting \$100 million and \$50 million respectively into AI research at the University of Montreal, McGill University and U

of T. Both Quebec and Ontario are also angling to be included in another [federal program](#) offering \$950 million to establish a handful of so-called superclusters. AI is considered a shoe-in for funding.



Element AI executive Team (top left to bottom right): Jeremy Barnes (chief architect), Gabriel Duford (SVP development and technology), Nicolas Chapados (chief science officer), Philippe Beaudoin (SVP research), Jean-Francois Gagne (CEO), Anne Martel (SVP operations), Yoshua Bengio (board member, co-founder), Jean-Sébastien Cournoyer (board member, co-founder) (Photo: CNW Group/Element AI)

Prime Minister Justin Trudeau has been a vocal champion of AI. Speaking in Brampton, Ontario the day VI was officially launched, he compared the field’s importance with the advent of electricity and the microprocessor as he stressed the risk of not seizing on this opportunity.

“We can either be a part of (AI), help steer its direction ... or we can watch other countries step in,” said Trudeau. “They’ll happily hire our best students and hardest workers and why wouldn’t

they? We are home to some of the world’s top talent when it comes to artificial intelligence and we can’t afford to lose that competitive advantage and all the good jobs that come along with it.”

Private investors are also getting into the game. [Element AI](#), a recent start-up co-founded by deep learning guru Yoshua Bengio — the French-born director of the University of Montreal’s Montreal Institute for Learning Algorithms — recently raised \$135 million from a group of venture capital and high-tech companies including Intel Capital, Microsoft Ventures and several global sovereign wealth firms.

While VI can’t match the salaries paid by corporate heavyweights, it does offer researchers and graduate students the flexibility to pursue a mix of basic and corporate research. VI is even establishing an office of industry relations to link researchers to government and industrial datasets and potential collaborators.

“This hybrid has been successful in the people we’ve won in the talent wars with other universities, pairing machine learning researchers with coders which leads to commercial opportunities,” says Jacobs. “There’s greater money elsewhere — China is spending billions and Open AI (a San Francisco-based non-profit AI research company associated with business magnate Elon Musk) has \$1 billion in commitments. But Canadian money is substantial and we punch above our weight.”

The pacemaker



John Hopps (far right) and his colleagues with their first pacemaker in 1975 (Photo: University Health Network Artifact Collection)

The first cardiac pacemaker was invented by a Canadian electrical engineer, John Hopps, who was researching the effects of radio frequency heating on hypothermia in 1941. He found that if the heart stopped beating when its temperature dropped, that it could be restarted artificially, using mechanical or electrical stimulation to make it beat. This research allowed the development of the first cardiac defibrillation machine, which was used by Hopps to start a dog's heart in 1949.

Electric wheelchair



George Klein (left) and his NRC colleague Robert Owens with an early prototype of the electric wheelchair in the early 1950s (Photo: National Research Council)

The National Research Council's George Klein invented the first truly practical electric wheelchair when he fixed the flaws of earlier designs, by increasing the electric drive's voltage, adding independent drives to the wheels and adding a sophisticated control device that looked like a "joystick".

Source: National Research Council

Electron microscope



Eli Franklin Burton (left) with colleagues Albert Prebus (at microscope) and William Ladd and the first electron microscope, 1940.

In 1938, University of Toronto physicist Dr. Eli Franklin Burton led a team of graduate students (James Hillier, Cecil Hall and Albert Prebus) that resulted in the first practical electron microscope, an extremely useful tool with many industrial applications in areas as diverse as plastics and textiles manufacturing and the examination of metallic and crystalline structures.



Ann Makosinski (Photo credit: Jen Steele)

Shining a light on Canada and its next generation of change-makers

YOUTH SPOTLIGHT

By Sarah Fox

Ann Makosinski gets the humanitarian benefits of innovation. The University of British Columbia English literature student and creative mind behind Hollow Flashlight—a flashlight powered by heat expelled from the human hand—has

stepped up as one of the country’s most influential entrepreneurs... and notably, one of its youngest.

A 19-year-old inductee to Forbes magazine’s coveted “30 Under 30” list (as of this year), Ann’s knack for

invention began as a child. Even back then she gravitated towards problem solving and experimentation. Picture a young Ann constructing different contraptions and gadgets with any material available—a pastime she says taught her the value of leveraging resources.

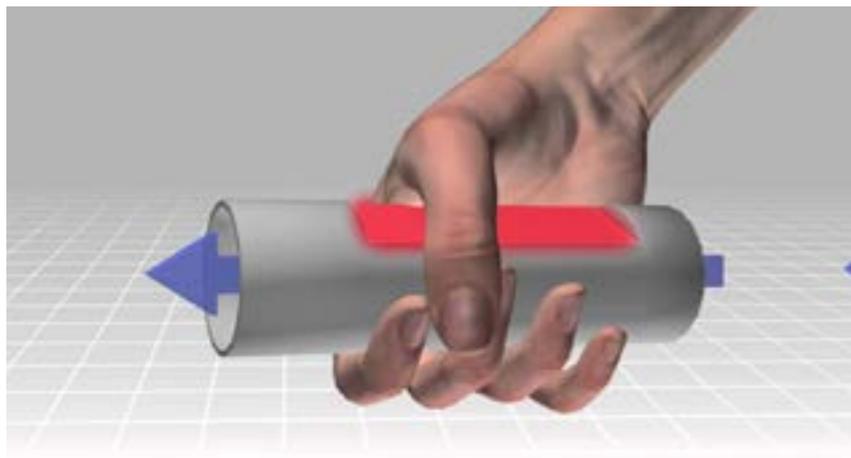


Today, the inventor considers many factors when devising projects, but cites alternative energy sources

as a central focus. “Energy is always around us,” notes Ann. “I care about us taking advantage of it.”



Ann Makosinski demonstrates her eDrink mug on the Jimmy Fallon show in October 2015.



Hollow flashlight

On the heels of Hollow Flashlight, the teen has unveiled another invention: a mug that doubles as a phone charger. How? It’s as brilliant as converting heat from a hot beverage into an electric current.

Evidently a winning idea, she was awarded Shell Canada’s 2015 Quest Climate Grant for her

eDrink mug, sending her home with \$50,000. Ann’s latest invention has also earned her pop culture status. For proof, see her [interview](#) with Jimmy Fallon on the Tonight Show.

Finding imaginative ways to reuse energy is how a globally-minded Ann plans to protect the planet and help others. With negotiations for Hollow Flashlight underway, she hopes her invention will be distributed around the world in emergency kits and also used to help brighten

education for kids—literally. “I hope to have my flashlights distributed to youth in developing countries that do not have access to electricity or light to read their schoolwork at night.”

Ultimately, Ann’s love for innovation is driven by a passion for learning. Having participated in science fairs since she was in elementary school, Ann cheerleads other young people to always strive to learn more, work harder and do better—especially when it comes to shaping the future of Canada.

“Moving forward into the next 150 years, our country needs more innovative youth and STEM students who want to affect the future of our world,” Ann says. “In Canada, this means more funding for science fairs and encouraging youth to work on their own passion projects outside of school. Learning about science is invaluable.”

Source: WE Charity. In Celebration of Canada’s 150th anniversary, WE, a worldwide development charity and youth empowerment movement, asked Ann Makosinski and 49 other remarkable Canadians the question: What are you doing to make our country a more caring and compassionate place? For more inspiring stories of how Canadians plan to shape our nation’s next 150 years, visit we.org/stories.



INVENTED IN CANADA

Radiation therapy



(Photo: Atomic Energy Canada Limited)

Canada ushered in the age of modern nuclear medicine in 1951, when the first cancer patients were given quick and successive radiation treatment from cobalt-60 therapy units at the Victoria Hospital in London, ON, and at the Saskatchewan Cancer Commission in Saskatoon. Although ionizing radiation from radium and X-rays had been used for decades in cancer treatment, it was either too weak to penetrate far enough to treat deep tumours, or prohibitively expensive. In 1947, the National Research Experimental Reactor at Chalk River, Ont., began producing radioactive cobalt-60 isotopes about 100 times more radioactive than radium and far cheaper to produce.

INVENTED IN CANADA

Pablum

Frederick Fitzgerald Tisdall, Theodore G.H. Drake, and Alan Brown from the Hospital for Sick Children were responsible for the development and production of Pablum, a cereal-like food meant for the improvement of infant nutrition. Pablum was a combination of minerals and vitamins needed by growing children and a ground, pre-cooked mixture of starches. The product dominated infant feeding for decades after its introduction in 1930 and its royalties contributed to supporting the research at the hospital for the next 25 five years.

Source: University of Toronto



Big Science
in a
Big Country

From the depths of the Canadian shield to a Nobel prize



Nobel laureate Dr. Art McDonald (Photo: Art McDonald-SNOLAB)

[SNOLAB](#) is a world-class science facility nestled in the depths of a century-old and still operating Vale Creighton nickel mine inside the Canadian Shield near Sudbury, Ontario in Canada. The combination of great depth and cleanliness that SNOLAB affords allows extremely rare interactions and weak processes to be studied.

The science program at SNOLAB is currently focused on sub-atomic physics, largely neutrino and dark matter physics. SNOLAB seeks to enable, spearhead, catalyze and promote underground science, whilst inspiring both the public and future professionals in the field.

At 2km, SNOLAB is the deepest clean room facility in the world. It is an expansion of the existing facilities constructed for the Sudbury Neutrino Observatory (SNO) solar neutrino experiment. SNOLAB has 5,000 m² of clean space underground for experiments and supporting infrastructure. On the surface there is a 3,100 m² SNOLAB building to support the underground experiments.



It was at SNOLAB that Dr. Arthur McDonald's Nobel-prize-winning research in particle physics and cosmology took place. The 2015 prize was awarded to McDonald and a co-recipient, Japanese researcher Takaaki Kajita. The pair were recognized for their work in separate experiments that showed neutrinos

change 'flavours' while travelling from the sun to earth – proving they have mass.

In May, McDonald travelled to Washington, D.C., along with SNOLAB director Dr. Nigel Smith and Minister of Science Kirsty Duncan, to discuss international research

collaborations, particularly the US-Canada collaboration on the SNO experiment and at the SNOLAB underground laboratory.

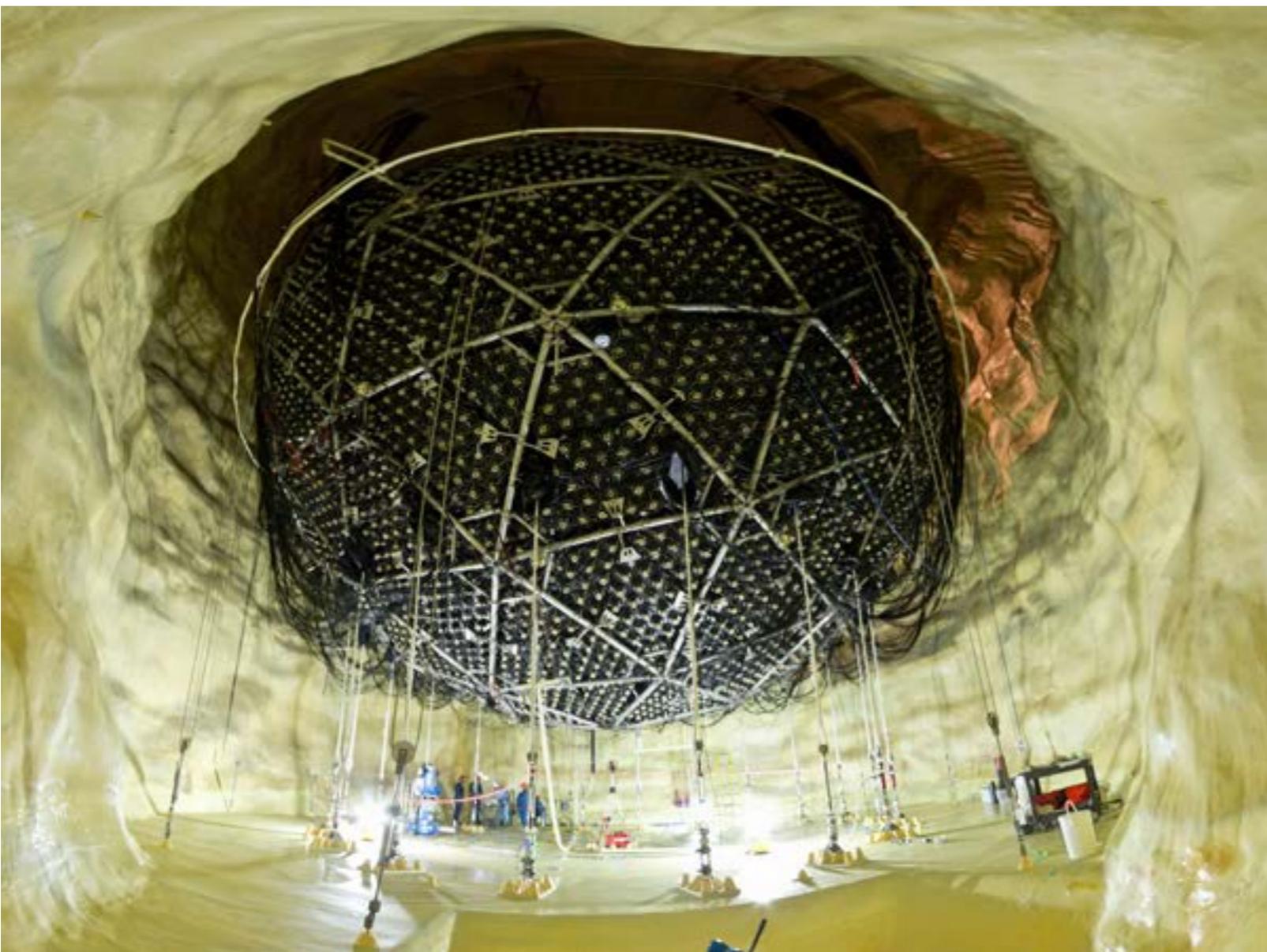
SNOLAB's sustainability received a critical shot in the arm earlier this year with \$28.6 million from the Canada Foundation for Innovation, coupled with support from the Province of Ontario and in-kind support from Vale.

“These funds will be used to employ the 96 staff at SNOLAB and support the operations and maintenance of our world-leading facilities, allowing Canadian researchers and their international partners to undertake world-class research into astroparticle physics, nuclear and particle physics, astronomy, genomics and mining innovation.”

SNOLAB has a user base that includes almost 80 institutions in 15 countries and involves almost 500 researchers, engineers, technicians and students.

Source: SNOLAB

[Watch the video](#)



Navigating a melting Arctic

Combining Inuit traditional knowledge and high tech sensors to make frozen waters safer

By Sohini Bhattacharya



Andrew Arreak (left) with a smart qamutik, and Christian Haas from York University.
(Photo: Andrew Arreak - SmartICE)

The Inuit of Pond Inlet, Nunavut, have been navigating the sea ice for centuries, relying on their experience and wisdom from their elders to inform when and when not to travel across the frozen mass. But as global warming intensifies, the ice is becoming increasingly unpredictable and unsafe. A new technology is promising to change that as a result of a collaboration between Memorial University, the Inuit community, and Nunatsiavut, the self-governing Inuit region of Labrador.

“My colleagues and I wanted to help our community and try to address their concerns

about the Arctic sea ice conditions,” says Andrew Arreak, a Pond Inlet resident and research coordinator for the project, which is led by Dr. Trevor Bell, a noted geographer at Memorial. [SmartICE \(Sea-Ice Monitoring and Real-Time Information for Coastal Environments\)](#) uses high-tech sensors to monitor and track changes in sea ice, making it much safer for locals to tread upon.

During the uncharacteristically warm winter of 2009–10 a community survey conducted by the government found that one in 12 locals fell through thinning ice in Nunatsiavut, and more than half of the residents could not travel across the ice to collect wood to heat their homes.

Sea ice has been a leading protagonist in shaping the lives and culture of the Inuit, and understanding it has been a skill passed down from generation to generation. “Initially, my community was very concerned about the SmartIce project,” says Arreak, noting that they were apprehensive to replace their traditional wisdom with technology. “So I started listening to them and asked how they would like me to work on the project.” The feedback helped inform the current iteration of the project, which uses sensors stored in floatable

plastic tubes that monitor danger zones identified through community feedback. Data are then collected via electromagnetic waves in the ice, producing an accurate reading of its thickness.

The beauty lies in the simplicity of the gadget, which visualizes data through user-friendly maps where orange means “caution” and red means “stop.”

Besides Pond Inlet, SmartIce is being piloted in Nain, Labrador. For their work so far, Bell, Arreak and their team were recognized with a 2016 Arctic Inspiration Award, the “Nobel of the North,” which came with a \$400,000 prize.

“It’s good to see the community embrace SmartIce,” says Arreak, who emphasizes the importance of community ownership over the development and implementation of the technology. “We can go back to predicting ice conditions better, and making life safer.”

Quebec life sciences strategy targets \$4 billion in foreign investment



By Mark Henderson

The recently-released 2017-2027 Quebec Life Sciences Strategy is positioning the province to be in the top five North American life sciences clusters within a decade.

The strategy aims to leverage its scientific expertise, particularly in precision medicine and big data, by attracting \$4 billion in private investment to boost industry employment and increase the number of Quebec-based firms and their contribution to provincial GDP.

Entitled *Innovation Takes Life*, the [new strategy](#) comes seven years after the province of Ontario launched [its own](#), which is beginning to pay off with major new investments from capital powerhouses such as [BlueRock Therapeutics](#). Ontario and Quebec collaborate in the life sciences space, notably with the creation in 2011 of the Ontario-Quebec Life Sciences Corridor which represents one of the largest bioclusters in the world.

The whole-of-government strategy — the broad strokes of which were unveiled in last month's Quebec Budget — comes with \$205 million in new and existing money over five years to implement its four core planks: research and innovation (\$95.1 million); company creation and growth (\$49 million); private investment attraction (\$32.9 million); and integrating innovation into the health and social services network (\$28 million).

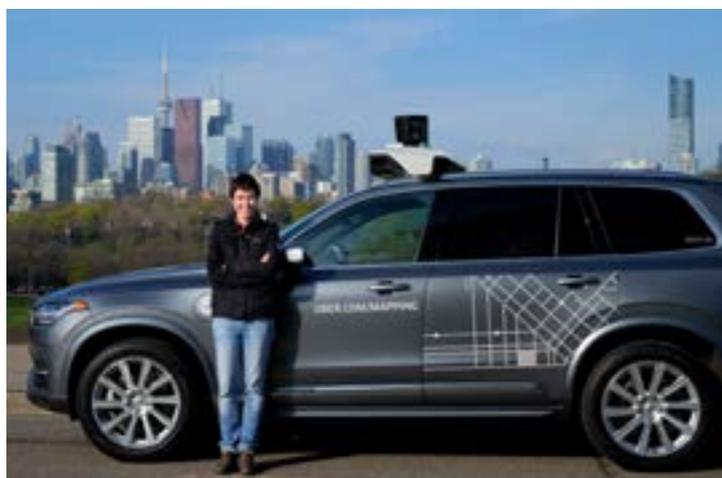
With the advent of a lower-cost R&D model for drug development featuring increased collaboration between multinationals and smaller research-based firms, new opportunities are emerging that the strategy intends to exploit. That entails a shift in the sector from a generalist to a multi-specialist approach that can compete more effectively in the global marketplace. Life sciences is one of the province's key knowledge-based industry sectors accounting for \$5.6 billion in provincial GDP in 2014. In

2016, it supported nearly 31,000 industrial jobs at 630 companies and almost as many in public research centres and related service companies.

Fonds de Solidarité FTQ — Canada's oldest and most successful labour-sponsored venture capital fund with \$12.2 billion in net assets — has been a significant supporter of the strategy throughout its formation. It announced its intent to be a strategic and financial partner during the implementation phase, including helping to foster the emergence of and growth of life sciences companies. FTQ will also leverage its international partner network which it views as particularly opportune given the political turmoil creating unease among knowledge workers in Europe and the U.S.

INNOVATION SPOTLIGHT

Uber opens self-driving research hub in Toronto



Uber's newest recruit, Raquel Urtasun (Photo: Erica Edwards, Uber Canada)

Uber Technologies Inc. is establishing an artificial intelligence (AI) research group in Toronto's MaRS Discovery District, attracted by the region's wealth of AI talent. The company has already recruited a top expert to head up the group, University of Toronto associate professor Raquel Urtasun, a Canada Research Chair in Machine Learning and Computer Vision. The San Francisco-based company is also donating \$5 million over several years to the recently established Vector Institute, which is receiving up to \$100 million in government funding as part of an effort to produce, attract and retain top talent. AI is considered a strong contender to receive supercluster funding as part of a \$950-million federal competition.

Self-driving e-shuttle coming to Montreal



A Paris France-based company, Transdev, tested its Easymile driverless shuttle around in Montreal in May as part of the World Summit on Public Transit.

(Photo: Transdev)

FPInnovations has partnered with Motrec International Inc., Technoparc Montréal, ABB Inc., and Ericsson Canada Inc. to develop an electric autonomous shuttle, adapted to Canadian winter conditions. Technologies to be integrated into the shuttle include vision, object recognition, artificial intelligence, navigation systems, battery management and automatic recharging, as well as vehicle-to-vehicle, vehicle-to-user and vehicle-to-infrastructure telecommunication systems. The first series of shuttles will be implemented at Technoparc Montréal before being integrated into the public transit network. Technoparc Montréal will be the first demonstration site.

Funding awarded for bio-refineries



(Photo: S2G BioChem)

Bioindustrial Innovation Canada has invested in two commercial-scale demonstration bio-refineries for the conversion of multiple feedstocks into a range of chemical intermediates for use in the food, packaging and industrial sectors. The support goes to S2G BioChem, a Vancouver-based developer of natural biotechnology conversion processes and Origin Materials, Sacramento CA. S2G will construct a \$20-million demo facility to produce xylitol (a sugar alcohol used as a sweetener) and value-add bioglycols. Origin's facility will produce commercial-scale chemical intermediates using technology first validated at its Sacramento pilot plant.

Air Canada moving to shared biofuel fuel system



(Photo: Brian Losito, Air Canada)

Air Canada is partnering with 13 organizations on a three-year project to introduce 400,000 litres of sustainable aviation biofuel (biojet) into a shared fuel system. Led by Canada's Biojet Supply Chain Initiative (CBSCI), the project is a first in Canada and is aimed at creating a sustainable Canadian supply chain of biojet using renewable feedstocks. Previous Air Canada biofuel flights used biojet that was segregated and loaded separately into an aircraft via tanker truck. By contrast, CBSCI's objective is to start developing a more efficient operational framework that will introduce biojet into a multi-user, co-mingled airport fuel supply system.

IoT network expands across Canada



(Photo: [Global Rainbow](#) (2014) by [Saku Takakusaki](#), licensed under [CC BY-ND 2.0](#))

Six months after launching its purpose-built Internet of Things network in southwestern Ontario, a Waterloo, ON startup has expanded its network enabling machine-to-machine communication for the Internet of Things across the country. Founded by former BlackBerry employees, Eleven-x Inc. has now deployed its low-power wide area network in 22 cities, covering 60% of the country's population, making it Canada's first and only coast-to-coast network built specifically for IoT communications. Further Canadian expansion is planned for this year, the company said.

Waterloo building global-scale AM lab



Research associate Jerry Rathapakdee works in the Multi-Scale Additive Manufacturing Lab at the University of Waterloo. (Photo: University of Waterloo)

The University of Waterloo has secured \$22.4 million cash and \$5 million in in-kind support to establish a Multi-Scale Additive Manufacturing (AM) Lab that's expected to generate 18 new partnerships, create more than 80 jobs and commercialize 21 advanced manufacturing technologies. Core funding of \$8.9 million comes from the Federal Economic Development Agency for Southern Ontario, with the Ontario government providing an additional \$6.2 million — the largest investment the province has made in post-secondary AM. Once fully ramped up, it's expected to be among the 10 largest university-based AM facilities in the world.

Merck and TEC Edmonton create health incubator



Merck Canada Inc. has tagged TEC Edmonton to establish a business incubator linking Alberta-based health tech firms to the health research expertise of the Canadian subsidiary of Darmstadt Germany-based Merck Group. The initiative is part of the larger, newly established Alberta Merck Innovation in Health Fund — a partnership between Merck Canada, the University Hospital Foundation and the Alberta Ministry of Economic, Development and Trade. The incubator is intended to create several start-ups in the province's health innovation space, leveraging business accelerator acumen of TEC Edmonton — a joint venture between the University of Alberta and the Edmonton Economic Development Corp.

McGill to open retail innovation lab



Aldo Bensadoun

Aldo Bensadoun, founder of global shoe retailing chain Aldo Group, has donated \$25 million to McGill University to establish a digital retail innovation lab. Slated to open in fall 2018, the school will integrate research in big data, artificial intelligence and neuroscience with more traditional commerce instruction to confront the massive transformation towards on-line shopping now taking place within the retail sector. The school anticipates collaboration with global retailers seeking innovative solutions in the areas of fashion retail, health and wellness, financial services and sustainability.

DMZ expands to New York City



The DMZ, a startup incubator based out of Ryerson University in Toronto, is opening a new office in New York City, overlooking Battery Park in the heart of the city's financial district. Available to startups across Canada, the DMZ will provide both a physical space and a community that supports entrepreneurs in growing their business in the U.S. "Along with providing startups access to a community and a network of potential partners, customers and investors, the new office will contribute to the interest from U.S. businesses towards Canadian tech startups," says DMZ executive director Abdullah Snobar. Currently, the DMZ has five Canadian startups working out of the New York City office, including SlimCut Media, Reportin' and Sampler.

Engaging Entrepreneurs – One Student at a time.

In 2014, the [Province of Nova Scotia](#), as part of the [One Nova Scotia](#) Report, launched the [Provincial Sandbox Initiative](#) designed to create



a culture of entrepreneurship for students and communities across the Province. It came about as a result of the question - how and when do we get people moving through the start-up funnel?

The [sandbox](#) idea lives at the top of the funnel with each location acting as a hub designed to leverage

the brain power in the province's universities and colleges to help drive knowledge-based businesses and to offer educational learning opportunities.

[Jolene MacEachern](#) runs Dalhousie University's agriculture focused sandbox program [Cultiv8](#) out of the university's Truro Campus. Cultiv8 is one of [7 sandbox programs](#) in the Province designed to ensure all university students have access to resources necessary to help their ideas become reality. MacEachern says the key with programs like Cultiv8 is to get kids excited about innovation and entrepreneurship in their chosen field.

"Agriculture is a global innovation driver in many other regions of the world," says MacEachern. "We need to expose our students to these ideas. They need to know robots are farming in Japan. By getting people excited we will change the way we look at

agriculture's role in our emerging new economy." The sandbox program also offers an [Innovation Summer Bootcamp](#) which includes 16 weeks of entrepreneurship programming.

"Once they're engaged we see tremendous excitement," says MacEachern. "It's because they're learning that they can carve their own destiny and isn't that what we want most for our students?"

Credit: Springboard Atlantic

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Cancer biologist wins prestigious African-Canadian Award

McMaster University researcher Dr. Juliet Daniel received the Harry Jerome Award in technology and innovation this spring from the Black Business and Professional Association. Daniel, who was born in Barbados, and her team are currently [working](#) on aggressive and difficult to treat, triple-negative breast cancers that are most prevalent in women with African and Hispanic ancestry. Her research team seeks to identify unique DNA mutations or markers in cells that may explain this racial disparity and which can then be developed for diagnostic tests or therapeutics for women diagnosed with the disease worldwide, regardless of ethnicity.



Dr. Juliet Daniel

Canada fast tracks global skills visa

Canada is pushing hard for international talent. On June 12, the government officially opened its [global skills visa program](#) – part of its [Global Skills Strategy](#) – which shortens the time it takes for high-growth firms to bring in international talent, from a year to 10-14 days. The government has committed to fast-track visa and work permit applications for “low-risk, high skilled talent for companies doing business in Canada”. The new strategy also sees the government boosting its base immigration targets to 300,000 immigrants and refugees in 2017.



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Canada spending \$50M to teach kids code

The Government of Canada has launched CanCode, a \$50 million program dedicated to helping young Canadians learn coding and other digital skills. Over the next two years the program aims to train 500,000 students from kindergarten to grade 12, with emphasis on young women, Indigenous Canadians and other under-represented group. Navdeep Bains, minister of Innovation, Science and Economic Development, said, “Coding teaches our young people how to work as a team to solve difficult problems in creative ways.”



Innovation minister Navdeep Bains at the launch of CanCode June 14 in Ottawa, ON

Canada joins SESAME synchrotron project

Canada has become one of 16 observer states for the [Synchrotron-Light for Experimental Science and Applications in the Middle East](#) (SESAME) — the region’s first major international research centre. Canada’s participation will facilitate scientific collaboration on the third-generation synchrotron, which was launched under the auspices of UNESCO in 2002 and officially opened for users last month by King Abdullah II of Jordan. SESAME is modelled on the massive particle physics CERN laboratory which assisted in its construction. Full SESAME members include Jordan, Israel, Egypt, Turkey, Iran, Cyprus, Pakistan and the Palestinian Authority.

High school wins use of CERN accelerator

For the first time, a Canadian high school will conduct an experiment at CERN with the help of a University of Alberta professor and some technology from the SNOLAB underground neutrino lab in Sudbury, ON. CERN’s [Beamline for Schools](#) competition, which began in 2014, names two winning schools each year. This year, the [Charging Cavaliers](#) (École Secondaire Catholique Père-René-de-Galinée in Cambridge, ON) and TCO-ASA from Italy were selected from a total of 180 teams from 43 countries around the world. The winners have been selected to travel to CERN in September to carry out their own experiments using a CERN accelerator beam.

Trudeau delivers on deal to stop muzzling

Government researchers in Canada are now guaranteed the right to speak freely about their work, regardless which political party is in power. Their union, the Professional Institute of the Public Service of Canada (PIPSC), [describes the deal](#) as an “historic and unprecedented achievement”. A scientific integrity in the collective agreement ensures that members can speak about their work without being designated a departmental spokesperson. The deal also requires that departments develop scientific integrity policies and procedures in the coming months. The Research Group of PIPSC is the second to enshrine scientific integrity into its collective agreement. Negotiations are still underway by members at the National Research Council, Canadian Food Inspection Agency and the Canadian Nuclear Safety Commission.

Prime Minister Justin Trudeau’s Liberals made three key promises to the scientific community during their 2015 election campaign: to appoint a chief science officer; ensure scientists are able to speak freely about their work; and that scientific analyses are considered when government makes decisions.



Thousands of scientists from 500 cities around the world, including Calgary (pictured here) and 17 other Canadian cities, took part in the March for Science in April to protest what they say are attacks against science. (Photo: JMacPherson, Calgary, licensed under CC-BY-2.0)

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Genomics consortium gets \$33-million boost

The Canadian government is investing \$33 million to support the Structural Genomics Consortium (SGC) – a Canadian-led, international public-private partnership that conducts basic science on the structures of human proteins and releases the research to the public to accelerate drug discovery and help patients worldwide. This latest investment in the fourth phase of Canadian-based SGC activities, conducted principally at the University of Toronto, includes \$11 million in federal funding through Genome Canada, \$5 million through the Government of Ontario, and an additional \$17 million through pharmaceutical companies.



(Left to right) Dr. Martin Osmond, CEO and scientific director of the CHEO Research Institute; Marc LePage, president and CEO, Genome Canada; Jennifer Chan, VP, policy and external affairs, Merck Canada; Hon. Reza Moridi, Ontario Minister of Research, Innovation and Science; Dr. Cheryl Arrowsmith, chief scientist, Structural Genomics Consortium; Hon. Kirsty Duncan, federal Minister of Science; David McGuinty, MP, Ottawa South. (Photo: Genome Canada)

UNB home to new 3D metal printing centre

The University of New Brunswick is capitalizing on innovation offset obligations of two major companies to establish Canada's first research centre for 3D metal printing for the defence and marine industries. The Marine Additive Manufacturing Centre of Excellence is being established with \$2.7 million from Lockheed Martin Aeronautics as part of its industrial and regional benefits obligation related to the CP-140 Aurora Structural Life Extension Project. Irving Shipbuilding Inc is contributing \$750,000 as part of its Value Proposition commitments under the National Shipbuilding Strategy for the navy and coast guard. The centre plans to build core expertise in 3D technology by developing new manufacturing methods, procedures and training programs.



UNB Marine Additive Manufacturing Centre of Excellence (Photo: University of New Brunswick)

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Investment Attraction Accelerator to Launch in Atlantic Canada

When investors and market ready entrepreneurs come together, the outcomes can be significant. Time and again we've heard about great startup success for those companies who were able to secure necessary funding to move the idea into a commercializable opportunity. The problem tends to be matching the right investors with the right start-up at the right time.

That's why [Springboard Atlantic](#) CEO Chris Mathis and Nova Scotia-based [Jameson Group](#) (organizers of [Invest Atlantic](#)) CEO Bob Williamson are finalizing details around the first-of-its-kind investment attraction accelerator being launched soon in Atlantic Canada.

The Program will identify the best investable opportunities from Atlantic Canada and pair them with identified investors in key target markets.

"The program will seek out those best opportunity start-ups that also meet the criteria outlined in the input and feedback we've received from potential investors," says Mathis.

This market-driven pilot program will soon be accepting applications for entry into the programs first cohort scheduled to kickoff this Fall. The information will be published at www.springboardatlantic.ca

Credit: Springboard Atlantic

Calgary opening centre for carbon conversion

The Canadian and Alberta governments are putting \$20 million into a new test facility for technologies that convert CO2 emissions into usable products, like building materials, alternative fuels and commercial goods. The first users of the Alberta Carbon Conversion Technology Centre (ACCTC) will be the finalists of a global contest, the NRG COSIA Carbon XPRIZE, which has 27 teams vying for the final 10 spots. "The ACCTC will be one of the few places in the world where carbon conversion technologies can be tested at a real life scale," said Dan Wicklum, Chief Executive, Canada's Oil Sands Innovation Alliance (COSIA). The ACCTC will be owned by InnoTech Alberta, a subsidiary of Alberta Innovates, a research and development organization in the province.



An artist rendering of the Alberta Carbon Conversion Technology Centre. (Image: Canada's Oil Sands Innovation Alliance)

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Canada expands agricultural research with Germany

Agriculture and Agri-Food Canada has signed an agreement to boost agricultural research collaboration in four key areas as the recently approved Canada-European Union Comprehensive Economic and Trade Agreement comes into force. Canadian and German researchers will increase their collaboration in the areas of sustainable agriculture and climate change (soil and water protection, crop breeding), agri-food (crop breeding and food waste reduction), best management practices (knowledge and technology transfer) and personnel exchange. Canada and Germany have long collaborated on agricultural research under an S&T agreement originally established in 1971. Current ag-based projects focus on crop genetics and diseases, agro-ecosystem resilience, horticulture, pork production and micro-organism collections.

Arctic Council inks deal on scientific cooperation

The Arctic Council wrapped its 10th Annual Council Ministerial meeting in Fairbanks AK in May with the signing of Agreement on Enhancing International Arctic Scientific Cooperation and the passing of the chairmanship from the U.S. to Finland. The group also signed the Fairbanks Declaration, which calls for action “at all levels” to combat activities that contribute to climate change and pollution, as well as climate change mitigation and adaptation actions to strengthen resilience. A week prior to the meeting, Science minister Kirsty Duncan made her third official trip to Washington, meeting with top science officials to discuss cross-border research and collaboration in “supporting a robust culture of scientific excellence including how to further scientific cooperation in the Arctic and polar regions”.



Kirsty Duncan (front row, 4th from left) at Arctic Science Ministerial meeting in May.

