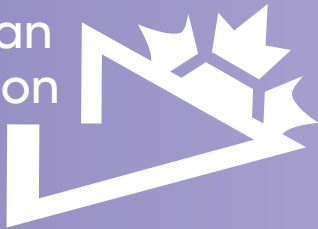


# Trail Blazers

Canadian  
Innovation  
News



**Do you know what a “keypunch girl” is?  
Check out their untold story.**

*Learn about a new international “Green Chemistry” Cluster,  
check out Alberta’s fancy new AI Supercomputing Hub  
and catch up on other groundbreaking Canadian innovations inside.*

**Winter 2018**

# What is CIN?

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

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

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.

**Canadian Innovation News  
@ Centre for Social Innovation  
192 Spadina Avenue,  
Suite 307  
Toronto ON M5T 2C2  
Canada**

**1-416-481-7070**

**Jeffrey Crelinsten**

Publisher Editor

**Rebecca Melville**

Chief Operating Officer

**Annie Camila**

Graphic Designer


**Adity Das Gupta**

Customer Engagement Manager

# Content

- 05 *Intended and Welcome Consequences of Digitization*
  - 06 *In the News: Quebec lithium-ion battery recycling project takes off*
  - 07 *The new applied research trailblazers*
  - 11 *Canadian Agricultural Innovations Displayed at the Canada Agriculture and Food Museum*
  - 12 *In the News: Chrysalix Venture Capital announces first close of a \$120 million fund for industrial innovation*
  - 13 *Disrupting the status quo — a new approach to partnership*
  - 17 *Moving Stories Exhibition*
  - 18 *In the News: New AI supercomputing hub at University of Alberta*
  - 19 *In the News: Toronto and Shenzhen launch the Sino-Canada International Innovation Centre*
- 

# Content

- 19 *In the News: University of Alberta opens venture space for commercializing health innovation*
  - 20 *Legacy Series — First-hand Stories from the Second World War*
  - 21 *In the News: TRIUMF to build new Institute for Advanced Medical Isotopes (IAM)*
  - 22 *Researcher Spotlight: From Key Punching to Computer Science*
  - 25 *In the News: Fanshawe College opens new advanced research centre in biotechnology*
  - 27 *In the News: Bioindustrial Innovation Canada partners with Italian "Green Chemistry" cluster*
  - 28 *STEAM Horizon Awards for Canadian Youth Studying in STEM*
- 

# Intended and Welcome Consequences of Digitization



Spanish flu vaccine vial, produced in 1918 by Connaught Laboratories, Toronto. In artifact collection storage at Ingenium. Photo credit: Ingenium.

Since beginning to digitize and put its national science and technology artifact collection online in 2015, [Ingenium – Canada’s Museums of Science and Innovation](#) has received valuable knowledge contributions and insights from many outside sources.

For instance, when University of Toronto historian of medicine Dr Chris Ruttly was researching early Canadian pharmaceutical success story Connaught Laboratories, maker of antitoxins and vaccines against rabies, diphtheria, tetanus, and smallpox, he came across digital records of a [vial of Spanish flu vaccine](#) in [Ingenium’s collection holdings](#). Connaught, which started in Toronto in 1914, has a distinguished history of producing antitoxins and vaccines, and was one of the first labs to produce life-saving insulin in large amounts.

Dr Ruttly’s online discovery highlighted for Dr David Pantalony, Ingenium’s Curator of Physical Sciences and Medicine,

the depth of Ingenium’s collection, as well as the value of digitizing it and making it available online for anyone to search who has access to the Internet. Ingenium’s vial is thought to be the only one in Canada and one of a very few in the world.

Pantalony explains that Ingenium’s science and technology collection is very wide and deep and that it is impossible for any one person to be an expert in all of it. As different artifacts and archives will be important to various researchers at varying times, everyone can engage with the [online digital collection](#) in their own meaningful ways and contribute to Canada’s base of science and technology knowledge and research.

The discovery this year of the Spanish flu vaccine vial in Ingenium’s collection is timely as this is the 100th anniversary of the flu’s devastation at the tail end of the First World War. The Spanish flu is estimated to have killed 40 million people worldwide in 1918 and 1919. As many as 50,000 Canadians died from the flu, a number that equalled in scale Canada’s World War I dead. Dr Pantalony emphasized for this article that Ingenium’s Spanish flu vaccine is inert and harmless.

## Quebec lithium-ion battery recycling project takes off

The Quebec consortium **Lithion Recycling Inc.** is implementing a novel process for recycling lithium-ion batteries. The process was developed by **Seneca**, a Montreal-based consulting firm that specializes in industrial materials process engineering. Lithium-ion batteries are used in electric vehicles, a growing market that so far lacks a sustainable recycling solution. The process developed by Seneca

and deployed by Lithion Recycling Inc. promises to allow up to 95% recovery of these batteries' components. Apart from Seneca, other members of the consortium include Centre d'études des procédés chimiques du Québec (CEPROCQ), Call2Recycle, and Hydro-Québec's Center of Excellence in Transportation Electrification and Energy Storage (CETEES)

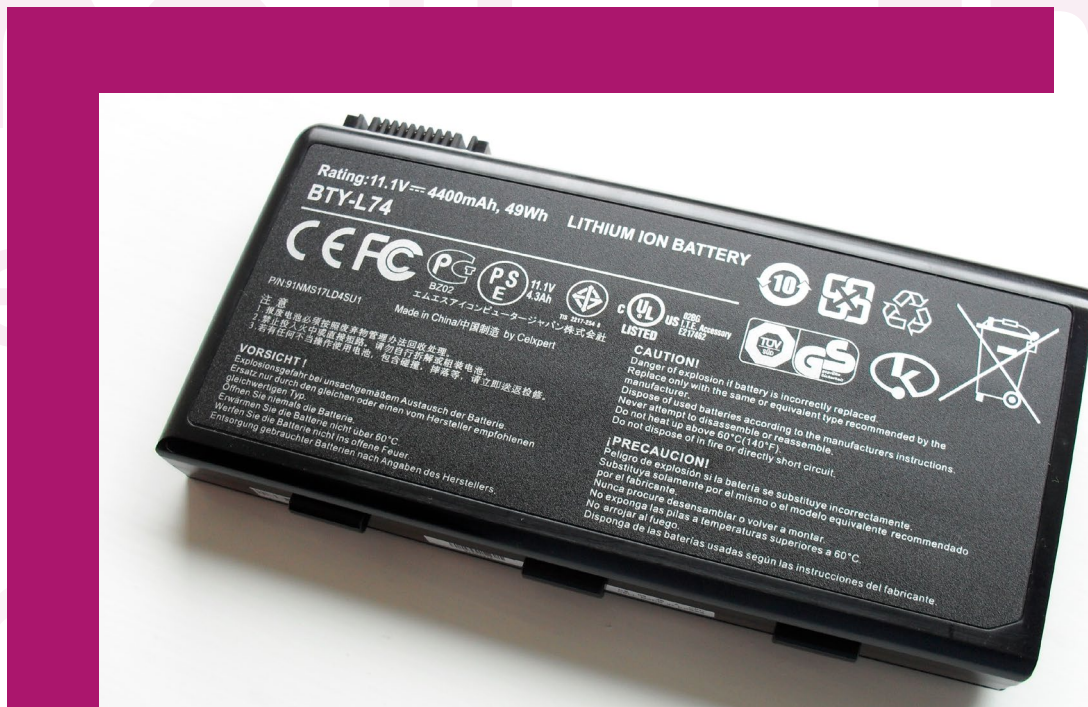


Photo credit: Fanshawe College

# The new applied research trailblazers



Students from George Brown College developed a brand-new app called Mellow, that helps young people manage their mental health and find appropriate resources when needed. Photo credit: CICan.



*By Denise Amyot,  
President and CEO,  
Colleges and  
Institutes Canada*

This fall, Colleges and Institutes Canada (CICan) hosted its latest Applied Research Symposium in Ottawa,

which was a wonderful opportunity to hear from experts and leaders in research from across the country, but perhaps most importantly, from students. This

event has proved the perfect opportunity to present a national Student Innovation Showcase on Parliament Hill, and every year, high profile guests are amazed by the depth and scope of the projects on display.

From exploring new sources of biofuels and creating new community engagement tools for police officers using video games and augmented reality, to building a probe that can detect brain cancer, this year's projects were truly awe-inspiring. It is incredible to see this sophisticated research being led by students and it speaks



Raphael Tetreault and Vincent Gutasikas from Sheridan College presented Bit Heroes Connect, a video game designed in collaboration with the York Regional Police to engage local youth and share important messages. Photo credit: CICan.

volumes about Canadian colleges and institutes' growing contribution to our country's innovation ecosystem.

Applied research at colleges and institutes is relatively new – it has only been about a decade since they have been able to receive any significant federal government funding for research activity, which makes this level of ingenuity all the more impressive.

In many ways, this new generation of innovators is setting the stage for a new approach to research that is more hands-on and collaborative than ever before. With industry or community partners always involved, the

applied research projects that are happening at colleges and institutes always aim to solve practical challenges with real-life implications.

It's no surprise then that all types of partners are taking note. Last year alone, Canadian colleges and institutes led over 7,300 research partnerships.

Whether it's making local businesses more efficient or helping communities deal with on-going challenges, student researchers have the chance to blaze new trails with each project. Their reach is also often global, supporting a growing number of international partnerships or working on some of the latest



“In many ways, this new generation of innovators is setting the stage for a new approach to research that is more hands-on and collaborative than ever before.”





Participants at CICA's Student Innovation Showcase pose with Minister of Science and Sport, Kirsty Duncan, and CICA President and CEO, Denise Amyot. Photo credit: CICA.

emerging technologies that are reshaping the future of work around the world.

Canada's Colleges and institutes benefit from a nimble approach to research with impacts that are often very quick to materialize – in fact, last year they produced over 1400 prototypes, 700 products, 500 processes, and 350 services. It is a very dynamic sector that has evolved rapidly to serve its partners.

Recognition has increased quickly too – Budget 2018's significant investment of \$140

million over five years for the College and Community Innovation Program (CCIP) recognizes the distinct role that colleges and institutes play in the research space.

This investment will support many new research collaborations and, most importantly, it will help secure Canada's leadership in the global innovation ecosystem.

## Canadian Agricultural Innovations Displayed at the Canada Agriculture and Food Museum



*Lacombe pig at Ingenium's Canada Agriculture and Food Museum, Ottawa*

Ingenium's Canada Agriculture and Food Museum in Ottawa welcomed in August a rare Lacombe pig to its display of Canadian farm animals. Lacombes were bred for their docile nature and rapid weight gain.

The Canadian-bred Lacombe is an example of innovative agricultural research and breeding that has been taking place in Canada for hundreds of years.

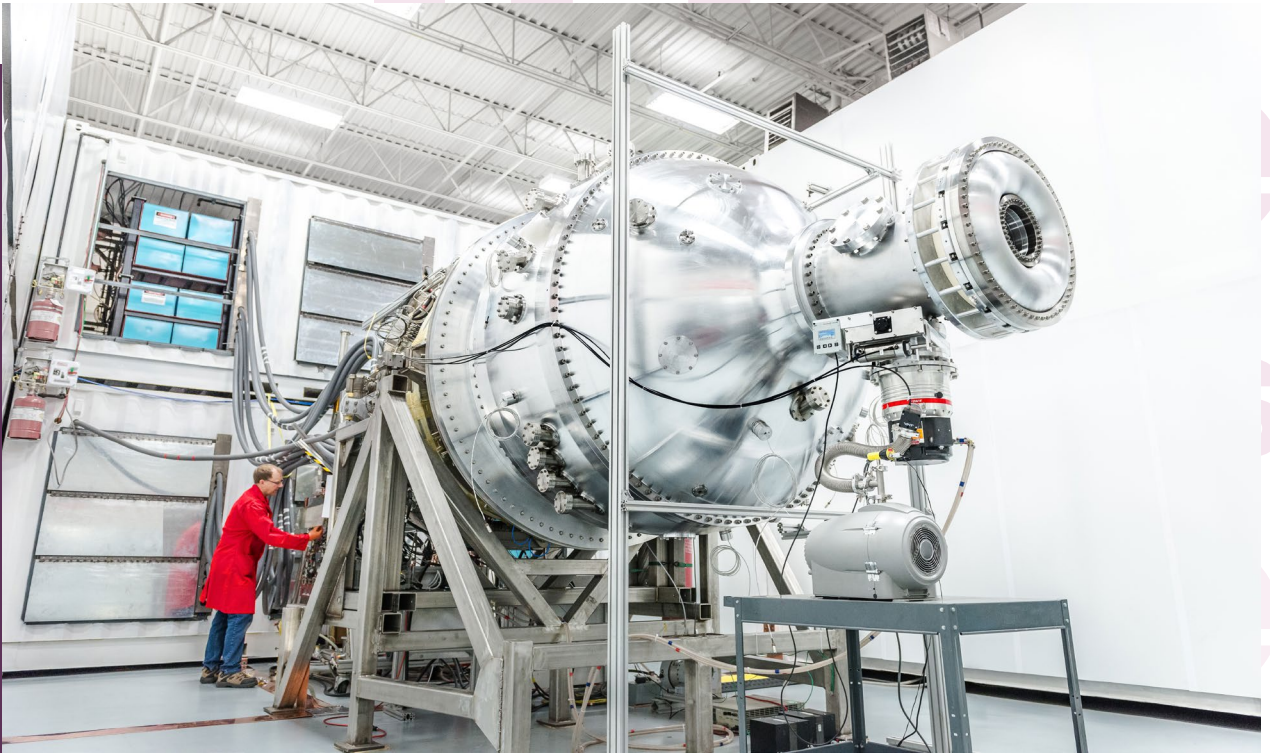
The Canadienne dairy cow descended from cows brought to Canada by Jacques Cartier and

Samuel de Champlain in the mid-1500s and early 1600s.

The Rideau Arcott sheep breed was developed in the 1960s and named for its birthplace, the Animal Research Centre, Ottawa.

As were the well-known McIntosh apple and the Red Fife and Marquis wheat strains, canola was also developed in Canada. The Canada Agriculture and Food Museum has produced travelling and museum-based exhibitions on this important Canadian oil crop that was developed 50 years ago.

## Chrysalix Venture Capital announces first close of a \$120 million fund for industrial innovation



Above: A plasma injector designed by General Fusion, one of the organizations backed by Chrysalix. Photo credit: General Fusion.

The Vancouver-based firm **Chrysalix Venture Capital** has announced the first close for a new \$120 million USD fund that will invest in intelligent systems to improve resource-intensive industries. Taking a global outlook, the Chrysalix RoboValley Fund will concentrate on early-stage ventures that are working on “Industry 4.0

applications that improve business processes, resource efficiency and environmental sustainability” for such industries as chemicals, energy and mining. The fund aims to invest in companies that use technologies like AI and IoT to push the world’s energy transition forward. Prominent international investors in the

fund include **Teck Resources Limited**, **Mitsubishi Corporation**, and **Mistletoe Venture Partners Limited**, among others. Chrysalix joins a trio of Canadian venture funds that want to raise up to \$700 million for clean technology companies, alongside **ArcTern Ventures** in Toronto and **Cycle Capital** in Montreal.

# Disrupting the status quo — a new approach to partnership



The Barrett Centre for Technology Innovation is slated for completion in early 2019. Rendering of the completed Barrett CTI (left), construction progress as of August 2018 (right).



*By: Dr. Darren Lawless,  
Dean, Applied Research &  
Innovation, Humber College*

Innovation and collaboration are words we hear and read almost daily – in meetings, in news stories, and in corporate mission and vision statements.

Without the partnerships to back them up and actions to make a real difference, they are just words. While there have been noteworthy successes between academia and industry, the potential

of these partnerships is not being fully realized, leaving us with a skills gap that requires urgent attention to correct. This is evident in studies highlighting Canada's poor innovation and productivity performance, including [The Conference Board of Canada's 2018 innovation report card](#). The time has come to stop saying “innovation” and give the word real meaning. This requires looking at new models of collaboration with industry, understanding their workplaces are our students' destinations.

Like all Canadian polytechnics and colleges, Humber has always valued and relied on

This article is part of the monthly Applied PeR\$pectives blog series that is available for free on the [RESEARCH MONEY](#) website. Applied PeR\$pectives is a space for the college and institute community to share information and insights about their ongoing work in building innovative capacity among their students, within their communities and across the country.

Applied PeR\$pectives is part of a new initiative by R\$ and Colleges and Institute Canada (CICan) to highlight the key role that colleges and institutes are playing in building Canada's innovation capacity. [Read more about the initiative here](#), and learn more about the leading-edge student projects, state-of-the-art facilities available for use by industry and innovative solutions being co-created by students, faculty and companies in the free booklet [Applied Research Comes of Age](#).

the expertise of our industry partners. Now is the time to raise that bar and look at new approaches to collaboration that directly benefit students and industry.

At Humber College, we are taking bold steps to help shape the future of collaboration and the economic benefits it can bring through

our unique model of polytechnic education and response to the needs of business.

A few years ago, we began to implement our vision of bringing a technology and innovation hub to Humber. In order to make it successful, we knew we had to take a different approach to innovation and seize the opportunity to work with and learn from industry leaders. Industry told us they needed a place for skills development, a place to foster awareness of their technology, a place to solve technical challenges inhibiting growth, and a place where they could meet and interact with all members of the innovation ecosystem. We listened attentively and then took action to create one place where all of these things could happen.

In 2019, we will launch the 93,000-square-foot Barrett Centre for Technology Innovation. This Barrett CTI will have no traditional classrooms and no traditional laboratories. Instead, the Barrett CTI will create a flexible space where industry will be encouraged to work directly side-by-side with our students and faculty to solve real-world industry challenges. It will help ensure that our students have the skills required for the careers of tomorrow and that our faculty stays current on where industry is going. Our partner organizations will benefit by having their business challenges solved and having a direct influence on the skills students are developing before they graduate.

While we are looking forward to the opening of the Barrett CTI, without the industry-leading organizations that have partnered with us and the Humber students and faculty who will work and learn within it, it is just a building.

It's the people – at Humber and from our partner companies – who will turn opportunities into progress and shared expertise

Barrett CTI will have no traditional classrooms and no traditional laboratories.

Instead, it will create a flexible space where industry is encouraged to work directly side-by-side with students and faculty to solve real-world industry challenges.



into real innovation. This is how we intend to change the game on multi-faceted partnerships.

Humber's Advanced Manufacturing Skills Consortium is comprised of industry partners working with the college to train students and employees of Canadian companies within the Barrett CTI. The consortium will integrate new learning pathways and opportunities for students, faculty, and industry experts to work together on the latest technology.

We are now positioned to engage local companies in discussions about technology adoption and providing space for them to come and interact first-hand with cutting-edge equipment. Not only can we assist them in future-proofing their operations, as an educational provider, we can help them train and upskill their current workforce.

Applied research projects and collaborative work between polytechnic institutions and private and public sector partners also puts our students ahead of the curve in a competitive knowledge and skills driven economy.

In order to prepare our graduates for the future of work, we need to continue to envision and work towards next-generation education. An education that is not bound by the confines of the past, but is enriched by the expertise of industry partners and focused on hands-on learning positions us all for future success.



## Moving Stories Exhibition

Moving Stories, a new exhibition at the Canada Science and Technology Museum in Ottawa, takes you through Canada's rich and varied transportation history. Drawn from the Museum's national science and technology collection, the 11 unique and seldom-seen pieces – automobiles, buses, and boats – all have stories to tell about who made them, who used them, and why.

The Canada Science and Technology Museum is one of three museums under Ingenium – Canada's Museums of Science and Innovation. The Canada Science and Technology Museum originally opened in 1967. Fifty years later, in 2017, the reinvented museum reopened its doors — following a three-year full



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*Custom Buick, 1931, in artifact collection storage at Ingenium.*

renewal — marking the start of a fresh, new chapter. Today, the museum combines visitor favourites from the previous incarnation — locomotives and the Crazy Kitchen — with 11 brand-new, interactive exhibitions in which visitors discover, play, and experience Canada's story of science, technology, and innovation.

*Moving Stories is open until spring 2019.*

## New AI supercomputing hub at University of Alberta



A new Artificial Intelligence-Supercomputing Hub for Academic and Industry Collaboration (AI-Hub) is coming to the University of Alberta. Amarjeet Sohi, federal Minister of Natural Resources, made the funding announcement last week at the university. The AI-Hub, equipped with high-performance computers capable of rapidly processing large amounts of raw data, seeks to create a collaborative link between industry and academia, in order to bring

new AI products to market. Expected to open in spring 2019, the supercomputer facility will provide training in AI to companies, qualified personnel and hundreds of students. Federal funding will also support marketing initiatives to increase the profile of Alberta's AI sector. The growth of AI technologies is projected to increase global GDP by \$15.7 trillion by 2030, according to a PwC study.

## Toronto and Shenzhen launch the Sino-Canada International Innovation Centre

The cities of Toronto and Shenzhen, often called Silicon Valley North and Silicon Valley of China, respectively, opened the Sino-Canada International Innovation Centre this fall at a ceremony in Toronto. The Sci Innovation Centre is intended to increase cooperation between Chinese and Canadian entrepreneurs and companies in the following industry sectors: electronic technology, ICT, biotechnology, cleantech and advanced manufacturing. It will serve as an incubator and accelerator, supporting start-ups with funding, mentoring, training, legal consulting and co-working spaces, as well as various programs. The Centre is a co-venture between the **Canada Confederation of Shenzhen Associations** and **Shenzhen Flat Panel Display Industry Association** and is supported by the Shenzhen Municipal People's Government. Additional partners include the **Univ of Toronto**, **Univ of Waterloo**, **MaRS Discovery District**, the **Ontario Centres of Excellence** and **Univ of Western Ontario**. The opening coincided with the launch of the 2019 Sci Innovation Competition, a global funding competition open to Canadian tech entrepreneurs.

## University of Alberta opens venture space for commercializing health innovation

The **University of Alberta** has opened a \$2.3 million venture hub called **TEC Centre Labs** that aims to help scientists and researchers commercialize their discoveries. Located in downtown Edmonton, the facility encompasses 8,000 square feet of wet lab and collaboration space, and houses two accelerator programs: the **UAlberta Health Accelerator**, which concentrates on assisting researchers at the university's Faculty of Medicine and Dentistry, and the **Merck Invention Accelerator**, which focuses on emerging health technologies that could find global applications. Funders for TEC Centre Labs included **Innovation, Science and Economic Development Canada (ISED)**, **Western Economic Diversification Canada**, and the **University Hospital Foundation**, as well as provincial and municipal partners.

## Legacy Series — First-hand Stories from the Second World War

This original documentary film series — created by Canadian film students and Ottawa's [Canada Aviation and Space Museum](#) — showcases powerful, personal accounts of the Second World War through the lens of aviation.

Through six episodes, the *Legacy Series* shares the captivating stories of Canadian veteran airmen and women who served in the Royal Canadian Air Force, Royal Air Force, Women's Auxiliary Air Force, and the Polish Air Force, as well as of former European civilians.

The *Legacy Series* bridges the multigenerational divide between



*Photo credit: Ingenium*

veterans who lived their stories decades ago and youth who, using today's digital technologies, recorded them. The veterans told their stories to bring our country's history to life so that the passage of time would not diminish their accomplishments for today's generations and for those to come.

All the *Legacy Series* episodes are on the [Canada Aviation and Space Museum YouTube channel](#).

## TRIUMF to build new Institute for Advanced Medical Isotopes (IAMI)



Canadian Prime Minister Justin Trudeau poses with TRIUMF staff during his visit to announce public investments into medical isotope research and innovation infrastructure. Photo credit: Adam Scotti, TRIUMF Lab ([Flickr](#))

Prime Minister Justin Trudeau recently announced federal investments for **TRIUMF**, Canada's particle accelerator centre, to create a new life sciences facility called the **Institute for Advanced Medical Isotopes (IAMI)**. Situated on TRIUMF's campus, IAMI will advance research into life-saving medical isotopes and radiopharmaceuticals. The facility will include labs and a

TR-24 medical cyclotron, one of the most technologically advanced commercial cyclotrons in the world. Among its many offerings, IAMI will provide a secure supply of important medical isotopes, contribute to next-generation cancer therapies, and accelerate global drug development by producing sought-after isotope-based radiotracers for gauging drug efficacy.

# From Key Punching to Computer Science

## RESEARCHER SPOTLIGHT



Remington Rand computer punch card sorting machine. In artifact collection storage at Ingenium. Photo credit: Ingenium.

The critically-acclaimed 2016 movie *Hidden Figures* tells the story of the crucial yet unrecognized contributions made by women to NASA's early Project Mercury and Gemini Space flights.

While researching the development of university computer science programs in Canada for her thesis, University of Ottawa doctoral candidate Jennifer Thivierge found another example of vital, but unappreciated work done by women. But this one is closer to home.

Jennifer discovered the untold story of women in the early 1960s in Canada who were relegated to the job of punching holes in early computer data cards. Although the work of these women known as “keypunch girls” was vital to computer operations at the time, they had no hope of advancement at work.

Serious about removing gender barriers in the sciences, Ingenium was keen to help Jennifer in her research about discrimination against women in the early days of computing in Canada.

[Ingenium – Canada's Museums of Science and Innovation](#) was thrilled to offer Jennifer one of two of the first Ingenium-University of Ottawa Fellowship in Gender, Science and Technology.

Ingenium runs three national museums in Ottawa: the [Canada Agriculture and Food Museum](#), the [Canada Aviation and Space Museum](#), and the [Canada Science and Technology Museum](#).

The Canada Science and Technology Museum provided space, resources, and access to its collection, including artifacts such as keypunch machines and card sorters from the 1950s to the 1980s.

“Keypunch girls”  
were vital to  
the success  
of computer  
operations in  
the 1960s, yet  
they themselves  
had no hope  
for advancement  
at their work.

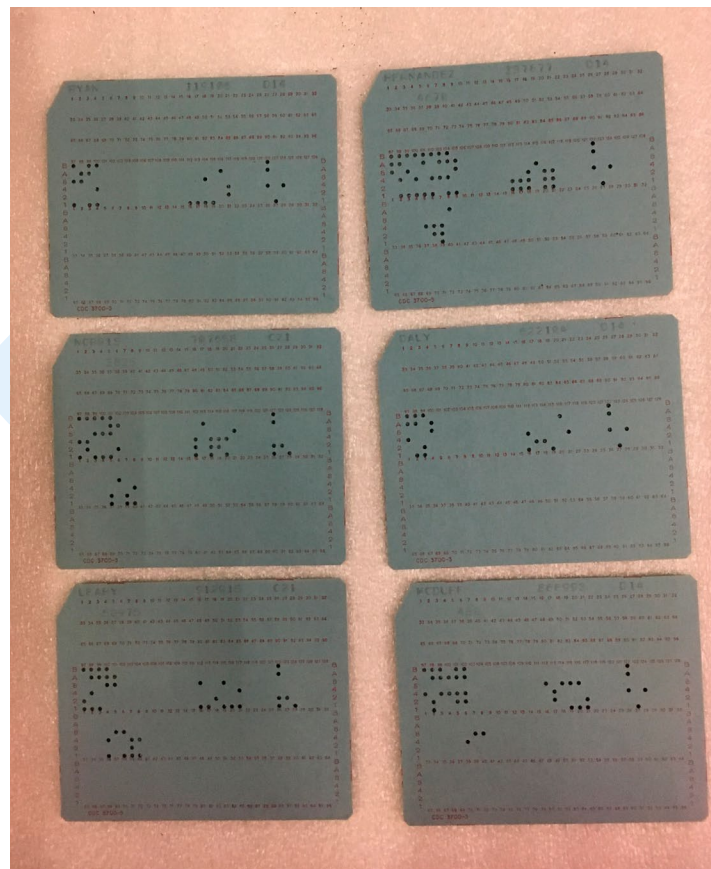


In addition to the “keypunch girls” story, Jennifer discovered that the percentage of women enrolled in university computer science programs across Canada has risen from 18.2% in 1972 to only 25% in 2011. She points out, however, that by 2016 the percentage of women enrolled in computer science programs at the University of Ottawa had risen to 33%, and that the numbers of female and male computer science professors had reached parity.

Ingenium is committed to encouraging and empowering women and girls in science, technology, engineering, and mathematics – the STEM fields. This will be achieved through a multi-pronged approach that includes the above-mentioned Ingenium-University of Ottawa Fellowship in Gender, Science and Technology, a [travelling display](#) that will relay in-depth stories about successful women in STEM, and specialised programming and events.



Remington Rand card punch machine, ca 1960. Card punch machine for punching holes in computer punch cards. In artifact collection storage at Ingenium. Photo credit: Jennifer Thivierge.



Computer punch cards have holes punched in specific positions and patterns which represent data in a machine-readable form that can be processed and stored by a computer. In artifact collection storage at Ingenium. Photo credit: Jennifer Thivierge.



## Fanshawe College opens new advanced research centre in biotechnology



Photo credit: Fanshawe College

**Fanshawe College** in London, Ontario, opened its new Centre for Advanced Research and Innovation in Biotechnology (CARIB) on Friday, Oct. 12, 2018. The centre comprises more than 13,000 square feet of teaching laboratories for biology, chemistry, instrumentation and physics, as well as an incubator and industry

research space with access to a cell culturing facility. Student and faculty research teams will be able to collaborate with local biotechnology partners in the agri-food industry.



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## Bioindustrial Innovation Canada partners with Italian “Green Chemistry” cluster

**Bioindustrial Innovation Canada** (BIC) has signed a memorandum of understanding with the **Italian Technology Cluster of “Green Chemistry”** between their networks and developing technologies that convert sustainable feedstocks into energy and value-added chemicals. The memorandum of understanding leverages



(SPRING), a non-profit association whose members operate in Italy’s bioeconomy sector. The partnership will promote collaborations to research and develop high-tech projects, including technologies that convert biomass and raw materials into bio-based products. Other areas of focus include establishing business relations free trade agreements with Europe, particularly the Canada–European Union Comprehensive Economic and Trade Agreement (CETA), says A.J. (Sandy) Marshall, Executive Director of BIC.

## STEAM Horizon Awards for Canadian Youth Studying in STEM

# STEAM

## HORIZON AWARDS

*Photo credit: Ingenium*

Do you know a young person who is often described as a leader, an achiever, or an innovator? Do they have limitless drive, ambition, and determination? If so, there's an opportunity for them to receive a \$25,000 prize towards their post-secondary education.

Founded in 2016, the STEAM Horizon Awards invite Canada's youth to promote positive changes throughout their community using science, technology, engineering, arts, and math (STEAM).

Winners will be awarded a \$25,000 prize for their post-secondary education. Two of the five prizes will

go to Indigenous youth. The prizes are funded by the Ingenium Foundation, alongside a group of award sponsors who are confident that the recipients will act as role models and ambassadors for future STEAM generations.

This year's award sponsors are Indspire, Ingenium Foundation, Lockheed Martin, NSERC, and Syncrude.

Please click [here](#) for more information about the STEAM Horizon Awards and how to apply.

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