



**INNOVATION
ACROSS
MULTIPLE
THEMES**

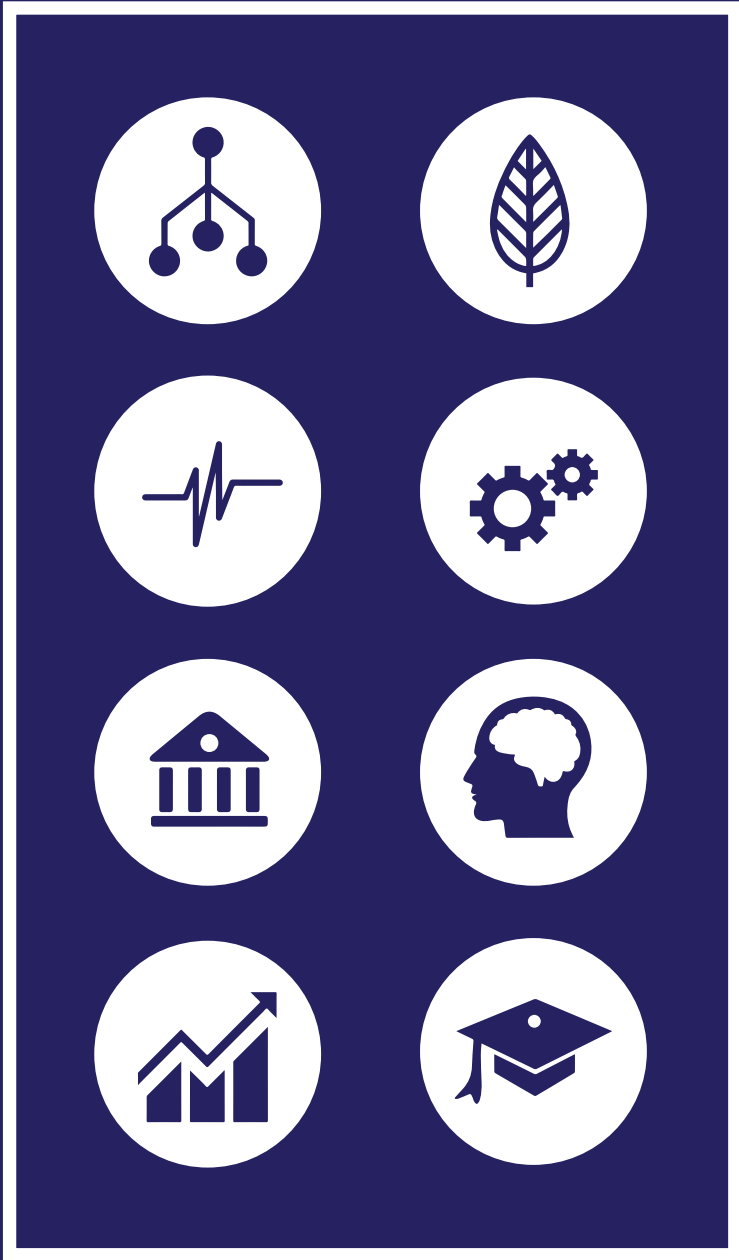


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**“ Ryerson is playing a key role
in the innovation ecosystem
in Canada and beyond. ”**

— Wendy Cukier

Message from the Vice-President, Research & Innovation

Ryerson University, Canada's comprehensive innovation university, is on an unprecedented trajectory of growth. Named one of Research Infosome's "Research Universities of the Year" in 2014, we have doubled research funding in the last five years. Our globally recognized Digital Media Zone (DMZ) was recently ranked fifth in the world among university-based incubators. Our extensive, diverse and interdisciplinary scholarly, research and creative activity addresses major challenges of importance to Canada clustered around the following themes:

Digital Media & Technology: Our researchers help drive the creation of new products, services, and online tools in critical areas including cloud & context-aware computing, transmedia, big data analytics, social media, 3D printing, assistive technologies, augmented reality, and more.

Energy & Sustainability: Our researchers are developing innovative technologies and processes — such as green roof technology, net-zero homes, smart grid technology, water conservation and testing, and more.

Health & Well-Being: Working across disciplines — health sciences, psychology, policy, administration, biomedical science, and engineering — our researchers explore prevention, diagnosis and treatment.

Technological & Industrial Innovation: By improving design and production processes — promoting the adoption of new technologies such as control systems, big data, artificial intelligence, nanotechnology, and 3D printing — Ryerson is helping take manufacturing to the next level.

City Building & Social Justice: Partnering with local communities, researchers are advancing inclusion and citizen engagement while driving economic growth and social innovation, in Canada and globally.

Design, Culture & Creative Industries: Ryerson faculty combine scholarly, research and creative practice to be leaders in the design and communications fields. Ryerson is internationally recognized with award-winning faculty in theatre, literature, film, photography, journalism, and fashion design.

Management, Entrepreneurship & Competitiveness: Ryerson is advancing prosperity by supporting entrepreneurial approaches, small business growth, and start-up acceleration, as well as examining the factors that drive and impede innovation.

Teaching & Learning for the New Economy: Ryerson faculty are exploring new forms of pedagogy, teaching tools, strategies for inclusion, and innovative approaches to increasing employment.

Ryerson University is home to over 150 centres, labs, zones, and institutes, including several new additions such as the City Building Institute, Ryerson Centre for Cloud and Context-Aware Computing (RC4), the Ryerson Institute for Infrastructure Innovation (RIII), the Institute for Biomedical Engineering, Science & Technology (iBEST), and the Global Diversity Exchange (GDX), among others. With more than 140 partner institutions in 36 countries, our researchers collaborate with the best and the brightest around the world. The following projects are just a few examples of the excellent and relevant work of our faculty.



Wendy Cukier, Vice-President,
Research and Innovation



DIGITAL MEDIA & TECHNOLOGY

Ryerson researchers drive the development of digital media by creating new products, services, and online tools. Our faculty explore areas such as cloud & context aware computing, transmedia, big data analytics, social media, 3D printing, assistive technologies, geographic information systems, augmented reality, and their applications.

Ryerson, government and industry partners at the forefront of the digital revolution

Abridged from INNOVATION: Ryerson University Research & Innovation Newsletter (January, 2014).

Building on Ryerson's successful model of entrepreneurship, innovation, and experiential learning, the Ryerson Centre for Cloud and Context-Aware Computing (RC4) brings together mobile technologies and predictive software to create digital products and services that cater to our individual needs and preferences.

Located in downtown Toronto, RC4 has the infrastructure and experts necessary to create new collaborations, knowledge, and jobs. With the support of Federal Development Agency of Southern Ontario (FedDev), RC4 will connect researchers with industry partners while also supporting research-driven start-up companies.

"RC4 is excited to be open and accepting applications to join our community," says Hossein Rahnema, RC4's Chief Scientist, who founded the start-up Flybits and was recently selected as one of MIT's 35 Innovators Under 35. "We believe building strong ties between industry and academia is critical for the future productivity and prosperity of the Canadian economy."

Bringing the right private and government partners to the table is vital for RC4's success. Wendy Cukier, Vice-President, Research and Innovation at Ryerson, believes that collaborative communities like RC4 "will help create market-driven projects that build companies, create jobs, and make our innovation economy a truly world-class ecosystem. This is especially true for new and emerging technologies such as cloud and context-aware computing, 3D printing, and big data analytics, which are transforming virtually every sector."

Matthew Kyan, Assistant Professor in Electrical Engineering, has begun several projects at RC4. Along with colleagues, he is developing innovative mixed-reality applications for Canada's cultural heritage sector. Working with AWE Company Ltd. and the City of Toronto, he has developed virtual re-enactments of the Battle of 1812 for Fort York, which can now be experienced by visitors through their tablet devices. Leveraging the camera on the tablet, Kyan's software uses cloud computing to recognize digital cues embedded into the physical environment and establish visual context, which triggers the onset of these virtual re-enactments.

Kyan is also working with Toronto-based start-up Synaptop, a cloud-based operating system that unlocks a host of sharing and collaborative possibilities for traditional desktop-style workflows. The goal is to build intelligence into cloud-based services to support audio-visual content creation. "Intelligent processing is key for industries generating massive amounts of data," says Kyan.

RC4 also operates two additional nodes at Ryerson University. These two nodes add to RC4's state-of-the-art facilities, offering services to researchers and industry partners across many vertical markets:

- The Ryerson Transmedia Centre, led by Richard Lachman, Associate Professor in Digital Media, combines communications and electronic media to create content for multiple platforms.
- A new node focused on 3D printing and advanced manufacturing, which connects emerging companies with researchers such as Ali Mazalek, Canada Research Chair in Digital Media.

Poised to be a multi-trillion dollar industry, the possibilities for enhanced digital communications, entertainment, and service delivery are endless for cloud and context-aware computing technologies. And RC4 is at the forefront of this digital revolution, positioning Southern Ontario as a global leader in the development of these emerging technologies.



Frauke Zeller brings innovative analysis of social media to Ryerson

Abridged from INNOVATION: Ryerson University Research & Innovation Newsletter (March, 2014).

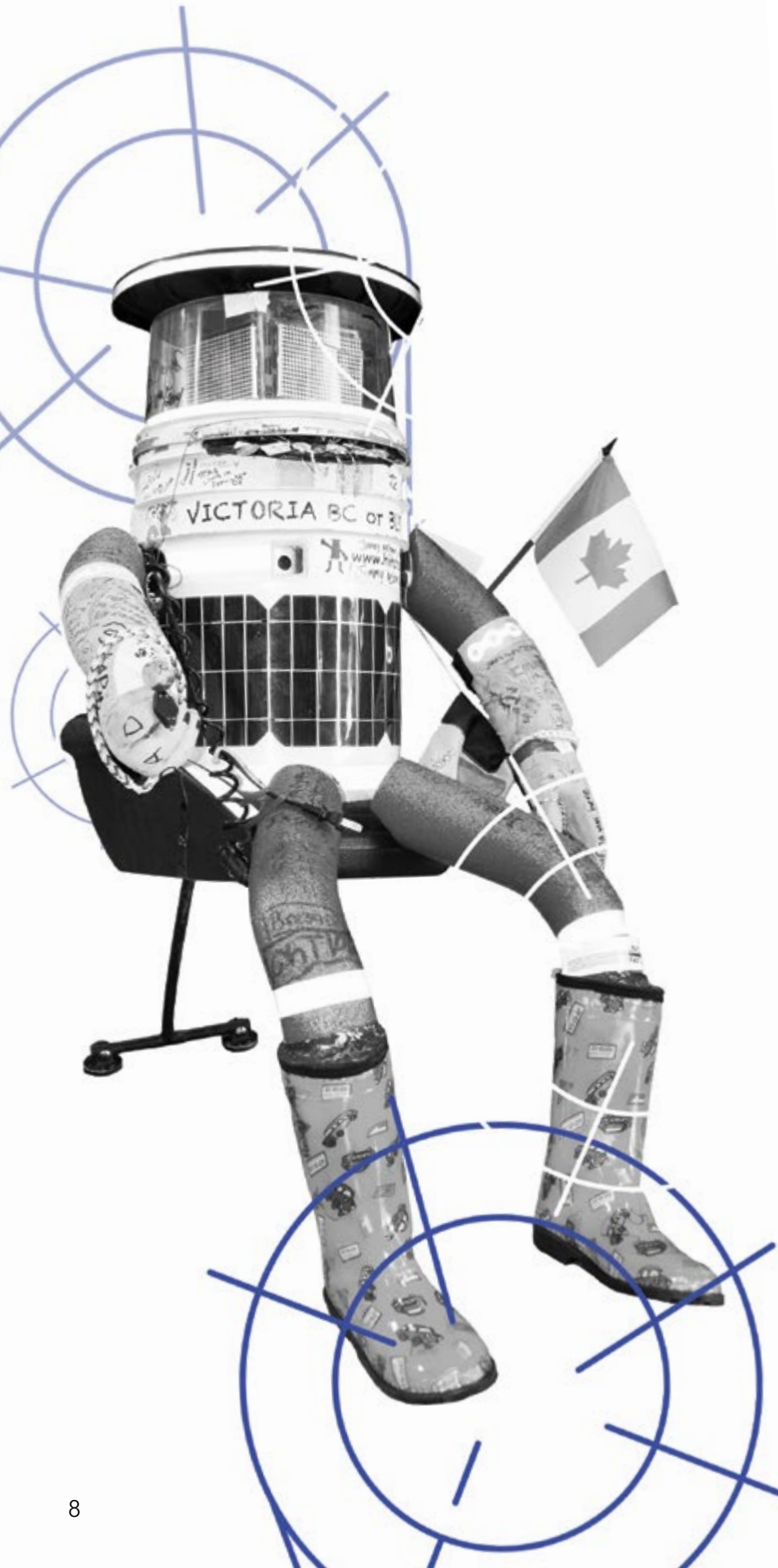
Ryerson provides a progressive and interdisciplinary environment that has attracted faculty and students from around the world. One of Ryerson's newest faculty members, Dr. Frauke Zeller, has recently been appointed Assistant Professor of Professional Communications. Her research combines computational linguistics and social sciences methods to analyze big data and digital communications content among online communities. This work includes, for instance, an examination of hundreds of millions of tweets occurring online every day on Twitter.

At Ryerson, Dr. Zeller will continue to build upon this research by using her innovative analysis methods to look at digital communication through the use of avatars, as well as across multiple modes of communication such as visual image, text, and audio clues. She is also interested in improving Human-Robot Interaction by means of an interdisciplinary approach. For example, she has developed a robot called my kulturBot, with Dr. David Harris Smith at McMaster University. The robot was designed as an art critic that takes pictures of art in galleries and tweets about them.

Prior to coming to Ryerson, Zeller received the prestigious Marie Curie Fellowship from the European Commission. The award enabled her to develop innovative methods of analyzing online communications and big data, at the renowned Centre for Digital Humanities in University College London.

"I'm excited to be at Ryerson where I can teach and incorporate a stronger language focus in my research," says Zeller. "The school is so interdisciplinary and students are so engaged and interested that the classroom is a very stimulating environment."

Photo Credit: Open Space Arts Society



Breaking down social networks in the era of big data

Abridged from INNOVATION: Ryerson University Research & Innovation Newsletter (January, 2015).

In our digitally connected world, people are rapidly increasing the amount of online communication, leaving a large data trail of social interactions. Dr. Anthony Bonato, Professor in Mathematics, designs and studies mathematical models to provide insights into these complex social networks.

"In the digital world of online social networks, I am interested in the dots and lines and how they tell us something about the hidden geometry of a network," says Dr. Bonato.

His recent project, *Advances in Network Analysis and its Applications*, included a multidisciplinary team of mathematicians and computer scientists from across North America to adapt algorithms to analyze data derived from Facebook and LinkedIn. This Mitacs-supported research project enabled the team to adapt algorithms to analyze data derived from Facebook and LinkedIn in order to examine an individual's attributes and social connections.

Otherwise known as 'Blau space,' this multi-dimensional space links

individuals by their friendship ties, forming a large, dynamic network. Coordinates correspond to attributes such as age, education, occupation, geographic locations, and other characteristics. In theory, the number of attributes make up the dimension of the social network; in practice, quantifying the overall dimension of the Blau space associated with the social network has remained an open problem.

By working with big data sets from Facebook and LinkedIn, the team successfully modeled social relationships and set out to quantify the dimensions of these social networks. Using a mix of tools from advanced mathematics and artificial intelligence, Dr. Bonato discovered that the list of attributes that define an individual are much shorter than previously expected. The team was able to demonstrate that the dimension of social networks is best approximated by the logarithm of the number of individuals in the network.

As the first study to quantify the dimensions of social networks, Dr.

Bonato's breakthrough research is generating new insights into the use of big data to model social networks. New applications of this research may be able to provide accurate predictions about individuals as well as the types of interactions they typically pursue.



Photo Credit: Clifton Li

DIGITAL MEDIA & TECHNOLOGY CENTRES, INSTITUTES AND ZONES

- Centre for the Study of Commercial Activity
- Ryerson Centre for Cloud and Context-Aware Computing
- The Inclusive Media and Design Centre
- Ryerson Multimedia Research Laboratory
- Infoscape Research Lab
- Centre for Digital Humanities
- Ryerson Multimedia Research Lab
- Centre for Interactive Multimedia Information Mining
- Experiential Design and Gaming Environments (EDGE Lab)
- Ryerson Communications Lab
- Transmedia Research Centre
- Signal Analysis Research (SAR) Group
- Digital Media Zone
- Transmedia Zone



ENERGY & SUSTAINABILITY

Ryerson researchers lead the development of innovative technologies and processes to promote energy conservation and sustainability. Projects include green roof technology, net-zero homes, smart grid technology, water conservation and testing, consumer education, and more.

Harnessing the power of microorganisms to manage waste

Abridged from INNOVATION: Ryerson University Research & Innovation Newsletter (September, 2013).

Microorganisms are found everywhere in the world—in the air, on land, and in both fresh and saltwater environments—and have the uncanny ability to thrive on all living things. That's what makes them central to our existence and survival, believes Gideon Wolfaardt, Professor in Ryerson's Department of Chemistry and Biology, and Canada Research Chair in Environmental Interface and Biofilms. He has dedicated his research to raising awareness about the role of microorganisms and the ways in which they can be controlled and harnessed for future good.

Wolfaardt's research on microbial biofilm ecology has applications in engineering, industrial, and clinical settings. "My interest lies in understanding why microorganisms are so successful," he says. "They'll be here long after we're gone and it's fascinating how they are able to continuously adapt to new environments and circumstances."

Wolfaardt says despite concerns surrounding infection and disease outbreaks, microorganisms also play a key part in helping facilitate a cleaner environment. "If we didn't have microbes we'd drown in our own waste," he says. "The more we recognize the role they play, the more we can enhance the process of the good ones and control the bad ones."

With more than 80 published peer-reviewed articles and book chapters under his belt, Wolfaardt has also presented at various seminars in North America, Europe, and South Africa. His current work centres around topics such as water treatment and management, infection control, microbial conversion of biomass, and the management of mine tailings and nuclear waste.

One multi-year project investigates the long-term impact of microorganisms

in the deep subsurface, given the fact that agencies responsible for nuclear fuel management have selected deep underground storage as a safe, long-term solution for used fuel. Partnering with the Nuclear Waste Management Organization (NWMO), he and his team are collaborating with the University of Saskatchewan to evaluate the presence and activity of microorganisms in bentonite clay, which will be used to surround fuel containers.

"We're looking at the environment that microorganisms create and what kind of metabolic activity they will have that may impact the long-term sustainability of the environment," he says, noting that corrosion is one concern. "We need to figure out when this corrosion will occur under those conditions."

Such knowledge is expected to ensure that Canadian deep geological repositories are able to mitigate microbial effects that may occur during the lifecycles of these storage facilities. "We need to ensure that microorganisms will not impact the long-term sustainability of these systems," says Wolfaardt.

Continuing on the theme of sustainability, Wolfaardt is also involved in the Global Sustainability Bioenergy Project, which seeks to tap into the potential of bioenergy on a very large scale. "I'm really interested in how to use microbes in the developing world to prevent food spoilage and optimize the use of plants and natural resources for fuel."



Greening Cities

Abridged from INNOVATION: Ryerson University Research & Innovation Newsletter (July, 2014).

Dr. Alan Fung, Professor of Mechanical and Industrial Engineering, looks beyond the benefits of energy conservation in homes and buildings to explore the energy generation potential of dwellings. His research advances net-zero energy infrastructures that can generate as much energy as they consume.

Dr. Fung is currently leading a Smart Net-Zero Energy Building Research Network at Ryerson to determine optimal paths for achieving net-zero energy consumption at the building and neighbourhood levels. He has also developed computer simulation and modeling tools to design, analyze, and develop energy-efficient infrastructure. He uses these tools to integrate new energy technologies into a structure's design and system to maximize on-site renewable energy potential. He also uses computer modeling to evaluate the impact and economic feasibility of sustainable housing in Canada.

"Many of my research projects involve substantial public and private

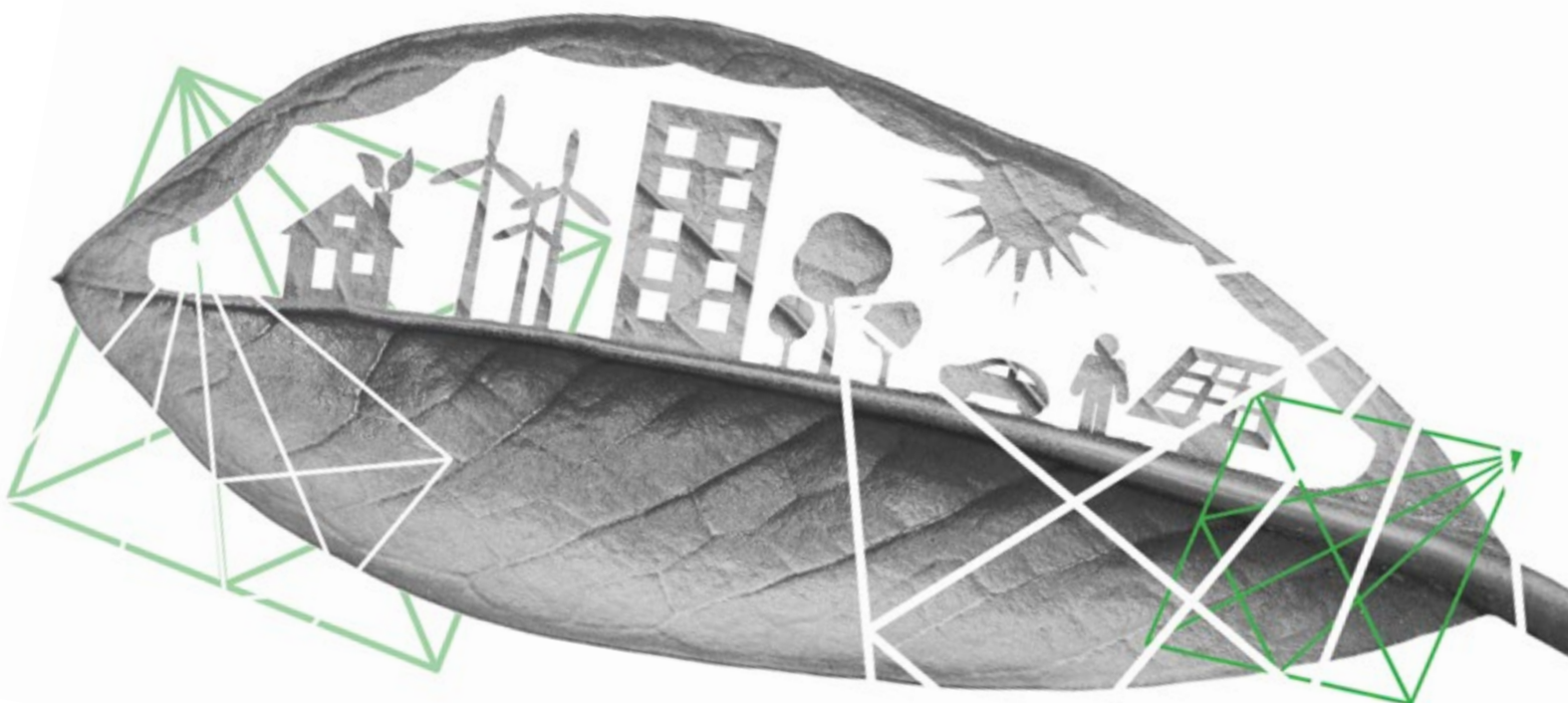
partnerships to promote research and development efforts and to accelerate industry and market acceptance of renewable energy and sustainable technologies in Canada," says Dr. Fung.

Dr. Fung and his students are creating groundbreaking solutions to urban energy challenges by designing and building the green infrastructure of the future with affordable materials and technology. Dr. Fung is working with his industry partner S2E Technologies—in collaboration with the City of London, London Hydro, and local developer, Sifton—to build a smart net-zero energy solar community in London, Ontario. Through the Mitacs Accelerate internship program, the project will train up to 60 PhD and graduate students, including 15 students from Ryerson.

Dr. Fung also works with Ryerson Architectural Science researcher Professor Vera Straka to improve the energy, water, and indoor environmental performance of existing high-rise buildings in

Toronto, which are often old and energy inefficient. This project, co-funded by the Ontario Ministry of Municipal Affairs and Housing, the City of Toronto, Canada Mortgage and Housing Corporation, Enbridge, and Mitacs, is part of the City Tower Renewal initiative to green aging high-rise residential buildings in Toronto.

The research team will identify cost-effective energy strategies and conduct a review of green building labeling systems, such as Leadership in Energy & Environmental Design (LEEDS), to prepare a 'building sustainability' best practice guide. The project will also include occupant engagement strategies to educate residents on energy and water conservation with the aid of the newly developed real-time energy consumption monitoring and feedback system.



How policy researchers are helping restore the Great Lakes

Abridged from Ryserson News and Events (January, 2015). Written by Mary Teresa Bitti.

How do you make sure that public policy designed to secure the health of the Great Lakes – and by extension the well-being of the 35-plus million people who rely on the system for drinking water and their livelihood – is actually implemented?

That's the question that Dr. Carolyn Johns, Professor of Politics and Public Administration at Ryerson, decided to tackle when she created the Great Lakes Policy Research Network (GLPRN), a collaborative partnership involving policy researchers and graduate students from eight universities in Canada and the United States. "I wanted to bring together Canadian and U.S. social scientists interested in Great Lakes governance and policy issues to mobilize around the renegotiated Great Lakes Water Quality Agreement and do research that would lead to better success."

A little environmental policy history: In 1972, Canada and the U.S. signed the Great Lakes Water Quality Agreement in order to restore and protect the ecological health of the Great Lakes, starting with Lake Erie, which had been declared dead in the late 1960s due to widespread contamination from urban areas, agriculture, industries, and sewage treatment plants. Because it is the shallowest of the five lakes, Lake Erie issues clear warning signals about pollution problems in the Great Lakes. The goals are simple: drinkable, fishable, swimmable waters.

Periods of concerted cleanup efforts restored Lake Erie and resulted in other successes, but this was followed by a period of indifference in the mid- to late-1990s. The result: by the mid-2000s, Lake Erie started to experience the negative effects of algae blooms including contamination. Today it is in serious decline. Algae blooms are also leading to public warnings around Lake Ontario.

In 2009, Canada and the U.S. announced they would renegotiate the Great Lakes Water Quality Agreement, which had not been revised since 1987. At that time, the two federal governments promised to clean up 43 of the most polluted areas. By 2012, when the latest reiteration was finalized, only four had been cleaned up.

"The Great Lakes basin is a complex ecosystem that requires complex human intervention. We look at why we aren't having more success. We can't have ebbs and

flows of government and public engagement," says Johns, who serves as Project Director of the network.

"We are doing a network survey of all the organizations and individuals with policy implementation mandates to understand how they work together or not. We already know Great Lakes efforts require a lot of government leadership and sustained attention and if it's not there, not a lot happens. We want to know more about who is doing what and who isn't engaged but should be.

"We also want to know more about our capacity to address issues such as groundwater management, offshore wind, invasive species, nutrient pollution management, shale gas, and climate change.

"We hope that the parties that signed the agreement become aware of the gaps in capacity and shortfalls and where to target their efforts. We want to help create more accountability so that the goals and objectives can be achieved in a timely manner."



ENERGY & SUSTAINABILITY CENTRES, INSTITUTES AND ZONES

- The Ryerson Water Centre
- Centre for Urban Energy
- iCUE
- Ryerson Urban Water

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**HEALTH &
WELL BEING**

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Ryerson researchers are grappling with pressing problems in prevention, diagnosis, and treatment. Working across disciplines – health sciences, psychology, policy, administration, biomedical science, and engineering – they drive health systems and social innovation to improve lives.

Individuals with PTSD who undergo couple therapy see significant improvement in symptoms and their relationship: Ryerson-led study

Abridged from Ryerson News and Events (August, 2012).

A North American study led by a researcher at Ryerson University has discovered that treating a person with posttraumatic stress disorder (PTSD) and their partner using a specific couple therapy greatly decreases the severity of their symptoms -- and improves their relationship.

"Research consistently documents that PTSD is one of the mental health conditions most associated with intimate relationship problems. Although there are effective individual psychotherapies for the symptoms of PTSD, there is minimal evidence to show that these therapies improve intimate relationships," says Dr. Candice Monson, a professor at Ryerson University's Department of Psychology and the lead author of the study to be published in the Aug. 15 issue of the *Journal of the American Medical Association*. "Now, there is increasing recognition that intimate relationships can play a vital role in the path to recovery for those with PTSD, and that relationships can improve along that path."

According to the Canadian Mental Health Association, PTSD affects approximately one in 10 Canadians, and is one of the most common mental health problems found among children and adults. In the U.S., 6.8 per cent of adults have experienced PTSD at some point in their life, according to the National Center for PTSD. This mental health disorder is usually caused by a psychologically traumatic event involving actual or threatened death or serious injury to oneself or others.

Dr. Monson collaborated with an international team of researchers on a four-year (2008-2012) study of forty couples, in which one partner was

diagnosed with PTSD. The couples, who ranged in age from 18 to 70 years, were randomly assigned to two groups of 20 couples. The first group received cognitive-behavioural conjoint therapy (CBCT) for PTSD, a pioneering treatment co-developed by Drs. Monson and Fredman, while the other 20 couples were put on a three-month wait list before receiving the treatment. Of the individuals diagnosed with PTSD who received CBCT, 30 percent of them were military veterans.

CBCT is designed to simultaneously reduce PTSD symptoms and enhance relationship satisfaction, and consists of 15 sessions over three phases. The researchers found that 81 percent of couples who received CBCT experienced a significant improvement in their PTSD symptoms. Sixty-two percent of

CBCT patients reported that their relationship with their partner had significantly improved. Those who received the therapy also reported fewer symptoms of depression, general anxiety and anger. Even after three months of completing the therapy sessions, couples reported the gains they made from their treatment were maintained.

The VA National Center for PTSD was involved in both the development and evaluation of the treatment. The treatment was developed while Dr. Monson worked at the centre's executive division and the White River Junction VA Medical Center. The study began while she was at the centre's Women's Health Sciences Division in Boston.



Transforming mental health supports for immigrant men

Abridged from INNOVATION: Ryerson University Research & Innovation Newsletter (November, 2013).

Sepali Guruge, Professor in Ryerson's Daphne Cockwell School of Nursing, will explore ways to reduce stigma of mental illness in Asian men.

Ryerson researchers will explore ways to reduce the stigma of mental illness among men and boys in Asian communities across Canada, thanks to a \$3-million research grant from the Movember Foundation. The pan-Canadian project, led by principal investigator Sepali Guruge, a professor in Ryerson's Daphne Cockwell School of Nursing, will study the effectiveness of two pilot anti-stigma interventions with 2,160 men living in Vancouver, Calgary and Toronto. The project will focus on reducing internalized stigma and also promote knowledge and skills building to advance mental health support within their communities.

Co-principal investigators include Ryerson nursing professors Josephine Wong and Souraya Sidani, Canada Research Chair in Design and Evaluation of Health Interventions, as well as other partners across the country.

The Canadian Mental Health Association calls mental health issues among all Canadian men "a silent crisis" due to male and societal beliefs about masculinity. This research is particularly topical as Asian communities are the fastest growing immigrant population in Canada. Men in Asian communities may be particularly at risk of further cultural-specific issues, such as gender ideologies, lack of awareness, and systemic barriers associated with racism and xenophobia.

"This funding is being awarded to important projects, such as Ryerson's, that support men at so many stages of life -- from adolescence to university, to first-time dads, and to those moving into retirement," said Paul Villanti, executive director, programs, Movember Foundation.

One of the largest research grants in Ryerson's history, this project draws on two particular areas of research strength at Ryerson -- diversity and health. The project is another example of how Ryerson University is making a difference in its community. Ryerson is Canada's first Ashoka Changemaker campus, making it part of an international network of universities and colleges that are committed to solving real-world problems in new and creative ways.



Dr. Beau Standish leads game-changing company "7D Surgical" with his former supervisor, Dr. Victor Yang

Abridged from INNOVATION: Ryerson University Research & Innovation Newsletter (May, 2014).

Dr. Beau Standish, assistant professor in Ryerson's Department of Electrical and Computing Engineering, currently serves as Chief Executive Officer of 7D Surgical, a company he created with his former supervisor, Dr. Yang along with Drs. Adrian Mariampillai and Michael Leung. 7D Surgical is a spin-off company from Ryerson University in partnership with the Sunnybrook Health Sciences Centre. The company already has multiple patent applications for its surgical navigation platform technology. The 7D Surgical Navigation system is a surgical tool that quickly generates detailed 3D surface images to help surgeons see below the surface of body tissue. "It's a GPS for surgeons that allows them to see where they need to go during surgical procedures," explains Dr. Standish.

The system generates 3D surface images – used to localize the position of a patient during a spinal fusion procedure – in only 1 minute, as opposed to 20-30 minutes as currently required by existing technologies. By speeding up and improving the surgical workflow process, this incredible innovation drastically reduces surgery times, thereby

reducing overall use of hospital resources and patient wait times.

This platform technology was developed out of the Biophotonics and Bioengineering Lab (BBL), directed by Dr. Yang at Ryerson. Although the system was specifically designed for use in spinal fusion surgeries, the technology can also be applied to any procedure where precision, speed, and real-time feedback are critical, such as hip, knee, ear, nose, throat, and plastic surgeries. Outside of health care, the technology can also be adapted for manufacturing. For example, it can be used to deliver a quick 3D scan of products for quality assurance.

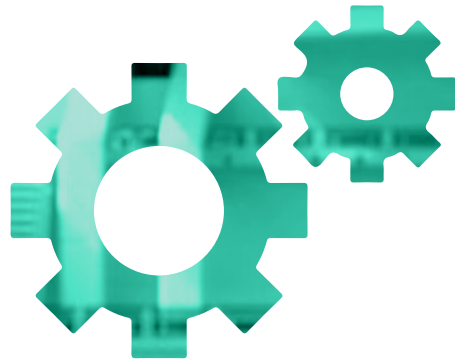
The entrepreneurial spirit of the BBL research program, supported by FedDev Ontario, Mitacs, and the Ontario Brain Institute, fosters an ideal training environment for post-doctoral researchers following in the footsteps of Dr. Standish. Eighteen Ryerson students, research assistants, and post-doctoral fellows are currently involved with photonics hardware, image processing algorithms, and pre-clinical testing at the BBL.

"It's a great opportunity for students, as their success validates our approach of 'Teaching Research' at the university," says Dr. Yang, who is also the Chief Scientific Officer of 7D Surgical. "In this collaborative environment, the students have the opportunity to work with clinical research scientists to develop an appreciation of real world biomedical applications."

7D Surgical's initial technology underwent testing with pre-clinical studies before recently being approved for a clinical research validation study at Sunnybrook Hospital. The full trial will include 60 patients undergoing both spinal and brain surgeries. The technology is currently in the regulatory approval process before it will be launched on the market for clinical sales. 7D Surgical is working with industry partners, Celestica and the Institut National d'Optique, to manufacture and package the technology for distribution. By sharing knowledge and leadership, Drs. Yang and Standish are ensuring that talent is harnessed to maximize innovation and impact.

HEALTH & WELL BEING CENTRES, INSTITUTES AND ZONES

- Centre for Global Health and Health Equity
- Centre for Studies in Food Security
- Centre for Health in at Risk Populations
- Institute for Stress and Wellbeing Research
- Psychology Research and Training Centre
- Nursing Centre for Research and Education on Violence Against Women and Children
- iBEST



TECHNOLOGICAL & INDUSTRIAL INNOVATION

Ryerson researchers are improving design and production processes, helping drive the adoption of new technologies and promoting global competitiveness in the international economy. Working with partners, they are leveraging technologies such as control systems, big data, artificial intelligence, nanotechnology, and production processes.

How smart technology could change public transit

Abridged from Ryserson News and Events (June, 2014).

Joseph Chow has an ambitious goal: to transform how urban transportation systems are designed and managed by using mobile computing, information technology, and the analysis of massive data sets.

A professor in Ryerson's Department of Civil Engineering and a Tier II Canada Research Chair in Transportation Systems Engineering, Chow is focused on developing a more efficient and adaptable urban transportation system – one that reduces traffic congestion, produces less pollution, draws on renewable energy, and ultimately convinces people to leave their cars at home.

The importance of developing such a network isn't lost on Chow. "If you think of society as a human body, then the transportation system is the circulatory system," he says. "Therefore, a strong transportation infrastructure is critical to supporting economic growth."

Chow is exploring two approaches to making Canada's aging transportation systems "smarter". The first approach is to design systems that respond to people's actual behaviour in terms of when, where, how, and why they travel. The second approach is to ensure that these systems can adapt to random fluctuations in the environment.

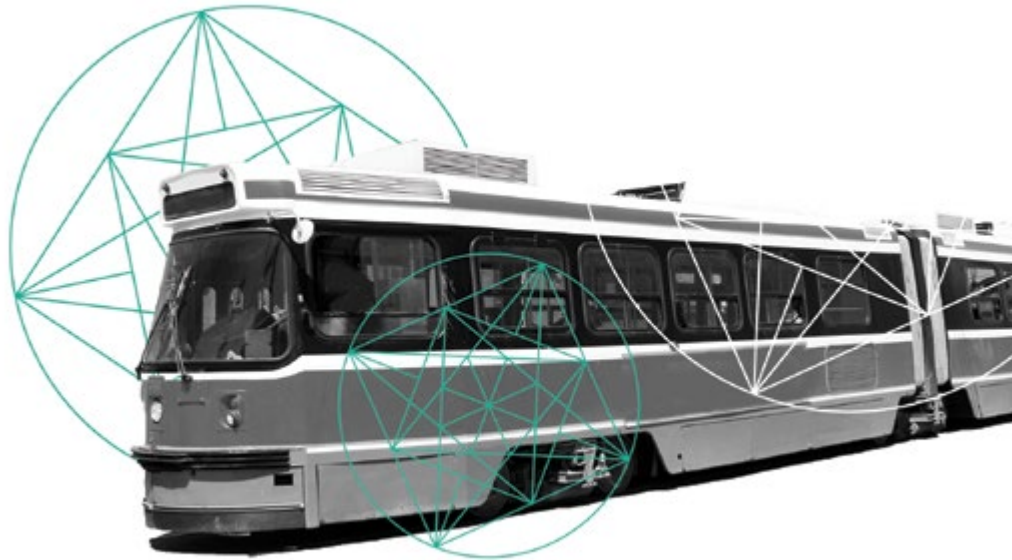
As Chow points out, existing transportation systems are traditionally designed without the flexibility to adapt to uncertain conditions. This can cause many problems. A common example is when multiple streetcars on the same route arrive together at one stop due to delays along the line. This lack of adaptation puts a strain on the entire system and significantly reduces the level of service for commuters, says Chow.

To that end, his research is aimed at helping transportation systems to

work more seamlessly, sustainably, and cost-effectively. Later this summer, in fact, Chow's research will find a new home in a state-of-the-art test bed environment located at Ryerson's Centre for Urban Energy and funded by the Canada Foundation for Innovation. The test bed will serve as a small-scale version of a real traffic

management from the public transit agency to private third parties may heighten demand at event venues, increase transit ridership (particularly during off-peak periods) and decrease the cost for travellers.

Finally, Chow has teamed up with fellow Ryerson Civil Engineering



management centre. Featuring an eight-screen video wall, multiple work stations, and GPS-enabled Google tablets, the test bed will enable Chow and his team of graduate students and postdoctoral fellows to conduct experiments using a simulated urban transportation system.

In another research initiative, Chow is exploring mobile platforms that would enable, for example, concert goers and sporting event attendees to use their smartphones to pay public transit fares to the event at a discount provided by the venue. This outsourcing of fare revenue

professor Bhagwant Persaud to predict the risk of road accidents along different routes based on current weather conditions. As society moves toward autonomous vehicles that make decisions on their own (e.g., Google's self-driving car), cars will be able to use this information in real time in order to select the safest and shortest routes.

"Once these flexible transport systems are in place, it will be much easier to make changes when they're needed," says Chow.

To mark manufacturing month, Advanced Manufacturing, Design and 3D Printing Lab launched at Ryerson University

Abridged from Ryerson News and Events published (October, 2014).

Ryerson University has launched an Advanced Manufacturing, Design and 3D Printing Lab in partnership with Edward Burtynsky, world-renowned photographer and co-founder of Think2Thing (T2T), and Bionik Laboratories, a robotic medical device and control systems start-up incubated in Ryerson's Digital Media Zone (DMZ).

The Advanced Manufacturing, Design and 3D Printing Lab is one of Canada's most technologically advanced 3D printing research facilities. Home to one of just three EOS P395 printers in the country, and the only one located at a university, the lab provides a focal point for collaborative research, innovation, and training.

"The Lab leverages our research expertise with the design and additive manufacturing excellence of Think2Thing, and Bionik's groundbreaking work in the development and commercialization of control systems to drive robotic medical devices with companies across sectors," said Wendy Cukier, Vice-President, Research and Innovation, Ryerson University. "We know from our partners in automotive, aerospace, biomedical, ICT, consumer products, and architecture that the Internet of Things and 3D printing are transforming products and the way in which we design and make them."

The Lab is part of Ryerson's newest research hub, the Ryerson Centre for Cloud and Context-Aware Computing (RC4), recently developed with support from the Federal Economic Development Agency for Southern Ontario and several industry partners.

"Additive manufacturing and 3D printing are fundamentally transforming multiple industries – everything from manufacturing to retail to healthcare," said Terry Stuart,

Chief Information Officer, Deloitte. "It's amazing to see Ryerson's Advanced Manufacturing, Design and 3D Printing Lab bring these important technologies to life in a meaningful way."

Edward Burtynsky, who co-founded T2T with award-winning industrial designer David Didur, is also an alumnus of Ryerson's Image Arts Program. By partnering with Ryerson, he will have access to a wide range of clients, faculty, and students to solve challenging design problems across sectors.

"Given its cross-disciplinary approach, its partnerships, and its innovation ecosystem, Ryerson was the obvious partner for launching our innovation centre," said Burtynsky. "We are here to respond to industry partner challenges, as well as artists, designers, academics, researchers, and others, providing the most current, state-of-the-art 3D technology and collaborating with the best talent and expertise."

The lab's other partner, Bionik Laboratories, develops control

systems and context-aware technology to create groundbreaking robotic medical devices, including exoskeletal legs currently being tested in rehabilitation hospitals. "This partnership provides us with access to new design and prototyping techniques as well as state-of-the-art technology. Ryerson has played an important role in helping us develop our technology and we see a bright future in linking new control systems with rapid prototyping and customization using 3D printing," said Peter Bloch, Bionik Laboratories CEO.

Combining the knowledge and resources of Ryerson with the expertise of T2T and Bionik, the Lab has established an environment that stimulates education, creativity, and inventiveness to accelerate product development. The Advanced Manufacturing, Design and 3D Printing Lab will enable designers and manufacturers from all sectors to use 3D technology to produce components and products with exceptional precision.



Bombardier looks to Ryerson for its next innovation - intuitive morphing aircraft wings

Abridged from INNOVATION: Ryerson University Research & Innovation Newsletter (May, 2014).

Airplanes have not seen dramatic changes to their overall design since their invention. In the aerospace industry, most aircraft are made with rigid bodies that are only prepared for one type of flight, such as passenger trips or military maneuvers. Although this type of "fixed-wing" design is reliable and durable, it does not maximize a plane's productivity over a broader range of flight paths. External conditions during take-off and landing often cause these fixed-wing aircraft to operate inefficiently, which results in significantly increased fuel consumption.

Ryerson researchers, Professor Jeff Xi and Associate Professor Paul Walsh at the Department of Aerospace Engineering, are working with Bombardier to design a flexible aircraft structure that can rapidly change its geometry during flight. The technology will give aerospace manufacturers the capacity to build wings consisting of a collection of individually-hinged small tiles that are interconnected. Morphing wings

will considerably improve the stability and agility of aircraft, as well as help to further Canada's vision for more eco-friendly aircraft with low fuel consumption and reduced emissions.

"When you fly a plane, you have take-off, climbing, cruising, descent, and landing," Xi explains. "These [phases] are all different, aerodynamically speaking, and if you translated them into optimal wing shapes, the geometries would all look radically different. Right now, airplanes use high lift devices to compensate for changing phases, but that's not optimal, because you are using a lot of energy. What you want is to have the overall wing geometry change."

By analyzing external conditions and adjusting wing shape in real-time, an aircraft can reactively perform better in unforeseen situations. For instance, a plane will be able to accelerate at a moment's notice to respond to an emergency, but then conserve energy by returning to a more leisurely pace.

"The push is to help 'green' aviation. If you can achieve the optimal aerodynamic performance, then you can maximize lift and reduce drag and fuel consumption," Xi says. "A morphing wing could represent a paradigm shift in future aircraft."

Xi is also leading Ryerson aerospace engineering students in this project at the Ryerson Institute for Aerospace Design and Innovation (RIADI). RIADI is a unique program that provides the opportunity for students to participate in project-based training and to collaborate with industry leaders such as Bombardier.

Two Ryerson Ph.D. students assisted in testing various wing shapes using 3D printed models to determine optimal shapes. The next steps are to develop a flexible yet durable material for the outer covering of the morphing wing structure, and then to conduct limited real-world testing of the design. This project will train graduates to become highly qualified personnel on the cutting edge of aerospace technology.

TECHNOLOGICAL & INDUSTRIAL INNOVATION CENTRES, INSTITUTES AND ZONES

- Institute for Innovation and Technology Management
- Entrepreneurship Research Institute
- Space Systems Dynamics and Control Lab
- Ryerson Institute for Aerospace Design and Innovation (RIADI)
- THRILL Lab
- Human Factors Engineering Lab
- IMPACT Lab
- Smart Laboratory
- Ryerson Centre for Cloud and Context-Aware Computing (RC4) Advanced 3D-Printing Lab
- Facility for Research on Aerospace Materials and Engineered Structure (FRAMES)
- Systems and Controls Lab
- Sensorimotor Processing and Integration for Rehabilitation, Adaptation, and Learning Lab
- Robotics, Mechatronics and Manufacturing Automation Laboratory (RMAL)
- Centre for Near-Net-Shape Processing of Materials (CNPM)
- Productivity Efficiency Analysis Research Lab (PEARL)
- Social Innovation Zone
- RIADI



CITY BUILDING & SOCIAL JUSTICE

Ryerson researchers are shaping Canada's future on the world stage. With collaboration between disciplines and with community, our researchers are promoting inclusion and citizen engagement, and driving economic growth and social innovation.

Canadian international development agency funds project to help vulnerable children and youth in Dominican Republic

Abridged from Ryserson News and Events (November, 2014). Written by Mark Witten.

As thousands of Canadians flocked to the Dominican Republic this past March Break to soak in the sun and sand, Henry Parada, Professor of Social Work at Ryerson University, also had the top Caribbean travel destination on his mind. He recently received the news that the Government of Canada would support his research that focuses on improving the safety and quality of life of vulnerable children and youth in the Dominican Republic.

Parada's research focuses on Latin American social work, community development, and child welfare within an anti-oppression framework. The Canadian International Development Agency (CIDA) will fund the Ryerson project through CIDA's Partners for Development Program, offering \$1.5 million over five years.

Member of Parliament Lois Brown, Parliamentary Secretary to the Minister of International Cooperation (the Honourable Julian Fantino), visited Ryerson to announce Canada's support for this initiative.

"Through this partnership with Ryerson University, Canada will help ensure that vulnerable children and youth have a safe environment to grow up to become healthy and productive members of society," said Ms. Brown.

The goal of this project is to improve the safety and quality of life for 10,000 boys and girls, often from neighbouring Haiti, by:

- Improving the skills of government agencies and civil society organizations responsible for protecting these boys and girls from abuse and sexual or labour exploitation;
- Enhancing the ability of these agencies and organizations to include youth in the design and implementation of child protection programs;
- Supporting the implementation of Dominican child protection laws; and
- Helping create a robust child protection system.

"Ryerson University is committed to effecting evidence-based social change through its research activities," said Wendy Cukier, Vice President, Research and Innovation. "This project builds on Dr. Parada's previous work in the Dominican

Republic and his longstanding relationships with government, fellow researchers, and civil society organizations in the region. Ryerson is grateful for the ongoing support of Dr. Parada and his Ryerson colleagues by the Government of Canada. This innovative project will contribute to improving the safety and quality of life for the most vulnerable children and youth in the Dominican Republic."

Dr. Parada will partner with local organizations such as Pontifical Catholic University Mother and Teacher, Dominican Republic Federation of Municipalities, Autonomous University of Santo Domingo, and the National Council for Children and Adolescents. He says building connections is key to the project's success.

"It's collaboration that makes this project happen," Parada said. "We want to collaborate with our partners because we want the Dominican Republic communities to be ready to respond to the assistance available to them."



Feel safe at home? Depends on where you live

Abridged from Ryserson News and Events (July, 2014).

A recent study by Ryerson University suggests that people living in high-rise buildings are more fearful of crime when walking around their neighbourhood, but once they're at home, they feel safer than those living in single detached homes.

"Fear of crime affects everyone," said sociology professor Heather Rollwagen, author of the study. "We arrange so much of our routine on being safe and minimizing risks to our family, even though actual crime rates in Canada have been decreasing for some time."

Dr. Rollwagen studies how people's

social environment impacts their perception of crime, especially how a person's housing affects their perception of safety both at home and in their neighbourhood — an area of research that has received little attention in Canada.

Rollwagen analyzed Statistics Canada data on crime and victimization involving more than 15,000 respondents who were asked a number of safety-related questions, such as how afraid they were to walk around their neighbourhood alone after dark, how fearful they were to stay at home alone at night, and how many neighbours they know.

People who live in high-rise buildings are less likely to know their neighbours and therefore tend to be more fearful of walking around their neighbourhoods at night than those living in single detached homes. However, once apartment dwellers are at home alone at night, they are almost three times more likely to feel safe compared to people in their single detached houses.

Rollwagen attributes this perception to the "fortress effect." "People don't feel as safe outside when they're walking around because they haven't built up those social networks with their neighbours. But when they come inside their apartment, they feel safer having that added layer of security." Rollwagen cautions that this can have a negative impact on an individual's surrounding social environment as "they may start to become 'islands' in their own communities."

To encourage more social interaction among people living in apartment buildings, Rollwagen encourages developers to create more public spaces, especially play areas for families, to build a stronger sense of community. Tenant boards can also plan more social events for people to mingle.



New challenges, new opportunities in a new Canada

Abridged from Ryserson Today (January, 2015). Written by Will Sloan.

Canada is changing, and diversity studies must change with it. On December 16, Ryerson staff and students marked the first year of the RBC Immigration, Diversity and Inclusion Project at Ryerson with a breakfast and workshop at the Ted Rogers School of Management (TRSM). In a panel discussion, faculty members discussed new challenges – and new opportunities – facing

immigration research in the 21st century.

"All labour force growth in Canada, because of our demographic trends, will actually come from immigration," said Wendy Cukier, Ryerson's Vice-President, Research and Innovation, and founder of the Diversity Institute at TRSM. "If we don't get this right, we won't have the kind of skilled

workforce we need to sustain economic growth."

Harald Bauder, Academic Director at the Ryerson Centre for Immigration and Settlement, called for more research on the role of legal status in the context of immigrant engagement. "There are a lot of immigrants living in precarious legal status. ... What does it mean to their

children? How do they get access to health and police services? What are the implications in workplace?"

Ratna Omidvar, Executive Director of the Global Diversity Exchange at TRSM, pointed to the increasing gap between Canadian- and immigrant-born wages, which has widened to between 30 and 40 per cent (compared to 15 to 17 per cent in the 1970s). Omidvar suggested researching and investing in settlement programs to improve immigrants' integration with labour markets. "There is a disturbing indicator that less than 30 per cent of Ontario's immigrants actually interact with settlement agencies. What happens to the other 70 per cent? What kind of advice do they get?"

Josephine Wong, Professor at the Daphne Cockwell School of Nursing, called diversity both a strength and a challenge, citing the lack of infrastructure to reach smaller communities. "The term 'immigrant' presents a stereotypical image in Canadian society. In reality, immigrant populations are very diverse, with unique and shared experiences. In Toronto, we have residents that identify with 200 ethnic identities."

TRSM Professor Howard Lin saw opportunity in changing areas like

Markham and Scarborough, where immigrants now account for more than 50 per cent of the population. "You have the old enclave economy, but you also have high-tech, opportunity-driven entrepreneurs," said Lin. He also saw opportunity in globalization: "The Pacific Mall small business owner can have impact because they have a link with their origin country."

Launched in November 2013, the RBC Immigration, Diversity and Inclusion Project is a seven-year initiative that funds research on immigrant issues. Staff and student projects focus on four themes: social engagement, employment/entrepreneurship, mental health, and preferences/consumer behavior. In the first year, 15 students and six staff received funding for research projects, internships and new ventures.

Wendy Cukier praised the initiative for bringing together diverse perspectives under a common goal, and driving cross-disciplinary collaboration. "We have students and professors from right across the university, along with community partners, business and government with different ideological approaches to the issue," said Cukier. "What we see from the RBC initiative

along with events like these is the ability to find common ground, build collaborations, and push the boundaries of our understanding."



CITY BUILDING & SOCIAL JUSTICE CENTRES, INSTITUTES AND ZONES

- Ryerson Centre for Immigration and Settlement
- Centre for Labour Management Relations
- Law Research Centre
- The Diversity Institute
- Centre for Indigenous Governance
- Centre for Voluntary Sector Studies
- Ryerson Centre for Children Youth and Families
- Centre for Studies in Food Security
- Centre for the Advancement of the Scholarship for Teaching and Learning
- Ryerson Centre for Immigration and Settlement (RCIS)
- Inclusive Media and Design Centre (IMDC)
- Centre for Labour Management Relations (CLMR)
- Law Research Centre
- Journalism Research Centre
- Centre for Urban Energy (CUE)



DESIGN, CULTURE & CREATIVE INDUSTRIES

Ryerson researchers combine scholarly, research and creative practice, both exploring and producing culture. Ryerson's leadership in design and communications fields is internationally recognized with award-winning faculty in theatre, literature, film, and fashion design.

New research centre preserves culturally important materials for future generations

Abridged from INNOVATION: Ryerson University Research & Innovation Newsletter (February, 2013).

With every passing year, fragile books and other printed materials from previous centuries face increased risk of fading and falling apart altogether. In fact, without appropriate action to preserve these culturally significant manuscripts and documents, their contents may never be enjoyed or examined by future generations. Thanks to Ryerson University's new Centre for Digital Humanities (CDH), however, historical books and papers are finding new life in a digital format.

For example, *The Yellow Book*, a periodical that was published from 1894 to 1897, is among the most influential publications of fin-de-siècle culture and has been digitized in the Centre's project, "The Yellow Nineties Online." Students can now access this important source and add material for peer review.

Led by co-directors Dennis Denisoff and Lorraine Janzen Kooistra, both professors in English at Ryerson, CDH also includes faculty members from Sociology, Early Childhood Studies, the RTA School of Media, the Ryerson University Library and Archives, and the Learning and Teaching Office.

Designing online environments for the preservation, visualization, and analysis of cultural texts and histories is a key component of the Centre's work, but their mission goes further.

"Working with external partners and developing the next generation of digital humanities researchers are key priorities of the CDH," says Denisoff. "As a research centre exploring innovative areas of digital humanities scholarship – such as enhanced critical curation, digital editing, and the visual analysis of historical texts,

lives and relationships – the CDH offers students and faculty exciting opportunities for collaborative intellectual research and the development of practical skills," says Denisoff. For example, the Centre recently sponsored a workshop called "Hands-On Introduction to Data Visualization," run by Jason Boyd, assistant professor in the Department of English, which demonstrated the use of SIMILE widgets (developed by MIT) for visualizing temporal data.

Participants were given a chance to apply the widgets to their own datasets – which included a wide range of topics from major historical chess games to the personography of the Victorian aestheticist community – to create visual renderings of information and facilitate new understandings and analysis of data.



Ryerson Image Centre acquires Berenice Abbott Archive

Abridged from Ryerson News and Events (March, 2015).

In conjunction with International Women's Day, the Ryerson Image Centre (RIC) is celebrating the landmark acquisition of the Berenice Abbott Archive. Abbott, the pioneering artist best known for her extensive and iconic documentation of New York City, is among the most important photographers of the 20th century.

Donated by a generous circle of benefactors who wish to remain anonymous, the Abbott Archive includes photographs, original negatives, and working materials representing the entire arc of her six-decade career.

The Abbott Archive is the largest and most comprehensive collection anywhere of the artist's work, comprised of more than 6,000 photographs and 7,000 negatives from the mid-1920s through the 1980s, as well as book maquettes, correspondence, personal journals, business records, and ephemera. It joins and greatly enriches the RIC's holdings, which already include the renowned Black Star Collection of photo-reportage.

"We are thrilled to add the Berenice Abbott Archive to our collection," said Paul Roth, director of the Ryerson Image Centre. "Public and scholarly interest in Abbott's work has increased significantly in recent years, and we look forward to welcoming researchers and curators so they can shine light on her extraordinary career."

Working in collaboration with the Jeu de Paume in Paris, the RIC had previously organized the 2012 retrospective exhibition and catalogue *Berenice Abbott (1898-1991)*: Photographs to promote the legacy of Abbott. Recent publications by famed German publisher Steidl Verlag have also helped advance public awareness of the scope and range of Abbott's career.

With the RIC's important acquisition, Abbott scholars will now have two destinations at which to study her work. The MIT Museum, at the Massachusetts Institute of Technology in Cambridge, is home to many of Abbott's papers and manuscripts, project records, and a collection of her science photography, including work she

did for MIT's Physical Science Study Committee in the late 1950s.

"Ryerson Image Centre's new Abbott acquisition will provide the opportunity to share resources and encourage new scholarship, and we look forward to working together with them," noted Gary Van Zante, curator of architecture, design and photography at the MIT Museum.

A small group of philanthropists teamed up to purchase the Abbott Archive and bring it to Toronto and the RIC. This gift to the RIC collection further establishes the institution's burgeoning reputation as one of the leading centres worldwide for the study of photographic history.

"We are immensely grateful for the generous donation of this unique and important collection of photographic works," said Adam Kahan, vice-president, university advancement. "It adds new depth to the RIC collection, and advances Ryerson's city-building enterprise by further enriching Toronto's cultural offering."



Arts students partner with public library in research project

Abridged from Ryerson News and Events (May, 2014). Written by Chantal Braganza.

In late April, well after classes and exams had ended, 10 students from Ryerson University's Faculty of Arts were still in the library — but they weren't there to hit the books. The third- and fourth-year undergraduates were visiting the Toronto Public Library's (TPL) two Digital Innovation Hubs, learning about the newly launched tech and education "maker" centres and asking questions about how these hubs might best serve their neighbourhoods.

Through presentations and workshops, the students drafted research guidelines for an eventual evaluation of the Digital Innovation Hubs, which offer affordable public access to high-tech tools such as coding software, 3D printers and scanners, and audio/visual editing equipment. These students, in disciplines ranging from Arts and Contemporary Studies and English to Politics and Psychology, partnered with the TPL to evaluate the hubs.

The evaluation project is part of Canadian Cities, a brand-new initiative and partnership launched at Ryerson University's Faculty of Arts. An interdisciplinary urban research initiative, the program aims to give faculty and students opportunities to work on urban projects with city organizations in ways that enhance faculty research and students' applied

knowledge, while providing a valuable service to the city partner.

This initiative produces what Art Blake, Associate Professor of History at Ryerson and project lead on Canadian Cities, calls "perfect learning moments," offering hands-on learning experiences to students that address very real community needs.

"When we approached the Toronto Public Library, the library staff said it would be helpful to figure out a way to evaluate the Digital Innovation Hub," says Blake. "The Hub is an important initiative for the Library, but the TPL doesn't have the staff and resources to do an evaluation."

This is of particular importance at the TPL's soon-to-open second Digital Innovation Hub at its new Fort York branch, located in the city's condense CityPlace neighbourhood. "The TPL is wondering how new vertical neighbourhoods, which are becoming more typical in Toronto, shape library use," says Blake.

The TPL partnership was initially proposed as an extra-curricular option offered to students who applied. But Canadian Cities at Ryerson has already started envisioning how this evaluation program might be incorporated into existing course work to promote learning beyond the classroom in departments such

as Politics, Sociology, and History, as well as one of Blake's own Arts and Contemporary Studies classes, "Gaming the City".

"It will help build the idea that urban studies and urban partnerships are, at their best, multidisciplinary," says Blake. "There's no one type of student or subject for a project like this."

This is certainly the case for Tatum Dooley, an Arts and Contemporary Studies student at Ryerson, who found that the workshop has had a significant impact on her career plans. "I found that I really loved the marketing and promotions component," she says of the experience. "The partnership has me seriously considering a future in advertising."



DESIGN, CULTURE & CREATIVE INDUSTRIES CENTRES, INSTITUTES AND ZONES

- Ryerson Image Centre
- Journalism Research Centre
- Modern Literature and Culture Research Centre
- Ryerson Theatre School
- Transmedia Centre
- Centre for Digital Humanities
- Inclusive Media and Design Centre (IMDC)
- Fashion Zone



MANAGEMENT, ENTREPRENEURSHIP & COMPETITIVENESS

Ryerson researchers are helping to ensure Canada's future economic prosperity by improving our understanding of entrepreneurial mindsets, small business growth and acceleration, and globalization.

Collaborate to Innovate: Ryerson helps SMEs navigate government programs to support success

Abridged from INNOVATION: Ryerson University Research & Innovation Newsletter (September, 2013).

Many organizations, especially small- and medium-sized companies, are not aware of the support networks and tools available to help support their businesses, or do not have the time and resources to navigate the required forms and processes. On July 30, Ryerson held its Scientific Research and Experimental Development (SR&ED) Tax Credit Workshop, the most recent session in a series of workshops aimed at addressing these challenges.

Representatives from the Canada Revenue Agency, including Rob Coelho (Director, Toronto West Tax Services Office) and Rob Musselman (Manager, Financial Review), spoke to an audience of over 90 Ryerson faculty and industry partners about the SR&ED program, encouraging Canadian businesses of all sizes and in all sectors to pursue research and development in Canada. The program is the largest source of federal support of this type, and participants were offered

advice on how to apply this support to eligible Research and Development investments. The workshop marked the first time that the Canada Revenue Agency held an outreach session with an academic institution.

"It is a great program, especially for small- and medium-sized businesses who might not ordinarily be able to realize the commercialization of their ideas through to completion," says Jennifer MacInnis, Legal Counsel and Senior Director of Applied Research and Commercialization at Ryerson. "It is a program that helps companies bootstrap their research and development, leverage investments, and helps keep their innovation efforts in Canada."

"Ryerson's research is the fastest growing amongst Ontario universities, and it's largely because of the strength of our partnerships," says Dr. Wendy Cukier, Vice President, Research and

Innovation at Ryerson University. "The SR&ED Workshop is part of a comprehensive suite of programs that are aimed at making it easier for industry partners to get support, to solve real world problems, and ideally to partner with the University. Ryerson is open for business and provides one-stop shopping to support R&D in SMEs."

In June, in partnership with the Ontario Ministries of Research and Innovation (MRI) and Economic Development, Trade & Employment (MEDTE), business owners met with government representatives, academics, and industry colleagues to exchange tips on expanding their businesses into international markets. A third workshop, which will take place in October, will help industry partners navigate and exploit funding sources to support industry-university research partnerships.



City building through entrepreneurship and innovation

Abridged from INNOVATION: Ryerson University Research & Innovation Newsletter (July, 2014).

Ryerson is actively researching and promoting transnational entrepreneurship. The University is committed to city building and innovation by helping Canadian businesses expand into global markets, and encouraging international and immigrant entrepreneurs to build their businesses in Canada.

Dr. Howard Lin, Professor, Ted Rogers School of Management, and Director of the Canada-China Institute for Business and Development (CCIBD), has shown how immigrant and local businesses can exchange innovation and generate social capital by sharing collective economic benefits

derived from cooperation between groups.

"Canadian local businesses sometimes lack a vision for international markets that can be compensated by our immigrant base," says Dr. Lin. "At the same time immigrants need the social capital that local family businesses can provide. There are many complementary possibilities between local and immigrant business activities."

The CCIBD recently co-organized the Tsinghua University Forum on Overseas Chinese Studies at Ryerson, focusing on the theme of "Overseas

Chinese Entrepreneurship: Theory and Practice." The event featured Liu Tee Shu, recipient of the Elis Island Medal of Honor that recognizes the contributions of distinguished immigrants to America, and Shi Xiaoguang, consul from the General Consulate of China in Toronto, who encouraged efforts to promote further business and scholarly exchange between Canada and China, and entrepreneurship in the Chinese community. The forum was attended by over 300 entrepreneurs, community leaders, business service providers, and students.

First Canadian Global Entrepreneurship Monitor report in ten years shows Ontario's strengths and weaknesses

Abridged from Ryerson University's Research & Innovation News & Media (December, 2014).

Innovation and entrepreneurship are flourishing in Ontario. Ryerson is working with industry and government partners to further Canadian innovation by building a pipeline of future thought leaders.

Ryerson led research on the Ontario report for the 2013 Global Entrepreneurship Monitor (GEM), which provides an annual assessment of entrepreneurial activity, aspirations, and attitudes of individuals and experts in 70 economies around the world. Researchers Charles H. Davis (Associate Dean, Faculty of Communications and Design), Howard Lin (Professor, Global Management Studies), Dave Valliere (Associate Professor, Entrepreneurship and Strategy), and Neil Wolff (Assistant Professor, Entrepreneurship and Strategy), conducted the research.

At the Launch of the Ontario Report of the 2013 Global Entrepreneurship Monitor (GEM) on November 18, Dr. Davis shared highlights from the report. A panel discussion was moderated by Ted Rogers School of Management Dean Stephen Murphy, and featured Dr. Wolff, George Cadete (Director of Commercialization, Ministry of Research and Innovation and Ministry of Economic Development, Trade and Employment), and Dr. Wendy Cukier (Vice-President, Research and Innovation).

In Ontario, nearly 12% of the adult population is involved in early-stage entrepreneurial activity, a key metric for GEM. Ontario's total early-stage entrepreneurial activity (TEA) rates are comparable to leading world economies including Singapore and the United States, and particularly outstanding for adults between the ages of 25-34 relative to other

economies.

Ontarians also have a positive attitude towards entrepreneurship. More than half of Ontario adults think that starting a business is a good career choice and abundant opportunities exist for entrepreneurship. Almost half believe they have the knowledge and skills to create a business.

On the other hand, the research also highlights where Ontario lags behind, such as the need for more education and training, and support for young people. Other areas for improvement are the conditions for commercialization and R&D transfer activities, such as provision of better programs to strengthen technology adoption by firms. Instead of too much focus on incubating and accelerating start-up companies, Dr. Cukier wants to see more attention paid to technology adoption for

small and medium enterprises (SME) to help grow their business. "We need to invest effort to understand end user needs so we can effectively take advantage of the technology."

According to Dr. Cukier, "Many characteristics associated with entrepreneurship are also associated with leadership. The core set of skills can be applied in many disciplines. Entrepreneurship should not only focus on the start-up industries, it should also be applied to government and non-profit sectors, as well as in large companies." She also believes that entrepreneurs need to understand how to balance their optimism and confidence with the self-reflection to recognize what they do not know, in order to surround themselves with the right people.

To Dr. Wolff, the value of entrepreneurial activity can also be realized through job creation. "The economic system cannot support all entrepreneurs. Society needs meaningful jobs as well," said Wolff. Stressing the need to help companies budget the "valley of death" and grow to the next level, Wolff also asserted, "Good businesses create good jobs. We also need to help business become larger, growing companies." He sees entrepreneurship more as a behavior rather than a process or training, which starts with planting the seed of entrepreneurship in the minds of

students and letting it germinate through real-world experience.

Ryerson is not only committed to fostering entrepreneurship and innovation, the University is also critically analyzing what works to promote evidence-based policy and practice. "GEM is an important contribution to our understanding of entrepreneurship processes and to benchmarking progress," said Cukier.



MANAGEMENT, ENTREPRENEURSHIP & COMPETITIVENESS CENTRES, INSTITUTES AND ZONES

- Institute for Study of Corporate Social Responsibility
- Entrepreneurship and Research Institute
- Canada-China Institute for Business and Development
- Centre for Labour Management Relations (CLMR)
- Ryerson Centre for Immigration and Settlement (RCIS)
- Institute for Innovation and Technology Management (IITM)
- Digital Media Zone (DMZ)



TEACHING & LEARNING

Ryerson researchers are exploring new forms of pedagogy, teaching tools, strategies for inclusion, and innovative approaches to increasing career success of our graduates.

Big ideas happen in Canada: Ryerson showcases innovation at Discovery

Abridged from Ryerson University's Research & Innovation News & Media (May, 2014).

Ryerson University participated in the Ontario Centres of Excellence's Discovery 2014 trade show and conference on May 12-13. With industry, academia, students, the investment community, entrepreneurs, and government under one roof, Canada's leading innovation-to-commercialization conference provided a showcase for collaborative opportunities.

As affirmed by his Excellency the Right Honourable David Johnston, Governor General of Canada, "Big ideas happen here." The Governor General spoke about developing a robust innovation ecosystem in Canada by "creating an atmosphere where ideas move very quickly... and can be put into practical use very quickly." He also asserted that universities are at the heart of innovation, playing a considerable role

in attracting and developing talent from around the world.

Ryerson has a long history of collaboration and multidisciplinary research that breeds innovation. Our 125 centres, institutes, and innovation zones bring together faculty, students, industry and government partners to determine best practices, improve processes, and develop new products, technologies, and services.

A number of Ryerson research centres, institutes, and innovation zones that were on display at Discovery 2014, including the Centre for Urban Energy, RTA Transmedia Centre, the Centre for Studies in Food security, the Diversity Institute, the Inclusive Media and Design Centre, the Ryerson Centre for Cloud and Context-Aware Computing, the Digital Media Zone,

and Ryerson Urban Water. Faculty start-ups featured include Geographic Information Science and Systems, the Interior Design Research Centre, and 7D Surgical.

Ryerson's innovative 'zone' model of education emphasizes real-world experience, providing students with opportunities to work with industry partners or create their own companies. By fostering the next generation of innovators, Ryerson continues to enable the development of game-changing ideas that will transform Ontario and Canada.

Several companies founded by Ryerson students and recent graduates were also featured at Discovery 2014, including recipients of the OCE Entrepreneurship Fellowship Program that supports projects in the areas of social entrepreneurship, energy, and neuroscience. Ryerson companies that received OCE funding include Madeleine Collective and Plug'n Drive. Other Ryerson student-founded companies featured at Discovery 2014 include Drive EV, Energy Savers, Materialyze, and Set Scouter Inc.



Building the pipeline of entrepreneurs with Summer Company program

Abridged from INNOVATION: Ryerson University Research & Innovation Newsletter (November, 2014).

Ryerson University is training Canada's next generation of entrepreneurs. In addition to its globally recognized Digital Media Zone (DMZ), named one of the world's top five incubators, Ryerson is also building the entrepreneurial pipeline as the only university to host Ontario's Summer Company Program.

The Program targets youth who are returning to school, with a particular focus on those facing barriers, and offers training, mentoring, and seed funding courtesy of the Ontario Ministry of Economic Development, Employment and Infrastructure. More than fifty youth aged 15-29 participated in the 2014 Summer Company Program, double the number from 2013. Together they created 51 companies and generated more than \$164,000 in sales over the summer.

"There is no shortage of ideas at Ryerson. Our students make the province better for everyone," said President Sheldon Levy at the Summer Company graduation.

Companies started through the program were diverse — from a theatre collective, to a vegan bakery, to a website development company. One of the most successful 2014 companies, Crimson Fish, was founded by Ryerson Film Studies student Neil Hanson and is dedicated to creating high-quality visuals and stories for emerging Canadian businesses. Another participant, Jalisa Luces-Mendes, started the company Proof. it, which created an app that allows apartment hunters to review rental properties. "It was a good experience for creating a business plan, budget, and cash flow," said Luces-Mendes.

Students worked with a diverse range of faculty and industry mentors who helped them cultivate their business and marketing skills. Dr. Alison Kemper, Assistant Professor in Entrepreneurship & Strategy, mentored four students. One of the Ryerson students under her mentorship, Parham Rokni, started Cleopatra's Accessories, a retail company that offers modern and vintage accessories sourced from

countries around the world.

Ryerson Master's candidate Matthew Tokarik started a small energy consulting firm, 2ND Lot, which was recently accepted into Ryerson's Innovation Centre for Urban Energy (iCUE). "I see entrepreneurship as a potential career choice," Tokarik said. "I made some strong relationships to move forward with. Our goal in the near future is to build an industry presence."

"Entrepreneurial skills are essential, whether you are in business, engineering, social work, photography, biology, or public administration," said Dr. Wendy Cukier, Vice-President, Research and Innovation, noting that the Summer Company participants were from a full range of disciplines. "A recent survey showed more than 50% of our students in virtually every discipline have considered starting their own businesses. We need to give them the mentoring and the support they need to succeed."



Ryerson University's new, innovative skills-training program helps Arts and Social Sciences grads obtain employment in the ICT Sector

Abridged from Ryerson University's Research & Innovation News & Media (June, 2014).

In Canada's budding knowledge economy, fast-paced technological change and expanding global communications have created a demand for talented workers who possess what the Conference Board of Canada terms "essential skills" – skills such as critical thinking, creativity, effective communication, and emotional intelligence that support employees' ability to think, collaborate, and innovate.

Social Sciences, Humanities, and Liberal Arts graduates have developed these 'job-ready' skills, but studies have shown a lack of career-specific support for these students and graduates, both in Canada and abroad. To address this shortcoming, Ryerson University's new Advanced Digital and Professional Training – Information Communication Technology (ADaPT-ICTs) internship program takes an innovative approach to preparing Business, Social Sciences and Humanities (SSH) students and recent graduates to excel in the labour market. Implemented as part of Ontario's Youth Skills Connections Program, ADaPT-ICTs is designed to improve students' employment prospects in the ICT sector by integrating technology-enabled courses with experiential learning opportunities such as paid internships.

From May 7 to 16, 2014, a cohort of 31 students and recent graduates took part in the intensive two-week 'bootcamp' hosted at the Ted Rogers School of Management, where they received training in digital literacy, numeracy, marketing, data analytics, business etiquette, management, leadership, and best practices for presentations.

"The ADaPT-ICTs program not only gives students tangible and practical skills, it also gives them the kind of experience that you can't learn in a classroom," said Dr. Wendy Cukier, Vice-President of Research and Innovation, Ryerson University. "We have watched this exceptional group of students, from various educational backgrounds, work together and learn important concepts that will carry them through their internships and well into their future careers."

Participants had the opportunity to work with industry professionals like Dr. Jaigris Hodson, a leader in digital communication, social media planning, and trend analytics; Mark Farmer, digital strategist for York University; as well as a number of Ryerson University staff and faculty including Dr. Dale Carl, Dr. Wendy Cukier, Dr. Chris Gibbs, Dr. Ken Grant,

and Dr. John Turtle. The two-week bootcamp also gave participants the opportunity to network with industry representatives from management consulting firms like Accenture, and not-for-profit organizations like San Romanoway Revitalization Association.

"The program really builds upon the more conceptual and theoretical knowledge acquired at university by giving us practical, directly-applicable job-market skills," said Mitchell Guerreiro, a fourth-year undergraduate student from Queen's University. "It poses an opportunity for anybody to make valuable educational and business connections, and build upon knowledge that they already have."

The internship component of the program, supported by over 60 industry partners, provides organizations with access to students and recent graduates in business and SSH programs. "I'm looking forward to finding internships for each participant – internships that make them excited to get up and go to work in the morning," said Connie Bannister, Project Lead. "I can't wait to see what the next group of participants brings."

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Research Partnerships helps researchers find industry and community partners, as well as potential sources of funding. For more information, contact **Mark Patterson**, Director, Research Partnerships.

Research Communications and Knowledge Mobilization helps enhance Ryerson's reputation for research and innovation through integrated outreach, events, and communications channels. For more information, contact **Amanda Gaspard**, Director of Research Communications.

Ryerson International works within the University community to strengthen Ryerson's international partnerships and expand the range of overseas experiences for students and faculty. For more information, contact **Marsha McEachrane Mikhail**, Director, Ryerson International and International Liaison Officer.

Research Planning, Finance, and Administration provides financial leadership, data analysis, and records management to manage finance and evaluation systems, advise on complex multi-stakeholder projects and grants, and develop strategies to promote research productivity. For more information, contact **Dr. Vivian Chan**, Senior Director, Research Planning, Finance and Evaluation.

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