



McMaster University Research Centres & Institutes

2022 Annual Aggregated Report

An overview of 2022

The success of McMaster's Research Centres and Institutes (RCIs) is dependent upon the people – the directors, faculty, staff and students – who work within them. I'm happy to share some of those successes with you, in the second RCI annual report. Through the 2022 reporting process, I was repeatedly reminded of the high-quality work coming out of our multidisciplinary and Faculty-based RCIs. Our RCIs have a critical role to play as we emerge from the global pandemic and build new methodologies for academic research. They bring our researchers together, often across disciplines, to create a value-added research model.

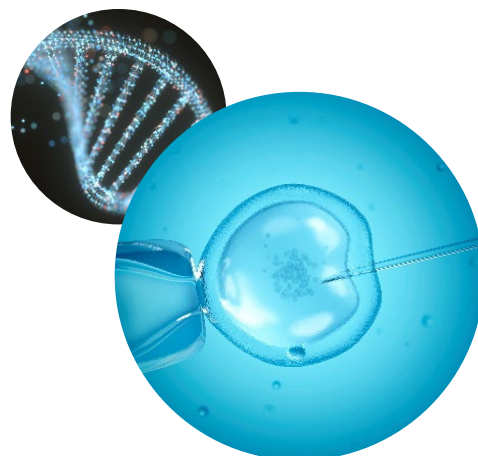
Our excellence in research is driven by the efforts of our research community – efforts that are amplified through our RCIs. These centres and institutes allow our faculty members and their research teams to focus on the most pressing and demanding problems facing society, to pool their talents and resources, and to maximize institutional impact and output. Specifically, RCIs allow us to advance our strategic research objectives; enhance research collaborations; facilitate interdisciplinary research; stimulate partnerships; expand our global reach; increase our ability to secure funding for major research initiatives; and strengthen the linkages between research and teaching.

In 2022, McMaster established three new RCIs: i) Centre for Advanced Research for Mental Health and Society with Dr. Marisa Young as Director ii) Digital Society Lab with Dr. Cliff van der Linden as Director and iii) McMaster Institute for Research on Aging - Dixon Hall with Dr. Parminder Raina as Director. In accordance with the policy Guidelines for the Governance and Review of Research Institutes, Centres and Groups, 11 external RCI reviews were completed. The reviews were overwhelmingly positive and spoke to the excellence of our centres and institutes and the incredible work of their directors. The review process and the expertise of the review board members allowed us to gain critical feedback to inform our strategic direction for RCIs going forward.

The Office of the Vice-President, Research (OVPR), continues to support the RCI Undergraduate Summer Research Program initiative, now in its third year. With the 2023 cohort, 39 undergraduate students – spread evenly across the faculties – will have received financial support to work in an RCI of their choice, often gaining their first experience in a research environment. At the request of the Deans, we held our first three knowledge sharing and engagement events, providing opportunities for the RCI leadership community to connect with and learn from one another. And, to help RCIs maximise their impact, we introduced the Research Centres and Institutes Engagement Fund to support up to 20 proposals that address the need to coordinate members around the thematic mission of an RCI.

This aggregated report speaks to both the qualitative and quantitative impact of our 67 centres and institutes during 2022 and tells an amazing story. A few highlights: more than 45 percent of McMaster's peer-reviewed journal publications and conference proceedings were enabled by our RCIs; some 360 post-doctoral fellows, 2100 graduate students, and 1800 undergraduate students advanced their research through RCIs; and nearly 1750 external collaborators reaped the benefits of working with our RCIs.

Dr. Andy Knights
Associate Vice-President, Research
Office of the Vice-President (Research)



RCIs By the Numbers

Interacting with RCIs in 2022:



Faculty¹



Postdoctoral
Fellows²



Graduate
Students³



Undergraduate
Students⁴



Other Academic
Researchers⁵

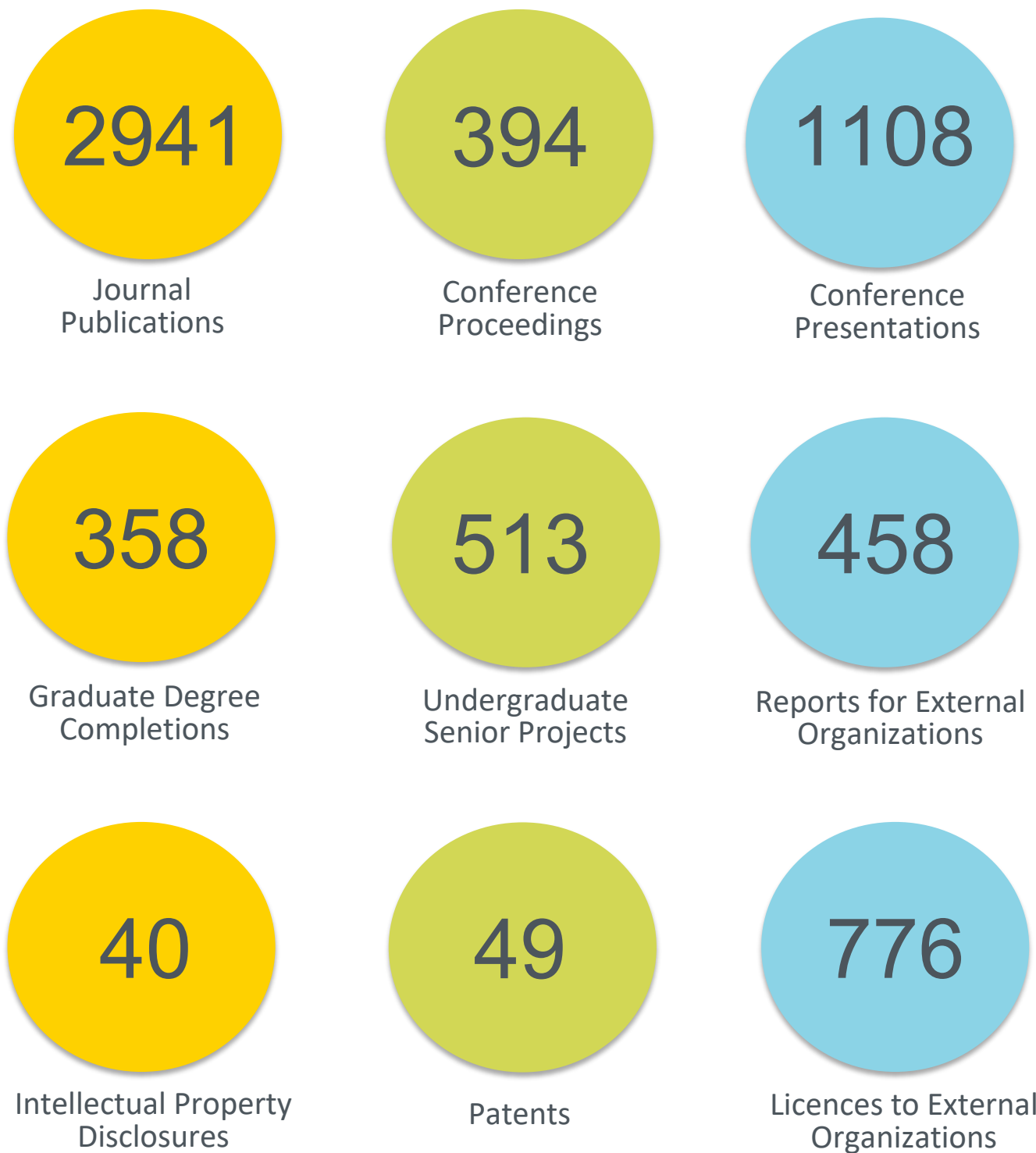


Other
Non-Academic
Researchers⁶

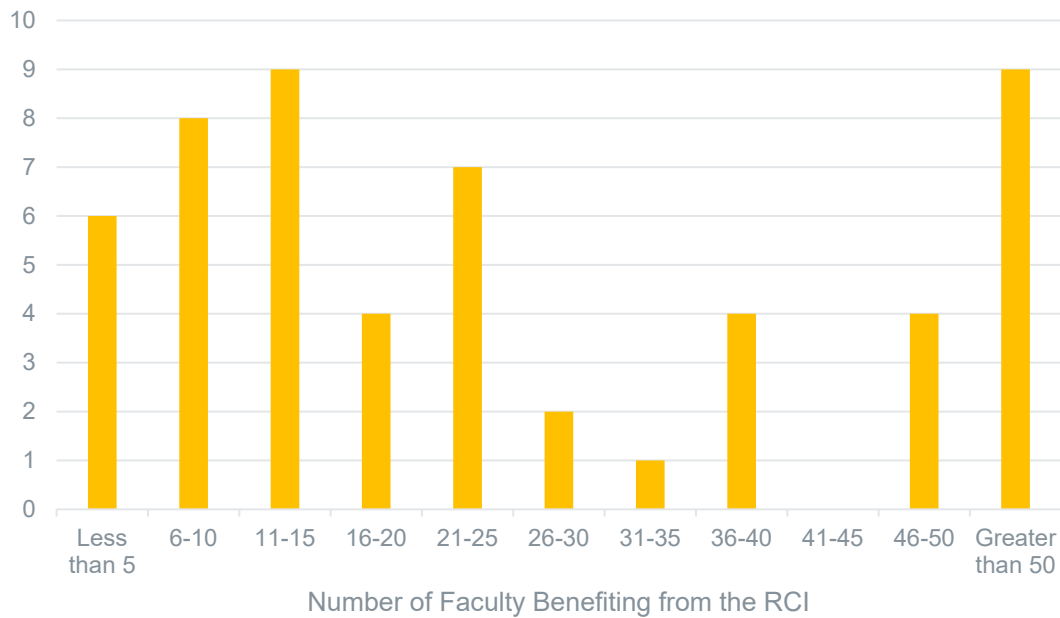
1 Total number of faculty member/RCI interactions
2 Number of PDFs supported by our RCIs
3 Number of graduate students supported by our RCIs
4 Number of undergraduates working with RCIs
5 Number of non-McMaster academic researchers interacting with our RCIs
6 Number of external collaborators such as from industry, not-for-profits, and government, supported by our RCIs

RCIs By the Numbers

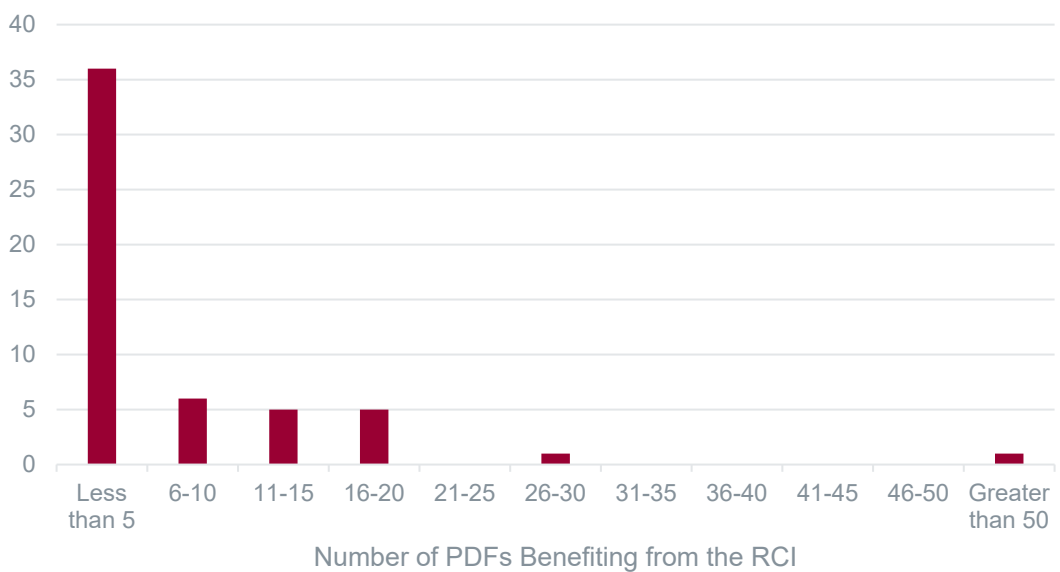
Enabled by RCIs in 2022:



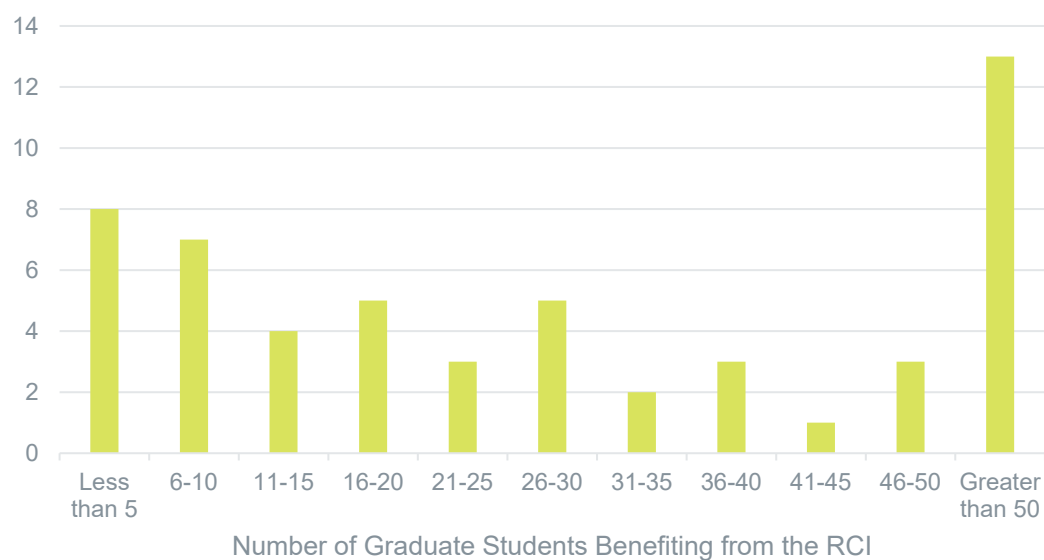
Number of RCIs versus Faculty Beneficiaries



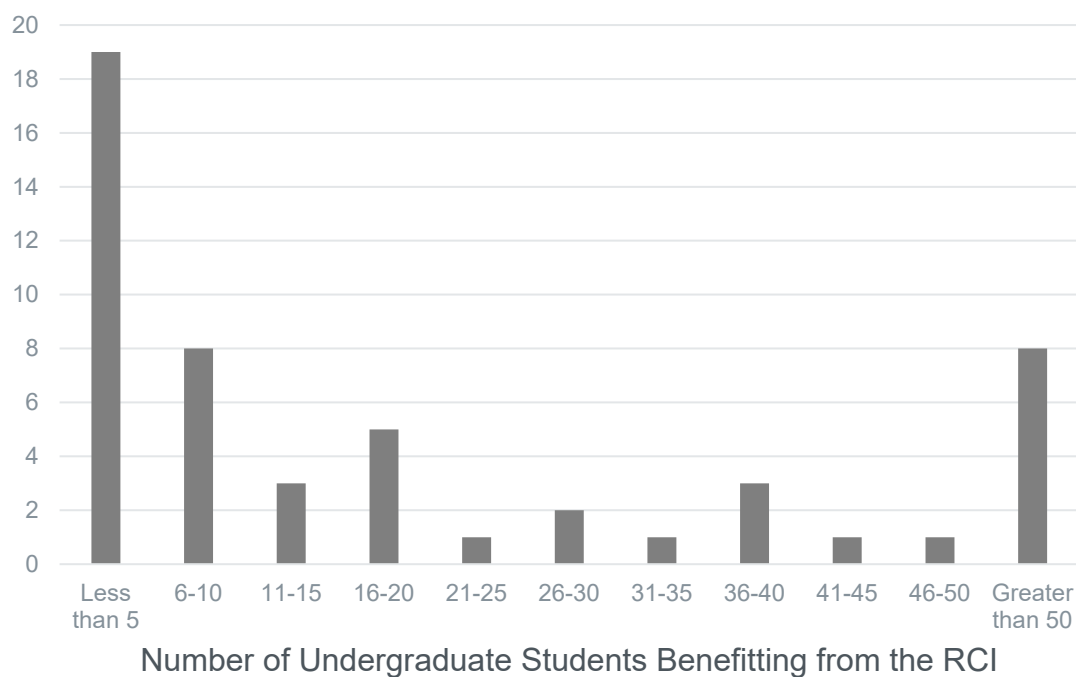
Number of RCIs versus Postdoctoral Fellow Beneficiaries



Number of RCIs versus Graduate Student Beneficiaries



Number of RCIs versus Undergraduate Student Beneficiaries



Research Impact and Influence examples

Creating education opportunities for incarcerated Canadians

The [McMaster Indigenous Research Institute's](#) (MIRI) Prison Education Project is increasing post-secondary educational opportunities for incarcerated Canadians. The Project is part of MIRI's mission to improve and promote access to research and education focused on Indigenous teachings in governance, law, philosophy, art and science.

Through the Walls to Bridges* (W2B) program, MIRI brings university courses into prison settings, enabling incarcerated and university students to learn together as peers while earning the same university course credit. Instructors and students explore diverse Indigenous perspectives, histories, governance systems and languages, while fostering a learning environment that has the power to produce rich and important results.

The Project will address the overrepresentation of Indigenous peoples in the prison system, who are consistently marginalized and forgotten, while providing students with the critical thinking skills needed to make positive changes in their own communities.

The first Walls to Bridges course at McMaster (Indigenous Studies 2IR3, Indigenous Resurgence) began in January 2023 at Grand Valley Institution, a women's prison in Kitchener. MIRI is preparing to host a second course in Fall 2023.

MIRI is currently leading several initiatives to expand the Prison Education Project. In collaboration with Wilfred Laurier University, the Institute is organizing a five-day intensive training program for future W2B course facilitators. MIRI is also contributing to the formation of a W2B National Council, has plans to host the 2024 Prison Education Conference and is currently working with the Hamilton Regional Indian Centre and Wentworth Detention Centre to expand the Project within these settings.



*University of Windsor W2B final class project South West Detention Centre, Fall 2022



Uncovering the deep connections between music and the mind

Researchers, scientists and musicians at the [McMaster Institute for Music and the Mind](#) (MIMM) are exploring the deep connection between music and the human brain. MIMM houses a unique research performance hall called the LIVElab. Featuring state-of-the-art technology – including active acoustic control and devices that measure electrical and physiological responses in the brains and bodies of musicians, dancers and audience members – the LIVElab is designed to increase neuroscientific understanding of how performers interact, how audiences are cognitively, socially and emotionally impacted by music and how music can be used in therapeutic applications.

MIMM's youth education and outreach program engages 2000 students annually. Through interactive tours of the LIVElab, students are introduced to the technology and experience first-hand how it can be used to solve real-world problems. Music production workshops provide learning opportunities for youth to utilize loops, drum pads, synthesizers, and digital effects to create their own digital music. MIMM also offers online educational resources, including their Science RendezVous webpage, which features a virtual LIVElab tour and activities related to LIVElab technology and research.

MIMM's educational programs are designed to highlight how scientific knowledge and technology can be applied in creative arts settings. The Institute has established partnerships with the Hamilton Wentworth District School Board and community organizations including An Instrument for Every Child, the YWCA, Girls in Science, and youth from Six Nations.



Advancing ethics in global and public health

Researchers at the [Institute on Ethics & Policy for Innovation](#) identify and address ethical challenges, ethics-related risks, and policy gaps that have the potential to undermine the impact of life-saving technologies and interventions in global health. A new partnership with the Kamuzu University of Health Sciences (KUHeS) in Blantyre, Malawi, Africa will allow both institutions to work together to address ethical challenges and questions associated with global and public health issues.

The partnership is part of IEPI's mission to collaborate with the global health research community, partners, funders, and other stakeholders to navigate the ethical, social, and cultural challenges that arise from scientific and technological advancement — so that, ultimately, innovative health solutions reach those who need them most.

With support from the Bill and Melinda Gates Foundation, IEPI and KUHeS will work together to develop joint educational programs and host graduate students and research fellows at both universities — advancing excellence in African research and bioethics by helping to strengthen and develop training, skills, and resources for ethics practitioners and health professionals.

In September 2022, the partners co-developed and co-delivered a two-week summer school program on global health, security, equity and governance at KUHeS' Center for Bioethics in Eastern and Southern Africa. IEPI faculty delivered 10 guest lectures and provided 10 tuition scholarships for African scholars to attend the program, and plans are currently underway to expand the program.

Leading interdisciplinary research on next-generation materials

Materials play a central role in our daily lives. From cellphones and electric vehicles to medical equipment and treatments, the next generation of innovations in health, science and technology will depend on the discovery and development of new materials.

The [Brockhouse Institute for Materials Research](#) (BIMR) is a world-leader in interdisciplinary materials research, innovation and education. In 2022, BIMR launched the Future Materials Innovators program (FMIP) — an initiative designed to support original materials research led by McMaster graduate students.

BIMR selects and funds up to three FMIP projects each year. Each research team includes students from at least two different departments who share an innovative research idea that addresses a global challenge. With access to BIMR's unique suite of research facilities and platforms, the program enables students to build critical research skills while contributing their expertise to the study of new materials with improved properties, enhanced performance, and decreased impact on our environment.

The program encourages students to lead every aspect of their research — including writing their research proposal, developing a budget and hiring and supervising an undergraduate summer researcher to help with their project. At the end of the year, the teams present their results as part of the BIMR Seminar Series. Last year, three teams were selected for the program with projects that advance solutions in biomedicine, manufacturing and the environment.



Empowering parents with interactive workshops on childhood disability

The [CanChild Centre for Childhood Disability Research](#) has developed a series of online interactive workshops to empower parents of children with developmental disabilities. ENVISAGE: ENabling VISION And Growing Expectations provides parents with information, resources and skills-building tools that have been shown to help them feel more competent, CONFIDENT and connected to fellow parents and care providers throughout their parenting journey.

The ENVISAGE program was co-designed by CanChild in partnership with researchers at the Australian Catholic University and Melbourne University with input from clinicians and parents. ENVISAGE-Families provides parents and caregivers of children with neuro-disabilities under the age of six with an introduction to modern international concepts about health, development, parenting and personal self-care, as well as strategies for sharing these ideas with family, friends, and service providers.

Sixty-five families in Canada and Australia enrolled in the ENVISAGE-Families program last year. Participants reported that the workshops improved their sense of empowerment and confidence in parenting. Thanks to the success of the program, the Australian Catholic University was awarded \$6.9M from the Australian Department of Social Services to offer ENVISAGE-Families to 1000 families across Australia over the next three years.

An Analogue program called ENVISAGE-Service Providers is currently in development. The program will be available to service providers who work with children with developmental challenges, delays and disabilities.



Increasing access to education and support for displaced students and scholars

Researchers at the [Institute on Globalization and the Human Condition](#) (IGHC) examine the impact of globalization in our lives, communities, and the environment. The IGHC plays a crucial role in promoting research and teaching on global and international issues and themes, including civil society, health, government, trade, cultural production and political activism.

In 2021, the IGHC launched a series of initiatives to sponsor and support students and scholars located in Afghanistan whose work, education and livelihood was put at risk when the Taliban regained control of the country. This project evolved into the McMaster Committee on Students and Scholars in Crisis (CSSC) – a group comprised of faculty, staff, students, alumni and community members who have been forcibly displaced from their homes. In 2022, McMaster's six Faculties and the Office of the Provost collectively pledged \$800,000 to the CSSC. The funds have helped students and scholars at risk around the world, including in Afghanistan and Ukraine.

IGHC is exploring ways to remotely employ researchers and students located in Afghanistan, including those associated with Kabul University's Master's program in Gender and Women Studies. Marufa Shinwari, a PhD student at McMaster, helped Kabul University faculty develop the curriculum for the program in 2015. Since then, Shinwari and other members of the IGHC and the CSSC have been working together to create spaces at McMaster and abroad where young learners and scholars impacted by global crises can freely think, challenge and share ideas.

Helping companies stay ahead of the manufacturing curve

Nearly every industry today faces challenges caused by our evolving technological landscape and the need

for new tools that will help them meet shifting demands. Experts at the [McMaster Manufacturing Research Institute \(MMRI\)](#) are developing ground-breaking manufacturing solutions to keep their partners ahead of the technological curve.

In 2022, MMRI partnered with Press Lock Technologies – a North American leader in clinching and self-piercing rivet devices used in the sheet metal industry. A team of experts at MMRI worked with the company to upgrade the design of one of their punch tools – a device commonly used to indent and create holes in hard surfaces, like metal. The company needed a solution that would prevent materials from sticking to the punch tool. MMRI put their cutting-edge facilities and expertise to the task.

The Institute developed new specialized coatings for the punch tool and used a unique polishing method during post-processing to combat the sticking problem. With assistance from MMRI, Press Lock Technologies was able to trial new and innovative PVD coatings for their mechanical clinching technology and introduced four new products to the marketplace in their first year of operation. Press Lock is currently exploring how the coatings can be applied more broadly, giving the company a competitive market advantage.

In December 2022, MMRI moved to McMaster Innovation Park. The 21,000-square-foot state-of-the-art facility is equipped with a private 5G network – thanks to a partnership with Canadian technology provider TERAGO – creating new research possibilities in data analysis, machine learning and remote automation that can be used to improve manufacturing processes, products and productivity. An Open House for industry and government partners is planned for May 2023.



Transforming the healthcare landscape through policy-relevant research

The [Centre for Health Economics & Policy Analysis \(CHEPA\)](#) is pioneering interdisciplinary health research to inform fair and sustainable health and social systems. Researchers are engaged in a variety of studies aimed at improving health equity, access, delivery and patient, public and community engagement.

Opinion surveys show that 86 per cent of Canadians believe palliative care should be provided at home as much as possible. With this in mind, CHEPA is conducting an economic evaluation of a program designed to train more than 6,000 paramedics in six Canadian provinces to provide at-home palliative care for Canadians who require urgent palliative services.

CHEPA is also leading research on new health care delivery systems. As healthcare systems around the globe face pressure to meet rising demands with limited resources, researchers at CHEPA are exploring the efficacy of mobile integrated healthcare (MIH) – a new model of community-based healthcare that uses community paramedics to provide needs-based on-site urgent and nonurgent care.

Researchers found that the use of MIH in the Niagara region was associated with a decrease in the proportion of patients transported to the emergency department. It also saved health care costs compared with regular ambulance responses. Their findings suggest that the MIH model is a promising and viable solution to meeting urgent health care needs in Canadian communities, while substantially improving the use of scarce health care resources.



Improving digital accessibility for older adults

For older adults, navigating an increasingly digital world can be a challenge. The [McMaster Digital Transformation Research Centre](#) (MDTRC) is leading cutting-edge multidisciplinary research to better understand the implications of digital transformation in the context of aging and accessibility.

Older adults are the fastest growing segment of the population, but the challenges they face when using technology are typically overlooked. As we age, we tend to experience a decline in vision, hearing, short-term memory and tactile movement control, which can lead to barriers in navigating websites, apps and accessing health and customer services.

Researchers from the MDTRC are examining how aging impacts older adults' technology User Experience (UX) and exploring new user interfaces that make digital

innovation more accessible. Researchers use traditional behavioural tools such as surveys, focus groups and interviews to gain insight into participants' experiences and neurophysiological tools to gain a deeper understanding of how participants interact with technology.

The Centre is currently preparing to launch a Mobile User Experience Lab (MUXL) – a one-of-a-kind facility that can go directly into communities, allowing the Centre to extend its work across Ontario and ensure that older adults and the disabled are able to participate in research related to technologies that impact their life and health. The MUXL Open House is planned for April 2023.



List of Research Centres and Institutes

Bertrand Russell Research Centre
Director: Dr. Alex Klein

Biointerfaces Institute
Director: Dr. John Brennan

Biomedical Engineering and Advanced Manufacturing
Director: New Director to be confirmed in 2023

Brockhouse Institute for Materials Research
Director: Dr. Alex Adronov

Canadian Centre for Electron Microscopy
Director: Dr. Nabil Bassim

Can-Child: Centre for Childhood Disability Research
Co-Directors: Dr. Olaf Kraus de Camargo and
Dr. Briano Di Rezze

Centre for Advanced Research for Mental Health and
Society
Director: Dr. Marisa Young

Centre for Advanced Research in Experimental and
Applied Linguistics
Director: Dr. Ivona Kucerova

Centre for Ancient Numismatics
Director: Dr. Spencer Pope

Centre for Automotive Materials and Corrosion
Director: Dr. Joey Kish

Centre for Clinical Neuroscience
Director: Dr. Benicio Frey

Centre for Community-Engaged Narrative Arts
Co-Directors: Dr. Lorraine York and Dr. Daniel Coleman

Centre for Discovery for Cancer Research
Director: Dr. Shelia Singh

Centre for Emerging Device Technologies
Director: New Director to be confirmed in 2023

Centre for Excellence in Protective Equipment and
Materials
Director: Dr. Ravi Selvanganapthy

Centre for Health Economics & Policy Analysis
Director: Dr. Jean-Eric Tarride

Centre for Human Rights and Restorative Justice
Director: Dr. Juanita De Barros

Centre for Mechatronics and Hybrid Technologies
Director: Dr. Saied Habibi

Centre for Metabolism, Obesity, and Diabetes Research
Co-Directors: Dr. Katherine Morrison and
Dr. Gregory Steinberg

Centre for Networked Media and Performance
Director: Dr. Christine Quail

Centre for Peace Studies
Director: Dr. Chandrima Chakraborty

Centre for Research in Micro- and Nano-Systems
Director: Dr. Jamal Deen

Chanchlani Research Centre
Director: Dr. Sonia Anand

David Braley Centre for Antibiotic Discovery
Director: Dr. Mathew Miller

Digital Society Lab
Director: Dr. Clifton van der Linden

Escarpment Cancer Research Institute
Director: Dr. Gregory Pond

Farncombe Family Digestive Health Research Institute
Director: Dr. Steve Collins

Gilbrea Centre for Studies in Aging
Director: Dr. Anthea Innes

Institute on Ethics and Policy for Innovation
Director: Dr. Claudia Emerson

Institute on Globalization and the Human Condition
Director: Dr. Petra Rethmann

L.R. Wilson Institute for Canadian History
Acting Director: Dr. Ken Cruickshank

Labarge Centre for Mobility in Aging
Director: Dr. Parminder Raina

Lewis and Ruth Sherman Centre for Digital Scholarship
Director: Dr. Andrea Zeffiro

MacData Institute
Director: New Director to be confirmed in 2023

McMaster Advanced Control Consortium
Director: Dr. Christopher Swartz

McMaster Centre for Climate Change
Director: Dr. Altaf Arain

McMaster Centre for Scholarship in Public Interest
Director: Dr. Henry Giroux

McMaster Centre for Software Certification
Director: Dr. Richard Paige

McMaster Centre for Transfusion Research
Co-Directors: Dr. Donnie Arnold and Dr. Issac Nazy

McMaster Digital Transformation Centre
Director: Dr. Milena Head

McMaster Immunology Research Centre
Director: Dr. Carl Richards

McMaster Indigenous Research Institute
Director: Dr. Savage Bear

McMaster Institute for Energy Studies
Director: Dr. Dave Novog

McMaster Institute for Music and the Mind
Director: Dr. Laurel Trainor

McMaster Institute for Research on Aging
Director: Dr. Parminder Raina

McMaster Institute for Research on Aging - Dixon Hall
Director: Dr. Parminder Raina

McMaster Institute for Transport and Logistics
Director: New Director to be confirmed in 2023

McMaster Institute of Health Equity
Director: Dr. Jim Dunn

McMaster Manufacturing Research Institute
Director: Dr. Stephen Veldhuis

McMaster Midwifery Research Centre
Director: Dr. Beth Murray-Davis

McMaster Physical Activity Centre of Excellence
Director: Dr. Stuart Phillips

McMaster Steel Research Centre
Director: Dr. Joe McDermid

McMaster University Centre for Buddhist Studies
Director: Dr. James Benn

McMaster University Centre for Effective Design of Structures
Director: New Director to be confirmed in 2023

Michael G. DeGroote Centre for Medicinal Cannabis Research
Director: Dr. James MacKillop

Michael G. DeGroote Cochrane Canada Centre at McMaster
Director: Dr. Holger Schunemann

Michael G. DeGroote Institute for Infectious Disease Research
Director: Dr. Mathew Miller

Michael G. DeGroote Institute for Pain Research and Care
Director: Dr. Norm Buckley

Michael G. DeGroote National Pain Centre
Director: Dr. Norm Buckley

Michael Lee-Chin and Family Institute for Strategic Business Studies
Director: Dr. Ron Balvers

Offord Centre for Child Studies
Director: Dr. Stelios Georgiades

Population Health Research Institute
Director: Dr. Salim Yusuf

Schroeder Allergy and Immunology Research Institute
Director: Dr. Susan Waserman

Spark: A Centre for Social Research Innovation
Director: Dr. Michelle Dion

Statistics Canada Research Data Centre at McMaster
Director: Dr. Michael Veall

The McMaster Origins Institute
Director: Dr. Jonathon Stone

Thrombosis and Atherosclerosis Research Institute
Director: Dr. Jeffery Weitz