TRANSFORMING OUR COMMON TOMORROW

UNIVERSITY OF WATERLOO RESEARCH STRATEGIC PLAN 2026–2030

UNIVERSITY OF WATERLOO

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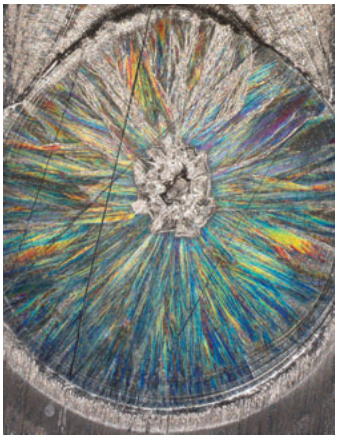


Front cover: Peacock Mountain, by Mikhail Malmyguine (Faculty of Engineering, BASc. student) with assistance from Michael Benoit (Faculty of Engineering). The image is a digital microscopy image of a laser weld produced by the laser directed energy deposition (LDED) process. This is the end of the weld which causes the enlarged circular shape. The colourful streaks are iron and titanium oxides of various thicknesses. The photo name is due to the colour and shape of the deposition that resembles a peacock tail.

At the Stratford School of Interaction Design and Business (Faculty of Arts) students learn about creativity, technology and business through research and experiential education that accelerates knowledge and fuels innovation.

About Us

Who We Are

We are a leading global research-intensive university, renowned for entrepreneurship and innovation, providing co-op and work-integrated learning at scale with impact.

Our Vision

A community of curious, collaborative, innovative, and entrepreneurial problem-solvers and leaders who seek to understand and identify equitable and sustainable solutions for the future of humanity and our planet.

Our Institutional Values

- Think Differently
- Act with Purpose
- Work Together

INTRODUCTION

The University of Waterloo's 2026–2030 Research Strategic Plan highlights the distinctive capabilities, bold approaches, and diverse research community that have propelled Waterloo as a leader in responding to the considerable challenges and opportunities of today.

The plan's development has been guided by the long-term vision of Waterloo@100. This strategic framework challenges us to continually rediscover the unconventional spirit that defined Waterloo's founding, driving impact-oriented research that reaches well beyond traditional boundaries.

Waterloo's strengths in foundational and applied research have been widely recognized through such publications as **Research Infosource**, where we are **perennially named Research University of the Year in the comprehensive category**, and **Pitchbook which consistently ranks Waterloo within the top 25 institutions globally for the count of founders with undergraduate degrees whose companies have also raised at least one round of venture capital funding**. Building on such successes, the 2026–30 plan aims to foster a better understanding of our world and beyond through the acquisition of foundational knowledge and the mobilization of our findings in profoundly impactful ways. From health and sustainability innovations to societal, economic, and technological transformation, Waterloo, in collaboration with a rich spectrum of local and global partners, is poised to offer trailblazing solutions to key questions arising from our rapidly changing global landscape. Key to our success is to deliver solutions that are not only innovative but deeply informed by multiple disciplinary perspectives, enriching the research ecosystem, and magnifying societal benefit. This is enabled through our leading-edge research infrastructure, including an array of well-supported Core Facilities accessible to the whole campus community as well as external partners.

Waterloo recognizes that diverse teams generate more creative, robust, and equitable research outcomes. We benefit from a range of voices by ensuring that our work is guided by Indigenous Knowledge Keepers and enriched by a multitude of lived experiences and perspectives. At Waterloo, our goal is to ensure that our research planning, execution, and dissemination carries local and global impact.

The first section of the 2026–30 Research Strategic Plan outlines our overall strategic goals and objectives and provides a roadmap for successful outcomes.

The second section of the plan provides an overview of our research thematic areas and includes examples of the transformative research that our vibrant and diverse research community is conducting.

As we navigate our research trajectories over the coming years, Waterloo is ready to meet both the local and global issues and opportunities that lie ahead.

We invite you to learn more about our journey and our unique research stories through this 2026–30 Research Strategic Plan.

RESEARCH STRATEGIC GOALS

Goal One

Unearth foundational knowledge as the building blocks of impactful applied and interdisciplinary research

Objectives:

- **Foster a wide range of foundational and applied research programming to address complex local and global problems**
  - Ensure that a wide range of research themes and approaches are valued on our campuses and beyond.
  - Increase and diversify research funding sources.
  - Increase research capacity across the institution to gain leadership in new and emerging research areas.
- **Support and celebrate interdisciplinary research**
  - Promote new connections through networking events and co-located research spaces on campus.
  - Provide developmental seed funding and shared professional staff supports to catalyze novel interdisciplinary initiatives.
  - Support interdisciplinary graduate research programs spanning all Faculties.
  - Create and track measures of success for interdisciplinary research initiatives.
- **Value and encourage innovative knowledge exploration and risk taking in research**
  - Recognize unconventional, high-risk approaches to research in annual performance, tenure, and promotion processes.
  - Foster and support new internal and external partnerships focused on high-risk, high-reward challenges.

“My research interrogates the ideology of expertise on Indigenous Peoples with the goal of re-centring community-based knowledge systems and de-centring colonial interpretation and authority.”

—Dr. Talena Atfield (Faculty of Arts), Canada Research Chair in Tentewatenikonhra’khánion (We Will Put Our Minds Together)

Goal Two

Grow campus, community and global connections

Waterloo values its connections with community through its various health initiatives. This includes a longstanding partnership with the KW4 Ontario Health team, and the outward-facing programs and services of the Centre for Community, Clinical and Applied Research Excellence (Faculty of Health).

Objectives:

- **Build on existing, and forge new, research partnerships (faculty, students, private and public sector, alumni) within and beyond the University**
  - Create, cultivate, and sustain new research partnerships with care and respect to ensure mutual benefit.
  - Seek input from and collaboration with community, industry, not-for-profit, and international partners.
- **Foster and enhance communication, engagement, and knowledge sharing between internal and external research partners, Indigenous rights-holders, and all underrepresented groups**
  - Support internal and external communities of practice.
  - Strengthen knowledge mobilization across and outside of campus so that our research outcomes are known to wide audiences, maximizing impact.

The School of Optometry and Vision Science (Faculty of Science) is establishing a new $53 million national centre of excellence in optometric patient care, vision research, and clinical education, funded in generous part by several prominent alumni (above: artist rendering of new facility).

In 2025, Waterloo signed a Memorandum of Understanding with Chippewas of the Thames First Nation (COTTFN). Through research supported by the University's Indigenous Futures Circle, the partnership is intended to advance shared research interests addressing social, environmental, and economic challenges faced by COTTFN and other Indigenous communities.

Shown are Chief Joe Miskokomon of Chippewas of the Thames First Nation (right), Waterloo President and Vice-Chancellor, Vivek Goel (centre), and Indigenous Knowledge Keeper, Elder Myeengun Henry (standing).

In partnership with the Caribbean Canadian Association of Waterloo Region and supported by $3 million from the Federal Black Entrepreneurship Ecosystem Fund, Dr. Trevor Charles (Faculty of Science, top left), founded LiftOff, an entrepreneurship, incubator and accelerator program designed to support Black entrepreneurs from the earliest stages of starting a business to innovating, growing, and scaling an existing business. Dr. Charles has since founded Lanterna Black Innovation Hub, a non-profit organization that is partnering with the University to advance Black innovation both on campus and in the surrounding community.

Goal Three

Inspire innovation, entrepreneurship, and experiential learning

Objectives:

- **Enhance the concept and practice of entrepreneurship in our scholarly activities**
  - Maximize the collective impact of Waterloo's innovation and commercialization hubs.
  - Enhance co-op, capstone, and commercialization opportunities for our students and faculty members.
  - Fully leverage and widely promote our unique creator-owned intellectual property policy.
- **Receive guidance from, and promote partnerships with, Indigenous Knowledge Keepers in fostering different ways of knowing**
  - Act on input and recommendations from the Indigenous Faculty Council, the Office of Indigenous Relations, and Indigenous supports throughout our Faculties and central administration.
  - Learn from Indigenous Knowledge Keepers and communities to develop relationships that promote innovation rooted in traditional ways of knowing.
- **Enrich entrepreneurial and research experiential learning opportunities**
  - Promote programs such as *Up Start* that accelerate research commercialization and create new pathways that drive entrepreneurial success through seed funding and advisory meetings with Waterloo commercialization experts.
  - Promote and update our research and entrepreneurial specializations and opportunities to maximize student and faculty participation.

Quantum-Nano Fabrication and Characterization Facility

Goal Four

Attract, nurture, empower, and recognize diverse, high-quality talent

Objectives:

- **Foster an inclusive research community through engaged and continuous learning about cultural sensitivity, safety, and ethics to ensure all research stakeholders, Indigenous rights-holders, and all underrepresented groups feel welcome and appreciated**
  - Continue and expand collaboration through cross-campus partners, such as the Research Equity Diversity and Inclusion and Indigenous Research Councils and other diversity, equity, and inclusion partners to address systemic barriers.
  - Grow ongoing development and capacity building to support equitable and inclusive research practices, including the expansion of the Building Inclusive Research Capacity program, and decolonizing research offerings.
  - Contribute as strategic advisors to research data management, research security and innovation, and partnership initiatives.
  - Re-launch Waterloo's Canada Research Chair Equity Action Plan with new transformative principles and recognized best practices.
- **Ensure campus research stakeholders can access a full spectrum of resources and supports to update their skills and build their research programs**
  - Facilitate a co-ordinated framework to develop, access, and sustain shared research infrastructure.
  - Foster communities of practice for specific research areas and associated facilities.
  - Provide research upskilling opportunities including workshops, courses, and cross-training placements.

Longhouse Labs (Faculty of Arts) is a dedicated space for Indigenous-led experiences and learning—artist's rendering of the Longhouse labs community space.

RESEARCH THEMATIC AREAS

As part of the Waterloo@100 Strategic Visioning process, five interconnected Global Futures thematic areas were developed that align with Waterloo's academic and research strengths. The goal of the five overlapping Futures "Societal, Technological, Health, Sustainable, and Economic" is to help focus and co-ordinate work across disciplinary and organizational boundaries.

Underpinning research within and across these Futures is Waterloo's continuous commitment to foundational research and scholarship. Our curiosity and commitment to excellence in foundational research and scholarship advances an understanding of ourselves, our planet and the cosmos, and enables the ongoing development of technologies, innovations, and applications we cannot even imagine today.

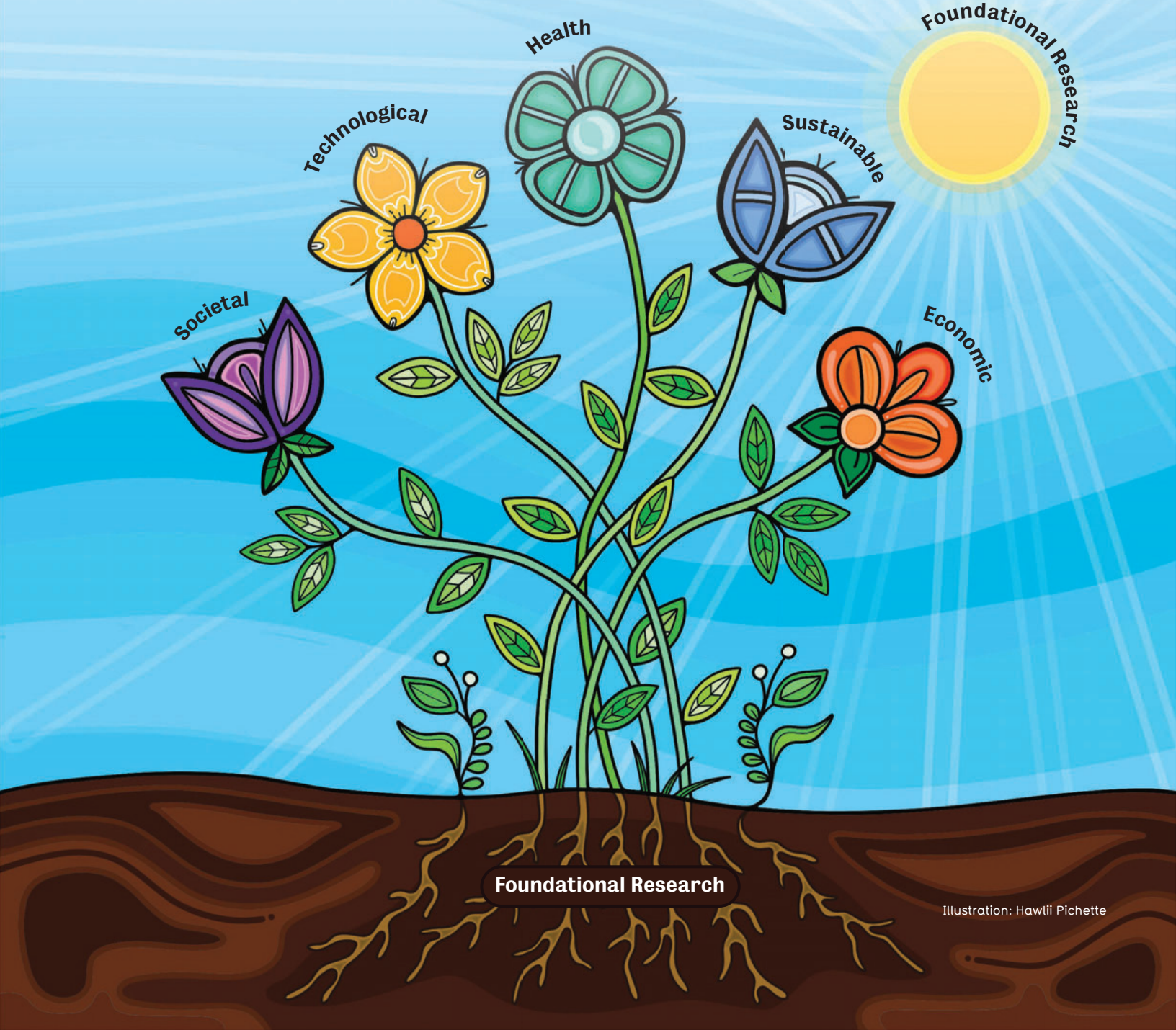
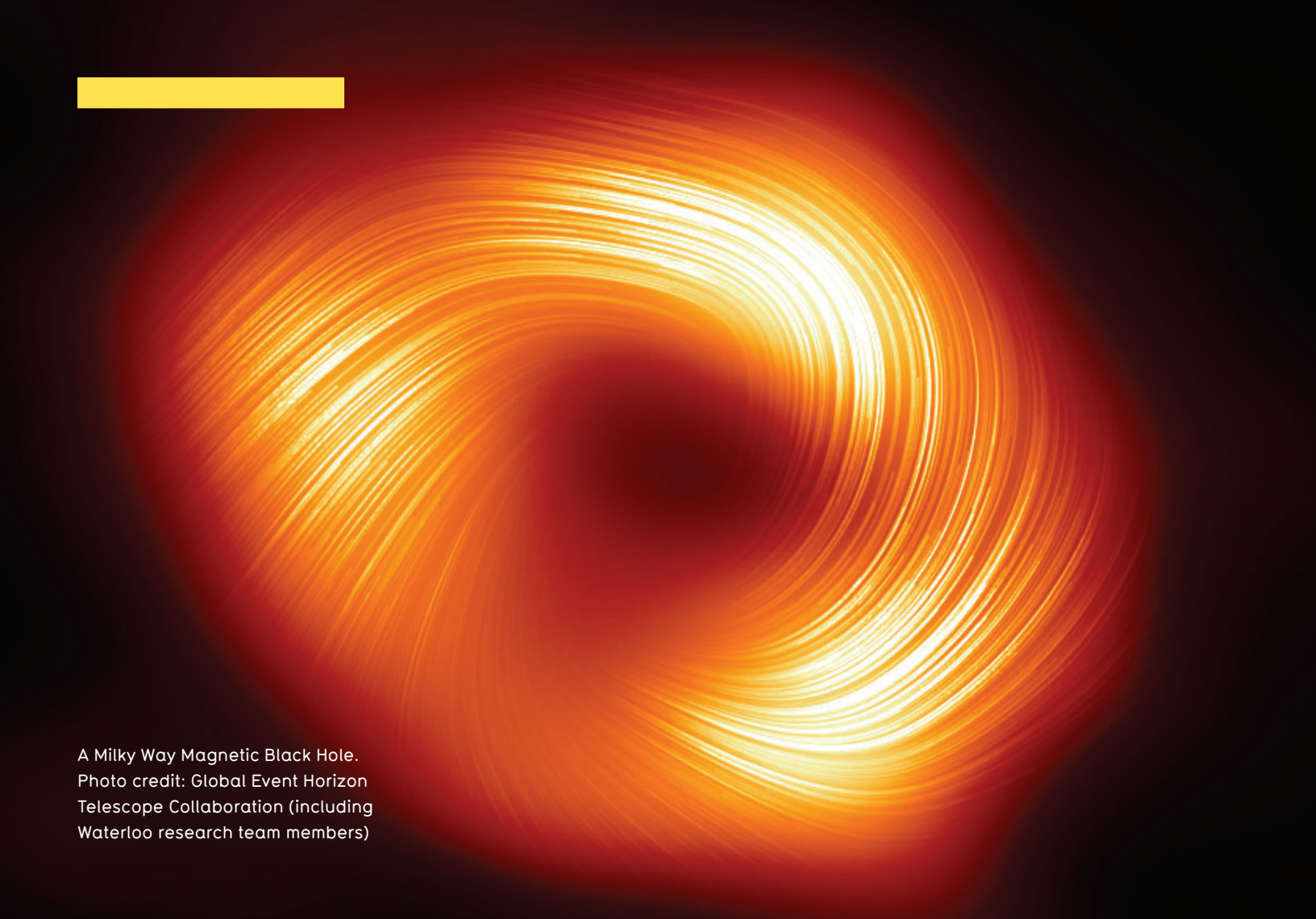


Illustration: Hawlii Pichette



A Milky Way Magnetic Black Hole. Photo credit: Global Event Horizon Telescope Collaboration (including Waterloo research team members)

Illuminating the Unknown: Foundational Research

Since its inception as one of Canada's premiere research institutions, Waterloo has led foundational investigations into how to transfer knowledge beyond the academy and how to mobilize it through paradigm-changing applications. At Waterloo, we understand that transformational research begins with foundational discovery.

Foundational knowledge fuels the growth of applied research even as it pushes the boundaries of various domains of foundational inquiry.

Foundational research at Waterloo underlines our passion to explore and illuminate the unknown. It spans topics of study such as mathematics, astronomy, astrophysics, quantum theory and theoretical computer science, molecular and evolutionary biology, epistemology, philosophy, and linguistics, among others.

Intrinsic to foundational knowledge are Indigenous ways of knowing which emphasize interconnectedness, reciprocity, and a deep respect for the natural world. Strong foundational knowledge and research underscores our commitment to curiosity-based investigations, knowledge transfer, and innovation.

From left to right. Craig Norris (CBC, Kitchener—Waterloo Moderator), Dr. Ashley Mehlenbacher, Dr. Mary Wells, and Dr. Donna Strickland at the TRUsT kick off event.

Promoting Fundamental Trust in Science and Technology

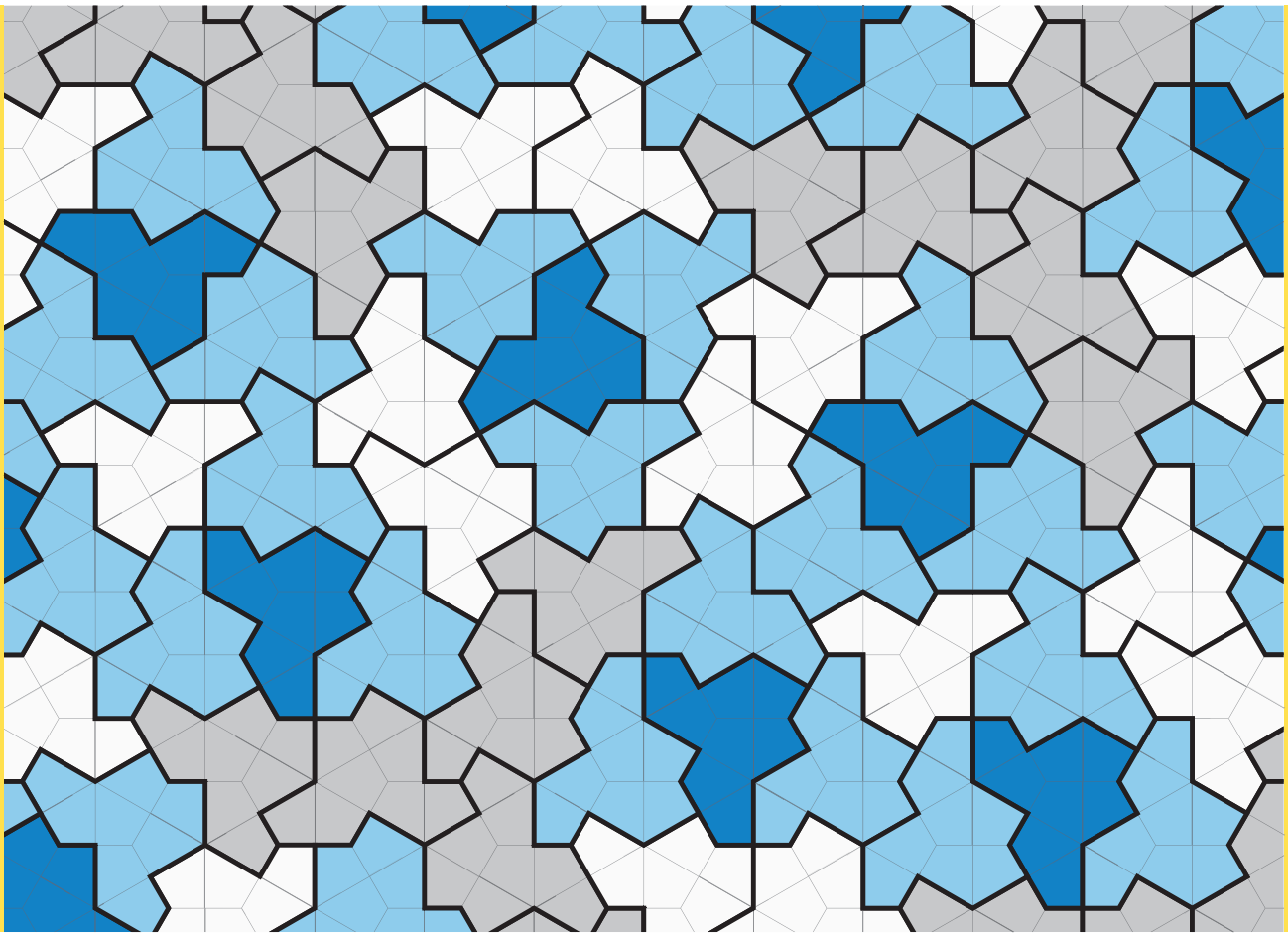
Together Nobel Laureate Dr. Donna Strickland (Faculty of Science), Dr. Mary Wells (Dean, Faculty of Engineering), and Dr. Ashley Rose Mehlenbacher (Faculty of Arts), Canada Research Chair in Science, Health and Technology Communication, launched the Trust in Research Undertaken in Science and Technology (TRuST) network, which explores the concept of fundamental public trust in health, technological, and other scientific research that affects and benefits our everyday lives. In 2025, Dr. Lai-Tze Fan (Faculty of Arts) joined as a Co-Director.

TRuST
Trust in Research Undertaken in Science and Technology

Dr. Lucía Martín-Merchán

Disproving a Long-standing Math Conjecture

Dr. Lucía Martín-Merchán (Faculty of Mathematics, Postdoctoral researcher) has disproved a conjecture that mathematicians have been investigating for almost thirty years. In her article, "Compact holonomy G2 manifolds need not be formal," published in arXiv:2409.04362. Martín-Merchán makes an important intervention at the intersection of the pure mathematics fields of differential geometry and algebraic topology.



The “einstein” tile

Finding the Einstein Tile

Dr. Craig Kaplan (Faculty of Mathematics) is a member of a collaborative team that uses mathematical ideas to create tools and algorithms that generate ornamental patterns and that empower artists and designers. The team solved a 60 year old mathematical problem seeking a shape that can tessellate space in a nonperiodic way by discovering a 13-sided shape—the “einstein” tile—that is able to fill the infinite plane without overlaps or gaps in a pattern that never repeats in a regular fashion. Ein Stein means “one stone” in German.

Dr. Travis Craddock

Uncovering the Mysteries of the Brain

In his lab, Dr. Travis Craddock (Faculty of Science), Canada Research Chair in Quantum Neurobiology is shedding light on how neuroinflammation affects the neuronal microtubule cytoskeleton to help Canadians suffering from diseases, such as Alzheimer’s and Parkinson’s.

Amy Nahwegahbow in Waterloo's Indigenous Gathering Space.

Rooted in Community Values, Culture and Relational Accountability

Vanier Scholar and member of Whitefish River First Nation (Robinson Huron Treaty area), Amy Nahwegahbow, along with PhD supervisor Dr. Brian Laird (Faculty of Health), practices foundational community-based research grounded in community values, culture, and relational accountability with First Nations, advancing community-led environmental monitoring and contaminant exposure assessment to support self-determined approaches to environmental health.

Dr. Merrin Macrae, together with members of the Biogeochemistry Lab.

Understanding Complex Ecological Processes

Dr. Merrin Macrae's (Faculty of Environment) research within the Biogeochemistry Lab focuses on hydrobiogeochemistry, or fundamental linkages between hydrology and biogeochemistry, and the distribution and movement of water, nutrients and soil in natural and impacted ecosystems.

Societal Futures

Demographic transformations, increased migration, digitization and automation, shifting geopolitical relations, and declining trust in democratic institutions are among the forces transforming society. While there is a deeper understanding of the global legacies of colonialism and social injustices, our social echo chambers can contribute to polarization and disinformation, stifling constructive dialogue across different points of view and lived experience.

Across the spectrum of our research activities, we are investigating the impacts on society and generating practical solutions that help societies adapt to rapid change and build inclusive communities where everyone can flourish.

Photo caption: Chris Hughes, Aerial View, City of Waterloo. The Future Cities Institute (Faculty of Environment) founded in collaboration with funding from industry partner CAIVAN Communities brings together a global network of interdisciplinary researchers from a variety of fields, industry leaders, practitioners, students and community members to develop new tools and approaches for building healthy and prosperous cities.

Sub-themes:

- Anthropogenic effects on natural systems
- Future cities
- Creative expression
- Cultural reconciliation, regeneration, preservation, and revitalization
- Developmental, cognitive, clinical, and educational psychology
- Governance, policy, and communications
- Human-Computer interaction
- Recreation and work-life balance
- Responsible and ethical ownership and use of data and technology
- Self-determination, sovereignty, and security
- Social determinants of health
- Thriving, resilient, and inclusive communities

School of Architecture students build a Tiny Home prototype in a studio class.

Building Inclusive Communities

The Tiny Homes project was launched to address housing insecurity in the Region of Waterloo.

This initiative is the result of a partnership between the Schools of Architecture (Faculty of Engineering) and Planning (Faculty of Environment), and the City of Cambridge. It explores how thoughtfully designed tiny homes can help by offering a fast, flexible, cost-effective and dignified emergency housing solution.

Dr. Sara Hart

Advancing Research in Precision Education

Dr. Sara Hart (Faculty of Arts), Canada Excellence in Research Chair in Developmental Science leads a research team harnessing advancements in genomics and comprehensive data on children's development to innovate new approaches to precision education.

ALCHEMY

Partnering for Defence Applications

Alchemy is a company that exemplifies how a Waterloo incubated startup can expand into a globally successful business with societal applications across fields such as the automotive and defence industries. Alchemy was co-founded by Khanjan Desai (Faculty of Engineering, BASc.'13) and Chong Shen (Faculty of Engineering, BASc.'13) and develops practical applications using nanotechnology. Their most recent defense solution, powered by their "Crypsis Class" nanocomposite coating, is designed to conceal uniforms to avoid detection in various operational environments. The company was awarded a $1M contract from the Canadian Department of National Defence IDEaS thermal infrared signature management funding program to further advance the technology, specifically for textile integration. The company has also been selected to participate in the NATO DIANA's Operating in Extreme Environments training program in Latvia at the UniLab Defence accelerator to field test "Crypsis."

Dr. Laura Mae Lindo

Building Black Studies Through Community

Former MPP for Kitchener Centre/ critic for Colleges and Universities and Anti-Racism and Equity, Dr. Laura Mae Lindo, now a Philosophy professor in the Faculty of Arts, was recently appointed as the new Director of Black Studies.

Travelogue tapestry created by Ellen Siebel-Achenbach (Faculty of Arts) as part of a travel course to England with Dr. Joan Coutu and Tara Cooper (Faculty of Arts) on the theme of castles. Each day of the trip is illustrated through embroidery as part of Ellen's broader research into intangible crafting heritage, historical reconstructions, and object recreation.

Preserving Culture

Undergraduate students in Germanic/Slavic Studies, Culture and Language Studies, Visual Culture, Spanish and Latin American Studies, Music, Religious Studies and Classical Studies present research at the annual University of Waterloo Culture Fest co-organized by Conrad Grebel University College.

A watermark on a photo is a way to tell if it has been generated by AI (left in green). The Unmarker tool is able to remove watermarks (right) on AI generated content.

Promoting Ethics in Technology

Andre Kassis, a PhD candidate in Computer Science, and his supervisor, Dr. Urs Hengartner (Faculty of Mathematics), created the "UnMarker" tool that can remove any artificial intelligence (AI) image watermark. Their research highlights the need for more robust ways of identifying AI generated deepfakes to keep pace with the rapid trajectory of AI technology.

Dr. Mark Ferro and Emma Littler

Investigating Youth Mental Health

Dr. Mark Ferro (Faculty of Health), Canada Research Chair in Youth Mental Health, and his student, Emma Littler (Faculty of Health, PhD candidate) provide insights into children's stress levels by using hair cortisol as a tracking biomarker to show potential symptoms of depression, anxiety, or other mental health concerns over-time.

Technological Futures

Waterloo's Faculty members solve problems through robotics, autonomous systems, and human-computer interaction research. This spans fundamental design and development to commercial applications including, robots that build cars, explore space, deliver coffee, defuse land mines, and perform surgery.

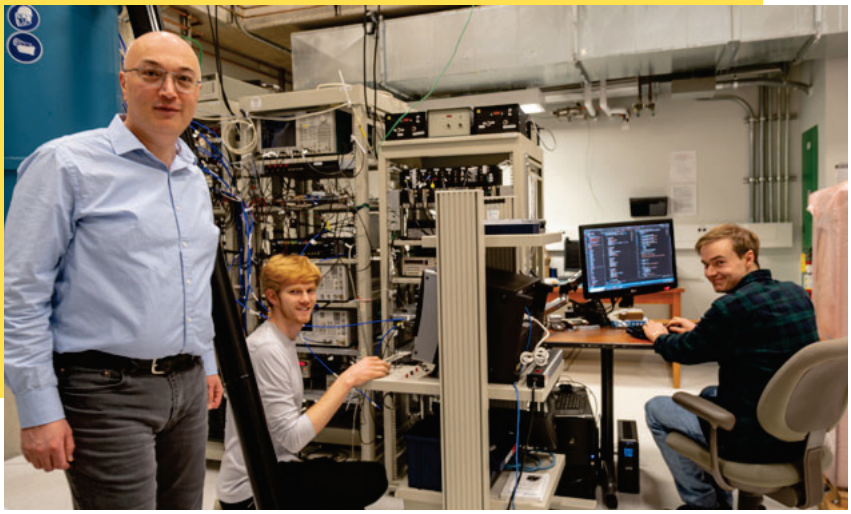
Technology continues to accelerate at an exponential pace, bringing both benefits and new challenges. Emerging technologies are often adopted before the full impact on culture and human behaviour is understood.

We have seen that big data can be harnessed to help governments and organizations make informed decisions and address equity and equality concerns. However, this has also led to a loss of privacy and the inequitable distribution of wealth. Cybersecurity and gaps in data literacy are ongoing risks. The world is now demanding that innovators develop technology with greater responsibility and accountability.

As Waterloo continues to lead in technology and innovation in critical areas, such as Artificial Intelligence, we have an opportunity to shape technology to serve society, rather than letting technology shape us.

Sub-themes:

- Artificial Intelligence tools
- Aerospace, aviation, and defence sector applications
- Autonomous systems
- Biotechnology
- Cybersecurity and threat detection
- Data science
- Digital infrastructure
- Multi-scale and advanced manufacturing and construction
- Nanomaterials
- Process systems engineering
- Quantum technologies
- Robotics
- Sensor technologies and applications



Dr. Adrian Lupascu (Faculty of Science), Institute for Quantum Computing leads the Superconducting Quantum Devices Group Lab., with IQC graduate students like Noah Janzen (PhD student, left) and Sean Dougherty (MASc. student, right). Photo: IQC

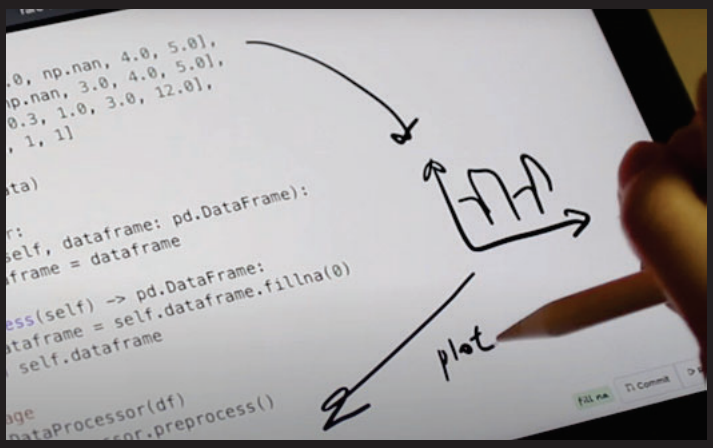
Developing Superconducting Quantum Devices

The University of Waterloo is an anchor of the quantum ecosystem in Canada through research commercialization, and training. The Superconducting Quantum Devices (SQD) group explores the rich physics and applications of devices based on superconducting materials operated at ultra-low temperatures.

Dr. Slim Boumaiza (left) and Dr. Hassan Sarbishaei (PhD'14)

Improving Digital Infrastructure

In his Emerging Radios Systems Group Laboratory, Dr. Slim Boumaiza (Faculty of Engineering) conducts multidisciplinary research across the semiconductor device, circuit, and system levels of radio hardware, targeting the realization of next Generation technologies.



Innovating Software

Code Shaping, developed by Computer Science graduate student Ryan Yen and his advisors, Dr. Jian Zhao and Dr. Daniel Vogel (Faculty of Mathematics), leverages AI to create a new way to edit code by drawing on and around it.

Text and diagram instructions being used to change software code.

Dr. Ehsan Toyserkani and Dr. Mihaela Vlasea (bottom right) at the Multi-Scale Additive Manufacturing Lab grand opening in Kitchener.

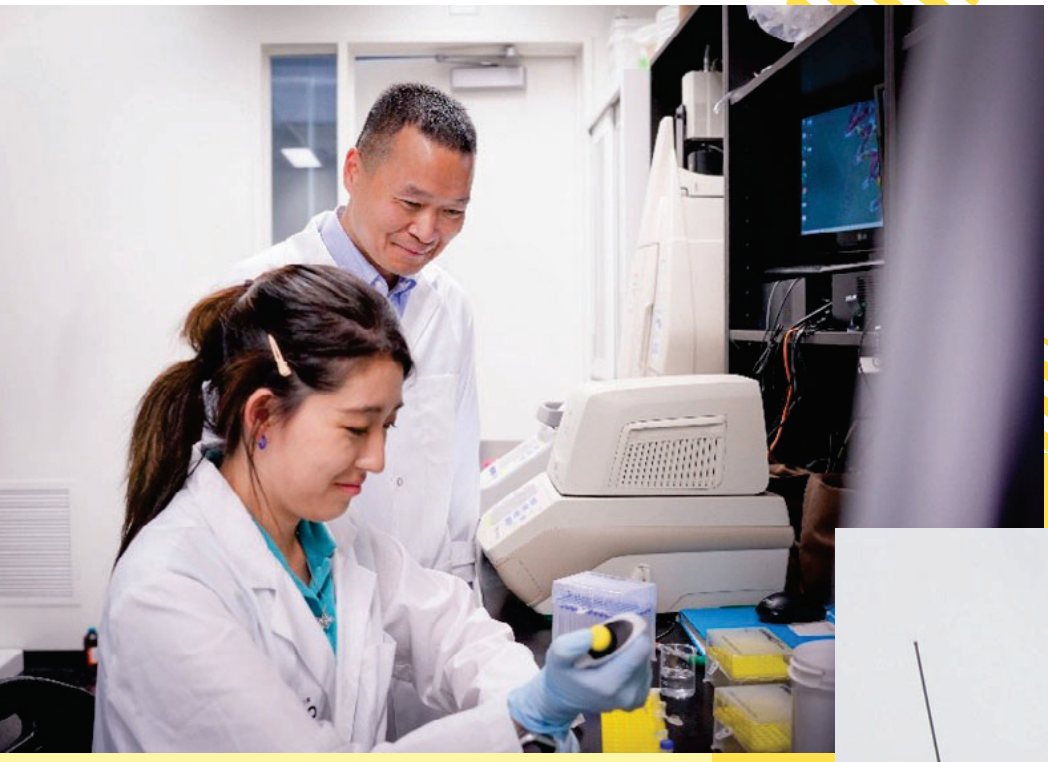
Creating New Materials

Directors Dr. Ehsan Toyserkani (Faculty of Engineering), Canada Research Chair in Intelligent Additive Manufacturing and Dr. Mihaela Vlasea (Faculty of Engineering), Canada Research Chair in Sustainable Additive Manufacturing run the Multi-Scale Additive Manufacturing Lab where students, researchers, and industry partners create a new vision for sustainable manufacturing through innovative interdisciplinary collaboration.

Dr. David Del Rey Fernández

Pioneering the Future of Aerospace AI

Dr. David Del Rey Fernández (Faculty of Mathematics), Pratt & Whitney Canada's Industry-Sponsored Research Chair in Industrial Artificial Intelligence develops machine learning-driven simulation techniques that will revolutionize the way we design, test, and optimize gas turbine engines.



Dr. Juewen Liu (standing) and student Xuewen Guo (BASc.'25, seated)

Measuring Biological and Chemical Reactions

In his Bionanotechnology and Interfaces Laboratory, Dr. Juewen Liu (Faculty of Science), Canada Research Chair in Biosensors and Bionanotechnology researches how DNA molecules act as biosensors to help detect heavy metals in water and how they can be also used for targeted drug delivery.

Dr. Claude Duguay and his team near Churchill, Manitoba, deploying and operating radar systems to advance remote-sensing research on snow.

Developing and Using Sensors

Dr. Claude Duguay's (Faculty of Environment), Founding Director of the Interdisciplinary Centre on Climate Change research involves remote sensing and modeling of northern lakes and permafrost lake-atmosphere interactions.

Health Futures

Many physical and social determinants of health contribute to our well-being, yet too many individuals and communities do not achieve the best possible health status. Those that are sick or injured navigate complex health systems that are unsustainable, under pressure from escalating costs, and facing shortages of health professionals and an aging population.

Waterloo is taking a unique leadership position in this space by focusing on our strengths at the intersections of health, society, technology and entrepreneurship and engaging partners to co-create solutions that advance population health and support the development of more sustainable community-based health systems.

Photo caption: John Hanna (BASc.'22, on patient table demonstrating CODI). Cobionix, a pioneer in autonomous medical robotics co-founded by Waterloo graduates, Nima Zamani (BASc.'14, MASc.'18), Dr. Tim Lasswell (BASc.'14, MASc.'17) and John Van Leeuwen (BASc.'81) with support from Waterloo's start-up incubator—Velocity—uses its medical robot, CODI, to perform tele-assisted ultrasound procedures.

Sub-themes:

- Biomathematics and biostatistics
- Community-driven health
- Digital health
- Drug discovery
- Molecular and physiological determinants of health
- Healthy development and aging
- Health care practice and systems
- Medical imaging, sensing and diagnostic technologies
- Nutrition and food security
- Personalized and precision biomedical technologies
- Preventative health and mobility

Dr. Nancy Waite at the 2024 Ontario Pharmacy Evidence Network Summit.

Driving Community Health

Dr. Nancy Waite (Faculty of Science) is part of the Pharmacy Innovation in Immunization Research Collaborative where she helps advance the roles that pharmacists, pharmacy technicians, government and industry play in immunization efforts, improving patient understanding of vaccines, and increasing vaccine uptake.

Waterloo's health researchers are continually innovating to provide a wide variety of outreach and more equitable access to health products and services for local and global communities.

Dr. Plinio Morita (bottom left) with members of his Ubiquitous Health Technology Lab.

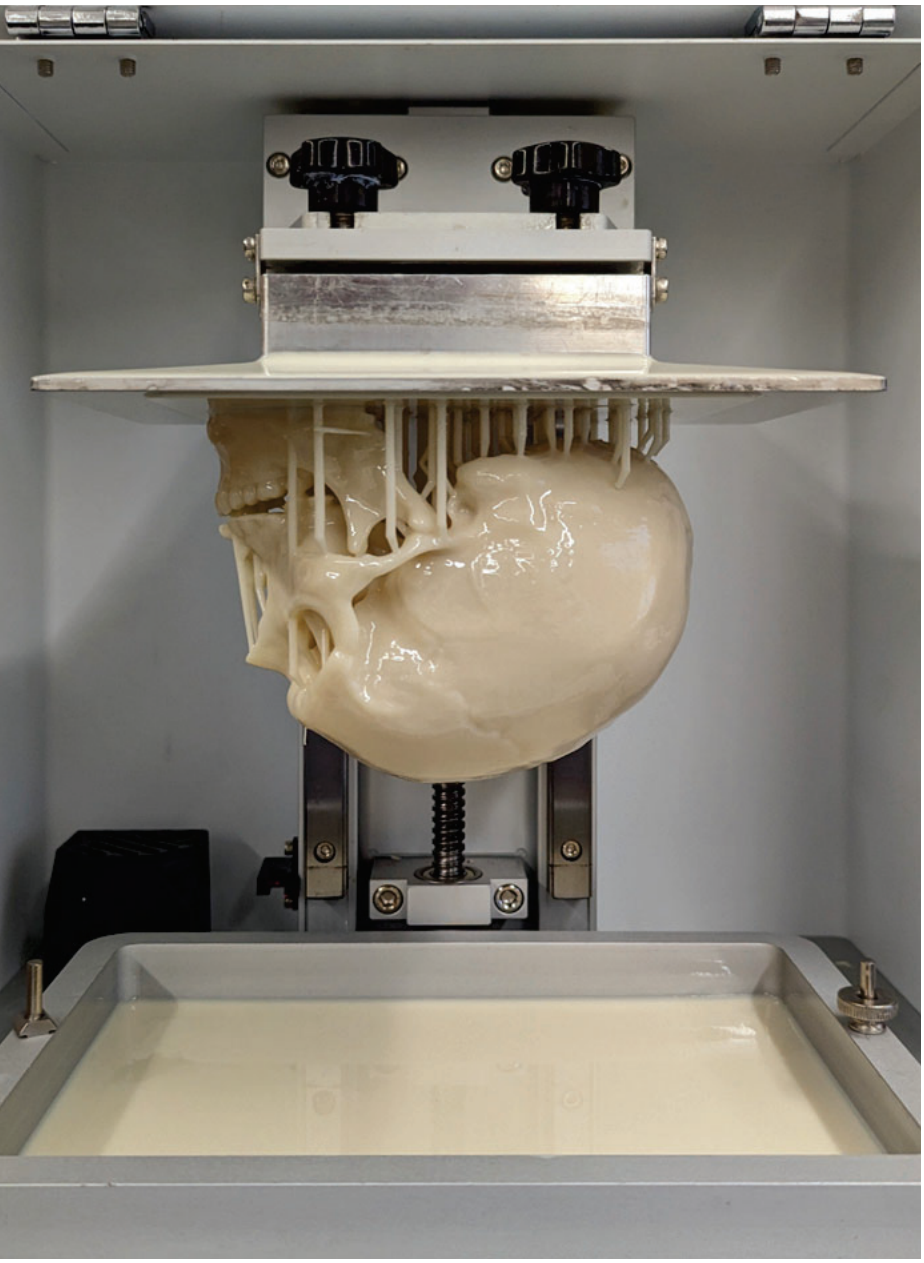
Using Technology to Strengthen Health Systems

Dr. Plinio Morita (Faculty of Health) drives health technology innovation in his Ubiquitous Health Technology lab by applying AI, machine learning, and data engineering to strengthen public health, health systems, and help curb the impact of climate change on human health, in Canada and around the world.

Exploring Vision Health

Dr. Lisa Christian (Faculty of Science) drives scientific inquiry for binocular vision and pediatric optometry and Dr. Ben Thompson (Faculty of Science) leads research that advances neurorehabilitation for vision loss.

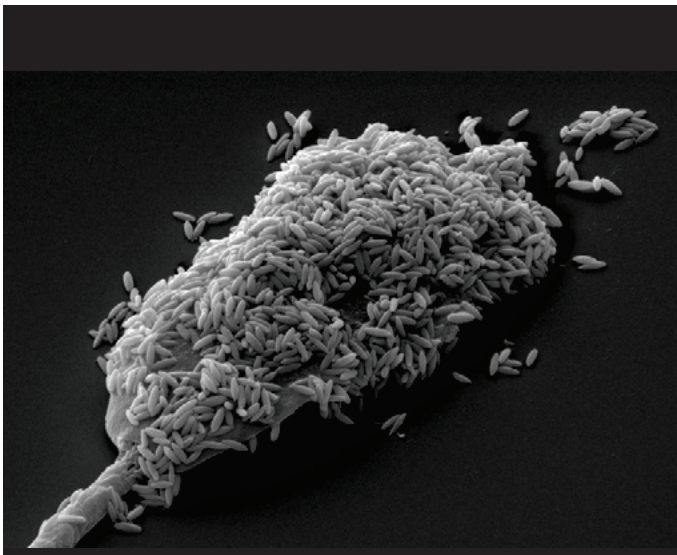
Dr. Lisa Christian and Dr. Ben Thompson



An anatomically accurate model of a human skull 3D printed using innovative biomaterials developed in the Composite Biomaterial Systems Lab.

Moving Biomedical Research Forward

In the Composite Biomaterial Systems Lab, Dr. Thomas Willett (Faculty of Engineering) and his team of trainees and collaborators investigate the materials science of bone tissue and develop innovative 3D printable biomaterials for bone reconstruction towards the goals of improving bone health and repair.



A scanning electron image of IRONSperm

Using Microbots for Drug Delivery

Dr. Veronika Magdanz (Faculty of Engineering) develops microrobots that can be controlled magnetically for various medical applications. Biohybrid microrobots consisting of magnetic nanoparticles attached to sperm cells are actuated by external magnetic fields, and localized by ultrasound or fluoroscopy to guide targeted drug delivery in the reproductive tract.

From left to right: Dr. Mary Thompson, Dr. Geoffrey Fong and Dr. David Hammond

Fighting Tobacco Use with Interdisciplinary Research

The International Tobacco Control (ITC) Policy Evaluation Project—led by Dr. Mary Thompson (Faculty of Mathematics), Dr. Geoffrey Fong (Faculty of Arts), and Dr. David Hammond (Faculty of Health), and a team of 150 researchers across 31 countries—has shown that graphic warnings, smoke-free laws, higher taxes, and other policies of the global tobacco control treaty are effective. ITC evidence has advanced global progress to significantly reduce tobacco use.

itc
International Tobacco Control Policy Evaluation Project

Dr. Lora Giangregorio in the Bone Health and Exercise Science Laboratory.

Informing Healthcare Practice

Dr. Lora Giangregorio (Faculty of Health), Canada Research Chair in Bone Health and Exercise Science conducts research in her Bone Health and Exercise Science Laboratory where she collaborates with members of Osteoporosis Canada and the Schlegel-University of Waterloo Research Institute for Aging to increase physical activity participation and prevent fractures in at-risk-people.

Dr. Christine Dow on Nansen Ice Shelf, East Antarctica

Sustainable Futures

The sustainability of our quality of life is intricately connected to our social, economic, and environmental well-being. While the global climate emergency is one of the greatest threats to our collective future, we are also challenged in preserving biodiversity, ensuring clean water for all and producing enough food for a growing planet.

Waterloo is already a leader in sustainability research and education. We will build on this strength by mobilizing interdisciplinary teams to generate practical and transformative approaches to sustainability, thereby shaping pathways toward a just, low-carbon, and prosperous future.

Dr. Christine Dow (Faculty of Environment), Canada Research Chair in Glacier Hydrology and Ice Dynamics uses state-of-the-art numerical models and the Digital Research Alliance of Canada supercomputers to examine the role that water plays in ice sheet flow speed and its impact on sea level rise.

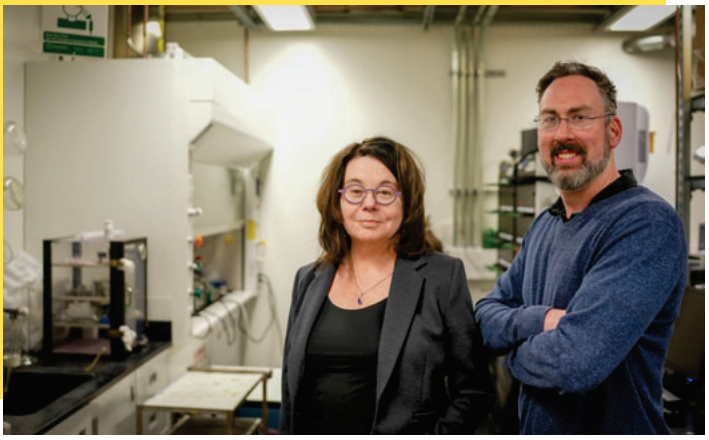
Sub-themes:

- Biodiversity conservation
- Circular design, manufacturing, and implementation
- Climate systems
- Data studies for applied environmental science
- Earth observation
- Food production and quality
- Northern environments
- Renewable energy sources and storage technologies
- Sustainable computing
- Sustainable transportation
- Water science and technologies

Pipistrel Velis Electro, the world's first certified electric aircraft, at the Region of Waterloo International Airport (YKF).

Certifying Electric Planes

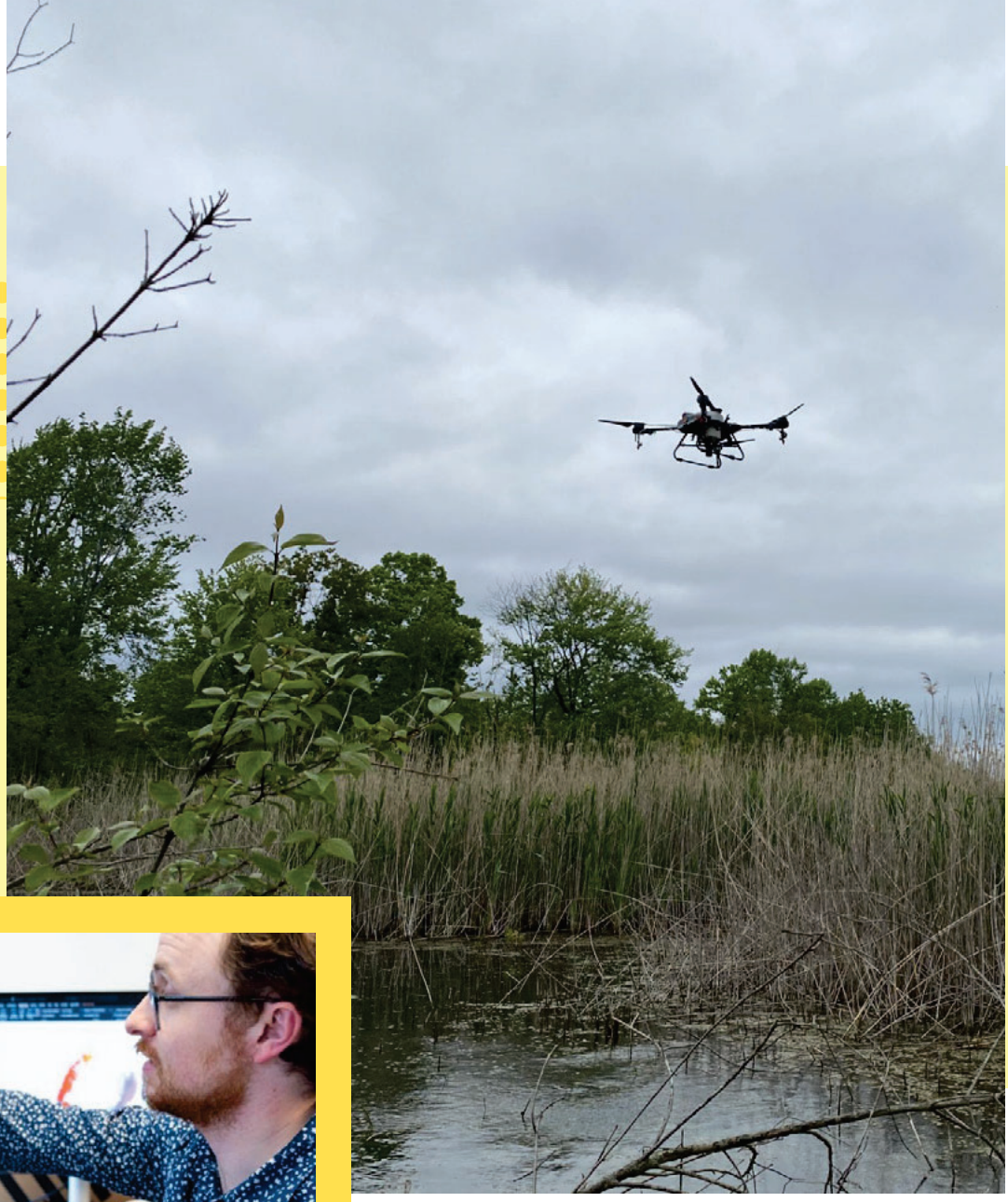
Dr. Suzanne Kearns (Faculties of Science and Environment), Founding Director, Waterloo Institute for Sustainable Aeronautics and Dr. Mehrdad Pirnia (Faculty of Engineering) work through Waterloo's Institute for Sustainable Aeronautics on electric plane battery optimization and airport energy infrastructure planning, using mathematical modelling, machine learning, and novel energy systems to ensure that electric planes flying in Canada can handle Canadian-specific conditions.

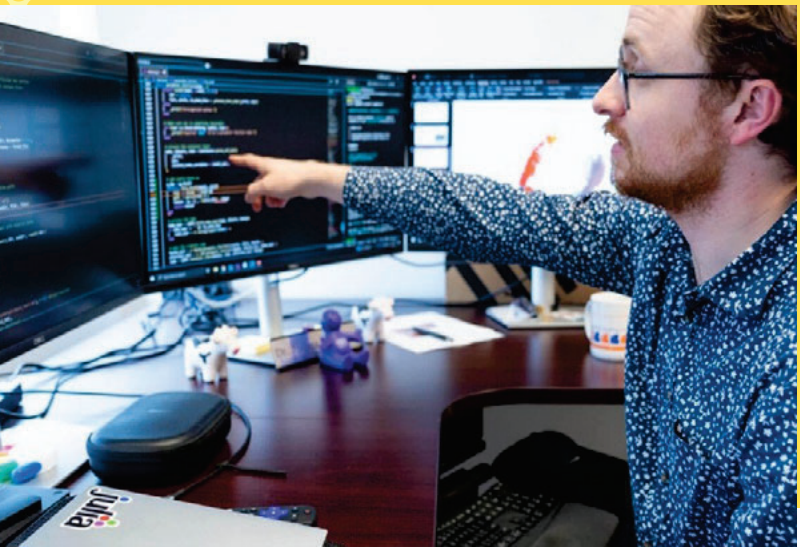


Dr. Linda Nazar and Dr. Michael Pope

Making Breakthroughs in Battery Research

Dr. Linda Nazar (Faculty of Science), Canada Research Chair in Solid State Energy Materials and Dr. Michael Pope (Faculty of Engineering) lead the Ontario Battery and Electrochemistry Research Centre (OBEC) to develop next generation battery technologies.





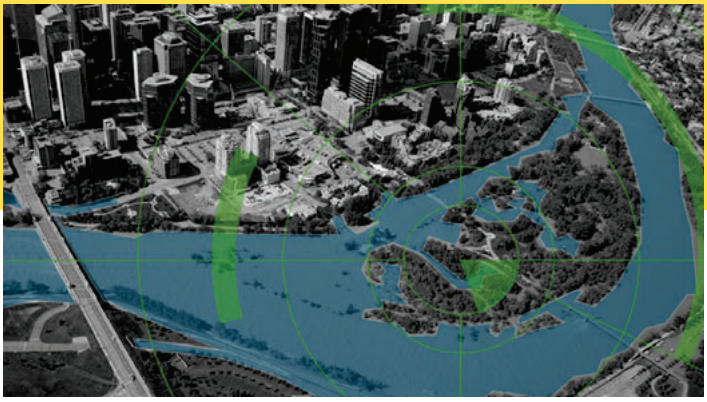
Dr. Joshua Pulsipher (Faculty of Engineering) uses machine learning and advanced decision-making tools to guide efforts in preventing, controlling, combating, and evacuating due to wildfires.

Dr. Rebecca Rooney (Faculty of Science) supervises graduate research such as that for Grace Lew-Kowal's award winning Masters thesis which demonstrates a single, targeted herbicide application from a remotely piloted aircraft system (i.e. a drone) is effective in suppressing invasive Common Reed. This research won the 2025 Outstanding Paper Award by the Journal of Invasive Plant Science and Management.

Utilizing Technology for Biodiversity Conservation and Prediction

Waterloo uses its specialized technology excellence to engage in critical research that ensures the long-term health of our natural world.

Faculty of Environment EV3,
LEED Platinum Certified Building



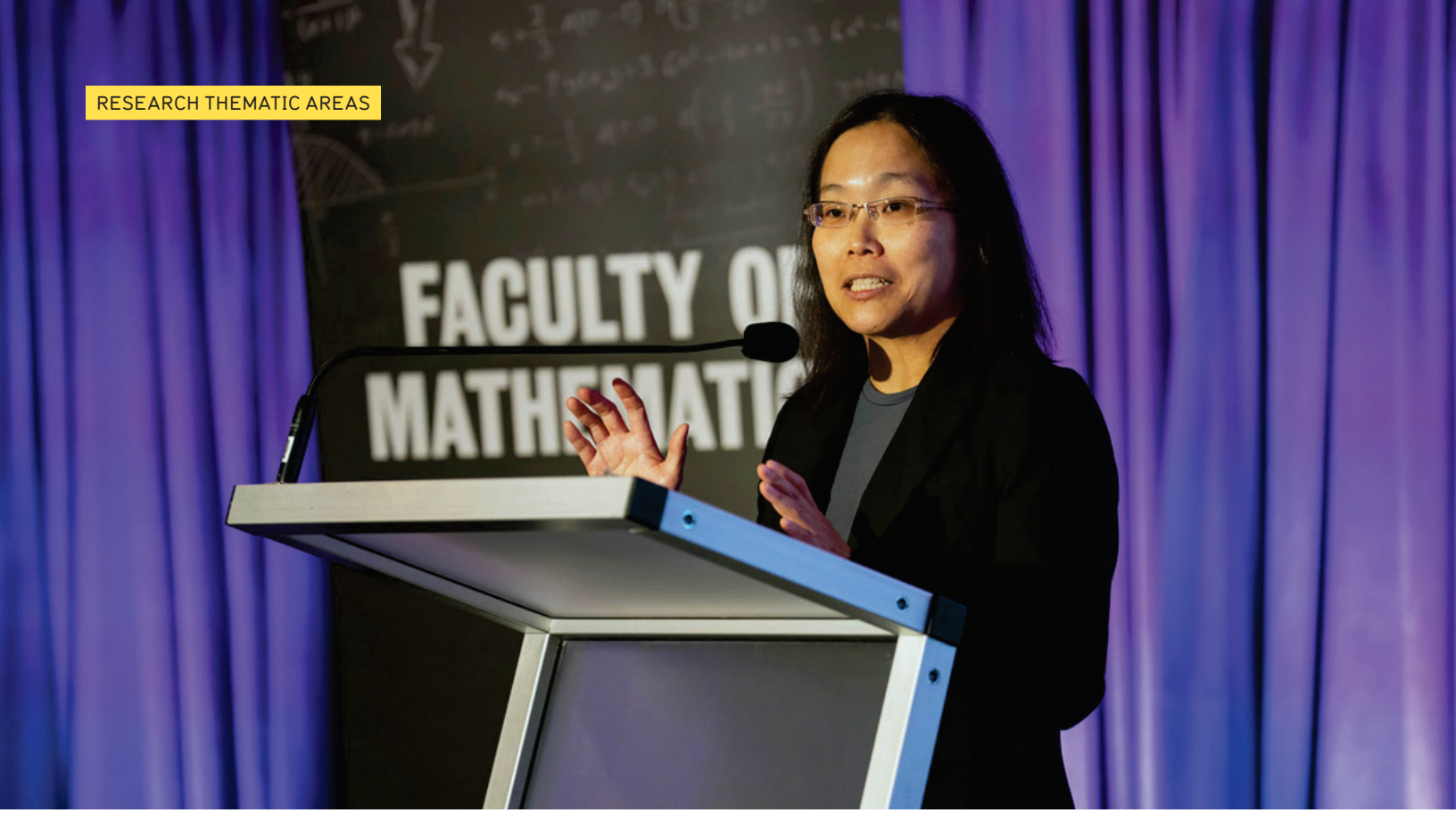
Flood map, City of Calgary

Mapping Floods

Faculty members from Engineering, Dr. James Craig (Canada Research Chair in Hydrologic Modelling and Analysis), Dr. Bryan Tolson, Dr. John Quilty, and Dr. Jonathan Romero-Cuellar (Postdoctoral fellow) develop advanced modelling approaches that integrate hydrological science, artificial intelligence, and high-performance computing to support more accurate, nationally consistent flood hazard mapping.

Implementing Renewable Energy Research

Dr. Juan Moreno-Cruz (Faculty of Environment), Canada Research Chair in Energy Transitions investigates large scale energy transitions affecting urban and industrial systems. The Faculty of Environment operationalizes renewable energy research, for example, through EV3, the first LEED (Leadership in Energy and Environmental Design) Platinum Certified higher education building in Ontario with solar panels that produce enough power to run seven homes.



Economic Futures

Technology is transforming the economy and the world of employment with the rise of global workers, increased automation, and AI. New technology can increase efficiency and flexibility, but the workforce must keep up with new systems.

Labour shortages, disruptions to supply chains, and geopolitical and digital threats have shown us the vulnerabilities and risks inherent in our economy. Canada faces serious challenges with productivity growth, and without a significant change in course we will not have the resources necessary to advance these futures and the challenges ahead.

Waterloo has the foundation to shape innovative ecosystems and develop talent to help create more equitable, resilient, and future-proofed economies.

Sub-themes:

- AI adoption
- Autonomous systems and supply chain resiliency
- Biomanufacturing
- Commercialization activity
- Economic and insurance modeling
- Health system optimization
- Product lifecycle assessment
- Organizational behaviour and operations research
- Risk management theory and strategy
- Sustainable tourism

Photo caption: Dr. Edith Law (Faculty of Mathematics, shown), new Google Chair in the Future of Work and Learning and Executive Director of the Future of Work Institute, Waterloo. The University of Waterloo and Google have entered into a partnership to create the Google Chair in the Future of Work and Learning. The partnership will enable a number of research and education initiatives at the intersection of technology design and pedagogical innovation, including hands-on learning labs for students to envision technologies for the future of work and learning through prototyping.

Industrial-Organizational Psychology Graduate students at the Canadian Society for Industrial & Organizational Psychology poster awards (from left to right): Pearlyn Ng (1st place-EDI research category), Amy Barron (1st place), Allister Grapes (3rd place), Iris Xing (2nd place). First place research topic: Factors that may bias managers' interpretation of mistreatment claims among employees.

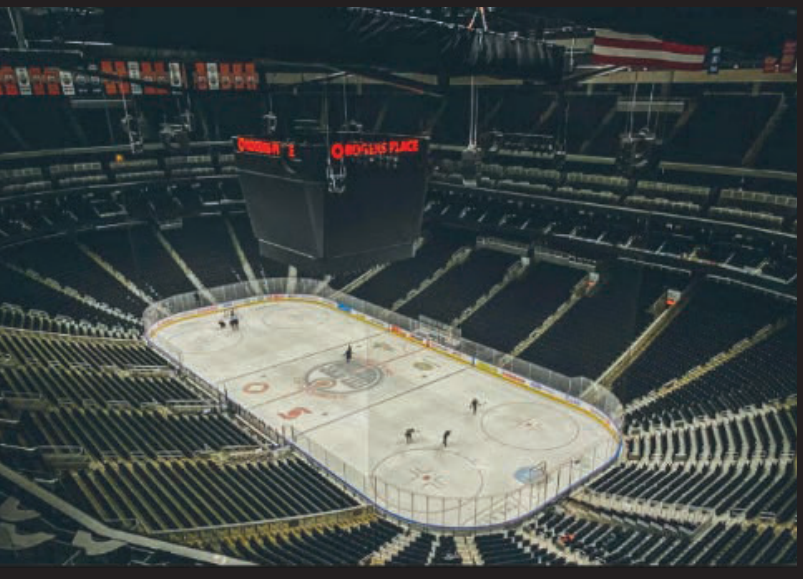
Understanding Organizational Behaviour

The first Masters program in Industrial-Organizational Psychology (Faculty of Arts) at Waterloo began in 1966. The program has since expanded to PhD studies and boasts graduate career trajectories in Ontario Hydro, Bell Canada, the Federal Government, the Canadian military, Deloitte, KPMG, Ernst and Young, and SPG Canada, among others.

Illuminating metal supply chains (LUMET) project logo.

Uncovering Critical Mineral Value Chains

As part of the Industrial Ecology Group, Dr. Steven Young (Faculty of Environment) works with partners from the University of British Columbia, Queen's University, University College London, and the British Geological Survey to illuminate the sustainability of metals and minerals along mineral value chains through the LUMET project.



Collaborating for Research Commercialization

Waterloo has a highly productive research partnership with Rogers. One collaborative project focuses on how hockey fans engage with the game and engages 5G technology to provide teams with valuable insights for data-driven decision making. This research partnership emerged from a hockey hackathon organized by University of Waterloo's start-up incubator—Velocity. Students had the opportunity to access proprietary NHL data sets and were tasked with generating ideas and offering new solutions that Rogers-owned Sportsnet could incorporate into their viewing experiences.

Rogers Place, Edmonton, Alberta.

Blue Mountain ski resort, Ontario.

Studying Tourism

Researchers including Dr. Daniel Scott (Faculty of Environment), Dr. Michelle Rutty (Faculty of Environment), Canada Research Chair Tourism, Environment and Sustainability, Dr. Bryan Grimwood (Faculty of Health) and Dr. Karla Boluk (Faculty of Health) are reshaping sustainable tourism locally and globally through world-leading initiatives on low-carbon and climate resilient tourism, Indigenous-led tourism, regenerative and nature-based tourism, and tourism's role in health and well-being. Their work addresses challenges of over-tourism, explores entrepreneurship as a driver of sustainability, and examines tourism dynamics in an increasingly multi-polar world.

Quantifying the Cost of Quantum Computing Attacks

Dr. Michele Mosca (Faculty of Mathematics), Co-founder, SoftwareQ, and Dr. Vlad Gheorghiu (Co-founder and CEO, SoftwareQ) have developed a framework to estimate quantum computing attacks so that industries can be prepared.

Dr. Michele Mosca

Michael Phillips (BASc.'17, CEO and Co-founder, shown) and Phillip Cooper (BASc.'17, Co-founder) founded Vena Medical in the final year of their BASc. programs with support from Velocity. They have created the world's smallest camera fitted into an angioscope capable of travelling down human veins and arteries.

Catalyzing Innovation

The University of Waterloo's flagship startup incubator (Velocity), provides essential training, mentorship, and resources that empower researchers and students to transform innovative technologies and ideas into real-world solutions and thriving companies. The Innovation Arena (IA) in downtown Kitchener, with 45,000 sq. ft. of product development and commercialization space, serves as a first office and community hub for Velocity founders to launch their businesses and drive economic impact. The IA streamlines commercialization pathways for businesses, fast-tracking the delivery of new technologies and helping drive Canada's next wave of economic growth.

Biodegradable cosmetic containers and packaging designed by Dr. Tizazu Mekonnen.

Reimagining Material Production

Waterloo researchers are leaders in circular economy research. This includes Faculty members in the Faculty of Engineering, Dr. Tizazu Mekonnen (Canada Research Chair in Sustainable Multiphase Polymers) who studies polymer processing and material design and fabrication to advance the sustainability and functionality of polymer systems, Dr. Elisabeth Prince, whose research creates more degradable and recyclable plastics, and Dr. Christian Euler who re-imagines how waste materials—such as plastics, carbon dioxide emissions, and agricultural residues—can be converted into marketable products.

APPENDIX A: RESEARCH STRATEGIC PLAN CONSULTATION PROCESS

Between January 2025 and October 2025, the Office of the Vice-President, Research and International undertook an extensive campus consultation process for the development of the Research Strategic Plan 2026–2030.

This process included meetings with diverse campus stakeholders from our faculty, administrative and student bodies. Targeted sessions were designed with a diversity, equity, and inclusion lens.

Existing strategic consultative documents including the Waterloo@100, and Faculty and Indigenous strategic plans were used as primary resources for the development of the plan.

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