

Strategic Research Plan 2024-2029 - University of Manitoba: *Change through Research*

Our **vision** is *Research Grounded in Relationships, Committed to Change*.

Our **mission** is *to transform research culture, to advance understanding, and create societal impact*.

Our **values** are Respect, Relationality, Responsiveness, Responsibility, Reconciliation, Reciprocity, and Relevance. The incorporation of seven research values signifies the importance of the seven sacred teachings or laws in Indigenous culture and the Haudenosaunee (Iroquois) philosophy's Seventh Generation Principle.

We propose the following **seven interdisciplinary themes**, which are fluid and interweave with one another.

1. Foundations: Fundamental research in the sciences, engineering, social sciences, humanities, and health sciences are celebrated at UM; exploration underlies all advances of clinical, scientific, economic, and societal value. The UM further recognizes the vital role that creative work and artistic expression play in enriching the human experience. Indeed, creative arts, design, and performance are vital areas of inquiry, illustrated by the broad range of both national and internationally distinguished contributions from the Centre for Creative Writing and Oral Culture, the Desautels Faculty of Music, the School of Art, the Faculty of Education, and the Faculty of Architecture. Writers, artists, musicians, actors, film makers, and composers contribute through a diverse range of artistic disciplines, fostering creativity, innovation, and critical thinking within the university community and to critical acclaim. These fundamental threads weave a rich tapestry which serves as a foundation of knowledge relevant to Canadian society, and upon which UM will build its inter- and multi-disciplinary themes. Harmony between fundamental, theoretical, and applied research will also lead to reciprocal systems of development. Significant efforts are underway in centres and institutes such as the Manitoba Quantum Institute and Winnipeg Institute for Theoretical Physics.

In a rapidly evolving geopolitical context, a deep understanding of the past is paramount to informing present and future strategies. Whether it is understanding the origins of the universe and the primordial world, the fundamentals of philosophy, modern thought, languages and cultures, or probing fundamental mathematical, physical, and biological principles, the pursuit of fundamental knowledge is the cornerstone of research at UM. These pursuits are enhanced through the lens of Indigenous knowledge and ways of knowing that are guiding us on our path to reconciliation by recognizing and seeking to address the ways in which the historical roots of the Doctrine of Discovery have violated Indigenous human rights.

2. Social Justice and Human Rights: UM researchers are well-positioned to support the research that advances social justice and human rights. The UM's robust social justice and human rights research landscape is anchored in the Centre for Human Rights Research, Arthur V. Mauro Institute for Peace & Justice, Centre for Defence and Security Studies, Manitoba Centre for Health Policy, Ongomiizwin – Indigenous Institute of Health and Healing, Institute for Global Public Health, National Collaborating Centre for Infectious Diseases, Centre on Aging, and Research and Education for Solutions to Violence and Abuse (RESOLVE).

Taking people-centred, grassroots, inter-sectional and inter-disciplinary approaches, UM researchers drive solutions to human rights challenges such as mass violence and genocides, human rights abuses and political repression, racism and discrimination, and income insecurity. Through the lens of social sciences, education, and the law, researchers are examining the connections between educational equity and access; refugees and migration futures; and health equity, including advancing physical and mental wellness. UM researchers are finding pathways toward reconciliation; economic and environmental justice for vulnerable populations; peace and conflict resolution; the rights of Two-Spirit, Lesbian, Gay, Bisexual, Transgender, and Queer Plus (2SLGBTQ+) communities; and equality and empowerment of women and girls. UM researchers are showing how both human rights and social justice frameworks provide critical tools for addressing the structural inequalities faced by Indigenous Peoples and governments in Canada and throughout the Indigenous world

and can bolster Indigenous sovereignty and self-determination. Scholars in the creative arts also play a crucial role in fostering critical conversations and promoting social justice through the power of writing, music, and the visual arts, facilitating a deeper understanding of diverse perspectives and advocating for human rights.

Researchers across UM contribute to research that works for a more just and sustainable world where human rights are respected, and social justice is more than a slogan. Human rights and social justice research tie together researchers from different faculties and colleges and crosses disciplines and research models and methods. We will work towards centering social justice and human rights in our research endeavours.

3. Research by, for, and with Indigenous Peoples: Research by, for, and with Indigenous Peoples means, first and foremost, all research engages in partnership involving Indigenous researchers and/or communities. First Nations, Inuit, Métis Peoples and communities are diverse and context-dependent, and we are committed to honouring their distinctions. For this reason, it is also essential to empower, build trusting, meaningful, and genuine relationships, and work in equal partnership on issues that bring value and benefit to the people and communities involved. Successful relationships with Indigenous communities include reciprocity in representation, relevance and commitment to the community, and a responsibility to take direction and learn from Indigenous communities while giving back to those communities through research.

Research by, for, and with Indigenous Peoples at UM explores a vast and fascinating array of topics across multiple fields and disciplines. It is integral to our vision, mission, and values. Areas of transformative and impactful research include: Indigenous history; Indigenous languages; Aboriginal law and treaty rights; Indigenous governance and rights; health and socio-economic equity for Indigenous Peoples; food and water security and sovereignty; gender-linked Indigenous cultures and practices; co-creating places and spaces with Indigenous communities; artistic and cultural resurgence; Indigenous land-based practices; reimagining education including Indigenizing curricula and pedagogy, applying Indigenous knowledge and culture to Western concepts, and enhancing educational opportunities for children and youth; and amplifying Indigenous voices by honouring Indigenous knowledge and artistic traditions, and embracing decolonial perspectives and cultural revitalization.

Research by, for, and with Indigenous Peoples reframes perspectives about, and approaches to, research, because it incorporates Indigenous perspectives, knowledges, paradigms, and tools at its core. Part of this reframing involves shifting the research lens from a deficit-based focus that seeks to fix problems for Indigenous Peoples, and instead acknowledges the historical and ongoing impact colonialism has created in sustaining the underlying structures and conditions that adversely impact the lives of First Nations, Inuit and Métis Peoples in Canada. Indigenous Elders, Knowledge-Keepers, individuals, and communities hold a significant amount of knowledge about solutions, which can be applied in regional, national, and international spheres.

When considering the other thematic areas in this Strategic Research Plan, we note that each theme is enriched by Indigenous knowledge and research undertaken by, with, and for Indigenous Peoples and communities. We aspire to embed Indigenous holistic approaches and views in a good way in all of UM research as a pathway to reconciliation.

4. Water and Food Security: Water and food are inextricably linked to each other and to the economic, social, and environmental well-being of the planet. Threats to water and food resources are increasing and are often linked to deforestation and urbanization on a global scale. Climate change exacerbates these threats by altering weather patterns, causing shifts in precipitation, salinity, and temperature of oceans, and increasing the frequency and intensity of extreme weather events. Such threats impact water and food security on local, national, and global scales. By engaging in interdisciplinary and creative research, UM researchers and scholars are raising awareness about the complex interconnectedness between water and

food security, and socio-environmental issues, fostering innovative approaches and inspiring action towards sustainable solutions.

UM research contributes significantly to water policy, conservation, management, and governance; community-based water monitoring; Indigenous water sovereignty; prairie land use and management, including approaches involving remote sensing and artificial intelligence; hydrology, landscape ecology, wetland ecology, and watershed processes modeling; environmental and sustainability education; and clean energy and circular economies. These approaches include appreciation of Indigenous cultural and spiritual meanings of water. As the United Nations Academic Impact Hub for Clean Water and Sanitation (SDG 6), UM researchers, in collaboration with Indigenous partners, continue to lead in interdisciplinary research on water systems, conservation, and protection; management of water quantity and quality; the impact of climate change on systems and security; and wastewater treatment.

UM researchers are uniquely positioned to address ongoing and future challenges with respect to food and nutrition security through the Canadian Centre for Agrifood Research in Health and Medicine, the Richardson Centre for Food Technology and Research, the National Centre for Livestock and the Environment, the Canadian Wheat Board Centre for Grain Storage Research, the Ian N. Morrison Research Farm, the Glenlea Research Station, and the Point Field Research Laboratory. UM has strengths in fundamental and applied research for the recycling of on-farm resources and biodiversity conservation. UM researchers are leaders in food science and nutrition, excelling in pre-commercial development and testing of food quality and nutrition through food-processing techniques and state-of-the-art analyses; integrated crop and livestock systems; greenhouse gas mitigation; water resource protection; promoting carbon sequestration and climate resilience; and adopting dietary patterns that reduce nutrition-related chronic diseases. UM researchers are driving the fourth agricultural revolution through cellular communication and data algorithms and processing, data storage and security, precision agriculture, and artificial intelligence.

5. Health and Well-Being: UM leads in critical health research in areas such as maternal, newborn, and child health; communicable and non-communicable diseases; sexual and reproductive health; healthy aging; and equitable access to health care in partnership with First Nations, Inuit, and Métis communities, and globally in countries such as Burkina Faso, India, Kenya, Nigeria, Pakistan, Peru, South Africa, Tanzania, Thailand, and Ukraine. Focusing broadly on the diversity of all human beings, UM health researchers partner with individuals, communities, organizations, health care facilities, and populations of all kinds, including those relegated to the margins of society, as they actively work to advance health and wellness.

UM researchers are driving innovation through centres and institutes such as the Institute for Global Public Health, the Manitoba Centre for Health Policy, Ongomiizwin - Indigenous Institute of Health and Healing, Cancer Care Manitoba, Children's Hospital Research Institute of Manitoba, George & Fay Yee Centre for Healthcare Innovation, the Institute of Cardiovascular Sciences, Health Sciences Centre, and the Centre on Aging. Notably, UM is the global leader in maternal, newborn, and child health at scale. Other expertise includes: optimizing population-level health through the Program Science approach; composition and value of human breast milk and connections to the microbiome; prevention of child maltreatment; infectious diseases and managing pandemics including public health strategies; interrogating the effects of inhaled air pollution on health and disease; understanding the interplay between the immune system and inflammation during infectious and non-communicable diseases in HIV, HPV, and mpox, for example; developing new therapies and vaccine strategies and exploring public acceptance and trust in these health technologies and products; pre-clinical research in biology, kinesiology and physiology in health and disease; advancing research in aging, diabetes, neurobiology, asthma and respiratory disorders, inflammatory bowel diseases, rheumatoid arthritis, transplantation immunology, and cancer; multidisciplinary genomic diagnostic and clinical therapies for rare diseases; health and wellness for the 2SLGBTQIA+ communities; health economics;

and developing medical instrumentation and sensors. As it has been well demonstrated that the creative arts have transformative power on mental, emotional, and physical well-being, UM scholars are also exploring the therapeutic potential of the arts, contributing to research that promotes holistic healing, improves quality of life, and enhances the understanding of the human experience.

Not only are UM researchers contributing their expertise in these areas, but they are also focused on ensuring that patients and their caregivers remain the first and foremost partners, with an emphasis on personalized, tailored medical care. Patients and their caregivers are being engaged early as research partners and not just as research participants, enhancing trust and enabling the incorporation of patient-driven perspectives into research planning. This approach generates evidence that is relevant and meaningful to them, encourages better-informed patient decision-making, and enhances knowledge translation. Ultimately, patient-centred research builds research capacity that is socially and culturally appropriate, thereby facilitating the development of a broader all-inclusive research environment necessary for generations of successful outcomes.

UM leads in health data management for the Province of Manitoba by exploring the rich and unique trove of interconnected health and social data in Manitoba and advising government on public health policy. Community-led health and wellness initiatives that advance equitable access to better health care for underserved populations, including Northern and rural Indigenous communities in Manitoba and Nunavut, are also providing solutions for society.

6. Climate Action and Sustainability: While climate science often considers large-scale processes, climate risks are experienced at the local scale through climate-induced disasters. Climate action that supports the challenges faced by communities who are and will be impacted by climate change is required. UM researchers, including those at the Centre for Earth Observation Science, Centre for Defence and Security Studies, National Centre for Livestock and the Environment, the Ian N. Morrison Research Farm, and Natural Resources Institute, are working with partners at local, national, and global scales on responses that build sustainable futures. They have made advances in understanding climate change and predictions of consequences, adaptation practices, community-based responses, and education.

In partnership with Indigenous rights-holders, UM researchers are national and international leaders in understanding and communicating the ocean's role in climate change and developing research and monitoring programs. Through centres and institutes such as the Manitoba Institute for Materials, UM is developing new materials, processes, and technologies that advance sustainability and reduce environmental impacts. New technologies for power generation and distribution, innovative local grids, and new transportation modes are being developed in partnership with Northern communities. Remote sensing, satellite, antennae, and drone technology development to mitigate greenhouse gas emissions are also areas of strength at UM.

Climate action demands various approaches across multiple disciplines. For example, architecture research and practice focus on environmental responsibility including how we design our buildings, spaces, and landscapes to improving construction techniques, enhancing energy efficiency, fostering community engagement, and incorporating Indigenous design. Researchers in engineering fields including computer, geotechnical, and transport engineering and construction and water management, are developing analytical and modeling tools and probing augmented reality methods and the use of digital twins in systems design. Asper School of Business and the affiliated UM Transport Institute researchers are working toward improving sustainability in transportation and logistics, including the role of cargo airships in the North. Scholars in the creative arts are addressing climate action and sustainability by using the arts as a platform for raising environmental awareness, advocating for sustainable practices, and inspiring positive action towards a more ecologically conscious society. Finally, educational researchers are exploring ways to teach and motivate

people of all ages on sustainability, environmental stewardship, climate change, and renewable energy matters.

7. Manitoba, Hudson Bay, Arctic, and the World. UM has long been a research leader in the Arctic and Prairie regions, with a specific focus on climate change and its effects on Arctic sea ice, carbon capture and storage and other chemical and biochemical processes, contaminants in sea water and associated risks to food chains, and mitigation of marine oil spills. Researchers are also examining climate change adaptations in Indigenous communities and climate change mitigation in agricultural production. Critical research in these areas has been expanded significantly across numerous fields and disciplines including human rights; transportation economics and supply chain management; engineering; public health; infectious diseases; habitat and population studies of wildlife; ecology and biodiversity; oceanography; navigability forecasting; climatology; hydrology; permafrost thaw; satellite, drone, and Internet of Things technologies; governance and security; social determinants of health; and data management.

Community leaders across Western Hudson Bay initiated discussions with UM researchers to take control of their own socio-economic futures and direct transportation/shipping developments in a sustainable and responsible way. This overture is consistent with UM's reconciliation strategy where researchers are recognizing the critical need to undertake research that is driven, co-designed, and co-led by Indigenous partners, including Indigenous leaders and communities. This work is informed and inspired by the Indigenous worldview encapsulated in the Inuktitut term Avativut ("our environment") and the Cree term Wahkotowin ("kinship and connectedness of people, water, air, land, and animals").

Motivated by the need to transport vast resources (energy, potash, minerals, and agricultural products), the possibility of expanding the shipping season across Hudson Bay in light of changing climate, and the ever-growing pressure on the capacity and geopolitical stability of the global supply chain, researchers are focusing on developing future transportation pathways. These pathways will provide shorter and geopolitically more stable trade routes connecting central/western Canada to Europe/Africa and Central/South America.

Envisioning a new framework, Indigenous leaders, communities, and researchers are focusing on socio-economic prosperity and wellness for communities in a changing climate to detect, monitor, reduce, and mitigate risks associated with massive infrastructure development. This work involves marrying cutting edge science with Indigenous knowledges to ensure the Arctic and Prairies thrive and supporting community-led initiatives to protect and conserve the biodiversity on Indigenous territories in the area. All stakeholders agree that it is no longer acceptable to work within outdated colonial frameworks where imprudent planning could devastate ecosystems and Indigenous homelands, jeopardize physical and mental health, human rights, and well-being, and exacerbate Canada's geopolitical and security risks.

Indigenous leaders, communities, and UM researchers are reimagining access through and proper management of Hudson Bay to transform community and regional connectivity, economic futures, and strengthen regional and global supply chains. This approach will help support Indigenous sovereignty, enhance the voices of Indigenous communities, increase affordability for those living in Northern and remote areas; provide opportunities for better education, training, and capacity-building for community youth; and improve health and well-being for the First Nations and Inuit people in the region.

Conclusion: The very foundation of research at UM is about discovery and advancing knowledges. The themes described above also lead to meaningful impact, signaling that the research we do matters. Some themes embrace community-based research, working for and with communities, while others lead to knowledge translation and commercialization.