

**YORK UNIVERSITY STRATEGIC RESEARCH PLAN:  
2023-2028**

**Knowledge for the Future: From  
Creation and Discovery to Application**

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## 1.0 Foreword

We recognize that many Indigenous Nations have longstanding relationships with the territories upon which York University campuses are located that precede the establishment of York University. York University acknowledges its presence on the traditional territory of many Indigenous Nations. The area known as Tkaronto has been care taken by the Anishinabek Nation, the Haudenosaunee Confederacy, and the Huron-Wendat. It is now home to many First Nation, Inuit and Métis communities. We acknowledge the current treaty holders, the Mississaugas of the Credit First Nation. This territory is subject of the Dish with One Spoon Wampum Belt Covenant, an agreement to peaceably share and care for the Great Lakes region. A strong commitment to acknowledging our colonial history and exploring Indigenous ways of knowing are central to York's contribution to building a stronger, more inclusive Canada.

Founded in 1959 on the traditional territory of the Anishinabek Nation, The Haudenosaunee Confederacy, and the Huron-Wendat, York University is a comprehensive research-intensive institution, and home to a proud tradition of interdisciplinary scholarship and the pursuit of discovery and innovation. Its commitment to excellence brings together arich diversity of perspectives with a strong sense of social responsibility that is making a difference to the world around us. Supporting the University Academic Plan 2020-2025: *Building a Better Future*, this Strategic Research Plan (2023-2028) ***Knowledge for the Future: From Creation and Discovery to Application*** lays out a vision for accelerating the growth and development of our research, scholarship and creative activity over the next five years—a plan that seeks to reaffirm and advance York's commitment to research excellence and to the development and application of new knowledge to create positive change in the local and global communities we serve.

York strives for the highest academic standards, and our strong commitments to academic freedom, social justice and responsibility are woven into the University's fabric. We champion decolonization, equity, diversity, inclusivity, and welcome and support varying perspectives in an inclusive and equitable environment where we integrate cross-cultural knowledge and cultivate innovative approaches to address complex global challenges. It is the unwavering support of these values by every member of the York community from which the institution derives its strength. The support for these values is a foundational principle of this Strategic Research Plan (2023–2028). York contributes to critical inquiry, scientific discovery, and the social and economic development of Canada by keeping research and advancement of knowledge across the full spectrum of disciplinary and interdisciplinary activities as an essential and integral part of our academic mission.

This plan showcases the depth and breadth of research at York— research that is innovative; advances critical inquiry and scientific discovery; challenges our beliefs and perceptions; and affects the social, cultural, and economic development of our country and beyond. Over the next five years, York is committed to advancing the research participation of full-time faculty and trainees at all levels across the institution. We will accelerate growth in the number and diversity of our scholarly outputs and research funding base and expand the influence of our work through broadening and deepening our external partnerships and engagement. Our goal is to demonstrate international leadership in scholarship, research, and related creative activity as one of Canada's leading research universities.

This plan was developed through a broad process of collegial engagement with our academic community. From the fall of 2022 to spring 2023, the York community participated in an open and attentive discussion about the role of research, our valuation of research, and our aspirations for the future of research at York. This inclusive engagement process was guided by an active and dedicated Strategic Research Plan Advisory Committee that included representatives from across the University and the broader community and was active in reaching out and helping to further solicit input from the York community. In keeping with York's practice of collegial governance, input from faculty members, students and staff was received through a series of community consultations and roundtable discussions on campus and through an active online site. Essential inputs into the plan's development were provided directly by the Faculties through consultations with their councils and advisory committee representatives, and by the Indigenous Council, Organized Research Units, along with Academic Policy, Planning and Research Committee of the Senate, as well as other research leadership bodies.

The York community has shown an enthusiastic response to the planning process and provided valuable feedback highlighting their aspirations for scholarly research in the context of the overall academic mandate of the University. In this plan, these aspirations provide guidance for the growth and development of research at York over the next five years. By implementing this research plan, we aspire to create opportunities for the entire University to engage in dialogue on emerging big ideas that have the potential to lead to positive change at a large scale. By proactively inciting discussion on emerging issues of societal importance, including the UN Sustainable Development Goals, involving leading minds representing a broad range of expertise, perspectives, and experience, we remain committed to enhancing the well-being of the communities we serve.

**Section 2.0 Executive Summary- to be completed and included at a later date.**

### **3.0 Mission and Research Vision**

York University's mission is the pursuit, preservation, and dissemination of knowledge. We promise excellence in research and teaching in pure, applied, and professional fields, testing the boundaries and structures of knowledge, and cultivating critical intellect. York University is part of Toronto: we are dynamic, metropolitan, and multi-cultural. York University is part of Canada: we encourage bilingual study, we value diversity. Being a public research university, we serve the people of Ontario, Canada, and the world through transformational research. York University is open to the world: we explore global concerns. We are a community of faculty, students, staff, and alumni committed to academic freedom, social justice, accessible education, and collegial self-governance. York University makes innovation its tradition. *Tentanda Via*: The way must be tried.

This plan seeks to advance York's research vision— to aspire to better understand the human condition and the world around us, and to employ the knowledge we gain in the service of society and the health of the planet. York is committed to excellence in research and scholarship in all its forms. Informed by a strong commitment to shared values, including the promotion of social justice, diversity, equity, and the public good, we believe that intensive engagement in research is a core institutional value that permeates the fabric of the University, and it is this foundation on which York's vibrant and exciting academic environment is built.

Moreover, this plan focuses on advancing the frontiers of knowledge through scholarship and research of the highest quality. It reaffirms York's commitment to an enduring and distinctive set of

core values:

- We strive for **Excellence** in fulfilling all aspects of our mission.
- We are **Progressive**, encouraging open-minded inquiry, innovative approaches, and forward looking solutions.
- We champion **Access, Inclusion, Equity and Diversity**, embracing differing perspectives, peoples, and ways of knowing, and fostering global fluencies and cross-cultural knowledges.
- We are passionate about advancing **Social Justice and Equity** through critical insight, creative problem solving, and socially responsible action.
- We explore **Inter- Multi-, and Trans- disciplinary relationships** between STEM, social sciences and humanities to address complex real-world problems.
- We are committed to a process of **Decolonizing** and driving change to lead to a greater sense of inclusion and belonging for all members of our community and beyond.
- We uphold **Sustainability** - environmental, social, and fiscal - as a vital compass for decisions and initiatives.

This commitment is also embedded in the University Academic Plan 2020-2025: *Building a Better Future*.

#### 4.0 Research Excellence

York University has developed a proud tradition of scholarship that has been defined throughout our history by engagement in a critical discourse in which the pursuit of discovery and innovation is achieved with a focus on social responsibility and justice. From its inception to our present standing as a diverse and comprehensive research and teaching institution, York has focused not only on new discoveries and the creation of new knowledge but also on how this knowledge can be used to benefit cultures and societies as broadly as possible. Research at York has seen remarkable growth of our research scholarship and creative activity experiencing an expansion of world-leading scholarship in the fine arts, social sciences, humanities, education, law, science and business, accompanied by rapidly growing leadership in health and engineering that is broadening and deepening York's engagement with and impact on our communities.

York researchers have played key roles in many of the important discoveries and influential scholarship of the past six decades. They include space instrumentation for the exploration of Mars; impacting the way we think about youth marginalization and homelessness; developing novel approaches to health care delivery; developing insight into the social and political history of Canada and understanding the environmental changes brought about by colonial expansion on Indigenous societies; advancing understanding of biological and computer vision and probing the impacts of digital gameplay; studying the formation and development of language policy in Canada; generating new insights into brain development in children with autism and intellectual disabilities across the lifespan; discovering that lifelong learning involves adaptations that are linked to the brain's performance; encouraging civic dialogue through performance and public art; working to improve the global plight of refugees and exploring immigration solutions; shaping future thought on suburbanization and today's ecological crisis; mapping the spread of infectious diseases through mathematical modelling; and studying virus-resistant plants to bolster the survival of agricultural crops and combat the effects of climate change.

York scholars have achieved the highest recognition in their fields – and follow in the tradition of our many accomplished scholars. They include over 150 Royal Society Fellows and new Members of the College, and twenty-five Distinguished Research Professors. York scholars have been inducted and named as Killam Prize winners, Guggenheim Fellows, Humboldt Fellows, Fulbright Scholars, and Trudeau Foundation Fellows. They have been recognized with the Steacie Fellowship Prize (recently rebranded as the Arthur B. McDonald Fellowships) and Governor General’s Award winners and receive a range of disciplinary honorifics and prizes for their books, lectures and other scholarly achievements. York’s allocation of thirty-eight Canada Research Chairs complemented by over fifty York Research Chairs and over thirty named Chairs and Professorships, demonstrates the University’s support for its faculty and their research excellence across disciplines. The work of our scholars enriches the teaching, research and overall learning environment for our students – our brightest minds and our next generation of leaders and thinkers.

Notably, research at York is strongly engaged internationally and has significant global impact. Indeed, research at York is research that delivers results. Ranked highly as a leader in the influential Times Higher Education Impact Rankings, York places 33<sup>rd</sup> in the world in meeting the United Nations Sustainable Development Goals, positioning York among the top 6% of universities worldwide for the last several years. The Times Higher Education Impact Rankings considers factors such as research, stewardship, outreach and teaching to determine the rank for each institution. Further, over the last 10 years, York has been top ranked among Ontario universities for our global collaborative research publications. York also has over 300 active partnerships with international institutions that enables the movement and exchange of researchers and trainees.

Leading examples of the international reach of York’s research include: the York-led Refugee Research Network bringing together Canadian and international scholars in the study of refugee and forced migration issues and engaging policy makers, non-governmental organizations and communities of practice in the pursuit of real-world solutions to the needs of refugees and displaced persons; utilizing AI and data science models in helping to predict viral transmission of disease and assisting local health authorities in mitigating new infections in Africa and other parts of the developing world; *Connected Minds: Neural & Machine Systems for a Healthy, Just Society*, creating an international hub of expertise in ethical, socially responsible research and technology to understand and optimize societal benefits and mitigate risks of human-machine interactions; Canada’s first Centre International de Formation des Acteurs Locaux (CIFAL) at York University addressing complex global issues in the areas of sustainable development, disaster and emergency management, diversity and inclusion, economic development, global health, and entrepreneurship; United Nations Economic Commission for Europe (UNECE) established the Toronto Centre of Excellence on Youth Homelessness Prevention at York assessing the state of youth homelessness and prevention in the 56 member states of the UNECE. Similarly, current health and science projects involving York researchers are driven by international research collaboration including examples such as Qatar University and other global partners leading the development of the first International Cardiac Rehabilitation Registry program improving patient outcomes for low- and middle-income countries; the European Organization for Nuclear Research (CERN), NASA and the European Space Agency missions.

The York community understands the value of collaborative research and the importance of translating discovery into action. We seek to engage the world around us in collaborative, participatory and partnered research that is inclusive, builds long-term relationships and brings tangible benefits to the communities with which we work. York has seized on the opportunities

provided within a comprehensive institution to make long-term investments in supporting participatory and collaborative research and scholarship that reaches from Toronto into York Region, across Canada and around the world.

We enhance our impact locally and globally through the graduates we prepare and the scholarly, research and creative activities we create, making a significant impact on the social, economic, cultural and other well-being of the communities we serve. Through York's integrated approach to teaching and research, undergraduate and graduate students, as well as postdoctoral fellows, enjoy the active mentorship of internationally recognized scholars, access to cutting-edge research infrastructure and an exciting and engaged environment for the pursuit of discovery. York hosts one of the largest cohorts of graduate students in the country, and York's graduate and postdoctoral fellows are key drivers of the University's research excellence and scholarly success. York is committed to enabling our students to acquire, advance and apply their skills and knowledge and to providing them with exceptional supervision, engagement and instruction that supports a high-quality educational experience.

York has a strong commitment to supporting our continued growth and application of our research, scholarship and creative activity through focused planning documents including the University Academic Plan. As emphasized in "Knowledge for the Future" in one of its six Priorities, the University Academic Plan (2020-2025) describes the continued growth and acceleration in our research and creative activities as key to the overall success of the institution. Furthermore, the University Academic Plan makes strong commitments to expanding the success of research at York over the next five years, with a focus on deepening York's research contributions in addressing complex and pressing issues, such as those highlighted by the United National Sustainable Development Goals (UN SDGs). The University Academic Plan will continue to bolster research efforts by continuing to increase faculty and trainee research participation, meeting infrastructure needs, increasing our entrepreneurial and innovation activities, while broadening external partnerships, expanding our research influence through open scholarship, and helping to ensure growth and diversity in our research and creative outputs. As the importance and prominence of research, scholarship and related creative activities continue to intensify at York, this Strategic Research Plan provides the next level of detail in articulating our strategy for translating research ambition into successful outcomes and contributions.

#### **4.1 Commitment to Decolonizing Research**

York places a great value on diversity of thought and strives to pursue inclusive excellence by decolonizing research and ensuring that our researchers are committed to a global mindset, ethical judgment, and critical integration of diverse ideas and worldviews. We recognize that decolonizing research requires ongoing examination of the colonial processes, practices, and ways of thinking that continue to delegitimize and devalue Indigenous knowledges and Indigenous peoples at York University. York values the achievements of Indigenous scholars and students in research, teaching and learning, despite ongoing barriers deeply rooted in colonial practices and policies that govern research policies and procedures (including, for example, grant administration, ethical review, and grant adjudication), and conflict with Indigenous research methodologies. All peoples have greatly benefitted from Indigenous knowledge, languages, and ways of knowing and being. Accordingly, York continues to critically and systematically interrogate our ways of functioning, in all aspects of the academy, that inadvertently or otherwise interfere with our commitment to supporting, recognizing,

and valuing Indigenous knowledges and Indigenous scholars.

Furthermore, York's emphasis on interdisciplinarity provides national and international leadership in the promotion of new approaches to research and scholarship. In particular, York is committed to working with Indigenous communities and York-based Indigenous scholars to deepen our understandings of respectful forms of research engagement, development and application. York has taken positive steps to advance this ongoing commitment. The University Academic Plan 2020-2025: *Building a Better Future* affirms York's commitment to the Indigenous Framework and identified six priorities for action for building a better, including stronger relationships with Indigenous communities. In the Winter 2023 term, the Office of the Vice-President Research & Innovation (VPRI) will launch the first fully Indigenous Research Ethics Board, led and advised by Indigenous members, with the aim of providing oversight and ethics review into research involving Indigenous Peoples. In further supporting Indigenous scholars and the knowledge creation they are involved with, in collaboration with the community, knowledge keepers and elders, this plan identifies Indigenous Futurities as an opportunity to advance social, cultural, artistic, policy, legal, economic and justice areas that holistically shape Indigenous experience. York remains committed to building community partnerships in research and to facilitating research that respects Indigenous approaches to knowledge and learning.

#### **4.2 Commitment to Diversity and Inclusivity in Research and Scholarship**

This plan reaffirms York's long-standing commitment to the values of equity, diversity, inclusion and social justice. York believes that our diverse community, research excellence, and commitment to collaboration allows us to address complex challenges to serve the public good and create positive change in the communities we serve. We acknowledge that creating positive change requires that all members of our diverse community are equally valued and recognized and feel a sense of belonging, common purpose, and shared responsibility to enrich and support each other's work. As such, we aim to nurture an equitable and inclusive environment where all members of the York community experience a strong sense of belonging and well-being. This includes cultivating equitable and inclusive research environments in which the intersecting social relations of power are continually analyzed and challenged. York is continuing to create and sustain diverse research teams and encourage research programs in equity-deserving communities. This involves the continued support of scholarship for equity-deserving groups, the Dimensions Charter, and the advocacy and work related to Tri-Council funding and programs. As outlined in the University Academic Plan, we are also continuing our actions to support reconciliation and transformation through our Indigenous Framework and intensify our systematic efforts to embed human rights, equity, diversity, and inclusion training across the University.

Furthermore, as we build on our research strengths across traditional and non-traditional areas of research, scholarship and creative activity, we recognize that the nature of our relationships with each other and with that individual research and scholarship of each member is the foundation upon which the research enterprise at York is built. Only with this solid foundation can we expect to successfully expand our reputation for research excellence. As a community, we acknowledge the importance of graduate students and postdoctoral fellows to the success of our research and scholarship, and we are committed to providing them with the best possible supports as they pursue their training.



## 5.0 Research Areas of Strength: Comprehensive Research Engagement across the Institution

York is providing national and internationally recognized research leadership across six broad intersecting and interdisciplinary areas:

- Advancing Fundamental, Discovery and Theoretical Research and Scholarship
- Illuminating Cultures and Cultivating Creativity
- Building Healthy Lives, Communities and Reimagining Futures
- Reaching New Horizons in Science, Technology and Society
- Pursuing a Just, Equitable and Sustainable World
- Elevating Entrepreneurship Through Socially Responsible Innovation

York is committed to ongoing investment that will support these research strengths across the institution, which, in turn, will enhance the influence and recognition of our scholarship and creative activities broadly.

### 5.1 Advancing Fundamental, Discovery and Theoretical Research and Scholarship

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Research at York begins with appreciating the importance of fundamental inquiry, theoretical research and creative scholarship as an essential means for future social, scientific, and technological developments to solve complex societal problems. Throughout the University, scholars are investigating the world that surrounds us: from the study of moral, political and legal philosophy to pure mathematics; from the investigation of molecular and subatomic interactions to exploring the human brain; from the poetic representations of data and generative systems in light and sound installations to the novel use of artificial agents in interactive environments; from the study of Indigenous life, cultures and traditions to the origins of government, the development of political institutions and the growth of non-state systems of government; from the study of chromosomes to the understanding of the cosmos; from understanding the limits of computation to developing more efficient methodologies for computational biology, cryptography, machine learning, and other engineering applications, from vision science pursued separately from neuroscience and computational perspectives to the integration of these two methodologies to yield novel insights into how we perceive and interact with the world around us. A primary function of universities is to train critical minds, to inspire new generations who learn to think of the impossible as the *not yet* possible and to encourage questioning of the fundamental values and assumptions of our world. The promotion of critical scholarship that challenges our assumptions and questions our values helps us to understand the world as we see it today, and enables us to transform it into the better place we envision for tomorrow.

While York emphasizes the benefits of applied research and development, we also recognize that pure scholarship, systematic examination, and the development of creative works and scholarly activities remain essential to the research mandate of the university, and that these endeavours need to be strongly supported and encouraged as an ongoing cycle that moves from discovery to invention and back again, based on a model that breaks down disciplinary walls and encourages collaboration. Engagement in pure inquiry-motivated research is a particular privilege for and responsibility of the University's faculty and students resulting into fundamental knowledge and scholarship, which is

often utilized by practitioners and applied scientists to eventually devise inventions that apply new knowledge in useful ways. The quality and recognition of this foundational research is validated through critical peer review, as well as prizes and awards that recognize the University's scholarship and provide funding to support this scholarship and its application to societal and industrial problems.

At York, the advancement of fundamental discovery research is sought through the formulation and exploration of critical questions that push the boundaries of traditional modes of inquiry and scholarship. In the social sciences and humanities, a critical approach embraces reflective assessments of society, cultural change and ways of knowing. To advance critical social and cultural theory, researchers are exploring historical change; political activism; the social and economic transformations of societies within Canada and around the world; and how culture has been and continues to be a crucial means of expression and an avenue for creative problem solving. Other forms of fundamental research in social sciences range from engaging in the study of work, employment, and labour in the context of a constantly changing global economy; enhancing knowledge of issues related to a variety of transnational phenomena that are rapidly changing society, law and governance; and emphasizing community-engaged scholarship, real-world and needs-driven research, and evidence-based training for effective emergency management.

Critical scholarship at York is a hallmark of the institution and is apparent in the research conducted in the natural sciences, arts, humanities and social sciences. York researchers explore a range of moral, political, feminist, Indigenous, environmental and legal philosophies and ethics, and are expanding the critical analyses of gender, sexuality, class, race, ethnicity, nationality, citizenship, age and ability. Across disciplines, the profound dedication to equity is reflected in research devoted to understanding and transforming attitudes towards constructs of race, class, identity, gender and power differentials in a range of social, political, educational, ecological and economic formations.

Researchers are exploring language acquisition and theories of linguistic variation, and educational models that help us understand more clearly the role of language in multicultural societies. By pushing the boundaries of innovative form and expression in the visual and performing arts, researchers probe cultural attitudes towards race, sexual identity and marginalized groups. Indigenous languages and knowledges as vital sources of insights for our world and for future generations are an essential aspect of this research.

Through a critical lens, researchers at York are exploring the effects of the global movement of people, by displacement or through growing diasporas. York's researchers are at the forefront in the study of the effects on society of political, social and cultural inequities, injustices and human rights violations. When we enhance our understanding of world religions, ancient and current cultural practices, and the exigencies of political and economic powers, we can make better sense of a complex world. At the same time, research into the role of archives in knowledge dissemination and preservation informs the communication of new knowledge.

York displays strong research leadership in discovery-based science across physics, chemistry, pure mathematics, biology, psychology, and other disciplines. Astrophysics researchers use observations and theory to study the origin and evolution of structure in the universe, including the role that dark matter plays and how galaxies take shape. Using lasers to trap and hold individual atoms, quantum optics researchers are measuring atomic energy states with unprecedented precision, so that even the reliability of fundamental constants can be tested.

York's high-energy physicists are bringing leadership to large-scale international initiatives through TRIUMF (Canada's National Laboratory for Particle and Nuclear Physics), the ATLAS collaboration at CERN (the European Organization for Nuclear Research), and the T2K collaboration in Japan that is seeking out and studying the elementary particles of which everything is comprised, including antimatter, neutrinos, the Higgs boson and magnetic monopoles. Fundamental research in physics, mathematics, and other natural sciences at York has formed the basis of future technologies and toolsets that results in solutions for real-world problems. For example, innovative and critical advances in pure mathematical concepts in analysis, probability, and image and signal processing continue to yield novel health, finance and artificial intelligence applications and technologies.

Biological research at York extends from molecules to cells, organisms, populations and ecosystems. York researchers are pushing the boundaries of genomics and proteomics to more fully understand how the expression of genes is regulated and to determine the structure and function of proteins and other factors encoded by the genome. Researchers have developed innovative approaches to investigate the diversity and functionality of the proteome resulting from alternative splicing and post-translation modifications. Other bioinformatics research ranges from investigating how growth factors, hormones, and microRNAs regulate oocyte maturation and placental development and how their dysregulation contributes to the pathogenesis of preeclampsia, to developing novel techniques to extract mammal DNA from the air that we breathe.

Physiological, metabolic, behavioural, biochemical and genetic processes are being investigated in different model systems, including yeast, filamentous fungi, insects, fish, bees and mice. Researchers in chemistry and biology are elucidating the structure of molecules and proteins by nuclear magnetic resonance spectroscopy, X-ray crystallography and mass spectrometry, and are making original contributions to chemical biology, organic, inorganic and physical chemistry, while others are exploring the fundamentals of animal behaviour and cognition, including migrations patterns and how animals adapt to and interact with their environments. Other fundamental research activities in natural sciences include studying brain function, mapping and wiring, predicting the effects of environmental stressors, such as climate change, invasive species and habitat alteration on ecosystems, and studying the genetics and evolution of social insects to guide the conservation of native pollinators to improve their health.

York's Centre for Vision Research is a global leader in investigations focusing on the intersection of biological and computational vision. While building on pillars of strength in neuroscience and computer science, our vision researchers break traditional academic silos and work in close collaboration to yield an integrated understanding of visual perception that spans from basic mathematical and computational principles to how these principles are implemented in biological mechanisms. These efforts also extend to studying how intelligent agents, be they natural or artificial, interact with their environment through their visually mediated actions, i.e., perception to action. These fundamental investigations support novel applications ranging from visual aids for people with disabilities to new generation autonomous robots for navigating unknown terrains.

## 5.2 Illuminating Cultures and Cultivating Creativity

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York University is an important contributor to the advancement of creative work and scholarship in the arts and culture in Canada. We are an emerging leader in the conception of new media and design of digital technologies, and a groundbreaker in cultural production and creative research. This dynamic creativity is complemented by critical analysis of culture and its production, the creation of original and experimental works of art, the science of human experience, the analysis of media and culture, and the implementation of new technologies that increasingly shape everyday lives. York's researchers are investigating the future of narrative emerging forms of cultural expression, interactive storytelling, mobile media, entertainment and gaming, immersive education and training, gallery installations, and interactive cinema, including 3D cinema and stereography.

The significant breadth and scope of scholarship in communications and cultural studies, fine arts, interactive arts and other digital humanities, computing science and engineering, philosophy and environmental studies, languages, literature and linguistics, technical and creative writing, and translation draw together a community of researchers who cut across traditional disciplinary boundaries to facilitate dynamic collaborations in arts and culture related research areas, including internet of things, social media, 3D simulations and animation; artistic theories and cultural impact; interactive art and immersive environments; the implementation of participatory design, maker methods, physical computing, digital fabrication, wearable computing, and creative coding for the creation of novel digital forms; the expansion of procedural poetics into emerging virtual reality, augmented reality, and mixed reality media; the application of expertise in audio-visual signal processing, vision science, machine learning, artificial intelligence (AI), and robotics toward new conceptions of responsive living environments; design and development of assistive technologies in healthcare and other project-based research that integrates scientific investigation and creative expression into new critically computational futures.

York's Sensorium engages in research-creation, curatorial and scholarly projects ranging from performance, media environments and ecologies; future cinema and next generation gaming; and social practice and community engagement based on interdisciplinary collaboration. Research creation in performance, embodiment and sentient systems explores the spectrum of performance, from public experiences to galleries and proscenium stages, with integrated focus on the intersection of the human body and adaptive media systems. Work in this cluster traverses theories of multi-sensory experience, applications of sensing technologies, open-ended participatory artificial life environments and the intersection of machine agents and the performing arts. The media environments and ecologies cluster engages in the creation of interactive installations and immersive environments, networked objects and wearables, digital fabrication, and data visualization. Research-creation in future cinema and next generation gaming involves the creation of new stories for new screens, researchers who are developing integrated, performance based, and networked media projects, ranging from interactive documentaries, augmented reality and virtual reality, large-format media, and pervasive games alongside site-specific interventions, to develop digital technologies that are expanding the affective and cinematic geographies of contemporary media cultures. Within social practice and community engagement, researchers are exploring how digital and communication-based media can be creatively used to foster social and political change with a focus on cyber-activism, virtual reality in human-rights work, and building community connection and dissent through social media.

Research in these areas depends increasingly on engineering technologies and is complemented by AI research conducted in the Center for Artificial Intelligence and Society and York University Libraries. Researchers at York's Social and Technological Systems Lab combine robotics engineering and

interactive product design to develop solutions and interventions for the aging population, people with dementia, and interactive learners. York's research librarians and archivists advance our research culture and reputation by providing research leadership in evolving data-driven research methodologies used in digital scholarship and in managing research data to maximize accessibility. York University Libraries are actively exploring how to better extend this infrastructure into new modes of capturing, managing and exploiting information and large sets of data, and developing new ways to present, visualize and understand this data to support new forms of cultural expression. York's Motion Media Studio, an inter-disciplinary studio space created in 2016 in the heart of Cinespace, enables access to state-of-the-art technology, such as markerless motion-performance capture, augmented reality, virtual reality, and immersive environments and motion simulation. The Motion Media Studio serves as an incubator for diverse talent development, hands-on training, industry partnerships, community engagement, and research excellence within burgeoning media production facilities and mixed reality spaces.

At York, creative cultural production is complemented by the critical study of cultural traditions, production, and performance practices, including Indigenous narrative and forms of cultural expression and storytelling. The focus of research collaboration with indigenous communities centers around decolonizing education, strengthening community and cultural reclamation, and exploring indigenous methodologies through visual storytelling. Digital storytelling is also helping to advance the understanding of Indigenous student achievement and the processes of decolonizing and indigenizing schools. Linguistics scholars have been assisting in the development of language policy as it affects public education in Nunavut, and they are providing insight into how language policy has led to the threats experienced by francophone cultures in Ontario and Quebec, and internationally. In anthropology, researchers critically explore how people are subjected to, participate in and contest the processes of living in a world that is interconnected by powerful economic, cultural and technological forces. Historical scholars examine the forces and thinking that shaped cultures in the past as a starting point for acting and thinking in the present while the politics of contemporary, popular and more traditional forms of cultural expression are examined from a current political science, sociological and communications perspective. In theatre, York researchers have traced the genealogical development of performance studies in Canada and are providing leadership in major international research projects from Bali to South Africa, which are focused on the history of theatrical design and understanding the traditional narrative of theatre.

Researchers are exploring art, digital media, and globalization to better understand how artists in different cities contribute to the development of new cultural and informational landscapes, the use of new technologies to facilitate and become material for such projects, and how the projects themselves materialize. Scholars in this area are documenting new cultural formations and community-based cultures – from urban parks to transitory performances in neighborhoods and virtual spaces on the internet. Research outcomes include exhibitions, curatorial interventions, performances, and publication. For example, the Youth Climate Report, adopted in 2016 as an official education and outreach program under Article 6 of the United Nations Framework Convention on Climate Change, is based on a multilinear, interactive, database documentary film project that uses a Geographic Information System (GIS) map platform to showcase almost 500 videos of climate research produced by youth from around the world. Design researchers imagine new intelligent user interfaces for the future that inform our understanding of communications technology in the world today. Dance researchers are focusing on dance science, including the psychological aspects of injury as well as prevention research, and motor learning and motor control, while other types of scholarship is focusing on dance history and criticism. York's music scholars are engaging in highly

recognized investigations, integrating academic studies and studio training across a wide range of musical cultures and traditions. For example, ethnomusicological research is exploring the lived experience and the ongoing significance of music in defining the self and community within a context of global destabilization. Other researchers across the University are pushing the boundaries of cinema and media studies through exploring the intersections of cinema and media with technology and art; examining intellectual property law, regulation and policy issues, and rights management; studying the impact of digital disruption predicted to emerge in the next generation of digital technologies; and developing a deeper understanding of management practices across the creative arts and cultural industries.

### 5.3 Building Healthy Lives, Communities and Reimagining Futures

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York researchers are focusing on improving health outcomes, keeping people healthier longer, and redefining and advancing new approaches to create positive change both locally and globally. Researchers are shaping the future of health through the bridging of new knowledge and applications to improve the understanding, prevention and treatment of disease and injuries, with an emphasis on advancing best-practices for access to care, cost, administrative efficiency and effectiveness, equity, and health care outcomes. Initiatives include biomedical exploration; healthy aging and age equity; Indigenous understandings of healthy environments; the promotion of mental, creative and physical health; critical examinations of disabilities; analyses of global health and global health governance; health informatics and disease modelling; bioethics; exploring bullying behaviours; nursing; kinesiology; health policy and management; clinical psychology; neuroscience; and situating wellness in the contexts of history, culture and the lived environment. This approach to health research is making a significant contribution towards improving the overall health and well-being of individuals, communities, and environments.

Health research is inherently transdisciplinary and integrates knowledge from different disciplines, perspectives and responds to complex and dynamic issues. York's growing reputation as a leader in global and transdisciplinary health research is reflected in the establishment of our strong global health links, such as those formed through the World Health Organization collaborating Centre on Global Governance of Antimicrobial Resistance (WHOCC) at York as part of York's Global Strategy Lab working to address transnational health threats and social inequalities. In addition, York supports six health-specific Organized Research Units (ORUs, also known as centres of excellence) and collaborative research that seeks to both inform and transform policy, planning and practice such as drawing on lessons from the pandemic in addressing gaps in long-term residential care, or solutions and prevention strategies for youth homelessness. York's researchers are working to influence health outcomes that are impacted and intrinsically shaped by circumstances, decisions and social, economic, and cultural challenges that contribute to the health of individuals and communities.

A sampling of York's integrative health research extends from the laboratory to the community. For example, through our internationally recognized Centre for Vision Research (CVR), researchers from across the University are advancing understanding of how the human brain works through a multi-faceted approach including visual neuroscience and computer vision, making connections across the health care sector and contributing to improved rehabilitation for stroke patients and patients with head injuries and new treatments for vision loss. As well, our researchers are offering new routes of investigation and insight into the genetic, molecular and cellular neurobiology and environmental

effects on brain development in children with autism. Interdisciplinary teams are generating new insights into health and nutrition, diabetes and relationships between diabetes, stress and physical activity and new discoveries to address hypoglycemia. In the biomedical sciences, research ranges from bioengineering that is improving medical device technology and improving diagnosis and screening to broad interdisciplinary approaches to improving understanding and treatment of severely debilitating and chronic conditions, including a broad range of neurological health disorders, concussion and dementia, as well as those being addressed in York's new Centre for Integrative and Applied Neuroscience (CIAN). Other examples of the wide spectrum of health-related research activities range from the Dahdaleh Institute for Global Health Research (DIGHR) which is developing novel solutions for planetary health, global health and humanitarianism, and global health foresighting, to the Krembil Centre for Health Management and Leadership which is advancing the calibre of management and leadership in the burgeoning health industry. York researchers are advancing discoveries in cancer research, cancer biomarkers, and developing new therapies and enhancing quality of life for cancer patients and families.

Our faculty members are working to address discrimination by monitoring the human rights of persons with disabilities worldwide, along with health-related inequalities for all people, including those who are marginalized and face increased health risks. Others are focusing on enhancing literacy and educational involvement and well-being among marginalized populations, including Indigenous peoples, women, rural populations, persons with disabilities, economically disadvantaged groups, immigrants and ethnic and cultural minorities. Child and youth research produces leading scholarship on youth homelessness, mental health, education and relationships and development of infants, children, adolescents and families. Others are looking to break down Western paradigms of healthcare and remove systematic barriers for Indigenous and other communities. With a focus on promoting wellness, healthy aging, and improving quality of life, health scientists are exploring critical questions involving muscle health and its metabolism and engineers are designing technologies for the aging population, improving mobility and quality of life to assist with healthy aging. Other areas of health-related research include the influences of air and water quality on human health; the association of sustainable growth on individual and population health; the use of biomolecular interactions to diagnose and treat diseases; and women's health, sexuality, including the intersection of LGBTQ2S sexuality, gender, and human rights.

Partnerships are integral to York's health-focused research. Researchers are partnering with public health organizations, hospitals and private sector industries to build on our strong relationships with those providing health care and developing new collaborations with our community partners. For example, we are partnering to advance digital health solutions, health informatics, integrated electronic health records, as well as providing health solutions to inform policy and improve outcomes for patients – while impacting clinical decision making. Building on these areas, York is developing new programming in health intelligence, health informatics and a new data science program to provide our students with the skills they need to succeed in navigating the future of healthcare. Other partnerships are working with neighbouring full-service hospitals and community-based healthcare service networks to enhance training, research and innovation and exploring ways to improve safety in the health care system through enhancing patient-centered care. These capacity-building partnerships bring together clinicians, patients and researchers in a collaborative way to best serve our local populations and beyond.

The COVID-19 pandemic has had a profound impact on all facets of our health and healthcare. York researchers continue to be active in examining many of the different angles and impacts of the pandemic – as a transnational health threat underscoring the interconnected nature of health, from

disease modelling and migration to substantial impacts on our mental and physical health. Neuroscientists and psychologists are studying how wearing protective masks impacts our ability to recognize faces, and scientists and microbiologists are informing public behaviour on effective mask choice and personal protective equipment in guarding against infections. York researchers continue to study the underlying social determinants of health that drives disease transmission across the world. They are examining and providing a broader understanding of the different intersecting issues including global health governance, social engagement and social justice in overcoming health inequities between the Global North and South. Our researchers are utilizing AI and data science models in helping to predict viral transmission and assisting local health authorities in mitigating new infections in the developing world. Studies are looking at outcomes of the pandemic response and recovery phase linking pandemic stigma to negative psychological, economic and health impacts for certain diaspora communities in globalized urban centres. As well, research is enabling advocacy for mental health support for frontline workers responding to COVID-19 and other infections and informing policy to mitigate COVID-19 associated gender-based violence and support differentially affected racialized populations and communities.

Our researchers are providing a critical voice in the debate over healthcare reform in Canada. They are addressing privatization, healthy aging, the erosion of universal health care, worker shortages and inequities in health care. The recent pandemic has intensified this debate and floodlit these challenges. Conducting wide-ranging investigations on systemic issues like racial bias in the healthcare system is key in gaining a better understanding of the diverse Canadian population and helping to inform decision makers on creating a more responsive and compassionate system. This includes a focus on how institutions shape the experiences of people who use them. Research uses a health equity lens to examine health and human rights, as well as how gender and ethnicity shape access to health and social care. Additional research around larger age equity issues, as well as a systematic analysis of the increasing levels of privatization within our residential care system and promoting improved policies and practices around conditions and wages for care workers, are all contributing to positive change through important and impactful research.

#### 5.4 Reaching New Horizons in Science, Technology and Society

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York University is renowned internationally for its interdisciplinary approach to solve complex wicked problems facing our world today. We pride ourselves for sustaining a framework for socially responsible and inclusive research by co-creating research goals with multidisciplinary academic-community teams, while striving to predict the impact of emerging technologies. Not only do our researchers develop solutions to address large-scale challenges ranging from global health equity, environmental sustainability, water sanitation and security, clean energy, and smart and resilient communities to poverty and youth homelessness prevention, modeling and mitigating pandemic spread, disaster and emergency management, they inform social decision-making by recognizing that solutions to complex contemporary grand challenges have multiple interacting natural, social, scientific, and technical features. York assigns high priority to understanding these complex issues, researching practical solutions, and communicating our expertise to science and non-science academics, practitioners, policy makers, entrepreneurs as well as the public at large.

York is home to 30 organized research units (ORU), which serve as synergistic hubs for participatory



research programs that bring together expertise from across disciplines spanning science, technology, society and the arts. The recently inaugurated Centre for Artificial Intelligence and Society (CAIS) unites researchers who are collectively advancing state-of-the-art theory and practice of artificial intelligence (AI) systems, law, governance, and public policy. Their research focuses on AI systems that address societal priorities in healthcare, smart cities, and sustainability, and are fair, explainable, reliable and trusted. Likewise, the Centre for Integrative and Applied Neuroscience aims to explain the biological basis of human behavior in health and disease, and mobilize research from multiple disciplines ranging from health, science and engineering to social sciences, law, and arts to address health, education, industry, and other applications important for the global community. In collaboration with researchers from Center for Vision Research, they are integrating the fields of visual psychology, computer vision, robotics, and visual neuroscience as they investigate new models of human visual mechanisms and the ways that will lead to visually intelligent machines.

York University has a strong history of impactful research activities in water-related fields through its fostering interdisciplinary collaboration with external academic, government, and industrial stakeholders. The One WATER ORU at York University engages in interdisciplinary world-class research on sourcing, AI, technologies, education, sustainability, resource recovery and reuse as well as their environmental, educational, and societal implications. One WATER addresses the diverse aspects of the ongoing water sustainability crises, attracts and trains future leaders in the field, educates the public, and innovates with industrial partners.

York is home to the Dahdaleh Institute for Global Health Research focused on developing critical problem-solving approaches to pursue effectiveness, equity, and excellence in global health. The Institute's research calls urgent attention to the health of human civilization, the state of the natural systems and ecological boundaries in which we live, and the interdependent relationships and dynamics between these interwoven processes. The Institute focuses on improving the clinical public health effectiveness of humanitarian response with scientific research, technological innovation, an appreciation of complex adaptive systems, and critical perspectives that address the realities of humanitarian policy and practice. The institute also seeks answers to important questions such as: What is the global health we want? It asks this question in multiple ways and contexts, and pursues innovative and transdisciplinary approaches to design more effective, just, and equitable solutions that address the health challenges of the global commons.

The York Emergency Mitigation, Engagement, Response, and Governance Institute (Y-EMERGE) and Canada's first Centre International de Formation des Acteurs Locaux (CIFAL) at York University work to transform the way societies understand, conceptualize, analyze, manage, and govern crises, disasters, and emergencies. Y-EMERGE emphasizes community-engaged scholarship, real-world and need-driven research, and evidence-based training for effective emergency management. CIFAL York envisions a more sustainable, inclusive, and equitable world, empowering communities to overcome global challenges, while integrating the UN Sustainable Development Goals for shaping a better future. CIFAL York is dedicated to serve as a hub for knowledge exchange and capacity building among government officials, the private sector, academia, and civil society by facilitating a range of inspirational training and research opportunities. In July 2021, the United Nations Economic Commission for Europe (UNECE) established the Toronto Centre of Excellence on Youth Homelessness Prevention, the first Geneva UN Charter Centre of Excellence in North America at York

University. The Centre of Excellence builds on the work of York led Canadian Observatory on Homelessness (COH) and assesses the state of youth homelessness and prevention in the 56 member states of the UNECE, with the goal of putting youth homelessness and prevention onto public policy agendas everywhere.

York is an international leader in space science, engineering, geomatics and environmental sciences research. Researchers are leading the contribution of scientific instruments for space missions supported by the Canadian, American and European space agencies. The research involves development of space flight instruments, planetary exploration and Earth observation. Our earth, space science and engineering (ESSE) researchers have led the Canadian contributions to the NASA Mars Phoenix mission and the NASA OSIRIS-REx mission. The ESSE researchers are also involved in the NASA Mars Curiosity rover mission as well as NASA OSIRIS-APEX mission. York has recently launched the Microsystems Technologies and Application (CREATE-MTA) program, which will deliver comprehensive practical training and research opportunities to solve design challenges that cover the full range of microsystems technologies and the full design-to-application lifecycle. Our ESSE researchers are leading research on mass and volume reduction for rocket launching satellites, self-sustained medical support for human spaceflight, and biopharmaceuticals. York researchers also have an established track record of leadership in atmospheric research with observations to investigate the processes of climate, weather and air quality, as well as broad engagement in the environmental monitoring of air, water and biodiversity.

Scholars in the humanities and social sciences expand our critical understanding of science and technology by exploring their social, cultural, political, philosophical and material dimensions. This research offers unique interdisciplinary perspectives on both the historical development and contemporary challenges of scientific and technological practices and discourses. Researchers from across the University are collaborating on projects in the development of technologies in the digital arts, computing and engineering. Further, with the development of new technologies come new legal issues and rapidly evolving legal and social norms. York's legal scholars are exploring the complex legal and governance issues surrounding intellectual property, artificial intelligence and technology law, and interacting with their colleagues in sciences and engineering. The Institute for Technoscience and Society (ITS) is a global hub of critical and interdisciplinary research and knowledge mobilization on the relationship between technoscience and society, especially the configuration of social power underpinning scientific claims, medical practices, emerging technologies, and sites of innovation by cultivating interdisciplinary, comparative and transnational research, collaboration, policy-thinking and practice. IP Osgoode explores legal governance issues at the intersection of intellectual property (IP) and technology. Among the program's target areas are all facets of intellectual property protection and access, privacy, ethics and intersecting areas of the law, from contract, health, labour, Indigenous, environmental, constitutional, corporate and international law? all within a variety of disciplines, from business, sciences, and the arts.

In mathematics and statistics, researchers are undertaking leading-edge studies that focus on applications for the sciences and health sciences. They are developing new mathematical models for the prediction of disease transmission and the geosimulation of how a disease spreads, and they are coordinating several academic-industrial collaborations in data mining, neural networks, pattern recognition and vaccine mathematics, modelling and manufacturing. Significant contributions to this research are being made by researchers in the life sciences, with emphasis on biochemistry and molecular biology, cell biology, ecology and population biology, genetics and animal and plant science and mathematics. Researchers in chemical and physical sciences are pushing the boundaries of

nanotechnology and advancing the fields of synthetic chemistry, proteomics and materials science.

### 5.5 Pursuing a Just, Equitable and Sustainable World

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Pursuing a just, equitable, and sustainable world requires research that offers new insights into key challenges facing Canadian society and the global commons. Our researchers ask critical questions that probe environmental and urban sustainability, as well as climate justice, and forge socially engaged partnerships – both locally and internationally – to address inequality in a global context.

At York, the desire to build a more sustainable future underscores all of our teaching, research, and operational activities. Guided by both the University Academic Plan and our Sustainability Strategy, we draw on the strengths of our diverse and inclusive community to approach sustainability through a holistic lens of collaboration, innovation, and knowledge mobilization. For example, through our new CIFAL centre, CIFAL York, we are bringing leaders from governments, not for-profits, and industry together with researchers and educators to address complex global issues in the areas of sustainable development, disaster and emergency management, diversity and inclusion, economic development, global health, and entrepreneurship.

The nature and scale of our societal and environmental problems require a broad spectrum of research approaches that seek positive change. York researchers are pursuing collaborative, integrative and solution-oriented research on environmental issues at multiple campuses in multiple countries and in international research partnerships that traverse borders and span the social sciences, law, business and engineering. For example, York initiated global research collaborations search for ways to challenge the inequities that produce uneven anti-microbial resistance across the world; they create original scholarship that squarely addresses urban food insecurity and housing crises, and translate research findings into change-oriented and accountable public policy. In addition to cutting edge sustainability initiatives on York's Keele and Glendon campuses, our EcoCampus at the Las Nubes Biological Reserve in Costa Rica provides a living laboratory where issues of neo-tropical conservation, education and eco-health are studied and explored. The Reserve's library, La Casita Azul, provides an important link between the campus and the surrounding community through the development of programming and providing studyspace and internet access. In addition, York researchers address transnational criminal relations and human rights violations, as well as their impact on migration and the security of refugees who are the flotsam and jetsam of global geopolitics amid war and humanitarian emergency. York researchers address violence, conflict, and impact of war in all its forms.

York is an urban university with internationally recognized expertise in urban design, planning, and sustainable transportation to facilitate and integrate city life. Examination of issues related to urban sprawl and political ecology are major challenges engaged by York researchers who bridge ecological research and public policy. York leads the world in research on suburban development globally as an approach to examining governance, land use, migration, infrastructure and daily life. York researchers focus on urban immigration gateways, like Toronto, looking to enhance the social, economic and

political inclusion of newcomers to Canadian cities. York researchers lead tool and process development to advance the measurement of Ecological Footprint and Biocapacity, reduce Canada's overall carbon footprint, and build sustainable energy sources of the future. This includes implementing York's Energy Management Plan to accelerate greenhouse gas emission reductions from the University's central utilities and deep retrofits to buildings, and development of power and renewable energy systems and materials for green infrastructure, such as micro- and nano-structure bio-materials. Through the Ecological Footprint Initiative, York University is currently measuring its GHG emissions and the ecological footprint of York University and its institutional activities. This includes scope 1 direct energy emissions, scope 2 emissions purchased from utilities, and scope 3 emissions which includes Transportation (commuting, business travel etc.), and Procurement of Goods and Services.

York researchers study water quality in Canadian lakes and investigate threats to these habitats. They examine the health impact of climate on vector-borne and waterborne diseases; predict climate change patterns using insect sub-fossils; study the migratory patterns and health of forest songbirds and study invasive insects within ecosystems under threat. York is a research leader in the biodiversity and conservation of bee populations that are vital to the pollination of wild plants and crops, which in turn produce food for human consumption. Ecologists study the effects of multiple environmental stressors on different ecosystems and develop computer models to predict these effects. This research advances our understanding of how climate change, acid rain, mineral levels and invasive species threaten the North American landscape and the biodiversity that is essential to human existence.

Scholars at York are also investigating the ethical implications of climate change, including the responsibilities we have for future generations. Issues of cultural citizenship, community and the environment are being explored by researchers through a range of experimental and creative practices that emphasize public art installations and scholarly publications that examine urban development, Inuit culture and climate change. York researchers are also exploring climatic and environmental change in Europe, North America and Asia across various historical periods and showing how these shifts have had profound social, economic and political effects over time.

As Canada continues to make progress towards its goal of net-zero emissions by 2050, York researchers have engaged in research that addresses the justice dimensions of the transition to a greener economy, contestation over extraction, and the distribution of pollution burdens affecting marginalized communities and vulnerable populations, including through the Ecological Footprint Initiative. Indigenous scholars at York University share their knowledge, and with allies forge new Indigenous understandings of the natural world and of reconciliation in a world still largely dominated by settler institutions. Researchers actively pursue scholarship that bridges disciplines concerned with achieving social justice in the context of both natural and built environments. York's new Centre for Indigenous Knowledges and Languages (CIKL) hosts scholars whose research analyzes environmental degradation through the oral narratives of Indigenous elders and community members over time.

Legal scholarship probes important environmental, equity and human rights issues in Canadian and global environmental law, including those related to Indigenous peoples and the environment. This work is complemented by research on natural resources law; the impact of resource development on constitutionally protected Indigenous rights and treaty rights; ethical investment; governance for sustainability; and sustainable finance. York researchers are established international leaders in research on equity and intersectional relations of inequality and oppression. These include anti-

poverty analysis in Canada and in the global South; politics and processes of racialization; inclusive approaches to gender and sexuality; as well as critiques of ableism and its resulting inequalities. Our researchers also examine global migration as a barometer of inequality and violent conflict. York researchers focus on the violation of fundamental human rights, and the loss of security and livelihoods abroad and the search for temporary work in Canada to feed their families back home. Researchers of forced migration probe the adjudication of refugee claims of those who claim asylum in Canada, including the discrepancies in our refugee determination system. York is a world leader in migration research on all fronts, but with a particular focus on those in precarious circumstances. Refugee-related research in international forums and in immigration policy thrives at York where strong ties to research centres and international organizations abroad have been forged over decades of collaboration.

These research outcomes play a strong role in informing public policy development and community practice in government, non-governmental organizations (NGOs) and UN organizations. Similarly, feminist research at York examines national and transnational issues, applying analyses of race, gender, sexuality and other axes of difference to the workplace, transitional justice, colonial violence, and much more. York's researchers focus more generally on analyzing Canada in the context of North America and in relation to global political economy.

## 5.6 Elevating Entrepreneurship Through Socially Responsible Innovation

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York fosters a thriving community of scholars who are passionately interested in how socially responsible innovation can improve our economy and our planet. With the increasingly entrepreneurial nature of the University, York continues to create breakthrough innovations by aligning its research with societal and market needs. Entrepreneurship research at York is conducted within a broader community setting that emphasizes social justice. Our exploration of factors that contribute to the technological developments, market innovations and the performance of entrepreneurial ventures is balanced by research that critically questions the assumptions underpinning market capitalism, neoliberal political models, Eurocentrism and bourgeois culture. Along with leading scholars in innovation, entrepreneurship and business management, York boasts several of the world's leading critics of contemporary capitalist society who are exploring the violence of capitalist, colonial and patriarchal states, societies and economic systems, and the nature of the structures of governance that instantiate and sustain these inhumane inequities from the local to the global stage. Rather than being incompatible, these two research areas generate a productive tension that, in turn, yields a unique perspective on the development and implementation of responsible innovation.

Entrepreneurship has clear ties to economic performance, yet entrepreneurial innovation is far from being restricted to goals driven only by the profit motive. With increasing frequency, entrepreneurs seek ethical pathways to develop and conduct business in a manner that contributes to the well-being of society. Responsible innovation requires governing technological, scientific, and economic development in a conscientious manner. York researchers strive to illuminate the conditions that can foster such responsible innovation: many are recognized as a world leader in research regarding sustainability, corporate social responsibility, business ethics, social enterprise, and social sector

management. The COVID-19 pandemic, as well as a range of other global developments, has given new urgency to extending our understanding of how business can be conducted responsibly given the complexities of contemporary social and economic conditions. For instance, through our globally recognized Centre of Excellence in Responsible Business (COERB), York researchers are creating and disseminating new knowledge about the social, environmental, ethical and political responsibilities of business.

As attention to environmental, social and corporate governance (ESG) issues has become a critical priority for organizations, researchers at York are well positioned to advance knowledge regarding rapidly evolving ESG challenges and practices. This research is focused on creating new knowledge about the social, ethical, environmental, and political responsibilities of organizations, and how critical issues facing organizations can appropriately be addressed. Scholars from across the humanities, social sciences, law and business are engaged in tackling critical, interconnected issues in this regard, such as examining how ESG factors and climate risks intersect with relevant policies and laws in Canada, including the impact on Indigenous communities and the duty to consult.

This same ethos informs our research into extractive industry practices, the adoption of new technologies (including AI), international intellectual property regulation, and trade and investment agreements. Still other initiatives examine labour standards and labour relations, and probe how public policy can promote socio-economic equality for workers both in Canada and abroad. The Global Labour Research Centre (GLRC) at York University engages in the study of work, employment and labour in the context of a constantly changing global economy. Research about venture capital, private equity, real estate and infrastructure, and finance occurs alongside research into the cultural, social and economic challenges of human migration, settlement and diasporas. At Lassonde School of Engineering, a major emphasis on the development of the “renaissance” engineer, who brings a sense of the public interest and corporate responsibility to professional practice, is reflected in the creation of research programs exploring transportation networks, energy solutions and the development of new devices and technologies.

York researchers are known for putting critical insights to practical uses through dynamic interactions with decision makers in the public and private sectors. From economic policy consultations to gender analysis of budgets, to assessing intellectual property protections and creating informed dialogue on urban transit, we serve as drivers and catalysts for more intelligent public policy. For example, researchers at York’s IP Osgoode are helping to frame intellectual property law and related technology discussions in Canada, and they are introducing useful policy options aimed at providing balance in policy- and law-making processes. Our hosting of the Law Commission of Ontario is a further example of our hands-on policy engagement, as is our leadership of the Canadian Observatory for Homelessness and the Refugee Research Network. Our contributions to policy and the economics of renewable energy through the Sustainable Energy Initiative are another strong example.

Through Innovation York, the University has launched several initiatives including York University’s pan-institution entrepreneurship hub that has over 14 different programs, building a unique entrepreneurial community. All these programs are delivered through YSpace: ELLA, Ontario’s first accelerator focused on women-led businesses; YSpace Digital, offering a variety of online supports and services; YSpace Markham, a physical incubator supporting growth-ready ventures; and YSpace Georgina, with entrepreneurial resources and collaboration space located in Northern York Region.

York also partnered with the Black Creek Community Health Centre to create the Black Entrepreneurship Alliance, focused on creating entrepreneurial support and upskilling opportunities. Our entrepreneurial programming is establishing York as a recognized leader as an entrepreneurial hub, delivering unique programs that are first of a kind in the industry. York now operates Ontario's first food and beverage accelerator and Ontario's first women led professional services ventures, as well as Northern Ontario's first entrepreneurial hub. These initiatives have worked towards maximizing the commercial, economic, and social impacts of research and innovation—from helping to reduce the gender equality gap in entrepreneurship to creating opportunities for all entrepreneurs, these initiatives are exemplars of socially responsible innovation at York.

A common thread through all of York's initiatives is our collaborative approach to knowledge creation and social and commercial innovation, according to which academic researchers work with community partners, the private sector and policy makers to advance and promote social consciousness and enhance business and economic practices. York researchers exhibit leadership that fosters innovation and enhances society's capacity for building for sustainable livelihoods while supporting the public good and contributing to our regional economy. Founded by York University, Research Impact Canada, a pan-Canadian network of 23 institutions, hospitals, and research organizations, is a national leader in the practice of creating social value and impact from research, knowledge, and innovation.

## **6.0 Research Opportunities: Compelling Opportunities for the Strategic Development of Research**

Within the breadth and diversity of cutting-edge scholarship at York, there are many areas where scholars have coalesced to provide enhanced opportunities for leadership and recognition through strategic investment in more focused collaborative activities. These are complemented by emerging areas of research that are underpinned by a strong vision of the York community achieving new levels of research leadership in ways that bring a unique York perspective to solving some of the world's most compelling challenges. Some opportunities are driven by new frontiers of fundamental inquiry, while others reflect the convergence of strong academic interest and external opportunities that can have a transformational effect on society. All reflect the ability of York to make unique contributions.

Development of these opportunities brings together varied perspectives, disciplines and understandings to deliver innovative achievements and address emerging challenges. Strategically, by committing to supporting and building these areas of opportunity, we are positioning ourselves to further enhance the profile and deepen the recognition of York's ground-breaking scholarship that informs our academic programming. Some opportunities were initiated in our 2018-2023 SRP and have the potential to further enhance the University's profile. Other new opportunities reflect the progress of our scholarship and the evolution of the world around us in areas where York researchers have the potential to excel.

- Digital Cultures and Disruptive Technologies
- Healthy Communities, Equity and Wellbeing
- Indigenous Futurities
- Climate Action for a Sustainable Planet
- Studies in Equity and Social Justice
- Catalyzing Inter and Transdisciplinary Research Opportunities

## 6.1 Digital Cultures and Disruptive Technologies

The digital revolution that we currently are witnessing has been referred to as the Fourth Industrial Revolution as this new stage of human development has been enabled by extraordinary technological advances comparable with and, in some cases, even exceeding those of the first, second and third industrial revolutions. As this era of embedded connectivity is distinguished by the widespread and common use of technology throughout society, these rapid advances in technologies continue to merge the physical, digital and biological worlds in a manner that creates both promising opportunities and potential risks. With the continued upsurge of social media platforms, the expansion of complex algorithms, growth of data sets, the scope and level of activity of this digital revolution continues to accelerate while its implications are still being fully understood. Digital technologies have given rise to vast new industries; enabled the development of various forms of artificial intelligence (AI) and machine learning; and transformed means of communication, ways of learning and cultural industries— thereby disrupting notions of culture, society, knowledge and citizenship in highly significant ways. As a result, there is a continued need for research on the digital world at the intersection of the arts, sciences, law and engineering, pushing technological boundaries while critically investigating the social, cultural and legal impacts and the ways in which it is shaping and changing human activity and interaction.

AI related research at York has gained considerable momentum over the past five years, with research ranging from the development of new brain-inspired AI systems, through application to smart cities, disaster management, emergency planning and disease transmission models, to novel legal and governance frameworks. Currently more than 140 faculty members are engaged in AI related and digital cultures research at York, contributing to both technological applications of research as well as an interconnected transdisciplinary approach. York's program offerings are reflective of this with both undergraduate and graduate programs in digital cultures related areas, including the undergraduate (BA) and graduate programs (MA, MSc, and PhD) in Digital Media offered jointly by the Lassonde School of Engineering and School of the Arts, Performance, Media & Design. Likewise, Health Studies (Policy, Management, Informatics, and eHealth) offers a broad perspective and teaches about all aspects of the health care system as well as about other factors, such as wealth and ethnicity, that influence the health of Canadians through both undergraduate (BHS) and graduate programs (MA And PhD).

York researchers have been leading the development of visual perception technologies, through the Centre for Vision Research and more recently in conjunction with the Vision: Science to Applications (VISTA) program to provide global leadership in research focusing on the intersection of computational and biological vision. Moreover, the VISTA program has facilitated the extension of vision research to include colleagues from the arts and humanities. Indeed, at the most recent program review, York's President referred to VISTA as a "forever program", indicating ongoing recognition of vision science as a key strategic direction for the university.

York researchers are also working to advance the development and implementation of digital technologies and to ensuring its equitable and ethical adoption, as well as exploring how the increasingly digital world in influencing the way we live, interact and conduct business. Our researchers are exploring AI and digital technologies within the digital media contexts, legal frameworks through IP Osgoode, and the Osgoode Hall Law School's Intellectual Property Law and Technology program and the IP Innovation Clinic (Law & Engineering). Furthermore, the interplay



between media arts, performance and digital culture through research centres, such as Sensorium, adds to the richness of angles and dimensions of perspectives and explores networked connections between people, responsive environments and ecologies of place.

Other scholars from across the humanities, social sciences, health, engineering and law are studying the moral, ethical and legal implications of digital technologies including AI, and effects on governments, public policy, labour markets, personal and national security, human health and health systems and challenges to our sense of individual identity and collective humanity. Work in this area also explores research in immersive environments including virtual and augmented reality, the impact of digital usage in a variety of community settings including Indigenous communities; how digitally based forms of knowledge and expertise are emerging online; and how digital gaming can inform education. In addressing the potential risks of emerging disruptive technologies, York scholars are also engaging in AI research that relates to data policy, intellectual property, EDI and human rights issues, governance and access, surveillance, information privacy, and cybersecurity. Importantly, this holistic approach is characterized by a deep engagement with community, industry partners, public agencies and international organizations focusing on the impacts and applications of digital technologies. Coordinating investment and promoting interdisciplinary interactions will propel research and strengthen industry-academic collaboration in these areas. Further, we will continue to build upon our cutting-edge digital arts and technology research and existing collaborations with some of Canada's largest digital media hardware and software companies.

As technological advances foster new systems, impacting many dimensions of society, we have identified the integration of disruptive technologies into society as a critical area for accelerated research over the next five years. One critical opportunity will be guiding the ethical, legal, sociological and technical development of the rapidly expanding technology including AI, high-performance computing that is associated with the challenges of big data, as well as technical literacy that all societies face today. Beyond AI, we will also extend our leadership in new disruptive technologies (including Health Informatics, Blockchain, Beyond 5G, Advanced VR, nano, Big Data, Cybersecurity, and Smart Cities) as well as their applications in social sciences, humanities, Health, and other STEM fields, interfaces and content creation, scientific inquiry, design, policy development and critical discourse in digital media. We will further our recognized leadership at the interface of an expanding cluster of creative industries in film, television, informatics, data visualization games and app development. This focus will continue York's leading scholarship on how disruptive technologies will affect culture, living, economics and identity. Moving forward, York will continue to advance key recommendations outlined in our AI task force's November 2021 report, titled *Fostering the Future of Artificial Intelligence: Report for the York University Task Force on AI & Society*, to further advance York as a future global centre of excellence for AI related initiatives and research. Support in this area will leverage York's current success in digital media, AI and the broader impacts of innovation on society, encouraging continued innovation to sustain our leadership.

## 6.2 Healthy Communities, Equity and Wellbeing

For over three years, the COVID-19 pandemic has transformed our lives, our economy, and our health care system. As the greatest public health challenge in more than a century, never has the health care system in Canada been under greater pressure. The pandemic has placed our health care system under enormous stress and has worsened long-standing issues, such as lack of access to

primary care in communities across Canada, resource constraints, patient backlogs, and the adoption of new technologies. From addressing longstanding issues to reimagining healthcare systems, the issues we face are broad and far-reaching.

As we continue to tackle COVID-19 and adjust to the many socioeconomic changes that it has brought, researchers at York have aimed to better understand the changes that are needed in our healthcare system. The COVID-19 pandemic has had a particularly devastating impact on long-term care homes— researchers are investigating the state of the healthcare labour force and especially those working in long-term care. Healthcare providers have turned to online tools to deliver services remotely during the pandemic, causing a rethink of how digital innovation can be used in healthcare but also causing increased inequities for vulnerable communities. As such, researchers are examining how to adapt e-health for a broader population and strengthen the ability to detect and respond to public health events and emergencies.

Healthcare management is in a state of flux given the emerging challenges from the pandemic with need, access and delivery. There is a need to optimize access to the right care, in the right place geographically and with faster access. As such, York researchers are working to improve patient scheduling and healthcare staffing using advanced artificial intelligence tools. Meanwhile, researchers in the humanities and social sciences are examining the barriers and drivers of access to healthcare.

Aging and increasingly diverse populations, together with the growing complexity and personalization of health care, are driving the search for health care solutions that emphasize wellness and disease prevention to minimize the need for medical intervention. Increasingly, medical advances are transforming acute conditions such as neurodegenerative diseases, HIV infection and cancer into long-term chronic conditions that must be treated and monitored over decades. Increasing longevity and the complexity of life and has been accompanied by increasing challenges to mental health and cognitive function. In alignment with the United Nations Decade of Healthy Aging (2021-2040), providing long-term, cost-effective regulations, technologies and solutions to these challenges is an opportunity that aligns directly with the strengths of York's health research, which focuses on wellness and community health and emphasizes York's commitments to equity and social justice.

Concurrently, health care in Canada remains health care for the privileged. In the developing world, health inequities and challenges affect far greater percentages of people. In addition to learning how to export and translate health care solutions globally to respond to challenges, there is a pressing need to extend the partnership with developing nations to empower global health care solutions and break down historically vertical models for their transmission and adoption. This work is multidisciplinary where public health (biostatistics, epidemiology, environmental science, behavioural science, health policy and management) intersect with the social sciences (demography, political economy, law and human rights, and sociology), natural sciences (biology, biochemistry, and bioinformatics) and engineering and computer science (biosystems, bioengineering, biomedical devices, microfluidics, health informatics, and bio- micro-electro-mechanical systems) to address problems that can arise locally but have interconnected global implications affecting health and health equity, while always being mindful of underlying cultural, social, legal, environmental and economic perspectives. These issues are further heightened through the large-scale migration of peoples driven by environmental and economic forces and conflict.

Health research has gained considerable momentum and recognition over the past five years through the individual achievements of researchers and the successful launch of major initiatives. These initiatives include VISTA, bringing together the visual sciences and their application and societal impacts; the Health Care Ecosphere, leading the development and commercialization of personalized health care solutions, and enterprise health technologies that move prevention and management out of traditional environments into new spaces; York University Centre for Aging Research and Education, pursuing active and positive responses to changes and challenges throughout the aging process on a societal and individual level and; creation of the Dahdelah Institute for Global Health Research, whose researchers are pursuing solutions to global health challenges with a focus on women, children, Indigenous peoples, prevention and the governance, policy and management systems to fully realize benefits. Another example of York University's strength in health research is the growth of research and international collaborations across a wide range of bioengineering- and biosystem-related disciplines.

Over the next five years we are committed to expanding research that focuses on health, health care regulations, digital health, health outcomes and the promotion of wellness. From biomolecular engineering to the health of populations, from biomedical to social work and health law, and from healthy aging in communities to global child health, researchers will accelerate their individual success and will fully realize the potential of recently launched initiatives. In addition, we will pursue new partnerships across health care, social services, natural sciences, engineering and global health sectors to extend the leadership and influence of our research. With the opening of a new campus in Markham, Ontario, in 2024, we expect to further enhance our focus on community engagement, while new directions in bioengineering research will be launched with the continuing expansion of our engineering programs.

The development of our engaged health research programs is expected to build York's ability to address Ontario's evolving and unmet clinical and community health care needs. Over the longer-term York maintains its aspiration for a new kind of medical school to focus on integrated interdisciplinary care, family medicine, community health and wellness through the lifespan. Informed by demographics, health care gaps and the evolution of medicine, our emphasis is on the integration of primary care physicians within the context of the broader health care and wellness promotion teams. As a partner in the Vaughan Healthcare Precinct (VHCP), York is well positioned to advance health care practices and outcomes through local and global partnerships.

York University is also deeply committed to fostering innovative approaches, technologies, and perspectives to solve problems and promote global economic and social well-being. Building off the success of our entrepreneurship hub YSpace, York is committed to supporting social innovation and the translation of new knowledge to decision and policy makers, as well as the commercialization of innovations developed within the VHCP through start-up venture creation and growth programs. The tremendous wealth offered by the surrounding disciplines at the University, which can provide unique perspectives and innovative approaches to solving some of the most pressing questions in health promotion and practice, disease and injury prevention, and health care delivery.

### 6.3 Indigenous Futurities

*Deeply rooted in history, futurities recognizes that the future, despite its*

*intangibility, is directly impacting us today.*<sup>1</sup>

*Indigenous futurity considers how indigenous revivals might be viewed as expressions of "futurity," operating in resistance to those assumptions that consign Native American [Indigenous] peoples and lifeways to the past.*<sup>2</sup>

York University has a long-standing commitment to access, inclusion, equity and diversity. In a time when truth, reconciliation and justice are dominating public discourse about Indigenous issues and when Indigenous communities in Canada and around the world are facing severe health, social, legal and societal challenges, the need for research that imagines the future has never been greater. Learning from Indigenous ways of knowing, ways of being, worldviews and laws, futurities research will contribute to changing lives and will significantly affect nations, communities and individuals. Indigenous Futurities will help research make a positive impact on Indigenous communities. As a recognized global leader in socially engaged research and knowledge mobilization, York is committed to building community partnerships in research. In the Indigenous Framework (2017), York pledged to "facilitate research that is relevant to Indigenous life and respects Indigenous approaches to knowledge and learning."<sup>3</sup> York's researchers are positioned to collaborate with local and global Indigenous communities on research that will contribute to improving community life while enhancing cultural, economic and environmental sustainability. Never losing sight of history, this research opportunity simultaneously insists on consideration of our relationships to Indigenous futures and the ways they will continue to influence and shift the emphasis in current research and innovation.

York is home to a large group of scholars including faculty, post doctoral fellows and undergraduate and graduate students, both Indigenous and non-Indigenous, whose research exists in relation to Indigeneity. These scholars engage in a range of contexts and topics from the epistemological to the environmental, from the mathematical to the methodological, exploring interrelations across disciplinary boundaries and borders. Recent Indigenous research initiatives are focusing on circumpolar cultural sovereignty including collaboration with Inuit, Alaska Native and Sami communities; community engagement on mining and extraction in Baffin Island, Northwest Territories and Yukon Territory; the role of youth in health promotion, and the legal and environmental interrogation of just and equitable relationships; the interactions between Indigenous and non-Indigenous laws; the histories of Métis, First Nation, Inuit and Native-American relationships with colonialism; Indigenous language policies, art and education; Indigenous knowledge systems and their various applications in diverse contexts including water and environmental governance, environmental justice, forest policy and management, and sustainable development; and urban Indigenous education and communities. Most significant, Indigenous researchers have made major

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<sup>1</sup> Paul Kuttner, "Futurism, Futurity, and the Importance of the Existential Imagination," *Cultural Organizing* (blog), May 17, 2017. Accessed February 11, 2018, <http://culturalorganizing.org/futurism-futurity/>

<sup>2</sup> Sean Teuton, "Indigenous Futurity," in *Native American Literature: A Very Short Introduction* (New York: Oxford University Press, 2018), chapter 7. Accessed April 20, 2018, <http://www.veryshortintroductions.com/view/10.1093/actrade/9780199944521.001.0001/acrade-9780199944521-chapter-7>

<sup>3</sup> York University, *The Indigenous Framework for York University: A Guide to Action* (2017), emphasis added. Accessed February 11, 2018, <http://indigenous.yorku.ca/files/2017/08/Indigenous-Framework-for-York-University-A-Guide-to-Action.pdf>

contributions to the scholarship of Indigenous ways of knowing. This SRP Opportunity will further support and enhance these existing initiatives and foster deeper engagement with these and other developing research projects.

York University's context has changed since the launch of the 2018-2023 Strategic Research Plan SRP and the Indigenous Framework in 2017. York acknowledges our colonial roots and has remain publicly committed to ongoing efforts at addressing barriers to Indigenous research<sup>4</sup>. There is a strong commitment to further strengthen our efforts to reach research excellence in Indigenous research. Nonetheless, the following accomplishments have been made since 2018.

- In September 2021, York launched the Centre for Indigenous Knowledges (CIKL), an organized research unit (ORU) committed to Indigenous approaches for the environment, education, languages and decolonizing research. Researchers at CIKL have examined a broad range of topics: climate justice issues facing Indigenous peoples, proliferating beadwork as a form of knowledge mobilization, supporting Indigenous-led conservation, and enhancing the protection of water and Indigenous water governance.
- York provided additional supports to CIKL including funding an Associate Director and a full-time centre coordinator (2022, ongoing).
- York developed an action plan to address recommendations in the report "Decolonizing Research Administration: An evaluation of Indigenous Research at York University"<sup>5</sup>. This action plan is being implemented jointly by VPRI and VP EPC
- Senate approved the creation of Canada's first dedicated Indigenous Research Ethics Board involving community members including Elders and youth (2023).
- York invested in Indigenous Research Seed Grants and has made a commitment to invest for three years starting in 2023.
- York created the Indigenous Incentive Grants and Indigenous Scholarly Events and Outreach grants
- York hired the Associate VP Indigenous Initiatives and has committed to hiring an Indigenous Research Support specialist
- York hired Indigenous Provostial Post-doctoral Fellows and is accepting applications for additional post doctoral Fellows going forward
- With guidance and input from Indigenous Council and CIKL, Knowledge Mobilization (KMb) York developed a tool to help non-Indigenous researchers plan to engage with Indigenous communities

Indigenous-related research consistently references community: whether within an urban context, a nation or a global/international community. An Indigenous worldview insists that within a community all relations matter and having good relations with all of Creation is foundational to healthy communities. As community-based research, the focus covers a broad spectrum of lands and territories and insists on acknowledging specificity of context. Notions of relationship-building, reciprocity of process and outcome, respectful engagement with each other and relevance of the work to those involved in the projects are integral to the research. This opportunity encompasses

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<sup>4</sup> <https://yfile.news.yorku.ca/2022/05/24/a-statement-on-yorks-commitment-to-the-indigenous-framework-and-decolonizing-research/>

<sup>5</sup> [https://www.researchgate.net/publication/344798162\\_Decolonizing\\_Research\\_Administration\\_An\\_evaluation\\_of\\_Indigenous\\_Research\\_at\\_York\\_University](https://www.researchgate.net/publication/344798162_Decolonizing_Research_Administration_An_evaluation_of_Indigenous_Research_at_York_University)

post-colonial interests, trans- Indigenous theory, and other forward-looking community-referenced, reciprocally beneficial research.

Going forward over the next five years, the focus of this research opportunity will be on Indigenous futurities and will include social, cultural, artistic, legal, policy, economic and justice areas that holistically shape Indigenous experience. Collaboration in exploring Indigenous and non-Indigenous approaches in these areas, while understanding the need for Indigenous researchers to take the lead, will mark the distinctiveness of York's approach. Following this lead holds promise for current research influenced by a future that honours Indigenous ways of knowing and shapes the direction of all our work within Indigenous communities, Canada as a nation, and beyond into global contexts. The intent of this opportunity is to ensure that Indigenous-related research includes a commitment to listening to and learning from Indigenous peoples' knowledge, laws, ecology, spiritual practices and experiences. The commitment of researchers to participate in imagining the future while never losing sight of the past will enhance our commitment to the import and role of research in creating the future we desire.

#### 6.4 Climate Action for a Sustainable Planet

In Canada and around the globe, climate action is no longer a matter of political debate or individual conviction—it is an existential challenge that demands a research and evidence base to enact change. As human population and activities grow, there are ever-greater pressures on our environment and societies from climate change and the related proliferation of disease. Both of these contribute to increasing inequalities and creating new disparity among peoples and countries. The climate crisis is urgent; social, economic, and infrastructure impacts will continue to accelerate if we do not act now. We must pave a stronger path towards a more sustainable planet and to addressing the emergencies and disasters along the way. Over the next five years, York will invest in research to concretely address this climate crisis, building on and expanding its knowledge and experience related to climate change to meet this challenge. We will apply our expertise on disaster response and humanitarian emergencies to acute weather events caused by global warming here in Canada and abroad, paying careful attention to and including those historically marginalized from these activities as partners and as beneficiaries. A new research centre (Y-EMERGE) has been created to capture and consolidate this world-renowned expertise.

Across disciplines, our scholars are recognized as world leaders of research on the root causes, expression, and consequences of inequality and oppression. The underlying factors driving the climate crisis and the manifold consequences of key environmental and societal challenges are a concentrated focus of research at York. So too are sustainability efforts to achieve net-zero emissions on our campuses and off, through new technologies for transportation, home construction and heating, urban design and regulatory innovation to incentivize a smaller carbon footprint. Above all, research in this area strives to inform and enhance law and public policies that shape the behaviour of governments, public and private organizations, and individuals.

Growth in individual and collaborative scholarship at York in this area over the past five years has been remarkable. Research that challenges the status quo and creates team that cross disciplinary boundaries offers energy and design alternatives, but also modalities to change public opinion. York research partnerships and networks to examine elements of the climate crisis extend far beyond the borders of Toronto and Canada, into Global South and North countries but also their civil societies.

Transnational corporations in food production and mineral extraction, for example, must be scrutinized for their roles in polluting the global commons but also as potential remediation actors going forward.

Any major societal or environmental challenge – whether food insecurity, global warming, or species demise - does not affect everyone or everything equally: humans will experience different consequences from nonhuman animals in relation to habitats under threat; one's nationality, ethnonational identity, gender, ability and location within historically salient colonialism all shape one's relationship to the climate crisis, with those who have historically been negatively affected become even more adversely affected.

Researchers are collaborating on interdisciplinary and broader transdisciplinary teams across York but also the world to tackle a range of climate-related issues: some use big data to probe the political and social pressures on the migration of peoples and the challenges faced by refugees; others have built an international network exploring and exchanging relevant solutions for youth homelessness and child welfare; researchers examine the evolving regimes of precarious work both in Canada and through studies of employment and labour in the global economy. The design of cities to be resilient, inclusive, and sustainable is a huge challenge that York researchers are addressing everyday through applied work with community partners and the City of Toronto, and across the country with partners engaged in what the federal government has called 'the feminist recovery from COVID-19' – addressing gendered and racialized challenges of employment, housing, health and much more. Social scientists and engineering professors collaborate on sustainability around transportation, meshing this analysis with equity in underserved communities; renewable energy research; and exploration of business ethics, the social economy, and corporate social responsibility scholarship at York.

Building on this base over the next five years, research in this area will inform and address emerging issues in urban, rural and wilderness environments at local, national and global scales. This research will include the preservation of ecosystems and species; emission and pollution; a sustained focus on human-animal interactions. York's commitment to SDG #16 'Peace, justice and strong institutions' reaffirms our research momentum on issues of governance and human rights, with implications for Indigenous reconciliation, global migration, and diplomacy but also extractivism, research on cultural genocide, and reparations in the wake of violence. Economic prosperity and ameliorating poverty remain squarely on York's research agenda, along with intimately related issues of security in all its forms. York will continue to lead global North countries with its global network of researchers addressing youth homelessness with net new projects that engage Indigenous partners and issues of homelessness among first nations.

York remains committed to developing new knowledge and solutions to achieve a just, equitable and sustainable future with and for Canadians and across the world. To supplement our sustainability research at the Keele and Glendon campuses as well as the EcoCampus at the Las Nubes Biological Reserve in Costa Rica, research partnerships that cross borders and engage communities will be a major focus of the University's new Markham Campus. Research at this campus will focus on directly engaging the surrounding cities, organizations, and residents in developing and fostering collaborative partnerships with businesses, social services, and both secondary and elementary schools. We plan to continue investing in our whole-institution approach to sustainability, embedding sustainable principles in every aspect of university life, and generating knowledge that integrates the social, cultural, economic and environmental dimensions of complex

sustainability challenges at scales ranging from local to global.

### 6.5 Studies in Equity and Social Justice

York was founded on a mission of social justice. With our longstanding commitment to the values of equity, diversity and inclusion, we are working together to create an equitable and inclusive scholarly environment that aims to create an equitable and inclusive society. This is critical in achieving inclusive excellence, where a multiplicity of research, perspectives, and lived experiences creates positive change towards a more innovative, just, and sustainable world. York's tradition of scholarship has been defined by a critical discourse in which the pursuit of discovery and innovation and engagement with broader society is achieved with a focus on social responsibility, equity, and justice. These values and core principles shared by our research community serve to strengthen and underpin our research priorities.

This commitment has set a fertile context for a rich profile of inclusionary research and scholarship that forms the core of our research enterprise and helps to shape our future direction as a dynamic, metropolitan, and multi-cultural university open to the world. Excellence in research is founded on ideas and knowledge that come from people with diverse backgrounds and lived experiences collaborating with diverse partner organizations. York conducts wide-ranging research examining historical and contemporary dynamics of cultural diasporas promoting an understanding of experiences as part of a larger global community, within a network of organized research units (ORU). York boasts a rich assortment of inclusionary research among its 31 interdisciplinary research centres, a network of synergistic hubs that bring together expertise across disciplines. Researchers in these ORUs explore a range of racial, moral, religious, political, feminist, Indigenous, age related, environmental and legal philosophies, as well as examination of all forms of discrimination and promotion of human rights. Across a spectrum of disciplines, there is deep dedication to equity and social justice expanding critical analysis of the constructs and intersectionality of identity, gender, sexuality, class, race, ethnicity, nationality, citizenship, age and ability. Research on decolonization and reconciliation focuses on reconfiguring settler-Indigenous-state relationships incorporating Indigenous methods of truth-telling and principles of restorative justice. This critical inquiry allows us to hear voices otherwise silenced by historical or contemporary injustice or marginalization. Further research in these areas studies our conceptions of diversity and the methods needed to explore it, contributing to the shaping of identification/ identity. For example, recent seminal research at York examines the ways in which accessible and equitable opportunities in education and employment account for the lived experiences of marginalized community members. Other researchers are contributing to research in areas such as digital inequality and injustice and addressing social-economic and cultural divides produced by differentiated access to information technologies. As well those that are considering the environment and emerging inequalities and impacts on the wellbeing of youth and advancing our understanding and support of Indigenous climate leadership and governance through a feminist and gendered lens to help amplify voices of Indigenous women and the youth.

This is further borne out in York's approach to integrating large scale transformative and structural changes to the way York hires and adjudicates research opportunities. Inspired by a need for change, York has created a system that invites research excellence from those who are typically overlooked and disadvantaged when it comes to research opportunities in academia. Places of Online Learning for the Adjudication of Researchers Inclusively and Supportively (POLARIS) is a first-in-Canada online training program to reduce unconscious bias and systemic barriers that offers rich and informative tools. This system is another mechanism in supporting EDI practices and fosters better awareness and education



among faculty as we seek to build a world-renowned cadre of diverse scholars that represent marginalized groups, but also progressively enhance its ability to diversify our research collegium.

Research in Equity Studies and Social Justice will also be supported by an equitable and inclusive campus environment. In addition to POLARIS, York has been active in supporting emerging Black and Indigenous researchers as well as addressing structural barriers in research through the York Black Research Seed Grants and the Indigenous Research Seed Grants. Further strengthening the research culture among our diverse scholars is a key component to promoting inclusiveness and research excellence. York is working towards a research culture that interacts in positive and respectful ways with Indigenous people and Indigenous knowledge, as well as making room for Indigenous research and Indigenous forms of disseminating research. York is implementing an action plan to decolonize research and research administration. This includes the chartering of the Centre for Indigenous and Languages including additional administrative supports and Senate approving the launch of Canada's first Indigenous Research Ethics Board. These activities will be supported by creating the position of Indigenous Research Support Specialist. In addition, VPRI has provided additional research funding for ORUs with an EDI mandate including the Harriet Tubman Institute for Research on Africa and Its Diasporas, Centre for Research on Latin America and the Caribbean (CERLAC), Centre for Indigenous Knowledges and Languages (CIKL), and [Centre for Feminist Research](#) (CFR). Furthermore, York's new community-informed DEDI Strategy supports values of equity, diversity, inclusion and social justice and will help strengthen and coordinate existing efforts at York and will act as a guiding framework to localize strategies and actions across the institution.

While fostering inclusionary scholarship, it is vital that we support knowledge creation that will have a positive impact on the communities we serve and build the profile and reputation of all equity seeking groups. Within VPRI, the Knowledge Mobilization Unit (KMB) and Entrepreneurship program have strong relationships with Jane/Finch community organizations including the TD Community Engagement Centre (CEC). TD CEC and KMB York co-chair a community engagement community of practice that supports community engagement across the University including, but not limited to, research. Our deep roots in York Region include a history with ongoing collaborations with United Way Greater Toronto focusing on collaborations with community organizations serving the needs of traditionally marginalized communities. One example is the collaboration with the Toronto Community Music Schools (formerly Regent Park School of Music). What started as a community-campus knowledge mobilization engagement has flourished into a donor funded research chair in Community Based Music with funding dedicated to ongoing and emerging collaborations.

In building on our commitments to decolonization, equity, diversity, inclusion and societal justice, we will continue to enhance and support our research efforts over the next five years, informing critical discussions of the sources and nature of inequalities and oppressions; in turn, these initiatives will better inform actions that can change and transform these inequalities. The University will continue to ensure that appropriate sensitivity to cultural and community rights, roles and responsibilities is applied to all research projects conducted at York. We will further cultivate inclusive and equitable research environments that nurture multiple and intersectional ways of scholarship and knowing. York remains committed to foreground the voice and needs of Indigenous communities within Indigenous research, facilitate research that is relevant to Indigenous Life and respects Indigenous approaches to knowledge and learning, and study Indigenous knowledge systems and their various applications in diverse contexts including water and environmental governance, environmental justice, forest policy and management, and sustainable development. Likewise, York is dedicated to expanding collaborative research and programming that is relevant to the historical, cultural and creative productions of Black and other

racialized communities. There are centuries of accumulated traditional knowledge that we believe are fundamental to solve some of the complex problems we face as a society.

## 6.6 Catalyzing Inter and Transdisciplinary Research Opportunities

As the world continues to address urgent global challenges such as climate change, global health crises and political polarization, and their impact on people and the planet, it is critical now more than ever for York to support novel transdisciplinary research approaches that help drive innovative solutions to these multi-faceted problems. Solving these increasingly complex societal challenges will require a more holistic model, one that integrates knowledge between different disciplines, across disciplines and beyond each single discipline, involving various stakeholders – understanding issues through a social, economic, political and environmental lens. Through engagement between the different participants, new understandings are co-produced to generate solutions to the increasingly dynamic problems that far exceed the boundaries of contemporary academic disciplines and stakeholders. This transdisciplinary approach integrates different views and methods from a range of related disciplines into a common conceptual framework and provides a more inclusive perspective to understanding the causes and consequences of an issue. This transdisciplinary framework extends to delivering socially relevant solutions that are responsive, relevant and socially applicable.

York's excellence in interdisciplinary research is already renowned. But increasingly York researchers are moving towards a transdisciplinary approach as dynamic research questions continue to evolve. York researchers are cultivating this thinking across disciplines through our recent Catalyzing Interdisciplinary Research Clusters program fund, which aims to foster interdisciplinary and transdisciplinary collaboration, global research excellence and world-class training opportunities. Research cluster projects continue to amplify York's international research excellence with projects that help to address complex global issues identified in the United Nations Sustainable Development Goals and beyond. Nurtured by this funding program and others, York researchers have been coming together in transdisciplinary teams to advance knowledge in a broad range of areas: measuring and analysing common brain functions to advance diagnosis and treatment of all neuro-psychiatric disorders; addressing the multifaceted natural, social and political issues underlying the pursuit of sustainable resource extraction in Canada's North; utilizing geomatics to study the evolving effects of climate change on ecosystems and human populations; examining technologies, treatment and impacts of water contaminants on the environment and human health; and understanding the pathway from colonial genocide to building just relationships. York researchers are also helping to address complex financial technology (fintech) challenges from a similar socially-relevant perspective integrating transdisciplinary research methods and engaging sector partners. Research in this area is highly established and collaborative and as such has been identified as a research cluster focus at the Markham Campus. It is underpinned by broad expertise that draws together insights from economic, legal, ethical and societal-technical angles. This is exemplified by those involved in the transdisciplinary exploration of digital currencies, where York researchers take an inclusive approach to exploring the technical aspects of governance, architectures, financial inclusion of underprivileged communities, and policy on regulatory frameworks for financial systems, including data and privacy regulations.

But examining and addressing socially- relevant challenges by crossing disciplinary boundaries is nothing new for York researchers who have gained considerable momentum and recognition over the past several years through the success of major collaborative initiatives. These initiatives include VISTA, and

now the new *Connected Minds: Neural & Machine Systems for a Healthy, Just Society*, bringing together our highly collaborative research team spanning neuroscience, engineering, arts and humanities with a diverse cadre of engaged partners, to understand and optimize societal benefits and mitigate risks of human-machine interactions. This includes the study of researchers considering the moral, ethical and legal implications of disruptive technologies on humanity and society as a holistic approach that is transdisciplinary in nature. York's 30 Organized Research Units (ORUs) also serve as incubators for participatory research adding to the richness and dimensions of transdisciplinary research at York. York's newest ORUs exemplify our strengths in technology, sustainability practices, artificial intelligence, as well as neuroscience and emergency mitigation, water, and technoscience and society – exploring areas from multiple perspectives. As an example, the ORU ONE Water where researchers are bringing together considerable knowledge and diverse perspectives to greatly enhance the capacity to address the ongoing global water sustainability crisis. This ORU draws on strong expertise and enables diverse industry and community stakeholder partnerships, with a rich research pedigree in water sourcing, artificial intelligence, water technologies, education and sustainability, resource recovery and reuse, as well as focusing in on origins and outcomes of the environmental, educational and societal implications of water.

Over the next five years, York researchers will continue to develop their understanding and practice of transdisciplinary research, continuing to break down disciplinary constructs and expand on research that considers and responds to socially relevant issues. Funding drivers like the Catalyzing Interdisciplinary Research Clusters program and additional support for research teams at our Markham Campus, assist with this commitment to further fuel and scale the evolution of York's interdisciplinary research into a more dynamic inquiry approach. With the increased funding capacity and support for transdisciplinary research clusters, researchers will be able to accelerate the capacity of their fully launched research projects and initiatives and expect to pursue larger-scale external research funding as well as the development of broader research nodes and potential national and international networks. In addition, we will seek to expand meaningful participatory engagement with aligned stakeholders and partners where possible and pursue new research partnerships across the spectrum.

**Sections 7.0 – 8.0 to be completed and included at a later date:**

- Enabling Strategic Research Success**
- An Operational Plan to Support Research Development**
- A Commitment to Working in Partnership, Translating Research into Action and Promoting Innovation and Entrepreneurship**
- Summary and Expectations**