**FOR INFORMATION** **PUBLIC** **OPEN SESSION**

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| **TO:** | Planning and Budget Committee |
| **SPONSOR:** | Vivek Goel, Vice-President, Research & Innovation |
| **CONTACT INFO:** | 416-978-4649; VP.Research@utoronto.ca |
| **PRESENTER:** | As above |
| **CONTACT INFO:** | |
| **DATE:** | December 4, 2017 for January 10, 2018 |
| **AGENDA ITEM:** | 5 |

## ITEM IDENTIFICATION:

*Institutional Strategic Research Plan 2018-2023*

## JURISDICTIONAL INFORMATION:

The strategic planning framework for research is considered by the Planning and Budget Committee and the Academic Board for information and feedback. (Academic Board Terms of Reference, Section 5.1. and Planning and Budget Committee Terms of Reference, Section 4.1).

## GOVERNANCE PATH:

1. **Planning and Budget Committee [for information and feedback] (January 10, 2018)**
2. Academic Board [for information and feedback] (January 25, 2018)

## PREVIOUS ACTION TAKEN:

The current *Institutional Strategic Research Plan 2012-2017* was presented for information to Academic Board on April 19, 2012.

## HIGHLIGHTS:

The Institutional Strategic Research Plan (ISRP) reflects the breadth of U of T research within a flexible framework that identifies broad thematic research areas and expresses our core commitments to research and innovation excellence. It is meant to provide support and direction but not limit individual faculty member or divisional research priorities. The ISRP also identifies objectives to support university scholarship. Several external funding programs require an ISRP in order for us to propose projects for funding (for example, the Canada Research Chairs program, Canada Foundation for Innovation).

Through a consultative and broad-based process, during 2017, the Office of the Vice-President, Research & Innovation (OVPRI) engaged members of the University community in the development of a new ISRP to cover the coming five-year period. Throughout the process, the Research Advisory Board, that includes Vice-Principals, Research, Vice/Associate-Deans, Research and Vice-Presidents from across all our academic divisions and representatives from the affiliated hospitals, was a key venue for discussion, advice, and guidance on the strategic research issues and directions of the University, as well as providing critical leadership in the consultation process with the academic divisions and our affiliated hospitals.

During the spring of 2017, the OVPRI solicited input to the development of a new ISRP. Input was received through town halls on the three campuses; sessions with academic divisions, university-wide committees (for example, Principals & Deans, the Council of Aboriginal Initiatives, and the Connaught Committee), and with university research staff; and, through submissions via an online survey that was advertised to the University community at large. The OVPRI also met with the Toronto Academic Health Science Network (TAHSN) Research Committee.

These initial consultations indicated that we should continue to frame our ISRP within a flexible framework with relevant broad, thematic research areas and strategic objectives, similar to the current plan. We heard that the themes, and especially the subthemes, would benefit from a refresh to align with current and potential future areas of research and innovation, and that the plan should be clearer on the importance of engagement in fundamental research and critical inquiry. Further, we heard that the strategic objectives could be more focused and include approaches to equity and diversity, indigenous research, knowledge mobilization, research and teaching, as well as metrics and benchmarks to ensure we can measure our progress.

The input received during this first round of consultation became the foundation for drafting the ISRP. The draft document was circulated broadly in October 2017 within the university community, and feedback was solicited from groups as per the initial consultation, as well as by placing the document online for feedback through an online form. It was presented and discussed at a meeting of the Principals, Deans, Academic Directors and Chairs (PDAD&C). Based on feedback we further refined and clarified the strategic themes, sub-themes, and objectives.

The resulting *Institutional Strategic Research Plan 2018-2023* (ISRP) identifies seven strategic research themes and related subthemes, and five strategic objectives. Our aim is to enable U of T to continue to increase its research excellence by supporting and demonstrating our leadership in research and innovation; fostering collaborations, partnerships and engagement; advancing equity, inclusion and diversity; supporting the integration of research and innovation in the student experience; and, strengthening the institutional supports that foster research and innovation excellence.

## FINANCIAL IMPLICATIONS:

N/A

## RECOMMENDATION:

This item is *for information only*.

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## DOCUMENTATION PROVIDED:

*Institutional Strategic Research Plan 2018-2023*

UNIVERSITY OF TORONTO



# EXCELLENCE, INNOVATION, LEADERSHIP

## THE UNIVERSITY OF TORONTO STRATEGIC RESEARCH PLAN 2018-23

DRAFT DECEMBER 15, 2017

# Executive Summary

For nearly two centuries, University of Toronto faculty, students, postdoctoral fellows, and staff have been extending the boundaries of knowledge and providing answers to some of the world's most important questions.

The U of T Strategic Research Plan is a flexible framework that will engage the research community and our partners in the challenges that face humanity. The Plan highlights the environment and approach that will allow our researchers to continue to do their outstanding work by providing a climate that will enable them to thrive.

The Plan highlights the scope of scholarship at U of T and identifies seven interconnected thematic areas that are designed to facilitate excellence and collaboration both within U of T and with partner organizations, and to address issues of local, national, and global importance:

**DISCOVER:** Our Understanding of Humanity and the Universe
**SUSTAIN:** Societies, the Environment, and Natural Resources
**PROMOTE:** Healthy People, Healthy Communities, and a Healthy World
**ENGAGE:** Language, Culture, Art, and Values
**ADVANCE:** Governance, Diversity, and Social Justice
**INNOVATE:** Technologies for the Future
**BUILD:** Community and Livable Societies

The Plan identifies five strategic objectives:

Demonstrate National and Global Leadership in Research and Innovation
Foster Collaborations, Partnerships, and Engagement
Advance Equity, Diversity, and Inclusion Across Research and Innovation
Support Integration of Research and Innovation in Student Curricular and Co-Curricular Experience
Strengthen the Institutional Supports that Foster Research and Innovation Excellence

# TWO CENTURIES OF RESEARCH IMPACT

## Our vision for the future is challenging but clear: to create the most supportive environment possible so that our researchers, scholars, and learners can do what they do best—advance understanding and apply new knowledge.

For nearly two centuries, University of Toronto faculty, students, postdoctoral fellows, and staff have been extending the boundaries of knowledge and providing answers to some of the world's most important questions: How can we better promote health and cure disease? How do our diverse communities negotiate understanding across differences? How did we get here, and what are the fundamental features of the physical universe? How is human activity affecting the environment and influencing climate change? What does it mean to be human? How do we understand and embrace different ways of knowing, and how do we infuse our research practices with such knowledge? Can we create societies that advance health, dignity and justice for all? How do we achieve sustainable economic development? How can we use new technologies to communicate, innovate, engage with our fellow citizens, and build a better world?

U of T is among the world's top research-intensive institutions and one of a very few that excel in all disciplines and subject fields. The extraordinary breadth and depth of academic excellence across our three campuses and partner hospitals is visible in the local, national, and global impact of our scholars' research. Our researchers, scholars and innovators are internationally recognized for their ground-breaking contributions – U of T is ranked within the top ten universities globally in the production of influential research. Our impressive performance is a reflection of the excellence of our faculty, our graduate and undergraduate students, postdoctoral fellows and their collaborations with leading researchers and institutions world-wide, as well as our strong partnered research. The Toronto Academic Health Science Network (TAHSN), composed of the University of Toronto and its affiliated hospitals and their research institutes, is a leader in Canadian health care research, innovation, and delivery, and is one of the largest, most productive academic health science clusters in the world. TAHSN works collaboratively to advance and sustain a shared academic mission of providing high quality patient care, conducting innovative research, offering world renowned top-quality education programs, and participating in knowledge transfer activities.

## Fundamental Research, Impact, and Innovation

Increasingly, public and private research funders expect to see immediate impact from their investments, with clear evidence of linkages between the academic activities of scholars and the larger goals of society beyond the university. However, new approaches to solving problems would not be possible without strong foundations in basic and theoretical investigator-led research. Fundamentally, our progress as humans has been driven by valuing knowledge for its own sake. Society entrusts universities to nurture and support the curiosity needed to undertake research that generates and preserves such knowledge. The preservation and generation of knowledge must be valued for its own sake, even if the societal applications of such research are indirect or not evident for decades, or ever.

Investigator-initiated research plays a major part in part in creating new knowledge, satisfying the basic human need to understand the universe and our role within it. Expanding this understanding is at the

root of social progress, inclusiveness, economic growth, better health, and a higher quality of life. In addition to this fundamental knowledge, basic research provides the foundation for life-changing products and technologies; new approaches to solving problems would not be possible without strong foundations in basic and theoretical investigator-led research.

When U of T professors Till and McCulloch demonstrated the existence of multipotent stem cells in 1961, for example, they could not have foreseen how *Medicine by Design* would eventually harness the exceptional expertise at U of T and its partner hospitals to undertake transformative research in regenerative medicine and cell therapy. It is a reminder that unanticipated or serendipitous discoveries can be the most valuable, as they often have unexpected implications for society far beyond their immediate impact.

Research advances have also resulted in technologies that have led to some of the grave threats to human existence, such as nuclear annihilation or climate change. We must also ensure that our research addresses the potential for adverse consequences of new discoveries and supports society in dealing with present and future dangers.

Basic and investigator-driven research on social and technical innovation also influence society through the education and experience that students receive and take with them as they move on to positions within government, private industry and civil society. For many if not most professors, the opportunities for long-term immersion in important intellectual problems are a key motivation to devoting a lifetime to research. **U of T is, and will remain, an institution where the pursuit of fundamental and disciplinary knowledge serves as the foundation of our research strategy**.

## Research Impact

The University's institutional vision, *Towards 2030*, re-affirms the central role of excellent disciplinary and interdisciplinary research within the University as well as the need to leverage those strengths to nurture successive generations of Canadian scholars, leaders, innovators and citizens. U of T remains an educational institution at heart, but it is also our obligation as public stewards of knowledge to ensure that our scholarship engages the broader community and is widely disseminated in order to have an impact.

Impact can be defined in many ways. One definition is: the benefits to be gained from listening to and involving the perspectives of the people and groups with whom we work and seek to engage in our scholarship and from being both inclusive of those perspectives and ethical in the way we conduct research. The benefits of this approach extend beyond U of T and the scholarly community to a larger community of societal institutions and actors.

At the local level, we collaborate with community agencies, organizations, and municipal governments to investigate the issues they face and identify experiential learning opportunities that allow our students to become engaged in the communities where they learn and live. The presence of the University of Toronto with its research capacity and our highly qualified graduates has shown itself to be a key draw for multinational firms considering the Greater Toronto Area location and/or local expansion.

At the provincial and national levels, we seek out opportunities for our scholarship to inform public policy debates that affect people in every region of the country. Globally, our partners are institutions

and organizations that can help us extend our reach and impact in order to understand and address the significant challenges that our planet faces.

## An Innovation and Startup Powerhouse

Research that feeds innovation, entrepreneurship, and commercialization is thriving at U of T. In all sectors and across all of our campuses, our faculty members, postdoctoral fellows, and students are turning ideas into products, services, jobs, and companies that are contributing to the Canadian economy and improving lives around the world.

U of T is known for its vibrant culture of innovation, its research partnerships that span the globe, and its multitude of collaborations with public- and private-sector organizations. International rankings place us among the top universities working with the world's most innovative companies. We are a North American leader in the number of new intellectual property (IP)-based startups, new invention disclosures, and new licenses and options. On average, U of T and its partner hospitals file one patent every three days on behalf of our researchers. As we foster innovation, U of T researchers also work with our public-sector partners on issues of regulatory design and policy analysis necessitated by new technologies and products. We are committed to developing inclusive innovations that engage all members of the community in the innovation process and in realizing its impact.

U of T leads all Canadian universities in entrepreneurship. We are dedicated to fostering student entrepreneurship and the U of T entrepreneurship community provides mentorship, expertise, space, and networks for all stages of the innovation pipeline and provides the skills and resources entrepreneurs need to effectively pitch ideas, find collaborators, and build and scale their businesses or to apply these experiences in other employment settings.

## The Next Five Years

This Strategic Research Plan sets the stage for the next five years (2018 to 2023) with the identification of research themes, examples of sub-themes, and strategic objectives. It draws on the plans of our academic divisions, affiliated partners, and government and community stakeholders. It is informed by the institutional priorities articulated in U of T's *Towards 2030* plan, the *President's Three Priorities*, the *International Strategic Plan*, and the *Administrative Response to the President's Advisory Committee on Divestment from Fossil-Fuels.* Moreover, this Strategic Research Plan supports the Calls to Actions found within the *Final Report of the Steering Committee for the U of T Response to the Truth and Reconciliation Commission of Canada* specifically addressing ethical Indigenous research practices. Much remains to be done responding to the challenges raised in the report, so we will engage Indigenous community members to build a respectful process for Indigenous research to support the educational hopes and dreams for Indigenous communities and future generations.

## STRATEGIC RESEARCH THEMES

The U of T Strategic Research Plan identifies seven thematic areas that engage the community and our partners in solving fundamental questions and finding solutions to some of the most pressing challenges that face humanity. The key to the success of this strategy is to support the excellence of investigator-led research, basic and applied, both for its intrinsic value and so that the University can remain responsive to new areas of priority as they arise. These clusters of scholarship have emerged from the work underway in many different disciplines and divisions at U of T:

**DISCOVER:** Our Understanding of Humanity and the Universe
**SUSTAIN:** Societies, the Environment, and Natural Resources
**PROMOTE:** Healthy People, Healthy Communities, and a Healthy World
**ENGAGE:** Language, Culture, Art, and Values
**ADVANCE:** Governance, Diversity, and Social Justice
**INNOVATE:** Technologies for the Future
**BUILD:** Community and Livable Societies

Through emphasis on these key thematic areas, we can support our traditional strengths in disciplinary and interdisciplinary research in order to create the novel approaches and breakthroughs that are needed to address issues of local, national, and global importance. They represent broad areas of overlapping significance and interaction and, as such, scholarship in each will have consequences for all the others. Together, they represent a sustained commitment to issues pertaining to the sustainability of human communities and the natural world.

The seven themes can provide us with opportunities to increase the impact of our research by informing public priorities and policy. They dovetail with international responses to global challenges, such as the United Nations Sustainable Development Goals and the Paris Agreement on climate change—all projects in which the international research community is concentrating resources and talent. Although they represent areas of scholarship in which U of T and its partners already have considerable strength, they require sustained support in order to have a continuous and lasting impact.

The themes and sub-themes are not meant to be exhaustive of all the excellent work going on at the University—nor are they meant to be prescriptive. They serve our community in a variety of ways:

- Offer students, faculty members, divisions, and our partners examples of strategic entry points into the critical fundamental research undertaken by our scholars;
- Inform our interdisciplinary and multidisciplinary networks and collaborations that depend upon outstanding disciplinary work;
- Integrate with the work of the University's cross-divisional units and initiatives, which support the impact of current research by creating interdisciplinary hubs that concentrate on large, globally significant issues;
- Provide the flexibility required to respond to new challenges as they arise; and,
- Allow us to identify new challenges and thematic areas in an ongoing way.

The themes also embody the strengths of the University that result from our twin teaching and research missions: our ability to apply new knowledge to advance education and practice and our commitment to

mobilize our extensive and diverse intellectual resources, in collaboration with community partners of all kinds, to the benefit of society.

## DISCOVER: Our Understanding of Humanity and the Universe

*Scholars from every academic corner of U of T are exploring foundational principles and discovering answers to fundamental questions.*

The freedom to engage in fundamental, exploratory, and critical scholarship—scholarship guided by the innate need to understand ourselves and the world around us—across the humanities, social sciences, and sciences is a foundational principle of the research-intensive university. Investigator-led research generates new knowledge and underpins excellence in all cross-disciplinary and problem-based research, often leading to advances not anticipated by goal-oriented investigation. Researchers and students from every academic corner of U of T are conducting basic research, enriching our understanding of fundamental questions: from the mathematical principles underlying physical reality; to how molecules and particles interact; to the origins and meaning of life, species, consciousness and disease; to the beginnings of our planet and the universe in which it resides. In doing so, they are bringing to light insights and understanding that are intrinsically important. If history is any guide, whatever we discover will very likely radically affect the future of how we think about ourselves, our world and our place in the cosmos.

### Examples of Sub-themes

### ENRICHING FUNDAMENTAL KNOWLEDGE

Fundamental research is the key to discovery. It is the foundation on which breakthroughs are built and a necessary precursor to the applied research that directly affects society.

U of T scholars are actively engaged in efforts to advance our understanding of the fundamental principles that underlie the structure and evolution of the physical universe and its constituents; challenging how we think about life, its interconnectedness, and the conditions under which it thrives; providing the language and the tools with which we explore and articulate fundamental relationships; and, plumbing the depths of humanity's past, bringing to light fascinating new knowledge about how our species and the diversity of human cultures came to be. Our scholars working with Indigenous epistemologies, and with critical understandings of the many dimensions of education and research, are challenging assumptions about what we think we know and how we know it. And, in exploring the artistic and cultural dimensions of human experience, U of T scholars are using their expertise, their insights and their abilities to develop creative ideas to explore the complexity and variety of the human experience.

U of T investigators in every field are pursuing research and cross-discipline collaborations to investigate questions that are, at root, driven by our very human need to understand the meaning of our own existence -- and that may provide the insights needed to solve some of our greatest challenges.

## MIND, BRAIN, AND THE HUMAN

Most cultural and religious traditions throughout history have maintained that humans are unique, despite divergent philosophies. U of T researchers in many disciplines are exploring and questioning the nature and status of human rationality, creativity, and the social aspects of what it means to be human. For example, through the study of the differences and similarities between our cognitive capacities and those of artificially intelligent systems and what that might tell us about the distinctiveness of the human mind; and, the nature and status of human rationality and creativity.

U of T scholars are discovering and debating the nature of the most human characteristics, and helping us understand just what makes the human mind unique.

## PLANET EARTH AND THE COSMOS

Observations of space are critical to advancing many key scientific issues that have long fascinated physicists and cosmologists: the early expanding universe, the formation of stars and galaxies, the movement of planets, the discovery of extra-solar planets, and the prospect of life elsewhere in the universe. The more our knowledge of the solar system, our galaxy, and the rest of the universe grows, the more we understand how the Earth formed and how life here arose.

U of T scholars are leading the development of Earth-observing satellites that are important components of research in climate change and natural resource management. And, advances in instrumentation for space-based observations have opened up new electromagnetic windows not available to ground-based astronomy, and, here on Earth, several very powerful and extremely large telescopes, such as the Square Kilometre Array, are under development. The new era of space exploration is made possible with the help of a new generation of space-related technologies that includes nano-satellites and autonomous rovers.

The advent of high-performance computing and big data analytics also provides new ways to analyze the wealth of new data that is being collected, and these advances have given us the ability to perform detailed computer simulations of the evolution of our solar system and galaxy.

## ORIGINS OF HUMAN DIVERSITY

Numerous and diverse research fields raise profound, fundamentally human concerns about diversity, both genetic/physiological and cultural. Researchers seek answers to questions about the origins of species, consciousness, and disease; the origins of language, art, science, civilization, culture; and the full range of human diversity. For most people, questions of origins and diversity hold personal significance and speak to the multiple identities we all hold, and so their exploration is necessarily multifaceted.

U of T scientists and social scientists are cultivating collaborations with U of T humanists and artists as they explore our evolving place within the world. U of T researchers are studying humans and their primate cousins in all their biological and social dimensions, examining the factors that have affected the evolution of humans and other animals. Those who work with models of social behaviour across cultures are establishing theories about the similarities and differences between communities and differences between cultures.

Questions of origins resonate across all disciplines and among the general public because they directly confront the mysteries associated with our existence, our past, and—perhaps most important—the possibilities for our collective future.

## SUSTAIN: Societies, the Environment, and Natural Resources

*Human activity is a major cause of environmental change, and the rate of that change has accelerated dramatically over the last century.*

Understanding the dynamics of both natural and human-made changes in the environment requires fundamental knowledge spanning many disciplines. Water, air and soil pollution; climate change; the depletion of natural resources; species extinction; and waste disposal are challenges that are partly a result of an incomplete understanding of environmental, socio-technical, and cultural systems and processes.

The University of Toronto has a long and outstanding record of research and innovation in matters related to energy, the environment, climate change, and natural resource management, including: ground-breaking research on Earth's climate history; modeling of the future impact of human-induced global warming; innovative studies of contamination from bitumen extraction in the Athabasca region; rapid warming, sea ice loss, and environmental change in the Arctic; research on the geochemical processes involved in waste disposal and groundwater clean-up; and, collaborative research with international partners to explain recent lower-stratosphere increases in ozone-depleting chemicals. U of T's scholars also study the historical and cross-cultural ways of thinking about humanity's relationship to nature, recognizing that some of our contemporary ecological problems–and possibly their solutions–have their roots in the practices of other times, places, and cultures.

### Examples of Sub-Themes

### GLOBAL CLIMATE CHANGE

Climate change poses a major challenge to humanity. Detecting and quantifying these changes will require developments in remote sensing and cosmic-based imaging technologies, and addressing these issues requires the concerted efforts of a wide range of disciplinary perspectives. The impact of climate change also has relevance for public policy, the operation of all industries and social sectors; the health of humans and ecosystems, and the economic wellbeing of Canadians. For example, reduction of Arctic sea ice in the Canadian Arctic Archipelago has implications for northern shipping routes, resource extraction, and sovereignty of previously inaccessible locales.

U of T's scholars are collaborating to develop measurement concepts, biosphere information retrieval techniques, monitoring tools, and sophisticated computational models for quantifying change and its effects on terrestrial carbon and water cycles. Researchers at U of T are also studying the physical processes underlying climate change, including studying the change and its effects on the Arctic and sub-Arctic regions. U of T researchers are studying climate change in the context of sustainable societies and ecosystems, global governance, and environmental policy and law. They are trying to understand how the technical, social, policy, and political challenges of implementing potentially costly environmental solutions can be overcome; how institutions can foster the application of critical thinking,

rigorous science and new technology to a given problem; and how the principles of sustainable development—including how social, environmental, ethical and economic issues are intimately interconnected—question traditional models of economic growth.

## SUSTAINABLE SOCIETIES

A sustainable society is one whose patterns of consumption support environmental and resource integrity; one that balances basic human needs with the capacity to provide them; and one that assures its citizens equality, freedom, and a healthy standard of living without compromising the needs of future generations. Concerns about our planet involve exploring socio-technical systems change and formulating forward-thinking ideas to resolve the institutional, behavioural and regulatory issues that must be part of any solution to our sustainable energy and emissions reduction challenges.

U of T scholars from a variety of disciplines are joining forces to study what makes a society sustainable, including such issues as: the governance and planning of development; indigenous and historical ecological knowledge; decarbonization policy; the impacts of democracy, business and innovation on conservation; environmental education and behaviour change; the commodification of nature; urban sustainability; the changing face of the Arctic; and, the environmental health of vulnerable populations. They are also studying how non-polluting, renewable resources can provide the power to drive sustainable energy systems; how altered consumption patterns reduce resource use and eliminate waste; how efficient farming techniques and technologies can improve yields; and how the protection of natural habitats and critical ecosystems protects the quality of our air, water, and soil.

## SUSTAINABLE ENERGY AND CLEANTECH

The world has come to depend very heavily on non-renewable fossil fuels and their by-products to fuel industry and economic growth. This dependence has had a tremendous impact on the global economy and has been a catalyst for conflict. Our cities have been built on the assumption that fossil fuels are a relatively cheap and available resource without major external costs, a faulty premise as we now near the exhaustion of these resources.

U of T researchers are collaborating with partners in the private and public sectors to develop world-leading cleantech and sustainable energy solutions, such as: new battery technology and fuel cells, solar energy and fuels, energy storage, smart grid technology, renewable energy systems, monitoring systems, low energy passive solar housing, high performance/low environmental impact buildings, durability, systems integration, sustainability and resilience, as well as research about best practices for the design, construction, commissioning and maintenance of municipal infrastructure. U of T researchers are also pouring their energies into the engineering and commercialization of related breakthroughs, including: the world's most energy-efficient light bulb; environmentally friendly biodiesel fuel; cleaning of biogas waste and conversion to fertilizer; cost-competitiveness improvement of solar power; and next-generation photovoltaic cells.

As part of this effort, U of T is using its own campuses as a living laboratory to test out new technologies, designs, and strategies. Researchers are also formulating forward-thinking ideas to resolve the institutional, behavioural and regulatory issues that must be part of any solution to our sustainable energy challenge.

# PROMOTE: Healthy People, Healthy Communities, and a Healthy World

*Improving health and well-being has long been a human imperative, and there is still much we can do to alleviate suffering and improve quality of life for all people and their communities.*

Over the last two centuries, advances in public health, disease prevention, basic medical sciences, and the health professions have saved countless lives and have improved and extended the lives of many more. Nonetheless, global trends have created new and increasingly complex health problems that threaten population health and health equity, and will require all of our ingenuity to solve.

U of T investigators on our campuses and within our affiliated teaching and research hospitals are collaborating to advance high-quality patient care and to actively translate knowledge for the benefit of all Canadians and people worldwide. For example, U of T researchers are making advances in assisted living technologies, neuro-robotics, and brain-computer interfaces that are enabling users and improving quality of life; connecting public health and Indigenous traditional knowledge to health practitioners, program managers and policy-makers; addressing the importance of physical inactivity, a leading cause of many chronic diseases, and how physical activity and sport can be an important part of disease prevention; and, conducting basic and translational research that spans applications of novel biomaterials to applications of music, the arts and humanities in the health sciences. As U of T researchers and trainees seek to develop personalized and regenerative therapies that offer hope in treating heart disease, cancer, and the replacement of failing organs, they are also trying to find improved ways to help those at immediate risk from hunger and malnutrition, HIV/AIDS, malaria, tuberculosis, and emerging infectious diseases.

Knowing that aspects of human health and experience can only be captured and better understood through a variety of research approaches, U of T scholars are also asking how education, knowledge of human development, and an understanding of the broader biologic, social, cultural and environmental determinants of health can help us devise better ways of preventing disease in the first place.

### Examples of Sub-Themes

## HUMAN DEVELOPMENT AND HEALTH THROUGH THE LIFESPAN

If we want to age well and remain active, healthy, and productive members of our communities, it is vital that we understand the linkages between early childhood development and later-life health, learning, and social flourishing. To curb the social and economic costs associated with disease and chronic illness, research must consider the social, economic and environmental contexts of disease and illness.

U of T scholars, educators, and investigative teams from across disciplines and divisions are collaborating to ensure that health through the lifespan is at the forefront of research, education, technology development, and social policy agendas. U of T researchers are at the forefront of research into how various biological, economic and social factors affect the health and wellbeing of individuals and communities. Reducing the impact of social challenges requires research that informs policy as well as practice to recognize the dynamic interplay with individual risk. Youth coming out of foster care

are at risk of becoming homeless because they lack resources and supports. Older Canadians are living longer and with fewer disabilities than the generations before them, but the majority of seniors also live with at least one chronic disease that must be managed. U of T experts are also looking at how conditions such as cancer, cardiovascular disease, and dementia impose particularly significant personal, social, and economic burdens, and they are examining ways our current health care system turns its focus toward promotion and prevention rather than on treatment.

## MOLECULAR MEDICINE AND THE BIOLOGY OF DISEASE

We have entered a new era of medicine based on a detailed understanding of human biology and on the underlying genetic, molecular, and cellular mechanisms of disease. Molecular medicine and the biology of disease embrace a vast array of phenomena with wide applications, from regenerative medicine, tissue engineering, systems biology, and genomic medicine. Precision medicine is a promising medical approach that involves using an understanding of a patient's genotype and epigenetics to tailor their medical care.

U of T researchers are looking for specific biomarkers to aid in the early and more robust detection and prevention of common conditions such as cancer, cardiovascular disease, obesity, diabetes, autoimmune diseases, and asthma. U of T is integrating engineering and scientific approaches, such as in stem cell therapy, regenerative biomolecules, tissue engineering and the use of biomaterials, new drug discovery, synthetic biology, among many other possibilities, to open new paths to the treatment of disease and injury. U of T and its affiliated hospitals have an outstanding record of achievement in biomedical, biochemical, pharmaceutical, and clinical research, and U of T humanists and social scientists are on the forefront of examining the emerging ethical, legal, social, and public policy issues raised by these new approaches.

Our integrated system of specialized research facilities dedicated to basic and applied research, clinical translation, advanced manufacturing, and commercialization is helping to facilitate these insights.

## GLOBAL HEALTH, PUBLIC HEALTH, AND HEALTH SYSTEMS

Global health has achieved extraordinary improvements in recent decades by building on national public health efforts and institutions: Global life expectancy in the last 40 years has increased more than in the preceding 4,000 years and child mortality rates in some countries have decreased by 75 per cent. However, new challenges have quickly replaced them along with questions about whether our current health care systems will be able to ensure non-discrimination and equitable access while delivering any proposed solutions cost-effectively.

U of T researchers across the health and social sciences are working overseas and in Canada, leading an urgent charge to understand the complex links between illness and lifestyle, poverty, social development, opportunity and geography. They are studying the emergence of chronic diseases as a major global challenge that also creates a heavy economic burden by increasing the demand on health-care and social systems and by reducing productivity. And, as international travel increases and greater numbers of people migrate from one region of the globe to another, they are studying how emerging health trends migrate with them. U of T researchers are also learning from urban immigrant, Indigenous, and northern communities, as these groups grapple with health issues that are specific to their life experiences. In partnership with these communities, U of T researchers in many health-care fields are addressing the complex factors that underlie health inequities to create better health outcomes for all.

The sustainability of health systems and health services is also a significant challenge across the world, and U of T is a leader in research that addresses questions of accessibility, quality, sustainability, and efficiency of health services.

U of T researchers across sectors are committed to creating new knowledge and applying it widely to change the trajectory of global health towards faster declines in death and illness and more productive lives.

## ENGAGE: Language, Culture, Art, Values

*Language, culture, art, and values are not only the ways in which human beings express themselves or relate to each other—in a fundamental sense, they define us as human.*

In the face of great social, cultural, and technological change, the importance of our languages, literatures, cultures, art, and values cannot be overstated. By learning about the ideological practices and processes that have shaped and continue to structure the lives of people historically and cross-culturally, it becomes possible to transform and change inequitable practices.

U of T students, researchers, scholars and performers who engage with the fundamental cultural, historical, philosophical, linguistic, literary, and artistic dimensions of human experience are helping us understand the diversity and complexity of our changing world. Our scholars who are interested in the world's languages and literatures, the study of particular cultures and eras, communications, education, and visual and cinema studies are placing our era of digital media, social networking and the rapid transmission of ideas in its proper cultural and historical contexts. Researchers who tackle issues of pedagogy, representation, and performance are giving us better understanding of our shared experiences, as well as placing our digital era in its cultural and historical contexts. U of T also has a rich community of researchers investigating cognitive systems, and they are applying the results of their investigations to mental health research, the cross-cultural study of mind and consciousness, and the study of the underpinnings of creativity and art.

### Examples of Sub-Themes

### COMMUNICATING IN THE DIGITAL ERA

The ability to engage and communicate is fundamental to our identity as human beings, particularly through our ability to find, construct, and convey meaning through language, art, and other symbolic means. Technologies, from the printing press to today's smart phones, have given us new methods for trading information and telling stories. In order to understand the future possibilities of our world, we must explore new modes of narration and making meaning, along with their social, political, epistemological, technological and ethical implications.

Our faculty members are internationally renowned for their insights into the impact of new communications technologies, and for their ability to develop creative ideas, from writing symphonies to documenting the evolution of living languages, that explore, design, and critique new technologies, and media that enable people to communicate, create, learn, share, and collaborate. Drawing on a rich history of research in communication studies, U of T scholars are examining how diverse digital tools are

influencing the creative convergence of art, science, technology, business, and education and changing how and what we communicate. Our researchers are also looking at how new technologies are being applied in an ever-expanding variety of contexts, including: political discourse and radical cultural critiques; Indigenous language preservation; art and literature projects; eHealth innovations in diagnostics and treatment; computational biology; information policy research; and, computer-human interaction and social networking.

## VALUES IN PERSONAL AND PUBLIC LIFE

Addressing questions about the perspectives of different cultures—for example, how Indigenous voices and knowledge systems contribute in creative, transformative, and critical ways to the dialogue on values — is essential to comprehending how cultures interact, and to building understanding, creating opportunities for communication, and promoting peace.

U of T scholarship is centrally engaged with profoundly influential and enduring questions of value in personal and public life. The exploration of such matters as the role, validity, and transmission of values, who should be responsible for attending to issues of public concern or what is a fair resolution to a dispute is fundamental to understanding both social and technical challenges. Investigators that engage with issues of pedagogy, representation, performance, and recording are giving us better purchase on our shared experiences as human beings, and on our history. By embracing and understanding difference, and by applying multidisciplinary tools to critically examine our deepest assumptions and biases about other people, U of T researchers are helping to fight racism and anti-LGBTQ discrimination, work for equity and inclusion, understand different ways of knowing, and promote openness and peace. Personal and public values arise as critical questions in the work of U of T scholars who are looking to address important questions of fairness, suffering, human dignity, equity and social justice.

Scholars at U of T who study values in personal and public life are making critical contributions to their fields and helping to generate a deeper understanding of human behaviour and society.

## ART, DESIGN, AND PERFORMANCE

The acts of representation and performance cross cultures and embrace how images, sounds, structure, design and language relate to the world at large, as well as how we related to each other, as both individuals and societies.

U of T has been setting the stage for creativity in the arts and design from its inception. Our faculty, staff, students, and graduates figure prominently in the ranks of leading writers, performers, researchers, and administrators across artistic pursuits and around the world. Our faculty are critically engaged with the forces of urbanization and technological change, the challenges of environmental sustainability, the struggle for cultural expression, as well as playing a pivotal role, for example, in the production of the built environment bridging the technical and social, the practical and theoretical. Our scholars and educators in theatre, drama, and performance study the relationship between the artists who create written texts intended for production, those who turn scripts into performances, and the audiences who experience the resulting theatrical event. Our art and architectural historians research a wide range of periods and regions, and incorporate various disciplinary approaches, generating diverse understandings of the history of human artistic production and reception. For example, our fundamental and creativity-driven research in music at U of T focuses on understanding music and sound as expressive cultural communication in a global context.

Whether examining the multi-faceted forces of globalization, exploring new approaches to inter-cultural dialogue, or pushing the frontiers of digital media production, our vibrant arts research community contributes their insights and creativity, drawing from the humanities, social sciences, and creative arts.

## ADVANCE: Governance, Diversity, and Social Justice

*Effective governance and inclusive engagement are prerequisites for human prosperity, well-being, and social justice.*

Governing for peace, prosperity, inclusion, and justice presents significant policy challenges. The study of governance in its various forms is central to several urgent contemporary issues: legal reform and the strengthening of democratic and civil society institutions; the creation and establishment of procedures and rules that lead to greater efficiency, transparency and accountability in decision making; negotiating understandings across difference; and the challenges of decolonization and making governance more inclusive, participatory, respectful of diversity and responsive to issues of autonomy, equity and social justice.

Although the links between political institutions and governance, on the one hand, and social justice, equity, peace, and prosperity, on the other, may be relatively clear, they unfold in complex ways. U of T scholars who study these relationships are finding that the institutions that foster peace and prosperity in one culture, geographical location, or historical period may be detrimental in another. Moreover, we have little understanding of how to promote the development of effective institutions, laws, governance, and regulatory frameworks in other jurisdictions. U of T researchers are learning about the ways that political and social institutions, diversity, social justice and peace influence one another, and how they are entwined with issues as wide-ranging as climate change, resource depletion, population pressure, migration, health care reform, international security and development, and gender, ethnic, class, and cultural identity.

### Examples of Sub-Themes

### THE KNOWLEDGE ECONOMY AND THE GLOBAL VILLAGE

The late Marshall McLuhan, a U of T professor, first predicted the emergence of a global village interconnected by communication in 1964, stating "… *we have extended our central nervous system itself in a global embrace, abolishing both space and time as far as our planet is concerned."* As part of this move toward globalization, Canada's economy has been undergoing a paradigm shift to an innovation-powered knowledge economy—one based on the provision of high-value services, knowledge products, highly qualified personnel, and, increasingly, social innovation.

U of T researchers are critically challenging how the ever-increasing globalization and proliferation of information and knowledge affects the boundaries between public and private life. They are exploring questions such as the relationships between mass media, civil society, and private enterprise and whether the convergence of media affects freedom and democracy. They are studying the meaning and value of different forms and roles of knowledge. The development of human capital has become central to economic theory with significant implications for public policy and our nation's innovation,

productivity, and prosperity challenges. On the global scale, U of T scholars are studying how economic recoveries depend on understanding what triggers a financial crisis as well as on recognizing opportunities for change, so that we may build a more sustainable, humane, and just knowledge economy.

## PEACE, CONFLICT, INCLUSIVENESS, AND JUSTICE

The beginning of the 21st century has seen the development of new kinds of conflict, in which adversaries are less clearly defined and sources of hostility are based on major discrepancies between the social, cultural, and political systems of the combatants.

Scholars at U of T conducting research to identify the deep causes of strife—from poverty and disease, inequality, resource scarcity and weapons proliferation, to competing claims for justice and failures of foreign-policy decision making. Preventing conflict, more than understanding its cause, requires understanding the types of institutional arrangements that can lead to diversity, inclusiveness, and social justice. U of T researchers are studying the roots of peace and conflict in our own culture through studies of wide-ranging phenomena, such as imperialism in ancient China, India, Greece and Rome and the colonial legacies of Canada and other nations. U of T scholars whose work is grounded in Indigenous philosophies, beliefs, traditions, and practices are contributing to historical and alternative understandings of how governance, treaties, the environment, and cultures relate to each other. And they are leading innovation by proposing new and more respectful ways of engaging communities, building partnerships, promoting self-determination and marshaling institutional expertise to stop conflict before it starts.

## LAW, ETHICS, AND THE DIGITAL INTERFACE

What is right and what is just? What is in the best interest of the public good? What are our obligations as individual citizens and as members of organizations in a world where our collective actions can have global consequences? Historically these difficult questions have been at the heart of democratic life. Trying to provide answers is of importance to Canada's governance, security, prosperity, and well-being.

U of T's researchers are exploring aspects of these central questions, such as how we craft laws around digital surveillance; how we identify fake news propagated through social media; and, how internet censorship and surveillance shape the openness of communications or threaten human rights. At U of T, humanists and social scientists have noted that the best and most sustainable solutions will come from uniting scientific and technological insights with the results of basic research in numerous disciplines. The study of successful public institutions has led to the insight that these institutions serve their societies most effectively and humanely when they have the creative capacity to break away from the administrative application of policies and traditions and publicly re-imagine and realize new social arrangements. Scholars at U of T are undertaking this very kind of re-imagination and asking how societies can fairly and equitably utilize and allocate knowledge in the digital age.

# INNOVATE: Technologies for the Future

*New technologies and advanced materials, processes, and engineering techniques have enabled society to realize novel and innovative ways of producing goods and delivering services while at the same time serving as a lens through which to understand our humanity.*

U of T researchers are at the forefront of an innovation revolution. They are world leaders in the development of emerging technologies, such as molecular biology, artificial intelligence and machine learning, and quantum optics, nanoscience, 3D printing, as well as studying how their application is redefining possibilities in such areas as health care, finance, manufacturing, and entertainment. New knowledge and new technologies, with their tremendous capacity to permanently alter our social and physical landscapes, are intimately intertwined with questions of values, ethics, equity, and social policy which, in turn, cannot be disentangled from the fundamental science behind the technologies.

Our conceptions of new and emerging technologies and the roles they play in our society must include considerations related to the ways in which societies utilize and allocate new innovations in science and technology. The implications are important not only for the way we address the ethical, legal and social issues, but also for how we do science and engineering and how we design the institutions that oversee them. U of T researchers are also exploring human interactions with complex technologies, and profoundly questioning whether we conceive, design or plan new technologies with full recognition and consideration of human capacities and limitations to adapt to them.

### Examples of Sub-Themes

## SIMULATION AND IMAGING

The arts and humanities have long been concerned with how human beings create new worlds by imagining and imaging them—worlds come alive in performance and through various modes, techniques and technologies of representation. Simulation, imaging, and visual reality techniques are now used routinely in disciplines as varied as neuroscience, structural chemistry, geophysics, and electrical and computer engineering. Remote sensing, digital imaging, and simulation technologies are also relied upon to amass, analyze, and communicate technical data—for example, to create maps of Earth from orbit and geophysical maps of the Earth's interior, maps of the genome and three-dimensional models of molecules.

Researchers from disciplines within every division at U of T are collaborating to create new kinds of representation, and to study the many applications of simulation and imaging technologies, including computational photography, semantic image retrieval, non-realistic image rendering, image-based modeling and navigation, virtual reality, gaming, robotic-vision, bio-imaging, intelligent vision-based interfaces, and automated medical image analysis. U of T scholars are also studying how new digital imaging technologies are changing the way we document our personal lives, what we think of privacy and security, and how we communicate and express ourselves.

## DATA, ANALYTICS, COMPUTATION, AND ARTIFICIAL INTELLIGENCE

The vast quantities of complex and connected data at our disposal have fueled our need for ever more powerful computers, networks, digital storage, and analytical methods. And, the massive processing power of today's computers, as impressive as it is, has not yet been able to quench our ever-growing thirst for speed and computational capacity.

U of T researchers are world-leaders in advancing next-generation computing, analytical tools, and artificial intelligence in such areas as computer vision, computational linguistics and natural language processing, knowledge representation and reasoning, cognitive robotics, and machine learning. Harnessing the quantum mechanical properties of atoms and photons, U of T researchers are studying how quantum cryptography could ensure cybersecurity. They are integrating the University's traditional strengths in data analytics, security, and privacy to develop cyberphysical frameworks that will underpin the next generation of applications including, for example, in health, the financial sector, advanced manufacturing, transportation, and autonomous vehicles. U of T scholars are also studying the social implications of these transformative innovations, ensuring that Canada's policy framework can keep pace with changing technology and consumer needs.

## ROBOTICS, AUTONOMOUS TECHNOLOGIES, AND ADVANCED MANUFACTURING

These technologies are poised to make an enormous impact on our daily lives through a myriad of applications. At the same time, a broad set of concerns have been raised from how robots and autonomous systems will impact our society—from the workforce, to privacy and security, to the ethics of using robots around vulnerable populations such as the elderly and people with disabilities.

U of T is home to researchers actively innovating in intelligent robotics, mechatronics, autonomous vehicles and systems, sensing technologies, terrestrial and space exploration, assistive and rehabilitation devices, robotic surgery, and surveillance. They are also pushing the boundaries of research in advanced materials and manufacturing, for example, in exploring properties such as superconductivity that might lead to advances in sensors, imaging, and myriad other technologies. Our world-class facilities test new ideas that have the potential to save lives, boost productivity and efficiency, and reduce environmental impact. U of T researchers are also supporting innovative social enterprises, for example, in testing cutting-edge 3D printing technology to create high-quality, better-fitting prosthetics in developing countries. U of T scholars are studying how the interface of humans and technology impacts human behaviour, health, the economy, law, and cultural expression.

# BUILD: Community and Livable Societies

*Livability might be defined as the sum of the factors that add up to a community's quality of life.*

Factors that influence a community's quality of life include the built and natural environments, the rule of law and accountable governance, access to safe and secure food and water, overall economic prosperity, health and access to affordable care, housing, social stability and equity, educational opportunities and possibilities for artistic, cultural, linguistic, entertainment, and recreational participation and enjoyment. And, as more people seek refuge from the pressures of conflict, poverty, and lack of economic opportunity, and as work becomes more mobile, related factors such as citizenship, integration, and belonging become increasingly relevant.

Our researchers are actively studying many of these factors. U of T scholars in diverse disciplines are showing us that many of the things we take to be the hallmarks of just and livable societies have roots in societies of other places or times. They are collaborating on projects designed to explore the interactions of politics, art, design, and culture in historical and contemporary urban environments; how to build and manage complex technological and operational urban systems that are humane and facilitate civic engagement and accountable governance; and, as U of T scholars are revealing in their studies of urbanization, human rights, internationalization and multiculturalism, livable societies must also concern themselves with global issues of security, environment, social inequalities, health and justice.

### Examples of Sub-Themes

## LIVABLE CITIES

The world's population is increasingly urban, with more than 50 per cent of people around the world living in city-regions. By 2030, that figure is projected to be more than 60 per cent. Yet, there is great variation and geographic unevenness in levels of urbanization around the world. The greatest impacts of population growth, continued rural to urban migration, and the growth of cities with more than 10 million residents, will predominantly affect regions in Asia and Africa. Closer to home, more than half of those who identity as First Nations, Metis or Inuit, live in urban centres, in which just over a third reside in five cities in Canada. With so many people living in urban settings, it is urgent that we gain a better understanding of how cities work and their impact on human health and prosperity.

U of T investigators are coming together in multidisciplinary centres and networks to investigate the social and physical impacts of urban areas, including poverty and prosperity, urban sprawl, transportation networks, regional planning, pollution and the environment, infrastructure, parks and urban landscaping, demographics, health services delivery, recreation, housing, culture, innovation, and education in the urban context. They are also asking some fundamental questions about the sustainability and resiliency of urban living. Even with the best urban planning, public policy, and a prosperous economy, costs come not only to the local environment but to the planet as a whole. The work of U of T students and researchers in this area has a direct bearing on the dynamic and cosmopolitan environment in which they find themselves. Their work will continue to explore and address complex urban challenges, with the aim of making cities and urban regions both locally and globally, more sustainable, prosperous, inclusive and just.

## HUMAN RIGHTS AND DIVERSITY

Any search for justice is based upon identifying values that are viewed as so critical to the wellbeing of humanity that they have come to be institutionalized as "human rights." Despite the Declaration of Human Rights (UDHR) by the United Nations General Assembly in 1948, and most recently in the United Nations Declaration of the Rights if Indigenous Peoples (UNDRIP) in 2007, the notion of human rights itself has been the subject of ongoing intense philosophical debate and criticism for millennia, as our scholars of ancient Islam, China, Africa, Greece, Rome, as well as the Indigenous traditions of North America and elsewhere, can attest.

Human rights and humanitarianism scholars at U of T are also moving beyond these debates by asking questions about the allocation, distribution, and protection of sovereign authority; the role that culture,

minority and Indigenous rights, and the right to self-determination play in the promotion of a just international legal order; the relationships between international economic, social, equality, and labour rights, and the right to development; and the validity of the international legal commitments to the liberalization of trade, services, and development. Within Canada, our scholars are participating in the conversation on how Canadians can meaningfully respond to the calls to action articulated by the Truth and Reconciliation Commission. At U of T, scholars are asking if international human rights law can reinvent itself as a law of social inclusion and, in the process, redraw the boundaries of political community and the nature of political association.

## MIGRATION, INTERNATIONALIZATION, MULTICULTURALISM, AND IDENTITY

Migration has become a major global pattern as people flee war, poverty and famine. They come to new countries bringing old traditions and identities, along with varying levels of interest in adapting to their new culture.

As Canada and other societies the world over grapple with the challenges of balancing values of respect for diversity and equality with respect for cultural and linguistic differences, U of T scholars are encouraging dialogue among policymakers, government and nongovernmental organizations, and members of both immigrant and non-immigrant communities. U of T scholars are also exploring issues spawned by migration and internationalization including immigrant inequality in the labour force; impacts of migrant workers on developed economies; migration patterns of highly skilled labour; social construction of ethnicity; accommodation of refugees; impact of migration on health; and, the role of the integration immigrant parents shaping Canada's identity and Canada's future. Ultimately, they are considering whether immigration policies democracies meet principles of justice and good governance.

# STRATEGIC OBJECTIVES

Our aim is to continue to be among the handful of research-intensive universities in the world that excel across the breadth of fields of scholarship. Our vision for the future is challenging but clear: *to create the most supportive environment possible so that our researchers, scholars, and learners can do what they do best—advance understanding and apply new knowledge.*

To do so, and in keeping with its mission, the University of Toronto will continue to promote high-quality research. We remain committed to the following:

- Providing an environment and supports that are conducive to research and attract top faculty, staff, students and trainees;
- Emphasizing peer-reviewed research, publications, and related creative and professional contributions of our faculty members;
- Engaging students and trainees in research experiences that prepares them for a broad set of roles in society;
- Ensuring that all our undergraduate and professional students have opportunities to engage in research and innovation experiences;
- Enhancing the University's educational mission through research-informed pedagogy;
- Maintaining a capacity to respond selectively to new fields of research as they emerge;
- Supporting engagement and inclusive collaboration with peer institutions and a diverse array of industry, professional, public sector, government, community, and civil society partners;
- Fostering equity, diversity, and inclusiveness, among researchers themselves and among and within research approaches, methodologies, and ways of knowing;
- Supporting the continued development of open access, open data, and open science; and,
- Communicating and celebrating the value of our research and innovation achievements.

U of T's success in reaching these commitments depends upon the supportive partnerships within our research and innovation ecosystem: our academic divisions and campuses, our affiliated hospitals, and hospital-based research institutes, as well as our numerous governmental and not-for-profit partners, communities, organizations, and institutions.

Our strategic objectives are informed by key societal challenges. We collaborate with key funding partners in supporting the design and implementation of research programs. These programs are essential to attract and retain outstanding researchers, to strengthen existing areas of excellence and develop new ones, and to increase synergies between teaching and research.

With our partners, U of T has also built a robust research and knowledge building enterprise --one that puts us in an exceptional position to be leaders in the creation of strong national research networks that, with ongoing public support, will strengthen Canada's position in the global knowledge economy.

In *Answering the Call: Wecheehetowin*, *the Final Report of the Steering Committee for the University of Toronto Response to the Truth and Reconciliation Commission of Canada,* the University has committed to seeking out opportunities to engage with Indigenous partners and, together, lead the process of reconciliation. Within our administration, training, practices, and policies, we are committed to reflecting and embracing Indigenous knowledges, practices, and perspectives as valid and equal to other

knowledge systems, as well as supporting Indigenous scholars and communities to conduct the research they seek to pursue.

These commitments and relationships form the backdrop to our strategic research objectives that will guide our actions and performance measures. The objectives also complement those of the academic divisions, which will continue to develop their own more detailed plans, goals, actions, and performance measures.

## 1. DEMONSTRATE NATIONAL AND GLOBAL LEADERSHIP IN RESEARCH AND INNOVATION

Excellence and leadership in research and innovation is what allows us to have the broadest and deepest impact, in both scholarship and society beyond academia. We will continue to set benchmarks for our success through the outcomes of our funded research programs, the number and quality of our research partnerships, and international recognition as appropriate to academic units, disciplines, and activities. We will also measure our success in innovation, entrepreneurship, and all the other ways knowledge is creatively mobilized and applied, as well as capturing the impact of our research in society.

We will continue to seek leadership in these areas and strive to be among the top universities working with the world's most innovative companies. Leadership includes expanding opportunities for students to participate in a wide variety of entrepreneurial events and activities, enabled through research partnerships that span the globe.

U of T's successes in a broad range of program offerings and research activities have a major economic and social impact, locally, nationally and globally. They are in keeping with U of T's Strategic Mandate Agreement with the Province of Ontario and with our role as a globally recognized research-intensive institution with a distinct leadership role in Ontario's post-secondary education system.

We are committed to supporting our research community so that the University of Toronto continues to lead by:

- Garnering the highest share of funding from Tri-Agency programs, Canada Foundation for Innovation, Canada Research Chairs, and private sector partners;
- Holding the highest share of national and international awards and honours among Canadian universities;
- Achieving the highest share of highly-cited researchers among Canadian universities;
- Placing in the top 25 universities in the world as ranked by leading research-based global rankings;
- Ranking as one of the only public universities in the world that excels across a broad range of areas of scholarship; and,
- Placing highly in global innovation and entrepreneurship rankings and surveys that reflect our successful research-based startups, new invention disclosures, and new licenses and options.

## 2. FOSTER COLLABORATIONS, PARTNERSHIPS, AND ENGAGEMENT

Given the tremendous expertise of our faculty members, the University can play an important role in addressing the issues we face by engaging with communities as true partners and by advancing solutions

that are sustainable, equitable, and that serve the needs of those communities. We are committed to maximizing the impact of U of T research by mobilizing that research through our work with students and out into society, and by facilitating its use by those who need it most.

Through engagement in meaningful collaborations and partnerships with colleagues, students, partners, and communities locally, nationally, and internationally, we can further our understanding of research and innovation needs and contribute directly to resolving societal problems. Given that many research problems are complex and require the expertise of different disciplines, in addition to supporting disciplinary-based, basic research, we will also continue to support opportunities for division-crossing, and multidisciplinary and interdisciplinary engagement and research. Collaborations and partnerships also allow us to leverage complementary research strengths, which produces unique capabilities used to foster learning and accelerate discovery.

We will continue to develop strategies to increase our participation in partnered research programs and cross-divisional knowledge mobilization events and symposia**.** Establishing evidence of engagement and impact will require working with divisions to select, develop, and evaluate measures that are appropriate to the field of inquiry and the specific activity, such as:

- Increasing the number of collaborations and partnerships among U of T researchers and the amount of associated funding;
- Increasing the number of Social Sciences and Humanities Research Council (SSHRC) Partnership Grants; Natural Sciences and Engineering Research Council (NSERC) Collaborative Research and Development Grants, Strategic Research Network Grants; and Strategic Project Grants; and other partnership programs;
- Developing practices to foster positive, respectful relationships between the university and Indigenous communities, allowing for mutually beneficial and trustful partnerships;
- Increasing the number of local and international government, NGO, and industry partnerships; and,
- Defining new approaches in collaboration with our academic divisions to measure research engagement impact.

## 3. ADVANCE EQUITY, DIVERSITY, AND INCLUSION ACROSS RESEARCH AND INNOVATION

The University of Toronto's commitment to equity and diversity is central to its public mission as well as its devotion to the pursuit of excellence. Often our best work gets done when we come together with colleagues in socially, culturally, and intellectually vibrant environments.

As an institution, U of T will work to ensure an environment in which students, postdoctoral fellows, faculty, and staff are provided with the support needed to realize their goals and aspirations as they relate to research and innovation. Through continual examination and monitoring of practices, policies, and programs we will aim to ensure that equitable and inclusive principles prevail within U of T's research and innovation activities including internal funding programs, research awards and honours, researcher recruitment and retention, research funding, and innovation and entrepreneurship, as well as aligning with the broader initiatives at the University of Toronto.

We also know that Indigenous / Aboriginal people, persons with disabilities, racialized persons / persons of colour, LGBTQ individuals, and women experience discrimination, barriers and biases that affect their

experiences as researchers at U of T. Sustained attention and action to recognize and remediate these systemic and persistent barriers is required to ensure our researchers work and study in an environment free from harassment and discrimination, and where principles of equity, diversity and inclusion are interwoven into the U of T research enterprise. This includes integrating best practice recommendations into our internal procedures and programs in order to encourage broad and diverse participation and to counter bias in peer review and selection processes.

Guided by the calls to action relating to Indigenous Research Ethics and Community Partnership arising out of the University of Toronto's *Response to Canada's Truth and Reconciliation Commission*, we will strive to be a welcoming place that respects and promotes Indigenous worldviews, methodologies, and ways of knowing, as well as to seek to create the conditions and spaces that will allow Indigenous knowledge and practice to thrive. We will engage with Indigenous community members to build a respectful process for Indigenous research and to develop community partnerships that are a priority and benefit to those communities. With respect to research ethics, training that recognizes historical patterns of unethical research practices must be available to all scholars, including students, seeking to work in partnership with an Indigenous community.

Some of the metrics for our success will include:

- Meeting, and exceeding, the goals laid out in the University of Toronto *Canada Research Chair Equity, Diversity, and Inclusion Action Plan*; and,
- Increased participation and success rates of underrepresented groups in internal and external research funding, research awards and honours, and entrepreneurship programs.

## 4. SUPPORT INTEGRATION OF RESEARCH AND INNOVATION IN STUDENT CURRICULAR AND CO-CURRICULAR EXPERIENCE

The research and teaching missions at the University of Toronto are inextricably linked. Research and innovation activity should actively engage undergraduate, professional, and graduate students. Research intensity and diversity at U of T, as well as research-informed pedagogy, should enhance the entire educational mission and position the University as the top destination for future students, researchers, and innovators.

We will continue to highlight and develop research- and innovation-related resources that provide students with specific information on the scholastic and career benefits of research and innovation experience, opportunities (including practicum experiences and community engaged learning opportunities), funding sources and programs, and course offerings. We will support the importance of faculty members researching their own teaching (Scholarship of Teaching and Learning). This will underscore our commitment to research-based teaching innovations, standards and practices.

The U of T innovation and entrepreneurship community will continue to provide mentorship, expertise, space, and networks for all stages of the innovation process for students and faculty. Health, safety, and ethics are important parts of research training, and we are committed to making relevant resources available in a way that is user-friendly and transparent to students.

Some of the metrics we will use to measure our success include the:

- Proportion of undergraduate students who obtain research opportunities;

- Proportion of graduate students receiving external support and awards;
- Engagement of professional program students in research opportunities;
- Proportion of undergraduate and graduate students who have research based curricular or co-curricular community engaged learning experiences;
- Engagement and impact of student innovation and entrepreneurship activities and opportunities; and,
- Engagement of instructors in the Scholarship of Teaching and Learning, including publications and conference presentations.

## 5. STRENGTHEN THE INSTITUTIONAL SUPPORTS THAT FOSTER RESEARCH AND INNOVATION EXCELLENCE

It is the role of the University to work with its own governance structure, divisions, affiliated partners, students, postdoctoral fellows, faculty and staff, as well as with other universities, governments, non-governmental organizations, private sector partners, and individuals to provide all members of our scholarly community with the tools they need to be successful and competitive.

We will continue to create and refine the tools, policies, best practices, and procedures that facilitate research and innovation of the highest standards of ethics, integrity, and accountability including supports that facilitate compliance with the financial and regulatory requirements of our sponsors and other agencies. The University ranks at a high level internationally for its scholarship and the services that we provide must continue to support this achievement.

We will continue to be responsible stewards of the funds we receive; to respect human and animal subjects in research; to ensure that our faculty, students, postdoctoral fellows, and staff work in safe environments; to recruit the committed volunteers who work on our ethics and review boards (in particular, ensuring that diverse voices from less represented groups are included); to process with due care and efficiency our high number of research grants and partnership agreements; to continue to work to ensure that the full cost of research is covered by our sponsors; to support faculty nominations for prestigious prizes and celebrate the many successes achieved by our scholars; to protect the intellectual property of our researchers; to support the translation of research society; to foster and support entrepreneurship; and, to cultivate a culture where these matters are a high priority and are respected. We are also committed to developing a structure, protocol, and training for ethical review of Indigenous-related research and articulating guidelines for the undertaking of research in and with Indigenous communities.

During the period of this plan we will assess our activities in this area and develop appropriate metrics for assessing the success of our services. The following are examples of ways we will monitor our progress:

- Develop and assess goals and metrics on the quality and level of support for faculty and academic divisions; and
- Monitor the quality and amount of training and professional development opportunities and resources for research ethics and safety through innovative means.