

BEYOND SUSTAINED SUCCESS

Leveraging Our Unique Strengths and Charting New Territory



UNIVERSITY OF
TORONTO

2012 Annual Report

Office of the Vice-President, Research & Innovation

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INTRODUCTION

In 2012, U of T ranked:

21st Times Higher Education World University Rankings

19th QS World University Rankings

27th Shanghai Jiao Tong Academic Ranking of World Universities

7th NTU World University Rankings

The University of Toronto has an established record as a **research leader in Canada** and continues to gain **recognition internationally**, drawing top researchers and students from across Canada and around the world. The broad spectrum of research strengths at the University, the success of our researchers and our students, and our national and international recognition, are complemented by **strong research administration**.

Investment, talent and vision in the Vice-President Research and Innovation (VPRI) portfolio have resulted in the development of an efficient and effective system that not only supports faculty members in their research, but also positions **U of T as a beacon** in the higher education and research landscape. Just as our faculty members are research leaders in their fields, the VPRI portfolio also leads through proactive advocacy for university-based research, with an awareness of **changes in the broader research landscape**, and by strategically charting new territory to establish the University of Toronto as a pioneer, as a partner, and as a beacon.

This annual report provides an overview of the research enterprise at the University of Toronto, making evident that when it comes to our researchers and research administration, our campuses and our partner hospitals, and the benefits

of research for our students and for society, there is much **more than meets the eye**. This report also opens up what may appear to be the “black box” of research administration at the University. It sheds light on the activities undertaken across the VPRI portfolio, between VPRI and other central administrative units, administration in the divisions, and stakeholders external to the university, making it clear that the University research administration is **greater than the sum of its parts**.

In addition to building on nearly **200 years** of research **excellence across a broad range of disciplines** and having an understanding of the present that is informed by a critical and analytical lens, we must also consider how to leverage traditional strengths and develop new ones. We would be remiss if we did not ask ourselves, **“What are we uniquely positioned for and capable of doing?”** Insight and boldness, both, are needed to move forward and a number of next steps are clear. The University of Toronto must maintain leadership and extend our reach. We must also leverage our existing strengths while establishing leadership in new areas by harnessing the power of collaboration. Taking these steps will enable the research enterprise at the University of Toronto to advance.

PART I: THE UNIVERSITY OF TORONTO RESEARCH ENTERPRISE

More Than Meets the Eye

The success of the research enterprise at the University of Toronto is widely acknowledged and is perhaps most **often recognized in the awards and honours** won by researchers, the attention given to groundbreaking research at the University, and metrics related to **research funding, partnerships, publications, and commercialization**. While these accomplishments are important in telling the story of the success and impact of University of Toronto research, there is more to our research than meets the eye. Excellence across a broad spectrum of disciplines, the strengths of the campuses, the vital link to the partner hospitals, and the benefits **involving our students in world-class research**: these are intrinsic to the success of the research enterprise at the University of Toronto.

Although the numbers cannot tell the whole story of the University's research success, the following figures highlight key accomplishments and convey an impressive message about U of T's sustained leadership in research (Figures 1-2, Table 1).

U of T receives more
Tri-Agency funding
per year than any other
Canadian university.

FIGURE 1

Share of Tri-Agency Funding (2011-12)
U15 Universities

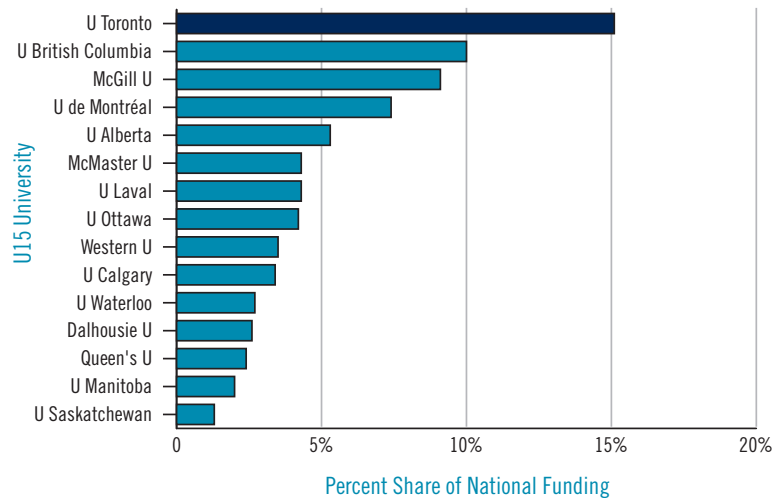
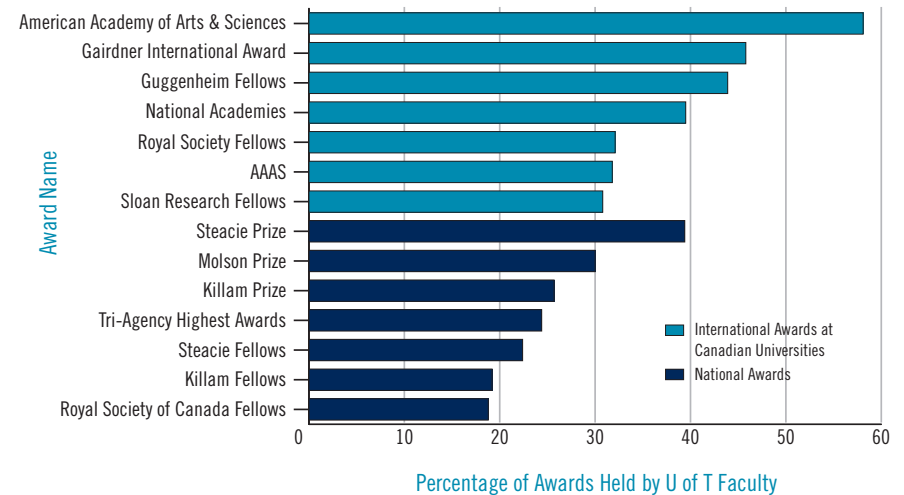


FIGURE 2

Faculty Honours by Award (1980-2012)
Prestigious National and International Prizes & Fellowships



Based on total research output, **the top two universities in the world** are, in order, **Harvard and U of T.**

TABLE 1

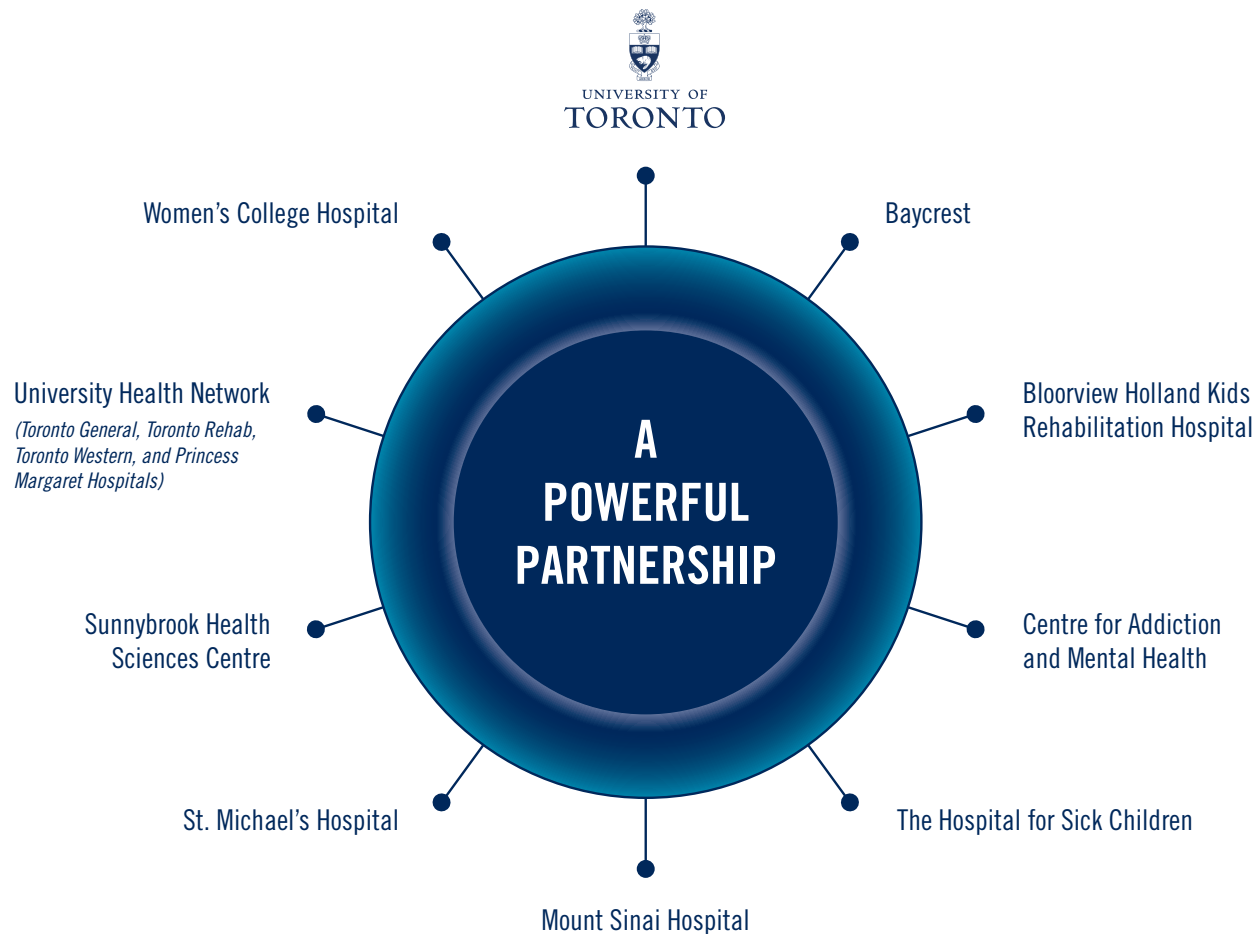
U of T Rankings on Publications and Citations (2007 to 2011)

	Canadian Peers (U15)		North American Peers Public (49)		North American Peers All (74)	
	Publications	Citations	Publications	Citations	Publications	Citations
ALL FIELDS	1	1	1	1	2	3
HEALTH & LIFE SCIENCES	1	1	1	1	2	3
Clinical Medicine	1	1	1	1	2	3
Health Policy & Services	1	1	1	5	2	10
Nursing	1	1	3	4	4	5
Pediatrics	1	1	1	1	2	3
Pharmacology & Pharmacy	1	1	1	1	2	2
Rehabilitation	1	1	1	1	1	1
Rheumatology	1	1	1	1	1	2
ENGINEERING & MATERIALS SCIENCES	1	1	8	8	9	12
Cell & Tissue Engineering	1	1	1	2	3	5
Biomedical Engineering	1	1	1	3	2	5
Materials Sciences, Biomedical	1	1	1	5	3	7
Nanoscience & Nanotechnology	1	1	13	11	19	17
PHYSICAL SCIENCES						
Acoustics	1	1	4	1	4	1
Biophysics	1	1	2	4	3	9
Chemistry	1	1	2	9	5	13
Mathematics	1	1	4	7	5	10
SOCIAL SCIENCES	1	1	1	5	2	6
Anthropology	1	1	3	8	4	10
Behavioral Sciences	1	1	1	1	2	2
Economics	1	1	3	3	14	14
Education & Educational Research	1	1	2	7	3	10
HUMANITIES						
Linguistics	1	1	1	2	1	2
Literature	1	1	2	4	3	6
Philosophy	1	1	1	4	1	5

AN ACADEMIC ECOSYSTEM

Campuses and Hospital Partners

U of T's three campuses and nine partner hospitals form a robust ecosystem. Their commitment to maintaining a depth, breadth, and standard of excellence in research and scholarship is unrivalled in Canada and rare in the world. Collectively, they reflect and uphold U of T's reputation as one of the world's top universities.



U of T and its
9 hospital partners
rank among the
top 4
biomedical
complexes in
North America.

— NTU 2012 World University Rankings for Clinical Medicine

STUDENTS AT THE UNIVERSITY OF TORONTO

Global Ambassadors & Agents of Change

80,000 students

709 undergraduate programs

215 graduate programs
(master's and doctoral)

63 professional programs

18 combined programs (include
professional master's elements)

Students are an integral part of the U of T research community, and they make valuable contributions to research and innovation, especially at the graduate level. Today's student researchers will graduate to become the **highly qualified personnel of tomorrow**, agents of change in society, valued contributors to Canada's knowledge economy, and global ambassadors for U of T. The university drives student interest and participation in research, **contextualizes classroom learning in local and global problems** that are being addressed at the University, and ultimately increases the number of highly qualified personnel entering the workforce, **benefitting society at large**.

The University is also in the midst of an effort to expand graduate student enrolment from both domestic and international applicants. Currently, approximately **14 per cent of U of T graduate students come from outside of Canada**, from China, Hong Kong, India, Japan, Malaysia, Pakistan, Saudi Arabia, South Korea, the United Kingdom, the United States, and many other countries. Since graduate students perform an important role in research, an increase in recruitment has implications for research funding and infrastructure needs. U of T is committed to supporting all researchers – faculty members and students – by providing effective administrative support to assist in the management of and accountability for research funds and the ethical conduct of research.

THE UNIVERSITY OF TORONTO RESEARCH COMMUNITY

Performance & Reputation

At the core of U of T's international reputation for research excellence is its community of close to **7,000 full-time faculty members¹, 2,700 postdoctoral fellows and research associates,** and **15,000 graduate students** who collectively produce more scholarly publications per year than any other university in the world, except Harvard (Table 1).

U of T researchers are world leaders across the full spectrum of research and scholarly inquiry, in basic and applied research, and many faculty members assume leadership roles in multidisciplinary research teams across Canada and with international partners. This consistently strong performance across a vast breadth of disciplines enhances **U of T's reputation as an ideal place to conduct research**, and as a consequence, the University consistently attracts new faculty members from leading institutions around the world. Approximately **half of the University's postdoctoral fellows** and nearly **30 per cent of faculty members** recruited to U of T in recent years have **come from abroad**.

The research contributions of U of T's faculty, postdoctoral researchers and graduate students in their respective fields are complemented by an **equally strong administrative foundation** that supports the business processes of the **"research pipeline"**: from capturing and managing research funds to protecting intellectual property and mobilizing knowledge beyond the campus. The University of Toronto is also home to **44 libraries** on all three campuses, making it the **third-largest**

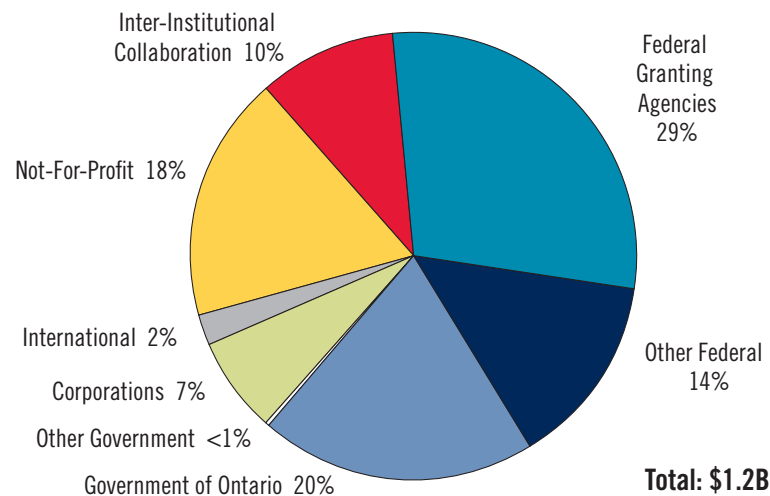
academic library system in North America.

The libraries collectively offer more than 21 million digital and traditional holdings.

Although public interest in research tends to focus on outputs such as breakthrough inventions, new treatments and therapies, disruptive technologies, revolutionary ideas and works, and other exciting advances for society, often understated is the **funding that drives research and scholarship**. A university's ability to produce world-leading research is related to its ability to attract research funding.

On average,
Science and Nature
 each publish at least
 one article per month
 featuring **U of T research**.

FIGURE 3
Research Funds Awarded by Sector (2011-12)
U of T and Partner Hospitals



U of T and its nine partner hospitals attract **significantly more external research funding than any other university in Canada**, capturing a record **\$1.2 billion in 2011–12** (Figure 4). Approximately 30 per cent of this total amount was awarded by the Social Sciences and Humanities Research Council (SSHRC), the Natural Sciences and Engineering Research Council (NSERC) and the Canadian Institutes of Health Research (CIHR), representing a **15 per cent market share of all Tri-Agency funding awarded across Canada in that year** (Figures 3,11).

Since its inception in 1998, the Canada Foundation for Innovation (CFI) has awarded a total of \$822.3 million in research infrastructure funding to the University of Toronto, representing an **18 per cent market share of all CFI funding** awarded across Canada (Figures 5,6). CFI contributions – in partnership with provincial agencies such as the Ontario Ministry of Research and Innovation – have been leveraged for an investment of **more than \$2 billion in research infrastructure**, enabling U of T to establish **world-leading facilities** that have helped to attract and retain some of the world’s most talented researchers and trainees (Figure 9).

FIGURE 4 **Research Funds Awarded – Ten-Year Trend (2001-2012)**
U of T and Partner Hospitals

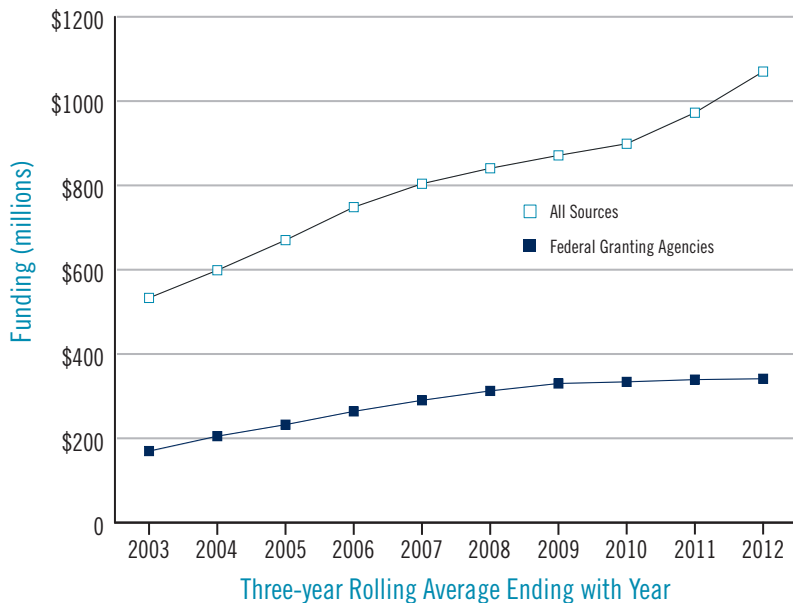


FIGURE 5 **Canada Foundation for Innovation (CFI) Funding Since Inception (1998-2012)**
U15 Universities

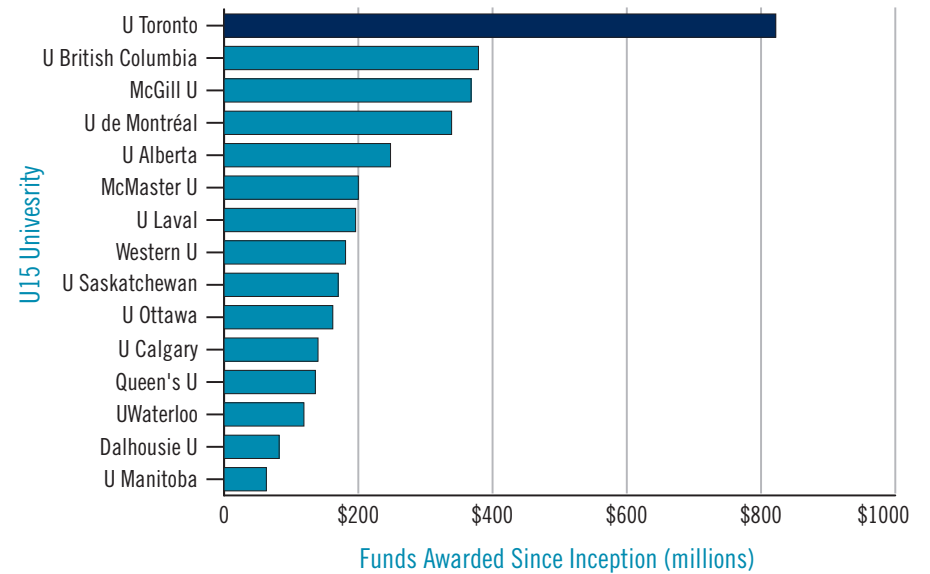


FIGURE 6 **U of T's Share of CFI Funding By Major Competition**

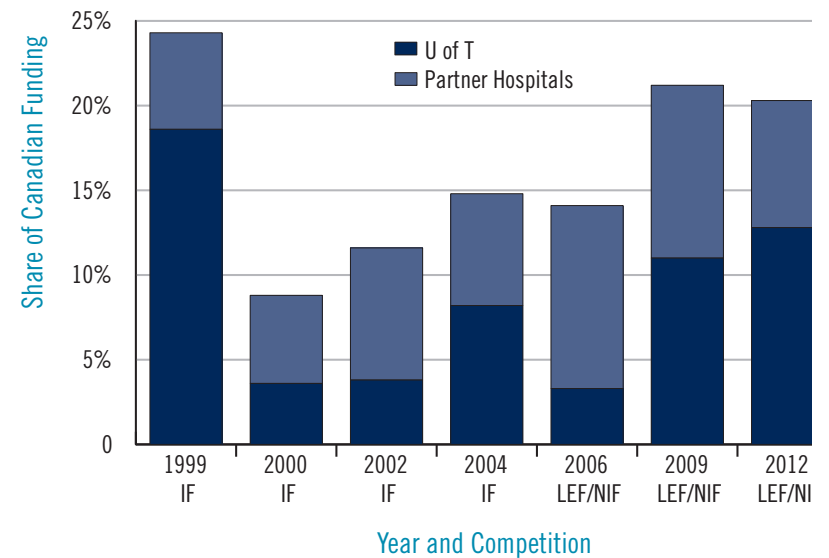


FIGURE 7 **Research Revenue - Industrial Sources (2009-10)**
U15 Universities

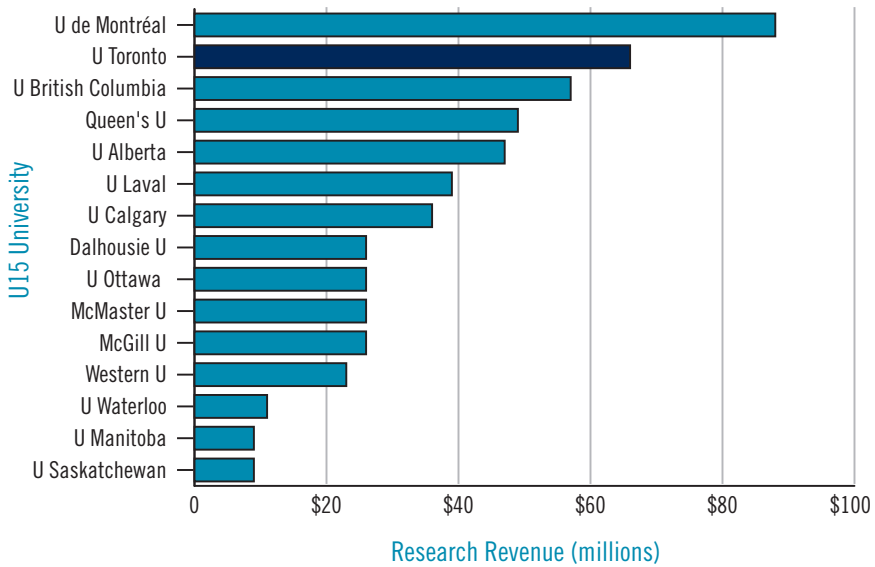


FIGURE 8 **Research Revenue – Industrial Sources (2009-10)**
U15 Universities

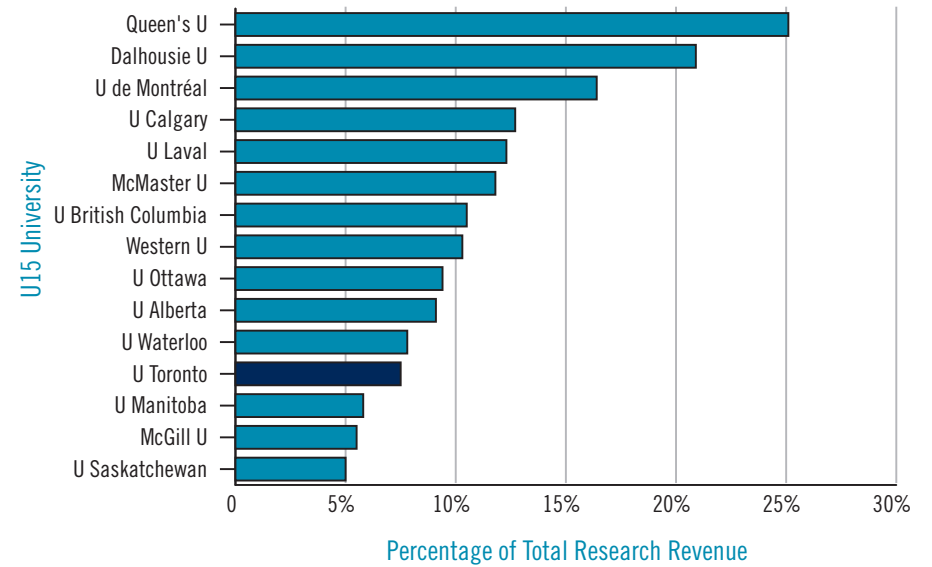
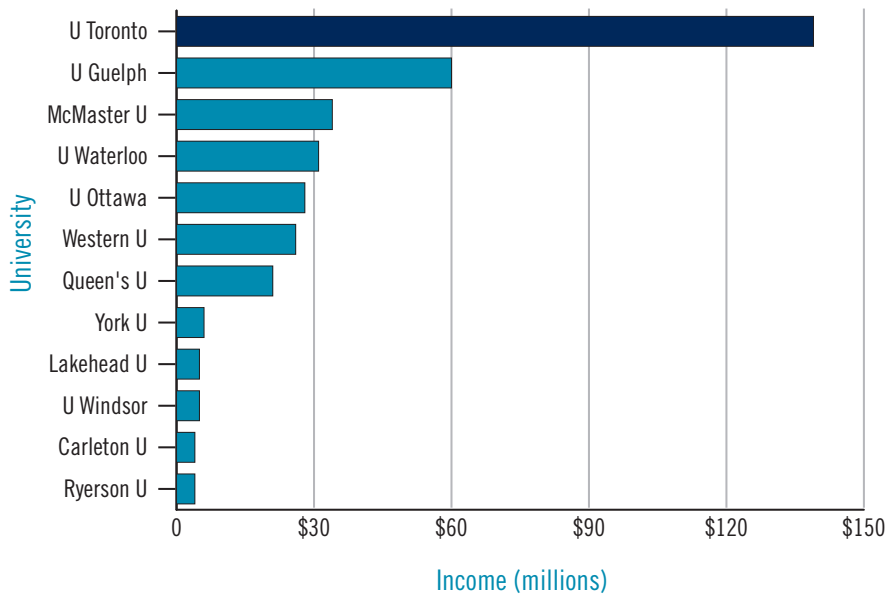


FIGURE 9 **Research Income from Provincial Sources (2010-11)**
Top 12 Universities



Two-thirds
of all invention disclosures
at U of T involve
at least one student.

PART II: THE UNIVERSITY'S RESEARCH ADMINISTRATION

Greater Than the Sum of Its Parts



Our **2010 report**, *Sustaining Research Excellence: Challenges and Opportunities*, provided a critical overview of **changes made in the VPRI organizational structure** in order to better respond to the changing research funding landscape and to improve efficiencies

and effectiveness in research administration activities at U of T. The University's investment in VPRI and the **new VPRI tri-pillar model** of research administration — Research Services Office (RSO), Innovations and Partnerships Office (IPO), Research

Oversight and Compliance Office (ROCO) — coupled with Strategic Initiatives and Research Communications teams have proven successful.

Although members of the University community in academic and administrative units are typically aware of select aspects of the work undertaken within our portfolio, it is important for us to **open up the “black box” of VPRI activities** in order to provide a more complete understanding of our work. In the cross-pillar activities and the coordinated efforts within VPRI, as well as in various initiatives with central administration units and with administration in the divisions, it is clear that **U of T's research administration capacity is greater than the sum of its parts.**



Office of the Vice-President, Research & Innovation



Research Services Office



Innovations & Partnerships Office



Research Oversight & Compliance Office

VPRI RESEARCH ADMINISTRATION PILLARS

Overcoming Challenges & Reaching Milestones

CHALLENGE #1: INCREASE MARKET SHARE IN TRI-AGENCY COMPETITIONS

Our 2010 report identified for each of the VPRI pillars – RSO, IPO, ROCO – a key challenge to be addressed. This section provides a short description of these challenges, ways in which we are overcoming them, and milestones we have reached.

Changes in the funding agency structures and priorities pose a challenge for universities. In order for the University of Toronto to increase market share in Tri-Agency funding, **RSO staff facilitate faculty participation and success** in a broad range of domestic and international research funding programs. In partnership with the academic divisions, **RSO provides leadership** in analysis, strategies,

systems, tools and value-added knowledge and experience to enable the development of successful proposals: from individual investigator-driven exploration, through large-scale collaborations and partnerships, to institutional programs that reward leading researchers and expand **research infrastructure and capacity**.

Regaining Canada Research Chairs

Four years ago, VPRI identified the Canada Research Chairs (CRC) program as a priority for U of T's research funding trajectory (our allocation dipped to 238 in 2011-12). We set a **goal of returning to a minimum of 250 CRCs** by increasing our market share in each council by a quarter of a percent each year for four years, and sustaining those shares thereafter (Figure 11). We engaged the academic divisions by identifying their particular Tri-Agency strengths and weaknesses, and by asking them to devise plans to increase success based on their respective realities (Tables 2A-D).

Our strategy has now borne its first fruits: **U of T has regained 10 CRCs in the 2013-14 re-calculation, for a total of 248** (Figure 10). This tremendous turnaround is testament to a sound strategy and the determination of the divisional academic administrators and individual faculty members who have approached funding opportunities with renewed vigour.

FIGURE 10

Canada Research Chairs
Regular Chairs Allocation (2013-14) – U15 Universities

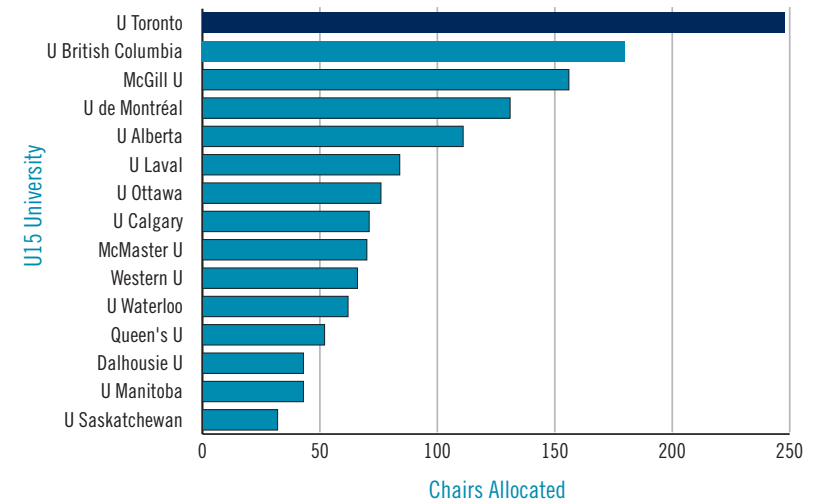
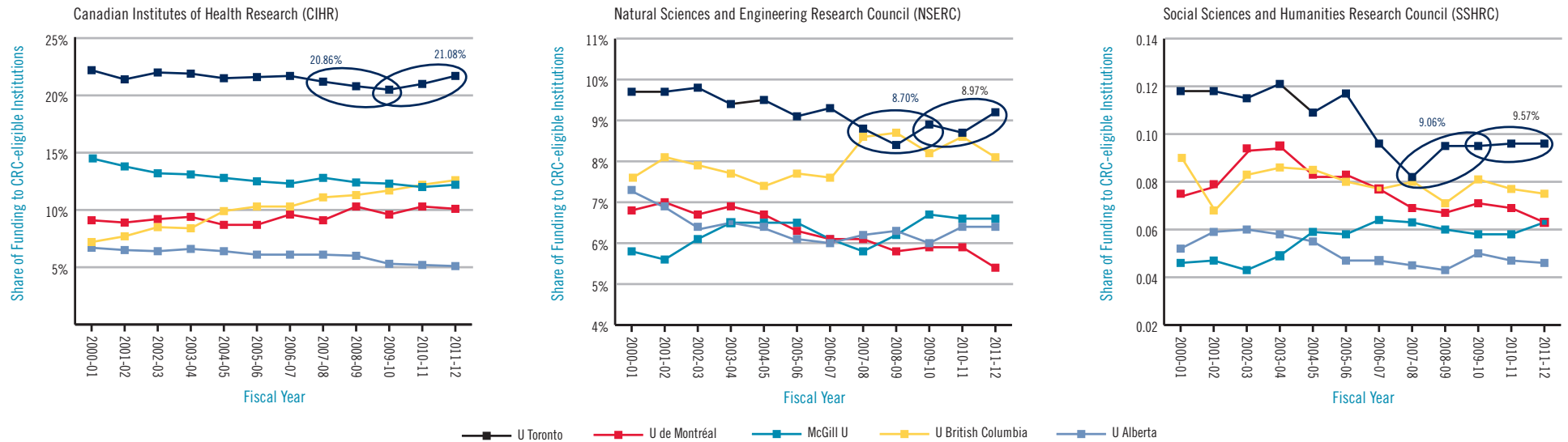


FIGURE 11

Tri-Agency Market Share (2000-01 to 2011-12)
Top Five Universities



Each year, RSO receives **2,800** new funding applications and oversees more than **\$400m** in research funding awarded to **2,800** Principal Investigators across **9,000** active accounts involving **800** unique sponsors and **2,000** different programs.

RSO’s other key role is to offer **expert post-award management support** to minimize risk in an ever-evolving and complex environment of heightened accountability and transparency. RSO’s overarching goal is to be a **research enabler**, working alongside researchers and academic divisions to steward sponsor investment and allow researchers to focus more of their time on research.

Given U of T’s excellent reputation in research and best-practice research management, RSO staff members are frequently called upon by sponsors and other institutions for guidance on a variety of issues and initiatives.

Success in major research funding competitions (i.e. CFI, Canada Research Chairs, the Canada Excellence Research Chairs, Genome Canada, Ontario Research Fund, etc.) is supported by **RSO coordination** and leadership. For example, there has been a significant increase in funding market share following VPRI’s development of an **internal peer review and pre-submission**

competition for major funding programs, which is coordinated by RSO. **Liaison activities** with the Tri-Agency, international research funding organizations, and research foundations are ongoing. The RSO team is crucial for facilitating dialogue when funding programs are being revised and in **mitigating issues resulting from changes to funding programs**.

RSO also plays a leading role in the development of new tools and services for the University research community – all available through the Research and Innovation website. **Research Alerts** enables dissemination of important information to individuals according to their interests. **Project RAISE** (Research Administration Improvement and Systems Enhancement) is streamlining and automating institutional research business processes to increase efficiency, transparency and accountability. **Searchable funding opportunity databases** enable researchers to explore new sources of research support.

TABLES 2A-D

Participation in CRC-eligible Tri-Agency Programs (2008-09 to 2010-11) By School of Graduate Studies Division and Faculty

Participation and success in Tri-Agency programs (Tables 2A-D) remains a priority for VPRI. Success in Tri-Agency programs is important not only for faculty members and graduate students to undertake research and training, but also because the University's "market share" in these programs (Figure 11) directly affects the allocation of funding to U of T from the Canada Research Chairs program, the Indirect Costs Program, and the CFI.

Faculty/Division	SOCIAL SCIENCES		
	2008-09	2009-10	2010-11
Arts & Science	56%	53%	58%
UTM	64%	59%	56%
UTSC	46%	55%	53%
Architecture	13%	5%	13%
Law	56%	50%	71%
Information	42%	38%	55%
Management	45%	42%	52%
OISE	63%	52%	57%
Social Work	50%	67%	67%
ALL FACULTIES	55%	50%	56%

Faculty/Division	LIFE SCIENCES		
	2008-09	2009-10	2010-11
Arts & Science	90%	89%	89%
UTM	76%	81%	94%
UTSC	94%	86%	89%
Dentistry	30%	36%	37%
Forestry	69%	82%	83%
Medicine	73%	76%	74%
Nursing	67%	71%	73%
Kinesiology & PE	36%	23%	33%
Pharmacy	81%	87%	86%
ALL FACULTIES	72%	75%	75%

Faculty/Division	PHYSICAL SCIENCES		
	2008-09	2009-10	2010-11
Arts & Science	91%	93%	90%
UTM	85%	90%	86%
UTSC	81%	85%	86%
Applied Sci. & Eng.	97%	96%	95%
ALL FACULTIES	93%	93%	92%

Faculty/Division	HUMANITIES		
	2008-09	2009-10	2010-11
Arts & Science	38%	37%	45%
UTM	65%	60%	52%
UTSC	50%	43%	39%
Music	7%	7%	17%
ALL FACULTIES	41%	39%	44%

The Connaught Fund

Administered by RSO, the Connaught Fund invests more than \$3 million annually through a number of programs for emerging and established scholars (Table 3). The Fund was established in 1972 from the sale of the assets of the Connaught Medical Research Laboratories, which produced insulin commercially following its discovery at U of T.

TABLE 3

Connaught Fund Annual Program Allocation

Program	# of Awards	Maximum Allocation
Global Challenge Award	1 full award 3 proposal development awards	\$1,030,000
New Researcher Award	60 awards in \$10K category 8 awards in \$50K category	\$1,000,000
Innovation Award	Approximately 10 awards	\$500,000
Summer Institute Award	Up to 3 awards	\$150,000
McLean Award	1 award	\$50,000
International Doctoral Scholarship	Numerous awards	\$1,000,000
Faculty Recruitment Support	Numerous awards	\$50,000
Total		\$3,780,000



Planet-finder Ray Jayawardhana of the Department of Astronomy and Astrophysics is the most recent winner of the McLean Award, funded jointly by a generous gift from U of T alumnus William McLean and the Connaught Fund. Jayawardhana and his research group will use the \$100,000 prize to focus on "extreme worlds."

"It's been an extraordinary time," he says. "In the past 15 years, astronomers have found over 500 confirmed planets outside our solar system. The pace of discovery is astounding and the diversity of these worlds is tremendous."

Photo: Paola Scattolon

CHALLENGE #2: STRENGTHEN RESEARCH PARTNERSHIPS

Knowledge generated at the University can solve specific problems, bring new technologies to the market, and create social innovations in a variety of sectors that benefit the economy and society at large. **The Innovations and Partnerships Office (IPO) helps turn ideas and innovations into products, services, companies, and jobs.** The activities at IPO have been reviewed and improved with **visible and tangible outcomes**, in three areas in particular: building successful partnerships, enhancing innovation, and championing entrepreneurship.

Each year, IPO manages

150 invention disclosures

on behalf of over

1,200 researchers

...and these numbers are **increasing.**

Building successful partnerships

A key aspect of the IPO mandate is to assist the U of T research community by **increasing research revenues from industrial sponsors and partners** (Figures 7–8,17). Ongoing strategies for building successful partnerships include:

- Improving the **turnaround time** to complete industry-sponsored contracts and agreements by eliminating redundant work processes and improving efficiency. Already, **half of the partnership applications and agreements** processed by IPO each year are completed within **10 business days**.
- Maintaining consistency in research agreements by developing new **“industry-friendly” templates**, and improving website content for internal and external audiences.
- Increasing business development activity to encourage and **facilitate connections** between U of T faculty members and industry partners. This focused campaign offers support and resources to members of the U of T research community while **leveraging the external “pull” of potential industry partners** to support collaborative research initiatives.

FIGURE 12 NCE Expenditure (2008-09 to 2010-11)
Three-year Average – U15 Universities

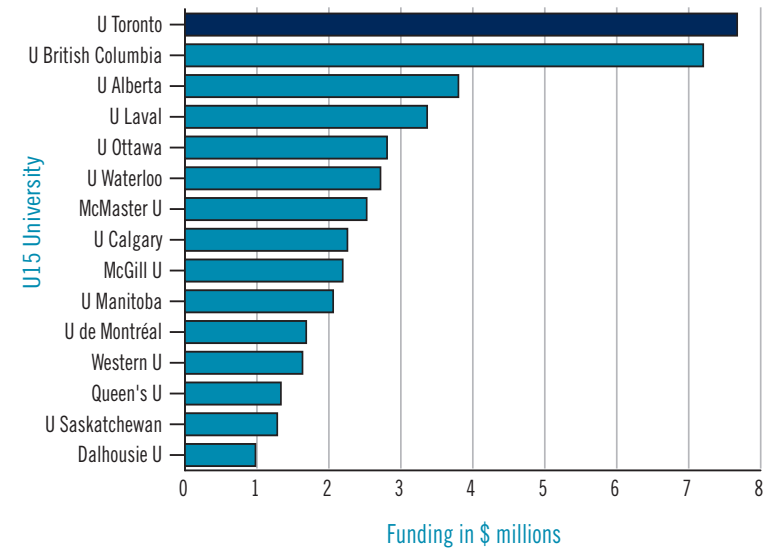


FIGURE 13 NSERC Engage Grants (2009 to 2012)
Top Universities

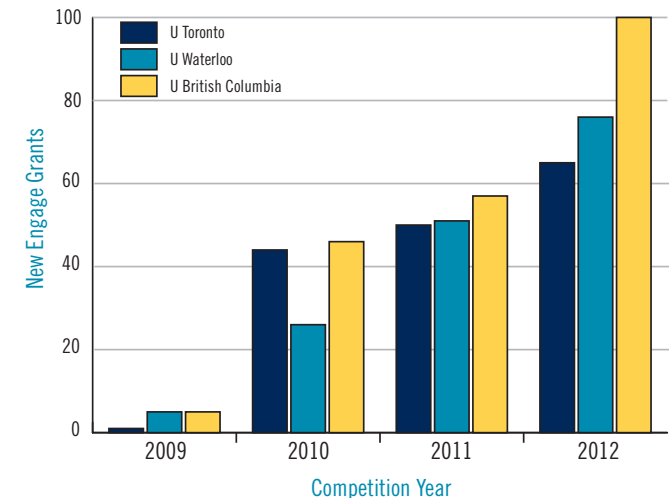


FIGURE 14 **New Start-up Companies (2008-09 to 2010-11)**
U.S. and Canadian Universities

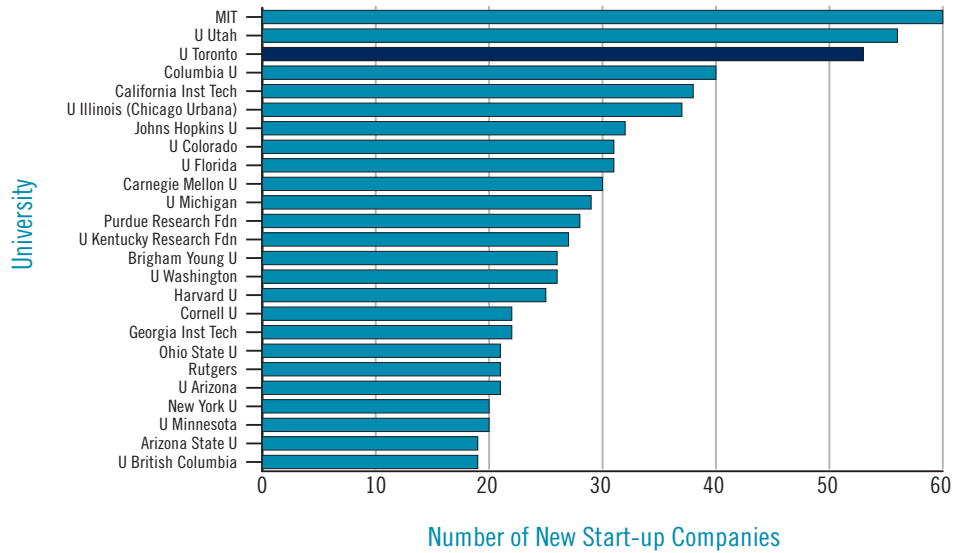
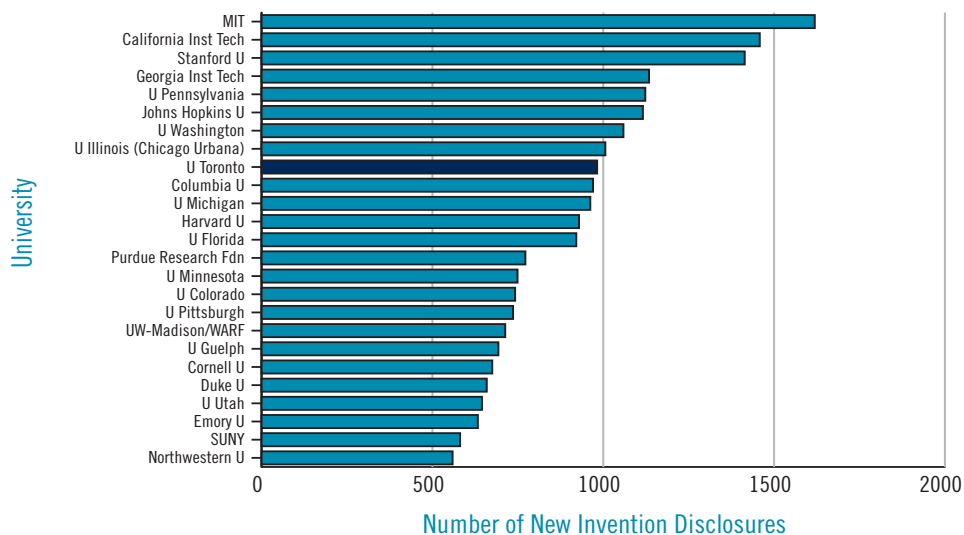


FIGURE 15 **New Invention Disclosures (2008-09 to 2010-11)**
U.S. and Canadian Universities



U of T is a Canadian leader in commercializing university research.

Including hospital partners,

53 start-up companies were created
and
982 invention disclosures were received

At U of T alone,

43 companies were created
and
476 invention disclosures were received.

between fiscal years 2009 and 2011 (Figures 14, 15).

Enhancing Innovation

The second aspect of IPO’s mandate is to enhance innovation, entrepreneurship, and technology transfer activities at the University of Toronto. U of T researchers submit approximately 150 invention disclosures each year (Figure 15), more than any other university in Canada, and this number continues to increase through IPO’s “walking the halls” initiative. **IPO works closely with MaRS Innovation** to assess the marketability of these new inventions, protect intellectual property, coordinate and implement commercialization activities, provide licensing and start-up opportunities, and increase public and private funding for commercialization activities.

To build on the steady growth of high quality disclosures, **IPO is updating and refining key processes for submitting and reviewing new disclosures.** For researchers seeking personal assignment, IPO will provide specific, transparent guidance on the new VPRI website (to be launched in Spring 2013) to assist U of T faculty members in these processes and support compliance with the University’s Inventions Policy.

Championing Entrepreneurship

IPO champions entrepreneurship at U of T through several **key initiatives such as UTEST** (UofT Early Stage Technologies), a partnership with MaRS Innovation to support, mentor, and incubate early-stage companies and entrepreneurs at U of T; the **Connaught Start-up Seed Fund**, an accelerator fund that provides early-stage financing to fledgling U of T companies; and annual recognition events, such as the **Inventor of the Year Awards**. IPO is a major engine for U of T’s industry partnerships, commercialization, entrepreneurship, and global leadership in innovation.

FIGURE 16

New Licenses (2008-09 to 2010-11) U.S. and Canadian Institutions

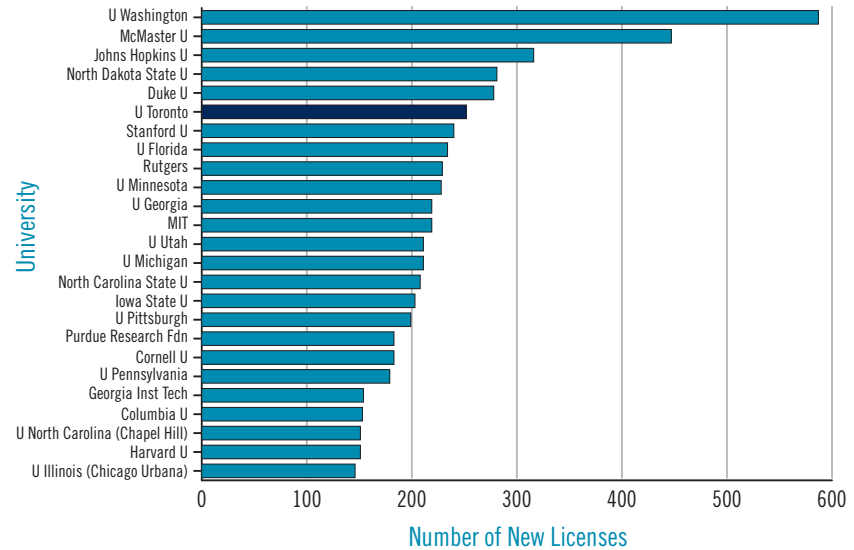
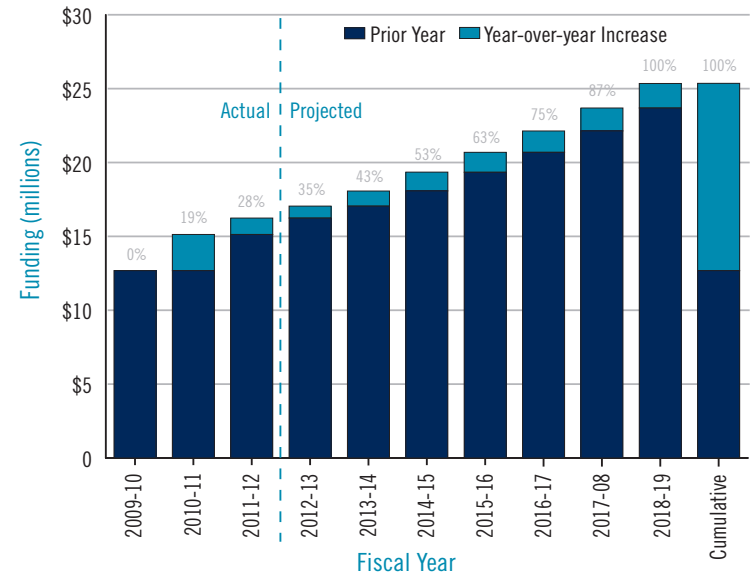


FIGURE 17

Increasing Private Sector Funding Over Ten Years Projected Increase in Corporate Funding of 100%



CHALLENGE #3: ADDRESS CHANGING REQUIREMENTS FOR OVERSIGHT AND COMPLIANCE

One of the first offices of its kind in Canada, ROCO ensures accountability, transparency and ethical conduct in research across the U of T system. This broad directive is accomplished through a number of processes and initiatives designed to support faculty researchers in their efforts to comply with the **high standards of our research sponsors, legislation, and policies** governing research. ROCO exists to protect the University and its research community from potentially harmful errors in research administration and financial reporting on **more than 10,000 active research funds** (Table 5).

A key priority for ROCO is to **manage and reduce institutional risk by establishing a framework for enterprise risk management**, which involves continued efforts to identify problem areas and to re-engineer business processes that strengthen transparency, accountability and auditability. This essentially **safeguards the University and its sponsors from any errors** in financial transactions. Ensuring the University maintains compliance with the **changing requirements of research sponsors**, such as NIH and the federal funding agencies, is a priority.

Another aspect of ROCO's mandate is to **support the independent Research Ethics Boards and Animal Care Committees** that review all proposed research activities – both funded and unfunded – involving humans and animals (Table 4).

A **foundational aspect of ethical compliance is stakeholder education**. This is accomplished by providing the research community with appropriate processes, mechanisms and information. A **ROCO training and outreach program helps U of T researchers** to understand important expectations, best practices, and restrictions around the spending of sponsor funds.

Finally, ROCO is responsible for **ensuring that U of T meets the financial reporting expectations** of its sponsor agencies. ROCO oversees the compilation of approximately 7,000 financial reports per year, liaises with auditors in approximately 100 external audits per year, and translates the recommendations of the auditors into enhancing business processes. These activities **improve the transparency, timeliness, and accuracy of reporting on research revenues**.

In 2011-12,
ROCO managed

10,259 active research funds,

oversaw the compilation of

7,000 financial reports,

took part in

100 external audits,

and supported the review of

4,615 research ethics protocols.

TABLE 4

Protocols Received by Board/Committee 2008-09 to 2010-11

Boards/Committees	2008-09	2009-10	2010-11
RESEARCH ETHICS BOARDS			
Health Sciences & HIV	1,617	1,684	1,720
Social Sciences & Humanities	2,344	2,438	2,316
Subtotal	3,961	4,122	4,036
ANIMAL CARE COMMITTEES	528	582	579
TOTAL	4,489	4,704	4,615

TABLE 5

Volume of Active Research Funds 2008-09 to 2010-11

Year	Number of Active Funds
2008-09	10,402
2009-10	10,580
2010-11	10,259

STRATEGIC INITIATIVES & RESEARCH COMMUNICATIONS

Activities & Milestones

Activities undertaken by the Strategic Initiatives and Research Communications team members involve identifying where there are opportunities to strengthen the position of U of T research vis-à-vis the research landscape locally, regionally, nationally and internationally; academic, government, industry and community stakeholders; and the media and a diversity of publics.

STRATEGIC INITIATIVES



Strategic Research Plan

In 2009, the Office of the Vice-President, Research & Innovation began the development of the institutional Strategic Research Plan (SRP), which was **highly consultative** and invited input from faculty members, academic Chairs, Vice-Deans of Research and others with senior administrative roles at the University. In 2011, *Excellence, Innovation, Leadership: The University of Toronto Strategic Research Plan, 2012-2017* was published (pictured above).

An important distinction of the SRP is noted recognition for **research strengths** at the University across a **broad range of disciplines** and emphasis on **collaboration** across disciplines and with research partners as fundamental not only to advancing research, but also to **addressing increasingly complex local, national and global issues**. The seven research themes in the SRP – *Explore, Sustain,*

Promote, Engage, Advance, Enable, and Build – are inclusive in terms of the ability to locate within them fundamental research across the disciplines. They also support valuable interdisciplinary connections.

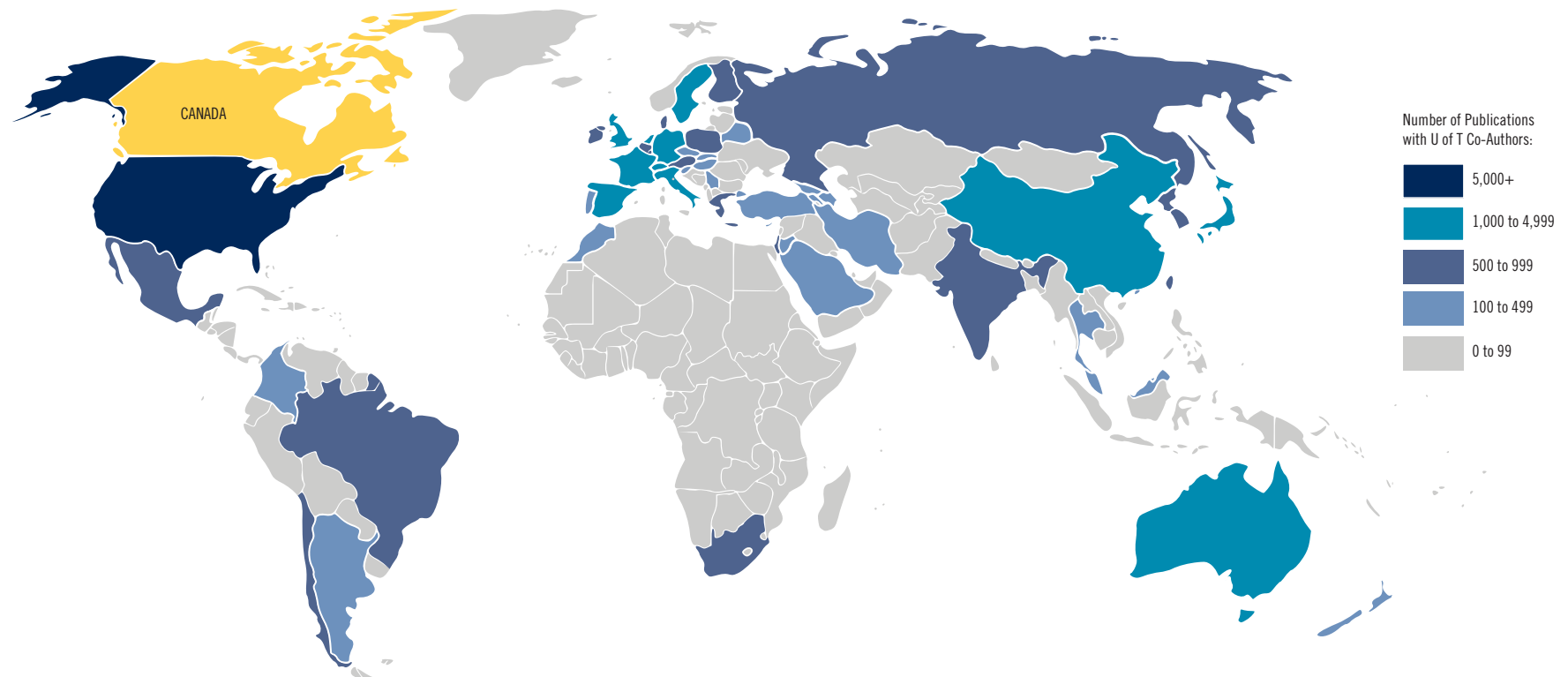
Awards & Honours Strategy

VPRI's recently implemented awards and honours strategy is built on an **integrated approach to supporting the progression of faculty members** in their nominations for research awards, honours and prizes. The University of Toronto Research Awards and Honours Committee (UTRAHC), formed to develop and implement the strategy, is advisory to the Vice-President and meets twice annually. A second group – the divisional Awards and Honours Committee – **supports coordination and collaboration** in awards and honours nominations, includes representatives from the faculties and hospitals, and meets six times annually. By **fostering a culture and network of excellence promotion**, researchers at the University of Toronto win more prestigious awards than their peers at any other Canadian university.

Research Partnerships

VPRI recognizes the **importance of research activities that involve partners** at other academic institutions nationally and internationally, as well as private and public sector partners (Figure 18). Our office is proactive in this arena and current initiatives span a number of research areas and include key partners internationally.

FIGURE 18 **U of T's Global Reach (2008 to 2012)**
Publications with International Co-Authors



Global Research Partnerships

Brazil — In 2011, U of T signed an agreement with the State Research Foundation of São Paulo (FAPESP) and Western University that resulted in a joint call for **research collaborations in lung disease, deep brain stimulation, and soil and water remediation**. As well, in 2012 an MOU was signed with the University of São Paulo to collaborate in the areas of **neuroscience, global cities, oncology and international relations**. A neuroscience conference was held December 2012 in São Paulo and is to be followed by an oncology symposium in November 2013 in Toronto.

Germany — The German Academic Exchange Service (DAAD) Strategic Partnership Program very recently awarded almost €1 million to Goethe University to support research collaborations with U of T and four other universities to support **student and faculty mobility programs**.

India — U of T, in partnership with The University of British Columbia and the University of Alberta, was recently awarded a Canada-India **Research Centre of Excellence for \$15 million** entitled “Innovative Multidisciplinary Partnerships to Accelerate Transformation & Sustainability (IC-IMPACTS)”. IC-IMPACTS has three areas of focus:

sustainable and safe infrastructure, integrated water management, and public health disease prevention and treatment, to be applied synergistically to underserved communities in India and Canada.

Taiwan — U of T has signed **cooperation MOUs** with the National Taiwan University, the National Tsing Hua University and Academia Sinica to support research collaborations and trainee mobility. Funding is being sought through the Dragongate NSC program. A partnership with a leading Taiwanese computer company has recently been initiated in the area of **health cloud technologies**.



Research Catalogues

The research catalogues (pictured above) were first developed following the publication of the Government of Canada’s “Mobilizing Science and Technology to Canada’s Advantage” (2007). **Showcasing and promoting the spectrum of University of Toronto faculty research** projects,



awards, and honours across the disciplines, the first set of catalogues includes five volumes: Humanities, Arts & Culture; Social Innovation; Information & Communication Technologies; Energy & the Environment; and Health Sciences. The information used for the catalogues is being updated and

transitioned to an electronic database that can be used to produce a variety of customizable outputs (such as updated catalogues and other documents as events and liaison activities may require).

Research Matters

Research Matters is a campaign to **share stories with the public** that convey the valuable ways that university-based research shapes and improves society by contributing to **new policies, practices and ways of thinking about and understanding the world**. The initiative is led by the Council of Ontario Universities in collaboration with Ontario’s 21 universities. The website for the initiative offers a collection of short and engaging stories about how “**research matters**” and covers a broad spectrum of research fields. The initiative is also host to a series of **free public events – “Life in 2030”** – that explore questions and possibilities about the what world and society will be like in the year 2030. VPRI played a leadership role in the development of this initiative.

Focus on Research

This is a collaborative initiative between VPRI and the University of Toronto Libraries. Focus on Research is a website that houses **faculty profiles** containing information on research keywords, research projects, and publications.

Southern Ontario Smart Computing Innovation Platform (SOSCIP)

The University of Toronto leads the SOSCIP initiative with Western University, bringing together a **consortium of seven universities and IBM**, with support from the Government of Ontario and the Government of Canada, for an **investment of \$210 million** in the initiative. SOSCIP serves as a platform for research activities that partner **academic researchers and small to medium-sized**

enterprises (SMEs) requiring capacity for **large-scale, computationally intensive problem-solving and highly complex data mining and analytics**. This platform includes Canada’s fastest supercomputer, an IBM Blue Gene/Q housed at U of T (**recently ranked 65th among the world’s top 500 supercomputers**), and Cloud and Agile computing infrastructures at Western University.

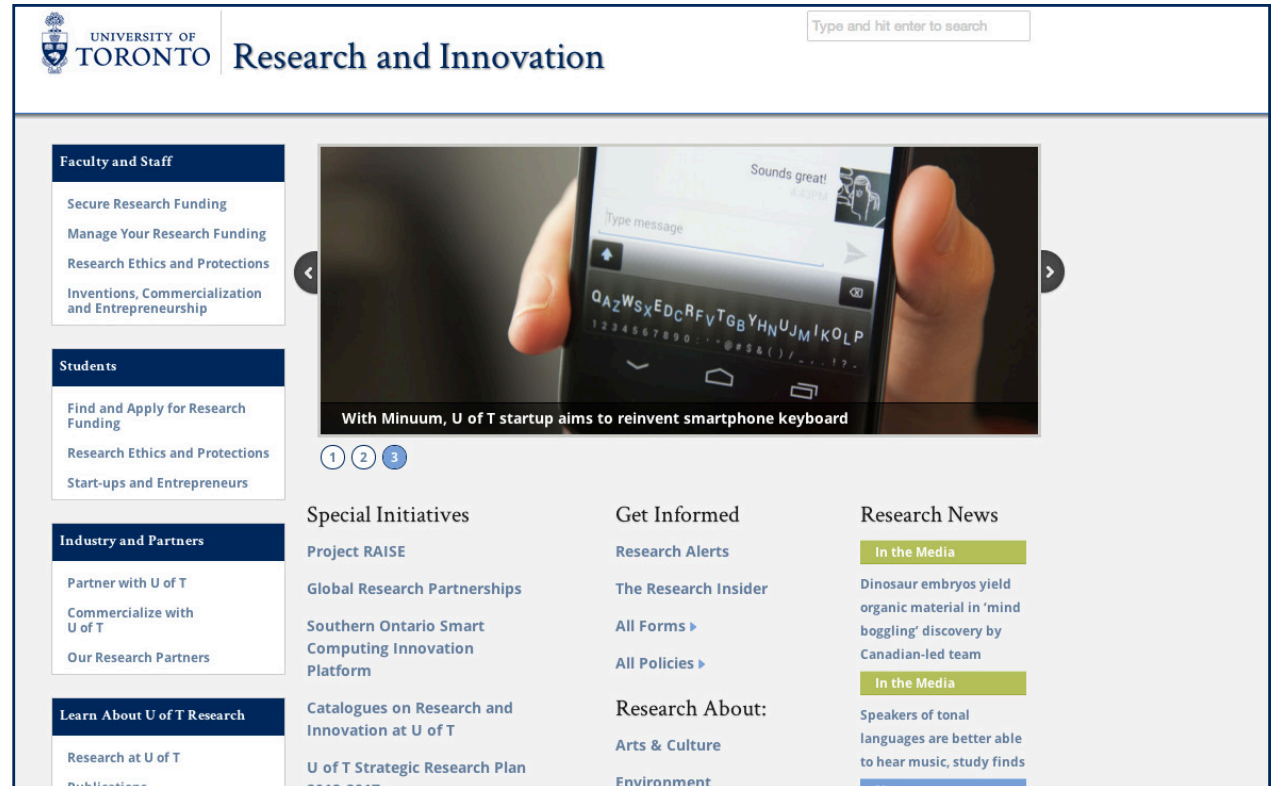
In 2012, IBM opened a new data centre in Barrie, Ontario that will also support SOSCIP’s research activities and enhance its capabilities. SOSCIP has initiated 34 academic- or business-led research projects involving 25 SMEs and all seven universities in the consortium. The number of SMEs involved continues to grow.



RESEARCH COMMUNICATIONS

Edge magazine

Published since 2000, the target audiences for *Edge* magazine are government, business, media, prospective faculty, and students. The focus of the publication is on **topics of importance to society** (themes for recent issues have included the brain, computing, healthy aging, social innovation, stem cells, new media, and research commercialization; the next issue will focus on cities). *Edge* is an **award-winning magazine** that has become an important vehicle for communicating the University's research strengths, engagement, and innovation in matters vital to global society.



Research and Innovation website

The VPRI website is an important point of contact between VPRI, the University of Toronto community, and external stakeholders. The website had 219,198 unique visitors from January 1 to December 31, 2012 (monthly average 18,267). A redesign of the website is near completion, with a planned launch in Spring 2013 (pictured above).

The Research Insider

This quarterly newsletter enables VPRI to communicate directly with the University of Toronto research community about activities and services within the portfolio, research funding, and award achievements. The most recent issue (December 2012) was sent to 3,147 recipients and generated a relatively high open rate (44.7 per cent) and click-through rate (16.6 per cent) compared to industry standards.



Annual Reports

The VPRI portfolio uses two models to publish annual reports in alternating years. The first model (used for this report) is strictly for Governing Council and its committees and focuses on **achievements of the past year in terms of research funding, awards and honours and special initiatives** throughout VPRI. The report can take on a particular theme that is of interest to the internal U of T governance community (for example, the 2010 report, “Sustaining Research Excellence: Challenges and Opportunities”).

The second model is a report intended for both external and internal audiences that focuses on **promoting and profiling U of T’s research strengths via specific themes**. This model is distinguished by a conceptual storytelling approach, and features very high quality original photography (for example, *Excellence, Innovation, Leadership: Research at the University of Toronto; Ideas that Could Change the World; and Life in 2027: Ideas about tomorrow from our next generation*, pictured above).

COORDINATION WITH ADMINISTRATIVE AND ACADEMIC DIVISIONS

In addition to the activities within and across VPRI teams, described above, there are key initiatives through which **VPRI is partnering with the academic divisions** to provide support for the research community at the University of Toronto. Some examples are described in this section.

Members of the VPRI portfolio also undertake **collaborative work with various central administration units**, including the University Planning and Budget Office, the Office of the Provost, the Division of University Advancement, the Directors Management Committee, and the Directors Management Group, among others. VPRI teams coordinate to **strengthen research support in the academic divisions** through partnership with groups such as the Divisional Research Facilitators, Chief Administrative Officers, and Business Officers. VPRI also leverages the valuable work undertaken by the many **academic champions** at the University, who generously contribute their time and effort to the betterment of the University’s research enterprise through service on many internal and external committees.

Research Advisory Board (RAB)

With representatives from academic divisions (Vice-Deans, Research), UTM and UTSC (Vice-Principals, Research) and members of the VPRI Executive, RAB meets monthly to discuss, advise, and provide guidance on **strategic research issues**. RAB plays a leadership role as liaison on research with government, industry, and community stakeholders.

Enhancing Effective Partnerships in Research Administration (EEPRA)

Executive Directors and Directors from across VPRI teams meet once per year with seven groups across the academic units: Faculty of Medicine, Faculty of Arts and Science, Faculty of Applied Science and Engineering, Ontario Institute for Studies in Education, Deans of Single Department Faculties, University of Toronto Mississauga, and University of Toronto Scarborough. These meetings provide VPRI with an opportunity to discuss **accomplishments of the past year and plans for the year ahead**, and provide senior administration in the academic divisions with an opportunity to offer **feedback on what is most needed** in working with VPRI.

Special Advisor on Research Ethics and Integrity

The Special Advisor to the Vice-President, Research and Innovation on Research Ethics and Integrity is a senior academic who provides **academic leadership** to the Research Oversight and Compliance Office (ROCO) **regarding research ethics and integrity**. This individual also represents the Office of the Vice-President, Research and Innovation to external organizations, agencies and groups, and non-University healthcare/research institutions (including hospital partners) with respect to relevant academic activities concerning research ethics and integrity. The role includes **working with academic divisions** on their research integrity educational activities and providing academic leadership for ROCO’s research ethics education. Allegations of research misconduct are processed centrally in VPRI, and the Special Advisor is responsible for overseeing that process, including ensuring policy, procedure, and regulatory adherence. The Special Advisor also acts on behalf of the Vice-President in responding to complaints, and if asked, in making necessary reports.

PART III: LOOKING AHEAD

The University of Toronto as a Beacon

To move beyond sustained success and to chart new territory, we must make informed and strategic decisions about leveraging the unique strengths of our top researchers and students, our campuses and partner hospitals, and our research administration and leadership. Some fundamental considerations for looking ahead involve (i) extending our reach; (ii) maximizing the potential for connectivity and collaboration; and (iii) further operationalizing success.

MAINTAINING LEADERSHIP AND EXTENDING OUR REACH

U of T has established leadership in a number of areas. The prestigious awards and honours held by our faculty members, our market share in research funding, our industry funding and entrepreneurship, our placement in international ranking tables, and our publication and citation numbers, are all recognized areas of excellence for the University.

Building on our record, we have the opportunity to extend our reach. One way forward is to **increase the level of participation in funding programs**, which would also translate into increased support for the **training of future HQP** and enhance the creation of new knowledge and innovation. We can **increase tracking and promotion of international activities** – by individual faculty members across campuses, in academic units, and by the university at the institutional level – to extend our network of international research partnerships. There is also tremendous opportunity and increasing need for leveraging multidisciplinary strengths, **actively pursuing, in particular, innovative and bold possibilities** that humanities and social sciences research brings to bear at the intersection of research in the sciences, technology, engineering and medicine.

We must continue to
ask ourselves the question:
**“What more can we
accomplish?”**

Some of the most
**fertile ground for
discovery**
can be found at the
**intersection of
research disciplines.**

LEVERAGING STRENGTHS AND CHARTING NEW TERRITORY

The University of Toronto and collaborative initiatives

The University of Toronto is **uniquely positioned** to leverage existing research strengths across a broad range of disciplines in order to chart new territory and establish itself in **emerging areas where academic leadership is needed**. Nationally and internationally, there is increasing emphasis on collaborative initiatives, in research activities as well as in research funding policies and priorities.

This **shift toward collaboration has gained momentum for more than 30 years** and has become particularly evident in the past decade, whether in regard to research methodology and data analysis, or in resources that support research and extend the benefits of research more broadly to industry, government, and community stakeholders.

In **looking at the future of the research enterprise** for the University of Toronto (and for the research community more broadly), the VPRI will focus on three **key areas that maximize the potential of our strengths and our leadership position** as an institution: connectivity, collaboration across the disciplines, and operationalizing success.

Connectivity

The University of Toronto has **valuable networks**, both internally and externally, whether in terms of collaboration and coordination across campuses, administrative units, national and international higher education organizations and research partnerships, or industry and community partners and contacts. This **connectivity can be further leveraged**. Internally, VPRI works closely with key administrative units, such as Government, International and Community Relations and the Division of University Advancement, among others. The Vice-President, members of the VPRI Executive, and Directors in

the portfolio are active, for example, in organizations such as the **Council of Ontario Universities and the U15**, as well as the Canadian Association of University Research Administrators. VPRI is also active in developing **global research partnerships**, with initiatives involving foreign government agencies and embassies, universities, researchers, and **industry partners**. U of T's strong connection to industry is evidenced in its leadership in Mitacs and involvement in MaRS Innovation (the largest tech transfer experiment in Canada), as just two examples. VPRI can also **strengthen connections to community** by supporting faculty in the context of changing approaches to research, in which community organizations are increasingly engaged as research collaborators in the exchange, co-production, and communication of knowledge, further informing research, theory, and practice.

Collaboration across the research disciplines

Many University of Toronto faculty members, graduate students and postdoctoral researchers are taking the initiative to engage in multidisciplinary research. **Collaboration across the disciplines is valuable** not only for bringing together diverse (and sometimes divergent) perspectives to better understand **complex issues of 21st-century realities**, but also because, at the intersection of research disciplines, some of the most **fertile ground for discovery** can be found. This kind of work, however, is not without its challenges.

VPRI can develop institutional mechanisms and supports to **overcome** two of the most **common challenges of collaboration across disciplines**: (i) limited institutional recognition and support; and (ii) insufficient opportunity to bridge disciplinary divides (whether epistemological and methodological or in regard to theory and practice).

One form of **institutional recognition for interdisciplinary research** can be found in the Strategic Research Plan. Others include the University's Connaught Fund program, calls for proposals and institutional awards and honours. Organizing **symposia and workshops** are also important for the relationships and exchange of knowledge needed for collaborative and multidisciplinary research. We can strive to provide both a foundation and an umbrella to support and encourage research and practice that crosses disciplinary boundaries through a dedicated **institution-wide centre for interdisciplinary research**. There is also a role for U of T to play in facilitating dialogue with external sponsors in regard to their capacity to support excellence in interdisciplinary research.

Strategic direction in this area also includes taking a **coordinated approach to research funding opportunities for multidisciplinary research** and supporting collaboration among institutes and centres in the academic divisions. In addition, each of the campuses has unique strengths, undertakes innovative initiatives, and celebrates significant successes. There is potential to explore through **leveraging the tri-campus system** and encouraging more cross-campus initiatives.

OPERATIONALIZING WHAT WE ARE UNIQUELY ABLE TO ACHIEVE

The University of Toronto research community and VPRI share tremendous successes that are testimony to the **vibrant research culture** of the University, the dedication of academic and administrative units, and a **depth and breadth of knowledge and skills** that is enviable. While we must endeavour to replicate our efforts in order to sustain our success, we must continue to ask ourselves the question: "What more can we accomplish?" Indeed, we can **strive to surpass the goals we have reached**. This, we do regularly, across administrative and academic units. We have sustained our successes. Investments in our efforts have proven sound. What would be **prudent at this time**, therefore, is **to consider how best to operationalize** what we know we can achieve. A number of areas are worthy of consideration.

A FIRST CONSIDERATION: Our **approach to the research funding landscape** nationally and internationally, which involves relationships between funding organizations and governments, **shifting policies and programs, and collaborative initiatives**. We have an understanding and awareness of changes that have occurred historically

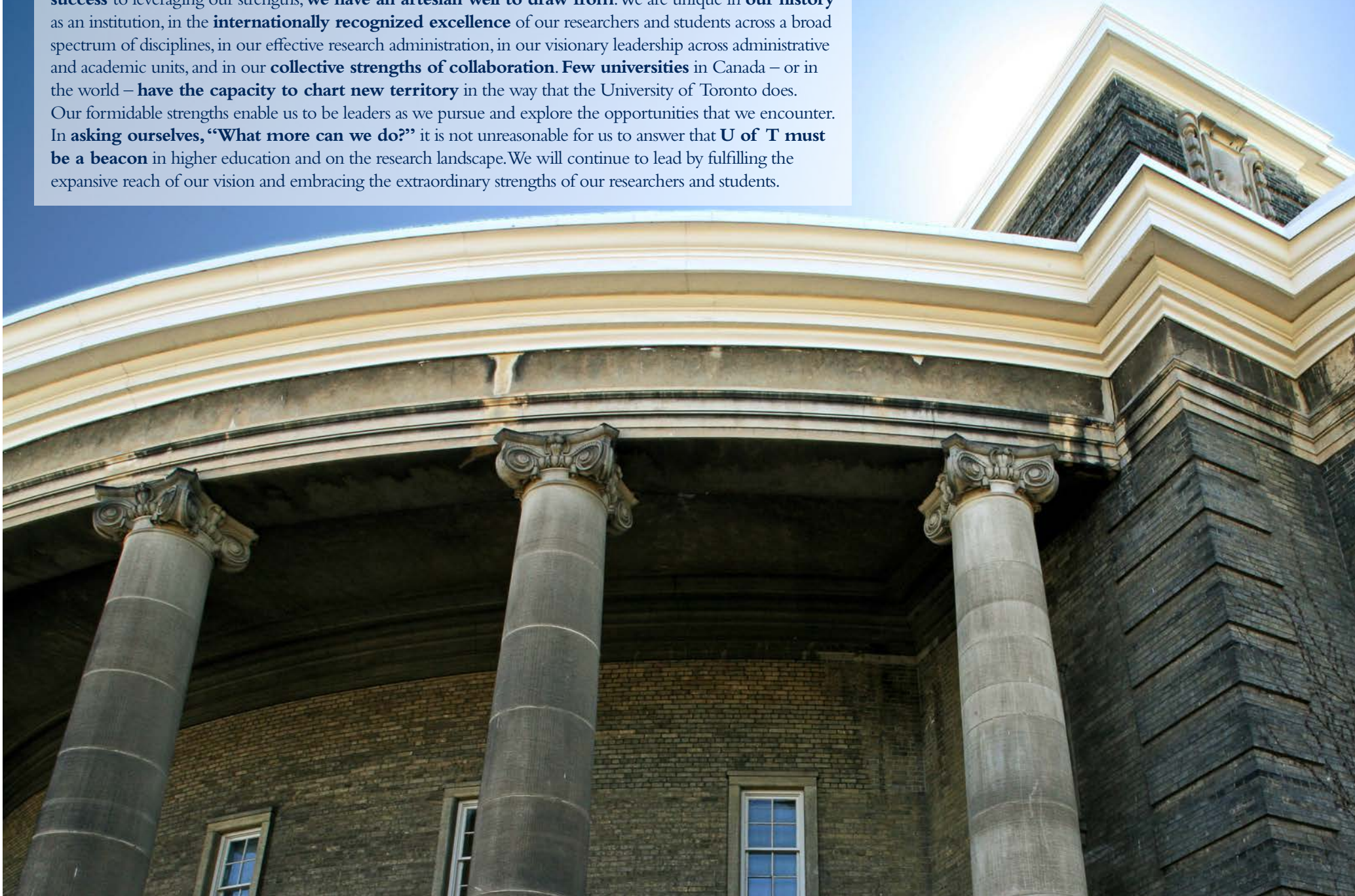
and those on the horizon, but we need to invest in operationalizing both a responsive and a proactive approach to these changes.

A SECOND CONSIDERATION: The need for strengthening the **framework to leverage the acknowledged strengths** of our researchers. VPRI and the academic divisions have invested in supports and initiatives that have been recognized and celebrated, but **increased coordination and collaboration would enable further success**.

A THIRD CONSIDERATION: Ensuring that our faculty members are at the forefront of **what it means to be a leading researcher and scholar of the future**. Careful attention to changes in research and scholarly activity – and academic culture more broadly – over the course of the past 10 years can inform a strategic approach to developing a **framework of supports to expand the repertoire of faculty strengths** needed to address the challenges of a changing research enterprise.

CHARTING NEW TERRITORY

In considering how the research enterprise at the University of Toronto can **move beyond sustained success** to leveraging our strengths, **we have an artesian well to draw from**. We are unique in **our history** as an institution, in the **internationally recognized excellence** of our researchers and students across a broad spectrum of disciplines, in our effective research administration, in our visionary leadership across administrative and academic units, and in our **collective strengths of collaboration**. **Few universities** in Canada – or in the world – **have the capacity to chart new territory** in the way that the University of Toronto does. Our formidable strengths enable us to be leaders as we pursue and explore the opportunities that we encounter. In **asking ourselves, “What more can we do?”** it is not unreasonable for us to answer that **U of T must be a beacon** in higher education and on the research landscape. We will continue to lead by fulfilling the expansive reach of our vision and embracing the extraordinary strengths of our researchers and students.



ENDNOTES

1 The number of full-time faculty members contributing to U of T's research mission (6,892 faculty at Fall 2012) includes all faculty holding professorial appointments, all teaching-stream faculty (Lecturers and Senior Lecturers) and all clinical faculty except Adjunct clinical faculty. The number excludes term-limited sessional and stipendary faculty, research associates, and faculty with any other type of appointment (5,697 faculty at Fall 2012).

FIGURES

FIGURE 1 Share of Tri-Agency Funding (2011-12)

Data sources: CIHR Expenditures by University and CIHR Program, 2011-12 report; NSERC Facts & Figures 2011-12 report; and SSHRC Payments by Program Activity Architecture, Region, Province & Institution 2011-12 report.

Based on government fiscal year, April to March.

Funding for the Networks of Centres of Excellence, the Canada Research Chairs program, the Indirect Costs Program, the Canadian Microelectronics Corporation (NSERC funding held at Queen's University) and the Canadian Light Source (NSERC funding held at the University of Saskatchewan) are excluded.

Partner hospitals and affiliates data are counted with each university.

FIGURE 2 Faculty Honours by Awards (1980 to 2012)

This figure shows the percentage of international and Canadian prizes, fellowships, and memberships in prestigious scholarly societies held by U of T faculty as

a percentage of the number of these awards and honours held by faculty in all Canadian universities since 1980.

Data sources: Individual agencies. Based on calendar year.

Includes current AAAS (American Association for the Advancement of Science) members only. The National Academies consists of: Institute of Medicine, National Academy of Engineering, and National Academy of Sciences. Tri-Agency Highest Awards include: the Gerhard Hertzberg Canada Gold Medal for Science and Engineering (NSERC); Health Researcher of the Year (CIHR); and the Gold Medal for Achievement in Research (SSHRC).

Due to the timing of announcements, the following honours are updated until 2011 only: Tri-Agency Highest Awards, American Association for the Advancement of Science, Steacie Prize, and Institute of Medicine.

FIGURES 3&4 Research Funds Awarded by Sector (2010-11) and Research Funds Awarded – Ten-Year Trend

Data source: VPRI. Based on government fiscal year, April to March. The Federal Granting Agencies include the Canada Research Chairs program.

FIGURES 5&6 Canada Foundation for Innovation (CFI) Funding Since Inception (1998-2012) and U of T's Share of CFI Funding by Major Competition since Inception (1999)

Data source: CFI website, projects funded database updated January 16, 2013. Based on government fiscal year, April to March. National projects excluded. Partner hospitals and affiliates data are counted with each university. IF: Innovation Fund; LEF: Leading Edge Fund; NIF: New Initiatives Fund.

FIGURES 7&8 Research Revenue Industrial Sources

U of T's rank in research revenue from industrial sources drops to 12th when normalized over total research revenue.

Data source: Financial Information of Universities and Colleges 2009-10, Canadian Association of University Business Officers (CAUBO). Fiscal year varies by university. U of T's is May to April.

Toronto data corrected for one-year lag in reporting for partner hospitals. McMaster: only entities consolidated were included. Partner hospitals and affiliates data are counted with each university.

FIGURE 9 Research Income from Provincial Sources (2010-11)

Data source: Financial Information of Universities and Colleges 2010-11 Preliminary Report, Canadian Association of University Business Officers (CAUBO). Fiscal year varies by university; U of T's is May to April. Partner hospitals and affiliates data are counted with each university.

FIGURE 10 Canada Research Chairs (2013-14)

Source: Canada Research Chairs website, allocations updated March 2013. Based on government fiscal year, April to March. Limited to regular allocation. Partner hospitals and affiliates data are counted with each university.

FIGURE 11 Tri-Agency Market Share (2000-01 to 2011-12)

Data sources: Canada Research Chairs' list of programs excluded from the credit base for chair allocation; Expenditures by university and CIHR Program; CIHR awards search engine; NSERC Facts and Figures; NSERC awards search engine; SSHRC Payments by Program Activity Architecture, Region,

Province & Institution; SSHRC awards search engine. Based on government fiscal year, April to March. Partner hospitals and affiliates data are counted with each university.

Funding is defined as the sum of annual budget instalments approved by each council. Adjusted for Enzyme Replacement Therapy for Fabry Disease program (administered at UHN but re-distributed to participating universities in accordance with their CRC credits).

Limited to CRC-eligible programs, with the exception of the Networks of Centres of Excellence, which are not included. Denominator limited to funding made to CRC-eligible institutions.

FIGURE 12 **NCE Expenditure (2008-09 to 2010-11)**

Data source: Indirect Costs Program. Based on government fiscal year, April to March. Limited to expenditure eligible under the Indirect Costs Program.

FIGURE 13 **NSERC Engage Grants (2009 to 2012)**

Data source: NSERC, April 2013. Based on government fiscal year, April to March. Limited to top three universities when counting all awards since inception (2009).

FIGURES 14-16 **New Start-up Companies, New Invention Disclosures, and New Licenses**

Data sources: Association of University Technology Managers (AUTM), MaRS Innovation “2011 Summary Report on ‘AUTM Compatible’ Indicators”. Fiscal year varies by university. U of T’s is May to April. Where available, U of T includes partner hospitals. Institutions which report as systems are excluded.

FIGURE 17 **Increasing Private Sector Funding Over Ten Years (Projected Increase in Corporate Funding by 100%)**

Data source: VPRI. Based on U of T fiscal year, April to March.

FIGURE 18 **U of T’s Global Reach (2008 to 2012)**

Data source: Scopus, March 5th, 2013. Based on calendar year.

TABLES

TABLE 1 **U of T Rankings on Publications and Citations (2007 to 2011)**

Data source: InCites™, Thomson Reuters (2012). Report Created: Sep 14, 2012. Data Processed Dec 31, 2011. Data Source: Web of Science ® This data is reproduced under a license from Thomson Reuters. Based on calendar year.

All Fields, Health and Life Sciences, Clinical Medicine, Engineering and Materials Sciences, Chemistry, and Social Sciences are Essential Science Indicators field or field groupings. All other fields are Web of Science fields.

North American peers are the Canadian U15 universities, the members of the Association of American Universities (AAU) and the University of California at San Francisco.

TABLES 2A-D **Participation in CRC-Eligible Tri-Agency Programs (2008-09 to 2010-11)**

Data sources: VPRI and Office of the Vice-Provost, Faculty and Academic Life. Based on government fiscal year, April to March.

By Faculty of main appointment, irrespective of Faculty administering the funding. Eligible faculty members (denominator) were defined as:

1. holding a professorial rank; and
2. tenured or tenure-stream; and
3. paid by U of T in the fall term of the previous year (i.e., at U of T in time to apply for research funding).

Participating faculty members (numerator) were defined as those:

1. holding a grant from a CRC-eligible Tri-Agency program (excluding NCEs), with an instalment between April and March of each year; or
2. who applied for a grant from a CRC-eligible Tri-Agency program (excluding NCEs) between June of the previous year and December of the current year.

TABLE 3 **Connaught Fund Annual Program Allocation**

Data source: VPRI.

TABLE 4 **Protocols Received by Board/Committee (2008-09 to 2010-11)**

Data source: VPRI. Based on U of T fiscal year, April to March.

TABLE 5 **Volume of Active Research Funds (2008-09 to 2010-11)**

Data source: VPRI. Based on U of T fiscal year, April to March.



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