

Strategic Research Plan, 2008-2011

The University of Western Ontario

DRAFT FOR DISCUSSION

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Introduction

With annual research income of over \$220M, Western (including its newly integrated Robarts Research Institute and its affiliated Lawson Health Research Institute), ranks within the top ten research-intensive universities in Canada. The University has performed exceptionally well in a range of Federal granting programs, including the Canada Foundation for Innovation, ranking seventh overall in Canada and second in Ontario in terms of allocated funding to date. Provincially, the University places second in Federal Tri-Council funding, and second in receipt of competitive research funding from Provincial sources.

Officially adopted in the fall of 2006, Western's Strategic Plan, *Engaging the Future*, affirms Western's objective to maintain and enhance its stature as a leading Canadian research intensive University "through strategic investment in areas of established and emerging research strength." According to the Plan, these aspirations "will be realized through attention to faculty recruitment and retention, emphasis on graduate programs and enrolment, recruitment of postdoctoral fellows, and construction and renovation of appropriate space." In addition, the plan commits to providing "the research infrastructure and support required to ensure a strong position among Canada's leading research universities," through an abiding focus on:

- Facilitating the alignment of people, resources and space so as to maximize research synergies and success
- Increasing the involvement of undergraduates, graduate students and postdoctoral fellows in the research enterprise
- Emphasizing the importance of knowledge transfer and collaborative research with community partners
- Promoting interdisciplinary and international research
- Tracking performance and celebrating our research successes

Rooted firmly in *Engaging the Future*, the Strategic Research Plan (SRP) establishes a proactive template for supporting both the culture and the practice of research at the University through the selection of key areas for research focus and the establishment of appropriate structures and resources for maintaining and advancing Western's position as one of Canada's premiere research-intensive institutions. Conceived as a living document, the SRP results from consultations among Departments, Schools, and Faculties and has evolved in accordance with the changing research capacities and opportunities emerging across campus in recent years. Its primary objectives are to:

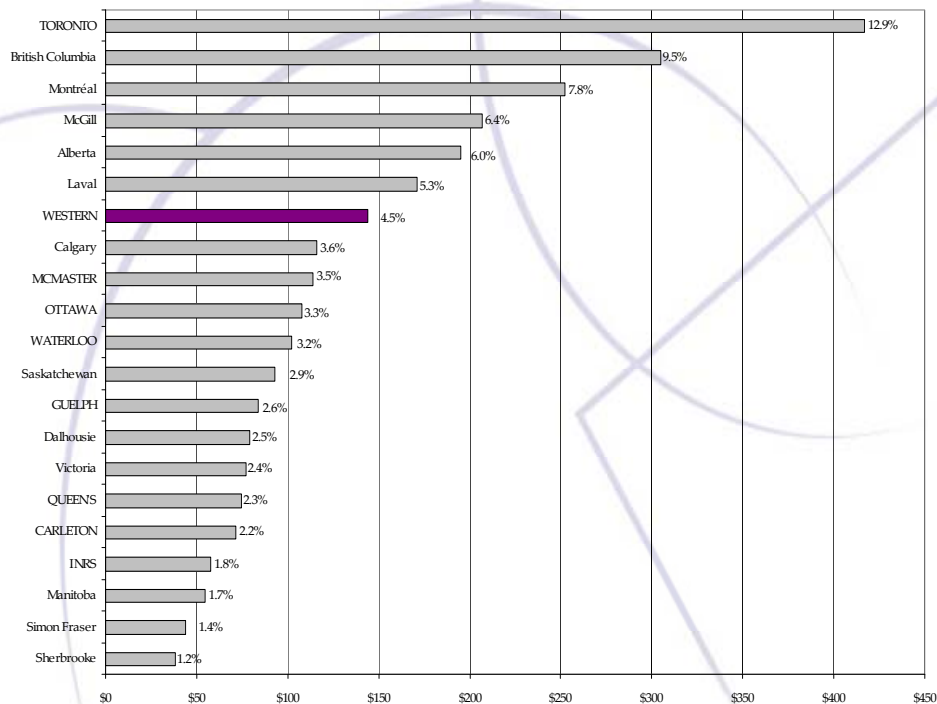
- Identify specific areas of existing and potential research strength at Western
- Assist the recruitment, training, and retention of highly qualified personnel at Western, and ensure that such personnel are able to access the resources required to undertake their research
- Encourage propagation of the collaborative and interdisciplinary research models required to tackle increasingly sophisticated research issues
- Provide direction to facilitate the development of infrastructure and services required to promote excellence in research, and to meet specified targets for

research performance for Western as compared to other research-intensive universities in Canada

- Promote opportunities for researchers to transfer the knowledge they have generated to the benefit of Canadians through engagement with community agencies, commercialization of invention and other means as appropriate to their discipline
- Cultivate broader research partnerships in London and Southwestern Ontario, the province, the nation, and internationally.

Research Western

CFI Awards and % National Share, 1998-2007



Source: University of Toronto

Defining our Research Strengths

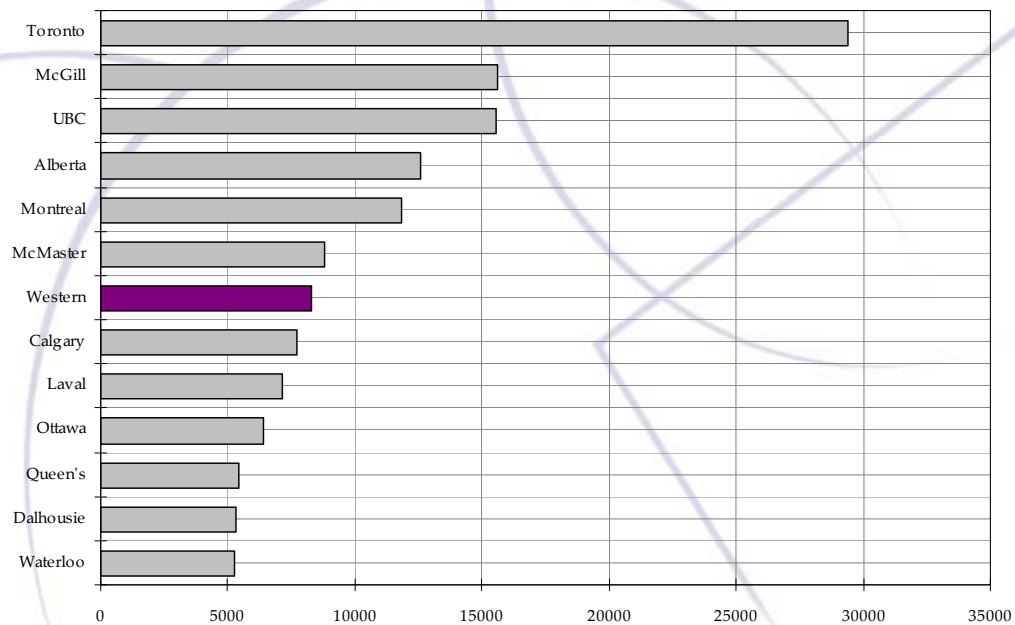
The primary goal of research and researchers is the generation of new knowledge and the application of that knowledge in the service of humankind. Academic freedom, a cornerstone of *Engaging the Future*, assures our researchers of the ability to pursue a very broad range of scholarly pursuits, subject to compliance with existing external and

internally derived legal and ethical requirements. At the same time, within this context at Western—and indeed other post-secondary institutions—there have emerged a more limited number of pre-eminent areas of investigation. Such areas have enhanced the reputation of the institution both nationally and internationally, and have helped to provide a competitive edge to researchers in their efforts to secure external resources in support of their work, regardless of discipline or area.

At Western, whether oriented purely towards discovery or to direct application in the service of the private or public sectors, such areas are defined by the research excellence demonstrated by both individual scholars and research groups. Measuring research strengths can of course be challenging, requiring a balance of both quantitative and qualitative measures and an abiding sensitivity to disciplinary norms.

Research Western

Total Journal Publications, G13 Universities, 1999-2004



For individual scholars, important measurement tools include funding levels, publication records, participation in training of highly qualified personnel, presentations at important conferences, involvement in the research community through review of grants and

manuscripts, membership on editorial boards, participation in scholarly associations, as well as success in translating the research to the public and private sector through technology transfer, policy formulation, or other mechanisms. For its part, assessment of group performance depends on the synergy and value added by having members work together on singular projects or broader thematic areas of investigation.

Based upon the Faculty Academic Plans submitted during the annual planning exercise and using an iterative process involving the Faculties and the Offices of the Provost, and the Vice-President (Research & International Relations), respectively, Western has identified four primary fields of research strength: Life Sciences and the Human Condition; Culture, Analysis and Values; The Human and Physical Environments; and Social Trends, Public Policy, and Economic Activity. Each of these fields can be further divided into some 50 specific areas of research focus in which the University has achieved national stature (see Chart 1).

In order to better “brand” the University and to enhance its profile in an increasingly competitive educational and research environment, however, we must seriously consider designation of a more limited number of signature areas related to national and international prominence at Western, not only in research, but teaching as well. If this approach is successful, our ability to influence the following target audiences is likely to be enhanced:

- Prospective faculty, undergraduates and graduate students, and postdoctoral fellows who may view Western as a destination of choice
- Governments, agencies, and foundations— both within and beyond Canada— that fund research and educational initiatives
- Politicians and senior government officials who set policy of critical importance to the University’s mission
- Potential donors to the University
- Members of the general public who will be better able to promote Western’s interests

The criteria which may be used in the designation of a signature area at Western will very much differ by category. In research, signature areas are identified by consistent and long-term accomplishments of individuals and groups in:

- Publication in prestigious journals
- Attraction of outstanding graduate students or postdoctoral fellows
- Success in achieving national and international awards and distinctions
- Attracting a disproportionate number of Canada Research or other Chairs
- Achieving unusual success in securing funding for infrastructure, equipment and/or facilities

In teaching and educational programs, other criteria may be applied, as follows:

- National and international reputation as indicated by published rankings
- Ability to attract students of high quality as measured by entering grades

- Success of graduates in their chosen careers, as measured by their accomplishments

With these criteria in mind, 10 signature areas for Western may be identified. These are briefly described below:

- **Business Education and Research**, as indicated by global reputation and ranking success of the Ivey School of Business, and the achievements of our faculty in areas related to the study of Economics
- **Environmental Sustainability and Green Energy**, as recognized through the accomplishments of the large number of faculty working collectively through the newly approved Interdisciplinary Initiative (IDI), and in our world-leading research in alternate energy and biomass conversion to bio-oil
- **Health Education**, as indicated through high quality of instruction offered across a variety of disciplines at Western, including our wide range of graduate programs in the therapies and unique programming in undergraduate medical sciences, nursing care and public health
- **Literature and Cultural Theory**, as indicated by our national and international reputation and recognition in the study of English literature, and the critical examination of contemporary popular culture
- **Materials and Biomaterials**, as shown by our broadly recognized leadership in the characterization of surface materials, and our pioneering work in the field of synchrotron radiation, leading to the establishment of the Canadian Light Source
- **Imaging**, as recognized by our broadly acknowledged leadership in the use and development of imaging technologies across the disciplinary spectrum, including sophisticated tools used in medical diagnostics, advanced microscopy, materials and historical and anthropological artifacts
- **Music**, as demonstrated by national recognition of program quality, library resources, and the success of our graduates
- **Neuroscience/Brain and Mind**, as indicated by internationally recognized research undertaken in a variety of disciplinary areas pivotal to an understanding of brain, its functioning and health, linking cell biology, brain imaging and psychology
- **Philosophy of Science**, as demonstrated by our position as one of North America's acknowledged leaders in research and teaching related to a critical understanding of the origins of scientific truth and its application in contemporary society

- **Wind Engineering and Natural Disaster Mitigation**, as recognized through our global leadership in the wind tunnel testing of some of the world's most recognizable buildings, bridges and structures, and related work in the sciences and social sciences in simulated structural testing and the development of policies and programs to help mitigate the devastating effects of natural disasters

By defining signature areas, we are in effect agreeing collectively to support them at all levels of the university—as possible and appropriate. Of most significance, signature areas will be given an enhanced profile in Western's representations external to the university in the form of publicity, fund-raising efforts, and in general the presentation of Western to the world.

Recognition will also be possible through the mechanisms currently in place for support of the University's education and research missions. This includes normal tools available through the annual budget planning process, including University Priority Investment Fund (UPIF), Canada Research Chair, capital and Provost's Academic Support Fund (PASF) requests. As well, the faculty involved directly in signature areas have recourse, like all others, to apply for funding as exists through the variety of internal funding mechanisms available on campus, including the Interdisciplinary Initiatives (IDI) Fund, the Academic Development Fund, the Course Internationalization Fund, and so forth. Support for signature areas may also be applied through discretionary funds managed by local units, Deans, and the Vice-Presidents. Deans, for example, may wish to allocate funding preferentially to signature areas through the Research Infrastructure Support Fund or other internal resources they may control. The Vice-President (Research & International Relations) may well use funding available from the Research Promotion Fund for this same purpose.

In defining the signature areas, the intent is *not* to develop a core set of competencies to the exclusion of the many other areas of research and teaching excellence at Western. All areas of excellence will continue to receive support, as they have in the past, through all our existing structures and resources. Indeed, it is expected that some of these other areas will eventually become signature areas in their own right. It will be important to review the list of signature areas; this review will occur on a four-year cycle, and will be led jointly by the Provost and the Vice-President (Research & International Relations).

Attracting and Retaining Canada's Best Researchers

Recruiting and Retaining Outstanding Faculty

Whether conceived of within or well beyond the specific areas cited in the previous section, the research strength of the University is inextricably linked to the quality of its faculty. Maintaining and building upon this strength thus requires that attention be paid to retaining our existing faculty, and in turn to recruiting new faculty who are clearly outstanding in their respective fields of endeavour.

In support of both of these objectives, the Office of the Vice-President (Research & International Relations) commits to working with the Provost, the Vice-Provost (Academic Planning, Policy and Faculty) and the Deans, within existing structures and agreements, to:

- Encourage appointment committees to recruit the very best researchers and to align their recruitment with University research priorities as detailed in the SRP, while at the same time promoting opportunities for women and designated groups
- Maintain the highest standards for recruitment, promotion, and granting of tenure for faculty members
- Make optimal use of federal and provincial programs such as the Canada Foundation for Innovation (CFI), the Canada Research Chairs (CRC) program, the Ontario Research Fund (ORF), and the Province's Early Research Awards (ERA) program to attract and retain the very best researchers in areas of research focus and strength
- Encourage and support the Faculties in expanding the mentoring of new faculty members by experienced faculty
- Recognize outstanding faculty members through specialized internal programs such as the Hellmuth Awards, the Distinguished University Professors and Faculty Scholars awards
- Work with the Faculties to establish a rigorous procedure for nomination of deserving faculty annually to distinguished external awards as offered by the Tri-Council, the federal and provincial governments, and other national and international agencies and foundations
- Communicate and support development opportunities for faculty members, especially where these support emerging areas of research strength

Building the Collaborative Model

Within an institutional context that supports academic freedom as a primary value, both research excellence and the research agenda of the University are without question firmly rooted in the research interests and engagement of the individual scholar. Thus, our continued excellence in research depends upon a sustained commitment to individual scholarship through the mechanisms as currently exist for this purpose. These include provision of start-up funding for faculty members, access to research support for faculty members in areas of importance to Western (especially in areas less likely to attract targeted funding from external sources), assisting faculty in identifying funding opportunities through existing and potential new sources, and creating opportunities for public recognition and celebration of individual research achievements.

At the same time, many researchers recognize that some of the more complex and vexing issues of the day can only be addressed through a more collaborative approach to discovery. This is true, moreover, across the disciplinary spectrum, from life sciences, to

science and engineering, arts and humanities, and the social sciences. This trend is clearly recognized and supported through the structure of many new and existing funding programs offered by both provincial and federal agencies which overtly stress the need for more collaborative approaches to achieve success in funding.

Historically, Western's faculty members have been engaged in a wide variety of collaborative—and often interdisciplinary—research projects. Many of these have been formally established in research groups, centres, and institutes. For example, within *The Human and Physical Environments* field, the Centre for Chemical Physics has during the last three decades spawned collaborative research enterprises such as Surface Science Western and Interface Science Western. These units have established Western as a world leader in characterization of materials and will allow it to explore new, leading-edge research programs in materials and related research. The Institute for Catastrophic Loss Reduction has engaged researchers from Social Science, Science and Engineering in the study of human and natural disasters and the means to mitigate such events. The Boundary Layer Wind Tunnel has attracted a strong interdisciplinary team of researchers from Engineering, Social Science and Applied Mathematics. It has been a world leader in the development of experimental techniques for modelling the behaviour of structures in response to wind loading. In the field of *Culture, Analysis and Values*, the Centre for Study of Theory and Criticism engages about a hundred scholars across campus in collaborations that cross many of the established disciplines of the Faculties of Arts and Humanities, Social Science, and Information and Media Studies. In addition, with its research partners in London, Western has fostered the development of outstanding research groups within the *Life Sciences and the Human Condition* field, including the Centre for Brain and Mind and the imaging group at the Robarts Research Institute, the Health Policy Initiative, the Canadian Centre for Activity and Aging, the National Centre for Audiology, and the Canadian Language and Literacy Research Network (CLLRNet). *Social Trends, Public Policy, and Economic Activity* incorporates a number of leading research groups of national and international importance including the Centre for American Studies, the Population Studies Centre, and the Political Economy Research Group.

In an increasingly competitive environment which emphasizes and rewards collaborative approaches to research, the University must continue its strong support for collaborative and interdisciplinary research by:

- Encouraging the continued selective allocation of resources (through programs such as the Interdisciplinary Initiatives [IDI] program) to assist and promote key interdisciplinary and collaborative research and teaching strengths
- Ensuring adequate funding and staffing to assist faculty members and teams with collaborative proposal development and management for both the established funding programs, and in the new collaborative funding programs offered through the federal granting agencies

- Ensuring that interdisciplinary research groups, centres and institutes are actively contributing to the mission of the University through periodic review and renewal

The Canada Research Chairs Program

A vital tool in faculty recruitment, retention and the development of research strengths in key areas is the Canada Research Chairs program. Of the 68 Chairs allotted to Western, all have now been assigned to Faculties, with 14 in the SSHRC area, 26 in the CIHR area, and 28 in the NSERC areas. To date, 63 have been filled, with five appointments yet to be made. In accordance with the review process at Western, all CRC nominations are forwarded by the Faculties and approved by both the Vice-President (Research & International Relations) and the Provost. In the selection process, particular emphasis is placed upon the proposed Chair's fit with Departmental and Faculty academic plans, and the University's SRP. In many cases, particular emphasis has been placed on making interdisciplinary appointments that serve the needs of more than one Faculty.

Overall, however, the goal is to optimize the strategic impact of the CRC program by creating the best avenue for fostering and developing internationally competitive research programs in key areas of strength as defined earlier in this document. Thus, in the *Life Sciences and Human Condition* field, four CRCs have been allocated to Biomedical Imaging, and an additional four to the related cognitive neuroscience area. Three have been directed towards support of Immunology and Chronic Disease. In *Social Trends, Public Policy and Economic Activity*, one chair has been allotted to Engaging Emerging Markets, and two to Social Demography and Change, while in *Culture, Analysis and Values*, one has been awarded to Literature and Literary Theory and another to Bioethics. In the *Human and Physical Environments* field, seven Chairs have been allocated in support of Materials and Biomaterials, five to Environmental Sustainability and Green Energy, six to Computational Sciences, two to Wind Engineering, Natural Disaster Mitigation and Management, and one to the Philosophy of Science.

The appointment of female faculty members to CRC positions is a key priority for Western. To date, our record of appointments within the NSERC and SSHRC areas has been consonant with extant male/female ratios among the faculty. Of the 14 Tier I and II CRC award-holders in the SSHRC area, 5 (33 percent) are female, a figure which compares favourably to female representation within the faculty generally at nearly 30 percent. In the NSERC areas, where about 12 percent of faculty are women, females have been awarded 6 of 28 (21 percent) of Tier I and II chairs. Women are still underrepresented in the CIHR area, and hold just 4 of 26 (15 percent) of Chairs awarded. The Vice-President (Research & International Relations) has committed to work closely with the Provost and the Deans of the relevant Faculties to increase the rate of appointment of female faculty as Chairs come up for renewal. Our goal is to achieve a level of representation of women within the CIHR area at approximately 23 percent.

Canada Research Chairs, 2006-2007

University	Allocated	Filled	% Filled
Toronto	262	249	95%
UBC	163	147	90%
McGill	158	137	87%
Montreal	119	95	80%
Alberta	118	99	84%
Laval	89	80	90%
Calgary	77	71	92%
Ottawa	69	49	71%
McMaster	69	63	91%
Western	68	63	93%
Waterloo	56	49	88%
Queen's	54	53	98%
Dalhousie	48	48	100%

In order to maximize the benefits of the CRC program with respect to faculty recruitment and enhancement of our primary research strengths, the University will continue to:

- Ensure that remaining new, and all renewed CRC appointments are made in areas of priority research strength
- Work with the Provost and Deans of the relevant Faculties to ensure that the number of women appointed to Canada Research Chair positions within each of the CIHR, SSHRC, and NSERC areas is at least proportionate to their representation on faculty

Building the Support Infrastructure for Research Excellence

Core Facilities and Physical Infrastructure

The University has invested in the past, and will continue to invest significant funds in building and maintaining the infrastructure utilized by researchers across campus. Such infrastructure includes not only office and laboratory space, but also core facilities including the Library System—a key resource in the development of virtually all research projects at the University. The role of the Library in this regard has been further enhanced in recent years through aggressive deployment of information resources online, allowing researchers to access information at their own desks, and through the construction of the Archives and Research Collections Centre, which will allow researchers unparalleled access to critical archival materials. Western's Information Technology Services also plays a vital role by providing the “backbone” for electronic

information transfer and access to information across campus and around the world, greatly facilitating collaborative opportunities for faculty at Western.

In addition to these resources, researchers and research groups have worked diligently with staff across the University to seek external funding for the establishment of an impressive inventory of research space and facilities which are now heavily utilized not only by faculty, students, and postdoctoral fellows on campus, but by researchers across Ontario and Canada and in many cases around the world. With funding from the Canada Foundation for Innovation (CFI), the Ontario Innovation Trust (OIT), the Ontario Research & Development Challenge Fund (ORDCF), the Ontario Research Fund (ORF), industry partners, internal and other sources, the total value of these projects has now exceeded \$350M, placing Western in the very top tier of Canadian universities in terms of availability of leading-edge research space and equipment in a broad variety of fields.

Core facilities in the *Life Sciences and Human Condition* field include the recently completed London Regional Innovarium, a \$35M CFI-OIT project which provides state-of-the-art animal care facilities supporting the work of biomedical research teams from the London region and beyond. Other key facilities include the CFI-OIT/ORF funded Centre for Brain and Mind, designed to facilitate the study of cognitive function and dysfunction in a broad range of neurological and psychiatric disorders. With a recent contribution of \$12M from the Ontario Research Fund for new imaging equipment to be emplaced at the Robarts Research Institute, London is poised to become the leading centre for brain imaging in Canada, and a global leader in this field. Robarts is also home to the London Regional Genomics Centre, a facility used extensively by researchers across London. Other key facilities include the National Centre for Audiology, a renowned CFI-OIT/ORF funded audiology and hearing science teaching, research, and clinical service facility, and the ORDCF-funded Western-led Ontario-Wide Protein Identification Facility, which allows for collaborative research designed to discover the precise role of proteins in the development of diseases and to develop effective prevention, treatment, and curative strategies.

In the *Human and Physical Environments* field, the Western-based \$100M Shared Hierarchical Academic Research Computing Network (SHARCNET) provides high performance computing (HPC) resources to researchers at 16 institutions across Ontario, making it Canada's largest HPC consortia and one of the top 500 computing constellations worldwide. The processing capabilities provided through SHARCNET enable cutting-edge research in a variety of areas from economics and business to chemistry, applied math and the life sciences. Funded by CFI-OIT, Surface Science Western provides Canada's largest and most comprehensive platform for the interdisciplinary study of materials, and is accessed by researchers and industries representing a wide range of fields, from the life sciences to engineering. The Boundary Layer Wind Tunnel has long been recognized as Canada's premier wind testing facility for large-scale civil construction projects, including some of the most recognizable structures in North America, Europe, and Asia. Western's capacity for wind testing and disaster mitigation increased markedly in 2006 as well with the construction of the Insurance Bureau of Canada Laboratory Facility for Better Homes. Located at London

International Airport, this one-of-a-kind CFI-OIT/ORF, insurance industry-funded venture will allow researchers to test—at full scale--the ability of houses to withstand forces of nature including hurricanes, tornadoes, and earthquakes. Western's \$28M CFI-OIT funded Biotron project, built in partnership of the University of Guelph, is the world's most advanced climate-controlled research facility, allowing for unprecedented opportunity to study the effects of climate change on crop production and ecosystems in a laboratory setting. Together, Western and the University of Guelph possess the largest inventory of climate-controlled research space in Canada. Adding to our current array of full-scale simulation research facilities is the soon-to-be-constructed CFI-ORF supported Avian Research Facility, which will provide state of the art access to researchers examining the effect of wind on bird behaviour, and Western's \$18M CFI-ORF funded flagship Lassonde Pavillion which will lead cutting-edge work on alternative energy.

There has been significant growth and expansion of the research facilities supporting work in the *Culture Analysis and Values* and *Social Trends, Public Policy, and Economic Activity* fields. Of note here is the establishment of the Statistics Canada Research Data centre in the Faculty of Social Science, which provides on-site the full array of StatsCan data accessible for use by researchers in London and region from a variety of disciplines from sociology to business, economics, health care, and geography. The Faculty of Arts and Humanities has also led the way in the creation of the Science, Epistemology, and Ethics Research (SEER) lab, a state of the art physical and virtual meeting and discussion space linking researchers, practitioners, students and community members with interests in the pursuit of value questions related to medicine and to science more broadly.

To ensure that Western research and researchers are well equipped to continue their work both within the context of their discipline and collaboratively, we will continue to:

- Work in collaboration with the Deans to ensure the financial viability, functionality of, and broad access to our current network of core research facilities in key areas of strength
- Identify existing external programs providing support for infrastructure development and renewal, and provide support to researchers through all phases of the project development process, from application, to implementation and project management
- Identify and advocate for large-scale infrastructure projects of broad significance to research and researchers in London and region which may be funded through alternate sources including direct approaches to government and the private sector
- Fully fund the indirect costs of research by working towards recovery of 40 percent of direct project costs from federal and provincial sources, and 40 percent of direct project costs from research funded by industry

Supporting the Work of our Researchers and Establishing Targets

Across the University, support for the research funding application process has expanded markedly in recent years. Each of the Faculties has now named an Associate Dean or senior administrator who is responsible for promotion of research objectives in

cooperation with other Faculties and the Office of the Vice-President (Research & International Relations). Since the last SRP was formulated in 2003, Research Western has added staff to provide direct support to researchers through the full spectrum of the research funding process, from assistance with proposal development and application to infrastructure, Tri-Council, and international programs, to management of accounts, assistance with development of financial and budget plans where warranted, support in ensuring compliance with University and external regulations concerning the ethical conduct of research, and knowledge transfer. As part of this unit's proactive mandate, the various teams within Research Western also seek to remove administrative and other roadblocks originating inside and beyond the institution before these become impediments to research success. To this end, Research Western works closely with other key administrative units such as Purchasing, Research Accounting, and the Department of Physical Plant and Operations. In addition, Research Western oversees an expanding array of internal funding programs, valued at approximately \$3M per year. A good portion of this funding is targeted towards disciplinary areas which may have fewer sources of external funding, especially in the arts and humanities and the social sciences. In many cases, the beneficiaries of these internal funding programs are new faculty members working to establish their independent research programs before applying to provincial, national, or international funding agencies.

In order to build and better align these services with the needs of researchers, we will continue to work towards:

- Developing effective and close ties between Research Western, the Faculties and service units across campus to create an effective and supportive environment for researchers on campus
- Aligning staff support to proposal development with discipline specific, researcher needs and the increasing array of strategic opportunities available through the federal and provincial governments, industry, and international sources
- Ensuring oversight, communication, and development of effective research support strategies through advisory bodies such as the Core Planning Group, and the Associate Deans (Research) group
- Ensuring that internal funding programs are well managed and advertised across campus, and targeted to provide researchers—especially those with limited access to external funding—with the support they need to more fully develop their research programs

In addition, to help orient and focus our efforts and to ensure that our research support programs reflect our firm resolve to maintain and enhance our status as a leading Canadian research university, we shall:

- Establish and work towards achieving a target of 5th place or better among the G-13 institutions in cumulative Canada Foundation for Innovation research funding (up from 7th place currently)

- Establish and work towards achieving a target of 5th place or better among the G-13 institutions in each of the Tri-Council agencies in funding per researcher (up from 7th-10th place nationally, depending upon the program)
- Establish and work towards achieving a target of 2nd place among Ontario institutions in cumulative Canada Foundation for Innovation funding, in each of the Tri-Council agencies in both funding per researcher and total annual research funding, and in cumulative Ontario-based research funding (thus maintaining our current 2nd place standing)

Enhancing Undergraduate, Graduate-Level and Post-Doctoral Contributions to Research

Western's reputation as an outstanding research university of the first rank is directly linked to its ability to attract faculty members with a passion for their scholarship and an understanding of the linkage between research and teaching at all levels. This in turn provides a vital link to undergraduates and their engagement in the research enterprise of the University. "Providing the best student experience" requires in fact that our undergraduates are both aware of, and—as possible—participate meaningfully in the research programs of our faculty across campus.

The recruitment of top graduate students and growth in the graduate student cohort are presented as key objectives in *Engaging the Future*. Not only does this help ensure growth in the numbers of highly qualified personnel graduating from Western—in the service of career development and economic development more broadly—it also contributes to the expansion of the research enterprise at the University as growing numbers of graduate students engage in a diverse range of research programs and offer assistance to the development of programs instigated by faculty. Western remains dedicated to providing academic and financial support to recruit exceptional graduate students who can perform research at the highest level and graduate in a timely manner.

Postdoctoral fellows constitute another key cohort within the research system at Western. While at the University, postdoctoral fellows pursue independent research programs which—especially in the life and physical sciences and engineering—often overlap with and complement those of their faculty supervisors. Indeed, in many cases, postdoctoral fellows make an essential contribution to the research programs of their faculty mentors and colleagues. Upon completion of their training period, many postdoctoral fellows take up academic positions at institutions around the world, thus enhancing the University's reputation as a leading research institution.

To enhance the quality of research training for undergraduates, graduate students and postdoctoral fellows at Western, and to ensure their continued contribution to the research enterprise at Western, we commit to:

- Widely promote access to external (e.g. NSERC Undergraduate Student Research Awards) and internal (Work Study) funding programs which provide opportunities to undergraduates to participate in research on campus
- Encourage researchers to hire undergraduates as research assistants wherever possible
- Increase enrolment in existing masters programs with identifiable capacity, quality and demand, and double enrolment in Ph.D programs across campus
- Develop new graduate programs in areas of research strength, with special emphasis on programs in interdisciplinary areas
- Enhance the profile and the visibility of postdoctoral fellows on campus, and ensure that the conditions under which they are contracted are commensurate with those at other Canadian universities
- Maintain competitive financial support for graduate students, including guaranteed minimum support for Ph.D Students
- Clearly recognize and acknowledge the contribution of undergraduates, graduate students and postdoctoral fellows to research at Western by encouraging their participation in Faculty Research Days and other events

Enhancing Research Impact by Expanding Opportunities for Knowledge Transfer

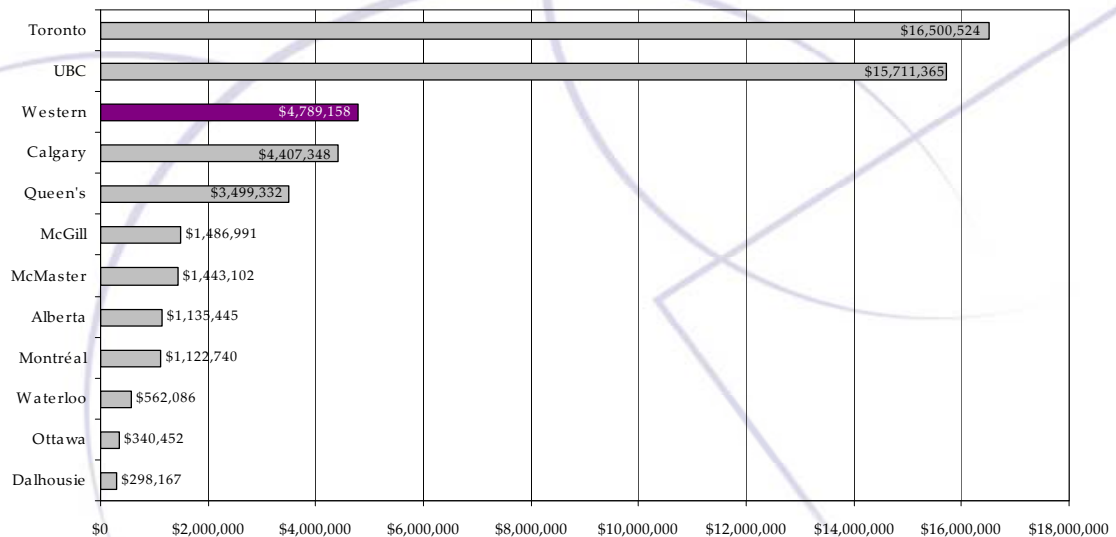
Over the last decade, increasing numbers of faculty on campus have expressed an interest in applying the benefits of their research to the service of the community and society more broadly. In response to this desire, the University has increased the amount of support provided to collaborative research with external parties. Such support has included administrative assistance provided to faculty in establishing formal agreements with companies, government agencies and community groups, as well as assistance in obtaining external funding to facilitate such activity. Further, the University has encouraged participation in organizations with a specific university-private and public sector bridging objectives, such as the Federally-funded Network of Centres of Excellence (NCEs), and Ontario Centres of Excellence (OCE).

Western has also greatly enhanced its capacity to assist faculty in engaging in commercialization and related ventures. To this end, Western has actively encouraged intellectual property disclosure and assignment, assisted faculty in the management of intellectual property, and has worked with researchers in the formation of spin-off companies. Through the \$400,000 Western Innovation Fund, Western has additionally provided researchers in disciplines ranging from education and psychology to the life sciences and engineering with direct assistance in product and technology development. Moreover, members of Western's Technology Transfer and Commercialization Council—made up of several Deans and community-based entrepreneurs—have provided hands-on assistance to inventors through the project development and/or company start-up process. The University has further contributed to commercialization by celebrating the contribution of faculty members to the community through awards and other forms of recognition.

In an effort to improve and expand our knowledge transfer capacity, the University's technology transfer office has made great strides in recent years to align its operations with the business development offices at the Lawson Health Research Institute and—prior to its integration with Western—the Robarts Research Institute. Western, its Robarts Research Institute and the Lawson announced in March 2008, in fact, their intention to form a single, city-wide office for the managing technology transfer. Already, reporting together annually to bodies such as StatsCan and the Association of University Technology Managers, Western and its affiliates have emerged as one of Canada's university leaders in knowledge management and transfer. Western has extended the collaborative model to other universities in the region as well through the formation of the C4, which in effect pools the knowledge transfer skills and services of consultants working at Western and three partner institutions: Waterloo, Guelph, and McMaster. The consortium recently received federal and provincial funding in excess of \$5M to build this new and expanded service model.

The University's Research and Development Parks in London and Sarnia provide physical facilities and a nurturing environment for new commercial ventures, many of which have emerged from Western. The London Park is home to the Stiller Centre for Biotechnology Commercialization, a collaborative venture established by Western, the Lawson Health Research Institute, the Robarts Research Institute, and the City of London. This \$10M facility helps small biotechnology companies get started and develop their technologies and services into commercially viable products. The Centre is one element helping to ensure that research and development opportunities in one of Western's key fields of research strength—*Life Sciences and the Human Condition*—are fully exploited. In Sarnia, the Research Park is already established as a major employer in the area, and is rapidly emerging as an important Canadian centre for research and development in the field of renewable energy. In the summer of 2007, the Park received a grant of \$10M from the Ontario government to establish pilot plant, laboratory, and office facilities to stimulate industry and academic research and training related to biofuels production. This initiative is designed to exploit the full potential of southwestern Ontario as a producer, manufacturer and end user of various types of alternative energy, and particularly biofuels.

G13 Gross Licensing Income (Western and Affiliates), 2006-2007



Source: AUTM data (Université Laval did not report)

These various activities in turn provide a visible symbol of Western's commitment to service by promoting economic development in the London region and well beyond. The University, through both Research Western and its research parks is an active participant on the governing bodies of organizations such as TechAlliance and the London Economic Development Corporation Board. In the spring of 2006, Western led the development of the Southwestern Ontario Economic Assembly (SWEA), a venture linking private and public sector partners across the region in an effort to promote economic growth and prosperity.

To further its goals with respect to the transfer of knowledge in the service of our city, our region, our province and our country, the University will continue to:

- Be proactive in encouraging and supporting faculty engagement in collaborative research with community groups, industry, and government agencies while protecting academic freedom and the integrity of the research process
- Increase the number of invention disclosures to achieve a rank of 5th place or better among the G-13 research institutions
- Actively seek external funding to support knowledge and technology transfer and commercialization activities undertaken by faculty members at Western
- Establish clear and transparent policies and procedures for faculty and institutional interactions with industry, including clear descriptions of

intellectual property ownership, overhead and royalty expectations and partnership agreements

- Together with the Lawson Health Research Institute, Western's Robarts Institute and other prospective partners (including the National Research Council), work to build our newly-established city-wide technology transfer office as a means to reduce existing duplication and enhance service to researchers and other inventors in London and region
- Celebrate the contributions of Western researchers to knowledge and technology transfer
- Support and nurture the growth of faculty-based start-up companies based at Western
- Develop and implement intellectual property policies for undergraduate and graduate students, administrative staff, and postdoctoral fellows at Western

As mandated by the University's Strategic Plan, *Engaging the Future*, we shall also work towards meeting stated targets with respect to:

- Doubling the value of contract research work with the private sector over the next five years
- Doubling the value of licensing and royalty income from Western-based inventions over the next five years

Establishing Key Partnerships for Research

Within academe, Western has led or been an active partner in several major inter-institutional initiatives. One of the largest current examples of partnerships supporting research in the *Human and Physical Environments*, is the establishment of the Canadian Light Source, first formed as a joint venture of the University of Western Ontario and the University of Saskatchewan. Instigated and led by Western scientists, this multi-million dollar project has major funding from the Federal, Ontario and Saskatchewan governments as well as from municipal, industrial and academic sources and has been described as Canada's biggest scientific research facility in more than 30 years. There is a long history of collaboration as well between researchers in Engineering, the Schulich School of Medicine & Dentistry, and London's National Research Council (NRC) facility in a range of areas including automotive design, manufacturing process, robotics and medical devices. Other significant examples of broad collaboration include collaborations involving faculty in the Department of Biology and Agriculture Canada's Southern Crop Protection and Food Research Facility and the Western-led formation of SHARCNET, a project funded by CFI and ORF and involving 16 other post-secondary institutions across Ontario to build a shared, massively parallel, high performance computing environment using high capacity network facilities. In addition, Western, with the Insurance Council of Canada and ORDCF, has established the Institute for Catastrophic Loss Reduction, with a mandate to research ways to mitigate the impact of natural disasters. Western researchers were key players, with Carleton and UBC, in creating POLARIS, a CFI-OIT and ORDCF funded project supporting earthquake research in Canada. Western, Waterloo and Waterloo Maple software created the ORDCF funded Ontario Research Centre for Computer Algebra (ORCCA) to research and exploit advances in

mathematical software. Western is also a member of the University of Toronto-led Centre for Microelectronics Assembly and Packaging, and participates in other NCEs and centres of excellence including the Canadian Institute for Photonics Innovations (CIPI), the Institute for Robotics and Intelligent Systems (IRIS), the Sustainable Forest Management Network (SFM), the Mechanical Wood-Pulps Network, and Materials and Manufacturing Ontario, and the Fields Institute. In support of the *Social Trends, Public Policy and Economic Activity*, and *Culture, Analysis and Values* fields, respectively, Western researchers are engaged in SSHRC-funded collaborative research initiatives, in areas such as the information technology sector of the new economy, globalization, French Studies, and the survival of the baroque in Europe and Latin America. Partnered with social agencies, the University also hosts two SSHRC Community-University Research Alliance projects, one involving applied research to assist children with special needs, and another which looks at ways of improving the quality of life for former psychiatric patients now resident in the community. In each case, projects draw upon large teams of researchers located at institutions across Canada and around the world. Western is host to two SSHRC Research Clusters, bringing together investigators from institutions across Canada to study population trends and ecological history, respectively.

In the *Life Sciences and the Human Condition* field, Western has created the CFI-OIT funded National Centre for Audiology, a multidisciplinary centre focused on improving life for the hearing impaired. Western participates in several NCE's such as the Canadian Bacterial Diseases Network (CBDN), the Health Evidence Application and Linkage Network (HEALNet), Canadian Stroke Network, Inspiraplex, and the Canadian Arthritis Network. Similarly, Western participates in the Consortium for Assistive Technology Outcomes Research (CATOR; funded by the US National Institute on Disability and Rehabilitation Research), the Ontario Rehabilitation Technology Consortium, and the Ontario Rehabilitation Research Network (Western and its partner health care and health research institutions in London are home to 3 of 4 Provincial strategic teams). Western is also home to the NCE funded Canadian Language and Literacy Research Network (CLLRNet) building on the presence of the National Centre for Audiology, and to the Institute of Infection and Immunity, one of the 13 institutes operating under the umbrella of the Canadian Institutes of Health Research (CIHR).

Further, the University—together with the Schulich School of Medicine & Dentistry and its Robarts Research Institute—have established vital partnerships with all of the key life sciences research institutions in the London area, including the Lawson Health Research Institute (the Lawson) and its London Regional Cancer Program (LRCP) and the Children's Health Research Institute. Collectively, Western and its affiliated research institutes constitute one of Canada's most successful health sciences research clusters. Western's Vice-President (Research & International Relations), the Dean of the Schulich School of Medicine & Dentistry, and the Scientific Directors of Robarts and the Lawson are jointly responsible for city-wide research planning. These partners have collaborated in the development of a number of initiatives, including the state-of-the-art city-wide Innovarium project, and the Canadian Surgical Technologies and Research (C-STAR) initiative, Canada's leading centre for research on robotics and image-guided surgery. More recently, such collaborative work includes the Life-Cycle Research Network,

linking universities and hospitals across southwestern Ontario in an effort to build capacity in the clinical trials area, and the Centre of Excellence in Family Medicine Project, a joint initiative of the Schulich School, the City of London, and the Province of Ontario which will see the establishment of a state-of-the-art clinical and research home-base facility in the Research Park at Western and satellite offices throughout London and region. University researchers, institute scientists, the National Research Council, London TechAlliance and local companies are collaborating as well in the establishment of Canada's first institute dedicated to research, development, and commercialization of medical devices.

Western's partnership activities on all these fronts are critical for enhancing the quantity and the quality of collaborative research within our areas of research strength, thus enhancing the University's research profile both regionally and beyond. To further promote and enhance the benefits of the partnership process, the University shall undertake to:

- Review and strengthen agreements between the University and its affiliated research institutions and continue to encourage collaborations across institutions and with the community generally
- Establish stronger working relations at the institutional level with federal laboratories in London, including both the National Research Council, and AgCanada's Southern Crop Protection and Food Research Centre
- Strengthen communication and interaction between the University and local government, non-governmental organizations, and the private sector
- Encourage activities that bring leaders in government, the private sector, and members of the local community onto the campus for research-related events and announcements
- Establish closer working relationships with local, provincial, and national economic development bodies
- Provide support for and promote use of regional facilities involving Western and its affiliated research institutions
- Work closely with Alumni Relations and Development to consolidate community and private sector links and to secure funding as necessary to support the acquisition of critical infrastructure and operating funding

Extending our Reach by Building International Linkages

At Western, a number of scholars and research groups have helped to establish an international reputation for Western in several areas of strength. Currently, there are strategic research partnerships with institutions on every continent, with particularly strong collaborations in India, China, Mexico, East Africa, the United States, and France. Within *Life Sciences and the Human Condition*, researchers in the Schulich School of Medicine & Dentistry are working with partners in China to develop and expand global production and consumption of traditional Chinese medicine. A team from both the Schulich School of Medicine & Dentistry and the Faculty of Health Sciences is working with post-secondary and other institutions in Rwanda to rebuild that country's health care

system in the aftermath of the genocide of the mid 1990s. And faculty, students and staff from across the University, Brescia University College, the Lawson and partner institutions in other parts of Canada are developing AIDS awareness programs and promoting the benefits of probiotic therapies in East Africa. In the *Human and Physical Environments*, faculty from Engineering have led the way in the establishment of broad collaboration agreements with Indian Institutes of Technology in Roorkee and Kanpur respectively, with emphasis on a range of fields including disaster management, power systems, and chemical reactor engineering. Faculty from Engineering, Science and Social Science have created the first Canada-Mexico joint institute for environmental research.

Researchers in the field of *Culture, Analysis and Values* have longstanding international research programs and affiliations in the area of culture and language, including collaborative work with scholars in the History of Medicine at the University of Würzburg, participation in a nationally funded German research project at Jena, visiting professorships and collaborative research at the Free University of Berlin, and collaborative research in Trans-Atlantic Studies, which includes faculty from Brown University and the Institute for Ibero-American Studies at the University of Salamanca, Spain. In addition, Humanities researchers are active in pursuing research exchanges and collaborations with scholars in France. Within the *Social Trends, Public Policy, and Economic Activity* field, Western's Centre for Research on Violence against Women and Children has engaged with partners in Costa Rica to study and combat family violence in that country, with lessons applied elsewhere in Latin American.

Internationalization will remain a priority at Western, as both individual researchers and research teams seek out global partnerships which allow them to tackle more complex issues and attract the resources necessary for this purpose. The various forms of international collaboration pursued will continue to be varied, from traditional scholarship leading to publication, to joint development of intellectual property and patenting, start-up venture formation, consulting work for private and public sector agencies, and international development assistance and aid. It is incumbent upon us collectively to recognize these various forms of contribution not only as legitimate expressions of academic freedom, but also as valid scholarly contributions which are appropriate to each researcher's disciplinary field as he or she interprets it.

In 2003, the University officially adopted a *Strategic Plan for Internationalization*. Through this Plan, the University has sought, and through its renewal will continue to seek to:

- Help our researchers to develop innovative international projects which build on their achievements in Canada by facilitating linkages with researchers at other institutions worldwide within our key fields of strength
- Help ensure their work is well funded by making faculty members aware of opportunities and by exploring new opportunities for funding in conjunction with other administrative units

- Identify key partner institutions possessing complementary research strengths and—in consultation with Faculties and individual researchers—establish or reinforce broad cooperation agreements with these institutions
- Develop faculty exchange activities with international partner institutions, and actively facilitate these through administrative planning and centralized funding
- Provide financial support for activities related to international research (e.g. travel for academic visitors to Western, international conferences, and seed money for research)
- Provide central support and assistance with the generation and refinement of funding proposals for international research
- Ensure that researchers conducting international work of various types feel that their work is valued and supported, and actively encourage colleagues to recognize both traditional and non-traditional international scholarship in decisions regarding tenure, promotion, and performance appraisal

Measuring and Promoting Our Success

As we develop our key research themes and pursue the collaborative model, it is important to establish milestones and to measure our success in achieving our research goals. In the past, a key measure of success has been research productivity as measured by faculty publications. Such measures are now well-established quantitatively, and appear in University and other reports listing numbers of books, articles, and other products of scholarly initiative authored by faculty members, including scholarly journals housed at Western or edited and directed by Western faculty, and participation on major editorial boards in the international peer review process. Qualitative measures are also available through citation indices, and in assessments produced at the department and Faculty level.

A related measure of success is the number of awards and distinctions earned by faculty for work in their respective research fields. These include fellowships in the Royal Society of Canada, Tri-Council agency medals and other forms of recognition, and various international prizes.

A third important measure of success relates to research funding. In 2006-2007, the University and its affiliates received over \$220 million in research funding for ongoing projects, placing Western in 10th place nationally. Since 1998, we have received some \$270 million from provincial and federal sources to support large-scale infrastructure projects with a total project value of \$350 million. Performance in the Tri-Council competitions is particularly important as this drives two other key measures: the number of Canada Research Chairs awarded to the University, and the amount transferred annually from the Federal government in support of the indirect costs of research.

A fourth measure of research “success” is related to technology transfer and commercialization, and is typically measured by such indicators as invention disclosures, patents awarded, and licensing income received. As the number of annual invention disclosures continues to rise (having doubled to 60 between 2004 and 2007) our licensing

income has concomitantly risen year over year. With our other research partners in London, we now rank within the top tier of the G-13 universities in licensing income. Notably as well, the value of contract research has more than doubled over the past three years to approximately \$14M annually. Including clinical trials conducted at both the Robarts and Lawson Institutes, the value of work with non-government sources approaches \$30M.

These successes have been communicated widely, both within the University community and beyond. We have developed new promotional materials which speak to the broad array of research activities undertaken at Western, both by individuals and our primary research groups. We now publish a semi-annual research newsletter, *Research Western*, in which we celebrate our research accomplishments and profile the research programs of investigators from across campus. We have aggressively pursued opportunities for advertising in local and national publications, and in collaboration with Communications and Public Affairs, have prepared special articles and news items for distribution to media sources. We have mounted exhibits at key events across Canada, and have taken an active role in sponsoring scholarly conferences at which Western research is featured.

In order to more effectively measure and monitor our successes in promoting collaborative research, and concomitantly, research excellence within and beyond our areas of strength, and to more effectively develop a broad “culture” of research at Western, we must develop additional indicators and find means to disseminate such information broadly. We must:

- Closely track our research performance in publications, awards and distinctions, and our success in meeting targets in research funding and commercialization as established in this document
- Report to the University and broader community on this performance through publication of an annual report by the Vice-President (Research & International Relations)
- Seek ways to better understand and quantify the contribution of research to the economic, social, and cultural development of the local region, the province, and the country, especially in areas where such contributions may be less well known, in the arts, social sciences and humanities
- Work with Communications and Public Relations to develop a quantitative and qualitative database of our research accomplishments through publication or other activities
- Publish the RW newsletter *Research Western* at least twice yearly, and update promotional materials regularly
- Work with the Office of the Vice-President (External) to develop presentations, media releases, stories, and advertising emphasizing the contribution of our research to society, with particular emphasis on areas which have historically received less attention than others (such as the Arts, Humanities, and Social Sciences)
- Ensure that the Research Western “brand” is well established, and through event sponsorship and other opportunities ensure that the RW brand is present

at research related events within and beyond the local community

Conclusion

Rooted solidly in *Engaging the Future*, this Strategic Research Plan defines key areas of research strength at Western and sets a clear strategy for developing and supporting research excellence both within and beyond these. It is, in effect, a living document to be reviewed and updated as circumstances within the University warrant, and as opportunities arise. Implemented through the Office of the Vice-President (Research & International Relations), in collaboration with the Provost and the Faculties, its ultimate goal is to firmly establish and enhance the culture and the practice of research in all units at Western, and to firmly entrench the University's status as a top research-intensive institution in Canada.

Chart 1: Areas of Research Strength at Western

<i>Life Sciences and the Human Condition</i>	<i>The Human and Physical Environments</i>	<i>Social Trends, Public Policy, and Economic Activity</i>	<i>Culture, Analysis and Values</i>
Biomedical Imaging	Advanced Fluid Mechanics	Building Sustainable Value	20 th Century Music
Brain and Mind/Neuroscience	Advanced Robotics and Real-Time System Controls	Distance Education	Chamber Music
Cancer and Cell Biology	Bioengineering	Educational Policy and Leadership	Communication, Consumption, and Culture
Cardiac and Vascular Biology and Respiration	Computational Sciences	Employment and Labour in Organizations	Cultural Industries and Institutions
Functional Disability and Health	Computer Based Systems and Environments	Engaging Emerging Markets	Ethics
Health and Aging	Electrostatics and Electromagnetics	Entrepreneurship and Innovation	Intellectual and Cultural History
Health Promotion	Environmental Sustainability and Green Energy	Feminist Theory and Sexuality Studies	Literature and Literary Theory
Health, Hazards, and the Quality of Life	Fluidization and Particle Technology	Government and Public Policy	Music in Education
Hearing Science	Functional Genomics and Evolution	Information and Media Policy	Musical Performance and Practice
Immunology, Chronic Disease, and Transplantation	Information Engineering	International and Intercultural Relations	New Music
Maternal and Newborn, Child and Family Health	Materials and biomaterials	Leading Cross-Enterprise	Popular Music Studies
Minimally Invasive Surgery	Mathematics and Science Education	Neural, Social, and Economic Foundations of Behaviour	Theoretical and Applied Linguistics
Musculoskeletal Health	Philosophy of Science	Organization and Management of Information	Visual Culture and Film
Physical Therapy	Planets and Stars	Role of Courts in Society	Vocal Arts
Speech, Language and Literacy	Power Systems and Power Electronics	Social Change	
	Wind Engineering, Natural Disaster Mitigation and Management	Social Construction and Use of Media and Information	
		Social Justice and Equity in Education	