

THOMPSON RIVERS UNIVERSITY STRATEGIC RESEARCH PLAN

Revised for Consideration by the Senate Research Committee: January 2009

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INSTITUTIONAL CONTEXT

Thompson Rivers University (TRU) was established March 31st, 2005 by legislation of the Thompson Rivers University Act, recognizing its achievement of the academic and research calibre of a university since its founding in 1970 as Cariboo College, and throughout its history as University College of the Cariboo beginning in 1989. Because of the size, structure and evolution of TRU, the institution is able to approach research in novel ways that are unique and distinct from the larger and older universities of British Columbia and Canada.

TRU is a comprehensive university including trades and technology programmes along with more traditional academic and professional programmes. There is a strong focus on undergraduate research, and graduate programmes are established in key areas. TRU takes a broad view of research to include scholarly activity, the production of creative works, and any other endeavour that results in knowledge creation, improves pedagogical practice, and pushes the limits of the discipline, and that can be disseminated.

The faculty structure recognizes those faculty members who are driven to push the boundaries of new knowledge through research, development and innovation (RDI), and those faculty members who are more focused on teaching at the leading edge of their disciplines while guiding students through the process of critical thinking and creative inquiry. RDI faculty members have a guaranteed course reduction, providing time to devote to research. There are currently 150 RDI faculty members, and these faculty members successfully compete for federal and provincial grants, collaborate internationally, and have national and international reputations.

TRU has a strong institutional and faculty commitment to providing undergraduate students with the opportunity and mentorship to conduct independent research. More recently TRU also engaged in graduate programmes giving faculty superb track records in developing highly qualified personnel (HQP).

Thompson Rivers University has developed a vibrant and collaborative research and innovation culture, with a significant focus on applied research and knowledge translation. Institutional structure, new and enhanced research facilities, new research chairs, an increased focus on graduate and undergraduate research, and new graduate programmes, are all contributing to the culture of research, inquiry and innovation at TRU.

TRU established an Office of Research, Innovation and Graduate Studies (TRU-RIGS) led by an Associate Vice President of Research and Graduate Studies (AVP RGS). This office provides dedicated support for grant and contract facilitation and management, and the promotion and administration of student research scholarships.

As part of TRU-RIGS the university Senate recently established the Office of Graduate Studies, specific criteria for faculty participation in graduate studies, and a graduate programme committee structure that encourages cross-disciplinary programme development.

TRU has three Tier 2 Canada Research Chairs, two BC Regional Innovation Chairs, and is currently searching for a Tier 1 CRC in the general area of Sustainable Development. The CRC Tier 2 positions are in the areas of Community and Ecosystem Ecology, E-Learning, and Cultural and Artistic Inquiry. The two BC Regional Innovation Chairs are in Cattle Industry Sustainability, and in Aboriginal Maternal and Child Health. In addition, TRU has made strategic appointments of key experts as adjunct faculty in areas that expand the research capacity of the university including the BC Regional Innovation Chair in Rural Economic Development at Selkirk College, and a number of professionals in government ministries, health agencies and practices, and the private sector.

MAJOR OBJECTIVES OF THE TRU STRATEGIC RESEARCH PLAN

The major objectives of Thompson Rivers University's Strategic Research Plan are to:

- Be inclusive of individual research passions, recognizing the importance of intellectual freedom for researchers to pursue their interests and passions without undue constraints and interference, and valuing the research results from individual endeavours, while providing an instrument for encouraging collaboration institutionally and externally.
- Support and build upon existing and emerging research strengths where TRU is, or is well-positioned to develop national and international leadership, and make a real difference to the world, both in terms of providing excellent opportunities for attracting and training the best students, and through the application of research in ways that improve the quality of life for all.
- Reinforce and facilitate TRU's role and leadership in the linking of research to community social, cultural, scientific, educational, technological and economic development.
- Facilitate the development of partnerships with communities, scholars, industries, institutions, government ministries and agencies for pursuing mutual objectives.
- Provide a guide for establishing and supporting research centres, collaborative facilities, and graduate programmes of the highest caliber.
- Encourage strategic developments in TRU's research park, and other capital

- developments in support of research.
- Ensure effective dissemination, knowledge translation and application of research results.

INSTITUTIONAL SUPPORT

TRU has a strong commitment to research, providing faculty with the infrastructure and administrative systems to undertake competitive research programmes. Institutional support includes facilitating funding for major equipment purchases and infrastructure, institutional research grants, endowment funds for chairs, matching funds for major infrastructure projects and grants, allocation of new research space and graduate student offices, professional development funds, undergraduate research scholarships and assistantships, support for conferences and conference travel, research workshops, grant facilitation, support for current and emerging research centres, identification of eight acres as a research park for future development, and investing in the research infrastructure.

The TRU Strategic Plan (2007-2012) identifies seven areas in which TRU wishes to distinguish itself as a “university of choice.” The goal to be the university of choice for the integration of research and scholarship with teaching and learning recognizes that TRU appreciates that teaching and research at a university are inextricably intertwined. Excelling as a university requires that students and faculty participate in the excitement of research, and are encouraged and given the environment to push the limits of new knowledge. The implementation plan for the Strategic Plan commits the institution to improvements in promoting research and dissemination of research, access to research resources, enhancing start up funds for new faculty, increasing undergraduate research scholarships, establishing integrated interdisciplinary graduate programmes, and developing national and international collaborations for research and graduate studies.

PLANNING AND APPROVAL PROCESS

The initial Strategic Research Plan was developed in 2005. Since then TRU has established the Senate Research Committee. This committee undertook a detailed and comprehensive process that involved the development a research inventory as a way of identifying research strengths that may have emerged since the original plan was developed. This, revised Strategic Research Plan is first to be approved by the Senate Research Committee, and then Senate, as a recommendation to the Board. The Senate Research Committee and Associate Vice President, Research and Graduate Students, oversees the implementation of the plan. The Senate Research Committee has the mandate to regularly review the plan, and present recommendations for revision to Senate, recognizing that the institution, its faculty and the nature of inquiry is evolving.

ASSESSMENT OF OUTCOMES

Key measures of success include increases or expansion of activities in the following areas:

- Dissemination of research results in the form of articles, books, production of creative works, exhibits, technical reports, workshops, conferences, the media, patents, licenses, and commercialization of research;

- Success in federal and provincial granting council competitions and other external research funding programmes;
- Indications that research has contributed to improved solutions, practices and products, through knowledge transfer and translation;
- Number of faculty members with well-established research programmes;
- Number of students engaged in pure and applied research, graduating with the creative inquiry and analytical skills to make a valuable contribution to the public and private sectors or to form their own companies;
- Benefits to the community;
- Recognition of research excellence through provincial, national and international invitations and awards;
- Growth in research capacity in terms of infrastructure, space, research tools, and administrative support and systems;
- The inclusion of research and inquiry as part of every student's experience, and the achievement of a generic set of research skills and outcomes;
- Collaborations with external institutions, universities, private sector and government agencies, and community groups for research and development;
- Ability to attract the best, and most innovative and creative faculty and students to TRU; and
- Research leading to new discoveries, products, services and solutions.

STRATEGIC RESEARCH AREAS

While TRU encourages research in all disciplines, the university has identified key areas of collaborative excellence or emerging excellence, and one overarching theme that encompasses all areas and reflects the overall research strengths of TRU.

Ecosystems and Environmental Resources: TRU is located in the semi-arid BC Interior in a region dominated by montane forest and grassland ecosystems that are important reservoirs of biodiversity. These ecosystems are under considerable pressure to be developed for resource exploitation, agriculture and recreational use. In the BC Interior these communities are further challenged by global climate change, the pine beetle epidemic, volatility of resource-based industries, urban encroachment, and changing economic drivers. Because these complex issues tend to elude traditional, discipline-based structures, TRU has developed strong collaborative trans-disciplinary research focusing on biodiversity, conservation ecology, grassland ecosystems, watersheds and fresh and saline water systems, and environmental monitoring. Collaborators are from the disciplines of Natural Resource Sciences, Biological Sciences, Chemistry, Geography, English, Fine Arts, Economics, Sociology, History, and Mathematics and Statistics, along with contributors from private, community, and government organizations.

In support of this research TRU dedicated a Tier II Canada Research Chair to community and ecosystem ecology, TRU supported facilities include a 2000 ft² greenhouse ecosystem simulation, and laboratory including a new elemental analyzer purchased with Western Economic Diversification (WD). TRU also supports the operation and maintenance of the greenhouse and a vehicle for summer research.

Other examples of unique research facilities and support include a research programme at the Sicamous Creek Experimental Research Forest in which over \$6 M has been invested to date, TRU's Wells Gray Education and Research Centre (WGERC), which provides an excellent base for forest ecology research and is particularly well-positioned for studying the consequences of natural ecosystem disturbances, a geospatial modeling facility to increase the volume of 'applied' results, such as decision support tools that foster better practices in sustainable resource management.

This research theme is supported by the Master of Science in Environmental Science, a cross-disciplinary graduate programme, and by developing innovative international collaborations.

Sustainable Communities: The small cities and the surrounding complexes of land, resources and decision-making bodies, comprising much of Canada's diverse landscape, have an urgent requirement to develop sustainable solutions to a number of economic, social and environmental drivers. Small cities and surrounding rural communities in the BC Interior region, and similar regions throughout Canada, are in transition, facing numerous challenges including stagnant or declining economies and population bases. While some communities are experiencing growth fuelled by out-migration from larger centres and development of particular sectors, the sustainability of the drivers is questionable. In either case, communities are challenged to minimize environmental impact while improving quality of life. To address these and other issues, TRU has developed strong collaborative trans-disciplinary research focusing on sustainable communities.

TRU provides space, funding and support for a multidisciplinary community-university research alliance comprising 26 researchers working with 35 community partners and partner institutions on an integrated research program to explore and enhance the social, cultural vitality of Canada's small cities. A key feature includes the exploration of artistic inquiry as a vehicle for community-based research and training. This research alliance provides municipalities with indicators to measure and sustain quality of life and local culture.

This research theme is supported by the Master of Science in Environmental Science, a cross-disciplinary graduate programme, a new Master of Arts in Interdisciplinary Studies, and the Centre for Canadian Studies.

Agri-Foods: A significant area of collaborative research strength is in the agri-food sector with a particular focus on economic and environmental sustainability of the ranching industries, including stewardship of the rangeland on which the industry depends, ranching technologies, meat health and quality, and value-added rangeland products. Ranching and related industries are central to the region served by TRU. These industries face considerable challenges requiring some bold changes in traditional practices and the development of new technologies to facilitate required changes. Challenges range from impacts of ranching on global climates, zoonotics and animal tracking, changing agricultural economics, land use conflicts and management, food quality and safety,

changing regulatory requirements, potential of international markets, and health and environmental impacts of animal farming practices.

In support of this research theme, TRU secured positions for a BC Regional Innovation Chair in Cattle Industry Sustainability, and a Canada Research Chair in Community and Ecosystem Ecology specializing in rangeland communities. Western Economic Diversification (WD), with the Southern Interior Development Trust and TRU funded the analytical and technical equipment for a Centre for Innovation in Ranching, Range Management and Meat Production (CIRRAMP). TRU is developing partnerships with federal and provincial non-regulatory research facilities, and with Aboriginal communities and agricultural associations, including giving adjunct status to federal and provincial research scientists, greatly expanding the capabilities of both institutions.

The facilities of CIRRAMP include a suite of analytical equipment for meat testing and grading both in-situ and in lab, a state-of-the-art smoke house, GIS hardware and software, and field equipment for measuring the environmental impacts of ranching. The new research facilities are among the most comprehensive and the best in Canada and the world, and closely unite academic researchers and technical development teams, using a practice-based research model.

Bio-products, Quality Control, Bioremediation and Product Testing: TRU researchers in biology, chemistry, geography and physics have considerable expertise and analytical facilities for the development of bio-products, pharmaceuticals and nutraceuticals, addressing issues relating to water quality and management, and expertise with applications to bioproducts, bioremediation, and food and beverage products. Current collaborative research includes:

- Investigation of bioactive compounds from plants, with antifungal and antibacterial uses,
- Development of biocatalysts and biosensors for environmental remediation,
- Detection of known lantibiotics and identification of novel lantibiotics, which are finding increased use in medicine and the food industry,
- Identification and quantification of drinking water quality,
- Creating antimicrobial peptides (AMPs), viewed as the next generation of antibiotics,
- Investigation of biologically active secondary metabolites present in natural extracts from plants and micro-organisms,
- Molecular synthesis, modelling, and new analytical techniques for rapid detection of contaminants,
- Quality testing, fermentation and optimization monitoring, and
- Watershed analysis.

In support of this effort, TRU increased available dedicated research and supported the bioproducts research centre, purchase and operation of a new 500 MHz NMR, a MS-LC-MS, various systems for chromatography with a variety of collectors, UV and AA spectrometers, capillary electrophoresis-UV detector, microscopy and a variety of sample preparation, incubation and storage facilities, and supports new proposals for infrastructure support.

Researchers routinely engage with local companies and government organizations for research and development. This research is also supported by the MSc in Environmental Science.

Healthy Communities, Wellness, and Human Development: Challenges relating to health and wellness of communities are being addressed by researchers from the Schools of Nursing, Social Work and Human Service, Education, Tourism, and the Faculties of Science and Arts. Expertise includes the socio-economic factors as determinants of health, bioinformatics and fuzzy logic for prediction of health, respiratory therapy and sleep disorders and associated medical technologies, community hospice, community-based addictions research, international social work, maternal and child health and related social and economic factors, aging research, recreational safety, community facilities that support health and wellness, improvements to outcomes of correctional facilities, community mapping and access to social services, food safety and security, and optimization related to community services, early intervention studies, health policy and management, and best practices leading to the recruitment and retention of health practitioners. TRU researchers routinely engage in collaborative efforts outside the university, including strong collaborations with Aboriginal Communities, health agencies and other community partners, government ministries, school districts and private industry.

TRU has an established clinic in sleep disorder, breathing, and respiratory therapy involving TRU faculty and students, a sleep specialist doctor, and private industry support. Other significant research facilities include IT facilities for health optimization and informatics, geospatial modeling, a dedicated lab for a Centre for Aging, access to population health databases, and collaborative facilities with hospitals, private clinics and community organizations.

In support of this effort, TRU has created an endowed BC Regional Innovation Chair in Aboriginal Maternal and Child Health.

Visual, Verbal and Cultural Literacy and Communication and Communication Technologies: The field of visual, verbal and cultural literacy examines how we “read” and communicate including through mass media publications, documentation panels, online communication and communication tools, art installations, private diaries and journals, and the language of public spaces. Research at TRU focuses culturally relevant instructional strategies and E-learning, giving expression to the general emphasis of TRU’s research on the scholarship of teaching and learning. The emphasis of research on culturally relevant instructional strategies incorporates practical and theoretical expertise in cultural expression and representation, and this expertise extends to the incorporation of visual and performing arts, as simultaneous tools for literacy development and strengthening community social fabric.

This work is supported by the Centre for the Study of Multiple Literacies Centre, which combines the efforts of nine TRU researchers, School District 73, and is currently

partnered with *Canadians and Their Pasts*, a Laval University-based CURA studying historical literacy. The Centre's research team has contributed to numerous publications, reports and presentations, a website, and music CD's that teach literacy through indigenous song. This group has developed international connections with a community in Reggio Emilia, Italy, where a commitment to visual art and visual literacy instruction has made its schools among the most successful in the world. Dissemination of information is a priority within this research theme. In addition to on-campus book publications, *Textual Studies in Canada Publications* has, in partnership with commercial publishers and The University of Alberta Press, produced several refereed book publications, Canada's "Journal of Cultural Literacy," is a refereed academic publications.

A second area of strength is E-learning as communication and cultural literacy, which builds on the incorporation of the BC Open University with TRU in 2005. Research focuses on the rich interaction of human and institutional practices and cultures with the development and adaptation of communication technologies. Leadership for this research is provided by TRU's Tier II Canada Research Chair in E-Learning, and a dedicated research facility, along with the Instructional Design and Research Group (IDRG), a team of researchers investigating new information and communications technologies, and the critical design and management challenges they present. This research and development occurs through a number of cross-institutional collaborations such as the participation of TRU faculty in cross-institutional collaborations such as the Environmental Trades and Telehealth projects, and in remote science laboratories, all of which concern the impact of remote access in increasing research and development in small cities and rural communities.

Community collaborations include other post-secondary institutions, K-12 institutions such as Alberta Learning, University of Calgary, BCCampus, and Open School (BC Ministry of Advanced Education), and collaborations with universities and research institutions internationally.

Culture and Creative Arts: Studies in Culture and Creative Arts are important as scholars are increasingly challenged to exceed former boundaries by exploring non-traditional subjects and critical approaches. This inquiry questions the meaning and location of text, authorship, and authority; examines issues of performativity in society; and pushes research to become more creative and collaborative in describing and interpreting society. TRU's strength in Culture and Creative Arts involves ongoing research in the areas of English, History, Philosophy, Visual and Performing Arts, Journalism, Film Studies, and others, resulting in a number of major publications, numerous articles and papers, as well as exhibitions and performances, many with national and international exposure.

This area of inquiry is supported by a CRC Tier II in Cultural and Artistic Inquiry, and the Centre for Innovation in Culture and the Arts in Canada (CiCAC). The Centre facilitates investigations into how artistic inquiry produces work that influences public understanding and public policy around issues of citizenship and cultural diversity. TRU supported the development of a 2000 ft² research and production studio purchased through CFI allocations.

Other areas of focus include cultural studies through theatre, history, English, journalism, cultural anthropology, and archaeology. The Artists-as-Researcher model engages the fine and literary arts with other disciplines to communicate the world, and evaluate the impact of such forms of cultural and creative communication including displays, installations, video, poetry and plays. The theme of Sustainable Small Cities overlaps, influences, and integrates with much of the research and creative development of faculty members in many of the Arts disciplines where there is a focus on culture and creative arts.

Researchers routinely engage with the Kamloops Art Gallery, the Kamloops Museum and Archives, Arnica Gallery, the Banff School of Fine Arts and numerous art galleries nationally.

Advanced Technologies and Applications: Applications of advanced technologies profoundly influence the way people work, live, communicate, and access information. TRU has developed expertise in soft computing, discrete mathematics and statistics, optimization and industrial automation. Active research involves faculty from Computing Science, Mathematics and Statistics, and Trades and Technology, and collaborations with other disciplines at TRU as well as public and private sector organizations. In the area of computing, a research group in evolutionary computing is investigating the design of evolutionary, self-organizing, real-time systems in robotics with a focus on nanosystems. Other areas include: discovering algorithms for machine learning or training on neural networks and fuzzy neural networks; digital speech processing and numerical computation; handoff mechanisms to support multimedia services in wireless communications; ethernet passive optical networks (EPON); and internet multicast algorithms, and directional routing algorithms over virtual networks.

TRU research strengths also lie in the areas of Discrete Mathematics and Statistics, especially in Combinatorics and Optimization. This research has wide applications in network liability, communication efficiency, quality control, enterprise scheduling and software designing. This research includes developing mathematical programming models of natural systems and human impacts on natural systems, and bioinformatics.

The Overarching Theme: Sustainable Development

Sustainable development, taken in its broadest context to include social, cultural, economic and environmental sustainability, emerges as the overarching research theme that encompasses all of the research themes that were identified in the original plan of 2005, and those that have emerged since that are described in this revised plan. The mission statement of the TRU Strategic Plan describes TRU as a, “comprehensive, learner-centred, environmentally responsible institution that serves its regional, national, and international learners and their communities through high quality and flexible education, training, research and scholarship.” The Plan identifies nine core values including “responsiveness” and “environmental responsibility”. “Responsiveness” means that TRU endeavours to play a responsive and creative role in the economy through research and development that improves communities. “Environmental Responsibility” is

TRU's commitment to research and development leading to a sustainable future. Within these values, the University Strategic Plan has seven strategic goals including: to become the university of choice for research and scholarship because it enhances the quality of education; to be the university of choice for environmental sustainability through research and practice; and to be the university of choice for internationalization, recognizing the institution's role and responsibility in the global context, and the blurring of economic, cultural, environmental and political borders.

In general, the research themes support the application of particular interdisciplinary and cross-disciplinary investigations that foster development, and innovation leading to new discoveries, products, policies, solutions and practices that are: sustainable over the long term; lead to greater participation in innovation, invention and commercialization; and facilitate the distribution of, and access to new products and solutions that improve the quality of life for all. Developments in science and technology leading to sustainable environments, cultures, and economies require cross-cultural communication, and healthy communities encompassing all of the research themes.

| Research Theme | CRC-NSERC | CRC-SSHRC | CRC-OPEN | Other |
|--|-----------|-----------|----------|--|
| <i>Ecosystems and Environmental Resources</i> | Tier 2 | | | |
| <i>Sustainable Communities</i> | | | | Senior CURA Researcher |
| <i>Agri-Foods</i> | | | | BC Regional Innovation Chair in Cattle Industry Sustainability |
| <i>Bio-products, quality control, bioremediation and product testing</i> | | | | |
| <i>Healthy Communities, Wellness, and Human Development</i> | | | | BC Regional Innovation Chair in Aboriginal Maternal and Child Health |
| <i>Visual, Verbal and Cultural Literacy and Communication and Communication Technologies</i> | | Tier 2 | | |
| <i>Culture and Creative Arts</i> | | Tier 2 | | |
| <i>Advanced Technologies and Applications</i> | | | | |
| <i>Sustainable Development</i> | | | Tier 1 | |