UNIVERSITY OF SASKATCHEWAN

Strategic Research Plan

Canada Research Chairs Program, Canada Excellence Research Chairs Program, and Canada Foundation for Innovation Program

October, 2021

Introduction

The University of Saskatchewan (USask) continues to embrace ongoing strategic renewal in its commitment to the people of the province of Saskatchewan, in its academic programs and the quality of the learning environment, and in the pursuit of research excellence. In the context of an extraordinary academic breadth, the University of Saskatchewan has established an international reputation for achievement in a diversity of disciplines. The University’s “Strategic Directions”, first articulated a vision for achieving the goals of enhancing academic pre-eminence in scholarship and program creativity with adherence to international standards.

In the spirit of this vision, USask undertook an institutional wide process to articulate a definitive set of existing foci of exceptional research and scholarship that have achieved pre-eminence regionally, nationally, or internationally, or are on the cusp of doing so and promote these widely as the University’s areas of pre-eminence or ‘signature areas’. This commitment follows upon the earlier investment in identifying broad areas of strength and promise, or research themes as expressed in the document Extending Horizons: University of Saskatchewan Research, Scholarly and Artistic Landscape (2006). Under the auspices of the Vice-President Research and Provost & Vice-President Academic, in May 2021 USask launched a process to renewal and revitalize our signature areas. The outcomes of this process will inform a revised strategic research plan in 2021-22.

The research themes within the University’s Canada Research Chairs Strategic Research Plan arise from the Extending Horizons document and represent areas of strength in the University’s collective research and scholarly activity. The ‘signature areas,’ enabled by the university’s capacity, investments, history, and sense of place, distinguish the University as a leader in Canada and internationally, with recognition based on output and achievement. Importantly, the University’s signature areas also reflect relevance to issues of national and international priority, contributions to innovation, and broad and inclusive collaboration and engagement. The significance of the signature areas and their ability to define USask in conjunction with these areas of exceptional research and scholarship will become apparent as the signature areas mature and are promoted widely over time.

The Canada Research Chairs (CRC) Program and the Canada Foundation for Innovation (CFI) provide opportunities for enhancement of research and training capacity in key areas of institutional priority, which will contribute substantively to achieving our goals. The Strategic Research Plan provides the framework within which these resources will be allocated, so that the University can build on its strengths, and pursue the research themes and signature areas described in the plan.
Objectives of the CRC and CFI Programs

The University of Saskatchewan Strategic Research Plan identifies objectives that will serve the national agenda for increased competitiveness in research and development and for improving the lives of Canadians. Key objectives of the Strategic Research Plan are:

- **Build on areas of existing research pre-eminence, including signature areas.** Areas of existing strength can benefit significantly through strategic enhancement of research capacity. Of particular importance are those areas of strength that serve to define our sense of place, and serve to contribute to provincial and national agendas for growth and innovation.

- **Support emerging areas of research excellence so they reach pre-eminence status.** Areas recognized as of emerging pre-eminence will benefit greatly through the academic leadership provided by Canada Research Chairs. Chairs will be deployed to contribute to establishment of ‘critical mass’, to sharpen academic focus, and to help to define academic direction and innovation.

- **Create opportunities to pursue new initiatives identified as of strategic importance to the University, Saskatchewan, and Canada.** In order to consolidate institutional capacity in new areas of research, it is important that academic leadership be embraced, and that this leadership serve as a hub about which critical mass may evolve.

- **Expand opportunities for partnerships and interdisciplinary research.** Chairs deployed strategically will contribute to linkages among researchers within the University, and between researchers at the University and external to the institution, including the many private and publicly funded research organizations situated on the campus of the University of Saskatchewan.

- **Attract and retain outstanding faculty by providing an environment in which chairs can be successful, and where “the best” will want to work.** Enhanced research capacity and international profile will directly affect the University’s ability to recruit and retain faculty in an increasingly competitive market.

- **Build the infrastructure to support leading-edge research through investment in new and emerging areas of technology, enhancement of research facilities and investment in major facilities to enable researchers to excel at the forefront of their fields.**

- **Train highly qualified personnel for Canada’s workforce.** Chairs, and the research clusters that are associated with them, will create research environments attractive to post-graduate and postdoctoral trainees. Expanding research programs, a growing body of post-graduate trainees, and an outstanding faculty will contribute directly to innovation in undergraduate programming and enhancement of opportunities for engagement of undergraduate students in research.

- **Enhance opportunities for external funding and the establishment of outstanding research infrastructure.** Chairs, and the teams of collaborators and students associated with them, will increase the competitiveness of researchers at the University of Saskatchewan for external funding.

The University’s CRC and CFI Programs

The USask CRC and CFI Programs are intended to enhance Canada’s research capacity and the training of highly qualified personnel. We aim to attract and retain researchers who are recognized as international leaders, and the provide them with the research infrastructure they need to be successful in a competitive international environment. The University’s CRC Chairs and CFI allocations are targetted to areas of thematic strength with the intention of building the University’s research enterprise and international reputation. The leadership and productive synergies demonstrated by the
Chairs, coupled with strategic investments in research infrastructure, creates a research environment conducive to growth in the pursuit of research excellence.

The University of Saskatchewan continues to benefit significantly from resources allocated from the Canada Foundation for Innovation, most notably through the creation of major new facilities. These have included, but are not limited to the Canadian Light Source, the Saskatchewan Structural Sciences Centre, the Ag-Bioprocess Engineering Research Laboratory, the Infrastructure for Applied Biotechnology in Agriculture, and InterVac (International Vaccine Centre), the first Containment Level 3 facility in Western Canada for human and large animal diseases. CFI support has allowed the USask to strategically align world-class research facilities with areas of research strength. Further, CFI funding has broadened the scope of existing research, and made possible the exploration of new and emerging areas of research. The University has recognized the relevance of these major facilities to the recruitment of outstanding faculty and the attraction of Chairs and will continue to capitalize on these investments through the strategic deployment of Chairs.

The University also recognizes that the Canada Foundation for Innovation is a key source of funding required to establish the necessary infrastructure essential to the success of our Chairs. Thus, the objectives for the CFI and CRC programs are consistent. The University has been successful in seeking to optimize the funding available through matching funds, in particular the Saskatchewan Innovation and Science Fund, Western Economic Diversification, and from a variety of other local, provincial, and national sources, both private and public.

Allocation of Canada Research Chairs at the University of Saskatchewan as of 2021

Table 1 provides an overview of the allocation of Chairs to the University across the three agencies as of March 2021 based on the results of the CRCP’s 2020 reallocation exercise. Active chairs and nominations in progress as of October 2021 are also identified.

Table 1. Allocation of Chairs, as of 2021

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<tr>
<th>Chair allocations as of March 2021 including Budget 2018 chair allocations</th>
<th>SSHRC</th>
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<th>Active chairs as of 2021</th>
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<th>Nominations in progress as of October 2021</th>
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Research Themes

As outlined earlier, in 2006 the University of Saskatchewan reviewed its research landscape in order to begin to identify areas of pre-eminence, areas of emerging pre-eminence, and areas of strategic importance to the University, the Province, and the Nation. This exercise resulted in adoption of the major research themes, which capture the areas identified as areas of research strength and priority at the University of Saskatchewan and represent the framework within which Canada Research Chairs will be allocated. As the University evolves and its scholarly activities reflect new synergies, these themes have been recast as appropriate, with the previous theme for Materials Science folded into the theme for Technology and Science. The university’s research themes are: Culture and Society;
Within the framework provided by the research themes, the areas of pre-eminence or signature areas augment these major themes and represent areas of depth and focus which distinguish the University’s collective research and scholarship. Broadly defined, the University’s signature areas are:

- Indigenous Peoples: Engagement and Scholarship;
- Agriculture: Food and Bioproducts for a Sustainable Future;
- Energy and Mineral Resources: Technology and Public Policy for a Sustainable Environment;
- One Health: Solutions at the Animal-Human-Environment Interface;
- Synchrotron Sciences: Innovation in Health, Environment and Advanced Technologies;

We anticipate that all of our chair nominations will fit into one or more of the research themes and signature areas described below. Our capacity in each of these research themes and signature areas is considerable, in part because of the investments made independently of this program and in part because of the work of numerous faculty members. The Chairs program will strengthen our commitment and bring additional focus. The precise character of the focus will depend, in the first instance, on the work of our nominees and the research programs they have developed.

**Culture and Society**

Understanding who we are as individuals, societies and nations is a fundamental aspect of scholarly work at the University of Saskatchewan. Current and developing expertise in this research thrust covers four major sub-themes. **Creativity and Innovation in the Arts** includes research, scholarly and artistic activities in art, drama and music with a strong emphasis on faculty members’ extensive creative development, performance and outreach activities. Research in **Society in a Global Context** includes inter-cultural discourse, literature and language analysis, race, gender and sexuality. In addition, building on our sense of place, this sub-theme includes interdisciplinary studies of the Great Plains including history, culture, and political and economic systems. Investments in areas of strength in the broader sub-theme of **Institutions and Society** leverage an established tradition of public policy research at the institution. Research addressing policy and culture, democracy in diverse societies, public policy and governance, rural development and the study of co-operatives and producer associations are key foci with emerging emphasis addressing health and social policy, science technology and innovation, leadership, and trade and transnational regulations. The signature areas of **Agriculture, Energy and Mineral Resources**, and **Water Security** also illustrate research strengths in this theme, related to consideration of access to natural resources. Research in **Humanities and Foundations of Knowledge** encompasses early societies, classical, medieval and renaissance studies, the history of science, human reasoning, and indigenous humanities. This base sustains the signature areas of **Indigenous Peoples**, as it relates to indigenous knowledge systems.

**Indigenous Peoples**

Research and scholarly activities pertaining to Indigenous Peoples is a main focus at USask. Under the sub-theme of **Health**, faculty are working to address inequities in health strategies, develop community-generated health research, and investigate how traditional practices can be incorporated
into health care education and delivery. International areas of strength in Administration and Business include Indigenous governance, decentralization, and community economic and business development. The area of Education focuses on Indigenous identity and culture. History and Social Justice is critical to this cluster, and includes expertise in native-newcomer relations, Indigenous law, northern plains and boreal forest archaeology, and First Nations and early Canadian literatures. The University continues to foster work in constitutional issues, treaty rights, and linguistic survival. Indigenous Peoples is also identified as an emerging signature area. As home to the highest proportion of Indigenous peoples of any province in Canada, this area reflects the desire to distinguish ourselves as a national centre of excellence in research directly related to engagement and scholarship of Indigenous peoples. Research in areas related to social justice, policy, health, education, administration and business is a strong focus. A leader in the conducting of ethical and appropriate research with First Nations and Métis communities, the University is particularly well poised to position itself as a leader in research in partnership with First Nations communities.

Environment, Natural Resources and Sustainability

The USask undertakes critical fundamental and applied research in the sub-theme of Resource Management. Areas of expertise include sustainability of prairie and northern ecosystems, hydrology and water resources, sustainable crop management systems, and processing, infrastructure development, and sustainable beef cattle systems. Under the umbrella of Earth, Climate and the Atmosphere, researchers are internationally renowned for their work in solar-terrestrial and atmospheric studies. Emerging areas of strength are molecular environmental science, and high-performance computing in Earth science. Energy and Mineral Resources as a signature area underpins the research involved in energy production and conservation, mineral mining, the security of sources of energy and related public policy, and the sustainability of society and its infrastructure. This theme also highlights our international reputation in signature area in Water Security. This focus encompasses sustainable freshwater resource management and assessment on a regional, national and international scale, based on research strengths in the areas of aquatic toxicology, hydrology and aquatic biology. USask has distinguished itself as a national and international leader in sustainability from the perspective of the world’s freshwater resources. USask was awarded a Canada Excellence Research Chair (CERC) in Water Security and a C150 Chair in Hydrology & Remote Sensing; developed a world-leading research and training institute focused on issues of water quality and water supply domestically and globally, and secured a Canada First Research Excellence Fund (CFREF) grant Global Water Futures. As a leader in the emerging area of Renewable Energy research, USask will look to build on its expertise in the areas of biomass conversion, bio-energy from animal and agricultural wastes, clean coal technology, bio-ethanol, bio-diesel, and energy transport. The research focus of Sustainable Agriculture Production captures a breadth of study in plant breeding and genetics, and sustainability in animal and crop systems. Agriculture, as a distinguished area of research, reflects the University’s leadership in food and bioproducts research and bio-energy sources, anchored by our CERC in Food Security; our Global Institute of Food Security and a CFREF Designing Crops for Global Food Security.

Technology and Science

The University of Saskatchewan has a broad array of research and academic interests in technology. The Social Contexts for Technology focuses on issues such as the organization of work, diffusion of innovation, artistic expression, durability of social bonds, distribution of property rights and the new rural economy. Research in advanced learning technologies uses techniques from computer science, human-computer interaction, artificial intelligence, and software-agent technologies to study these effects on humans. The research thrust of Information and Communication Technologies has had far-reaching impact and changed profoundly the very nature of many disciplines. These include
computer modeling, imaging, geographic information systems, communications and software technology, data mining technology, networks, and digital techniques. Key areas in this research thrust include communications and networks, computer architecture and system engineering, and next-generation groupware. **Biotechnology** involves research that permeates many disciplines at the University of Saskatchewan, including agricultural biotechnology, structural biology, bio-fuels and biomaterials, bioinformatics, and bioethics.

Work in **Materials Science** spans a number of disciplines and its results are found in many familiar products and applications. This research thrust involves the application of the laws and theories of quantum mechanics to explore and enhance atomic structure, uniting research in a wide range of disciplines, particularly chemistry, physics, mathematics and engineering. Areas of focus include material synthesis and modification using a variety of techniques, nano-structures and surface science, and material structures and macro-properties. Characterization of material properties is accomplished using a variety of methods including synchrotron light techniques, most notably the dedicated X-ray lithography facility for micro and nano-scale structure and device research fabrication at the CLS.

Opportunities to explore the boundaries of our understandings and interpretation of the natural world are at the heart of research in Fundamental Sciences. The **Foundations of Science** include work on logical and algebraic reasoning, and complex systems modelling. The home of the Canadian Light Source (CLS), the University of Saskatchewan’s research in **Synchrotron Sciences** permeates a staggering number of research areas in the health, pharmaceutical, natural and applied sciences including biomedical imaging, BioXAS and industrial sciences. Researchers in the chemical sciences, engineering, and health sciences are exploring functions, natures and applications at the nano-level; and the University is developing strength in the **Nanosciences**.

The University further recognizes **Synchrotron Sciences** as one of its distinctive areas of pre-eminence, which crosses virtually all research within the broad research thrust of **Science and Technology**, with applications in alternative fuels research, environmental contaminants, drug development, cancer treatment, and crop-resistance research. Novel technologies available through the CLS assist in mining exploration and extraction to better meet environmental standards in the mining, drilling, and refining of petroleum and mineral resources and enhance the signature area of **Energy and Mineral Resources**.

**Human and Animal Health**

Few other institutions match the broad array of human and animal health research expertise found at the University of Saskatchewan. Research in the area of **Chronic Disease** encompasses work on cancer, obesity, hypertension, the neurosciences, mental health and addiction, and arthritis. Research strength is also found in the companion area of **Infectious Diseases** where the University has firmly established its reputation in immunology and the intersection of animal and human health. Building on the strengths of our institution, University researchers continue to investigate and work toward commercial applications in the area of **Reproductive Health. Public and Community Health and Wellness** represents a huge area of collective strength; researchers in this area explore topics ranging from physical and mental development throughout the human lifespan, health delivery and care of vulnerable populations and public health issues. The **Molecular Design and Drug Development** focus unites researchers in the basic health and pharmaceutical sciences and includes work in drug and vaccine delivery, pharmaceutical nanotechnology and drug development. The health of rural populations and remote northern communities crosses boundaries with the **Indigenous Peoples** and **Water Security** signature areas, highlighting developing research expertise in the use and control of water on reserve lands and the safe drinking water standards in First Nations communities. The application of **Synchrotron Science** through the BioMedical Imaging and Therapy beamline supports
advanced research and development in medical imaging techniques, yielding new tools in cancer
detection and treatment and drug design.

Research to advance animal and human health, as a signature area titled One Health to reflect
the animal-human-environment interface, is based on the work of internationally recognized
researchers and an outstanding infrastructure in infectious disease and vaccine research to support
research in the life sciences. VIDO-InterVac provides advanced research for vaccinology and
immunotherapeutics and is a recognized global leader in the field of vaccine development. The
Academic Health Sciences Complex will integrate teaching and research facilities for unique
academic, clinical and scientific collaborations, positioning the USask as a leader in the health sciences
and supporting patient-centred health care.

Allocation of Chairs Planned for 2021-2022

The University of Saskatchewan is entering a period of extensive renewal in our CRC program. In the
upcoming five years, the institution anticipates significant turnover in Canada Research Chairs due to
natural end of chair terms, resignations, and unsuccessful renewals. Nationally, institutions are subject
to reallocation, as changes in relative success in competition for Tri-Agency funding bears on
entitlement. USask has a total of 12 Canada Research Chairs (5-T1, 7-T2) available for allocation until
2022.

Table 2. Chairs Available for Allocation, 2021-2022

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<tr>
<th>Unallocated Chairsa</th>
<th>End of Tier Tenure</th>
<th>Total</th>
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<td>SSHRC</td>
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<td>4 – T2</td>
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<td>NSERC</td>
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<td>1 – T2</td>
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<td><strong>Total</strong></td>
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<td><strong>12 (5 – T1; 7 – T2)</strong></td>
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a. Unallocated Chairs are those currently in process from the 2020 reallocation.

In order to take advantage of strategic opportunities, it is essential that the University retain a
degree of flexibility in the allocation of available Chairs. This flexibility is exercised judiciously and
after consideration by the USask Research Chairs Oversight Committee. In the last round USask
exercised flexibility to increase the number of SSHRC chairs. Current searches as well as a number
that will be launched fall/winter 2021-22 adhere to the allocation by Tri-Agency.

The University is cognizant of the potential difficulty in retention of its most successful Tier 2
Chairs. The University must also judiciously balance the desirability of recruitment of outstanding
young scholars into Chairs in order to provide them with the means to achieve their full potential,
against the advantages inherent in appointment of established, senior scholars with a proven record of
achievement. The latter may contribute to a more immediate realization of institutional goals.
Table 3. Anticipated Allocation of Chairs by Research Area, Strategic Research Plan 2021-2022

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<th>Research Area</th>
<th>SSHRC</th>
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<td>Culture &amp; Society</td>
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<td>Indigenous Peoples</td>
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<td>Technology &amp; Science</td>
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<td>Human &amp; Animal Health</td>
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<td>Environment, Resources</td>
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<td>&amp; Sustainability</td>
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Table 4. Current (as of 2021) and Projected (end of 2022) Allocations of Chairs by Research Area, Strategic Research Plan. Projected numbers include chairs awarded by 2022 and nomination submissions by December 2022.

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<th>Research Area</th>
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<td>Culture &amp; Society</td>
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<td>Indigenous Peoples</td>
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<td>&amp; Sustainability</td>
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Equity, Diversity and Inclusion

The university’s mission, vision and values statements describe USask’s commitment to promoting diversity, inclusion, equity, and meaningful change. Awareness of these intrinsic values is actively promoted at all levels of the university. From the President’s Office, and his messaging, to the active participation of Human Resources (HR) in ensuring that diversity, inclusion, and equity are imbedded in discussions that influence, shape, and direct development, leadership and organizational culture to reach institutional goals of a diverse and inclusive university. The university planning process currently underway reflects our commitment to the principle of diversity. Embedding this concept into the fabric of these strategic planning efforts will focus the university’s work in the future and emphasize to our community its importance in all we do.

USask’s CRC Equity, Diversity and Inclusion Action Plan (updated March 16, 2020) reaffirms USask's commitment to diversity, inclusion, and equity, and aligns with the federal government’s policies on non-discrimination and employment equity.
**Allocation of Chairs to Internal, External Candidates**

In accordance with the intent of the CRC Program to increase the number of outstanding scholars at Canadian universities, our intent is to place an emphasis on national and international searches, and it is expected that the majority of appointments will be to candidates external to the USask and from outside Canada. Offers are made to internal candidates only to retain exceptional scholars critical to develop areas of strategic importance and to address equity targets.

**Assessment of Progress**

The USask Research Chairs Oversight Committee has approved a number of indicators to determine the Chair’s success in meeting the objectives of the CRC Program. Specific expectations for Chairs may vary considerably across disciplines, so that indicators will not apply equally to all Chairs. Nevertheless, significant activity is expected to occur within each of the following five categories, and the progress of each Chair will be assessed against appropriate indicators within each category. Indicators for each category may include, but are not limited to:

**High Quality People**
- Visionary leadership
- Ability to recruit and retain outstanding faculty, maintain critical mass of researchers and students
- National and international awards and recognition
- Invited presentations at national and international conferences and at institutions outside the USask
- Training of highly qualified personnel (number and quality of graduate students, undergraduates engaged in research programs, post-doctoral fellows, research associates, research assistants, technicians; and their subsequent successful placement)
- Innovative contributions to academic undergraduate and graduate program development and delivery

**Significant Regional, National, and International Impact**
- Impact on policy (social, business, government, health, education)
- Contributions to Canadian social and cultural life through artistic, performance, cultural and literary work
- Contributions to technological advances; technology and intellectual property transfer
- Relevance to regional and Canadian innovation agendas
- Participation on professional bodies, committees, and boards at the national and international levels
- Outreach and community initiatives and service that benefit the public and private sectors

**Ability to Attract Resources**
- Success in securing external research funding, including national granting council competitions
- Enhancement of research infrastructure
- Involvement in collaborative initiatives with external institutions, organizations, and the private sector

**Significant Collaborative Activity**
- Formation and enhancement of cross-unit and cross-college collaborative groups
- Contributions to interdisciplinary and multidisciplinary activities
- Increased and innovative use of existing USask and local facilities and resources
Establishment and strengthening of national and international partnerships
Community and government agency linkages, partnerships and collaborations
Industry linkages

Significant Activity Output
- Publication quantity and quality; communication of research results
- Performance and exhibition of scholarly and artistic work
- External recognition, citation, and other evidence of impact of research, scholarly and artistic contributions
- Patents and commercialization agreements
- Direct economic impact (e.g. spin-off companies, job creation, impact on tourism)

A comprehensive review of the accomplishments of the Chair, undertaken during the final year of the term, will inform the process for recommendation on renewal or reallocation of the Chair. The university only supports renewal of applications which demonstrate that the Chairholder has achieved the objectives set out in the original nomination, has upheld the standards of excellence of the program, and has provided value added to the institution from holding a CRC position. The CRC Advisory Committee, a body of senior academics appointed by the USask Research Chairs Oversight Committee, is assigned the task of reviewing the renewal documentation and providing feedback to the Chairs and advice to the Oversight Committee.

Planning and Approval Process

Released in 2018, USask’s current strategic plan (nīkānītān manācihitowinihk in Cree and ni manachihitoonaan in Michif which translates as "Let us lead with respect.") is guiding institutional investment and focus until 2025. The plan identifies 12 major goals across 3 pillars: a) Courageous Curiosity: b) Boundless Collaboration and c) Inspired Communities. The planning process was informed by extensive engagement and dialogue both within and external to the university to identify areas and activities of strategic importance to the institution and society.

Final authority and responsibility for the Research Plan, the allocation and nomination of Chairs, and the allocation of internal resources rests with the University President. The President is advised by the USask Research Chairs Oversight Committee, consisting of the Provost and Vice-President Academic and the Vice-President Research; the Vice-Provost Faculty Relations, Associate Vice-President Research, and Director of the Research Acceleration and Strategic Initiatives (RASI) attend all meetings as resource personnel. A CRC Advisory Committee provides a forum for collegial consideration and serves in an advisory capacity to the Oversight Committee. This committee consults widely with members of the University community in terms of allocations to the research themes and signature areas and the selection of appropriate candidates.

CFI applications are developed under the guidance of a CFI Advisory Committee, chaired by the Associate Vice-President Research or designate, who makes a recommendation to the Vice-President Research. The VPR is then responsible for communication of advice to the President.

USask is in the process of renewing the signature areas/strategic theme areas which will be the basis of a new Strategic Plan. Discussions will conclude in Spring 2022 at which time, a revised Strategic Research Plan will be developed for post-2022. The new Strategic Research Plan will be developed through an iterative and collaborative planning process undertaken through University Council and committees of Council.