2016-2022*

Strategic Research Plan

SFU
SIMON FRASER
UNIVERSITY

*In October 2020 the Strategic Research Plan was updated with editorial changes and extended until 2022

The **Distinctiveness** of SFU Research

Established in 1965, SFU has developed over the past 50 years into Canada's leading comprehensive university. As one of the country's fastest-growing and most versatile research institutions, SFU is distinguished by its internationally recognized strengths across a range of core and interdisciplinary fields. SFU is committed to becoming a world leader in knowledge mobilization, building on a strong foundation of fundamental and applied research.

SFU is consistently ranked among Canada's top 15 research universities by major global and national university ranking systems.

SFU engages partners in urban and rural regions around the world to complement its expertise and contibue to global initiatives.

From discovery to knowledge mobilization, SFU's eight faculties are engaged in the full spectrum of research, building on a robust tradition of interdisciplinary investigation and collaboration. Research in the humanities and social sciences, for example, helps inform new directions in science and applied science. Similarly, advances in science and technology help shape new fields in the fine and performing arts, humanities and social sciences. Our ability to leverage core strengths in fundamental research across disciplines is the cornerstone of our knowledge mobilization activities. It is by connecting these diverse and cutting-edge research strengths that SFU researchers forge new approaches to significant challenges.

SFU is consistently ranked among Canada's top 15 research universities by major global and national university ranking systems. Most notable, in its 2020 World University Rankings, Times Higher Education ranked SFU as the top-ranked university for impact on sustainable cities and communities.

The QS World University Rankings consistantly places SFU among the top Canadian universities for citations per faculty, and the 2019 CWTS Leiden Ranking places SFU fourth in Canada for its percentage of international collaborative publications. The 2019 U.S. News Global Rankings places SFU among the top 10 universities in Canada in 6 subject areas. As well, in the Maclean's Rankings, SFU has been ranked 1st every year in the Comprehensive University Category, with the exception of 2014, when it was ranked 2nd.

SFU enjoys the fastest growing research income among research universities in Canada, having surpassed $100-million in 2013 and reached $161-million in 2019. Support for state-of-the-art infrastructure from the Canada Foundation for Innovation and attracting top talent through the Canada Research Chairs Program has further increased SFU's research capacity. While the university has also seen significant gains from industry- and community-partnered research and innovation activities, there is great potential to further expand its collaborations with community partners and the private sector.

Internationally, SFU engages partners in urban and rural regions around the world to complement its expertise and contribute to global initiatives. The extent of the university's international research collaborations is evidenced by joint publications with 2,947 institutions in more than 125 countries. SFU partners with industry, non-profit organizations, governments, and diverse communities to deliver impactful outcomes. By building on demonstrated strengths while remaining responsive to new opportunities, SFU continues to expand its global impact through high-calibre collaborations.

Our growth has been driven by a strategic emphasis on supporting research that is excellent, innovative, socially and economically relevant and engaged with communities. Indeed, this priority is part of SFU's strategic vision: to be the leading engaged university defined by its dynamic integration of innovative education, cutting-edge research and far-reaching community engagement.

SFU's Strategic Research Plan for 2016-2022 builds on its strengths and successes, and positions the university to continue to grow its capacity in research and knowledge mobilization. This plan provides direction for solidifying SFU's interdisciplinary research strengths while building critical mass in areas that are globally relevant and strategically important. It reinforces SFU's commitment to excellence across the full spectrum of research as the driver of bold research questions, engaged partnerships and transformative impact. Lastly, it provides a road map for how the university will capitalize on new opportunities, invest in strategic growth areas and drive forward initiatives that enhance its research performance. ■

Building on SFU's Vision:
The Objectives

Aligned with SFU's vision of being a leading engaged university, we aspire to be a world leader in knowledge mobilization, building on a strong foundation of fundamental and applied research by:

→ Supporting and promoting the full continuum of research, from the fundamental generation of knowledge, through the dissemination of that knowledge within the academic community and beyond, to the application of transformative ideas for the benefit of society.

→ Promoting research excellence, supporting and encouraging all researchers, including undergraduate and graduate students, postdoctoral fellows, faculty, staff, and community partners, who assist the research mission.

→ Leveraging fundamental research strengths, including interdisciplinary research, close community connections, and partnerships and collaborations to become a global leader in research mobilization.

→ Seeking opportunities to transfer the results of our research to the broader society, including policy-makers, civil society leaders and the community.
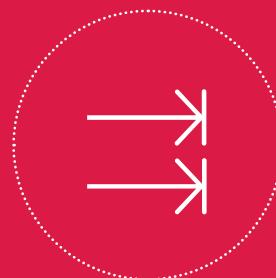
This document sets out a plan to deliver on SFU's vision by continuing to build on its research strengths.

The **Opportunities** Ahead

SFU's priority is to advance and support research excellence in all of its forms. The university will continue to support the full spectrum of research across all disciplines, at all three campuses. This commitment defines SFU research and enables both established and emerging leaders and groups to engage in a wide variety of research activities. Deepening our commitment to excellence will enable SFU to solidify its research strengths and build areas of excellence that are globally recognized.

The Strategic Research Plan identifies six priority research challenges that are designed to push the limits of discovery and knowledge mobilization and deliver impactful breakthroughs. **Success in tackling these challenges rests on the ability to draw from fundamental research—the backbone of SFU's research endeavours—and applied research.** Leveraging the strength of the arts, social sciences and the sciences will enable the university to contribute solutions to the pressing challenges facing the world.

To fully seize opportunities to address these challenges, SFU will facilitate the efforts of its researchers to collaborate and share resources. Potential and existing synergies between and across disciplines will be strategically leveraged through approaches that are:

INTER-DISCIPLINARY

SFU reaffirms its goal to support interdisciplinary research—from the humanities and social sciences to the fundamental and applied sciences—by cultivating areas of excellence. Through interdisciplinary approaches, emerging fields will develop and existing fields will achieve a critical mass of strength.

DATA-DRIVEN

From fundamental research to real-life application, data—whether big or small—is at the core of every problem we tackle. The process is both iterative and open to change as we access, store and leverage information to generate deeper insights and novel applications. It is the power of data combined with rigorous analysis that drives research forward.

AGILE

Excellence requires a culture of agility, one that is responsive to emerging opportunities that link to research strengths while proactively driving university priorities forward. SFU's strategically-focused and inclusive research culture enables it to network different perspectives and approaches for optimal performance and direct resources to areas of growth. Connecting research strengths to new and existing challenges enables researchers to collectively work towards high-impact solutions.

COLLABORATIVE

Facilitating seamless connections with diverse stakeholders—across academia, communities and the private sector—opens the door to the exchange of knowledge, resources and discoveries for the benefit of society. A continuum of partnerships strengthens the interplay between research and innovation to enhance social, economic and environmental wellbeing.

Emphasizing these approaches deepens our commitment to solidifying our research strengths while building on our globally recognized areas of excellence. To this end, SFU's Strategic Research Plan is not discipline-specific. Instead, it is focused on addressing real world problems, as research increasingly involves contributions from experts across diverse and often distant fields. As a large research-intensive university, our researchers focus on innovative solutions for a wide range of problems. In particular, we support research that addresses problems across a number of broad, strategically significant areas, referred to as challenges. SFU focuses on six challenges that encapsulate the breadth of and interconnections between researchers, build on our previous investments and serve as our priority research areas.

Addressing environmental concerns and creating a sustainable future.

Across the globe, we face several intensifying concerns including climate change, diminishing resources, exacerbated conflicts and natural disasters. Humanity is continually challenged to adapt to the world it inhabits and shapes. Addressing pressing environmental problems and creating a sustainable future rests on our ability to understand root causes and provide real mechanisms and solutions for change. It is at the intersection of the natural, applied, and social sciences that we can best assess the social, political, economic and environmental trade-offs of strategic interventions. Our aim in addressing this challenge is to focus on understanding perceptions, advancing strategies and developing interventions to improve our collective welfare and ensure a sustainable future.

Global environmental issues are among the most important challenges of the 21st century and SFU researchers have a long history of pursuing research related to environmental sustainability. These research programs focus on alternative energy development and transportations, fisheries and oceans, biodiversity, resource management, policymaking, climate change modelling, migration, educating about sustainability and helping communities and businesses respond to these challenges. There are opportunities to integrate sustainability concepts at all levels of the research enterprise. Indeed, solutions for climate change mitigation and adaptation are a key part of harnessing change and improving outcomes. Addressing the far-reaching effects of climate change will require collaboration with local and international communities to help ensure that research informs decision-making and enables actions that improve the global welfare of people and the planet.

Understanding our origins.

Understanding our origins calls on us to ask fundamental questions about the universe, our planet and societies. Insights that arise from this important work change the way we think about the universe and our place in it. SFU researchers measure and predict natural phenomena on multiple scales, including the subatomic, the cellular and the cosmic. Yet, natural phenomena only explain part of our beginnings, and a fuller picture emerges when we examine the development and progression of our languages, cultures and knowledge systems. With more thorough insights into our complex origins—both natural and human—we are better equipped to look forward, pushing the boundaries of discovery into new critical frontiers.

As a world-class research university, SFU has built considerable capacity in fields that address questions about the origin and evolution of the universe, about human life and organisms, and about human culture. Using advanced infrastructure and traditional methods of scholarly inquiry, SFU researchers are making important contributions to fundamental questions that are central to research in the sciences, education and the humanities. This research challenge encompasses questions being addressed in diverse areas, such as theoretical physics, archaeology, pure mathematics, biochemistry, evolution, language and behaviour, and cultural heritage through the study of literature, philosophy, anthropology and history. Promoting and supporting multiple modes of inquiry while fostering collaboration across disciplines will deepen our understanding of ourselves and the world we inhabit.

Supporting health across the human lifespan.

Globally, we are looking for ways to support the health and wellness of young and aging populations, manage pandemics, and develop treatments, interventions and preventative approaches for seemingly intractable diseases. Addressing this challenge requires approaches that span the spectrum from modelling organisms to understanding human society.

SFU researchers are investigating the causes and consequences of disease, including chronic and infectious diseases, mental illness and cancer. They investigate injury and have expertise in treatment, rehabilitation and recovery. Social, biological, environmental and behavioural determinants of health are investigated to support the wellness of individuals across the lifespan. At the same time, research on systems, infrastructure, and reforms within environments like the workplace, schools and socioeconomic services are helping shape health outcomes in important ways. Combining diverse disciplinary expertise will lead to cutting-edge interventions, models and policies that improve diagnosis, healthcare delivery and outcomes, and ultimately, the quality of life.

Strengthening civil society by advancing justice, equity and social responsibility.

Globalization, natural resource use and distribution, economic uncertainty, population migration and changing patterns of convergence and conflict challenge the structures of societies and shape the ways we interact with each other. Researchers at SFU are considering questions of equity and justice in relation to environmental, educational, health, economic and governmental systems. Matters of social inclusion, identity, diversity and belonging are key drivers behind how individuals and groups perceive and connect with society at large. Considerations related to justice, equity and social responsibility also shape the ways we engage with communities and value their contributions. Fostering community participation in research is both a vehicle for social change and a critical source of scholarship.

Combining new tools and traditional methodologies, SFU researchers are mobilizing knowledge to understand the complexity of the social, economic and political forces that challenge global communities. Linking key questions to action drives change and builds critical capacities across sectors including education, business, government and the wider community.

Enhancing our world through technology.

Technology impacts every aspect of our lives, at multiple scales, from nanotechnology to satellite communication. At SFU, we design and develop technologies that improve how we interact with each other, with computers and mobile devices, texts and images; how we learn, play, and perform; how we connect, integrate and adapt through space and time; how we access, store and transmit information; how we take care of ourselves and others; and how we age. The use of technology reframes old problems while providing solutions at new scales of magnitude. It can redefine innovation and create breakthrough discoveries both within organizations and the broader society.

As technology enables collaborative networks with a high order of complexity, SFU researchers can lead or participate in Big Science projects across the research spectrum and attract complementary expertise in key growth areas. Working in coordination with industry, SFU researchers cover a wide range of cutting-edge research and training programs, seamlessly integrating new research questions with technological outcomes. From discovery to applications in the real world, we leverage technology and data-intensive approaches to transform society and deliver tomorrow's solutions.

Transforming the landscape of teaching and learning.

We are inundated with new information through various outlets, from interactions with our peers, to the limitless Internet, to our everyday experiences. Yet, how we acquire, retain, participate in, and synthesize this knowledge varies. Central to fostering human development and growth is teaching and learning, where art- and science-based approaches combine to inspire innovation and transformation.

Strengthening the connection between teaching and learning has become a critical focus of scholarship. With a responsibility to develop and disseminate knowledge, researchers continually question their approaches to teaching and learning. Reimaging the teaching-learning nexus serves as a catalyst for new practices, modes of inquiry, connection and interventions at the individual and systemic levels. Embracing novel technologies and opportunities amplifies this research to understand both the short- and long-term effects of teaching on experiential learning, alternative learning and imaginative education. Deepening our understanding of the linkages between knowledge, experience and engagement supports the development of lifelong learners and lays the foundation for conceptual and practical innovations in teaching and learning.

These six intersecting challenges enable us to draw from diverse areas of expertise to build transdisciplinary research strengths and capacities. Going forward, SFU will seek ways to strategically invest in supporting research that addresses these challenges.

In the process of addressing these challenges, we have developed particular strengths that have led to the establishment of four strong research clusters. These clusters provide platforms that enable researchers to tackle large crosscutting challenges, while creating and capitalizing on distinct advantages for global leadership. The clusters are defined by a strong core of researchers from diverse disciplines who use innovative approaches and methods to drive impactful outcomes.

Big Data

Uncovering new uses for data, or new ways to extract knowledge from data, further expands the frontiers of art and science.

SFU integrates its strengths in big data research across many disciplines including: computing science, education, physics, bioinformatics, genomics, health sciences, computational criminology, statistics, business, engineering, interactive design, mathematics, visual analytics, geography, social sciences and communications. In these and other fields, advanced research computing, data mining and data warehousing, plus the ability to effectively work with and analyze large quantities of data, has become increasingly critical. The acceleration of data-intensive applications in fields as diverse as medicine and the humanities makes big data a top priority in the research arena, and SFU is well positioned to capitalize on this demand.

SFU is a leader in secure computing and the analysis of highly sensitive data in a privacy-protective setting. As host of one of Compute Canada's five national advanced research computing facilities, and as the lead on Compute Canada's national data centre consolidation project, SFU's expertise is widely recognized.

Through big data approaches, we can enable the development of novel approaches for data-intensive discovery and application. By applying advanced computing to fields like criminology and urban studies, for example, researchers are developing new ways to map justice system relationships, to model the impact of new policies and to discover, analyze and manipulate new crime patterns. Likewise, secure computing enables the de-identification of individual data to facilitate research on the determinants of human health and well-being, as well as research on development to support healthier communities. These computationally-driven approaches enable the integrated analysis and visual representation of outcomes. Combining data with effective computing tools and rigorous analytical methods supports the decision-making of policymakers, community groups and individual citizens.

As the potential uses of big data continue to unfold, new collaborations are evolving at the frontiers of science, such as the Large Hadron Collider at CERN (the European Organization for Nuclear Research) where SFU researchers played a prominent role in the discovery of the Higgs boson particle. As the lead institution for the Canadian ATLAS Tier 1 Data Centre at TRIUMF, SFU is an integral part of a coordinated network of advanced computing facilities worldwide, tackling big data problems at the most fundamental levels of science. The university has notable expertise in quantum computing, where breakthroughs in silicon-based quantum technologies move us closer to a new revolution in information technology. Strengths also exist in bioinformatics and the computational analysis of genomic data, as SFU researchers work in close collaboration with Canada's Michael Smith Genome Sciences Centre and with international partners.

Big data has also expanded the frontiers of education, the humanities and the social sciences. Learning analytics are used to develop support structures tailored to individual learners. Providing key indicators and using new technologies can guide a reimagining of interactions between learner, educator, content and curricula to better support learning. SFU is a Canadian leader in the digital humanities and in open access through initiatives like the Public Knowledge Project, where the SFU Library has played a pivotal role in moving scholarship towards a more open, innovative and accessible model.

Big data is benefitting and transforming society in numerous ways, although this transformation also entails new risks and challenges at the individual and societal levels. Balancing the wonders of data access and analytics with a critical lens provides a new perspective on the limits of big data, new research paradigms and novel methodological approaches. We share a responsibility to debate the use, collection and applications of data, as well as the balance between privacy and information sharing. These concerns not only shape what we do with data, but also how we protect it.

Uncovering new uses for data, or new ways to extract knowledge from data, further expands the frontiers of art and science. Likewise, the development of new tools and techniques supports data-intensive discovery. By building platforms to support this work and by launching a university-wide Big Data Initiative, SFU aims to accelerate data-intensive research and provide the computational power to deliver breakthroughs across the full spectrum science and social sciences. ■

Health Technology and Health Solutions

Understanding the full context of human health and wellness—influenced by areas such as development and aging; mental health, brain health and disease; personalized medicine and drug development; demography, policy, economics and management; the life sciences; computation and design; nanotechnology; robotics; and innovation—enables us to create technology-driven solutions to advance healthcare and help people to live healthy, independent lives.

Developing new technologies, instruments and applications supports human health from point-of-care diagnostics, to monitoring and treatment, to long-term preventive strategies. These tools link to computational strengths in genomics and bioinformatics to help understand human development and disease from the genomic level to the population level. Through the application of algorithms and statistical analyses, researchers are able to develop new methods for the diagnosis, prevention and treatment of disorders and infectious diseases.

In the area of mental health, SFU connects with diverse communities to integrate policy, community-based research and clinical strategies to deliver context-specific preventative initiatives and intervention solutions. Likewise, developing non-invasive
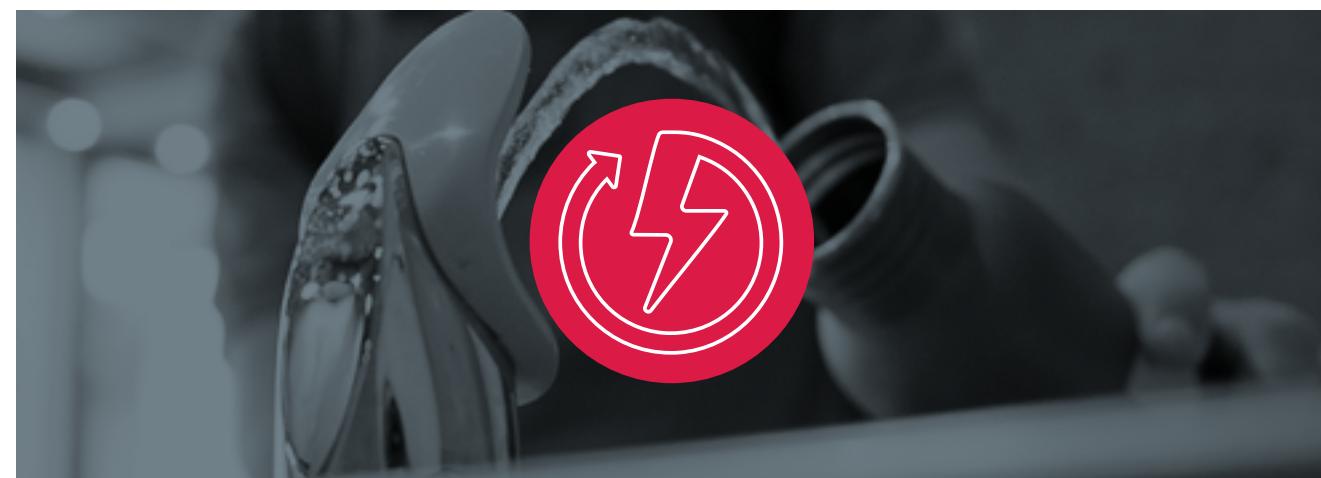
technology facilitates the diagnosis and recovery-focused treatment of mental health and substance abuse issues. Connecting technology to community and clinical outcomes increases the effectiveness of interventions that eliminate or reduce risk while lessening the associated financial or social burden.

SFU is also building leadership in rehabilitative and assistive technologies to support doctors and patients managing long-term chronic conditions and recovery from strokes, falls and other injuries. To support independence, our researchers are developing intuitive robotics and non-invasive wearable technologies, with a wide range of applications in assistive living.

Research in health technology relies on strong partnerships with clinicians and healthcare experts. By drawing on these networks—both across Canada and internationally—we continue to link diverse expertise to create localized solutions that meet the high demand for healthcare in communities. ■

New Materials and Technology for Sustainability

SFU has established expertise in the areas of materials science and engineering, with a complementary investment in technology development, for more than 20 years. One key area of focus is the rapidly changing global energy infrastructure. Humanity is at a critical juncture between urgently reducing greenhouse gas emissions and responding to the growing demand for energy. The need to shift away from existing dependencies towards new sources of renewable, clean and highly efficient energy technologies has positioned SFU as a globally recognized leader, particularly in the fuel cell science and technology field. The development of clean technologies does not occur in isolation. It rests on the ability to link multiple research approaches to commercialization and consumer adoption of new technologies while addressing the design, development and impact of new products, and the implementation of policies to incentivize their adoption. In response to these demands, SFU researchers collaborate across disciplinary boundaries to deliver innovative technologies that meet these global challenges.

Transforming ideas into engineered devices and materials extends beyond clean technology. It also links to strengths in health technology and information technologies. SFU's

research and development in this area—from molecular electronics, to quantum information, to photonics, and magnetic materials—is matched by entrepreneurial spirit across multiple fields and with external partners, allowing the delivery of the best possible tools to benefit end users.

Successfully delivering real-world solutions requires us to understand and capitalize on emerging markets, both locally and globally, in order to enhance competitiveness. Innovation and adoption in this cluster require key insights on how to attract investment, how to best commercialize technologies, and how to create value for industry, government and society at large. Successfully bringing a product to market is particularly dependent on understanding the behaviour and values of target stakeholders while managing a diverse workforce. SFU researchers are not only developing new technologies—they are also informing best practices. ■

Community-Based Research

As an emerging cluster, community-based research builds on SFU's strong tradition of engagement, working with communities to answer key questions and solve problems that are important to them. Areas of concern include: health, the environment, economics, politics, education, culture and social justice issues. SFU remains committed and responsive to new approaches and collaborations to tackle these questions. Community-based research is particularly salient when working with populations and groups who have been disenfranchised, marginalized, or who lack power and resources, such as the homeless, those with mental illness, refugees and newcomers, and LGBTQ2+ communities.

Community-based research is also critical as we engage with Indigenous communities. In working with these communities, SFU researchers seek ways to address a wide range of social, economic and historical issues, including the preservation of ancestral languages, strengthening health and educational systems, promoting Indigenous business opportunities and facilitating efforts to drive change and social welfare.

SFU researchers are working side by side with community members to meaningfully address issues of great relevance and urgency such as climate change, environmental pro-

tection and the preservation of natural resources. Our work with local and global communities helps communities assess competing demands to preserve key ecosystems and to optimize the utilization of resources. From preserving salmon stocks, to managing water systems, to adapting to the impacts of climate change, SFU partners with communities to link science with local knowledge and inform policy and practice. These approaches foster community partnerships and inform resource management and security while providing a foundation to develop innovative solutions. By aligning the university's research agenda with community concerns, SFU researchers connect diverse perspectives to address complex environmental issues from multiple fronts and share solutions on a national and global scale.

Researchers in this cluster use technologies to foster collaboration and help communities develop new ways to engage with the world. Digital games, for instance, foster intergenerational education opportunities and help communities imagine new futures where societies address issues of social justice and climate change. Likewise, understanding individual dynamics affected by culture, language and community connections creates a living lab that helps leverage technology to enhance student support and learning. Combining science and

art with the human experience fosters effective interactions in response to community challenges.

In an effort to connect people with their cultural heritage and help them trace historical milestones that have shaped their communities, SFU's digitization projects with BC's Indigenous, Chinese-Canadian, Indo-Canadian and Japanese-Canadian communities bring social justice issues to the forefront and ask how we can promote inclusivity across all communities in Canada. Likewise, the protection of cultural heritage is a key concern for many communities. Ancestral sites, artifacts, languages and knowledge are an integral part of individual and community identities. Working in partnership with local Indigenous communities to preserve cultural heritage creates a model of research where communities are not only respected, but also retain control over their cultural activities and legacies through the research process.

As a community-engaged university, SFU researchers tackle questions that require the use of community-based approaches. Through structures that support and recognize this research, SFU continues to demonstrate its commitment to conducting research that is useful to community members in making positive social change. ■

Taken together, these clusters epitomize how interdisciplinarity, agility, partnerships and data can seamlessly merge for maximum impact.

Expanding this approach will not only continue to build critical mass in existing areas, but also provide an important platform to develop and diversify SFU's strategic research strengths. SFU will build on the six research challenges to strengthen existing clusters and develop new ones. As that takes place, the university will create opportunities to lead high-impact research in discovery and knowledge mobilization.

How We'll Get There

Through research excellence, seamless partnerships and increased impact, SFU will continue to develop as a leading research-intensive university. These three broad strategies will advance the Strategic Research Plan by helping the university to respond to new opportunities, direct resources to areas of strategic growth and drive initiatives forward to enhance research performance.

1 Strengthen areas of research excellence.

SFU will build on its track-record of cutting-edge research across the full spectrum. By focusing on areas where it has built clusters of strength, and the six research challenges, SFU can position itself to accelerate its research efforts. Capitalizing on its distinct strengths to support the best possible research, SFU will:

Recruit and retain a diverse group of outstanding students, research fellows, and faculty.

Continuing to attract, support and retain some of the world's most accomplished and promising scholars will expand SFU's research capacity and inspire the next generation of researchers.

SFU will inform and inspire students on the potential of a research career as well as the range of opportunities made possible through the university environment. We will attract top students and recruit talent from communities that may otherwise be at a disadvantage to pursue higher learning by continuing to implement a number of outreach programs through our faculties.

We will strengthen programs that promote research in schools and in the community. SFU will encourage students to be curious and critical about the world around them through research partnerships with schools, public forums like the Trottier Observatory and Science Courtyard, the Philosophers' Café, SFU Public Square and through its educational outreach programs.

Creating opportunities for students to continually develop their knowledge and skills equips them with a "Degree of Experience." Through the SFU Work Integrated Learning Office, SFU will continue to provide undergraduate and graduate students with local, national and international research co-op placement opportunities and internships in their field of training. Promising students at all levels will be supported with Undergraduate Student Research Awards, Graduate Fellowships and research and teaching assistantships. Working with the Office of Graduate and Postdoctoral Studies, SFU will continue to focus on a range of services to support the research careers of graduate students and postdocs, including scholarships, travel and research awards, exchange programs and professional workshops.

At the heart of SFU research is the activity, creativity and mentorship of its faculty members. The university must continue to attract, retain and support researchers of the highest calibre to grow its research enterprise and inspire continued excellence and innovation. Our strategy is to build on strength in areas where the university has the potential for global leadership. Through the strategic use of Research Chair positions, we will recruit emerging and established leaders in key growth areas. State-of-the-art infrastructure—provided through the Canada Foundation for Innovation, the British Columbia Knowledge Development Fund, industry collaborations, internal support funds and other available mechanisms—will support their productive research programs. By aligning SFU's research and innovation strategy with federal and provincial priorities, the university will ensure that its research remains regionally relevant and well-supported. SFU will expand its research and innovation facilities at our three campuses, build new labs and enhance research safety to incentivize quality research in a world-class, inclusive research environment.

Provide a wide range of research support mechanisms accessible to all.

Providing high-quality research infrastructure backed by institutional commitments creates a positive research environment. Through these support mechanisms, SFU researchers can pursue excellent research programs and seek new funding opportunities.

SFU will identify ways to support contemporary and innovative research spaces while managing the challenges and limitations of its aging infrastructure. Good facilities are a critical element in supporting ground-breaking research and innovation. By capitalizing on opportunities with government and industry, and through internal mechanisms, SFU will enhance and expand its infrastructure to meet the evolving demands of a research-intensive university.

A wide range of mechanisms also supports new and experienced research faculty through start-up funds, teaching releases and development funding, bridging funds, administrative support funds, publication, travel, and workshop funds, and a suite of initiatives to promote collaboration and interdisciplinary research, including the SFU Community Trust Endowment Fund program. Through Faculty Grant Facilitators and Institutional Strategic Awards, researchers have access to grant facilitation services and receive support to develop competitive funding applications and partnerships with peer institutions and industry. SFU's strategy is to build on these services, not only to keep pace with its growing research enterprise, but also to look for new possibilities and opportunities to enhance its research culture. By using advanced resources, networks and technologies to support research management in the faculties, we are removing barriers to research excellence.

Ensure students have the opportunity to participate in research.

Linking cutting-edge research to innovative education empowers students to experience the creation and application of knowledge while cultivating the skills to face new challenges in a changing world.

SFU commits to a quality educational experience that allows undergraduate and graduate students to understand, evaluate, and pursue their own research interests. An immersive and supportive environment enables undergraduate students to engage with faculty-directed research projects through research-intensive courses and funding support for dedicated semesters in research. The majority of SFU's graduate programs require the completion of a research capstone or the submission of a thesis. Through research assistantships, graduate and senior undergraduate students receive hands-on training in research, often leading to quality publications. SFU's strategy is to mobilize funding mechanisms through federal, industry, and internal programs to support research training, and to provide opportunities for student internships at partner organizations locally and internationally. SFU Libraries will also continue to play a central supporting role through the Research Commons and institutional research repositories by ensuring access to research material, technical workshops, writing and publication support, and consultations.

Optimize resources and support structures to maximize impact.

Facilitating greater access to institutional research support ensures that researchers can spend their time doing what they do best: producing new knowledge and sharing it with the world.

Over the past decade, the research enterprise at SFU has grown significantly in terms of research income, output, infrastructure, training programs and the breadth and depth of its research expertise and partnerships. Consequently, a number of support mechanisms will need to be optimized to maintain this momentum.

Our strategy is to expand existing research support programs under a streamlined management structure to become more responsive to change and build additional capacity. We strive to remove barriers for researchers in the application and administration of grants and contracts, and create a one-stop research support portal to facilitate linkages between researchers, the private sector, community partners, and funding organizations.

Data-driven decision-making will be emphasized and resources will be allocated where they can be most effective.

We will identify strategic opportunities to optimize workflow across the research support offices and simplify access to critical information, processes and administrative support. Upgrades to existing research management and information systems will integrate pre- and post-award management through a centralized portal. Internal support mechanisms will be strengthened, including co-funding for major applications and partnerships, bridging grants, travel grants and administrative support grants. At the same time, new approaches will be developed to promote and assist industry partnerships.

Since SFU operates across three campuses, and research activity at its satellite campuses has expanded, the exchange of information and services across our three campuses, including our libraries, will be improved and greater capacity will be put into place where more support is required. Critically, a shared facilities data hub, and a research computing hub with analytic assistance, will be put into place to support university-wide big data activities including data management and access for researchers and students.

2 Seamlessly connect our research to our partners

Research is not conducted in isolation; it is a highly networked endeavour. Collaborative engagement in research sparks innovation by creating true partnerships on the road from discovery to knowledge mobilization. Focusing on the complementary aspects of SFU's Strategic Research Plan and SFU Innovates—our innovation strategy—means that we will:

Enhance connections between researchers, partners and communities.

Linking diverse perspectives together—from SFU to our academic, private sector and community partners—generates more powerful insights and relevant solutions to local and global problems.

Central to SFU's research strategy is building strong partnerships across sectors, both locally and internationally, through open access facilities, student exchanges and internships, workshops and seminars, support for visiting researchers and joint contracts.

SFU's Technology Licensing Office will attract new opportunties and promote research engagements with established and emerging sectors, through purposeful connections and communications. SFU will build on its successful 4D LABS model to bring diverse stakeholders from crosscutting sectors together to access its state-of-the-art infrastructure for advanced prototyping, rapid solutions and curiosity-driven discovery. In collaboration with the City of Surrey, SFU will strengthen activities to grow a community

of healthcare service providers, biomedical technology developers, and entrepreneurs to improve outcomes for patients, while supporting economic growth in the region. Through existing international networks and the support of SFU International, we will extend these collaborative models to a global setting and expand and strengthen the university's international collaborations.

Grow our open access, open data, and open innovation activities.

Reducing barriers to access first-rate information enables researchers to build clusters of excellence, invites public engagement on key ideas and helps entrepreneurs use data to drive innovation.

SFU is a trailblazer in open access and open knowledge initiatives. We will build on the Library's leadership efforts in the Public Knowledge Project (PKP)—a multi-university initiative developing open source software and improving the quality and reach of scholarly publishing—and in research data management to encourage and support the more efficient, faster dissemination of knowledge. In doing so, SFU can better support data management and access to maximize the use of a growing knowledge base.

With the addition of Canada's largest general-purpose university data system (Cedar) to our Data Centre, SFU will strengthen its already excellent collaboration with Compute Canada, bringing experience and knowledge of existing repository technologies and developing toolsets for indexing and parsing metadata from existing data repositories across Canada. SFU's focus on data access and data linkage, while respecting varying security and privacy protective requirements, will facilitate access to secondary data—including data sets, statistics, GIS and maps from providers such as Statistics Canada—for the academic community, and for its community, government and private sector partners.

Complementing these efforts is SFU Innovates, a university-wide strategy that supports open innovation where ideas are generated, tested and developed through collaboration and engagement. SFU's business incubation and acceleration programs will continue to support students and researchers by providing the space, mentorship, network and resources needed to take an entrepreneurial idea to fruition, leading to patented technologies and start-up and spinoff companies. Increasingly, these programs are becoming part of national and international networks. Through programs like VentureLabs®, RADIUS (RADical Ideas Useful to Society), Venture Connection®, Charles Chang Certificate in Innovation and Entrepreneurship, Beedie School of Business Invention to Innovation Graduate Program. SFU will continue to engage communities and challenge entrepreneurs to deliver innovative solutions that lead to real-world impacts.

At the heart of SFU research is the activity, creativity and mentorship of its faculty members.

Research is by its nature exploratory, leading to new discoveries, inventions and creative solutions that were once impossible.

3 Increase our impact on the national and international stage.

Impact is about how we can use our excellent research to collectively answer challenging questions. To amplify the effects of our work, we will:

Recognize and promote SFU research and scholarship.

Telling the story of research and its impact allows us to share transformative ideas with SFU's communities to generate excitement, create new connections, recruit top students and spark creativity to solve diverse challenges.

SFU will commit resources to better broadcast its research activities, celebrating its successes with the wider community, and publicizing its research and innovation expertise, infrastructure, and impact at the regional, national, and global levels. A growing research enterprise creates a growing research community, and a complex network of multi-sector and multinational collaborations. For that reason, sharing information is key to leveraging

existing strengths, maximizing the use of resources and facilities and recognizing excellence in valuable contributions and breakthroughs.

The contributions of SFU's researchers deserve recognition at the provincial, national and international levels. SFU's Institutional Strategic Awards will enhance recognition of research excellence and bring greater visibility to the achievements of our researchers and scholars by nominating highly meritorious researchers for major external awards. In this way, SFU can contribute to the national initiative to increase the recognition of Canada's researchers and research profile on the global stage.

Expand and refine metrics to measure our performance.

Identifying relevant and responsible metrics recognizes the diverse influence of research while engaging in a larger dialogue about what impact really means for research-intensive universities.

More than ever before, evidence-based decision-making has become paramount to organizational success and accountability. The availability of data and technological tools backed by sound methodologies enables an

examination of impact at the organizational level. Expanding our decision-making capability to benefit society and the economy means that a strategy must take into account meaningful interaction with and analysis of diverse data sets. Developing metrics, and evaluating performance and progress based on objective measurements, is key to operational transparency. It is also an effective tool for identification of new strengths and opportunities for improvement. By implementing a new research management platform, we will increase the accessibility of data to researchers, and streamline workflow across the research offices to improve the collection and reporting of metrics to the research community, university administration, funding agencies, the government and international partners. SFU will closely monitor its research performance using multi-dimensional indicators to provide an objective assessment of its output and contribution to the global research landscape. In doing so, the university will improve services to its researchers to make them more competitive for securing resources to grow their research programs and facilitate strategic partnerships with local and international peers.

Capitalize on emerging opportunities.

Remaining agile to take on new opportunities enables the university to continually connect its research strengths to new challenges, build clusters of strength and work towards high-impact and innovative solutions for society.

Research is by its nature exploratory, leading to new discoveries, inventions and creative solutions that were once impossible. The broad spectrum of research at SFU provides opportunities for training and expertise in emerging areas. Wide-reaching collaborations with industry and international organizations continuously challenge assumptions about the world, and create new opportunities and solutions, leading to discovery and innovation. By promoting interdisciplinary research and removing barriers for collaboration with leaders in emerging sectors, SFU remains responsive to new modes of engagement with stakeholders, where its researchers and entrepreneurs can make a difference across the spectrum of fundamental, applied and social sciences and the arts. ■

Implementation

SFU's Strategic Research Plan for 2016-2022 strengthens the university's leadership in research and knowledge mobilization through forward-looking strategic priorities. In order to effectively create and capitalize on strategic opportunities, SFU will continually assess its progress in meeting the goals of the Strategic Research Plan. In 2020-2021, SFU will develop and lead a community review process to assess how the university is meeting the goals of the Strategic Research Plan.