



RESEARCH PLAN



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Kwantlen Polytechnic University's (KPU) Research Plan is a bold new adventure that brings together applied research, experiential learning, and socio-economic innovation as central elements of KPU's mandate. The Research Plan integrates our core elements of teaching and scholarship with industry-supported applied research, innovative design and creative community partnerships. As a vibrant community of faculty, scholars, learners, and researchers we seek through this Research Plan to exercise the research-focused element of our mandate.

The Research Plan proposes four areas of concentration: Design Thinking, Sustainability Thinking, Clean Technology, and Healthy Communities. These themes respond to some of the most compelling issues of our time and signal a clear commitment by KPU to seek solutions through focused collaboration. The four areas propose innovative economic and social ventures that are action oriented and designed to catalyze new thinking, and new ways to solve problems by creating sustainable solutions. They support a series of strategies that link KPU to a range of industry and community partners in ways that provide further opportunities that support enriched learning experiences for KPU students.

KPU's community of faculty, scholars, learners and researchers is committed to working with our regional, provincial, and national governments and with industry partners to promote discovery, to cultivate innovation and to mobilize and share knowledge for the benefit of our collective communities.

KPU's Research Plan aligns with the strategic goals outlined in VISION 2018 Strategic Plan and Academic Plan 2018, and in doing so will direct our collective energies towards the fulfillment of our remarkable potential.

Salvador Ferreras, Ph.D.

Provost & Vice-President, Academic
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Promoting and Supporting a Culture of Discovery and Innovation

Since its formation in 2003, the Office of Research and Scholarship (ORS) has supported a broad range of research, scholarship, and creative artistry as an integral part of KPU's culture of teaching and learning, community engagement, and social innovation. The ORS has also advanced economic opportunities in the region through the promotion of industry-engaged applied research partnerships. These commitments remain core elements of this research plan, supporting a series of linked strategies through which experiential learning (teaching and learning) and discovery and innovation (research and scholarship) can come together in applied ways that are relevant to KPU's community, industry, and government partners.

The focus of the Research Plan is on enhancing support to research-active faculty and students, and finding ways to build infrastructure and expand institutional capacity. This focus recognizes and encourages both curiosity-driven research by individual scholars as well as applied research centred around institute and thematic clusters.

As a regional polytechnic university driven by teaching and learning, KPU is inspired by solving problems through research and engagement with communities of interest south of the Fraser River and beyond. The university is paying close attention to priorities being set by the rapidly growing municipalities in the region, emergent labour market demands, and the challenge of creating communities that are healthy, safe, prosperous, and sustainable. Our program priorities are intended to increase post-secondary participation, credential attainment, and career preparation and advancement to support economic and social development in our region.

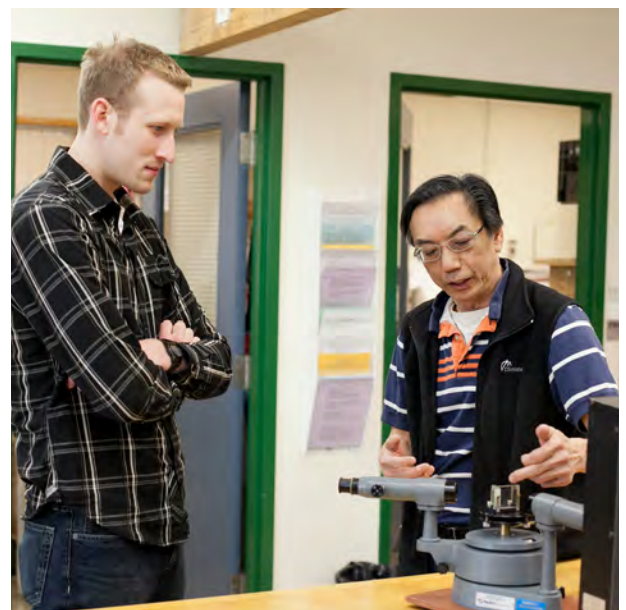
KPU's VISION 2018 Strategic Plan, identifies *quality, relevance and reputation* as the institution-wide goals that inform how research and scholarly activity will shape the characteristics of our polytechnic university mandate. Positioning this Research Plan where research and scholarship intersects with teaching and learning ensures alignment with the core institutional priorities of VISION 2018 Strategic Plan. Linking experiential learning with discovery and innovation, in practical and relevant ways, supports the strategic goals of the Academic Plan 2018:

1. To offer exceptional learning environments attuned to learners
2. To increase experiential learning opportunities
3. To define learning outcomes and methods demonstrating student capability
4. To ensure student success and well-being

KPU has always had a core of research-engaged scholars reflecting strong community engagement in departments such as psychology, criminology and sociology in the Faculty of Arts, as well as in the Faculties of Academic and Career Advancement, Health, Science and Horticulture, Trades and Technology, and in the Schools of Business and Design. A positive by-product of being a multi-campus institution is the opportunity to offer program concentrations with experiential learning tailored to the strengths and interests of the communities we serve. It connects faculty and students directly with economic and cultural leadership. The university's reputation as an active and committed community partner encompasses both curiosity-driven scholarship and applied research initiatives, and is celebrated through recognition by the Leading Edge Endowment Fund (LEEF), Canada Research Chair Program, and Royal Society of Canada recognition (kpu.ca/research).

This Research Plan identifies four strategic directions that align with VISION 2018 Strategic Plan and the Academic Plan 2018, and connects key communities of interest with KPU scholars and students:

1. Build intellectual and resource capacity around a mosaic of themes that transcend traditional faculty, departmental, and disciplinary boundaries.
2. Align with the strategic and academic priorities of the institution, and define a research culture that is responsive to our communities of interest.
3. Support the cornerstones of VISION 2018 Strategic Plan and the Academic Plan 2018 by promoting a culture of academic scholarship at KPU that aligns experiential learning with discovery and innovation.
4. Develop and support strategic partnerships that enable research clusters to collaborate with industry and community groups in developing innovative inter-disciplinary approaches to problem solving and community building in our region and beyond.



Across KPU, program concentrations and research clusters are being built to explore how innovations in technology and design can contribute to solving complex human problems. Areas of focus include sustainability thinking, design thinking, clean technology, and building healthy communities—the last two areas are in response to overtures from industry and community partners in the region. The program focus is both disciplinary and inter-disciplinary (including sustainable agriculture and horticulture, environmental protection technology, urban ecology, and public policy). The research clusters share common organizational characteristics: they have faculty champions and mentors, participation is open to current students and alumni, and there is representation from a broad range of community and industry partners. While most of these initiatives involve one or more aspects of teaching and learning, research and scholarship, and community engagement, they tend to operate without much overlap. This Research Plan calls for a more structured approach to transforming research and scholarship into action by integrating experiential learning directly with discovery and innovation.

The applied research focus is a response to the economic diversification that is shaping the KPU region, fuelled by advanced manufacturing, clean energy and related high tech industries, agri-foods and horticulture, health, FIRE (finance, insurance, and real estate), industries related to liquefied natural gas (LNG), hospitality services, and value chain support for the mining/resource extraction sectors. Engaging with these economic sectors will allow KPU to build and strengthen industry and community partners and be responsive to the factors influencing economic growth, while providing students and faculty with opportunities for experiential learning and applied research in real-world contexts.



The following diagram has been designed to highlight:

- Four major sectors of research and knowledge development (the inner quadrants);
- How research will be conducted (the darker grey segments around the outside).

The lighter grey segments around the outside of the diagram can be interpreted in two different ways.

1. From the perspective of faculty/mentors, they highlight the learning outcomes that emerge from the intersection of experiential learning and discovery/innovation with industry or community partners in real-world settings.
2. For students, they highlight the skills and outcomes that develop when engaging in applied research, which they will take with them as they enter the workforce.

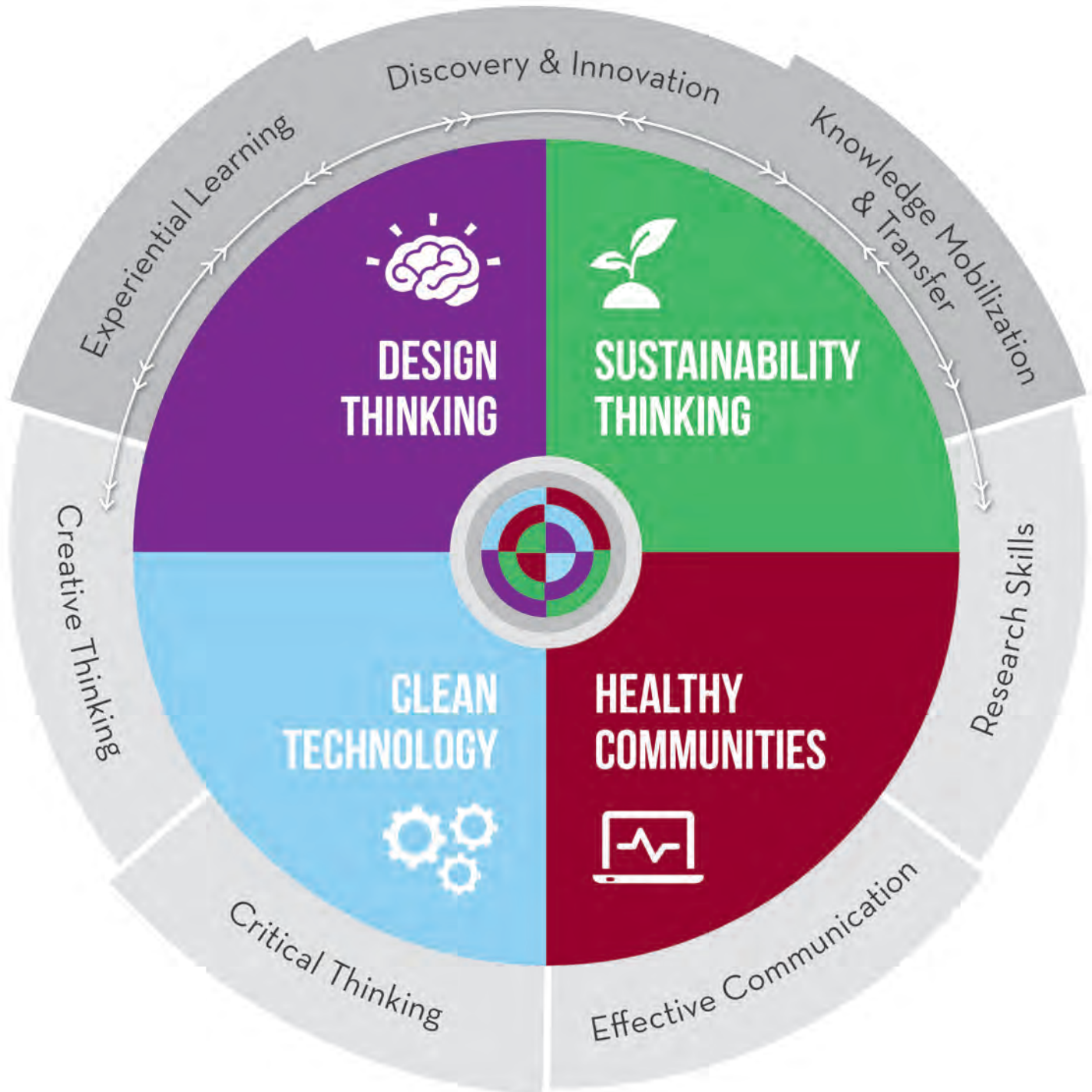
The diagram also identifies two areas of focus that advance this Research Plan beyond previous objectives:

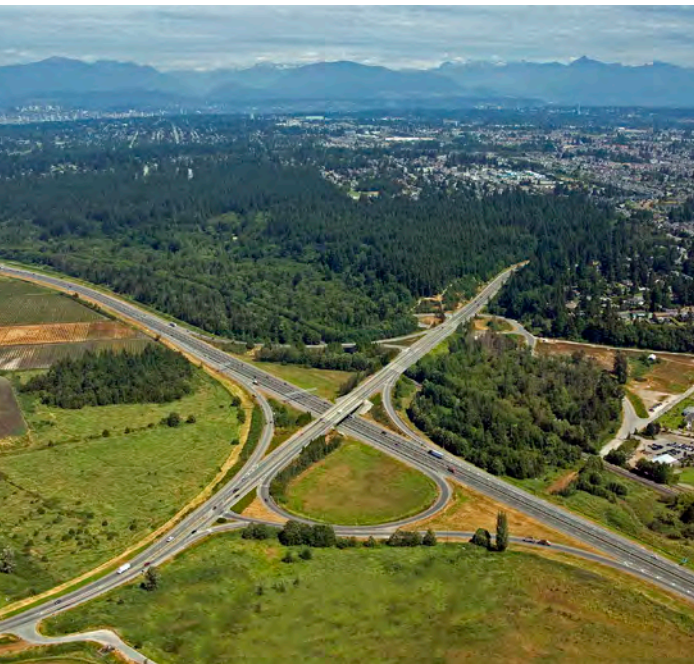
- A vision for research and scholarship at KPU that is fully aligned with the core teaching and learning priorities of the institution;
- A commitment to using knowledge mobilization and knowledge transfer to promote KPU's contributions to social innovation and transformation.

Taken together, the diagram and the descriptions that follow illustrate how research and scholarship contributes to the full realization of KPU's vision for teaching, learning, discovery and scholarship. While much is being done, there is considerably more to explore.



BUILDING KPU THROUGH APPLIED RESEARCH





Translating Research and Scholarship into Action

The Office of Research and Scholarship (ORS) is working with the deans, faculties and senior leadership to advance opportunities for promoting applied research with key industry and community partners, and incorporate experiential learning beyond the classroom. The overarching aim is to bring together the players, actions, and mechanisms needed to connect discovery and innovation with economic and social development. In response to external interest, KPU is working closely with industry and business to promote events and projects that will make the culture of research and scholarship more dynamic, and in the process, enhance the university's presence in the community.

Exciting opportunities are emerging through which KPU students will gain access to industry leaders in real-world contexts. This type of experiential learning will immerse students in new environments allowing them to develop key skills required to understand and contribute to designing solutions to complex problems. Acquiring knowledge and skills thus becomes both an input to their learning experience and an outcome of the learning process. As the following sections reveal, the industry partners will be able to engage with, and mentor, the next generation of the workforce and potential industry leaders.



Sustainability Thinking

KPU is emerging as a leader in British Columbia in promoting a range of sustainability initiatives in agriculture, horticulture, food systems, environmental protection technology, and public policies aimed at reducing unsustainable practices. In 2012 for example, the Faculty of Science and Horticulture launched a unique degree in sustainable agriculture adding to the growing suite of long-standing programs offered by the School of Horticulture.

KPU's focus on sustainability thinking involves interaction with, and is relevant to, municipalities, school districts, community NGOs, local small and medium-sized enterprises (SMEs), and the public at large. The university has two well-established applied research clusters—the Institute for Sustainable Horticulture (*ISH*) and the Institute for Sustainable Food Systems (*ISFS*)—that are making groundbreaking contributions

to our understanding of how to advance sustainable agriculture and food systems in BC and beyond. Several programs in Arts, Business, Design, Health, Trades and Technology, and Academic and Career Advancement have perspectives on sustainability embedded in their courses and reflected in the interest of faculty and students. Additionally, the highly regarded Environmental Protection Technology (*EPT*) program has been graduating students for several years into various “green” sectors of the economy.

Communities of interest who interact with faculty and students around issues of sustainability have access to a considerable and growing concentration of intellectual expertise and research capability. Through these interactions, students are gaining valuable real-world experience and potential pathways to careers during and after completing their KPU program. This strategic relationship between the academy and the community

is significantly reinforced through these authentic, co-creative opportunities.

As part of its long-term vision for an effective contribution of research and scholarship to the mandate of the university, the ORS will act as a catalyst for bringing together the various players who are developing courses, programs, research, scholarship and community-engagement initiatives on sustainability. The aim is to explore commonalities and distinctive characteristics when approaching issues and themes embedded in the concept of sustainability, and to articulate principles and concepts that define “sustainable thinking” at KPU.

Design Thinking

KPU has an established reputation for scholarly contributions to the social and cultural fabric of our communities through creative, fine and performing arts. Faculty, students, staff, and administrators on each of the campuses are regularly showcased and recognized for their artistic expression and contributions to their field of inquiry. The Chip and Shannon Wilson School of Design is committed to educating design leaders who can ethically transform diverse ideas, produce technology for innovation, and engage with design communities locally and globally. Scholars and creative artists within the Faculty of Arts (fine arts, music, creative writing, journalism, and interdisciplinary expressive arts) and other Faculties are being recognized well beyond KPU for their work and dedicated contributions to the community.

What might be broadly described as *Design Thinking* is being addressed at KPU in several disciplines and from a number of interdisciplinary perspectives. Design Thinking is reflected to varying degrees in the courses and programs on campus, as well as through the experiential learning and applied research projects occurring in the community. It encompasses a variety of methodologies and allows for the acquisition of a range of critical and creative skills.

The Research Plan broadens the conventional definition of design thinking to accommodate perspectives that are being developed at KPU where the goal is learning to design and the focus is placed on the value of the design process and skill development rather than just on an end product. In an age where information is readily available but quickly becomes

obsolete, design education at KPU encompasses processes that allow for analyzing and synthesizing information in innovative and creative ways to empower life-changing ideas. This new approach will encourage and support designers to seek solutions to complex human problems through a blend of theory and praxis that enables them to explore how technology and innovation can be used to challenge the limitations of current reality, and make new realities possible.

A growing number of potential industry and institutional partners are approaching KPU with requests to collaborate on initiatives that require innovative design solutions. The ORS is working with interested parties to identify how spaces on and off campus can become catalysts to support experiential learning for students, and applied research for faculty with industry or community partners.

At KPU, design holds a unique position. Its intrinsic characteristic (design thinking) has the potential to move us beyond the realm of physical objects. It provides a way of thinking and methodologies for understanding problems and investigating solutions in different ways. The Chip and Shannon Wilson School of Design's proposed *+Design, Centre for Creative Innovation (+D)* provides such a context (working title).

+D is an extension of the exciting changes being made to make the Chip and Shannon Wilson School of Design one of the top design schools in the world by 2024. A centre of excellence for innovation, applied research, and product development, *+D*'s infrastructure, space, and location will provide faculty,



students, and industry the opportunity to engage in the process of disruptive design thinking, creative exploration, idea transformation, strategic discovery, interdisciplinary co-investigation, and transformative enterprise, all of which are generally found outside of educational programming. This new reciprocal and reflexive relationship with educational programming will ensure that students, faculty, and industry engage in activities that extend foundational learning beyond the classroom and studio. It will provide the freedom to innovate.

+D will be a powerful learning enhancement tool and an incubator for discovery and innovation projects that align market needs with KPU knowledge and expertise. Through collaboration, mentoring, and partnerships with industry and end users, students will gain exposure to real-world design challenges in both virtual and physical spaces with supporting technical infrastructure and become effective humanistic designers whose experiences of *learning to design* will yield projects and products with deeper and broader positive sustainability impacts. It will also enhance opportunities for collaboration with other faculties and program areas.

Healthy Communities

Rapid population expansion and a concomitant growth in critical health care needs in British Columbia have created a pressing demand to bring together medical technologies, independent living technologies, and digital health technologies—with business and market expertise, clinical product development, and patient outcome solutions—to improve the health of individuals, and to build and sustain healthy communities across the region. A significant investment in research and development is being undertaken to understand and deploy health technology and to train more people in its use. This research will be a collaborative process involving multiple areas of expertise from the health sector, post-secondary institutions, and the private sector.

The City of Surrey has embarked on an ambitious strategic initiative—Innovation Boulevard—a health-technology oriented research and business corridor that will bring together leading health science practitioners, health service providers, and more than 180 health organizations in one square kilometre of Surrey City Centre. This new initiative will create a world-class hub to enhance patient care and boost economic growth. Health Tech Innovation (HTI), a space in the City Centre 1 building directly across from Surrey Memorial Hospital on Innovation Boulevard, will

bring together hospital, health care development, and key business services to quickly and effectively produce health technology solutions and products for market (e.g. medical technology and digital health accelerators) and integrate them into Surrey Memorial Hospital's suite of health and community care services.

KPU will join a network of health institutions, universities (UBC, SFU, and BCIT), and companies in HTI in 2015. Involvement in HTI will raise the university's profile in the community and provide access by researchers, students, and alumni to a range of research opportunities around the theme of building healthy communities. Exposure to real-world experiences in the health-care environment is a unique opportunity for KPU students and faculty to create innovative design solutions. Currently, KPU has some expertise in the health and life sciences areas, but the HTI space will give the university an opportunity to expand faculty and student access to hospital-embedded medical technologies, as well as technical and business expertise that can help commercialize research and development. The expansion of experiential learning and applied research opportunities at HTI will reinforce our polytechnic university mandate and strengthen KPU's presence in the health sector in the region.



HTI aligns with KPU's strategic, academic, and research goals by cultivating a supportive, collaborative, and exceptional learning environment that blends together relevant community engagement and academic expertise in order to explore concepts in community health, design thinking, and business concepts/skills. HTI allows KPU to draw faculty and students from across disciplinary boundaries into a systematic, structured, and cumulative approach where experiential learning can be integrated with applied research to build healthy communities in southwest BC.



Clean Technology

Clean technology is an emerging and dynamic sector of the British Columbia economy that is thriving, particularly in the areas of energy supply and storage, energy infrastructure and green building design, and energy efficient technologies. In 2011, BC's clean technology sector contributed over \$15 billion to the provincial GDP, employing 123,350 full-time equivalent workers.

Clean technology describes products and services that improve process efficiencies, optimize material resources and energy efficiency, reduce environmental pollution, and minimize waste. Research and development in this sector brings together innovations in science and technology with business acumen to address resource challenges, improve environmental conditions, and mitigate the impact of climate change. It typically explores one or more of the following areas:

- **Clean Energy**
- **Clean Water and Air Quality**
- **Clean Transportation**
- **Waste Management and Recycling**
- **Green Buildings**

The City of Surrey accounts for approximately 10% of BC's Cleantech sector, with approximately 40 companies located around the Surrey Fraser Docks, and in industrial zones close to the US border. The region's natural competitive advantage for clean

technology companies includes: its strategic location, low cost of business operations, a growing talent pool, and access to a robust supply chain, including business and academic networks.

Significant opportunities exist to expand BC's capabilities to develop clean technologies designed for water, air, and waste innovation. Water quality, waste management, and emissions reductions are fundamental industry needs that are currently underserved and have significant research and development potential.

KPU has a unique opportunity to position itself as Western Canada's top polytechnic institution with a focus on innovation in environmentally friendly practices and technologies associated with Canada's resource industry. KPU is making a significant contribution to the focus on job creation in sectors such as clean technology, health technology, and sustainability, which have been identified by the BC government. The university can leverage opportunities in the Cleantech sector based on existing and emerging programs that provide students with critical thinking and problem solving skill sets. KPU has the opportunity to take existing program offerings beyond the campus in order to create interdisciplinary learning and research opportunities for students, while preparing graduates for opportunities to work in SMEs in the Cleantech sector locally and regionally. Significant knowledge and research gaps exist in our understanding of how innovations in technology can be used to enhance clean air, clean water, and improve waste management strategies. KPU can substantially strengthen and broaden its program and research focus in these areas.



A partnership established between KPU, the City of Surrey, and Foresight Cleantech Accelerator Centre in 2014 will help build clean technology innovation in BC and beyond. Foresight CAC is a provincially funded, not-for-profit, structured venture acceleration program designed to help early stage Cleantech companies with guidance, networks, and experience. To date, BC Venture Acceleration programs, like Foresight CAC, have created 850 jobs and generated \$23.6 million in revenue.

The partnership between KPU, Foresight CAC, and the City of Surrey will create opportunities for faculty and students to work directly with BC's top clean technology innovators and business executives and will help accelerate KPU's ability to advance its objectives of:

1. Continuously improving the quality of teaching and research at KPU;
2. Increasing KPU's institutional reputation locally and internationally; and
3. Becoming a locally connected and globally relevant institution.

KPU has direct access to Foresight CAC's clean technology incubation space near KPU Surrey. Through this partnership, faculty and students can connect easily and quickly with industry leaders in this high growth sector. Alignment of relevant

KPU courses and programs (e.g. initially in business, design, science and horticulture) to Foresight CAC's *Challenge Dialogue* will expose students to a range of industries and experiences before graduation, and potentially to employment.

Collaborations developed through this partnership will help KPU faculties to align learning outcomes with skill sets being sought by industry and will generate and sustain an exchange process that involves both physical and intellectual capacity building. Current industries will have access to the next generation of employees, and through mentorship and funding opportunities, can support research and graduate studies for the next generation of industry leaders.

Working in the clean technology sector requires global systems thinkers who understand the complex relationships between the environment, economy, and people. Critical understanding (creative/critical/effective communication skills) and real-world immersion (spaces/praxis/experiential learning) will be augmented through interaction with current and ex-C-suite executives. Educators will be connected to communities of professionals where they can test new pedagogies and develop applied research agendas. Students will have direct access to innovators (industry and faculty) who are tackling global issues, and they can build and use their skills to explore next generation solutions. As this sector matures in the region, KPU with its partners can become a champion for innovation in clean technology, and a leader in Western Canada in advancing sustainable technologies and practices for Canada's resource sector.



Knowledge Mobilization and Knowledge Transfer

There is a growing trend among academic institutions to incorporate knowledge mobilization strategies (Kmb) into their applied research and community engagement. This includes creating compelling narratives that describe the diverse range of research and scholarship that universities are doing with community and industry partners.

The focus of Kmb is on the transformative impact of collaborations between non-commercial research and expertise in the public, private, and not-for-profit sectors. The work is often inter-disciplinary, technology-enabled, involves breaking new ground, and is heavily relationship based.

Knowledge Transfer (KT) allows for the results of these collaborations to be broadly exchanged and disseminated in the community as well as being a key source of input for the university to update and enhance teaching and learning.

This research plan proposes the creation of a robust and comprehensive knowledge mobilization strategy for KPU that is multidisciplinary and multi-sectorial, which builds a mosaic of inter-connected themes that transcend traditional faculty, departmental, and disciplinary boundaries. Elevating the

profile of research and scholarship through Kmb and KT strategies will help to advance the university's profile with government, industry, and community partners. It supports students by exposing them to real-world contexts to enhance their learning and provides real time opportunities for current and future employment.

KPU employs a variety of academic and social media outlets to showcase the curiosity-driven and applied research findings that form a major part of the university's Kmb and KT strategies in the design, sustainability, healthy communities, and social innovation fields. Considerable effort has gone into building partnerships within British Columbia by strengthening KPU's role in the BC Applied Research and Innovation Network (BCARIN), and across Canada through membership in ResearchImpact (a consortium of 14 universities committed to maximizing the impact of academic research for the public good and in support of global communities). The ORS is building profiles to highlight the KPU scholars and students, and broadly disseminating their work through our partners.



At the Confluence of Teaching and Learning and Research and Scholarship

KPU is committed to celebrate and showcase talented faculty and students, and to support efforts to enhance the university's reputation, increase enrolments, and attract and retain employees of the highest calibre. We are using new and well-established networks to promote partnerships between KPU scholars and external communities of interest. Within the university, we are looking to expand and improve strategies to encourage collaboration among faculty, and between faculty and students.

The ORS recognizes and supports research on the scholarship of teaching and learning as a legitimate and credible focus of scholarly activity within KPU.

ORS has refreshed its core mandate. The result is a renewed atmosphere of optimism and collegiality. We are committed to achieving positive results and making an impact through our collaboration with faculty and students. As a service unit of the university, the ORS is well positioned to showcase the talent of the researchers and scholars, as well as to support their efforts to produce creative work at the intersection of teaching and learning and discovery and innovation. The ORS is a place that encourages, facilitates and supports creativity and action; it is set up to be a catalyst for dialogues, strategic planning and collegial exchange around contemporary issues and research questions. We aspire to be acknowledged as a collaborative hub, portal, and network.

Considerable work remains to be done to realize this ambitious Research Plan. We need greater success in securing research funding. Specific issues relating to workload and governance are high priority (policies on intellectual property and commercialization, and on establishing and discontinuing research institutes are in progress). Details on how the Research Plan will intersect with the updated internationalization, teaching and learning, and strategic enrolment management plans have yet to be finalized, and important connections to KPU's strategies for enhancing aboriginal education will be proposed this academic year. Discussions continue with the key players on the merits of bringing the research institutes into the ORS as a capacity building strategy and a catalyst for peer support and mentoring.

Our vision for an effective and engaged ORS rests on several cumulative propositions:

- Research and scholarship is critical to KPU's credibility as a legitimate university.
- KPU is unequivocally committed to upholding the principle of academic freedom, and to celebrate the results of this kind of investment in our research and scholarship.
- The optimum role of the ORS is to support, promote, and showcase KPU's faculty and students in the pursuit of research, scholarship, and creative artistry.
- While specifics of the university's research endeavour are best determined and implemented through discussion among the community of scholars, the ORS has a strategic role to play in shaping answers to the question: *What is distinctive about KPU's contributions to solving complex human problems?*



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