

STRATEGIC RESEARCH PLAN

2016 – 2021



University
of Victoria



Dear colleagues,

The University of Victoria Strategic Research Plan, the first of its kind for the university, marks an important milestone in the university's ascent to being one of Canada's most research-intensive universities and a significant contributor internationally.

The Plan prepares UVic for a future in which there is tremendous opportunity to break new intellectual ground and make enormous contributions to society. The Plan also prepares the university for future excellence, knowing that the future also comes with resource constraints and heightening social expectations placed upon research universities—the new norm of international competition. Five priority areas and dozens of strategies and objectives have been identified for collective action.

We thank our campus community, and key funders and research partners, for contributing to the strategic research planning process. The development of this Plan involved extensive engagement and consultation, and the time and effort contributed by UVic's research community is gratefully acknowledged.

The contributions of the Strategic Research Plan Advisory Committee also deserve special mention. This committee was established to provide advice to the Office of the Vice-President Research on the development and implementation of the Strategic Research Plan process. The committee's dedication to the process and its invaluable advice are sincerely appreciated.

All of these contributions have created a Plan that will guide UVic's research mission in the coming years and support our researchers as they continue to push new ideas, discoveries and creations forward for the benefit of society and the world around us.

Yours sincerely,

A handwritten signature in black ink, reading "Jamie Cassels".

Jamie Cassels
President and Vice-Chancellor

A handwritten signature in black ink, reading "David Castle".

David Castle
Vice-President Research

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EXECUTIVE SUMMARY

The University of Victoria (UVic) is among Canada's most research-intensive universities, and occupies a unique historical, geographical and cultural niche in Canada. UVic has made significant strides forward in the breadth and depth of its research and social impact in recent decades. In the process, the university has developed unique capabilities for research and knowledge mobilization that are reflective of UVic's values and commitment to research. These guide the university's approach to remaining at the forefront of research excellence among international peers, and to being relevant to challenges facing contemporary society.

UVic researchers are global leaders, as demonstrated by the university's success in achieving international, national and regional recognition; in attracting external research funding including supports for research chairs; in showing vital impact through technological and social innovation; in providing research opportunities for undergraduates; and in training high-quality graduate students and post-doctoral fellows. This excellence is reflected in UVic's dynamic capabilities for research in areas as diverse as: culture and creativity; data science and cyber-physical systems; environment, climate and energy; global studies and social justice; health and life sciences; Indigenous research; ocean science and technology; and physical sciences and engineering, and mathematics and computer science.

UVic's Strategic Research Plan supports intellectual inquiry at its inception, enables the research projects and programs of faculty, staff and students and research partners, and sustains an environment that promotes excellence in research, education and training for the next generation of researchers and leaders. Future success for UVic research is predicated on having a clear sense of the organizational values to which the university is committed, understanding the competitive and changing landscape of research, and channelling existing research capabilities toward new opportunities for UVic researchers. By addressing the research needs and priorities of funders and partners in research, and attending to government priorities, UVic can meet society's need and demand for knowledge mobilized for maximum social impact.

At the core of this Plan are five priorities, and associated objectives and strategies, for enhancing and leveraging the best of UVic research:

DEFINING AND ACHIEVING
RESEARCH EXCELLENCE

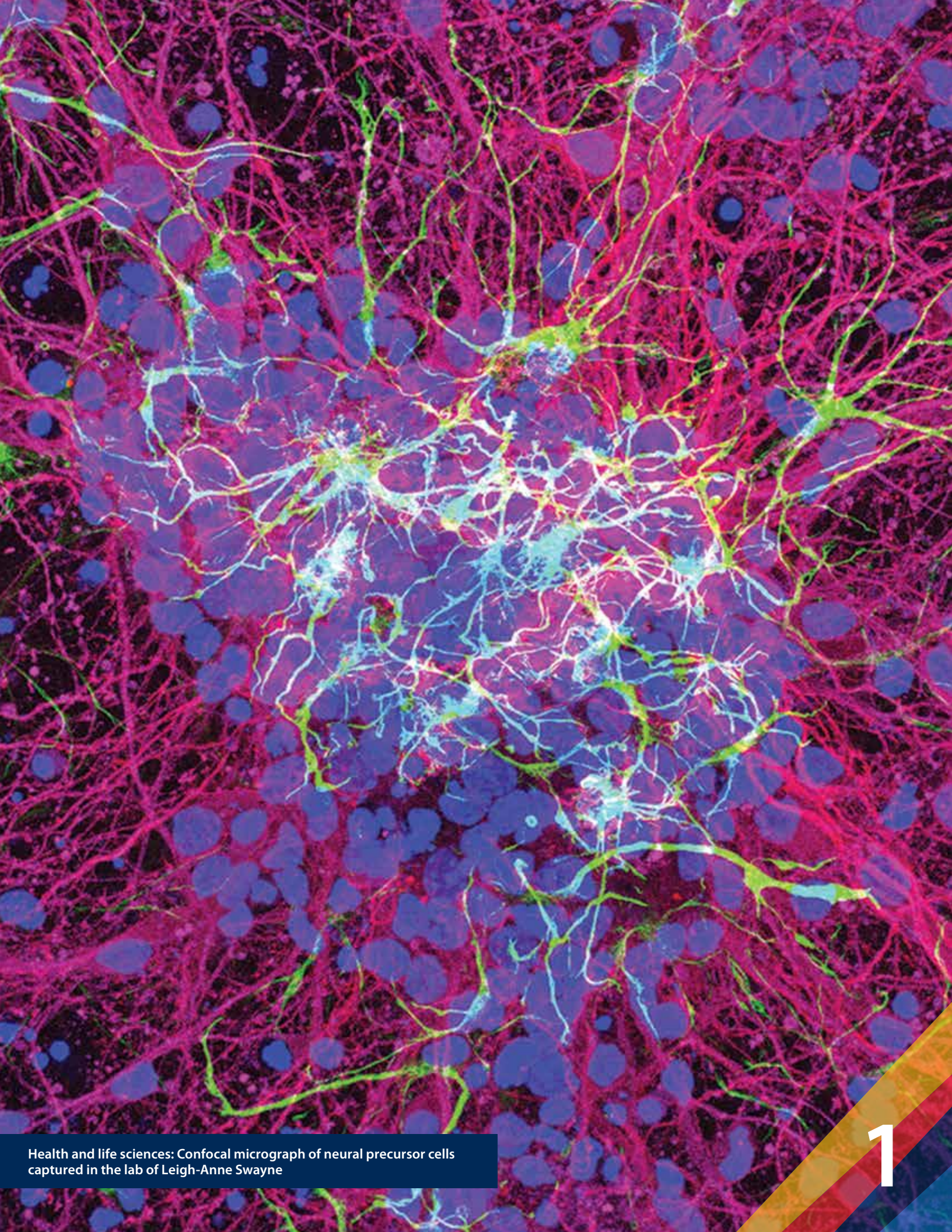
ENHANCING THE INTEGRATION
OF RESEARCH AND EDUCATION

EXPANDING PARTNERSHIPS,
INNOVATION AND ENTREPRENEURSHIP

IMPROVING RESEARCH COMPETITIVENESS
THROUGH DIFFERENTIATION AND SPECIALIZATION

ENHANCING AND OPTIMIZING
THE PROVISION OF RESEARCH SERVICES

These research priorities set directions for improving UVic's research environment and institutional support for research, with the ultimate aim of enabling current and successive generations of researchers to excel in research. With a view to implementing the strategies in this Plan, key objectives were developed to guide the development of annual implementation plans. Existing institutional planning processes and consultation mechanisms will guide implementation, and the timing and pacing of progress against the strategic priorities and objectives for research is subject to resource considerations over the five-year life of the Plan. By setting the course with high-level strategic priorities and by providing a way to see the priorities turned into actions, UVic will be able to achieve the research excellence, knowledge mobilization and impact on society required by the university's academic mission.



Health and life sciences: Confocal micrograph of neural precursor cells captured in the lab of Leigh-Anne Swayne

1 PURPOSE AND PURVIEW

The Competitive Landscape of Research

The high quality and dedication of UVic's faculty, staff, undergraduate and graduate students and post-doctoral fellows are foundational to UVic's research success. UVic has established its position as a leading research university in Canada by building upon its areas of established and emerging strength and by securing the support needed to sustain research growth. Constant improvement has yielded great results for UVic, as reflected in its dynamic capabilities and potential for future research success. By promoting the mobilization and application of knowledge for societal benefit, UVic continues to meet rising expectations about the role of research at Canadian universities.

Nevertheless, research is an intrinsically competitive endeavour and shifting priorities and needs create complex dynamics for any research university, including UVic. While research funding in Canada has plateaued over the last decade, the number of institutions competing for funding has increased markedly, creating a more competitive domestic market for research funding. Some long-standing funding programs supporting research infrastructure have ended without comparable replacements, and in other cases smaller awards are made or networks are funded for shorter terms. Detailed explanations about research (outputs and outcomes) have made funding applications longer and more complicated, and higher expectations in peer review processes drive competition between universities. With the rise of electronic media and new expectations regarding access to knowledge, as well as initiatives promoting an expanded range of options for dissemination, researchers face new challenges in their quest to mobilize new knowledge.

Changes to existing institutional funding programs, and the creation of new ones, have also reshaped the research landscape in Canada. An increased focus on research impact and collaboration, including partnerships and knowledge mobilization, is being witnessed across the research environment. Some research partners jointly coordinate specific calls for funding proposals—for example, Genome Canada and the Canadian Institutes for Health Research. In other cases, partnerships manifest themselves between universities and other sectors.

Research partnerships of all types are often predicated on leveraged or matched funding from different sources, a pattern that creates competition among universities for new types of resources. Funding agencies continue to support fundamental or discovery research, but even then there is an expectation that there will be downstream applications. These expectations shape and focus the social mission of universities as well as research collaborations, impact and innovation.

UVic must respond to—and take advantage of—this ever-changing and highly competitive research landscape by staying abreast of the changes and making strategic and tactical decisions. The Strategic Research Plan provides a consolidated strategic outlook based on institutional commitments and capabilities, and a basis from which the university can make strategic decisions to support the university's pursuit of research-intensiveness and research excellence. The Plan positions UVic as a responsive and nimble research-intensive university; enables prioritization and planning in response to new opportunities; and makes the most of existing resources in the pursuit of excellence in research, innovation and social impact.

“...[W]e must develop a research plan that addresses both the pressing operational needs for research support, and the strategic needs relating to areas of focus, partnerships, knowledge mobilization and community engagement.”

– President Jamie Cassels,
*Report to the University Community
on Campus Conversations, 2014.*

Research and the UVic Edge

UVic invests in all forms of research, scholarship and creative activity because they are integral to the substantial intellectual, technological, social and cultural contributions universities make to society. Over its five-decade history, UVic has emerged as one of Canada’s leading research universities and has achieved national and international stature, ranking among the top Canadian universities in terms of per capita research funding, and in the impact of its scholarly and creative work. The university’s commitment to research excellence underpins its academic mission by informing a broad array of disciplinary and interdisciplinary educational programs. Situated in an extraordinary academic, natural and cultural environment, UVic has an academic mission that integrates the vital impact of research within a culture of dynamic learning where teaching is blended with hands-on learning. These distinctive qualities give students the UVic Edge. The strength of UVic’s research and educational programs is directly related to the quality and dedication of the university’s faculty, staff, post-doctoral fellows, and graduate and undergraduate students. In all these ways and more, UVic’s research community is dedicated to shaping a brighter future for people, places and the planet.

Research Strategy in the Context of UVic’s Overarching Strategy

This five-year Strategic Research Plan is guided by, and serves to articulate, the three high-level objectives for research outlined in UVic’s 2012 Strategic Plan—*A Vision for the Future: Building on Excellence*. The vision set out by this overarching strategy is:

...to be a university of choice for outstanding students, faculty and staff from British Columbia, Canada and the world. We aspire to be the Canadian university that best integrates outstanding scholarship, inspired teaching and real-life involvement. As members of a diverse and dynamic learning community, we challenge one another to become thoughtful, engaged citizens and leaders, prepared to contribute to the betterment of a rapidly changing global society.

The three high-level objectives for research associated with this vision are:

OBJECTIVE 21:

To nurture our culture of excellence in research, scholarship and creative endeavours, enhancing UVic's local, national and international impact and reputation as a leading, innovative, research-intensive university.

OBJECTIVE 22:

To promote greater alignment of our research, educational and support programs, so that we can optimize the benefits derived from our investments in people, systems, infrastructure and programs across the university.

OBJECTIVE 23:

To enhance the social benefit derived through mobilization of research knowledge and creative endeavours from across the disciplines.

The associated UVic research mission is:

... to benefit society through the advancement and application of knowledge, innovation, creative and artistic expression, and the creation of research-inspired educational programs.

This Strategic Research Plan enables UVic to build on its research success while being prepared for future opportunities in an increasingly competitive and globalized research environment. The Plan describes UVic's unique combination of history, geography, attributes and abilities, and scopes out how best to support researchers in their ongoing pursuit of research excellence.

The Plan advances UVic's research mission by: articulating the university's commitment to research (§2); describing UVic's dynamic capabilities for undertaking research (§3); providing strategic priorities for bolstering research at UVic (§4); and developing annual implementation plans to support the realization of these priorities and objectives (§5).



2 UVIC'S COMMITMENT TO THE VITAL IMPACT OF RESEARCH

In addition to possessing a wide range of dynamic capabilities for research, discussed below in §4, UVic is known for its commitment to a set of organizational values that inform how individuals and the university as a whole strive for excellence in research and mobilize knowledge to benefit society. These values are reflected in the university's Strategic Plan, *A Vision for the Future: Building on Excellence*, in the *President's Report to the University Community on Campus Conversations*, and more recently in the UVic *Edge*. While contributing significantly to the strength of the UVic research enterprise as a whole, these values inform UVic's identity as a research-intensive university through research communications, emphasizing UVic's unique character, contributions and impact that differentiate it from other universities nationally and globally.

Excellence in Research

As one of Canada's most research-intensive universities, UVic consistently performs well in the top national and international ranking systems. At the core of research excellence is a commitment to the fundamental value of freedom of inquiry. Excellence in research is driven by pure curiosity, designed to respond to a specific problem, seeks to expand the boundaries of creative expression, and covers the whole spectrum of knowledge generation.

Discovery, Creation and Invention

Canadian society expects publicly funded universities to contribute expertise, ideas and solutions to economic, social, cultural, technological and environmental challenges. Leveraging insights, discoveries, inventions and creativity into outputs provides tangible benefits to society. UVic provides its researchers with

the tools, resources and access to experienced professionals and mentors to help move ideas, discoveries, creations and inventions forward to create vital impact.

UVic values and excels at innovation in all its forms and has been described as one of Canada's most inventive universities in a report by The Impact Group in 2012.

UVic's commitment to excellence in research *foci* and methodologies is matched by its commitment to seeing research put into use by inventors, entrepreneurial faculty, staff and students, all for the betterment of society.

Community-Engaged Research

UVic has an international reputation for excellence in community-engaged research, and the university's long-standing commitment is reflected in institutional policies and organizational supports for this form of research, from local to international. By working together, the university and local, Indigenous, regional and more diffusely constituted communities identify research priorities and co-develop research projects. Community-engaged research combines experiential learning and research together with a culture of effective knowledge mobilization and the desire to be a good citizen and neighbour. The areas of focus for community-engaged research at UVic are broad and deep, from understanding the lives of the homeless, to working with local school districts to chart children's learning, to mapping community natural, cultural and sustainable resources. UVic has a long-standing and

overt commitment to the social, cultural and economic advancement of its many partnering communities, and is particularly engaged with Indigenous communities. As exemplified by the extensive engagement with Indigenous communities, many of which are increasingly proactive about their own research agendas and capacity building, UVic research is optimally positioned to contribute to and enhance the potential benefits of the reciprocal shaping of universities and communities through community-engaged research.

Research-Inspired Educational Programs

The culture of a research-intensive university, and related research activity, enrich the educational experience for students by creating intellectual vibrancy and research-inspired learning opportunities. UVic's academic mission is premised on a commitment to suffusing every educational program offered by the university with relevant research. Sustaining research-inspired educational programs at UVic requires careful planning and involves aligning faculty recruitment with research and educational priorities, and aligning research and educational programs. Every student at UVic—whether studying on campus or by distance learning—should have opportunities to be exposed to the intellectual stimulation of a research-intensive university, engage in research and learn research skills.

The highly successful Jamie Cassels Undergraduate Research Awards (JCURA) support mentored research experiences for exceptional undergraduate students in every discipline.

Inspiring educational programs with research is a core UVic value. Every student is encouraged to develop research-related aptitudes. Students learn how to be focused and inquisitive, take initiative, solve problems, acquire and organize information, analyze and communicate, and pursue continuous learning. Research-inspired educational programs can take many forms. For example, each year thousands of students participate in on- and off-campus experiential learning via practicums, field trips, extra-curricular team activities, internships and UVic's co-op program, with many of them participating in some type of research.

UVic undergraduate students are also encouraged to apply for external research awards such as those funded by the Natural Sciences and Engineering Research Council (NSERC).

International Research

As an internationally engaged research university, UVic is at once locally relevant and globally significant. This international focus infuses the work of every faculty and research centre on campus, resulting in hundreds of state-of-the-art research projects and partnerships with links to virtually every continent on the planet. These partnerships are addressing some of the social, economic and environmental challenges most relevant to the world today. UVic's Strategic Plan calls for a robust international research strategy. During the strategic research plan engagement process it was made clear that UVic needs to be strategic in its approach to internationalizing research, provide its students with a range of international research opportunities, and offer enhanced administrative support for international collaborations.



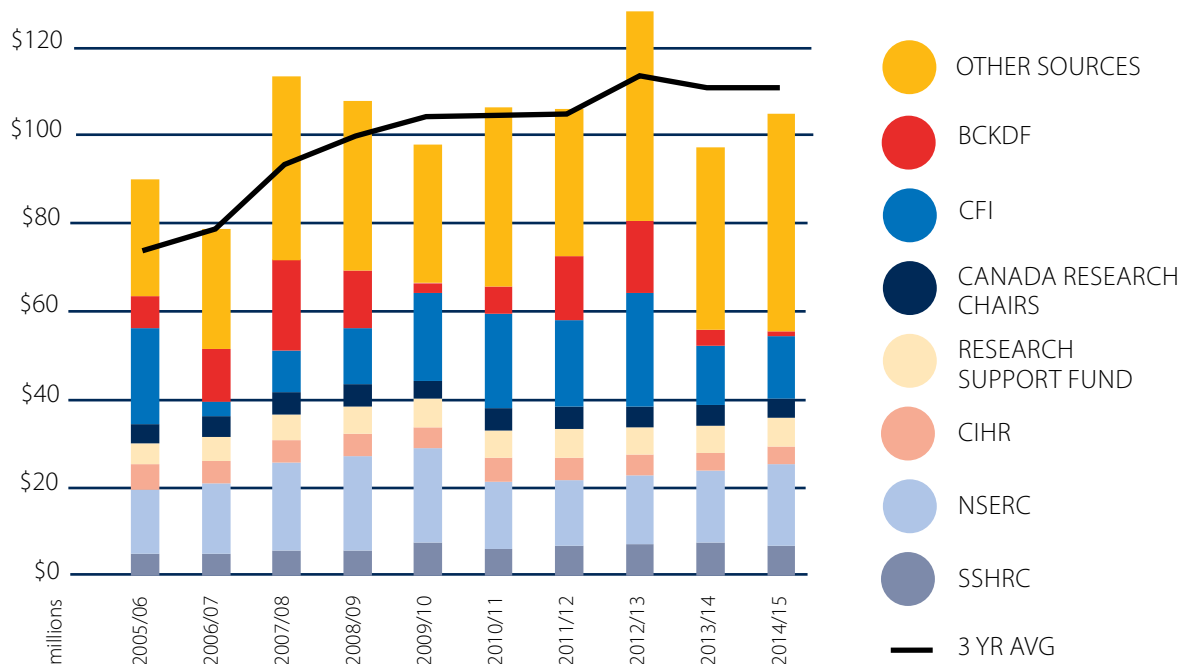
3 DEMONSTRATED RESEARCH EXCELLENCE AT UVIC

Research excellence, as defined more fully below in §5, refers to the complex processes by which important new knowledge develops fully and holds the potential for significant social impact.

Research Funding Success

UVic has experienced a steep trajectory for research income growth over the past 15 years, from approximately \$31 million in 2000-01 to \$112 million in 2007-08, and thereafter an annual average of over \$100 million. From 2009 to 2014, funding to UVic from the federal tri-council agencies (Natural Sciences and Engineering Research Council of Canada (NSERC), Social Sciences and Humanities Research Council (SSHRC), and Canadian Institutes for Health Research (CIHR)) has grown steadily. At the same time, UVic has continued to see growth in a wide range of other funding sources, including sectors such as government agencies, non-governmental organizations and industry. Funding from these sources now makes up half of UVic's research income, with annual variations attributable to cash flow variations in large infrastructure projects.

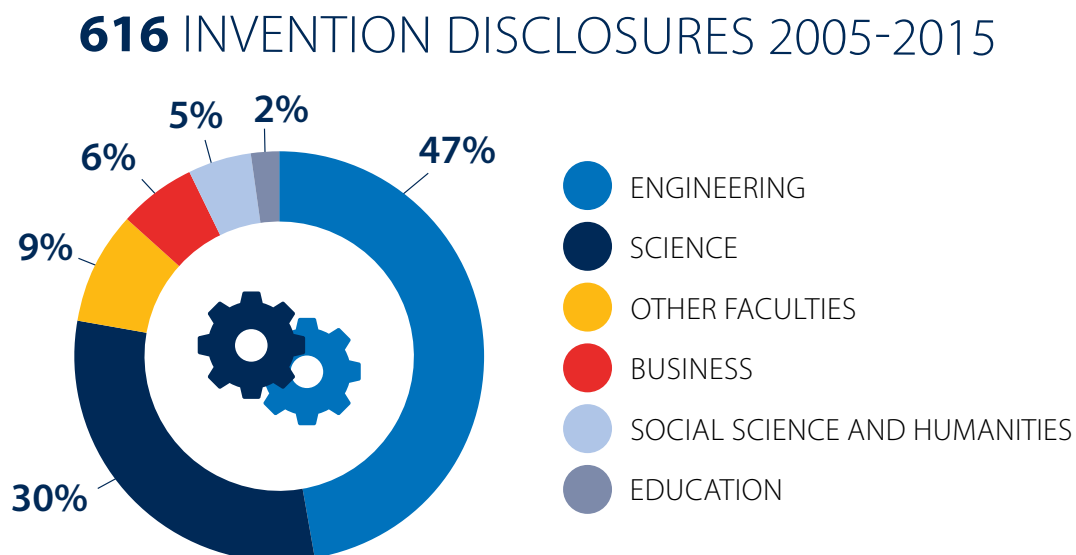
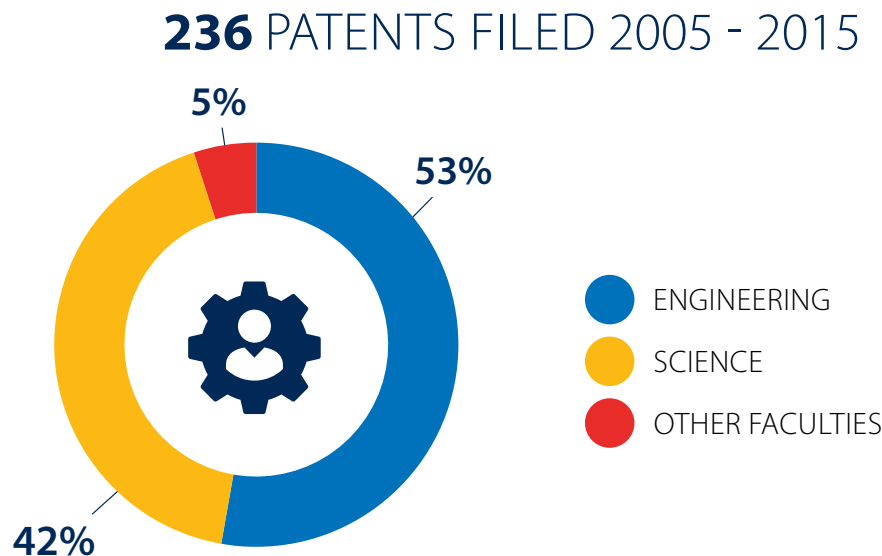
Figure 1: UVic Total Research Income 2005/06 – 2014/15



Innovation

UVic contributes to the local, regional and national economies through technological and social innovation. The university's Research Partnerships and Knowledge Mobilization (RPKM) unit, operating under the Office of Research Services, handles all industry liaison, contracts, community-engaged research, and knowledge mobilization services. RPKM's mission is to deliver high-quality services to the UVic community, particularly to attract research funding for programs, engage communities in research partnerships, and raise UVic's national and global profile. To date, UVic has had nearly 900 invention disclosures, averaging over 60 annually. The university has also filed more than 400 patents while maintaining an ongoing portfolio of just over 100 patents, managed through UVic Industry Partnerships. Most of these disclosures, filings and companies are created for the faculties of Science and Engineering, as indicated in Figure 2 below.

Figure 2: UVic Inventions Disclosures and Patents Filed 2005 – 2015



For the decade preceding 2012, UVic created 60 companies, and in the last three years has worked with UVic's Innovation Centre for Entrepreneurs (ICE) to incubate an additional 20 start-ups that are in various stages of commercialization. The Alacrity Foundation created an additional four companies via the Faculty of Engineering, with the support of industrial partner Wesley Clover. Some of these companies have been incubated alongside other innovative tenants at UVic's Vancouver Island Technology Park, British Columbia's largest integrated technology park. UVic is an associate member of Mitacs, a national, not-for-profit organization created to design and deliver research and training programs in Canada. With \$5.5 million in funding from Mitacs over the past 10 years, UVic and Mitacs have trained future researchers and built partnerships that support industrial and social innovation in Canada.

RPKM supports social innovation through its work in community partnerships. In 2014/15, for example, RPKM logged more than 900 discrete actions, ranging from information provision and referrals to hosting and attending meetings that support community-engaged research and knowledge mobilization. RPKM supports relationship building with a wide range of external partners including: not-for-profit organizations, the provincial government, other post-secondary institutions, and Indigenous governments and organizations. All of UVic's faculties and research centres maintain their own vigorous relationships with community partners, and RPKM provides further supports where appropriate to facilitate partnerships, particularly with the faculties of Social Sciences, Human and Social Development, and Education, as well as the Peter B. Gustavson School of Business and the Division of Continuing Studies.

In the Rankings

UVic is consistently ranked as one of Canada's leading research universities by external surveys and rankings and has had significant rankings success over the past five years. Although each ranking system is built to favour different performance metrics, placement at or near the top in a wide range of competing evaluations confirms that UVic's research is at the leading edge of discovery.

National recognition and Canada Research Chairs

UVic has been named a Canadian ReSearch Infosource "Research University of the Year" for 12 of the past 13 years. UVic ranked second in Canada for number of medical/science grants per 100 full-time faculty members and third in Canada for CFI cumulative funding from inception of the funding program to 2014 per full-time faculty member (as measured in 2011 when data was last available). Success in securing funding from the Tri-Council funders is reflected in UVic's seventh-place ranking in Canada for NSERC and CIHR grants measured by the size of grant per eligible faculty member. This is a particularly impressive outcome given that UVic does not have a medical school, which typically attracts higher per capita levels of research funding.

UVic currently holds [38 Canada Research Chairs](#) (CRC), the holders of which are conducting research in engineering and the natural sciences, health sciences, humanities, law and social sciences. UVic's success rate with CRC nominations is 98 per cent compared with the national average of 83 per cent. UVic was also the winner in 2012 of the inaugural Canada Research Chair Equity Recognition Award for exceeding equity targets for chairholder representation by women, visible minorities and Indigenous peoples.

International recognition

UVic's recognition in *international university rankings* has improved over the past decade. In 2015 UVic placed among the top 250 universities worldwide in the Times Higher Education (THE) World University Rankings. As a relatively young institution, this success was recognized in 2012 and 2013, when THE ranked UVic 11th and 20th globally (respectively) and first in Canada among universities less than 50 years old. From 2010 to 2014 inclusive, THE rankings had UVic first in Canada overall for a university without a medical school. Every year since the inception of the Leiden University Rankings in 2011, UVic has been recognized for the highest proportion of internationally co-authored research of any Canadian university. Leiden's 2015 rankings place UVic science and engineering first overall in Canada for a university without a medical school. Using

bibliometrics, the Leiden rankings place UVic third in Canada overall for scientific impact, and first in the broad fields of mathematics and computer science, and physical sciences and engineering. UVic placed fourth overall in Canada for collaboration. The 2015 QS Subject Rankings rank UVic at world-class level in 29 of 36 subject areas—and in the top 200 internationally in six subject fields: English language and literature, Earth and marine sciences, geography, law, philosophy, and psychology. In the 2014 Thompson Reuters Highly Cited list, UVic was tied for fourth in Canada with five researchers included, representing the top one per cent of most-cited researchers for their subject field and year of publication.

1ST

Leiden University Rankings – from 2011-2015 UVic ranked 1st for the highest proportion of internationally co-authored research of any university in Canada

TOP 200

QS Subject Rankings – in 2015 UVic is ranked at world-class level in 29 of 36 subject areas, and in the top 200 internationally in six subject fields: English language and literature, Earth and marine sciences, geography, law, philosophy, and psychology

201- 250

Times Higher Education (THE) World University Rankings – in 2015 UVic was ranked in the 201-250 category

External Research Awards

Celebrating the success of the UVic research community and communicating widely about that success is fundamental to UVic's culture of research excellence. Internally, the Office of the Vice-President Research recognizes research achievements across campus through the annual Craigdarroch Research Awards. External award nominations are made on recommendation to the president via the President's Advisory Committee on External Awards. The university's awards facilitator supports the development of candidates' dossiers in collaboration with faculty and academic units. National and international recognition reflects the quality of UVic's people and programs, and strengthens the university's reputation as one of Canada's leading research-intensive universities, which in turn attracts other leading researchers and funding. Figure 3 includes some of the national and international awards that UVic faculty members have received over the past decade.

Research Infrastructure

UVic has a decades-long, strong track record in the development, governance and management of large scientific platforms. Over the past 15 years UVic has excelled at securing research infrastructure funding from agencies such as the Canada Foundation for Innovation (CFI), Western Economic Diversification Canada, and the British Columbia Knowledge Development Fund (BCKDF). The total funding from those agencies since 2000 is almost \$300 million, leading to a sixth-place ranking in Canada for CFI funding per faculty member. UVic's faculty have a 92 per cent success rate in the CFI John R. Evans Leaders Fund awards competition, compared to the national average success rate of 79 per cent.

Figure 3: UVic's National Research Awards



UVIC'S EXTERNAL RESEARCH AWARDS: 2005 – 2015



UVic's infrastructure funding success has led to extensive growth in research infrastructure on campus and at associated facilities, including notable examples such as:

Oceans research including Ocean Networks Canada's NEPTUNE and VENUS observatories and many oceans-related projects (\$133 million);

The Advanced Rare IsotopE Laboratory (ARIEL) at Canada's national laboratory for particle and nuclear physics, TRI-University Meson Facility (TRIUMF) (\$76 million); and

The Centre for Advanced Materials Technology (CAMTEC) infrastructure which includes the Scanning Transmission Electron Holography Microscope (STEHM) and the Prometheus Project (\$16 million)

In recent years UVic has implemented a project management system for the largest and most complex research infrastructure projects, recognized by CFI as a best-practice model.

Research Centres

The university has a variety of research centres that respond to emerging research opportunities, promote collaborative and interdisciplinary research, and enhance research networking capacity and infrastructure. Their mandates range from a disciplinary focus within a single academic department, to centres that are inter-institutional in nature. Centres are also tasked with providing education and training in research and related skills through seminars, workshops, and non-credit courses for students and professionals in partnership agencies. Centres take a leading role at UVic in forming external partnerships in Canada and throughout the world, and mobilizing knowledge. The research activities of UVic research centres contribute significantly to the university's research capabilities, and a number of them are highlighted in §4 of the Plan. Centres that have received approval from UVic's Board of Governors and Senate receive a variety of financial administrative supports.

Graduate Students and Post-Doctoral Fellows

Graduate students and post-doctoral fellows are at the core of a research-intensive university. They make critical contributions to the university's research enterprise in labs, in the field, in local communities, in theatres and auditoriums, and in clinics. Over the past seven years, graduate students at UVic have consistently brought in over \$5 million per year in research funds through national scholarships, and there are roughly 250 active national scholarship holders each year. UVic is notably successful in the Vanier Canada Graduate Scholarship program, the most prestigious of the tri-council scholarship programs that aims to attract and retain world-class doctoral students. In 2013/14, UVic received five of the 165 Vanier scholarships awarded nationally (each worth \$50,000), and another five students were awarded scholarships in 2015/16. UVic's research-inspired learning environment and wide range of experiential learning opportunities prepares students to develop new ideas and solutions for addressing economic, social, cultural, technological and environmental questions, opportunities and challenges.



Data science and cyber-physical systems: Drone from the lab of Yang Shi, named by Thomson Reuters in 2014 as one of the top one per cent most cited researchers in his field in the world

4 UVIC'S DYNAMIC RESEARCH CAPABILITIES

UVic has unique and defining attributes, including its organizational history as a former college of McGill University and early affiliation with the University of British Columbia, its location as Canada's westernmost research-intensive university on an island in the Pacific Rim, and its unique cultural milieu especially among Indigenous people but also with a diverse professoriate and student body. As a research-intensive university, UVic has invested in faculty, staff and students, infrastructure, space and the development of institutional policies and procedures for research. Taken together, these resources reflect UVic's accumulation of research expertise and achievements. UVic has developed highly specialized research capabilities that allow the university to generate, absorb and apply new knowledge from insights, inventions and discoveries. These capabilities are dynamic since they empower UVic to anticipate and exploit new opportunities while remaining competitive. This section discusses a number of UVic's capabilities—described as clusters of research excellence that have ensured UVic's success as a research-intensive university, and that provide a strong platform for future successes. The clusters outlined in this Plan originated from, and have continuity in some cases with, strengths outlined in UVic's 2012-15 CRC and CFI Strategic Research Plan. Through the Strategic Research Plan engagement process, these strengths were discussed to

test and validate their continued relevance, and were updated to include newly emerged capabilities using the described criteria below (which are not in a ranked order). Further alignment of the Plan with the Enhanced Planning Tools will establish a set of common, comprehensive, longitudinal measures of research achievement and capabilities.

Criteria for determining areas of dynamic research capability:

- **Research excellence**, as recognized through external peer review, nationally and internationally, and including citations, rankings, and external awards;
- **Significant investment** that has been made, or is expected, by the university, its funders or research partners;
- **Selectivity in infrastructure investments** aligned with research capacity;
- **A critical mass of researchers** at the university that fosters the growth of leading edge disciplinary or interdisciplinary research through national and international collaborations and partnerships;
- **Responsiveness to community** needs and evidence of significant benefits returned, resulting from research on/with those communities;
- **Competitive or comparative advantage** over other universities; and
- **Connections** to graduate or undergraduate education and training.

The eight areas of dynamic research capability at UVic are: creativity and culture; data science and cyber-physical systems; environment, climate and energy; global studies and social justice; health and life sciences; Indigenous research; ocean science and technology; and physical sciences and engineering, mathematics and computer science. They are all outlined in more detail below.

Creativity and Culture

Creative arts and culture play a vital role in promoting civic engagement and global citizenship in sustainable societies at the local, regional, national and international levels. Arts and culture are spheres of engagement that are becoming increasingly interdisciplinary, inter-institutional, and international. In a world that is increasingly aware of its cultural diversity, prosperity depends on working across cultural differences, collaborating, translating and representing cultures to one another, and developing viable social, legal and political structures.

Creative and cultural research at UVic includes a broad cross-section of researchers, drawing expertise from the Faculty of Fine Arts (music, writing, visual arts, theatre, art history and visual studies), Faculty of Humanities (history, philosophy, Indigenous studies, English, French, Germanic and Slavic studies, Greek and Roman studies, Hispanic and Italian studies, linguistics, medieval studies, religious studies, Latin American studies, and Pacific and Asian studies), Faculty of Law, Faculty of Human and Social Development, Faculty of Education, Faculty of Social Sciences (sociology, political science, psychology and anthropology) and the Faculty of Engineering (computer science). UVic is also home to a number of centres and research groups including the Centre for Studies in Religion and Society, the Centre for Asia-Pacific Initiatives, the Centre for Global Studies, and the Consortium on Democratic Constitutionalism.

As the only university in British Columbia with a freestanding Faculty of Fine Arts, and as one of very few across Canada, UVic is a leader in creative innovation and arts knowledge (defined as knowledge creation and use, and training in the fine and performing arts). UVic's well-developed capabilities in Indigenous studies, religious diversity, global engagement, questions of nationhood and equality, and linguistic diversity have situated it well to address the challenges and opportunities associated with cultural difference and interaction. UVic has two endowed chairs and two Canada Research Chairs focused on issues related to the creative arts and culture (philosophy and political science). UVic faculty have been recognized nationally for research excellence in these areas with prestigious awards, including: Governor General Awards in the Visual and Media Arts and in Literature; Trudeau Foundation fellowships; Royal Society of Canada fellowships, medals and membership in the College of New Scholars, Artists and Scientists; and the Order of Canada.

Data Science and Cyber-Physical Systems

Data acquisition was once one of the biggest hurdles for researchers, but now ease of data generation, storage and access creates enormous new research challenges. Large volumes of structured or unstructured data need analytics to extract meaningful patterns and relationships. Data science has emerged as an important field in its own right, and enables other fields of research such as climate science, oceanography, physics and digitally based research in the humanities and social sciences. UVic has outstanding research capabilities and expertise in the field of cyber-physical systems including: computing; networked control systems; adaptive systems; energy systems; smart oceans technologies; assistive technologies and medical care monitoring, including elderly care; transportation and mobility; autonomous systems; smart materials; and wearable devices.

With new investment from CFI, UVic has been chosen as one of four hubs across Canada for advanced research computing which increases 13-fold the university's resources for cloud research computing capacity. The initial allocation of 5.5 petabytes of storage is 5,500 times that of a typical home or office computer, and will be installed in the university's existing data centre.

UVic has a number of groups and platforms on campus that reflect the institution's capability in these fields. One of UVic's faculty members in this area of research is recognized in the 2014 Thompson Reuters Highly Cited list, representing the worldwide top one per cent of most highly cited researchers in his field for networked control systems. UVic is also home to: an internationally significant interdisciplinary group working on digital humanities and arts; Ocean Networks Canada's data management system, Oceans 2.0; contributions from the Department of Mathematics and Statistics and the Department of Computer Science to biostatistics work in health and life sciences; and a broad range of researchers from across campus working on cyber-physical systems.

Environment, Climate and Energy

UVic's research on climate, ecology, terrestrial and atmospheric environmental science, and energy systems is focused on the search for innovative new approaches to living within planetary boundaries and restoring and protecting biodiversity. The university has a longstanding reputation for excellence in marine and terrestrial conservation and restoration, ecological and biological research, and sustainable human practices. Expertise is drawn from a broad cross-section of researchers from the Faculty of Science (earth and ocean sciences; biology; physics and astronomy; and mathematics and statistics), Faculty of Social Sciences (anthropology, environmental studies, geography, political science and psychology), Faculty of Engineering (mechanical and civil engineering), Faculty of Law (Environmental Law Centre), Faculty of Education,

and the Peter B. Gustavson School of Business, and is complemented by research in other areas such as public education and public administration. UVic researchers are working with governments, industry and community groups to find effective public policy and technological solutions to address the challenges posed by climate change and interactions between various Earth systems.

UVic has leaders in research on climate modelling, climate change mitigation and adaptation, development of sustainable energy systems, and the human dimensions of climate change. Two Canada Research Chairs focused on issues related to environment and climate, and one on energy systems design. Many researchers have been recognized nationally for research excellence in this area with prestigious awards such as the Steacie Prize and fellowship in the Canadian Academy of Engineering, as well as Trudeau and Royal Society fellowships. Three of UVic's faculty members in the areas of clean energy systems and climate science were recognized in the Thompson Reuters Highly Cited list for 2014, representing the top one per cent of most-cited researchers, for their subject field.

Research in this area is facilitated and supported by faculties, departments and a number of centres, labs and entities including: the UVic-led Pacific Institute for Climate Solutions; the Pacific Climate Impacts Consortium; Environment Canada's Canadian Centre for Climate Modelling and Analysis, and Water and Climate Impacts Research Centre (both located on campus); the Centre for Forest Biology; Ocean Networks Canada; Bamfield Marine Sciences Centre; and the Institute for Integrated Energy Systems.

Global Studies and Social Justice

As an agent in a world facing enormous socio-political and ecological challenges, UVic is committed to employing its research strengths and capacity to benefit external communities, promoting civic engagement and global citizenship, and valuing equal rights and dignity for all persons. UVic's researchers also explore

the forces that are precipitating globalization, and are identifying its political, social, cultural, economic and environmental implications. Their research is providing critical (reflective and reflexive) perspectives and methodologies on these challenges and on the possibilities for understanding and renewing conceptions of freedom, equality, injustices and inequalities.

Global studies and social justice research at UVic involves faculty from a broad cross-section of disciplines, drawing expertise from the faculties of Humanities, Fine Arts, Social Sciences, Education, Human and Social Development, Business, and Law. Areas of research include governance, politics, international law and trade, public management, women's and gender studies, cultural inquiry and social policy analysis. UVic has clusters of significant research capability in the Centre for Global Studies, Centre for Asia-Pacific Initiatives, Centre for Studies in Religion and Society, and the Consortium on Democratic Constitutionalism. UVic is the only university west of Quebec that has two UNESCO Chairs, one in early childhood education and the other in community-based research and social responsibility in higher education. The university is home to the world's only Chair in Transgender Studies and the world's largest transgender archives. The Peter B. Gustavson School of Business has a substantial focus on international business in its research and academic programs, including the Global Leadership and Organizational Behaviour Effectiveness (GLOBE) study on cross-cultural leadership.

Health and Life Sciences

In recent years there has been a significant shift in conceptions of the factors that determine human health and well-being. Greater attention is being paid to a range of structural, social, economic, environmental and health service factors that interact in complex ways to influence the health of individuals, communities and populations. Working with community groups and leaders, governments, health authorities and other health care agencies, UVic researchers provide the evidence-based

knowledge that decision-makers need to improve the health and well-being of people living in Canada.

A wide array of academic units at UVic contribute to this set of capabilities, including, but not limited to: nursing, biochemistry and microbiology, physics and astronomy, chemistry, biology, mathematics and statistics, social work, child and youth care, exercise science, physical and health education, educational psychology and leadership studies, health information science, public health and social policy, sociology, psychology, anthropology, the Division of Medical Sciences, and almost all departments in the Faculty of Engineering.

The scope and depth of health research at UVic is demonstrated through the work of more than 200 researchers who conduct health research or work in allied fields. Developing collaborations and synergies between UVic researchers and community partners, including Island Health (the health authority for Vancouver Island), stimulates research clusters in proteomics and genomics, medical physics, neuroscience, mental health, social determinants of health, and aging. Researchers in the Centre for Advanced Materials and Related Technology (CAMTEC) are developing biosensors using nanomaterials for detection of biomarkers, and biomedical engineering and medical physics are emerging areas of interdisciplinary strength involving many UVic faculty. The Department of Mathematics and Statistics has an internationally recognized team in mathematical modelling of biochemical networks and disease dynamics and epidemiology, including a 2014 Thompson Reuters Highly Cited Researcher. UVic currently has 10 Fellows of the Canadian Academy of Health Sciences, and two Steacie Fellows in the areas of biochemistry and molecular biology, respectively. One of UVic's faculty members was recently awarded the Science Educator Award from the international Society of Neuroscience in recognition of his significant contributions to educating the public about neuroscience.

The following research centres and facilities support UVic's capabilities in health and life sciences: Institute on Aging & Lifelong Health, Centre for Addictions Research of British Columbia (CARBC), Centre for Indigenous Research and Community-Led Engagement, Centre for Biomedical Research, Centre for Forest Biology, UVic-Genome BC Proteomics Centre, Centre for Youth and Society, CanAssist and CAMTEC. CARBC won the inaugural Research Canada Leadership Award (2014) in recognition of the centre's outstanding efforts in advocating for health research at the local, provincial and national levels.

Indigenous Research

UVic is located on the traditional territories of the Songhees, Esquimalt and W̱SÁNEĆ nations, and the university promotes research reflecting the aspirations voiced in the Truth and Reconciliation Commission to advance reconciliation between Indigenous and non-Indigenous peoples in Canada. Indigenous research is grounded in the knowledge and traditions of diverse Indigenous peoples, explores past and present interactions between Indigenous and non-Indigenous peoples, and considers ways in which those relationships might be reordered and restructured to secure a better future. UVic's Indigenous researchers apply culturally and methodologically appropriate approaches to answering questions and addressing issues most relevant to Indigenous peoples at local, regional, national and international levels.

UVic is a committed and recognized leader in Indigenous research, not only as a research focus or in terms of long-standing relationships with Indigenous partners, but also in terms of growing the number of Indigenous scholars. UVic has 19 self-declared Indigenous faculty members, and 4.6 per cent of undergraduates and 6.2 per cent of graduate students are self-declared Indigenous—among the highest proportions in a Canadian university. UVic's research programs aim to enhance the lives of Indigenous individuals, communities

and nations through advancing Indigenous knowledge and engagement with diverse knowledge keepers, seekers and systems. Indigenous issues in British Columbia are a central focus of UVic's research, but its reach also extends well beyond, certainly throughout Canada but also to the US, Australia, New Zealand, Fennoscandia, and increasingly to Latin America, Asia, and Africa. This research yields theoretical, methodological and policy outcomes of national and international significance and application in the field of Indigenous research.

A wide range of research projects have been undertaken at UVic over many years with particular emphasis on Indigenous language, culture, laws and governance, health and human services, and environment. The majority of Indigenous research here is undertaken by faculty in departments that have a significant focus on Indigenous academic courses and programs and/or faculty including: anthropology, child and youth care, social work, Indigenous governance, history, philosophy, political science, Indigenous education, Indigenous language revitalization, geography, environmental studies, visual arts, and law. UVic is home to a Canada Research Chair in Indigenous Law, a Law Foundation Professor of Aboriginal Justice and Governance, and a Hakai Professor in Ethnoecology. A number of UVic specialists in Indigenous research are fellows of the Royal Society of Canada, and others have been recognized with awards such as Killam and Trudeau fellowships.

Many UVic research centres and groups also have a focus on Indigenous research including the Indigenous Governance unit, Centre for Indigenous Research and Community-Led Engagement, Indigenous Law Research Unit, Centre for Youth and Society, Centre for Asia-Pacific Initiatives, and Centre for Studies in Religion and Society. Finally, the Peter B. Gustavson School of Business and Faculty of Law established the National Consortium for Indigenous Economic Development in 2014.

Ocean Science and Technology

UVic is an international leader in the study of ocean science and the development of marine technology. Ocean science and technology research is undertaken by researchers in the schools of Earth and Ocean Science and Environmental Studies; the departments of Biology, Chemistry, Geography, and Mechanical Engineering; and Ocean Networks Canada (ONC). UVic researchers have strong links with the region's thriving marine technology sector, and with scientists at several nearby research centres. Researchers are focused on a wide range of research themes including biogeochemical cycles, climate-ocean dynamics, marine environment and ecosystems. Ocean engineering and ocean energy are a focus in the Department of Mechanical Engineering and the Institute for Integrated Energy Systems (IESVic). Research themes in this field include underwater vehicles, tidal turbines and wave energy devices, offshore wind power, and green ship propulsion systems. UVic researchers and students are also deeply involved in the work of the Bamfield Marine Sciences Centre, a shared campus of the universities of Victoria, British Columbia, Alberta, Calgary and Simon Fraser University. The centre was established to provide a permanent base and infrastructure for marine and coastal-oriented field operations on the west coast of Canada.

The flagship for ocean science and technology at UVic is ONC, a national research platform established by UVic in 2007. ONC operates and maintains the NEPTUNE and VENUS ocean observatories, to position Canada as an international leader in the science and technology of ocean observing systems, and to maximize associated economic and societal benefits through commercialization and outreach. The observatories collect data in real time on physical, chemical, biological, and geological aspects of the ocean over long time periods, supporting research on complex Earth processes in ways not previously possible. More recently the Smart Oceans BC system is extending ONC's capacity, delivering science and information for responsible ocean management and sustainable ocean use. Smart Oceans BC uses a range of underwater and land-based instruments to monitor ocean conditions, help predict tsunamis and earthquakes, and provide science-based information for response to offshore accidents and natural disasters. ONC's Innovation Centre (a national Centre for Excellence in Commercialization and Research) is a world leader in commercializing this oceans observing technology, related digital infrastructure, and data analytics and modelling. The Innovation Centre's goal is to bring the benefits and solutions from ONC's technology to industry and government.

Physical Sciences and Engineering, Mathematics and Computer Science

Physical sciences at UVic encompass researchers from a wide spectrum of disciplines across campus, including the departments of Physics and Astronomy, Chemistry, Mathematics and Statistics, Computer Science, Mechanical Engineering, Civil Engineering, and Electrical and Computer Engineering, as well as the School of Earth and Ocean Sciences. Materials science research at UVic draws expertise from the departments of Biology, Chemistry, Electrical and Computer Engineering, Mechanical Engineering and Physics and Astronomy, as well as the School of Earth and Ocean Sciences.

In the broad area of physical sciences, UVic has significant capability in the areas of high-energy physics and astronomy—supported by centres such as the Astronomy Research Centre and the Victoria Subatomic Physics and Accelerator Research Centre—and enjoys close connections with nearby facilities such as the TRI-University Meson Facility (TRIUMF) in Vancouver and NRC Herzberg in Saanich. UVic faculty members have taken leadership roles in several global science endeavours, such as the ATLAS experiment at CERN, the Thirty Meter Telescope planned in Hawaii, the ARIEL linear accelerator at TRIUMF, and others, leveraging substantial (and often international) capital investment to benefit UVic research. The Department of Mathematics

and Statistics has internationally recognized groups in operator algebras, dynamical systems and mathematical modelling, with strong interactions between them. UVic is a founding member of the Pacific Institute for the Mathematical Sciences (PIMS) and continues to be a major participant.

A large cluster of researchers in advanced materials from the faculties of Science and Engineering has a broad range of expertise and established track records. Materials scientists and engineers in IESVic and CAMTEC use technologies such as nanotechnology, spintronics, photonics, supramolecular design, crystal growth and advanced microscopy to investigate new materials for applications as diverse as manufacturing, electronics and biotechnology.

Faculty in these fields are recognized nationally through fellowships in the Canadian Academy of Engineering and the Royal Society of Canada. They have also been recognized internationally for research excellence in the physical sciences—ranked 96th by Times Higher Education in 2014, and first in Canada in 2015 for impact in physical sciences, engineering, mathematics and computer science, according to the Leiden University Rankings.



5 STRATEGIC PRIORITIES

UVic's deep value-based commitments in its research (\$2) and dynamic capabilities for research (\$4) are the result of several decades of individual and institutional choices in the pursuit of new opportunities for research, scholarship and creative activity. The accrued capacity for research positions UVic—now and in the future—to generate, absorb and exploit new knowledge from insights, inventions and discoveries. Moreover, as the university experiences renewal with a predicted influx of new faculty and their graduate students, those researchers will extend and reshape UVic's existing capacity for research as they anticipate, monitor and respond to new opportunities, and strive to remain at the forefront of an increasingly competitive and rapidly changing research environment.

This section of the Plan builds on UVic's dynamic capabilities for research as the starting point for five strategic priorities that will renew and extend capacity for vital impact through research excellence and knowledge mobilization. The strategic priorities and objectives are:

Defining and Achieving Research Excellence

- Defining and achieving research excellence is the paramount objective of this Plan, and UVic will align resources, supports and incentives to ensure that, alongside teaching, the pursuit of research excellence remains at the forefront of UVic's academic mission.

Enhancing the Integration of Research and Education

- In alignment with the UVic Edge, UVic will promote and support the integration of research and educational programs to create dynamic learning opportunities that reflect UVic's extraordinary environment and contribute to the vital impact of research.

Expanding Partnerships, Innovation and Entrepreneurship

- UVic will expand its focus on partnerships as mechanisms to enhance innovation, generate new research opportunities, engage with community partners, mobilize knowledge in society, policy and professional practice, and support entrepreneurship.

Improving Research Competitiveness through Differentiation and Specialization

- Building on its unique combination of history, place and dynamic capabilities, UVic will continue to concentrate resources in areas that have already demonstrated, or show real prospects of, research excellence.

Enhancing and Optimizing the Provision of Research Services

- By making strategic investments in systems, staff and staff training, and through the optimization of service delivery and asset management, UVic will further the pursuit of research excellence for researchers and the university as a whole.

Each of the strategic priorities advances UVic's academic and research missions by linking the university's high-level goals to specific objectives. Associated strategies describe how the objectives will be realized and how progress made against each priority area will be evaluated, including existing processes and consultation mechanisms such as academic and integrated planning, and future processes such as the development of indicators from the Enhanced Planning Tools. Ultimately, the timing and pacing of implementing the five-year Plan and undertaking work to achieve each objective is subject to resource considerations.

Defining and Achieving Research Excellence

Research is a complex set of activities seeking to satisfy curiosity and the quest for new knowledge. Research excellence is achieved when new, significant knowledge is acquired, guided by prevailing standards and norms associated with the research process, and is manifested in the collected outputs, outcomes and impact of intellectual and creative inquiry.

New Knowledge: The pinnacle of research excellence is reflected in the European [*Aarhus Declaration*](#), a universal principle which encourages all researchers to aim for new knowledge and “real breakthroughs” that “changes paradigms, invents new fields and opens opportunities with broad social consequences.”



All research, by definition, has as its fundamental goal the creation of new knowledge, but it is the significance or transformative power of new insights and discoveries that define research excellence. While the declaration strongly promotes the pursuit of risky and ambitious research that has a high probability of enormous impact, research excellence is often a combination of seeking the utterly new and more predictable programs of incremental advances.

Guiding Standards and Norms: Researchers are understandably the greatest champions of intellectual life and the research enterprise. And they are the most likely to speak of the value of knowledge in its own right. Since research excellence refers to how knowledge is created and disseminated, excellence in research reflects evolving community standards for the integrity and quality of the research process itself. These standards have a broad scope, including discipline-honed criteria relating to the way that research questions are posed, or norms arising from communities of practice that guide the development of disciplinary and interdisciplinary research projects. Research process is also appraised in light of ethical norms relating to the conduct of research involving human and animal subjects, standards of collaboration with industry and community partners, and the evaluation of how the process avoids or mitigates social, environmental and other risks. Since the fundamental objective of research is to create new knowledge, communities of scholars react swiftly and decisively to preserve scholarly integrity in cases of research fabrication, falsification and plagiarism.

Productivity and Impact: A variety of techniques are used to ensure that knowledge is widely mobilized and research results are accessible in formats that end-users find useful. These include research communications; research-enriched educational programs; experiential opportunities; innovative use of digital platforms; community engagement, engaging government, professions, and community actors; commercialization; and input into public policy and regulatory frameworks. Working collaboratively with research partners in the co-design and development of research programs and projects is important for identifying stakeholders and often leads to unanticipated end-users of knowledge. Also integral to the mobilization of new knowledge is ensuring the consistent and strategic communication of research findings through conventional academic dissemination opportunities, and accessible and innovative approaches to reach audiences outside academia. Such communications encompass traditional opportunities in academic publications (including open-source journals), as well as engagement through avenues of communication adapted—in both form and substance—for non-academic audiences such as media releases, radio and television interviews, multimedia presentations, film and other performing arts, articles in technical or community publications, books and, increasingly, social media.



Define research excellence and achieve it by aligning resources, supports and incentives to ensure that the pursuit of research excellence remains at the forefront of UVic's academic mission.

 OBJECTIVES	 STRATEGIES
Adopt the definition of research excellence in the Plan to guide strategic decision-making	Communicate with academic units and integrate the definition into Enhanced Planning Tool (EPT) processes
Provide and sustain a high-quality research environment	<ul style="list-style-type: none"> ▪ Integrate EPT quality indicators for research into annual priorities of the Office of the Vice-President Research (OVPR) and implementation plans ▪ Align submissions to Integrated Planning with Strategic Research Plan priorities ▪ Work with the Office of the Vice-President Academic (VPAC) and the Dean of Graduate Studies to consider increasing the proportion of graduate students among the total student population ▪ Work with VPAC to foster a culture of recognition of research excellence through reporting and acknowledgement of research funding success
Promote research that engages with partners and communities to maximize opportunities for impact	RPKM to coordinate and facilitate research partnerships with the Office of the Vice-President External Relations (VPER) and the Office of Community-University Engagement (OCUE)
Recognize and reward high-quality, fundamental and problem-focused research, nationally and internationally	<ul style="list-style-type: none"> ▪ Increase the annual number of award nominations ▪ Work with academic units to define Enhanced Planning Tool indicators of research quality to support research award nominations
Increase research funding for research chairs and graduate student scholarships and sponsorships via endowments	Work with VPER to use fundraising priority-setting process to increase donations
Focus knowledge mobilization initiatives to derive greater impact and social benefit from research	Align EPT quality and demand indicators for research with mandate and activities of RPKM and OCUE
Support research communications to increase access to publicly funded research	<ul style="list-style-type: none"> ▪ Work with University Communications and Marketing (UC+M) to enhance and implement strategic research communications about UVic research excellence ▪ Work with UC+M to create tools and training for research communications, including social media ▪ Support the organization of conferences, workshops, colloquia, and reporting meetings with stakeholders ▪ Work with libraries to support open-access initiatives
Enhance supports for graduate student research	<ul style="list-style-type: none"> ▪ Undertake a review of graduate student support with VPAC and the Faculty of Graduate Studies (FGS) ▪ Work with VPER to use fundraising priority-setting process to increase donations for graduate research ▪ Work with other research universities in BC to improve competitiveness in graduate student funding, relative to other provinces ▪ Improve competitiveness in recruiting graduate students by enhancing financial packages and enhancing campus space allocations for graduate student use
Enhance supports for post-doctoral research	<ul style="list-style-type: none"> ▪ Work with VPAC and FGS to consolidate administrative supports for post-doctoral fellows ▪ Work with VPAC and FGS to improve the profile of and supports for post-doctoral fellows

Enhancing the Integration of Research and Education

Consistent with the commitment made to experiential learning and the UVic student experience in President Cassels' 2014 Report to the University Community on Campus Conversations, UVic's high international research standards will be maintained not only by attracting and supporting the very best faculty, post-doctoral fellows, graduate students and technicians, but also by ensuring that undergraduate students have exposure to, and opportunities to contribute to, university research.



People are the drivers of research success, and UVic's approach is to be maximally inclusive while recognizing that graduate students are of particular importance to the success of UVic's research, knowledge mobilization and social impact. This people-focused orientation is reflected in Objective 22 of A Vision for the Future, which emphasizes the need to bring educational and training programs into greater and more synergistic alignment with research. Just as the report on the Campus Conversations further extends this vision, so too does this Strategic Research Plan provide the basis for further implementation of this vision in curricula, co-operative opportunities, and in the design and resourcing of research projects and related infrastructure and space.



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Promote and support, in alignment with the UVic Edge, the integration of research and educational programs to create dynamic learning reflective of UVic's extraordinary environment and which contributes to the vital impact of research.

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 OBJECTIVES	 STRATEGIES
Recruit and retain the best researchers	Work collaboratively with VPAC on hiring processes
Ensure that educational programs are predicated on research excellence and, reciprocally, that research excellence is reflected in educational programs	<ul style="list-style-type: none"> ▪ Coordinate academic and research planning processes with VPAC ▪ Work with VPAC to review awards related to the integration of research and educational programs consistent with UVic learning outcomes
Provide every student with the opportunity to become engaged in the culture and activities of a research-intensive university	<ul style="list-style-type: none"> ▪ Work with academic units to expand opportunities for student engagement in research ▪ Provide on-campus and distance-learning research opportunities
Support graduate student success while optimizing existing resources	Work with FGS to monitor program completion rates for graduate students
Draw on library expertise in research-related education and training	Promote digital information fluency training throughout UVic

Expanding Partnerships, Innovation and Entrepreneurship

For researchers to contribute to the betterment of a rapidly changing global society, they must respond to challenges associated with competition and pursue opportunities for collaboration in an increasingly mobile and interconnected world. Although research has never occurred in a vacuum, isolated from the rest of the world, UVic research intensiveness and social impact is now frequently driven by partnered and leveraged activity with university libraries and partnership intermediaries such as UVic's Research Partnerships and Knowledge Mobilization unit.

One of the most important partnerships for UVic researchers is internal to the university—UVic Libraries. The libraries are a research platform in their own right, providing access to physical and digital collections, and to digital scholarship and data visualization space and supports. Integration of librarians into research projects is enabling for researchers, particularly for those projects making use of, or creating, digital resources. The library provides an important linkage between research and educational programs by offering training for digital information fluency, encompassing traditional conceptions of information literacy with increasingly complex forms of knowledge creation and dissemination. In addition to creating interdisciplinary linkages between researchers at UVic, the library is itself a conduit to other kinds of partnerships with organizations such as the Royal BC Museum and Archives, the Greater Victoria Art Gallery and Public Library, land title and survey authorities and police departments. Nationally, the libraries are working with the Canadian Association of Research Libraries (CARL) in partnership with Compute Canada to mount the Portage project, a multi-year initiative to create data management tools and build a national infrastructure for the preservation and discovery of research data.

Research is also increasingly coupled with innovation, understood as value-added technological and social solutions. Innovation is associated with new modes of entrepreneurship and changing professional practice through which novel exchange mechanisms allow for more rapid transfer of ideas, services, and products. To develop institutional capacity for these important drivers of change in research, in 2013 UVic created RPKM to consolidate activities related to research partnerships with industry, contracted research, knowledge mobilization and community-engaged research. With the concept of partnership underpinning all aspects of RPKM activity, UVic has developed a flexible approach to the delivery of research services that positions the university to compete and collaborate in a rapidly changing global society.

With a focus on research contracts, securing intellectual property rights, and licensing technologies, RPKM plays a crucial role in supporting partnership agreements, company development, and supports to legal entities held by UVic. As the university further consolidates its strategy on community engagement, RPKM will continue to play a critical role in providing services to community-engaged research programs and projects. These services include intellectual property management, cultural protocols, research agreements, and project planning and capacity building with external research partners. Although partnerships, contracts and community engagement are often considered endpoints, they are also critical mechanisms by which UVic creates a wide variety of entrepreneurial outlets for the exchange of ideas, services and products. Along with supports to entrepreneurial activity, UVic's commitment to partnerships enables many avenues for knowledge mobilization. Among the most visible is Ideafest, a celebration of UVic research and creative activity, which attracts thousands of public and university community participants to approximately 50 events annually in March.


UVic has made great strides forward with the creation of RPKM because its commitment to innovation, entrepreneurship and partnerships reflects the disposition of a research-intensive university dedicated to making the most of its dynamic capabilities, now and in the future. Yet providing high-quality services on and off campus requires a renewed commitment of purpose and resources to achieve the ambitious level of contracting, agreements, partnerships and mobilization of knowledge envisioned in this Plan. In part, that requires enabling RPKM to do its own homework using appropriate research information and administration systems. To remain competitive and in the service of enhanced collaboration, RPKM will streamline its contracts and agreements, and refine the approval process based on the level of institutional risk and variance from

template agreements. With the first collective agreement in place, RPKM will provide support to the process of clarifying and improving the intellectual property policy to ensure that all members of the university community have a strong and unified interpretation of it. In addition to policy improvements, partnerships, innovation and entrepreneurship will be further enabled with greater supports to, and activity within, UVic Industry Partnerships.

As it stands, RPKM provides an exceptional level and breadth of services in support of partnerships, innovation and entrepreneurship. RPKM is now poised, with further consolidation of its mandate and resources to support it, to deliver on the promise of vital impact that is central to UVic's research mission.



Expand UVic's focus on partnerships as mechanisms to enhance innovation; generate new research opportunities; engage with community partners; mobilize knowledge in society, policy and professional practice; and support entrepreneurship on campus.

 OBJECTIVES	 STRATEGIES
Promote internationalization of UVic research	<ul style="list-style-type: none"> ▪ Implement international working group recommendations ▪ Identify supports for ongoing and new international research partnerships
Improve institutional responsiveness to new opportunities for research partnerships and community engagement with regional, national and international partners	<ul style="list-style-type: none"> ▪ Engage partners and potential partners to identify key priorities for enhancing responsiveness ▪ Contribute to the review of a revised intellectual property policy ▪ Foster greater collaboration between UVic researchers and companies at the Vancouver Island Technology Park ▪ Work with the VPER, OCUE and regional economic development leadership to create the conditions and opportunities for economic and social development that improve well-being of citizens ▪ Foster collaborative approaches to designing, conducting and implementing research and educational programs with partners
Streamline contracts management to improve service on and off campus	Establish electronic workflows and refine approval process
Enhance supports for innovation and entrepreneurial activity	Work with Office of the Vice-President Finance and Operations (VPFO) to explore the potential for the university to gain access to venture capital
Increase UVic's research profile regionally, nationally and internationally	Work with UC+M and RPKM to enhance and implement strategic research communications about research partnerships
Enhance community-engaged research	RPKM to develop cultural protocols and best practices for initiating, continuing and expanding research partnerships in collaboration with other units including OCUE and the Office of Indigenous Academic and Community Engagement (IACE)
Further integrate university libraries into UVic research processes	<ul style="list-style-type: none"> ▪ Identify opportunities for librarians to collaborate on research projects ▪ Raise awareness of the ability of UVic Libraries to access other collections and repositories

Improving Research Competitiveness through Differentiation and Specialization

UVic has a strong values-based commitment to social and environmental progress that is reflective of the university's sense of place and a realistic assessment of how dynamic capabilities for research align with emerging opportunities.

The foundation of research excellence is exceptional faculty, students and staff. The sparks of inquisitiveness that lead to university-based research projects and programs originate with insightful people who ask questions, identify a problem that needs resolution, or reframe conceptions of states of affairs in new and insightful ways. The role of the university is to support inquiry at its inception, enable projects and programs, and nurture the environment to promote research excellence and high-quality education and training for the next generation of researchers. Objective 21 of the university's Strategic Plan places research excellence at the heart of faculty recruitment and assessment because the brightest and most inspired researchers define the international research agenda, and many of these agendas are reflected in the university's dynamic research capabilities. UVic has a history of advancing inquiry by providing centralized supports to seed new ideas, to convene scholars, and to respond quickly and assiduously to emerging opportunities.

UVic will continue to concentrate on areas that have demonstrated, or show strong potential for, research excellence. Responding to fruitful research trajectories involves decision-making about where and when to allocate resources strategically and efficiently to ensure that departments, schools and faculties can pursue priority lines of inquiry. For example, research

excellence is secured first by recruiting high-quality researchers and then by aligning resources for students and other trainees. Other opportunities for enhancing dynamic capabilities include clustering approaches where there are natural affinities between researchers, and where co-location and concentration of expertise will predictably generate knowledge spillovers, establish a competitive advantage in funding competitions, and act as an attractant to students. Research chairs, for example, can be used to nucleate such research groups, whereas industrial research chairs can stimulate impactful interactions between UVic and its research partners. Space and infrastructure are finite resources and need to be allocated strategically to have better than simply additive impact. Since the real costs of research exceed operational funding, careful attention must be paid to ensuring that research support funds and indirect costs of research are collected and deployed appropriately. As research intensiveness increasingly involves the use of large datasets and analytical prowess to extract meaning and value from them, for example, librarians and data scientists require supports to participate in research design and delivery. Internationalization, interdisciplinarity, community-engaged research and Indigenous scholarship—which are hallmarks of UVic research excellence rather than endpoints—similarly require systematic alignment of time, money and effort. UVic's research centres have played a pivotal role in defining UVic's dynamic capabilities and convene people into hubs of focused activity.



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Concentrate resources in areas with demonstrated or strong potential for research excellence.

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 OBJECTIVES	 STRATEGIES
Provide and sustain a high-quality research environment that enables and nurtures the expertise and aspirations of researchers	<ul style="list-style-type: none"> ▪ Develop and implement annual priority-setting process with the Research Advisory Committee and the Council of Centre Directors
Enable existing and emerging dynamic research capabilities	<ul style="list-style-type: none"> ▪ Promote clustering of resources where strategically advantageous ▪ Ensure that the allocation of space, infrastructure and research chairs aligns with Strategic Research Plan priorities ▪ Identify opportunities for increasing and improving space for researchers and students ▪ Explore ways to provide seed funding for interdisciplinary conferences and workshops
Fully engage the expertise and leadership of research chairs	Develop a research chairs forum focused on research leadership for UVic
Continue to ensure that UVic meets the use and reporting requirements of the Research Support Fund	Work with VPFO to review Research Support Fund use to ensure consistency with evolving reporting requirements
Optimize the collection of indirect costs of research	<ul style="list-style-type: none"> ▪ Engage internal community and external funders to optimize the collection of indirect costs of research ▪ Collaborate with other universities and organizations regarding related initiatives
Enable and support research centres to respond to emerging research opportunities and promote collaborative and interdisciplinary research	<ul style="list-style-type: none"> ▪ Develop standardized annual reporting templates ▪ Increase research networking capacity and infrastructure
Provide the best possible governance of research	Support, or lead, research-related policy and procedure reviews
Continue to build the visibility and reputation of UVic as a research-intensive university	Develop and implement a strategic research communications plan with UC+M and align Strategic Research Plan priorities with the UVic Edge

Enhancing and Optimizing the Provision of Research Services

UVic's research enterprise has grown, over the last decade and a half, to an average level of \$100 million per year in externally funded research that supports the research efforts of nearly 900 faculty members. Of these, 60 hold endowed or Canada Research Chairs and more than a dozen are *UVic Distinguished Professors* or Lansdowne Scholars. Research funding is raised through approximately 700 standard research and partnered grant applications for approximately 125 different funding opportunities annually. This application rate has led to the ongoing maintenance of over 2,000 active research accounts, with an annual turnover of 450, all of which require administrative and financial oversight. Roughly one third of these open research accounts involve active human subject research protocols, and another 80 require animal care protocols. Of the external research funding UVic is awarded annually, roughly one third is comprised of institutional grants in the form of approximately 40 awards from the Canada Foundation for Innovation and the BC Knowledge Development Fund, along with a rolling stock of nearly 40 Canada Research Chair awards and renewals. In addition, Research Partnerships and Knowledge Mobilization actively manages 300 ongoing and new contracts and agreements every year and maintains a portfolio of more than 100 patents to which 15 are added each year. The university discloses more than 60 inventions annually.

As discussed in §1, the drivers of change in the research landscape require Canadian universities to undertake more leveraged and partnered research associated with higher expectations about productivity and impact. UVic's current capacity to deliver high-quality research services may be steady-state now, but delivery capacity is being tested. The 2015 external review of UVic's Office of Research Services (ORS) concluded that the university

benefits from having a well-trained and motivated staff working in an organized and well-managed environment in which high standards of service delivery and compliance throughout the research process are met. Existing management mechanisms, such as the Research Services Operations Advisory Group, are working effectively and will continue to be used to manage needs and risk. Yet as the Canadian (and international) research landscape becomes increasingly competitive, UVic must optimize its research services to retain—and improve—its absolute and relative competitive position. “What capacity for research administration and associated services will UVic need in 2020?” is the question to confront now. Although major structural adjustments are not anticipated within ORS during the lifetime of this Strategic Research Plan, there are a number of recommended changes to UVic's research administration that will help to enhance and optimize service delivery.

For example, UVic currently oversees research grants with a pre- and post-award system, but could instead consider a model in which grants, particularly larger team and networked grants have continuous, cradle-to-grave, central administration. A culture of proactive, systematic grants facilitation, as demonstrated by other universities and in some units within UVic, can improve a unit's coordination of research and lead to greater numbers of applications with higher success rates. Grants facilitation should support and enhance research success across the university in nuanced ways appropriate to different modes of research. A university-wide system of grant facilitators embedded in faculties and divisions, along with grants-crafting and peer-review processes, once complete, will provide a common and high level of service. The establishment of a university-wide council of grants facilitators will ensure effective liaison with ORS grants officers. Furthermore, grant facilitators that are shared between faculties and perhaps track-specific funding councils can support opportunities for greater collaboration.

Every faculty and division has a strong vested interest in promoting a culture of research excellence. A university-wide system of associate deans research, once complete, will provide a common level of academic leadership and administrative oversight within faculties and divisions, and may raise new possibilities for the membership and mandate of the OVPR's Research Advisory Committee (RAC). Working alongside deans, division heads, and in concert with VPAC via Deans' Council, the associate deans research could consider developing annual strategic research plans within their faculties to share with RAC to achieve greater strategic alignment and synergies of research initiatives at UVic. Faculty and division annual research plans would, together with the annual strategic research implementation plans, provide an annual, strategic, institutional roadmap for UVic research.

UVic currently offers university-wide research services on a first-come, first-served basis. Optimization of ORS resources could be partly achieved by establishing a decentralized system for the provision of some services across the university. For example, a system of grants facilitators embedded in faculties or divisions can ensure that individual and small groups of researchers can receive the support locally and under the oversight and support of the relevant associate dean research. The administrative workflow in this case would be from academic units to the ORS. Centralized administrative supports would be in place for ethics, large-scale projects, networked activity, institutional partnerships and institutional programs. All of these are institutionally strategic initiatives, often requiring higher levels of institutional risk, regulatory requirements, commitment of resources, and/or acquisition of infrastructure. In recent decades UVic has acquired significant research infrastructure, some of which is located

at the central campus (e.g. the Advanced Microscopy Facility), at the Vancouver Island Technology Park (e.g. UVic-Genomics BC Proteomics Centre), and offsite (e.g. Ocean Networks Canada's NEPTUNE and VENUS cabled observatories and Arctic and Atlantic installations), or is widely distributed (e.g. the many research vessels owned and operated by UVic). UVic's research enterprise has grown and matured to the extent that efficient and sustainable use of infrastructure is an ongoing priority. An asset management tool for research infrastructure, with operational status, associated user base, technical support, operating costs and projected lifespan could be incorporated into a robust research administration system.

The self-analysis undertaken by the ORS, and the external review panel in 2015, indicated that UVic requires an enterprise-class research administration system and associated research information system. Without appropriate IT-enabled workflows and timely access to accurate information, UVic internalizes the costs of cumbersome workflows, allocates human resources inefficiently and non-strategically, and is exposed to ongoing institutional risks associated with business continuity and compliance. Collaboration with other BC universities would be streamlined and strengthened with jointly procured and inter-operable systems, such as harmonized ethics approvals.



An important enabling tool at any university is a system of internal research grants. Internal research grants are not a "sole source" of continuous funding but are intended to provide necessary funds for one-off projects and for leveraging small initiatives into larger, externally funded activities. Alternate-year applications support distributional fairness, and allocations for subventions to publication (monographs) can also be explored.



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Further the pursuit of research excellence for researchers and UVic as a whole by making strategic investments in systems, staff and staff training, and through the optimization of service delivery and asset management.

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 OBJECTIVES	 STRATEGIES
Position the Office of Research Services for 2021	<ul style="list-style-type: none"> ▪ Ensure that the Office of Research Services (ORS) annual service plan reflects Strategic Research Plan priorities ▪ Implement enterprise-class research information and administration systems
Increase the quantity and improve the quality of research grant applications	<ul style="list-style-type: none"> ▪ Work with faculty to assess the needs of researchers for achieving, measuring and recognizing success ▪ Create a university-wide, robust system of grants facilitation and management distributed through the faculties ▪ Monitor application success rates ▪ Optimize ORS workflow consistent with differentiated services ▪ Develop pre-selection guidelines for institutional program opportunities ▪ Work with Faculty of Graduate Studies to develop grants facilitation supports for graduate students
Support the development of annual research plans by academic units	<ul style="list-style-type: none"> ▪ Conduct a review of asset management models at other institutions ▪ Develop an asset management process for major UVic research infrastructure ▪ Seek advice from Internal Audit
Improve the management of major research infrastructure	Work with VPFO to review Research Support Fund use to ensure consistency with evolving reporting requirements
Improve UVic's internal research grants program	Strike a review committee, develop recommendations and consult before implementation
Support new collaborative research initiatives in response to emerging opportunities	Explore sources of funds to increase discretionary activity

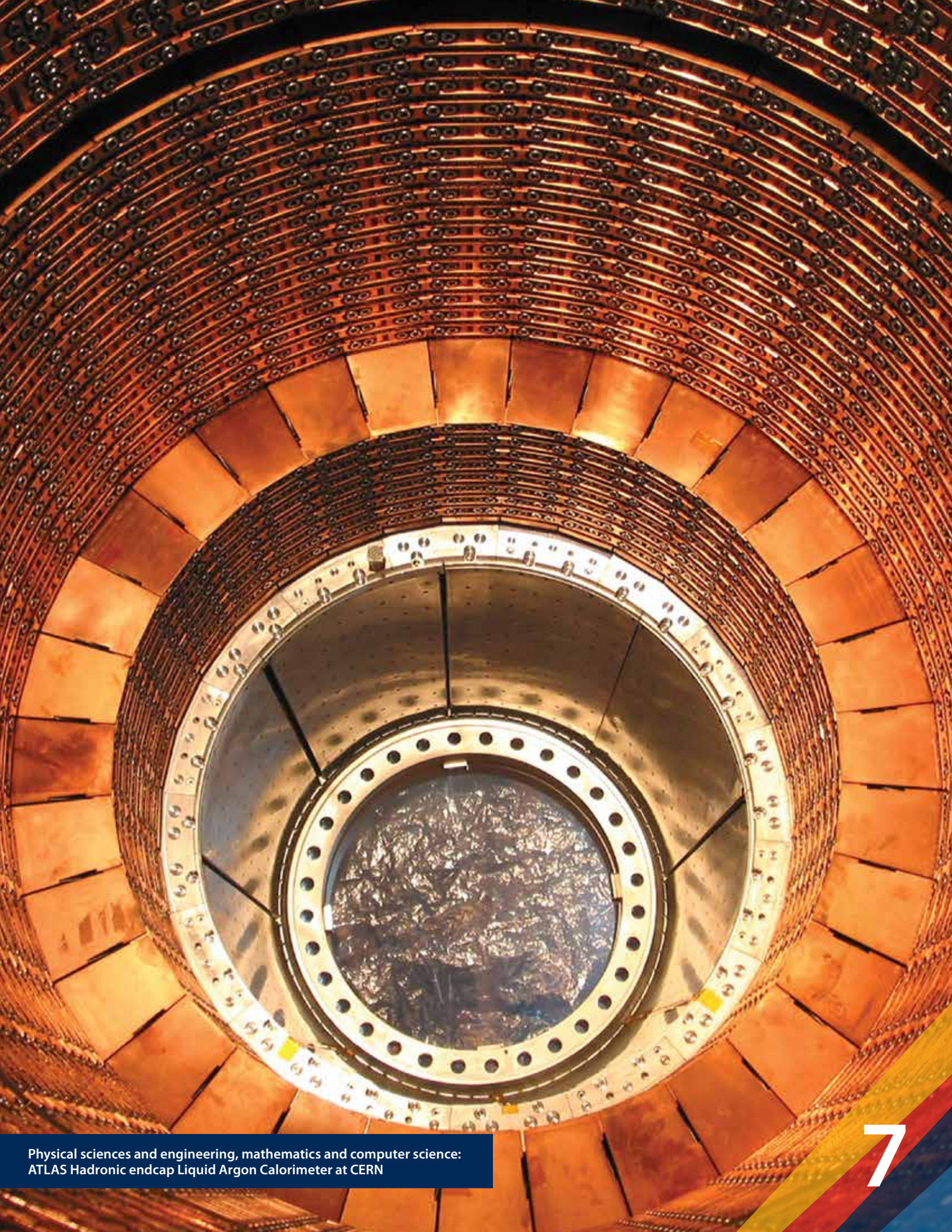


Creativity and culture: Artwork by Sandra Meigs, winner of the 2015 Governor General's Awards for Visual and Media Arts

6 STRATEGIC RESEARCH PLAN IMPLEMENTATION PROCESS

During the engagement process for the Plan's development, members of the UVic research community clearly indicated the need for an actionable and measurable plan. The five strategic priorities that guide UVic's strategy for research are set at a high conceptual level, but can be expressed as a set of achievable objectives and implementation strategies. Because these objectives and strategies are many in number and have many interdependencies, implementation will take place over the five-year term of the Plan. The implementation sequence is also important and to achieve an orderly implementation of the Strategic Research Plan, the Office of the Vice-President Research (OVPR) will develop annual implementation plans. This will include small to large-scale changes and initiatives, with some initiatives being yearlong while others may involve multiyear improvement plans. The implementation plans will articulate UVic's differentiated service commitments to individuals, groups, partners and networks. They will focus on research opportunities that are cross-cutting with the potential to achieve excellence with enhanced institutional support. The development process for the implementation plans will be aligned with existing and new processes including: annual

faculty academic planning; integrated planning; fundraising priority setting; Enhanced Planning Tools; and the UVic Edge. Where needed, the OVPR will work collaboratively with the offices of the Vice-President Academic, Vice-President Finance and Operations and the Vice-President External Relations on development of the implementation plans. Continued engagement and guidance from key UVic governance groups including Deans' Council, the Research Advisory Committee and the Council of Centre Directors will be required. Initiatives requiring approval by Senate and the Board of Governors will follow the appropriate policies and procedures. The priorities, objectives and strategies taken up in any given year will be subject to resource considerations, and constraints and opportunities will have to be balanced over the five-year life of the Plan. Progress and success will be monitored and reported yearly. Monitoring the implementation process will include reporting on timeliness, consistency of implementation and impacts on other activities. A summary progress report will be published annually. A cycle of annualized implementation planning, monitoring and reporting will lend itself to pro-active course correction and allow the OVPR to respond to emerging research opportunities as needed.



7 CONCLUSION

Over the last decade UVic has experienced remarkable growth in research activity and has become one of Canada's most research-intensive universities. This is clear evidence of the international calibre and excellence of UVic researchers, and the significant and transformational investments made in research space and infrastructure. UVic now has enviable research strengths that make it a dynamic and capable research-intensive university.

This Strategic Research Plan prepares the university for future research excellence and positions UVic to make important contributions to society. The plan recognizes the university's research strengths, and identifies five priorities and associated objectives and strategies, for enhancing and leveraging the best of UVic research into the future. Those new priorities, objectives and strategies will feed into the renewal of the university's strategic plan and other institutional plans. Over the course of the next five years, UVic will concentrate on building upon its research excellence, further integrating its research and educational programs to create dynamic learning opportunities and contribute to the vital impact of research, developing more robust partnerships and opportunities for entrepreneurship and innovation, increasing the competitiveness of the university by focusing on research where UVic has a competitive edge, and offering the best possible research services to researchers and their partners.



Ocean science and technology: Tempo-Mini instrument platform, developed by Ocean Networks Canada in partnership with IFREMER, near the base of the Grotto hydrothermal vent edifice

8 APPENDICES

- *Strategic Research Plan Advisory Committee Membership and Terms of Reference*
- *Strategic Research Plan Engagement Process Report 2015*

If you have any issues with the accessibility in this document or would like any clarification or additional information, please contact:

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Design: UC+M, Creative Services | **Photos:** p.1 Leigh Wicki-Stordeur, Swayne Lab; p.5 Valerie Shore; p.8 Dr. Elizabeth Vibert; p.16 UVic Photo Services; p.24 Andrew S. Wright | cold-coast.com; p.38 Sandra Meigs; p.40 CERN; p.42 Ocean Networks Canada