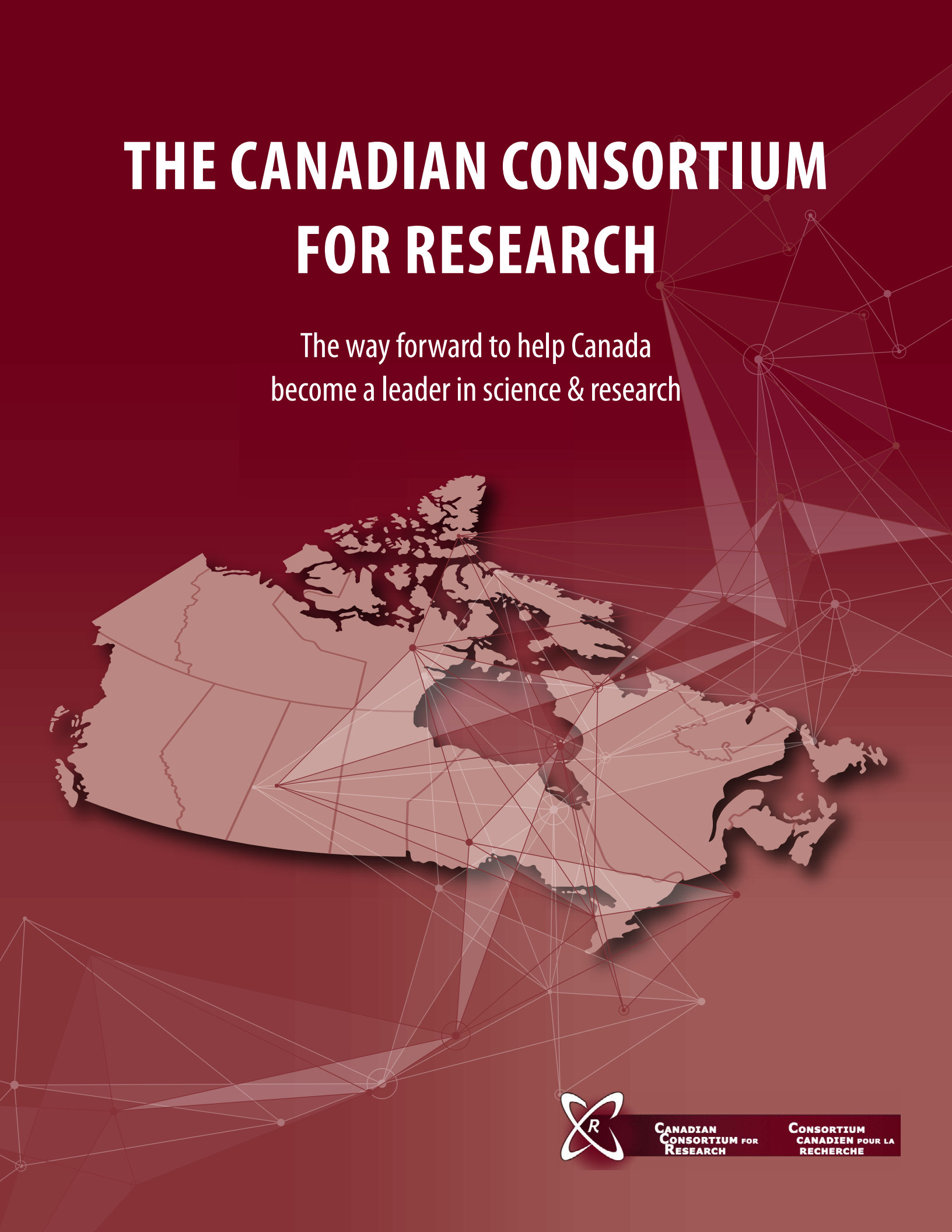
THE CANADIAN CONSORTIUM FOR RESEARCH

The way forward to help Canada
become a leader in science & research



Canadian Consortium for Research
Consortium canadien pour la recherche

ABOUT THE CANADIAN CONSORTIUM FOR RESEARCH

The Canadian Consortium for Research (CCR) was established in 1976. It consists of 20 organizations that represent researchers in all disciplines across Canada. While the majority of these researchers are based in universities, the constituent organizations have numerous members in government laboratories and in private sector research centres. With more than 50,000 researchers and 650,000 students represented in these member groups, the CCR is the largest umbrella organization in Canada whose primary concerns are the funding of research in all sectors and support for post-secondary education.

THE SCIENCE SUMMIT – WHAT WE HEARD

Two years following the release of *Investing in Canada's Future: Strengthening the Foundations of Canadian Research*, the final report of the Advisory Panel on Fundamental Research, the Canadian Consortium for Research (CCR) and the Canadian Psychological Association (CPA) gathered the research community in Ottawa on May 6-7, to explore and discuss the status of the research landscape in Canada. Participants rolled up their sleeves and got to work discussing the state of the sector, measures to revitalize the professoriate, re-consider the use of outcome metrics for academics and researchers, and the training needed for a generation of researchers whose careers, data show, will more than likely lie outside of academia.

THE SUMMIT - BY THE NUMBERS

100	900	2	3
academics, graduate students, government stakeholders, industry-based scientists, and research advocates from across the country, representing the natural and social sciences, engineering, biomedical sciences, and other disciplines	participants attended remotely	days of presentations and discussion	breakout sessions

KEY TAKEAWAYS

- **The federal government is a key partner to ensure the sustainability of the post-secondary education system.** The effects of the erosion of public funding amid rising university student enrolment have led to high tuition fees and student debt, but also to the underemployment of doctorally trained academic staff whose researcher skills are underused. This creation of a two-tiered academic workforce is marked by significant differences in wages and stability, and impedes progress towards equity and diversity in teaching and research.

- **Much needed recent investments in fundamental research have only partially reduced the shortfall.** Canada continues to underinvest in research when compared to peer countries. The ongoing shortfall in operating grants and personnel awards risks future generations of researchers and research. By way of example, investment in fundamental research received only about half of what is needed according to the Advisory Panel on Federal Support for Fundamental Science.

- **Research is a relatively small investment for a potentially large reward.** Implementing fully the FSR panel's recommendations for fundamental research is a fraction of any federal budget. Rebalancing and supporting the research ecosystem will bring significant benefits for Canadians, society, and the economy that come at minimal investment. The overall cost is $500 million (?), while not doing so means falling further and further behind.

- **The professoriate cannot be rejuvenated without addressing the challenges facing contract academic staff, and the subsequent impacts on faculty, students and university curricula.** Meaningful diversity is dependent on the science community broadening the scope and methodologies of what is considered evidence-based decision-making, in a manner that does not diminish current evidence-based decision-making metrics.

- **PhD training must extend beyond the halls of academia if we are going to successfully equip students and trainees to succeed.** To pursue careers outside of academia, students need more work-integrated learning opportunities, practical experience, exposure to a variety of role models, and opportunities to learn the language of private sector and government employers. Faculty, institutions and professional associations in turn need a greater understanding of how to best prepare students in these and other related areas.

> **Given global competition, the current conditions in the ecosystem, the role of research in underpinning innovation and educating innovators, and the need for research to inform evidence-based policy-making, it is also among the highest-yield investments in Canada's future that any government could make.**
>
> – Federal Science Review

CANADA'S FUNDAMENTAL SCIENCE REVIEW: PROGRESS AND PROSPECTS

David Naylor, Chair of the Advisory Panel for the Review of Federal Support for Fundamental Science

Canada's Relative Underinvestment in Research

- Canada's gross expenditure on research and development from all sources relative to the nation's gross domestic product has declined over the past 15 years and is well below the Organisation for Economic Co-operation and Development [OECD] average.
- From 2008 through 2016, granting council funding also showed a steady decline in per-researcher support.
- Compared to its peer nations, federal under-funding has meant that Canada is more reliant on universities and research hospitals to subsidize the nation's overall research effort.
- Canada also lags behind in patent generation, commercialization of academic research, business spending in gross domestic expenditure on research and development, researchers winning international prizes, and citation rankings in some fields.
- Canada also ranks lower than comparator countries in bachelor's level (15th among 29 OECD countries) and doctoral level (22nd among 35 OECD countries) graduation rates, dispelling a perception that Canada is over-educated relative to better performing countries.

Investigator-led Funding far from Recommended Level

- The FSR panel highlighted that a growing proportion of federal research funding in Canada had gone to support targeted and priority-based research, which can only be sustained with substantial increases in investigator-led basic research.

- The Panel's moderate recommendation was, at a minimum, to restore funding for independent research grants to 2006 levels in real terms, rescaled to current size of research community.

- While impressive, new investments for fundamental research overall have fallen short. After accounting for all specialized competitions, the total commitment to open competitions was about 62% of the FSR-recommended amount, at a net cost under 50% of the recommended investment due to cancellation of the Networks of Centres of Excellence.

Need for Further Governance, Oversight, and Coordination Improvements

- Notwithstanding an FSR panel recommendation urging more federal outreach to build policy bridges, collaboration in science policy across different levels of government remains limited.

- Within the federal realm itself, the federal government followed the Review's recommendation for the Canada Research Coordinating Committee [CRCC], though it is not chaired by the Chief Science Advisor and does not include external members from the research community. In 2019, the Government created the Council on Science and Innovation [CSI], and its mandate closely tracks the FSR's recommendations and will include a public reporting responsibility.

- To date, there have been no actions to undertake a comprehensive review to modernize, and, where possible, harmonize the legislation for the four agencies that support extramural research.

Investing in the Next Generation of Researchers

- The FSR also recommended a substantial investment in funding for students and post-doctoral fellows. While Budget 2019 made a $26.5M per annum investment in ongoing funding for graduate students across the tri-agencies, as well as a parental leave provisions, there was no allocation to post-doctoral fellows and no revision to the award levels.

- The federal government followed the Panel's recommendation to invest in early career researchers, though did not commit to refinancing award levels to account for inflation in the Chairs program.

Infrastructure, Infostructure, and Facilities & Administration Costs

- While welcomed, the federal government disproportionately made investments in infrastructure compared to operating grants and personnel awards, with major new funding for Canada Foundation for Innovation and large-scale investment in a digital research infrastructure strategy.

- There continues to be a major shortfall for the costs that institutions must spend to maintain facilities and equipment, to administer research grants and awards, and to deal with broad operational costs. In sum, the federal government largely ignored the FSR panel's recommendation for increases in the Research Support Fund.

The Future of Canadian Research: Where We Are and What's Next?

- In many instances, the new operating and personnel funding provided by the government fell well below levels recommended by the FSR Panel; in other instances, the federal government has made tangible progress in oversight, coordination, strategic clarity, and funding for multiple elements in the extramural research ecosystem.

- **Overall assessment:**
    - The investments to date have had positive impacts, yet there continues to be significant risks due to continued shortfalls to current and future generations of researchers
    - The investments needed represent a fraction of spending in any federal budget
    - Not doing so means continued lagging performance compared to peer countries, while…
    - …Other countries simply continue to invest more (e.g. United States, Germany)

A SNAPSHOT OF THE POST-SECONDARY AND RESEARCH LANDSCAPE: STUDENTS, FUNDING AND FACULTY

A talk by James Compton, Past President, Canadian Association of University Teachers (CAUT)

HIGHLIGHTS

Increasing enrolment yet persistent government underfunding

- Full-time university enrolment has increased significantly from 600,000 to just over a million between 2001 and 2016, while full-time college enrolment has increased from 450,000 to 530,000 over the same period. There are more graduate students as well, with significant increases at all levels.

- Public funding for post-secondary education has not kept pace with growth. Forty years ago Canada spent 0.5% of Gross Domestic Product (GDP) on PSE, while today it spends just 0.2%.

- The federal government's last infusion of targeted funds for core operating costs of post-secondary education was in 2008, with an $800 million increase through the Canada Social Transfer.

- From 2007 to 2017, the majority of provinces have seen significant reductions in public funding for post-secondary education and, according to the Parliamentary Budget Officer, do not have sufficient fiscal capacity to deliver current programs over the long term.

Rise of precarious academic employment underemploys researchers and slows progress towards equity and diversity

- A 21% decline since 2007 in tenure-track positions and a near doubling of 'off the tenure-track' contract positions.

- A national survey conducted by the CAUT of 2,600 contract academic staff showed that 53% of contract academic staff want tenure-track positions; 70% were employed on a course-by-course basis with no support for research

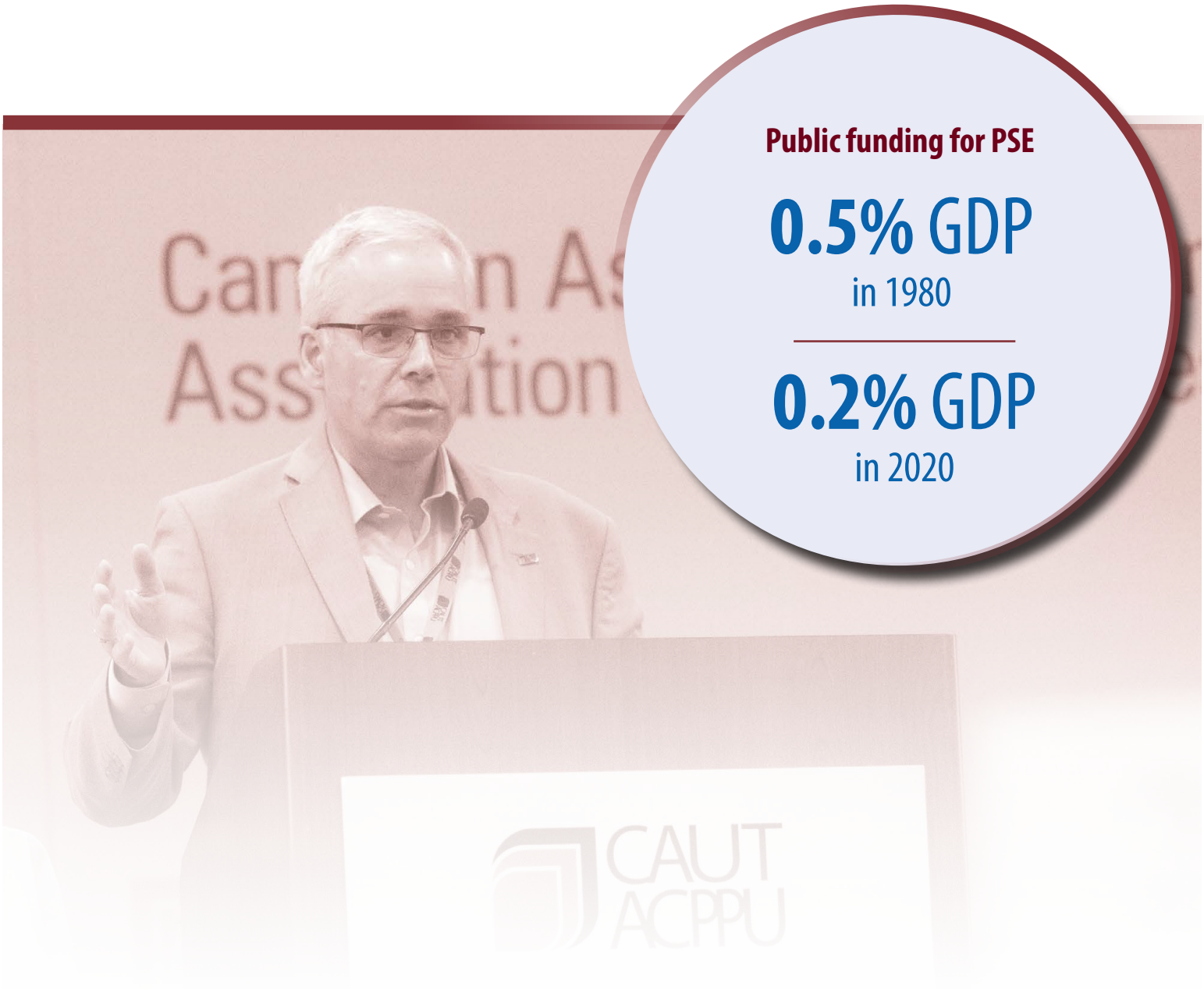
- Academic workforce not as diverse as either the student body it serves, or the general labour force, resulting in wage gaps when comparing men and women, and academic staff of different racial and cultural backgrounds.

- Though federal funding for basic research has increased, there are still significant differences in success rates between men and women applying for CIHR and NSERC funding.

PSE System Sustainability is the Goal

- We have seen positive impacts on investments in fundamental research, yet system sustainability for the broader researcher community must remain a goal.

- Without renewed public funding, underemployment of researchers in academia will continue to grow and further undermining Canada's research and science capacity.



THE BREAKOUT SESSIONS

IMPACTS AND OUTCOMES IN ACADEMIA AND SCIENCE: ARE WE MEASURING WHAT MATTERS?

Moderated by Brenda Austin-Smith, President, CAUT

Participants reflected on the difficulty and importance of embarking on a paradigm shift in measuring impact and outcomes in academia and science.

- The existing structure of reward and academic advancement is heavily reliant on one's number of publications, number of citations, and impact factors, resulting in a devaluing of activities that are critical to institutional success, research outcomes, and career development, such as serving on committees, being involved in policy development, conducting program evaluations, or advancing change through advocacy and community-based scholarship.

- Early career researchers, academic staff on contract, and academic staff who have heavier teaching rather than research loads, are negatively impacted by both the reliance and weighting of the current metrics.

- Metrics are vulnerable to manipulation, misunderstanding, and misuse, and peer review and peer assessment cannot be replaced in judging academic work.

- While metrics nonetheless do serve a purpose, and that any change to them should consider other data metrics in a way that minimizes any negative impacts, they also noted the need to broaden them to include other metrics used in evidence-based decision making.

THE ACADEMIC WORK ENVIRONMENT: HOW DO WE REJUVENATE, DIVERSIFY, AND EXPAND THE PROFESSORIATE?

Moderated by Peter McInnis, Vice-President, CAUT

To support and expand the professoriate, session participants discussed

- The need for more engagement of mid-career faculty,
- Recognition of and intervention for faculty burnout,
- Changes to grant adjudication and research funding procedures to account for the challenges young faculty experience,
- The need for substantive support for teaching as an important vehicle for knowledge transmission,
- Better value service in the peer review process, and the need to bridge the gap between academic, private sector, and government-based positions.

Participants agreed that

- The professoriate cannot be rejuvenated without addressing the challenges facing contract academic staff, and the subsequent impacts on faculty, students and university curricula;
- The importance of collegial governance and faculty's participation in governance;
- The need to protect the rights of faculty within collective agreements; and,
- The challenges experienced by researchers that are not based in academic settings.

TRAINING THE NEXT GENERATION: HOW DO WE BEST EQUIP STUDENTS AND TRAINEES TO SUCCEED IN AND/OR OUTSIDE OF ACADEMIA?

Co-moderated by Aimee Surprenant, Associate Vice-President (Academic) and Dean, School of Graduate Studies, Memorial University of Newfoundland, and Dr. Myrna Dawson, Professor of Sociology, University of Guelph

PhD training must extend beyond the halls of academia if we are going to successfully equip students and trainees to succeed.

- As only 20% of PhD graduates are able to pursue an academic career, participants concluded that responsibility to foster early awareness of potential career paths following the PhD falls to numerous institutional actors. Academic departments must recognize that not all graduates want or should be trained in a manner that creates a mirror image of their more senior academic supervisor, and instead require alternative sources of information and training opportunities. Students need to be more upfront about their interest in a career outside of academia.

- Faculty need to be open to training students for the positions and careers for which students are expressing an interest. Professional associations can provide resources and opportunities that universities may not have the capacity to provide. Funding agencies and academic institutions need to expand their current reward structure to merit more than publications, supervisor interactions, and academic pursuit.

- To pursue careers outside of academia, students need more work-integrated learning opportunities, practical experience, exposure to a variety of role models, and opportunities to learn the language of private sector and government employers. Faculty, institutions and professional associations in turn need a greater understanding of how to best prepare students in these and other related areas.

CCR CALLS FOR ACTION: MORE RESEARCH FOR A BETTER CANADA

1. Grow investigator-led operating grants within the Tri-Councils

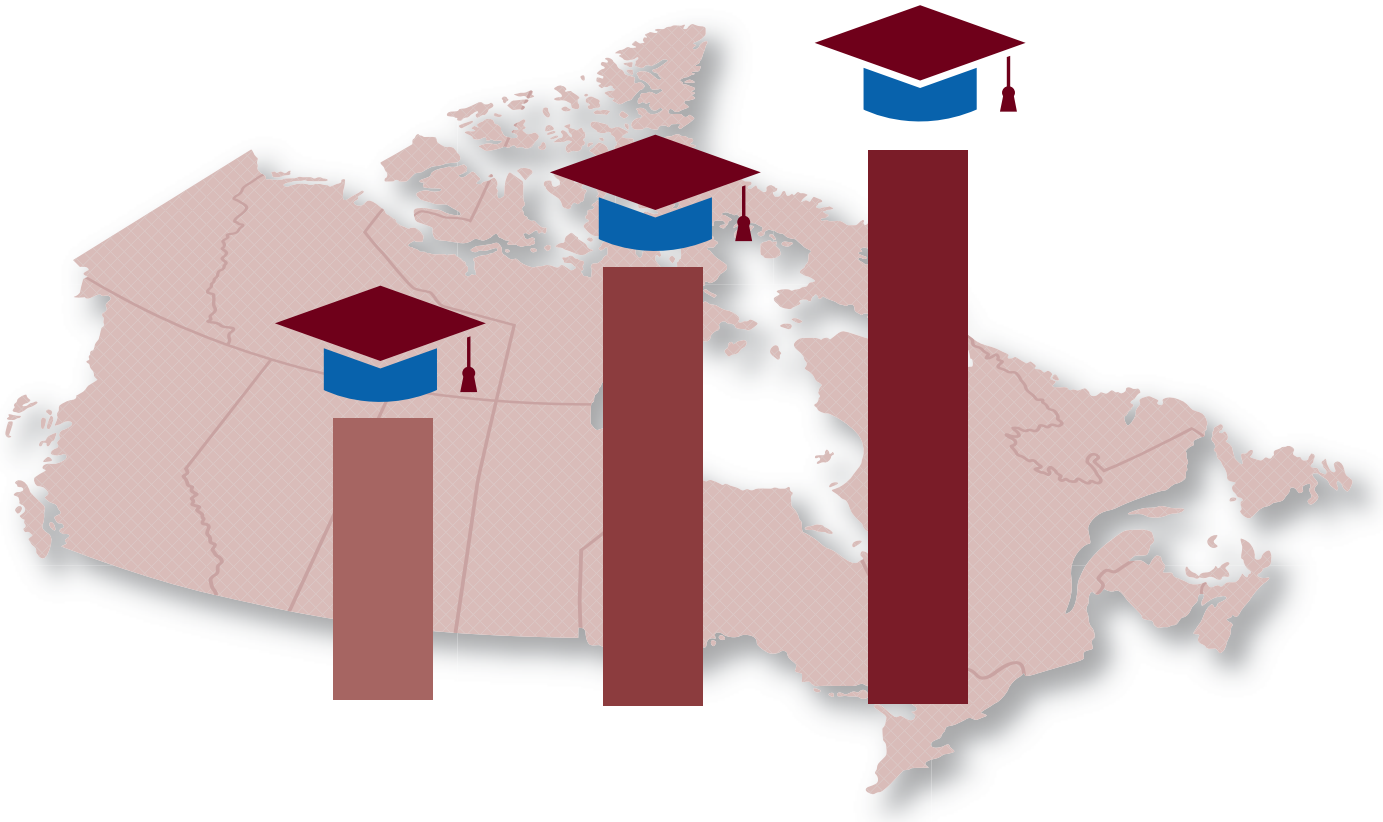
$85M per year for $170M in total over the next two years to support open competitions and reach levels identified by the Fundamental Science Review (FSR) Panel for Canada to stay competitive.

2. Support the next generation of researchers and scientists

Implement a total base increase of $140M per year, with additional equal increments of $40M/year phased in over three years to meet the FSR-identified steady-state target to support **Graduate Students and Post-Doctoral Fellows**.

3. Provide the tools to sustain research

Provide additional $100M/year for the next three years to reach the FSR-identified steady- state target **for facilities and equipment**.



WHY INVEST IN RESEARCH?

Research helps:

- Canadians live longer and healthier lives in cleaner and safer environments
- Protect and enrich Canada's diverse cultures and heritage
- Develop innovative technologies, goods, and services that contribute to our economic prosperity and create fulfilling jobs
- Sustain our economic sovereignty, standard of living, and valued social programs
- Foster a creative, vibrant, and inclusive society
- Stimulate informed public debate
- Support evidence-based policy-making in a period of accelerating change and complex domestic and global challenges
- Educate and inspire the next generation of highly qualified personnel and innovators who are able to ask and answer question across all domains
- Train the thought leaders who can scan the international landscape for insights from basic and applied research for use in local private, public and social enterprises
- Attract talented people and innovative businesses into Canada

[*]Dr. David Naylor, Fundamental Science Review Advisory Panel Chair, at May 2019 Summit

MEMBERS

Canadian Association for Graduate Studies

The Association brings together 52 Canadian universities with graduate programs, three national graduate student associations, the three federal research-granting agencies and organizations having an interest in graduate studies. Its mandate is to promote graduate education and research in Canada.

CAGS website

Canadian Association of Physicists

The Canadian Association of Physicists is a broadly-based national network of physicists in working in Canadian educational, industrial, and research settings. We are a strong and effective advocacy group for support of, and excellence in, physics research and education. We represent the voice of Canadian physicists to government, granting agencies, and many international scientific societies. We are an enthusiastic sponsor of events and activities promoting Canadian physics and physicists, including the CAP's annual congress and national physics journal. We are proud to offer and continually enhance our web site as a key resource for individuals pursuing careers in physics and physics education.

CAP website

Canadian Association of Research Libraries

CARL provides leadership on behalf of Canada's research libraries and enhances capacity to advance research and higher education. It promotes effective and sustainable knowledge creation, dissemination, and preservation, and public policy that enable broad access to scholarly information.

CARL website

Canadian Association of University Teachers

Founded in 1951, CAUT is the national voice for academic staff. Today, representing 72,000 teachers, librarians, researchers and other academic professionals and general staff, CAUT is an outspoken defender of academic freedom and works actively in the public interest to improve the quality and accessibility of post-secondary education in Canada.

CAUT website

Canadian Astronomical Society

The Canadian Astronomical Society was founded in 1971 and incorporated in 1983 as a society of professional astronomers. The society is devoted to the promotion and advancement of knowledge of the universe through research and education. Membership is open to persons with a professional involvement with these goals in astronomy and the related sciences. The main activities of the Society are its annual scientific meetings, the planning and realization of scientific projects, the support of the scientific activities of its members, and the dissemination of related information among members and other interested persons. The Society supports committees on Optical and Infrared Astronomy, Radio Astronomy, Space Astronomy, Theoretical Astronomy, Education, Heritage, Canadian Grad Students, and Awards. Cassiopeia, the quarterly newsletter of the Society, is published at equinoxes and solstices.

CAS website

Canadian Council of University Biology Chairs

The Canadian Council of University Biology Chairs is comprised of the Chairs or Heads of Biology Departments from most universities in Canada. Chairs play a key role in the leadership of Biology Departments and the improvement of Biology research and teaching in Canada. CCUBC strives to provide a forum for exchange of information between Chairs for improving Biology teaching and research in Canada.

CCUBC website

Canadian Federation for the Humanities and Social Sciences

The Federation for the Humanities and Social Sciences promotes research and teaching for the advancement of an inclusive, democratic and prosperous society. With a membership now comprising over 160 universities, colleges and scholarly associations, the Federation represents a diverse community of 91,000 researchers and graduate students across Canada. The Federation organizes Canada's largest academic gathering, the Congress of the Humanities and Social Sciences, bringing together more than 8,000 participants each year.

CFHSS website

Canadian Federation of Students

The Canadian Federation of Students is Canada's largest student organisation. It is composed of over 80 university and college students' associations in ten provinces with a combined membership of over one-half million students.

CFS website

Canadian Geophysical Union

The CGU began as a society dedicated to the scientific study of the solid earth and has evolved into one that is concerned with all aspects of the physical study of Earth and its space environment, including the Sun and solar system.

CGU website

Canadian Mathematical Society

The goal of the Canadian Mathematical Society is to promote and advance the discovery, learning and application of mathematics.

CMS website

Canadian Meteorological and Oceanographic Society

The Canadian Meteorological and Oceanographic Society (CMOS) is the national society of individuals and organisations dedicated to advancing atmospheric and oceanic sciences and related environmental disciplines in Canada. The Society's aim is to promote meteorology and oceanography in Canada, and it is a major non-governmental organisation serving the interests of meteorologists, climatologists, oceanographers, limnologists, hydrologists and cryospheric scientists in Canada.

CMOS website

Canadian Organization of Medical Physicists

The Canadian Organization of Medical Physicists (COMP), is the main professional body for medical physicists practicing in Canada. The membership is composed of graduate students in medical physics programs, post-doctoral fellows, as well as professional physicists, scientists, and academics located at universities, hospitals, cancer centres, and government research facilities such as the National Research Council. Every member has an educational or professional background in physics or engineering as it applies to medicine.

COMP website

Canadian Psychological Association

The Canadian Psychological Association was organized in 1939 and incorporated under the Canada Corporations Act, Part II, in May 1950. Its objectives are: To improve the health and welfare of all Canadians; to promote excellence and innovation in psychological research, education, and practice; to promote the advancement, development, dissemination, and application of psychological knowledge; and to provide high-quality services to members.

CPA website

Canadian Society for Brain, Behaviour and Cognitive Science

The Canadian Society for Brain, Behaviour and Cognitive Science (CSBBCS) is a non-profit organization whose primary function is to advance Canadian research in experimental psychology and behavioural neuroscience.

CSBBCS website

Canadian Sociological Association

The Canadian Sociological Association (CSA) is a professional association that promotes research, publication and teaching in Sociology in Canada.

CSA website

Chemical Institute of Canada

The Chemical Institute of Canada (CIC) is a professional association of chemists (Canadian Society for Chemistry), chemical engineers (Canadian Society for Chemical Engineering) and chemical technologists (Canadian Society for Chemical Technology) who are employed in, or associated with industry, academia, government and other organizations across Canada and the world.

CIC website

Council of Canadian Departments of Psychology

Formed in 1999, our primary objectives are to represent and promote psychology as a scientific discipline inside and outside university settings. We serve an advocacy and informational role with regional and national agencies which provide research and scholarship funds, and we provide leadership and perspective in the areas of undergraduate and graduate education, program accreditation, and research that takes place within departments of psychology. We maintain an active listserv, website, and database to ensure that our members are informed and connected. We have over 60 members from institutions across the country, from Vancouver Island to Newfoundland.

CCDP website

Council of Canadian University Chemistry Chairs

…representing over 60 Universities.

CCUCC website

Fédération québécoise des professeures et professeurs (FQPPU)

La Fédération québécoise des professeures et professeurs d'université (FQPPU) est un organisme à vocation politique dont la mission globale est d'œuvrer au maintien, à la défense, à la promotion et au développement de l'université comme service public et de défendre une université accessible et de qualité.

Site web du FQPPU

Professional Institute of the Public Service of Canada

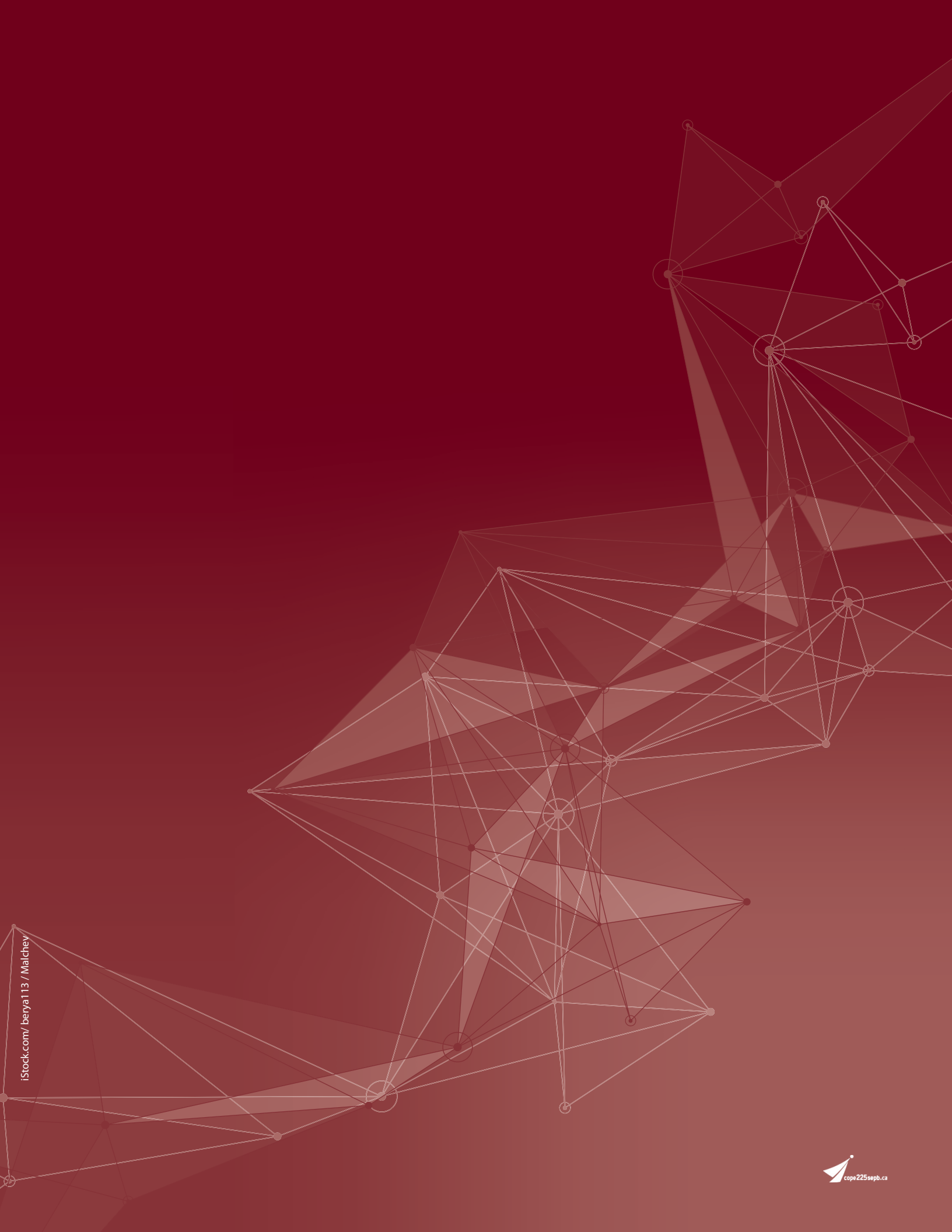
The mission of The Professional Institute of the Public Service of Canada is to represent members collectively and individually, by providing bargaining, labour relations and other member services; by promoting and defending the rights and interests of members; and by safeguarding and promoting professional standards.

PIPSC website

Statistical Society of Canada

The mission of the Statistical Society of Canada is to encourage the development and use of statistics and probability.

SSC website



iStock.com/ berya113 / Malchev

cope225sepb.ca