STRATEGIC PLAN

NSERC 2030: Discovery. Innovation. Inclusion.

NSERC
CRSNG

Cover page illustration: Raymond Biesinger

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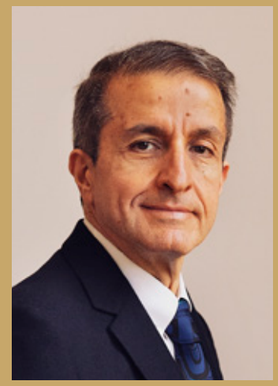
Message from the President and Chair



Prof. Alejandro Adem, FRSC
President, NSERC

Dr. Charmaine Dean
Chair, NSERC Council

We are delighted to provide a few words of context and introduction for our agency's strategic plan, *NSERC 2030: Discovery, innovation, inclusion.* *NSERC 2030* presents a vision for an agile agency that is steadfast in its support for investigator-driven discovery research while enabling quick responses to emerging Canadian research priorities.

We saw the value of a rapid scientific response to the COVID-19 pandemic. At the same time, we recognize the need for large-scale, sustained support for research on existential threats like climate change and anti-microbial resistance. Investments in emerging research areas and technologies such as artificial intelligence, quantum science and clean technology are also important priorities to maintain Canada's competitive advantage in these fields. Indeed, identifying, supporting and mobilizing new scientific and technological breakthroughs is a central aspect of our mission as a forward-looking agency.

Modern science recognizes the importance of mission-oriented research involving both the private and public sectors, and our plan proposes to see NSERC as a key player in mobilizing research to address the science and technology priorities that can enhance the economic prosperity and well-being of Canadians. Our vision is that of an agency that supports a continuous spectrum from blue skies research to commercialization.

As you will see, NSERC has an ambitious vision for Canadian research excellence and its potential to benefit the well-being of humanity and of our planet. Because our research ecosystem relies entirely on talented and skilled people, training, supporting and diversifying the next generation of Canadian scientists and engineers will be a top priority. Likewise, finding ways to continue attracting top international talent in a highly competitive global landscape will be big challenge that must be addressed.

Our plan emphasizes the overarching importance of equity, diversity, accessibility and inclusion across all our programs and throughout the research ecosystem. It also commits to developing deeper and more meaningful engagement with Indigenous communities, organizations, researchers and trainees and to exploring the role of science and research in the journey towards reconciliation.

In an era of misinformation, our plan also underlines the importance of promoting and communicating science, especially to eager young minds. NSERC will build on its excellent track record to enhance science literacy across Canada and provide critical support for programs involving schools, museums and other organizations to increase the participation of youth in STEM activities, with a particular focus on broadening opportunities for members of traditionally underrepresented groups.

To deliver on our plan, we envision a modern, inclusive, collaborative agency that is part of a harmonized, cooperative Canadian ecosystem. We will work closely with the Canadian Institutes of Health Research (CIHR), the Social Sciences and Humanities Research Council (SSHRC) and the Canada Foundation for Innovation (CFI), with other federal science-based departments, and with third-party organizations to deliver a "Team Canada" approach to addressing domestic and international research priorities, with a renewed focus on interdisciplinarity and open science, all while ensuring that Canadian research, knowledge and intellectual property is protected from foreign threats. We will seek to maintain a leading role for Canada as an international player in science and innovation.

The starting point for this plan was the report by the Council of Canadian Academies (CCA), Powering Discovery, which provides a thoughtful and extensive review of best international practices for funding natural sciences and engineering. That report should be regarded as a companion piece to this plan, which will inform us as we embark on the journey of implementation. This will require creative and original thinking about our current and new programs based on data-driven best practices as well as flexibility and experimentation.

We are especially grateful to our colleagues at NSERC who participated enthusiastically in developing the plan and are eager to see its implementation over the next few years. An important area of focus of this plan is the agency's commitment to ensuring the well-being of our staff, to living our values and to creating an optimal workplace for supporting science and engineering across Canada.

Finally, *NSERC 2030* was developed through extensive consultations with the Canadian research community, as well as with our institutional partners in the broader ecosystem. NSERC Council also played a key role in developing our strategy. As such, it conveys many of their views and aspirations, and we thank all of them for their invaluable contributions.

Acknowledgements

NSERC extends heartfelt thanks to staff, Council members and members of our diverse community of researchers, innovators and partners who offered their insights and valuable input in the strategic planning process. We also thank the Council of Canadian Academies for its 2021 report, Powering Discovery, which provided us with instrumental data that helped shape our vision. The report will be an important reference for the implementation of our strategic plan.

NSERC acknowledges that our Ottawa headquarters are located on the unceded territory of the Anishinaabe Algonquin people, who have been the traditional guardians of this land since time immemorial. We also pay respect to all First Nations, Inuit and Métis people across Canada and recognize and respect their ancestral treaty rights.

NSERC at a glance

Science and engineering deliver prosperity for society. Our mission is to nurture the discoveries and innovations that advance knowledge, improve the lives of Canadians and transform the world for the better.

The Natural Sciences and Engineering Research Council (NSERC) is Canada's largest funder of science and engineering, with a sterling international reputation thanks to our unwavering support for research excellence. We support the work of the best and most promising researchers, students and postdoctoral fellows at universities, colleges, CÉGEPs and polytechnics across the country. The research programs and projects we fund can be curiosity-driven, applied, industry-focused, interdisciplinary or high-risk/high-reward, uniformly enriching today's research ecosystem and our society.

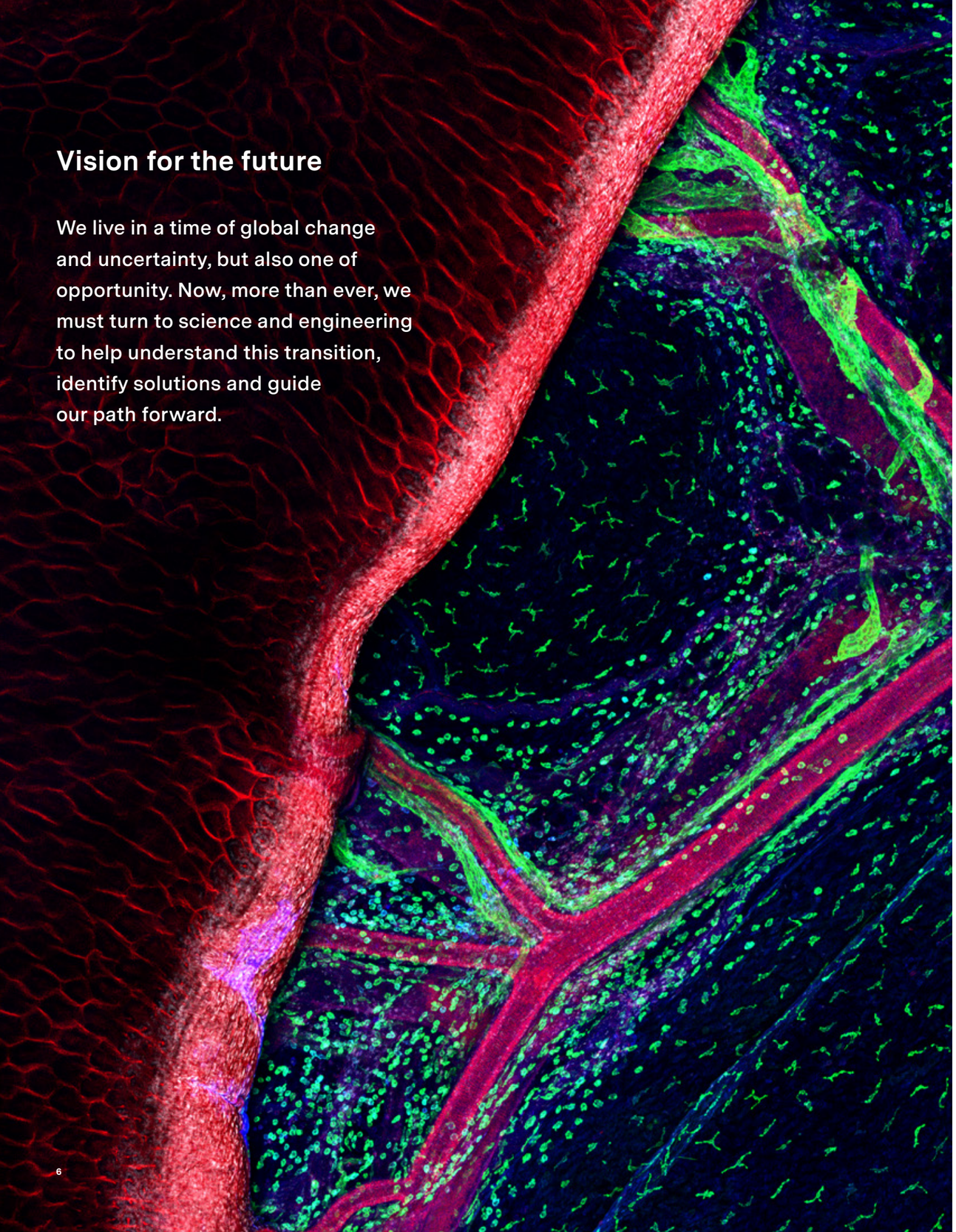
NSERC invests in over 70% of Canada's top researchers in the natural sciences and engineering and funds the training of over 33,000 students and postdoctoral fellows each year. Around 12,000 Discovery grants are currently funded; these are multi-year investments supporting research excellence at Canadian universities.

As an enabler, a convener and a promoter of discovery and innovation, NSERC helps forge invaluable links between researchers and key partners in the private, public and not-for-profit sectors. These collaborations generate new perspectives, drive commercialization and lead to breakthroughs that benefit Canada and the world. In 2021, NSERC supported nearly 5,000 partnerships among researchers and the private, public and not-for-profit sectors and facilitated $1.72 billion in leveraged contributions from partners over the past five years.

NSERC supports applied research in colleges and polytechnics across Canada, generating innovation with nearly 1,000 small- and medium-sized businesses each year and stimulating social innovation with more than 300 community-based partners. Each year, we steer over 20,000 students toward career-changing, experiential learning opportunities with R&D partners.

NSERC partners with the Canadian Institutes of Health Research (CIHR), the Social Sciences and Humanities Research Council (SSHRC) and the Canada Foundation for Innovation (CFI) to deliver some of Canada's key research funding and research support programs: Canada Research Chairs, Canada Excellence Research Chairs, the Canada First Research Excellence Fund, the New Frontiers in Research Fund, the College and Community Innovation program, the Research Support Fund and the new Canada Biomedical Research Fund. We also support graduate students and postdoctoral fellows through Canada Graduate Scholarships, Vanier Canada Graduate Scholarships and Banting Postdoctoral Fellowships.

NSERC promotes the value of science, engineering and the thrill of discovery in Canada, helping to ensure our research ecosystem can meet the talent, industry and technological demands of today and the future. Canada needs a diverse pool of world-class researchers to maximize its research potential; fostering a lifelong love of science in youth across the country is the best way to expand that pool. NSERC reaches two million young people, parents, teachers and curious Canadians every year through science promotion activities and supports close to 500 partners each year as they offer thousands of discovery-centred events in hundreds of communities across Canada.



Vision for the future

We live in a time of global change and uncertainty, but also one of opportunity. Now, more than ever, we must turn to science and engineering to help understand this transition, identify solutions and guide our path forward.

NSERC's programs help researchers achieve impact where breakthroughs are most needed, steering innovation for the public good. As Canada contends with the aftermath of the COVID-19 pandemic and the unprecedented challenge of climate change, deploying world-class expertise and accelerating discovery have never been more critical.

To face these challenges, Canada needs a deep pool of scientific expertise—after all, scientific endeavour depends on the skills, passion and knowledge of people. NSERC envisions a diverse and inclusive research ecosystem, one that expands the existing talent pool, welcomes researchers with a range of expertise, finds common space for mutually respectful exploration and decolonizes research practices to support First Nations-, Inuit- and Métis-led knowledge creation and innovation. This will serve to advance the research priorities of Indigenous rightsholders and produce economic, environmental and social benefits for Indigenous communities.

Collaboration expands opportunities and generates promising practices in research and innovation—the ones our scientists and engineers already embrace and the ones waiting to be unearthed. For NSERC, this means championing discovery research; interdisciplinarity; partnerships among academia, industry, the public sector and not-for-profit organizations; the contributions of small institutions as well as large; research security; and the principles of Open Science, all of this from the local to the global level.

We will work collaboratively and cooperatively with the other funding agencies and allied organizations in our ecosystem, building a strong, harmonized Canadian research infrastructure that reflects the increasingly interdisciplinary and dynamic nature of scientific research and the community's desire for administrative simplification.

As a research funder, NSERC must remain deeply connected to the community we support. We will continue to maintain strong partnerships with universities, colleges, polytechnics and CÉGEPs and, as we support Canada's research and innovation objectives and help drive change in key areas, work hard to align our programs with the community's needs. We will continue to share information and updates on our programs and provide a forum for receiving feedback directly from researchers and institutions, including through our NSERC Leaders initiative, advisory committees and research community engagement.

Recognizing the global interconnectivity of research and the daunting challenges of our times, NSERC will contextualize the impact of our programs within the framework of the United Nations' Sustainable Development Goals.

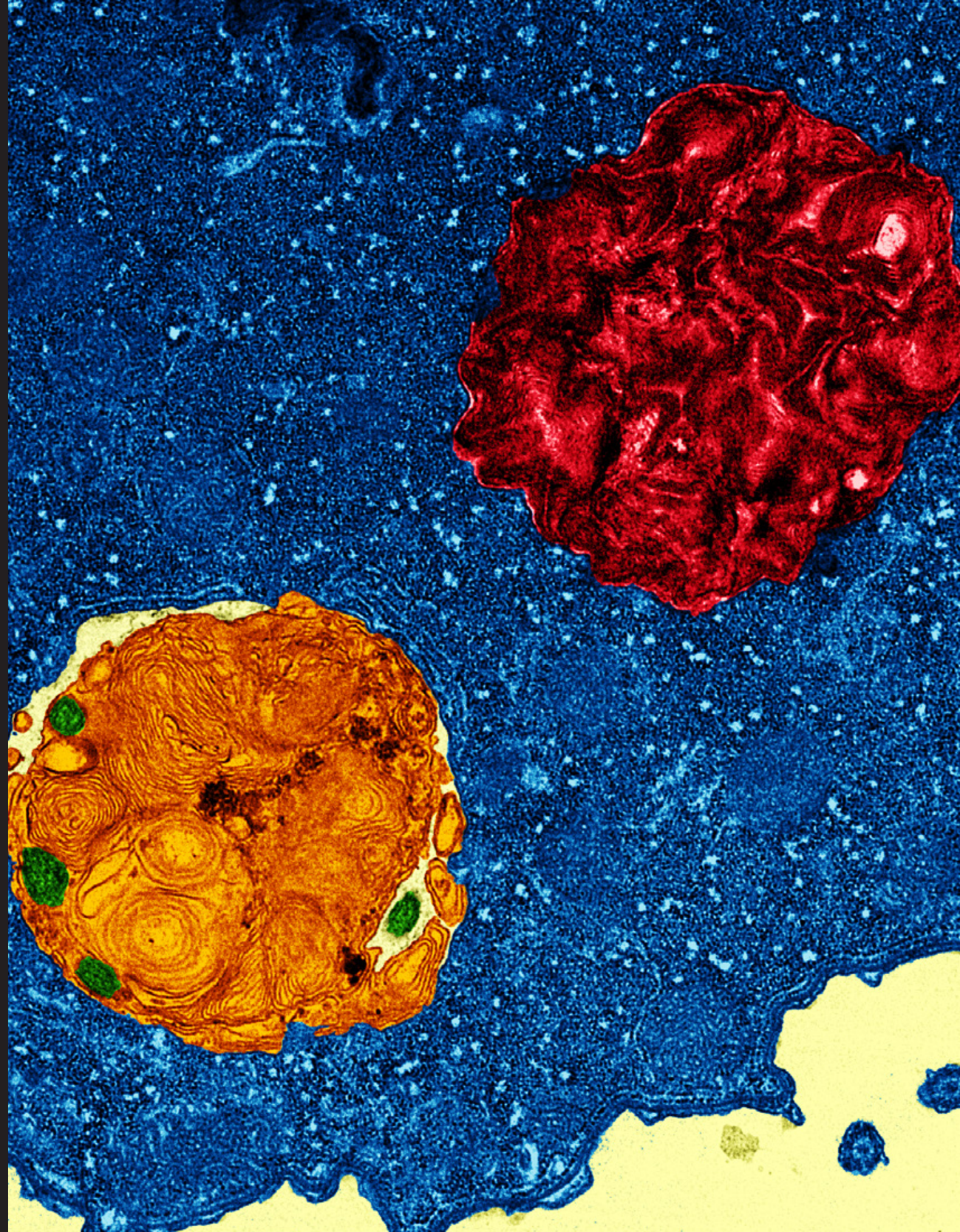
NSERC's future vision can be summed up in few words: help transform Canada into a global sustainability leader with a robust innovation economy and a dynamic research culture. If this sounds ambitious, we are ready. We are striving to modernize our operations to make them more adaptable and effective. We will build and maintain a diverse and talented workforce focused on excellence to achieve our vision. This will strengthen our role as a convener of new ideas, technologies and processes; as a promoter of science and engineering in schools and communities; as an accelerator of vital discoveries; and as a supporter of evidence-informed policy.

← **Tree of life**
Image by Keerthana Harwalkar, YuQi Li and Matthew Lok-Man Chang

McGill University

The tree of life (blood vessels in magenta and lymphatic vessels in green) branches out and reaches into the dark underground (uncleared intestinal surface in red) to "heal" it, as macrophages (in green) rain down to give a helping hand. This image shows us the distribution of tissue resident cells that populate the mouse peritoneum.

Support research excellence that strengthens Canada



A waste compacter
Image by Julie Alix Denoncourt, Steve Charette and Richard Janvier

Université Laval

The protozoan *Tetrahymena*, of which only a fraction in blue is seen here, is a single-celled freshwater organism. In this image, it is returning from a hunt for the bacteria on which it feeds (the green spots).

As Canada's largest funder of science and engineering, our path forward is clear: to fortify this country's robust research foundation through grants large and small. One of the best ways to support research progress is to offer a portfolio of options to applicants—one that accommodates a variety of endeavours and responds swiftly to emerging issues and the evolution of ideas.

To that end, NSERC's programming will continue to prioritize the curiosity-driven pursuits at the core of all scientific advancements. And because new knowledge relies on multiple kinds of investigation—across all disciplines—we'll also galvanize support for applied research as well as research in pressing and critical areas for Canada and the world. NSERC will work cooperatively with funding partners in government, the private sector and abroad, to leverage opportunities and increase impact.

The way researchers make discoveries is evolving, and NSERC must keep pace to continue providing effective research funding. This means adapting our programs and processes to foster interdisciplinarity and deliver on our commitment to the San Francisco Declaration on Research Assessment (DORA) by considering and valuing a broad range of contributions to research, training and mentoring in the evaluation of research excellence and by further focusing on the quality and impact of each contribution. It also means modernizing our program design and peer review mechanisms to match the way research functions today, easing burdens on applicants so they can focus on discovery and promoting policies and research founded on Open Science principles. Transparency and accessibility of research results will accelerate discovery, foster ethical practices and improve the robustness of findings.

More diverse and traditional ways of knowing, along with fresh methods and perspectives, are increasingly applied to research. NSERC will expand eligibility for First Nations, Inuit and Métis organizations across our programs. In line with the Tri-agency Indigenous strategic plan, Indigenous knowledge systems, Indigenous-led research and impact on Indigenous communities will be central considerations in NSERC's suite of programs.

Breakthrough discoveries can happen anywhere and be produced by anyone. Working with institutions and research organizations, NSERC will continue to promote the fundamental importance of accessibility, equity, diversity and inclusion in the research ecosystem. We must also recognize the research expertise that exists across the country and the impact of individual researchers as well as research teams.

Our focus

- NSERC will ensure that curiosity-driven, investigator-led pursuits form the foundation of our research funding.
- NSERC will work with the research community to review, modernize and improve our programs and processes to ensure their continued relevance and responsiveness to the needs of Canada's scientists and engineers.
- NSERC will work with SSHRC and CIHR to ensure that our tri-agency programs are aligned with the evolving priorities, objectives and methodologies for science and technology in Canada. We will collaborate transparently with both academia and government to provide connectivity and support, in particular on topics relevant to STEM fields.
- NSERC will explore ways to share valuable expert input to shape and advance future research, enhancing feedback to the research community while streamlining and improving the effectiveness of the competition process, shortening timelines and reducing administrative burdens.
- NSERC will apply EDI principles in its funding and ensure its peer review embraces a broader, more inclusive definition of excellence.
- NSERC will expand funding eligibility to Indigenous organizations and, working in collaboration with Indigenous rightsholders, explore the development of new funding opportunities to support Indigenous research priorities.
- NSERC will create an expanded funding envelop for research tools and instruments (RTI) that reflects increasing demand and the cost of doing research.
- NSERC will play a leadership role in supporting the Government of Canada's commitment to achieving net-zero emissions by 2050 and ensure our processes, policies and programs reflect this commitment to the environment.

We empower discovery

Researchers in Canada appreciate what discovery means in a funding context. Our grants portfolio has expanded to support some of the most promising research in the world.

— Our flagship Discovery grants help researchers chase advances over the long term while giving them the freedom to adapt as new findings emerge—to innovate wherever the research leads them.

— Because knowledge cuts across disciplines more than ever before, we're piloting the Discovery Horizons grants program, leveraging a new tri-agency interdisciplinary peer-review mechanism. These grants support science and engineering research that benefits from expertise in other domains. This promising pilot project aims to reshape the way we think about research questions, to craft new interdisciplinary tools and methods and to help our best investigators flourish in interdisciplinary research environments.

— Canada's post-secondary institutions must be robust to generate world-class research. The tri-agency Canada First Research Excellence Fund (CFREF) helps universities achieve success on a global scale by supporting their initiatives to attract the best research talent, forge fruitful partnerships, react to emerging discoveries and opportunities and establish transformational strategies. Approximately $200 million is awarded annually through the CFREF program to institutions working to amplify their key strengths.

— NSERC plays a vital role in the Government of Canada's New Frontiers in Research Fund, along with CIHR and SSHRC. This tri-agency program helps Canadian researchers working with partners, in Canada and abroad, delve into exciting new areas of interdisciplinary and high-risk/high-reward research that has the potential for transformative impact.

We know the importance of tools and instruments

Alongside the Canada Foundation for Innovation (CFI), NSERC ensures researchers can access the vital infrastructure and equipment they need to make scientific breakthroughs. Our Research Tools and Instruments (RTI) grants help university researchers build the best discovery and training environments at their institutions. These grants support the purchase, repair, renting or even creation of research equipment.

— An RTI grant allowed chemists Timothy Kelly and Bishnu Acharya to equip University of Saskatchewan facilities with a state-of-the-art instrument that measures molecular weight in polymers. This equipment is accelerating research on the use of advanced materials in commercial electronic applications and recycling agricultural biomass into plastics using sustainable biorefining processes.

— Another RTI grant is supporting collaborative investigations in neuroscience and robotics. Researchers at the Universities of Alberta and Waterloo can now work with their own world-class human-robot monitoring system and test facility, to learn more about the sensitive and complex interaction between humans and AI technologies, such as self-driving cars and assistive robotics. This equipment not only enables significant collaboration among scientific and social disciplines but also provides an outstanding training ground for researchers who are advancing Canada's AI industry and engineering better prosthetics.

We reward teamwork across disciplines

NSERC recognizes the value of interdisciplinary and cross-sectoral teamwork. The 2021 Brockhouse Canada Prize for Interdisciplinary Research in Science and Engineering was awarded to the Southern Ontario Centre for Atmospheric Aerosol Research (SOCAAR), which brings together experts across academia, industry and government working in fields such as public health, environmental engineering and the atmospheric sciences.

SOCAAR's efforts have widened our understanding of air pollution and its effects on cities. One of its studies revealed that most traffic pollutants are emitted by trucks, resulting in Ontario's policy shift toward better emissions testing and enforcement of larger vehicles. Other studies have shown that seasonal change impacts pollutants and that urban pollution is linked to hypertension and respiratory ailments. SOCAAR has also helped improve air monitoring technologies, and its overall work is leading to promising strategies to combat pollution's effects.

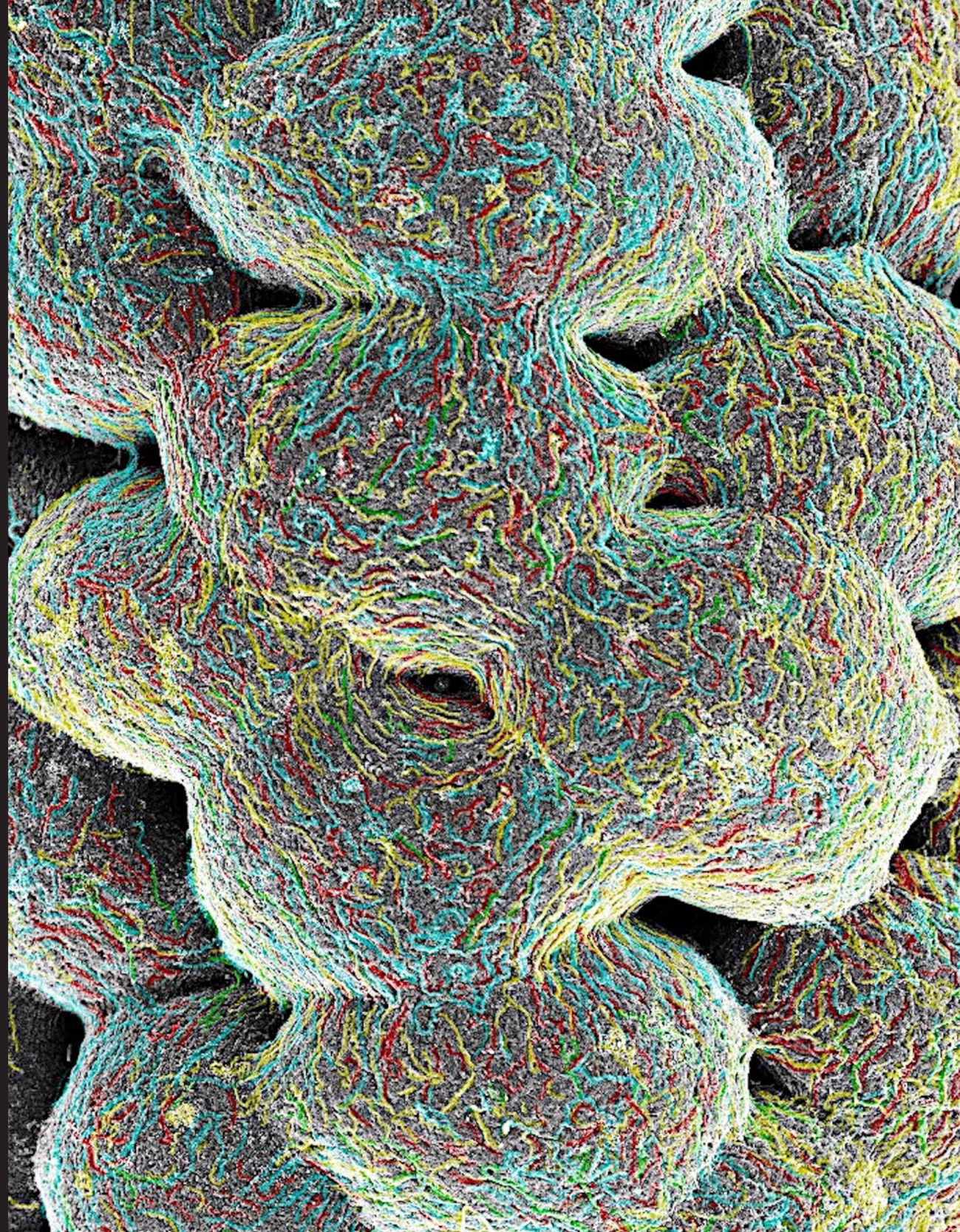
We support Indigenous leadership, self-determination and capacity in research

NSERC is committed to building meaningful relationships with Indigenous communities, organizations, researchers, students and postdoctoral fellows in line with the principles of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP); to supporting Indigenous research priorities; and to ensuring that NSERC-funded research involving Indigenous people and communities is beneficial to them and aligned with their priorities. We're involved in several initiatives that support the fuller participation of Indigenous scientists and engineers in the research ecosystem, fostering Indigenous research leadership and self-determination.

The Tri-agency Indigenous strategic plan, Setting New Directions to Support Indigenous Research and Training in Canada, embraces the reconciliation principle of ensuring Canadian research avoids replicating colonial impacts and is, instead, responsive to Indigenous needs and respectful of the role of Indigenous people as stewards of traditional knowledge.

NSERC has also signed a memorandum of understanding with Inuit Tapiriit Kanatami to further Inuit self-determination in NSE research and co-developed a workplan to help implement the National Inuit Strategy on Research; together, these will help "create a shared research pathway with full and equal participation by Inuit in the research process."

Expand, diversify and nurture Canada's talent pool



Everything is deeply intertwingled
Image by Olga Sirbu

University of Toronto

A scanning electron microscope was used to pinpoint the phenotype of one of the most primordial and conserved proteins in the extracellular matrix, called SPARC, in larval tissue of fruit flies *Drosophila melanogaster*, magnified to 40 microns.

NSERC knows the research ecosystem relies on attracting and retaining talented individuals at all career stages. Working with our partners, we will deepen Canada's wellspring of research talent and support experts so they have the resources and tools they need to meet every challenge.

This ensures that researchers can develop the skills that our collective well-being, environment and economy rely on, and that they can pivot their focus in an unpredictable and rapidly changing world. NSERC will work to prepare and empower those who are driven to contribute to the global knowledge economy, to deliver ground-breaking technologies and to provide essential knowledge for decision making.

This drive for discovery first emerges in schools and communities, and it must be nurtured at the root. NSERC will foster a science culture in Canada by supporting organizations that promote science literacy in schools and communities, by inspiring a love of discovery in young people and by empowering researchers at every stage—from students and fellows to early career researchers and principal investigators. Building trust in science depends on the openness of methodologies and results; NSERC is working to foster data management practices that create opportunities for new talent and reward researchers who practice Open Science.

High-quality training and mentoring play a major role in launching new researchers into exciting STEM careers. Budding scientists and engineers need a chance to experience different research and learning environments within Canada's extensive network of colleges, universities, and industry and not-for-profit partners, at home and internationally; this allows for greater knowledge mobilization and professional development. NSERC supports valuable research training opportunities for students and postdoctoral fellows, which helps them prepare for careers in and outside of academia. We'll provide flexibility for trainees seeking employment-focused programs that fit their chosen career paths, while encouraging the development of transferable skills that will benefit society.

Equally, researchers at the top of their fields must be empowered to explore ideas, generate knowledge and train the next generation of talent. Through the expanding tri-agency Canada Research Chairs and Canada Excellence Research Chairs programs, NSERC will continue to champion Canada's top NSE researchers and attract talented experts from around the world to our universities.

We also want to ensure that Canada's research ecosystem is accessible and inclusive for everyone who contributes to discovery, whether they are students, technicians, data specialists or researchers. A robust research enterprise depends on a vibrant and diverse population of trainees. To achieve greater diversity among researchers, we must ensure that diversity is nurtured at every level of education.

Our focus

- NSERC will work with SSHRC and CIHR to modernize and harmonize our suite of talent funding opportunities in the context of a highly competitive global ecosystem. This includes increasing award levels for trainees and empowering early career researchers.
- NSERC will review our programs and policies and work with partners to encourage international mobility of Canadian students and fellows and to broaden research opportunities for international graduate students and postdoctoral fellows in Canada.
- NSERC will apply an EDI lens to programs, policies and processes to identify and address barriers to equitable participation of underrepresented groups across our scholarship and fellowship programs. We will implement measures that support broader access to programs across the training spectrum, such as targeted funding opportunities that recognize Indigenous-specific contexts and Black scholars.
- NSERC will work with First Nations, Inuit and Métis communities and organizations to develop effective training mechanisms for nurturing and supporting Indigenous talent in STEM fields where they are critically underrepresented.
- NSERC will emphasize professional skills development to position trainees for success in whichever career they choose. We will build on our partnership with organizations advancing this work, such as Mitacs, to further expand industrial internship opportunities for students involved in NSERC-funded research projects.
- NSERC will review its governance structure to provide a strong voice to trainees and ensure their views and needs are properly considered.
- NSERC will develop mechanisms for supporting non-student research personnel who play a critical role in experimental sciences, by expanding eligibility to our programs.
- NSERC will continue to promote science literacy and STEM careers to young Canadians through its PromoScience program and through communications initiatives such as Science Odyssey and Science Literacy Week.

We recognize every stage of research excellence

NSERC will continue to recognize the impacts made by researchers at every stage—from student to Canada Research Chair.

— Our Collaborative Research and Training Experience (CREATE) programs help train new generations of researchers in key fields. These programs geared toward experts transitioning into the workforce are often international in scope. ArcTrain, for instance, is a Canadian-German CREATE initiative studying the impacts of climate change in the Canadian Arctic, subarctic and North Atlantic; its trainees are benefiting from access to vital research tools, direct experience on the ground in the North and professional development workshops.

— Thanks to provisions in Budget 2022, we're expanding the tri-agency Canada Excellence Research Chairs (CERC) program starting in 2023, funding at least a dozen additional CERCs in STEM fields. Experts will be recruited from all over the world to help in "reinforcing Canada's competitive advantage as a destination of choice for world-class researchers."

— NSERC recognizes extraordinary early-stage researchers through E.W.R. Steacie Memorial Fellowships, recently rebranded as Arthur B. McDonald Fellowships. These awards support early career researchers emerging as leaders in their fields. One past winner, UBC's William Cheung, is an ocean sustainability expert whose novel simulations help us predict the movement of marine species seeking cooler waters. This model gives policy makers a tool to help mitigate the impacts of climate change on coastal ecosystems and communities.

— Eminent NSERC-funded researchers who have produced an influential body of work throughout their career are celebrated yearly with the Gerhard Herzberg Canada Gold Medal for Science and Engineering. The list of award winners over the past few decades is comprised of highly distinguished and internationally renowned Canadian scientists, including recipients of the Nobel Prize, the Turing Award and the Wolf Prize. The 2020 awardee, University of Toronto's Molly Shoichet, is a biomedical engineer whose hydrogel innovation has opened new possibilities in regenerative medicine and pharmaceutical testing. The Shoichet Lab is now a lead player in the race for potential breakthroughs in vision, brain, spinal cord and cancer research.

We're striving to make research more inclusive

Research excellence depends on a diverse talent pool and on the opportunity for researchers to create positive and relevant impacts for every community in Canada.

— Along with CIHR and SSHRC, NSERC has developed the Dimensions Charter and related pilot recognition program designed to help postsecondary institutions increase equity, diversity and inclusion. The program addresses barriers and discrimination faced by women, Indigenous Peoples (First Nations, Inuit and Métis), persons with disabilities, members of visible minorities/racialized groups and members of LGBTQ2+ communities. More than 140 institutions have endorsed the charter. Seventeen post-secondary institutions are in the pilot program and will be able to apply for a Dimensions recognition. These institutions are part of an EDI community of practice that has helped co-develop resources and tools to drive cultural change in the research ecosystem.

— For too long, Black researchers have faced barriers to scholarship, grant and fellowship programs and, as a result, are underrepresented in science and engineering. Budget 2022 provided the Tri-agency with new funds "to support targeted scholarships and fellowships for promising Black student researchers." This will help create a more equitable and inclusive research ecosystem in Canada while increasing opportunities for some of this country's top talent.

— Strengthening EDI in science and engineering culture requires leadership. The pilot Chairs for Inclusion in Science and Engineering program supports researchers who contribute to a culture of inclusion by catalyzing networks of supporters, promoting EDI principles and enhancing awareness and understanding of barriers and inequities faced by members of underrepresented groups in NSE fields.

We're championing Indigenous research talent

— NSERC's Indigenous Student Ambassadors grants provide funding for Indigenous doctoral students and postdoctoral fellows so they can visit schools and Indigenous communities. These grants allow ambassadors to participate directly in community events and to promote science and engineering in workshops, pow wows and other activities in order to encourage greater Indigenous participation in these key areas.

— Our Undergraduate Student Research Awards help nurture students' interest in research and graduate studies in NSE fields. To remove barriers to program access, institutions can send applications from students who identify as Indigenous without impacting their institutional USRA quota.

— As participants in the Interdepartmental Indigenous STEM (I-STEM) Cluster, we are working with other federal departments and agencies to support the retention and career advancement of Indigenous employees working in STEM across the government. We're also identifying ways to encourage more Indigenous youth to pursue science and engineering at university.

NSERC is fostering a science culture in Canada

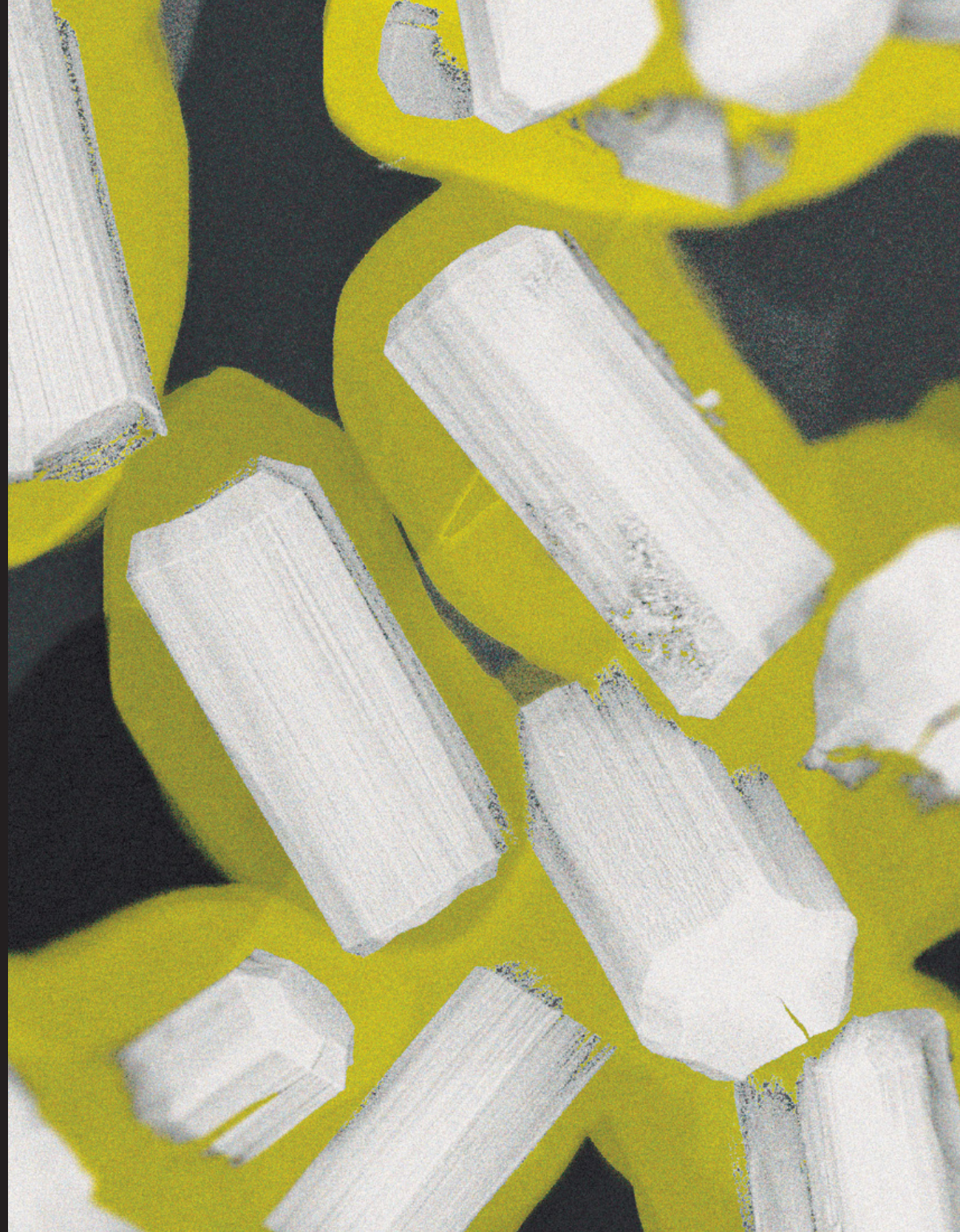
Getting Canadians of all ages excited about science is an ongoing NSERC priority, because trust in science leads to better decision making and a happier, healthier society for all. NSERC's science outreach and promotion initiatives contribute directly to a science mindset among the public, one that is curious, critical, open to evidence and new ideas and recognizes how science and engineering enrich our lives and communities.

— NSERC promotes science and engineering through outreach initiatives such as Science Odyssey, Canada's cross-country science and technology week. Since 2016, NSERC has been leading this national campaign, which emphasizes the importance of science, engineering and math for Canadians of all ages. On average, 410 Science Odyssey partners deliver 830 events from coast to coast to coast every year.

— Science Literacy Week brings together hundreds of schools, museums, libraries and other organizations annually to showcase the wonder of science for families. It focuses on sharing words, books and magazines related to discovery. Every year, an average of 255 like-minded organizations unite to present 550 events throughout Canada. The week culminates with National Science Reading Day, which had 44,000 participants in 2021.

— The NSERC PromoScience program supports organizations working with young people to promote an appreciation of science and engineering as well as hands-on learning. Through this program, the University of Calgary's Schulich Ignite project expanded online access to science and technology learning for youth in rural and remote locations, with a particular focus on reaching youth from underrepresented groups in the technology sector, including Indigenous youth and girls. With NSERC's support, the program grew twofold, and hundreds of budding software engineers were mentored by students at the Schulich School of Engineering. Elsewhere, through Wilfrid Laurier University, the Mama Aki Camp engaged Indigenous youth eager to learn more about ecology, biodiversity and food and water sources. This initiative was also diverted online due to the pandemic, where Indigenous Elders, knowledge-keepers and professionals helped deliver learning content.

Translate discovery into impact



Metal-organic illumination
Image by Paola Marino

Concordia University

What appear to be smooth hexagonal rods in this image are metal–organic frameworks (MOFs)—a captivating class of highly structured porous materials, comprised of inorganic and organic building blocks. Captured in three-dimension is NU-1000, a type of MOF that is comprised of zirconium, carbon and oxygen.

NSERC supports collaborations among institutions, researchers, industry leaders, not-for-profit organizations, Indigenous organizations and government decision makers to help promote evidence-based policy in Canada and build trust in expertise. When policy makers at all levels turn to sound research results and adopt breakthrough technologies, all Canadians benefit.

To help solve today's most pressing challenges, bolster Canada's economic competitiveness and prosperity and strengthen our place in an increasingly unpredictable global environment, we must ensure that new knowledge and technologies are put to use. To this end, NSERC will nurture connections with vital partners in the research ecosystem, including CIHR, SSHRC and CFI, other government departments and agencies, colleges and universities, industry, not-for-profit organizations, Indigenous communities and provincial funders. By supporting such partnerships, NSERC helps accelerate the application of research results for social, environmental and economic benefits. These connections promote instrumental collaborations, bringing together diverse perspectives and skill sets from across the innovation spectrum to find solutions.

We will also promote wider and more accessible dissemination of research findings based on Open Science principles. This helps ensure vital discoveries can have an impact where they're most needed, whether that happens to be in a single community, in a unique Canadian region, across the entire country or globally.

Our focus

- NSERC will enable flexible partnerships between post-secondary researchers and the private, public and not-for-profit sectors.
- NSERC will fund mission-oriented research and training to enable the development of new knowledge and technology, which is needed to address the significant societal, economic and environmental challenges of our time. Key challenges will be identified in partnership with stakeholders and government.
- NSERC will support college-based applied research in science, technology, social and health innovation that responds to the needs of business and community partners across Canada.
- NSERC and the National Research Council will explore further collaboration to create new joint opportunities that bring together academic and government scientists, as well as the private sector, to leverage resources and help address science and engineering challenges that are critical for Canada.
- NSERC will promote Open Science principles that encourage knowledge sharing and data access while respecting Indigenous data sovereignty. We will collaborate with other Canadian and international research funders to maintain an updated open-access policy aligned with global standards and appropriate to the Canadian context.
- NSERC will catalyze collaborations among policy makers and researchers in academia and government to help translate knowledge into impactful solutions. We will seek to create new joint funding opportunities with the Government of Canada's science-based departments that will leverage resources and knowledge to the benefit of Canada.

We collaborate across sectors

Collaborations that stretch beyond the lab help maximize research impact. NSERC will fortify existing cross-sectoral collaborations and forge new ones in the coming years.

— Through our flagship Alliance grants, we assist university researchers who are collaborating with public, private and not-for-profit partners to apply new knowledge to complex challenges. These grants help galvanize Canadian competitiveness and speed up the process of mobilizing knowledge and technology outside of academia in order to benefit wider society and support public policy.

— NSERC supports colleges, CÉGEPs and polytechnics through several initiatives. Through the NSERC-managed tri-agency College and Community Innovation program, we support collaborations between colleges and local companies to generate innovative solutions to business challenges, drive commercialization and support technology transfer and adoption. The College and Community Social Innovation Fund enables partnerships between colleges and arts organizations, Indigenous communities and other entities working on social innovations that improve inhabitants' well-being.

— We also provide grants to colleges that are establishing or expanding Technology Access Centres (TACs), which offer specialized expertise to public, private and not-for-profit organizations in their community. Two examples of NSERC-supported TACs are the Screen Industries Research and Training Centre at Sheridan College and the Centre technologique en aérospatiale at CÉGEP Édouard-Montpetit.

— Through our Idea to Innovation grants, we partner with public and private organizations to support researchers and technology transfer offices bridging the gap between science and the market. These grants promote the development of disruptive technologies and the de-risking of academic inventions. They help attract investments to support the growth of Canadian companies and start-ups, support intellectual property protection, raise awareness around research commercialization and foster an entrepreneurial culture.

We help connect research to national priorities

NSERC is uniquely positioned at the interface of government and the NSE research community. As a federal agency, we'll remain agile and responsive to the science and innovation priorities of Canada and its government. We will connect researchers with decision makers to ensure the most up-to-date knowledge is made available amid competing priorities and challenges.

— Established in 2018, the Canada Research Coordinating Committee (CRCC) brings together key players in the federal science ecosystem to ensure Canada's research investments are harmonized and aligned with Canadian priorities. Through the CRCC, NSERC is working to enhance collaboration and strengthen Canada's research ecosystem, so discoveries can more quickly be translated into impacts that boost our overall well-being.

— NSERC is collaborating with Environment and Climate Change Canada (ECCC) to deliver a targeted funding call in support of Canada's 2030 Emissions Reductions Plan. This special call supports research into greenhouse gas emissions reductions by interdisciplinary research teams, working with a range of partner organizations.

— In partnership with Agriculture and Agri-Food Canada (AAFC), NSERC is supporting post-secondary research in developing technologies and crop varieties that will allow for net-zero emission agriculture, another important piece of the puzzle in the fight against climate change.

— Quantum science is unlocking opportunities in many areas of application. Through Canada's National Quantum Strategy, NSERC is funding a range of new research and training opportunities that build on our prior investments in quantum research. This support will galvanize Canada's expertise in quantum science and help secure our global competitive advantage in this area.

— To address the threat that infectious disease has posed to human health and societies throughout the COVID-19 pandemic, NSERC joined with the Public Health Agency of Canada to launch the Emerging Infectious Diseases Modelling Initiative. As we learned during the pandemic, accurate modelling tools that can predict the spread of disease are crucial for health authorities seeking effective measures to respond to outbreaks and limit transmission.

We embrace the principles of Open Science

Every discovery builds on another, which is why Open Science principles are central to NSERC's strategic vision. Removing access barriers to research findings promotes the sharing of ideas and makes the research ecosystem more transparent and robust.

Open Science maximizes funding agencies' return on research investment and accelerates the pace of discovery. Moreover, it enshrines discovery as a public good, especially when findings are urgently needed by policy makers, regulators and not-for-profit organizations.

NSERC will promote the Tri-agency Open Access Policy on Publications and the Tri-agency Research Data Management Policy; we will uphold FAIR (findability, accessibility, interoperability and reusability) and CARE (collective benefit, authority to control, responsibility and ethics) principles when it comes to Indigenous data management and stewardship, in particular. We signed Wellcome's global joint statement on the sharing of data related to the outbreak of COVID-19, whether in the form of pre-prints, project descriptions or published articles. Our Open Science policies and practices will take into consideration crucial variables, such as ethical or legal limitations, the privacy of research subjects and Indigenous data sovereignty.

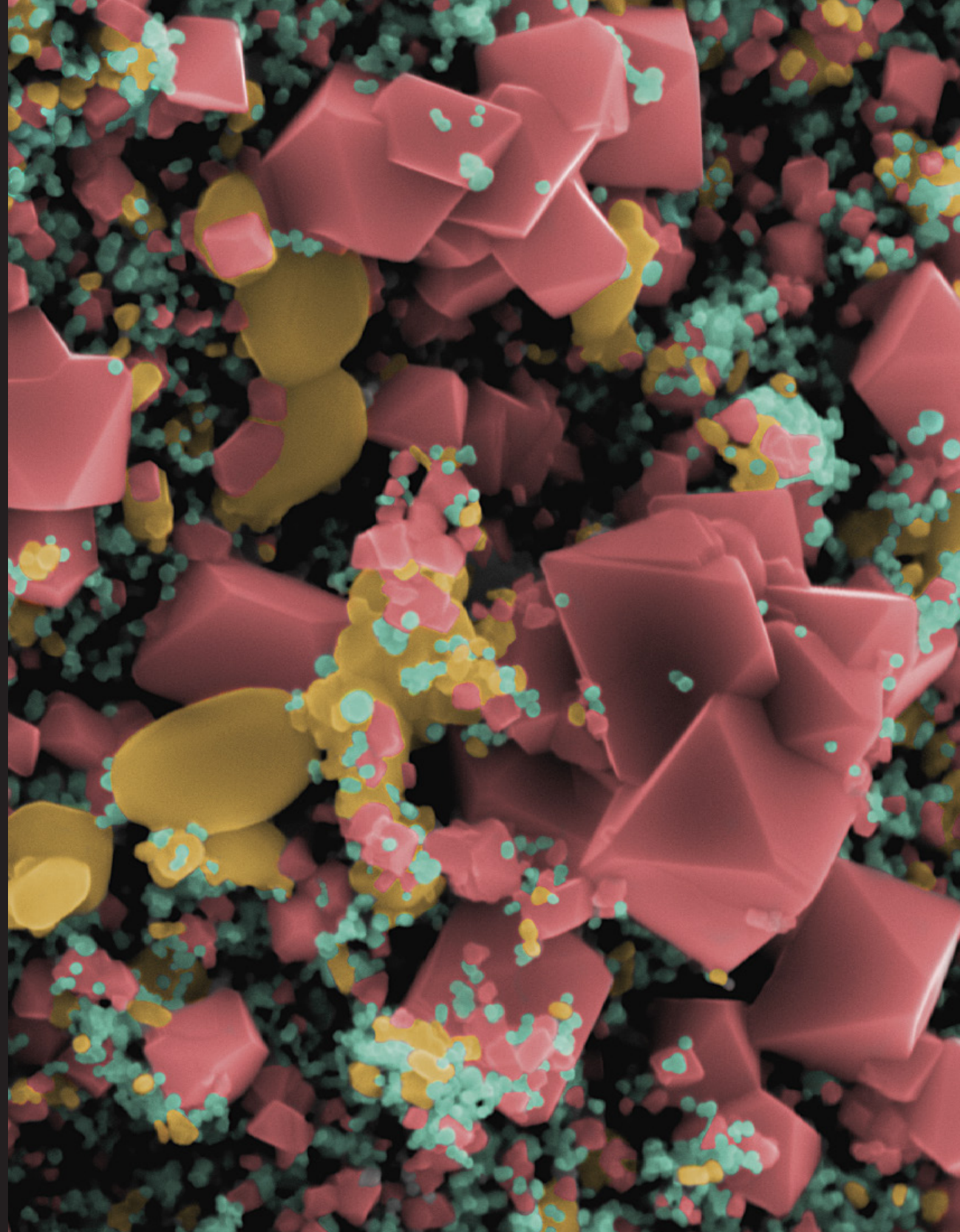
Exposing the hidden life of a parasite
Image by Kate Donaleshen and James Robinson

University of Victoria

A small parasitic wasp (*Megastigmus spermotrophus*) is one of many destructive insects to attack Douglas-fir trees, a major economic driver in western Canada.

PILLAR 04

Mobilize knowledge on a global scale



Mighty magnetic marvels
Image by Stephanie Gallant

Memorial University
of Newfoundland

This image shows magnetic cobalt ferrite crystals, ranging in size from about 50 nm to 600 nm, roughly 10,000 times smaller than a poppy seed.

Today's researchers, businesses and governments are part of an interconnected knowledge network that spans the globe, and NSERC recognizes the profound impact that international collaboration can have on research outcomes. We'll expand these partnerships to help scientists and engineers bring the greatest benefit to Canada while harnessing, in turn, global expertise that can advance the work of Canada's researchers.

Strong partnerships among the world's network of research institutions and funding organizations provide Canada's scientists and engineers with greater opportunities, help funding go further and ensure our researchers are connected to the best talent, ideas and facilities around the globe. NSERC is committed to supporting Canadian researchers while positioning Canada as a trusted partner for research collaboration and knowledge exchange on the global stage. Mobilizing knowledge across borders accelerates findings that can resolve today's most pressing and complex global challenges.

However, as the speed and complexity of science and engineering intensify, Canada's world-class research is a target for theft, espionage and the unauthorized transfer of intellectual property. NSERC is working with policy makers and researchers to put research security practices in place as global dynamics change, ensuring our research ecosystem is as open as possible and as secure as necessary while upholding core values of research integrity: honesty, fairness, trust, accountability and academic freedom.

NSERC's commitment to research security is fundamentally interconnected with our commitment to Open Science, national and international collaboration and accessibility, equity, diversity and inclusion. The global knowledge ecosystem is enriched by a collaborative, interdisciplinary, sustainable and inclusive approach. Within that ecosystem, we will take a leadership role when it comes to welcoming Indigenous participation and expertise, backing scientists and engineers from traditionally underrepresented groups and promoting interdisciplinary collaboration. Doing so will maximize the full potential of both Canadian and global discovery and innovation.

Our focus

- NSERC will forge partnerships with research funding agencies around the world that are aligned with our values and bring significant added value to the Canadian research ecosystem.
- NSERC will help Canada's most promising researchers and research institutions develop strong partnerships with international peers.
- NSERC will be an enthusiastic partner in a "Team Canada" approach to international collaboration along with other agencies and organizations, under the leadership of the Canada Research Coordinating Committee.
- NSERC will help lay the groundwork for successful participation by Canadian researchers in Horizon Europe, together with the other members of the Canada Research Coordinating Committee.
- NSERC will be an active participant in select international consortia focused on shared global priorities, which can significantly leverage NSERC funding to benefit Canadian researchers.
- NSERC will work with federal partners, academic institutions, research organizations and individual researchers to safeguard Canadian knowledge, data and intellectual property from foreign threats, assuring Canada's economic prosperity, national security and the integrity of our research enterprise.

We link Canadian experts with international partners

In a global research ecosystem, NSERC enables Canadian researchers to contribute their expertise to international projects. By collaborating across borders, researchers can pool expertise and resources to address global challenges at a much greater scale, achieving outcomes that would not be possible in isolation.

— The Alliance International grants ensure the world recognizes that Canada's researchers are global assets. These grants support Canadian scientists and engineers who are collaborating with global research leaders from the academic sector, helping Canadian researchers share their expertise abroad and leverage international know-how.

— The International stream of the tri-agency New Frontiers in Research Fund program supports Canadian experts involved in international high-risk/high-reward projects that push boundaries to unearth new ideas. These partnerships are making transformative impacts worldwide while enhancing Canadian competitiveness and research leadership on a global scale. Canada is currently spearheading a global climate change initiative through this fund.

— NSERC has established strong collaborative partnerships with leading agencies around the world, including the U.S. National Science Foundation, France's Centre national de la recherche scientifique, the German Research Foundation (DFG) and UK Research and Innovation. These have led to focused support for recent and future joint research opportunities in areas such as quantum technologies and artificial intelligence.

— Through the Canada Research Coordinating Committee, Canada and its funding agencies are working towards formal association with Horizon Europe, an exciting new dimension for our country's science.

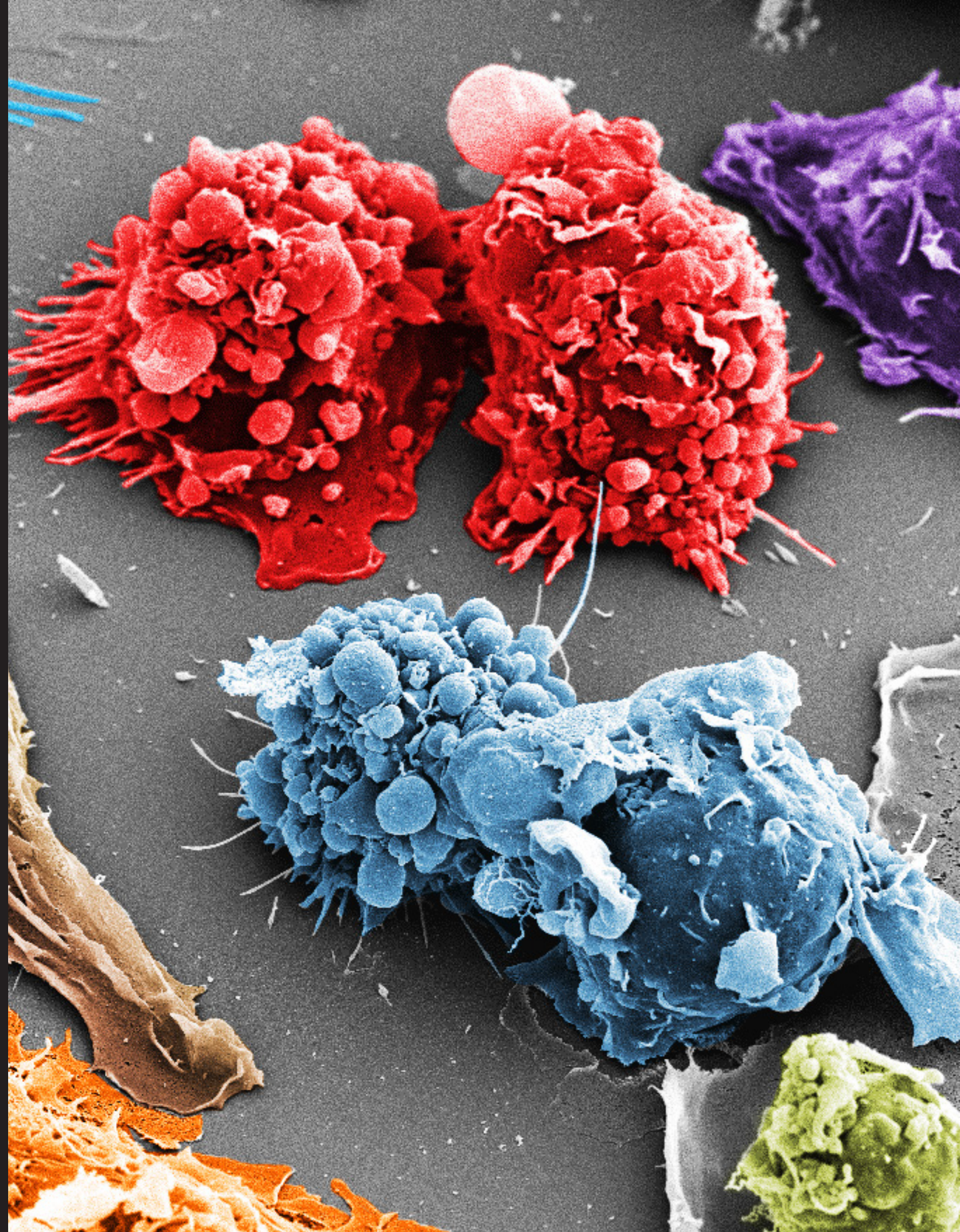
We champion Canadian science and engineering on the global stage

As a founding member of the Global Research Council, NSERC helps bring together science and engineering funding agencies from around the world to discuss shared challenges and best practices and to promote international collaboration and data sharing.

Along with CIHR, NSERC serves as Canada's representative to the Human Frontier Science Program (HFSP), helping to promote international collaboration and providing support for cutting-edge interdisciplinary research in the life sciences. Canadian researchers, as well as international researchers working in Canada, benefit tremendously from the prestige and collaborative model that the HFSP offers.

NSERC is also a key member of the Belmont Forum, an international consortium that funds multidisciplinary research on environmental issues.

Empower our organization and our people



Progenitor male germ cells
Image by Awang Junaidi Awang Hazmi, Ali Honaramooz and Eiko Kawamura

University of Saskatchewan

Gonocytes are cells that are progenitors of stem cells found in the testicles of newborns. This image shows different gonocytes (coloured cells) after two weeks in culture, interacting with testis cells (grey cells in the background).

People are at the heart of NSERC's success as an organization. To deliver on the priorities laid out in this plan and adapt to new ways of working, NSERC's workforce must be talented, agile and diverse. We must also embody a modern, healthy and inclusive work culture.

Our workforce will be bolstered by attracting, developing and retaining skilled and knowledgeable people from across Canada. By promoting bilingualism and accessibility in our workplace and by identifying and removing barriers so employees can achieve their full potential, we will cultivate a working environment that fosters creativity and excellence, promotes employee well-being and rewards all forms of success.

The way we work is changing. The future of work at NSERC will be a technology-enabled hybrid work model that will prioritize virtual core business while encouraging in-person collaboration where needed. A hybrid approach will put work-life balance at the forefront, enable us to access a broader and more diverse pool of talent from across Canada and reduce emissions associated with commuting and travel.

NSERC's hybrid approach to work will allow us to be leaders in the Greening Government Strategy by committing to more sustainable and responsible business practices that reduce our carbon footprint and better steward our environment. Council and peer-review meetings will be held online more often, reducing air travel. Our new net-zero Ottawa headquarters, located on Algonquin Anishinaabe territory in one of the most sustainable developments in Canada, will rely entirely on zero-carbon energy sources. We will also call on NSERC-funded researchers to evaluate the environmental impact of their work and take action to mitigate that impact.

As a promoter of innovation, NSERC welcomes the use of new technologies and practices within our own organization. We're committed to modernizing our management frameworks, policies, practices and operations to better support our workforce, to make transparent our responsible stewardship of public funds and to ensure we are responsive to the evolving needs of the research community and society. To this end, we're working with the other federal granting agencies to update and harmonize our grants management systems to better support applicants, administrators and reviewers during the grants management lifecycle. We're also bringing greater focus to inter-agency processes that enhance cooperation among funders, and we're taking steps to improve data management and stewardship to help promote evidence-informed policy and communicate the impact of our investments in research.

Our focus

- NSERC will build its workforce for future success by fostering accessibility, diversity, bilingualism and inclusion, and by promoting a safe, respectful and healthy work environment, making our organization one of the best places to work in Canada.
- NSERC will proactively recruit top talent and ensure that employees have the resources and support needed to continuously develop their competencies and skills and grow within the organization.
- NSERC will transition to a new way of working, adopting a hybrid work model and developing a new digital strategy to guide the modernization of our processes, practices and service delivery.
- NSERC will green our operations by significantly reducing the impact of our infrastructure and the need for travel and commuting.
- NSERC will host Mitacs Canadian Science Policy Fellows and visiting scholars from academia who will spend time at our agency to provide input on our programs and share their perspective with staff and management; this will enable the flow of ideas, improve communication and bring down barriers between the agency and the research community.

We're modelling the workplace and workforce of the future

NSERC is re-conceptualizing how we operate in the digital age, making our workplace and workforce more efficient and sustainable, and inviting talented people located further afield to work for, or contribute to, our organization. Our new headquarters overlooking the Ottawa River (Kitchissippi in Algonquin) is a state-of-the-art space for hybrid and virtual work. Our net-zero building's design focuses on healthier, more accessible and more collaborative work modes by integrating the latest tools and technologies and by reducing the use of water, energy and paper. This is all part of NSERC's Workplace Renewal initiative, which prioritizes modern and flexible office arrangements for our staff in an effort to lower our carbon footprint, improve work-life balance and enhance employee well-being.

We're testing innovative new ways to deliver our programs

NSERC has created the Program Innovation Hub so we can explore, test and learn how to better fund Canadian research. This new in-house initiative will help us develop and instill a culture of continuous program innovation and improvement across our agency, allowing us to deliver greater value and benefits to the research community in particular and to Canadians more broadly.

The Hub's main purpose will be to identify promising strategies, approaches and initiatives used by research funders and science promoters in Canada and around the world. This will be done through internal and external consultation, collaboration, data collection, analysis, experimentation and performance measurement, ensuring that any new program we adopt is based on evidence and best practices.

We're improving our own data stewardship

Everything comes down to data in the digital era and managing such a key asset requires focus and expertise. In November 2020, NSERC established a Chief Data Office to modernize our agency's data collection, management and analytics capacity, allowing us to improve overall decision making about program delivery. A transformative approach to managing in-house data will help unlock the promise of this asset to enhance NSERC programs, reduce administrative burdens on staff and applicants and communicate more clearly our value to the public.

The Chief Data Office is launching dedicated activities to improve NSERC's data stewardship in the short term, but it's also working to realize longer-term strategic capability. Specific actions include enriching data competencies among staff through training and recruitment; crafting a data governance framework to oversee this new direction; relying on the latest data tools and technologies; and enhancing data sharing with partners and stakeholders. All of this will help us ensure that our data is leveraged to its fullest potential to better serve the research community.

Tracking progress and measuring our success

NSERC will ensure we make progress towards our vision for the future by:

- engaging regularly with the science and engineering research community, Indigenous rightsholders and other stakeholders to assess whether NSERC is on track, maintaining flexibility to correct our course as needed
- strengthening our data management and analytics capabilities to support decision making and facilitate communications and information sharing
- monitoring and evaluating the effectiveness and impact of our programs on a five-year cycle
- advancing and monitoring the implementation of strategic initiatives using existing corporate processes and reporting frameworks, such as NSERC's annual integrated planning exercise; this will be shared every year through the Departmental Results Report

Telling our story

We will ensure NSERC communicates clearly with researchers, students and fellows, partners, Indigenous rightsholders, decision makers and the general public. We will also enable NSERC-funded researchers and trainees to effectively share their work and communicate its value. We are actively embedding science communication and knowledge mobilization activities as measures of success in our grant programs, broadening the reach and impact research has and redefining what we mean by research excellence. We want everyone in Canada to understand how investments in science and engineering are key to solving the challenges our country and world face today. Engaging Canadians with clear messaging that is relevant to everyday priorities will demonstrate the impact of natural sciences and engineering research and help keep our research ecosystem robust and active. Our framework for doing this is described below.

Engaging the research community

We will work to deliver consistent and timely information to Canada's science and engineering researchers, so they can harness NSERC programs and initiatives to their greatest possible advantage. To do so, we will work closely with universities, colleges, polytechnics and CÉGEPs to enhance outreach and highlight research success stories, in order to communicate the value and impact of the research we fund.

Engaging the public

It is essential that NSERC is known far and wide as Canada's champion of discovery and innovation, as its primary natural sciences and engineering research funder, and as a convenor of the research community. We want researchers to look to NSERC to spread the word about the impacts they are making. We will focus on producing creative and engaging content that promotes NSERC-funded research results and on enhancing our relationship with media to make it easier for science writers to interview Canada's most promising experts. We will also broaden our social media presence and create more multi-platform content.

Engaging our partners and our stakeholders

Collaboration unlocks discovery and innovation. To raise awareness of NSERC's programming and amplify stories of scientific breakthroughs and successes, we will strengthen our ties with organizations that are enriching Canada's science culture, with science advocacy organizations, with global partners in key countries and regions and with the communications offices of post-secondary and research institutions.

Engaging Canada's decision-makers

As a federal agency, NSERC's work is mandated and supported by the Government of Canada. To that end, we're committed to maintaining a strong relationship with Innovation, Science and Economic Development Canada as well as other relevant departments and agencies, so we can ensure federal partners and ministers have the science and engineering information they need to fulfill their priorities. We'll continue to showcase the social and economic benefits of government investment in NSERC, as well as the accomplishments of NSERC-funded researchers.

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