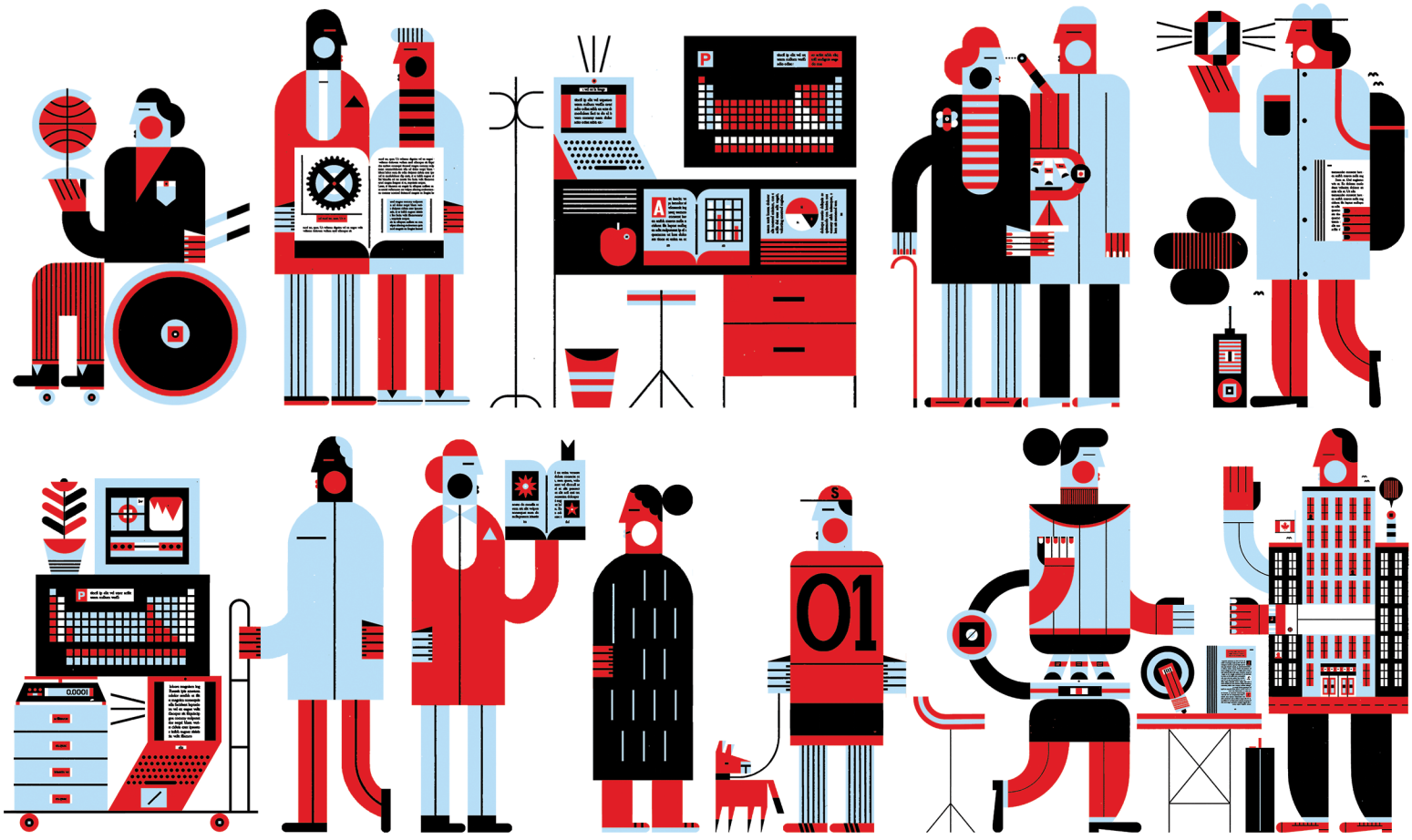
NSERC
CRSNG

## Consulting on the development of the NSERC 2030 strategic plan

# What We Heard report

March 2022

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# Part 1: Introduction

In November 2021, the Natural Sciences and Engineering Research Council of Canada (NSERC) commenced a consultation process with the scientific community to gather ideas and insights to inform its next long term strategic plan, *NSERC 2030*. The strategic plan, to be released in the fall of 2022, will lay out a vision for the future of natural sciences and engineering research in Canada and outline key priorities for NSERC as it continuously strives to improve the support it delivers to Canadian researchers and the Canadian research ecosystem.

This report provides a summary of input received through this consultation process, framed around a series of twelve discussion papers drafted by NSERC staff. Diverse groups with interests related to NSERC's mandate were consulted, including researchers, research trainees, university administrators, industry representatives, Indigenous leaders and government officials.

Input was gathered through several different approaches: discussion groups, online consultations, targeted focus groups, and one-on-one meetings between NSERC's President and stakeholders. Several organizations and institutions also provided comprehensive submissions, which are reflected in this report.

NSERC would like to thank everyone who took the time to provide valuable insight and thoughtful comments through this consultation process. We recognize that the COVID-19 pandemic continues to present real challenges for the research community and that many are struggling with balancing demanding workloads and other responsibilities. Your feedback will help shape NSERC's path as we seek to adapt to these new realities and meet the challenges of our time.

# Part 2: Key themes of what we heard

**2.1 Continue to prioritize the Discovery Grants program**

There was broad support for the critical role that the Discovery Grants program plays in the natural sciences and engineering (NSE) ecosystem and calls for NSERC to prioritize increasing the funding envelope for this program over launching more targeted or mission-driven funding opportunities.

**2.2 Increase the number of scholarships and post-doctoral fellowships offered by NSERC as well as the award values**

A common theme heard throughout the consultations was the need to better support research trainees, by offering more opportunities for funding as well as by increasing the value of the awards offered to relieve some of the financial burden placed on students and post-doctoral fellows.

**2.3 Where possible, streamline and harmonize program requirements to relieve administrative burden**

Participants expressed concern that the workload associated with grant applications and reporting was taking away from time spent on research and made recommendations for how to relieve some of that burden.

**2.4 Continue to promote equity, diversity, inclusivity and accessibility**

Consultations revealed widespread support for NSERC's efforts to ensure that the NSE research ecosystem is more equitable, diverse, inclusive and accessible. To date, progress on EDI remains uneven; more granular understanding of the persistent barriers is required, through comprehensive and disaggregated data, and meaningful engagement. Simple solutions will not be sufficient. Rather a culture of excellence that values a wider range of skills, experiences and expertise must evolve, along with scientific production.

**2.5 Engage with Indigenous communities to identify and support their research priorities**

Meaningful advancement of Indigenous self-determination in research was viewed as an important step towards reconciliation and the decolonization of research practices. Discussions centered around the need for openness and flexibility to support Indigenous-led research and around greater recognition of the uniqueness of Indigenous Peoples requiring a unique approach to engagement. This will involve allocating sufficient time and space to meaningfully engage Indigenous communities on research involving their communities or their land.

**2.6 Create more opportunities for partnerships between colleges and universities**

Participants were supportive of fostering collaborative and mutually beneficial partnerships between colleges and universities and of moving away from the binary view of research that takes place at colleges being completely apart from the research taking place at universities.

# Part 3: Who we consulted

## 3.1 Description of consultations

A public consultation period on the development of NSERC's new strategic plan took place from November 2021 to late January 2022. Consultations were framed around a series of twelve discussion papers developed by NSERC staff on the following topics:

1. Supporting multi- and interdisciplinary research
2. Supporting high-risk, high-reward research
3. Colleges, CEGEPs, and polytechnics and Canada's research and innovation ecosystem
4. Supporting Indigenous researchers and research
5. Supporting equity, diversity and inclusion in the research community
6. Enhancing connectivity in Canada's research ecosystem
7. Supporting researchers throughout their careers
8. Building the next generation of research talent
9. Maintaining flexibility and agility in research funding
10. Improving funding efficiency and reducing administrative burden
11. Enhancing research access and impacts in society
12. Improving the evaluation of natural sciences and engineering funding practices

Given the ongoing risk posed by the COVID-19 pandemic, and to facilitate national participation, all consultation activities (see annex B for the full list of workshops, focus groups and presentations) were held virtually. Feedback was sought on the ideas and concepts proposed in the discussion papers through four main approaches:

1. Workshops – NSERC staff hosted a series of nine workshops, with a total of 36 breakout groups, based on the discussion papers, between November 22 and December 8, 2021. The workshops were organized around three themes, each covered over the course of one week.
2. Focus groups and presentations – NSERC staff organized ten additional focus groups on key topics, including equity, diversity and inclusion (EDI); Indigenous research; high-risk, high reward research; and increasing the economic output of research. NSERC was approached to provide presentations on its strategic planning process to several groups and institutions, which included question-and-answer sessions.
3. Written comment period – NSERC solicited written comments through its website and via email between November 22, 2021, and January 16, 2022. Interested parties were also given the option to submit free-form responses through a monitored email address. Comprehensive submissions were received from several institutions and organizations, the content of which has been considered in the drafting of this document.
4. Additionally, NSERC's President discussed the NSERC 2030 strategic planning process with over 40 stakeholders and decision makers in meetings that took place between September 2021 and February 2022.

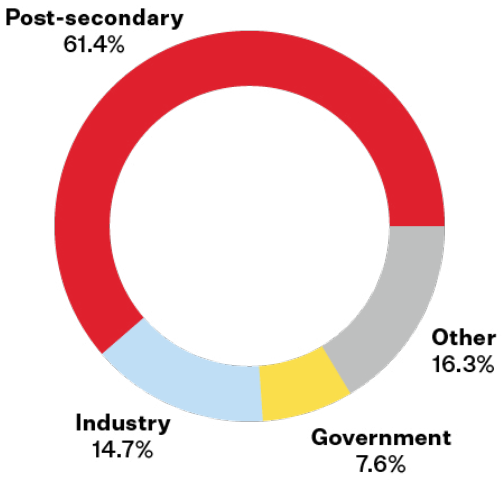
Throughout the consultation process, NSERC sought to include a diversity of views and perspectives and to ensure that there was representation from across Canada and from across the research ecosystem that it serves. NSERC engaged with the Canada Association of Research Administrators (CARA) and with *l'Association des administratrices et des administrateurs de recherche universitaire du Québec* (l'ADURAQ) to ensure that administrator perspectives were included. The agency also worked with l'Acfas to ensure the inclusion of francophone voices and with organizations representing trainees and young researchers including the Canadian Association of Post-doctoral Scholars and the Chief Science Advisor's Youth Council. Associations representing francophone and anglophone colleges and polytechnics were also actively engaged. Moreover, efforts were made to recruit voices from industry, government and non-governmental organizations.

Efforts were also made to seek feedback from groups that have traditionally been underrepresented in the natural sciences and engineering ecosystem. This included outreach to organizations such as the Canadian Black Scientists Network. Given NSERC's commitment to increasing Indigenous self-determination in natural sciences and engineering research, particular attention was given to outreach to Indigenous researchers and organizations.

## 3.2 Participation

Over 250 people participated in the workshops and focus groups, which were held in both official languages. Participants represented over 60 universities, colleges, polytechnics and CÉGEPs from across Canada and over 40 private and public sector organizations, including several organizations dedicated to scientific research and advocacy.

**Figure 1. Breakdown of participation in workshops and focus groups by sector**




Over 120 individuals provided comments via the online portal, which was open between November 2021 and January 2022, generating over 600 comments on the discussion papers.

As indicated below, all papers received a significant level of interest and input.

While anonymous self-identification data was requested as part of the online consultation process, a significant number of commenters opted not to provide this information, resulting in insufficient data for further analysis of views according to identity characteristics.

**Table 1: Number of individuals that provided feedback on each discussion paper through participation in a workshop or through the online comment portal**

| Discussion paper | Workshop | Online | Other | Total |
|---|---|---|---|---|
| Supporting multi- and interdisciplinary research | 12 | 52 | - | **64** |
| Supporting high-risk, high-reward research | 43 | 47 | - | **90** |
| Colleges, CEGEPs, and polytechnics and Canada's research and innovation ecosystem | 16 | 27 | - | **43** |
| Supporting Indigenous researchers and research | 22 | 48 | - | **70** |
| Enhancing connectivity in Canada's research ecosystem | 31 | 39 | - | **70** |
| Supporting researchers throughout their careers | 13 | 61 | - | **74** |
| Building the next generation of research talent | 13 | 58 | - | **71** |
| Supporting equity, diversity and inclusion in the research community | 38 | 64 | - | **102** |
| Maintaining flexibility and agility in research funding | 26 | 41 | - | **67** |
| Improving funding efficiency and reducing administrative burden | 18 | 49 | - | **67** |
| Enhancing research access and impacts in society | 19 | 43 | - | **62** |
| Improving the evaluation of the natural sciences and engineering funding practices | - | 32 | - | **32** |
| General comments | - | 43 | 26 | **69** |
| **Total** | **251** | **604** | **26** | **881** |

# Part 4: What we heard

This section presents a summary of comments received through the strategic planning consultation process. It summarizes many perspectives and is not intended to be attributed to specific organizations or individuals. NSERC has strived to incorporate a broad range of feedback into this report, however, we acknowledge that not all suggested actions or policy recommendations fall solely within its purview.

## 4.1 What we heard about supporting research and improving funding efficiency

**NSERC's funding opportunities**

Overall, participants spoke favourably about the valuable role that NSERC plays within the research ecosystem.

Multiple participants suggested that NSERC should avoid the creation of new targeted funding streams and focus its resources entirely on Discovery Grants (DG) and other existing programs. They felt that there needed to be a clear alignment of programs with what they believe should be NSERC's core mandate: supporting fundamental NSE research. It was felt that having too many programs with different requirements takes time away from pursuing research ideas and creates heavy and unnecessary administrative burden for researchers. Targeted funding opportunities, which sometimes have tight deadlines, were highlighted as being particularly challenging for small institutions with limited resources to navigate, with the potential for greater funding disparities between small and large institutions. Others noted a programming gap for researchers and industry partners between the DG and Alliance programs.

Several participants recommended that NSERC provide baseline grants with less burdensome application requirements. It was suggested that, in addition to removing some of the burden from researchers, this would alleviate some of the effort required of volunteer peer reviewers.

Through the consultations, participants shared thoughts on specific NSERC programs:

- Alliance grants: Some participants felt that the cost-sharing requirements in the Alliance program are prohibitive for small- and medium-sized enterprises (SMEs) because they lead to insufficient resources to support commercialization.
- Discovery Grants: Overall, the DG program was viewed as an excellent vehicle for delivering flexible research funding. Many participants called for an increase in the overall DG funding envelope to allow award values to be increased and/or success rates to be improved.
- Discovery Horizons: Some felt that the eligibility criteria related to interdisciplinary research have become convoluted and that these requirements are causing researchers to focus their attentions on achieving sufficient interdisciplinarity instead of on proposing the best, most rigorous science.

When it came to tri-agency collaboration and harmonization, this was seen as a positive concept, however, participants were divided on the value of joint funding initiatives. Some suggested that joint programs can help break down silos and foster collaboration, while others cautioned that the tri-agency applications are more work for researchers because they must anticipate and respond to the interests of multiple agencies.

**Support for high-risk, high-reward research**

There was no clear consensus from participants on NSERC's role in funding high-risk, high-reward (HRHR) research. Many participants noted the need for clear definitions around these categories. Participants noted that HRHR research is often,

but not always, interdisciplinary in nature. It was also noted that some HRHR research will fail (by definition) and that this risk needs to be accepted by funders and researchers in order for any HRHR research to be funded.

Participants felt that funding opportunities that support HRHR research have too many conditions (such as the research needing to be team-based, interdisciplinary, partnered, etc.), which can stifle the freedom to be creative. They also mentioned challenges with securing project partners and with the complexity of the internal administration of agreements between multiple team members. It was felt as though a requirement for many collaborators or partners in HRHR research can lead to conservative research proposals because of the need for consensus. This was seen as an impediment to high-risk research.

Some mentioned the importance of flexibility on the part of NSERC in funding HRHR research, sharing that NSERC has previously lacked agility in this area. In this vein, participants questioned whether the DG program was conducive to HRHR research. The fact that this is core funding for a researcher's fundamental program (which cannot be jeopardized), timelines for application and review, in addition to low funding levels and the timeframe of the awards, can discourage researchers from proposing leading-edge ideas and jumping on opportunities. From a training perspective, it was felt that longer funding timeframes were required in order to properly engage graduate students in high-risk research. They noted that the duration of current programs focused on HRHR research, such as the New Frontiers in Research Fund (NFRF) Exploration Stream (at two years), is shorter than a typical graduate research program. To address the issue of timelines, some suggested offering automatic grant extensions for projects that demonstrate promise at the end of the first phase.

To improve support for HRHR research, it was suggested that applicants be required to meet a subset of the program requirements, rather than all of them. They shared that meeting all requirements can be challenging and may exclude strong high-risk proposals, including those that are not disciplinary in nature. It was also suggested that HRHR research funding opportunities could have lighter review processes and include novel features such as double-blind review, short proposals, etc.

Participants also mentioned the need for advanced research infrastructure and novel instrumentation to support breakthrough research. It was suggested that the Research Tools and Instruments (RTI) grants program could be tailored to better address HRHR research needs.

**Supporting multi- and interdisciplinary research**

As with HRHR research, there was a lack consensus on NSERC's role in funding interdisciplinary research. Many participants emphasized the challenges in overcoming disciplinary boundaries and felt that, compared to the two other granting agencies, NSERC was perceived as especially rigid in its focus on disciplines. These boundaries were cited as impediments to conducting valuable research. It was felt that NSERC needs to continue to adapt its programming to new realities and to address key global challenges.

That said, numerous other participants stressed that disciplines provide the foundation of the research ecosystem, and that high-quality interdisciplinary research relies upon solid disciplinary boundaries. They felt that the development of and support for interdisciplinary research must not replace disciplinary research. Rather, disciplinary and interdisciplinary models should complement each other.

It was felt that interdisciplinarity should be accepted as a regular feature of grant competitions, rather than just through targeted programs like the Tri-agency NFRF. However, interdisciplinarity was largely not associated with fundamental research and almost exclusively characterized as addressing a particular challenge. Furthermore, some participants expressed concerns about the ability of review panels to fully understand interdisciplinary research proposals given members' more traditional disciplinary expertise.

Participants were divided on the topic of NSERC adopting a more challenge-oriented funding model in which interdisciplinarity would be more intrinsic. Any mention of the creation of new programs was accompanied by the caveat that this should not come at the expense of fundamental research.

Some noted that the newer generation of researchers and trainees have adopted more interdisciplinary skill sets that need to be supported through programs like DG.

Finally, participants mentioned the role of infrastructure in fostering collaboration and interdisciplinarity. They suggested providing support to build interdisciplinary laboratories where researchers and trainees can continuously share ideas and learn from one another.

**Administration of research**

Many respondents voiced concern about the administrative burden on academics associated with applying for research funding, noting that a researcher may spend a month or more preparing a single application. It was felt that, in general, the level of effort required for the application was not commensurate with the value of the awards. Participants repeatedly stressed that administrative burden is impacting the amount of time that principal investigators (PIs) have to devote to their research. Participants offered several suggestions to relieve some of this burden on researchers:

- Rather than requiring universities to track every expense report, transition to a system of random occasional audits.
- Minimize the number of different research funding programs and focus on harmonizing competitions and processes among the three granting agencies.
- Revise the Canadian Common CV, which is repetitive and burdensome, and update NSERC's online portal system to make it more user friendly.
- Consider how applications submitted to NSERC could be shared with other funding organizations, thereby reducing the number of applications a researcher needs to develop and submit.
- Facilitate the transition of a research project through different phases by eliminating the need for researchers to complete a full resubmission of application for further stages of the research.
- Require universities to address EDI considerations rather than individual researchers.
- Audit university research administration processes to ensure that they are streamlined and aligned with the tri-agency requirements.

Concerns were also raised regarding the demands placed on university and college administrators, remarking that the post-award requirements, particularly the financial reporting, can be very burdensome. On reporting requirements, participants requested greater clarity on timelines and a stronger rationale for these requirements. It was suggested that lowering the frequency of financial reporting (currently annually) and standardizing reporting rules and procedures between programs would be helpful. Several participants noted that the new national research security requirements contribute to the administrative workload. On the topic of harmonization, others highlighted the benefit of having a portal for all opportunities across the agencies.

Participants flagged concerns that the application timelines for new programs (Alliance Missions and Discovery Horizons) were too short.

**NSERC's peer review processes**

Recognizing the high quality of peer review, some participants proposed that "NSERC's peer review results for one program could be used by other NSERC programs or by other organizations, since the merit of the review would carry over unless the criteria changes between programs."

Some participants mentioned that NSERC was still putting too much weight on publications as a merit indicator and would like other types of contributions to research to have increased importance, for instance patents and partnership successes. Similarly, some participants felt as though the evaluation process relied too heavily on metrics, such as the number of presentations or publications.

**Duration of grants and timing of applications**

When it came to the duration of grants, there was a consensus that five-year awards are appropriate to provide support and stability while ten-year grants would be too long. Several participants proposed that longer grant periods or rolling deadlines for submissions would reduce the administrative burden on researchers and institutions.

Opinions were mixed on the idea of automatic renewals for grants. Some participants were in favor while others were opposed. Several participants also suggested a significantly shortened renewal application for major grants while another suggested that NSERC evaluate the renewal based on the results achieved. Some pointed out that annual competitions are important for planning purposes while others expressed interest in having some off-cycle funding opportunities.

**Supporting the college research ecosystem**

There was a broad range of opinions expressed on issues relating to colleges, polytechnics, and CÉGEPs (henceforth “colleges”), applied research, and to the role of colleges in the broader research ecosystem. Overall, it was felt that NSERC’s thinking tended to be quite binary when it came to universities vs. colleges, discovery vs. applied research, etc. Some participants mentioned the desire to move away from distinct categories of research programs for colleges and universities, noting that both types of institutions could undertake discovery research. In that vein, some suggested that programs be grouped by the size of the institution or by research capacity.

However, in order to make this change, participants expressed the need to address some of the barriers and biases faced by college researchers during the application process. This would include expanding eligibility for the Research Support Fund (RSF) to College and Community Innovation (CCI) program participants, instead of having the overhead allowance built into the college grants, which participants felt was inadequate to cover the research administration costs incurred by colleges.

It was felt that this binary thinking contributes to the challenges in developing collaborative partnerships between colleges and universities. Most participants were supportive of strengthening open and flexible collaborations between colleges and universities and of breaking down barriers between institutions. It was felt that more flexible funding opportunities were required to facilitate partnerships between universities and colleges. It was suggested that NSERC’s funding opportunities be reviewed and, where appropriate, flexibility mechanisms be built in where both discovery and applied research can be part of the solution. They noted that this would require adjustments to eligibility criteria and to the peer review process, bringing in experts that appreciate the value proposition of applied research.

Some participants felt that the collaborative nature of the discussion paper on colleges might give universities too much leadership and would reduce the impact of colleges’ niche expertise. Participants spoke about the challenges of collaboration between colleges and universities given the different objectives associated with applied and fundamental research. Notably, participants highlighted differences in approach to intellectual property (IP) ownership, whereby the IP generated through research partnerships with colleges is typically retained by the private sector partner.

Numerous participants mentioned the inherent interdisciplinarity of college research given that the problem to be solved is typically identified by a public- or private-sector partner. The nature of the problem then dictates which disciplinary expertise will be required.

When discussing the college research ecosystem, participants noted that many potential partners are often unaware of the value of college research or of the areas of specialization at different institutions. Participants suggested that NSERC consider applied research databases and other tools to help facilitate partnerships between researchers, prospective partners and government departments. Others suggested having NSERC mandate equipment sharing between colleges and universities in proximity to one another to increase the value of these infrastructure investments.

When it came to communicating the results of applied research, participants felt as though colleges struggled to effectively communicate results both within the ecosystem and to the broader population. They noted that, in contrast to university researchers, college researchers focus less on publishing their results. Other reasons mentioned included the lack of communications platforms, networks, alliances, marketing and intracommunity engagement at the college level. Participants shared that this can often result in project repetition at different colleges.

Citing the broader benefits of applied research on teaching and learning at the college level, some participants suggested that NSERC consider new funding opportunities to encourage college faculty involvement in applied research. They noted that faculty who are involved in applied research have greater exposure to current realities and challenges, which enhances their ability to equip students with the skills required in today's labour market.

## 4.2 What we heard on enhancing research impact and connectivity across the research ecosystem

**Science promotion and culture**

Many respondents supported the idea of NSERC continuing to play a role in advancing science culture and broader public understanding of science, for example by continuing to promote and raise awareness of career opportunities in NSE fields to young Canadians. Programs like PromoScience were recognized and applauded, however, some respondents indicated that program was under resourced.

Some noted that the COVID-19 pandemic has increased the need for science-based organizations to engage with the public and address issues like misinformation and mistrust in science. Science culture was seen as an area ready for NSERC to expand its collaborative efforts, not necessarily as a convenor, but as a partner with other like-minded organizations such as science centres and museums. Participants were divided on the degree to which this kind of public communication of science should be required or expected of researchers themselves.

**Assessing research impact**

Participants highlighted the difficulty in assessing research impact at project conclusion and in tying outcomes to a specific research project. Some suggested that the impact or outcomes of a research project should be considered at the application stage. Furthermore, they recommended that the potential impact of a project be evaluated, not only on the merits of that specific project, but also on a researchers' broader portfolio.

During one discussion, participants identified four main categories of research investments: "long-term safe," "long-term risky," "short-term safe" and "short-term risky." They noted that most of what NSERC funds falls into the "long-term safe" category, but that this category has the least potential for impact. It was felt as though research projects with the greatest impact were either highly exploratory or highly applied. Conversely, participants noted that NSERC mostly funds research that is in the middle range of technology readiness levels (neither very exploratory nor very applied), resulting in lesser impacts. In order to maximize return on investment, some suggested that NSERC should be redirecting funds towards research activities with the greatest impact, while others expressed caution at the redirection of funds from fundamental research.

**Commercialization and economic impacts of research**

Numerous participants focused on the lack of coordination between various players in the commercialization space. Some noted the importance of clearly defining "innovation" and "economic output" as it relates to fundamental research.

Many participants were supportive of NSERC playing a role in commercialization, if not through direct funding support, then at least through support for third parties with commercialization expertise. For example, it was suggested that NSERC fund entities at the college level that can provide direct commercialization support and expertise, rather than leaving it entirely in the hands of SMEs.

When discussing university technology transfer offices (TTOs), participants felt as though they lacked sufficient resources and expertise. The power imbalance between professors and TTO staff was flagged as a challenge as some participants felt that it prevented staff from appropriately managing requests for patents, resulting in wasted resources.

Participants recommended that NSERC allow researchers to use their grants (particularly Alliance grants) to secure intellectual property, including temporary patenting, allowing the researcher to publish their results and to approach other partners while mitigating concerns around loss of intellectual property.

Some participants felt as though there was insufficient support for applied research and a lack of recognition of its economic potential. They suggested that there is a significant and often untapped opportunity for learning and discovery between research and commercialization.

**Relationship between academic researchers and the private sector**

When it comes to partnerships with the private sector, participants highlighted the need for NSERC to fully grasp the realities of funding decisions for SMEs. For example, it was suggested that NSERC needs to more fully understand the R&D cycles and investments required for different technologies or sectors and adjust its funding scope and funding duration accordingly to ensure real impact. It was suggested that NSERC adopt a ranking scale for commercialization potential (used by the Ontario Centres of Excellence and the Centres of Excellence for Commercialization and Research). Additionally, participants suggested that NSERC work with the National Research Council's Industrial Research Assistance Program to understand their evaluation process and adopt a similar approach to evaluating projects at an earlier stage of development. Participants noted that this would ensure greater alignment of NSERC and NRC programming.

There was a lack of consensus regarding the respective roles of researchers and industry in developing partnerships. Some suggested that researchers could/should be better attuned to what is going in their sector and how their research could potentially be applied. That said, it was also noted that NSERC should not make researchers responsible for convincing industry partners of the value of their research. Other participants highlighted the burden placed on researchers to do the work of engaging with industry partners, while others felt as though the focus of this engagement was often tied solely to the need for a partner on a funding application. It was suggested that NSERC could play a greater role in connecting industry partners with specific challenges with academic research experts.

**Societal impacts of research**

Some noted that socio-economic impacts are a more important consideration than scientific output as outputs are only useful in the hands of those that can mobilize the information. It was also mentioned that research impacts should be determined by society or by affected communities, rather than by NSERC's peer review process, and that there should be resources available to help communities to better define research impacts.

In contrast, some participants felt that evaluating societal impacts was potentially not the best use of resources for NSERC or for researchers and administrators. “Societal impacts are a good goal, but they are slippery targets,” one respondent noted. Another respondent noted that “NSERC is the best of all tri-agencies for supporting fundamental, theoretical research. We hope this will continue and not be diminished because of competing demands for increasing societal impact and applications for industry. All are important.”

## 4.3 What we heard on supporting researchers, students and post-doctoral fellows

**Supporting researchers throughout their careers**

There was broad consensus that researchers require continued support at all stages of their careers. However, participants expressed varying opinions on whether program funding should be segmented by career stage, with many rejecting the idea altogether. Several participants suggested that NSERC provide a baseline level of renewable funding for anyone with a full-time faculty position at a Canadian university to ensure ongoing support for researchers throughout their careers. Participants noted the importance of developing clear definitions for different career stages, as well as recognizing EDI considerations across these stages, if funding is to be targeted in that way.

Generally, the DG program was widely lauded for the fundamental support that it provides to a significant number of researchers at institutions of all sizes across the country, allowing them to maintain research programs and provide learning opportunities for students. This was contrasted with the approach of other international funding agencies who choose to offer higher award values to a smaller number of researchers. One researcher noted that this model of support is the reason that they have remained in Canada. Increasing the number of DGs to support more researchers, rather than providing higher-value awards through more targeted funding opportunities, was viewed as a priority.

**Early career researchers**

Numerous participants pointed to the challenges presented by the early years of a career in academia and research, particularly prior to a researcher having secured a full-time position at an institution. These challenges can be even greater for researchers in smaller universities who have fewer resources available to them and who may have greater teaching responsibilities.

Many suggested that early career researchers (ECRs), particularly those at smaller institutions, need more support to help them set up labs and pay staff. It was noted that ECRs may have less ability to pay staff a reasonable wage, since they do not yet have a strong enough training record to justify higher award values under the current DG scoring system.

While some suggested that NSERC automatically provide modest, shorter-term DGs to all newly hired faculty, others were supportive of targeted DG streams for ECRs to allow them to compete for funding against researchers at a similar career stage. There was broad agreement that increasing the total number of available grants would increase the overall success rates, including for ECRs.

Finally, one researcher suggested that NSERC allow ECRs to sit in on review panels to allow them to better understand the process and improve the quality of their proposals.

**Mid- and late-career researchers**

Multiple participants were of the opinion that there was insufficient support for mid-career researchers and that this group should be differentiated from those at more established career stages. Similarly, others pointed to the lack of NSERC initiatives to support late-career researchers, suggesting that targeted funding for this career stage may have the greatest impact with respect to knowledge transfer. One researcher suggested creating a program to enable late-career researchers to receive training to update their skills and adopt new methods. Another suggested that it may be beneficial to provide support to researchers near the end of

their career, who are winding down their research activities, so they have sufficient resources to complete and publish their publicly funded research.

In contrast, others were not supportive of NSERC delineating specific funding for mid- vs. late-career researchers because it would add unnecessary complexity.

**Support for graduate students and post-doctoral fellows**

One of the most common themes to come out of this consultation was the need for NSERC to offer a greater number of graduate scholarships and post-doctoral fellowships, and to increase the value and duration of those awards. Many commented on the fact that these award values have not increased in over a decade and are therefore lagging significantly behind inflation. Financial insecurity is a particular challenge for trainees living in major cities where the cost of living is significantly higher. It was felt that this makes it difficult to retain Canadian talent and to compete for international talent, which poses long-term risks to the scientific community in Canada. A number of participants pointed out that current award values and low success rates are also impacting the ability to increase diversity in the academic community because students from privileged backgrounds would be more likely to have the means to choose to pursue graduate studies.

To address this, participants suggested increasing the value of NSERC's scholarships and fellowships and tracking annual increases to inflation. It was noted that the value of DGs would also need to be increased in parallel, given that many students are paid through their supervisor's grants. Additionally, some participants suggested extending the length of the awards to two-year awards for MSc students and four-year awards for PhD students, to provide them with greater stability. Several participants suggested eliminating the Vanier awards in favour of a larger number of awards at equal value, positing that these higher-value awards were creating inequities within the system.

In contrast, one participant suggested eliminating the scholarship and fellowship programs altogether and instead focusing on supporting trainees through an increased DG funding envelope with a higher success rate.

Another suggestion that was raised several times was the idea of allowing graduate students to secure their funding independently, rather than having to identify an institution and supervisor at the time of application. It was felt that this would simplify the application process for students and for NSERC and give students greater flexibility to pursue and secure research opportunities.

However, it was largely agreed that, while a robust and well-funded post-doctoral fellowship program is essential, it would not be productive to offer independent research funding to post-doctoral fellows (PDFs) given that they will still rely on their supervisor's research infrastructure and guidance. In addition, receiving funding through their supervisor relieves the administrative and bureaucratic burden of research. One participant suggested that PDFs be formally named as co-investigators to grants, while still being paid from them, in order to more fully recognize their contributions to the project.

The concept of the "post-doctoral cliff" was raised on more than one occasion with participants suggesting that more needed to be done to support the transition from fellowship to faculty position or to roles outside of academia.

Some participants emphasized the need for greater funding to support collaborative training opportunities with industry, for example, through the Collaborative Research and Training Experience (CREATE) program which was cited as an important source of professional development support. It was also noted that, while private sector experience can bring valuable learning opportunities, this type of experience is often undervalued in academic circles, including in funding applications. It was also suggested that, since industry faces challenges in recruiting enough PDFs, NSERC could fund or co-fund post-doctoral positions within industry.

Several participants requested that NSERC provide more robust guidelines on salaries, parental leave, and other human resources-related matters for trainees paid from DGs. Some suggested that NSERC work with institutions to ensure that graduate students and PDFs become formal employees with associated benefits.

Several participants recommended that NSERC consider scholarship and fellowship streams for international students and post-docs to increase Canada's competitiveness in the global race for talent.

**Support for professional research staff**

Numerous participants highlighted the critical role of high-trained professional research staff within the NSE ecosystem. It was noted that there is a lack of funding available to hire research technicians, which results in professors using their graduate students, whose salaries are typically lower, to fill those roles. Furthermore, there were concerns that the precarity of these roles in academia is a great threat to professors' capacity to do research and to universities' ability to provide high-quality research training. Participants expressed a desire for NSERC to provide funding to hire research professionals, including technicians and programmers, rather than just focusing on training new highly qualified personnel (HQP). It was suggested that this could be done through a simple increase in DG award values. Participants shared that funding for research professionals would promote a more stable research workforce and allow PIs to retain talented graduates in permanent positions.

**Support for training at colleges, CEGEPs and polytechnics**

On the subject of training HQP at colleges, some noted that existing college program structures prevent colleges from including university students on their grants, meaning that they must be contracted by the college as professionals, which creates administrative work. It was felt that recognizing university students on college grants would promote collaborations by bringing in their PI to the project as well, without having to apply to separate funding programs. In contrast, others noted that expanding the grants to include university students may reduce the number of opportunities available to college students.

College participants recommended that NSERC provide academic and industrial scholarship funding for college students. Some also suggested creating undergraduate scholarships that would be interchangeable between universities and colleges in order to broaden their training and increase their employability after graduation.

**Building the next generation of research talent**

Participants expressed support for NSERC initiatives aimed at getting young Canadians engaged in and excited about science and developing science literacy skills (i.e., Little Inventors, PromoScience, Science Odyssey). It was felt that these initiatives are important to the development of future STEM talent and that this aspect of NSERC's work should be considered when developing the strategic plan.

It was agreed that supporting positive research opportunities for students at the undergraduate level will help them build essential research skills and encourage them to pursue graduate studies. It was pointed out that undergraduate research skills can also make students who choose to enter the job market more appealing to potential employers. Expanding the Undergraduate Student Research Awards (USRA) program to offer opportunities to more students was broadly supported as was increasing the value of those awards to reflect the rising cost of living. It was noted that increasing the number of funding opportunities for undergraduate research will create opportunities for students from a greater range of backgrounds and thus, help improve the diversity of the talent pipeline. Some participants also suggested expanding the USRA program to international students to encourage them to build the skills and relationships needed to pursue graduate studies, and eventually a career, in Canada.

**Connectivity and networking**

Numerous comments were received on the desire for NSERC to play a greater role in convening the NSE community and in facilitating networking opportunities and knowledge exchange for researchers and research trainees within Canada and internationally. In particular, it was mentioned that NSERC could do more to connect graduate students with potential supervisors and collaborators, and early career researchers with late-career researchers who could play a mentoring role. Some also suggested a dedicated NSERC fund to help researchers and trainees cover costs associated with conferences and professional development opportunities.

On the other hand, some felt as though connectivity fell outside of NSERC's purview and that there were already ample opportunities through conferences and other collaboration opportunities and that funds spent on connectivity would take away from funding spent on research itself.

## 4.4 What we heard on supporting equity, diversity and inclusion in the research community

**Cultural transformation**

Participants shared that science and engineering are often viewed as exclusive or exclusionary in their culture where divergence of opinions may not always be well received. To achieve a more inclusive NSE research environment, a profound change will likely be required in assessing research excellence and recognizing researchers beyond their research productivity to encompass the wider range of contributions to research-related activities and the full range of collaborative relationships including training, team formation, interdisciplinary activities, knowledge dissemination through various forms, etc. It is also hoped that over the next decade, a different perspective on work-life balance will emerge, whereby funders and post-secondary institutions (especially universities), will support greater flexibility across career trajectories.

**Evidence-informed EDI decision making**

A clear consensus exists that inequities and gaps in diversity need to be exposed in a rigorous manner. Therefore, efforts are required to strengthen the collection of self-identification data by establishing infrastructure and providing other resources (financial, tools, guidance). Such support should not be limited to post-secondary institutions; other stakeholders, such as scientific societies, Indigenous communities and identity-based organizations can also play critical roles.

Furthermore, participants felt that it will be increasingly important to present disaggregated (and nuanced) data analysis and to set diversity goals that are accompanied by a clear and robust rationale, as done by the Canada Research Chairs Program. "Intelligent targets" should consider existing talent pools in the context of the wider Canadian population. Finally, it was noted that clear performance indicators will be required to help measure progress.

**EDI capacity building**

Post-secondary institutions conveyed their strong support for EDI, but noted that resources are often limited to undertake or sustain this work. Therefore, they emphasized the ongoing need for capacity-building grants. These and other forms of support (e.g., indirect funding to cover EDI training for researchers and other staff or administrators, support for outreach and for EDI advisors to assist underrepresented groups, support for accessible facilities and equipment, childcare support, etc.) should recognize the many differences that distinguish institutions from one another. It is particularly important to recognize the needs of small- and medium-sized institutions.

Individual researchers noted that they require support to integrate "relevant" (rather than boilerplate) EDI considerations in training and in the research process. For many applicants, EDI is limited to diversity in teams and, more specifically, to recruitment, overlooking the need to ensure an inclusive research environment. Relatedly, participants noted that it is critical to recruit diverse evaluators and to provide relevant training.

Finally, it was highlighted that often, timelines to respond to EDI-focused funding or to properly address new EDI requirements are too short. This can be particularly discouraging to applicants who are engaging in these matters for the first time.

**Engagement**

Participants emphasized that advancing EDI requires ongoing engagement to build awareness and foster change. However, they underlined the real risk of placing a heavy burden on the shoulders of researchers from underrepresented groups. To avoid tokenism, they felt that it is important to ensure that those engaged in EDI efforts are given "agency" and decision-making authority, as well as other forms of academic recognition.

With regards to engagement with Indigenous Peoples and Indigenous communities that are involved in research, participants were clear that research funding agencies should strive to harmonize approaches, such as flexibility around deadlines, time to build capacity and to disseminate results, which otherwise results in "inequity of time." They also emphasized the need to maintain a distinctions-based approach in engagement activities with First Nations, Inuit and Métis peoples and communities.

**Programmatic considerations**

Participants emphasized that sustaining diversity at all academic levels is key. This requires support across all career stages to be wisely allocated and made available to international trainees and scientists.

Some felt that NSERC should develop means to "scout" STEM talent from marginalized communities as early as high school and should also ensure that funding levers for trainees and/or stipends are equal to a living wage to overcome the economic barriers that disproportionally affect equity-deserving groups.

The concentration of funding to a small segment of established researchers based in a small number of institutions was noted as inhibiting greater equity. Conversely, some felt that funding quotas for programs such as USRA may in fact stand in the way of providing more support to underrepresented groups.

The topic of "diversity targets" or "outcome targets" was extensively discussed and received mixed support. Foremost, they were viewed as means and not ends in themselves. Moreover, some expressed concerns that a focus on diversity undermines the notion of excellence. The former University Faculty Awards were given as an example of "targeted" opportunities that were perceived as less meritorious. Yet, it was widely acknowledged that there is a pressing need to support talent from underrepresented groups, who may otherwise leave the academic sector ("leaky pipeline").

Therefore, participants noted that when measures such as "diversity targets" or "outcome targets" are set, it is critical that data, particularly disaggregated data, be provided to support the targets. It is equally important that the evaluation process be transparent. Moreover, using additional funds is perceived more positively.

There were concerns that increasing the number of Canada Research Chairs could result in "poaching," unless institutions were required to promote from within their own faculty. Currently, institutions are reluctant to present atypical candidates, often from underrepresented groups, as these often are not selected.

Despite the concerns related to targeted funding, there was more support for other interventions that would address persistent systemic barriers, and would foster inclusion, beyond meeting targets.

**Inclusive excellence**

Overall, participants strongly supported the notion of "inclusive excellence" shared across the three agencies, which would signal the importance of more comprehensive merit criteria, including EDI considerations that are an integral part of the review, rather than a preliminary hurdle.

Current indicators of excellence are seen as too rigid and narrow to identify more diverse talent. Instead, the agencies should endorse "universal

design principles" to replace a funding landscape that is highly fragmented, with fewer programs that are broader in scope, simpler, and more flexible with respect to researchers' qualifications and methodologies, including forms of research-related engagement and co-creation, and interdisciplinarity.

## 4.5 What we heard on supporting Indigenous-led research and researchers

NSERC benefitted greatly from the inclusion and engagement of Indigenous voices through this consultation process. NSERC wishes to express its profound thanks to all those who shared their insights.

**Research and reconciliation**

Meaningful advancement of Indigenous self-determination in research was viewed as an important step towards reconciliation and decolonization of research practices. Respondents indicated the need to acknowledge the harm to Indigenous Peoples that has resulted from colonial approaches to research, as part of the research process going forward. Greater Indigenous control over research, free from external biases and moving toward "research sovereignty" was a theme throughout.

When asked about their perceptions of NSERC, Indigenous participants pointed to a narrow focus on "hard science" and to the competitiveness of its programs. It was noted that NSERC lacks experience in fully and meaningfully engaging with Indigenous communities and in recognizing the value of traditional ways of knowing. Participants shared that NSERC's program parameters have created barriers to access for Indigenous trainees and researchers. They noted that low success rates and narrow evaluation criteria made scholarship awards, which are critical for developing talent, out of reach for many Indigenous students. Participants shared that, in many cases, Indigenous students felt as though it was not worth applying.

This same disconnect was also seen at the research funding stage. Participants remarked that they felt as though NSERC was uninviting to researchers looking to pursue an Indigenous mode of inquiry.

Feedback suggested that the relationship between research funding agencies and Indigenous Peoples based on mutual acceptance and true "weaving" of knowledges needs improvement. Some participants noted that the concept of integrating Indigenous knowledge with "western science" is not viewed favorably because it implies an unequal relationship.

**Definitions of Indigenous research and traditional knowledge**

Discussions suggested that defining "Indigenous research" is challenging. For example, participants agreed that research done by a scientist or engineer who is Indigenous, is not necessarily "Indigenous research."

Some also mentioned challenges in finding a safe space for sharing traditional knowledge and in claiming space in the academic community. When talking about traditional knowledge, participants pointed to the way in which knowledge is embedded in language and the fact that traditional ways of knowing can facilitate Indigenous language retention. For example, the names of plants can indicate their uses. NSE research was seen as a means to create more opportunities for Indigenous Peoples to engage with and reclaim their language. Indigenous respondents also spoke about the need for research projects to include and support Indigenous language revitalization and learning. It was suggested that NSERC could play a role in this area.

**Engagement**

When it comes to research undertaken with Indigenous communities or on traditional territory, participants emphasized the importance of relationship building. This would require allocating sufficient time and space for Indigenous Peoples to join the conversation. Input from the community should be sought from the very beginning of the

process, rather than asking for a reaction to a research idea that is already well defined by non-Indigenous people. Timelines should be generous and flexible, recognizing that other issues may arise at the community level that will take precedence.

It was suggested that NSERC make use of development grants to help build trust and stronger relationships with Indigenous communities and organizations. In its approach to engaging with Indigenous groups, participants were clear that NSERC must be flexible and open to different approaches. Participants advised NSERC to work with regional and community-based Indigenous organizations, which could support program and funding delivery.

During the discussions on colleges and applied research, participants mentioned the possibilities that arose from the Applied Research and Technology Partnership (ARTP) option 2 competitions when it came to helping colleges engage with small, northern or Indigenous communities on collaborative research projects. Many college representatives expressed a desire to work more closely with Indigenous communities and with colleges in rural and remote areas, and to remove barriers to access for Indigenous students within their institutions.

In some cases, participants felt as though NSERC placed too great a focus on the commercialization of research. Participants suggested that NSERC focus on areas of research that can build on existing relationships and that valorize Indigenous stewardship roles. Examples of such research areas included water, ecology, environmental management and governance. Responses also stressed the need for research partnerships to focus on positive social and economic outcomes and on supporting capacity-building and self-governance of Indigenous communities.

**Supporting Indigenous youth and career trajectories**

Participants saw a greater role for NSERC when it came to science promotion and raising awareness of opportunities in the NSE space amongst Indigenous youth through programming such as PromoScience. Some participants emphasized the value of involving Indigenous youth directly in research, particularly in land-based research or other areas with a direct connection to their communities. This type of community-based engagement was seen as critical for promoting post-secondary education among Indigenous youth and for developing a strong foundation of Indigenous talent in the natural sciences and engineering.

Participants noted that many Indigenous researchers may have non-linear career paths, often undertaking a PhD later in life. They highlighted the need to recognize that Indigenous scholars may have a different starting line than non-Indigenous scholars. To ensure that Indigenous scholars can compete for funding, it was felt that NSERC could do more to recognize the varied life experiences that Indigenous researchers contribute to their field when they enter the field later in life.

# Annex A: Acronyms

**ARTP** — Applied Research and Technology Partnership grants

**CCI** — College and Community Innovation program

**CREATE** — Collaborative Research and Training Experience program

**DG** — Discovery Grants

**ECR** — Early career researcher

**EDI** — Equity, diversity and inclusion

**HRHR** — High-risk, high-reward research

**HQP** — Highly qualified personnel

**IP** — Intellectual property

**NFRF** — New Frontiers in Research Fund

**NSE** — Natural sciences and engineering

**NSERC** — Natural Sciences and Engineering Research Council

**PDF** — Post-doctoral fellows

**PI** — Principal investigator

**RSF** — Research Support Fund

**RTI** — Research Tools and Instruments grants

**SME** — Small- and medium-sized enterprise

**STEM** — Science, technology, engineering and mathematics

**TTO** — Technology transfer office

**USRA** — Undergraduate Student Research Awards

# Annex B: List of workshops and focus groups

## Workshops

**November 22, 2021**

- Improving funding efficiency and reducing administrative burden (English)
- Enhancing connectivity in Canada's research ecosystem (English)
- Supporting high-risk, high-reward research (English)
- Colleges, CEGEPS and polytechnics and Canada's research and innovation ecosystem (English)

**November 23, 2021**

- Supporting multi- and interdisciplinary research (English)
- Colleges, CEGEPs, and polytechnics and Canada's research and innovation ecosystem (English)
- Supporting Indigenous researchers and research (English)
- Maintaining flexibility and agility in research funding (French)
- Supporting high-risk, high-reward research (French)
- Supporting multi- and interdisciplinary research (French)
- Colleges, CEGEPs, and polytechnics and Canada's research and innovation ecosystem (French)

**November 29, 2021**

- Enhancing connectivity in Canada's research ecosystem (English)
- Supporting Indigenous researchers and research (English)
- Building the next generation of research talent (English)
- Supporting equity, diversity and inclusion in the research community (English)
- Supporting researchers throughout their careers (English)

**November 30, 2021**

- Building the next generation of research talent (English)
- Supporting equity, diversity and inclusion in the research community (English)
- Supporting researchers throughout their careers (English)

**December 1, 2021**

- Supporting researchers throughout their careers (French)
- Building the next generation of research talent (French)

**December 6, 2021**

- Maintaining flexibility and agility in research funding (English)
- Enhancing research access and impacts in society (English)
- Improving funding efficiency and reducing administrative burden (English)
- Enhancing connectivity in Canada's research ecosystem (English)

**December 7, 2021**

- Improving efficiency and reducing administrative burden (English)
- Enhancing research access and impacts in society (English)

- Maintaining flexibility and agility in research funding (English)
- Enhancing connectivity in Canada's research ecosystem (English)

**December 8, 2021**

- Improving funding efficiency and reducing administrative burden (French)
- Enhancing research access and impacts in society (French)
- Maintaining flexibility and agility in research funding (French)
- Enhancing connectivity in Canada's research ecosystem (French)
- Supporting equity, diversity and inclusion in the research community (French)

## Focus groups

- December 10, 2021 – Engagement session with Canadian Society for Ecology and Evolution
- December 14, 2021 – Engagement session with Colleges and Institutes Canada (CICan)
- January 11, 2022 – Supporting high-risk, high-reward research (English)
- January 11, 2022 – Supporting high-risk, high-reward research (French)
- January 12, 2022 – Equity, diversity and inclusion discussion groups (English)
- January 14, 2022 – Equity, diversity and inclusion discussion groups (French)
- January 14, 2022 – Increasing economic output
- January 17, 2022 – Engagement session with Tri-agency Reference Group on the Appropriate Review of Indigenous Research (English)
- January 18, 2022 – Engagement session with I-STEM cluster on supporting Indigenous research
- January 20, 2022 – Engagement session on Indigenous research (French)
- January 25, 2022 – Engagement session with NSERC Committee on Equity, Diversity and Inclusion (CEDI)