

# ONTARIO RESEARCH FUND - RESEARCH EXCELLENCE

## ROUND 8 PROGRAM GUIDELINES

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## OVERVIEW

The Ontario Research Fund Research Excellence (ORF-RE) program promotes research excellence of strategic value to Ontario by supporting new leading-edge, transformative, and internationally significant research.

As a general rule, the minimum support provided by the ORF-RE to a project is \$1 million. The maximum support provided is \$4 million.

The ORF-RE focuses on scientific excellence and strong benefits to Ontario. Applications are reviewed against the following criteria:

- **Research Excellence:** Scientific merit, quality of research, and expertise of research team
- **Research Impact:** Anticipated value to Ontario in the following three categories:
  - **Commercialization**
  - **Economic Benefits**
  - **Societal Benefits**
- **Achieving Impact:** Plan for achieving Research Impact
- **Development of Research Talent:** a clear plan for the training of highly qualified personnel.
- **Project Management and Governance:** Management of the project, including governance structure, sustainability, budget, and milestones

The program will contribute towards eligible operating costs of an approved research project to a maximum of 1/3 of the total project costs, with 1/3 of the remainder coming from the applicant institution(s) and 1/3 from the private sector.

## PURPOSE OF ROUND

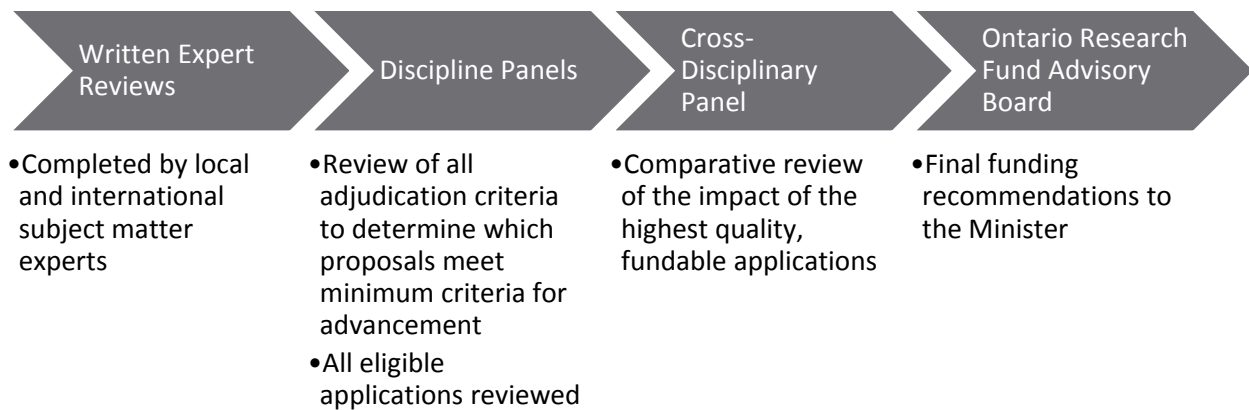
ORF-RE Round 8 is a general funding round. While Round 8 is open to all disciplines, the Ministry particularly encourages applications in three focus areas:

- Bio-economy and clean technologies
- Advanced health technologies
- Digital media and information & communications technologies

## APPLICATION & ADJUDICATION PROCESS

- Institutions submit Notices of Intent (NoIs) by July 31, 2015
- NoIs are posted on the Ministry website to help institutions identify opportunities for meaningful collaboration on projects with similar research topics or objectives.
- Institutions submit full applications by January 19, 2016.
- Applications are forwarded to three external expert reviewers for assessment of scientific merit and quality of research.
- All eligible applications, along with external reviews, are forwarded to Discipline Panels for a review against all adjudication criteria; up to three panel members conduct an in-depth assessment of each application.
- Discipline Panels make consensus rankings of all applications; only the highest quality, fundable applications advance to the next stage of evaluation.

- These applications, along with applicable panel comments and external reviews, are sent to the Cross-Disciplinary Panel.
- The Cross-Disciplinary Panel conducts a comparative review of research impact of projects forwarded by the Discipline panels. This panel forwards its recommendations to the ORF Advisory Board.
- The ORF Advisory Board makes recommendations to the Minister of Research and Innovation.
- The Minister of Research and Innovation makes the final decisions at his/her sole discretion.



- Decisions are communicated to institutions by letter to the institution's Vice President of Research or equivalent, the lead institutional contact and the Principal Investigator.
- Given that ORF-RE is a discretionary, non-entitlement program, funding decisions are final and there is no appeal process.

## DEADLINE DATES

The closing date for submitting a Notice of Intent (NoI) for Round 8 is July 31, 2015.  
The closing date for submitting a proposal for Round 8 is January 19, 2016.

Refer to the Application Form and Appendices A and B of the Round 8 Program Guidelines for instructions related to preparing and submitting an application.

## FUNDING

The ORF-RE program will fund eligible direct operating costs (including salaries and benefits and limited costs for facilities and equipment, management and administration), as well as a portion of indirect (overhead) costs. The program's 1/3 contribution is inclusive of both direct and indirect cost support.

The ORF Board may consider a "blended" funding formula in cases where the institution and its private sector partners, in combination, make up 2/3 of the required funding. This

funding flexibility would be provided based on the opportunity for success and the quality of the partnership between the applicants and their private sector partners.

Should the institution and its private sector partners fail to raise the needed 1/3 each or in the case of a blended formula, the required 2/3 of the total project value, the ORF-RE grant may be reduced proportionately. The ORF-RE grant will not exceed the absolute dollar value of the approved amount, even if this ends up being less than 1/3 of the total project value.

## ADJUDICATION CRITERIA AND PROCESS

### CRITERIA

Applications will be reviewed against five criteria:

#### RESEARCH EXCELLENCE

- Scientific merit
- Proposed innovation
- Credentials and appropriateness of the research team
- Where applicable, degree of inter-institutional and international research collaboration

#### RESEARCH IMPACT

- Anticipated value to Ontario as demonstrated by the applicant in the three categories below. No category is considered more favourably than the others.
- While applicants must address all three categories, they are encouraged to emphasize those which are most relevant to their project.
- The examples of each type of value are illustrative, not exhaustive. Applicants are encouraged to document all benefits, particularly to Ontario, associated with their proposal.
  - **Commercialization**
    - Commercialization potential
    - Ability to produce spin-off products and/or firms
    - Likelihood of patent and licensing opportunities
    - Knowledge transfer to industry
    - Benefits for Ontario pertaining to above
  - **Economic Benefits**
    - Improvements to Ontario's productivity and competitiveness
    - Creation of jobs
    - Sustainable use of natural resources
    - Improving efficiency in private and/or public sector
    - Regional economic development
    - Enhancement of Ontario's global reputation as an innovation hub
    - Expanding access to valuable data assets
  - **Societal Benefits**
    - Improvements to health and well-being of Ontarians

- Improvements to/preservation of environmental quality
- Reducing poverty
- Engagement and mentorship with youth
- Improving public policy
- Effecting a profound shift in the understanding of a given discipline
- Placing Ontario at the forefront of a particular research discipline from an international perspective

#### plan for **ACHIEVING IMPACT**

- A clear and tangible strategy for achieving Research Impacts
- Engagement of private sector and/or community partners to encourage the adoption of innovative technologies, practices, procedures, and/or policies
- The extent to which the project will ensure the next-stage recipients or end-users of the research have been and will be engaged. Next-stage recipients and end-users may include but are not limited to:
  - Firms
  - Trade associations
  - Clinicians
  - Researchers in the scientific community
  - Non-profit organizations
  - Community/patient groups
  - Government and agencies
- Track record of collaboration with next-stage recipients and end-users
- Strength and commitment of interested recipient partners, demonstrated through financial contributions and/or strong evidence of vested interest in the research

#### **DEVELOPMENT OF RESEARCH TALENT**

- Recruitment, retention and training of highly qualified personnel (HQP).
- Meaningful engagement of graduate and post graduate students and post-doctoral fellows.

#### **PROJECT MANAGEMENT AND GOVERNANCE**

- Business plan for the management of the project, including governance structure (i.e. management team, arm's length advisory board, scientific advisory committee, etc.)
- Sustainability plan for the research capacity that is created
- Project budget, budget justification and method for ensuring accurate forecasts
- Clear, specific and measurable milestones and deliverables
- If applicable, a data management plan

### REVIEW STAGES

There are four stages of adjudication review.

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## WRITTEN EXPERT REVIEWS

The first stage of review is written reviews provided by three experts, who may be located in Canada, or internationally. As much as possible the Ministry will recruit one expert recommended by the applicant.

No applications are removed from the competition at this stage of review; the written reviews provide input to the next stage of panel review.

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## DISCIPLINE PANELS

The second stage of review is composed of multiple panels based on research discipline. These panels review all aspects of proposals, with an emphasis on Research Excellence and Research Impact.

In order to progress to the next stage of review, applications must demonstrate excellence in both the quality and impact of the research proposed. In addition, applications must also demonstrate a sufficient plan in Achieving Impact, Development of Research Talent and Project Governance to show that the research team is able to execute the Research Excellence and Impact innovations described and provide an appropriate training environment.

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## CROSS-DISCIPLINARY PANEL

All proposals that reach this stage have demonstrated world-class Research Excellence and Research Impact in accordance with the objective of the ORF-RE program.

This panel will be tasked with recommending a portfolio of research projects with the strongest potential to support Ontario's economy and society and maximize the likelihood of positive benefit to Ontario.

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## ONTARIO RESEARCH FUND ADVISORY BOARD

The Ontario Research Fund Advisory Board (ORFAB) reviews the recommendations of both the Discipline Panels and the Cross-Disciplinary Panel and makes a recommendation to the Minister on the portfolio of projects to fund.

## ELIGIBILITY

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### ELIGIBLE APPLICANTS

Funding is open, on a competitive basis, to the following Ontario institutions:

- publicly assisted universities
- colleges of applied arts and technology
- hospital research institutes



- consortia of the above, with one institution as lead applicant, assuming responsibility and accountability for the consortium

Other Ontario not-for-profit research institutes may apply to the Ministry for eligibility. All decisions regarding eligibility will be made by the ORFAB. Institutions seeking eligibility for the ORF-RE Round 8 should contact the Ministry for additional information. In order to allow for sufficient time for the Ministry to process the request, applications for eligibility must be received at the Ministry by August 14, 2015.

For-profit organizations and agencies of for-profit entities are **not** considered eligible and cannot apply for, or receive, ORF funding.

If you are a researcher employed at a non-eligible institution and wish to apply, you must hold an academic appointment at an eligible institution and apply through that institution.

Funds contributed by the ORF-RE for approved projects are disbursed to the lead applicant institution. All research supported by ORF funds, including international initiatives, must be conducted in Ontario at an eligible institution.

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## ELIGIBLE DIRECT COSTS

The ORF-RE grant can be used for the following direct costs of conducting research:

- **Salaries and benefits:** claimed in proportion to the time spent working on the project
- **Facilities and equipment:** up to 10% of total direct costs
- **Other direct research costs:** including, but not limited to, materials, fieldwork expenses, and dissemination of research. Some hospitality costs may be eligible where essential for networking purposes but must adhere to the Broader Public Sector Accountability Act – 2010.
- **Management and administration:** up to 10% of total direct costs

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## ELIGIBLE INDIRECT COSTS

Indirect costs are overhead costs associated with conducting the research project.

Applicants can budget up to—but not more than— 40% of direct costs toward indirect costs, in line with the institution's policy on overhead charges. The ORF award is inclusive of both direct and indirect costs.

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## INELIGIBLE PROJECTS AND COSTS

ORF-RE will not accept applications for the following:

- contract (fee for service) research
- clinical trials
- endowed research chairs or any other endowments
- high performance computing platforms

In addition, the ORF-RE grant is not to be used for the following:

- costs related to proposal development
- fees for use of equipment owned by the institution unless such fees are charged to all institutional users based on a published schedule
- costs related to existing facilities infrastructure improvements, not specifically related to the proposal and/or not included in the original application
- opportunity costs
- any items or services not directly related to the project
- alcohol costs at hospitality events.

## OTHER PROJECT REQUIREMENTS

### ETHICAL, SAFETY AND INTEGRITY REQUIREMENTS

Institutions must undertake the responsibility to ensure any experimentation will be acceptable on ethical and safety grounds.

- Research involving human subjects or human stem cells must comply with the [Tri-Council Policy Statements: Ethical Conduct for Research Involving Humans \(TCPS 2 2014\)](#)
- In the case of laboratory animal experimentation, the institution must comply with the [guidelines and policies of the Canadian Council on Animal Care](#).
- Institutions must ensure that any research involving databases containing personal information adheres to ethical and legal requirements relating to privacy, confidentiality and security of the database information.
- Any research involving biohazards must adhere to the standards outlined in the [Public Health Agency of Canada's Laboratory biosafety guidelines](#).
- Research involving radioactive materials must comply with [Canadian Nuclear Safety Commission regulations](#).

The Ministry expects researchers and participating research institutions to maintain the highest standards of research integrity. Research institutions are expected to have and abide by policies and procedures that govern research integrity.

### INTELLECTUAL PROPERTY (IP)

The Ministry does not claim any ownership or rights to any IP resulting from ORF-RE funded projects. Such rights are to be determined by the lead institution in accordance with its current IP policy. In cases where a consortium of applicants exists, the policy, as dictated in the Inter-Institutional Agreement (IIA) between the consortium members, will dictate the IP policy.

### YOUTH ENGAGEMENT AND OUTREACH

Successful applicants will be required to connect youth with researchers and may use up to 1% of the ORF grant to undertake annual youth science and technology outreach activities directly pertaining to the ORF-funded research project. The primary target audience is high school students as they are most receptive to in-depth mentorship experiences.

Researchers can:

- engage youth audiences as well as educators and the general public both on-campus and in the local community
- expand on current outreach activities, or start new initiatives with an emphasis on activities that are free to youth and the public
- partner with other researchers in their institution(s) to undertake a broader outreach initiative
- participate in outreach activities operated by other organizations, such as science awareness organizations
- involve graduate students in outreach program design and delivery
- apply provincial contributions to expenses incurred in developing and delivering the outreach activity, e.g. consumable supplies, development of working models, mileage
- Outreach activities can also include such initiatives as speaking opportunities, lecture series, workshops and demonstrations, student competitions and lab mentorship.

## OWNERSHIP AND CONTROL OF RESEARCH EQUIPMENT

Ownership and control of research equipment related to a funded ORF-RE project must remain with the institution for a period of five (5) years after acquisition and/or installation. In the case of a project with a multi-institutional composition or consortium, the IIA should dictate the arrangements made with regard to the ownership, control and disposal of research equipment.

Research equipment must be located at an eligible research institution(s), or outside an eligible research institution when it can be shown that this is the most effective placement of the equipment. Any change in location requires notification in writing to the Ministry and may require the approval of the Ministry.

## GRANT AGREEMENT

When funding for a proposal is approved, the successful applicant will sign a grant agreement (contract) with MRI.

The agreement will address terms and conditions for the disbursement of the grant funds that could include, but are not limited to, the following:

- milestones, deliverables and performance measures
- project budget
- project management
- mode and schedule of payments
- accountability framework
- IP ownership and disposition

- communications strategies
- contract termination clauses
- monitoring and reporting requirements, including annual progress reporting, financial audits and Request for Disbursement and other reports as stipulated

The Ministry will monitor the project in relation to:

- governance
- timely submission of annual progress reports, including success stories
- project milestones, deliverables and performance measures
- cash flow and accuracy of cash flow forecasting
- financial reporting and audits
- youth outreach
- IP arrangements
- other requirements as set out in the contract

The Ministry, at its discretion and upon reasonable notice, reserves the right to undertake periodic site visits and scientific reviews of projects.

## COMMON APPLICATION ERRORS AND WEAKNESSES

Common weaknesses of applications identified in previous ORF rounds include:

- failure to meet research excellence criterion
- failure to indicate how the proposal relates to or differs from the current state of the art research in the field, within the Ontario context as well as nationally and internationally
- failure to indicate how the proposed research differs from research previously funded by the Ontario government
- proposed research lacks focus (numerous, unrelated or loosely related projects)
- failure to “make the case”, i.e. to explain the steps that led to the proposed research concept
- failure to demonstrate the impact of the research
- ‘overselling’ of research impact (eg. inflated market values do not convince panels, rather they demonstrate the applicants’ lack of understanding of the true market).
- failure to clearly explain the steps that will be taken to maximize the likelihood of achieving the research impacts
- failure to clearly engage next-stage recipients and end-users of research
- proposed research is not ground-breaking or innovative (e.g. small scale, single experiment focused)
- the budget appears inflated and/or expenses are not adequately justified
- the management structure is poorly defined
- the governance structure lacks autonomy
- sustainability is questionable beyond government funding

## SERVICE STANDARD

The Ministry of Research and Innovation is committed to making timely decisions on all complete applications once submitted. The Ministry expects to notify applicants of the outcome in September 2016.

## CONTACT INFORMATION

If you have questions about the ORF-RE contact:

### **Application and adjudication:**

Dawn Edmonds  
[Dawn.edmonds@ontario.ca](mailto:Dawn.edmonds@ontario.ca), 416-326-9632

### **Post-award and contracting:**

Jack Krepel  
[Jack.krepel@ontario.ca](mailto:Jack.krepel@ontario.ca), 416-326-9603

## USE OF INFORMATION

The Ministry of Research and Innovation is subject to the Freedom of Information and Protection of Privacy Act. The information and documentation provided to the Ministry of Research and Innovation may be shared with members of the ORF Advisory Board, the Review Panels, external expert reviewers and others for the purposes of administering the ORF program.

## APPENDIX A: DETAILED APPLICATION INSTRUCTIONS

Numbered instructions below correspond to specific sections of the application form. Please note that not all sections of the application have corresponding instructions.

### SUBMISSION REQUIREMENTS AND GENERAL INSTRUCTIONS

#### PROPOSAL COPIES

- Submit one original paper copy of the completed Application Form (including all associated attachments such as letters of support and CVs).
- The original must be signed by the Vice-President of Research or any other officer of the institution with the authority to bind the institution.
- The original application should not be bound or stapled (binder clips are acceptable and preferred).
- The following electronic documents must be submitted:
  - a PDF version of the complete application (including all attachments)
- If you have any questions please contact:
  - Dawn Edmonds at dawn.edmonds@ontario.ca or 416-326-9632

#### SUBMITTING APPLICATIONS

All completed applications must be received by the Ministry and/or postmarked no later than January 19<sup>th</sup>, 2016. Late or incomplete applications will not be accepted.

- Electronic applications will not be accepted as placeholders for late or pending original paper applications.
- Faxes and/or email attachments will not be accepted in place of the originals.
- Applications and supporting documents (including the institutional letter of support for the application) must be addressed and sent to:

Allison Barr, Director, Research Branch  
Ontario Research Fund – Research Excellence Applications  
Ministry of Research and Innovation  
Research Branch  
56 Wellesley Street West, 11<sup>th</sup> Floor  
Toronto, Ontario M7A 2E7

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## PAPER APPLICATIONS GENERAL FORMAT

- The application should be printed, single sided, on 8 ½" by 11" white paper.
- Text for attachments must be in black and of letter quality.
- Font for all attachments should be Arial 12pt. Condensed font is not acceptable.
- Where possible, ensure that all pages in attachments are numbered.

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## ELECTRONIC APPLICATIONS

- Use the template provided to prepare the body of the application.
- The application form supports rich text formatting.
- Electronic attachments should be clearly named in the following format:
  - Institution Name\_PI Last Name\_Attachment Type
- All attachments of a single type should be compiled into one file with a cover page listing the sub-documents included (e.g. all CVS in one document with a list on the front of all of the CVs and the order in which they appear).
- All attachments must be submitted as a PDF file.

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## PREPARING APPLICATIONS

- Adhere to the restrictions on characters provided for in the section of the Application Form where appropriate.
- Avoid technical jargon in abstracts and milestones.

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## COMMUNICATIONS

- To ensure continuity, consistency and open communication between the applicant and the ORF, all inquiries/discussions during the application, review and post-award processes are to be coordinated by the lead institution's named contact and the assigned Ministry staff.
- Applicants needing additional information or clarification regarding their application to the Fund may contact:

Application and adjudication:

Dawn Edmonds, [dawn.edmonds@ontario.ca](mailto:dawn.edmonds@ontario.ca), 416-326-9632

Post-award and contracting:

Jack Krepel, [jack.krepel@ontario.ca](mailto:jack.krepel@ontario.ca), 416-326-9603

## GENERAL PROJECT INFORMATION

### 1. PROPOSAL TITLE

Enter the name of your proposal. Please be concise (250 character limit).

### 2. AMOUNT REQUESTED FROM THE ORF

Indicate the dollar value of the requested ORF-RE grant. The maximum support provided to a project is \$4 million.

### 3. EXPECTED PROJECT START DATE

The "Start-date" for the project is generally the date of the Award Notification Letter or later. The Ministry may negotiate an earlier "Start-date" which will not be any earlier than the date of the call for proposals for that round of competition. For ORF-RE Round 8, this date is June 8, 2015.

### 4. LEAD INSTITUTION

Name the lead institution taking legal responsibility for the project. If multiple institutions submit a joint application, one institution must be assigned as the Lead Applicant (200 character limit).

### 5. LEAD INSTITUTION CONTACT

Provide the name and contact information for the primary contact at the institution for inquiries related to the application. This is not the principal investigator, but rather a staff person in the research office.

### 6. PRINCIPAL INVESTIGATOR

Provide the name and contact information for the named Principal Investigator on the application. Where applicable, indicate in section 6a the name of a co-Principal Investigator. Section 6a is not a required field. A maximum of two lead co-principal investigators is allowed on each application. Additional co-investigators will be listed in section 20.

### 7. RESEARCH FOCUS OF PROJECTS

Choose only the most applicable area of focus or, if not applicable, choose 'other' and specify the focus of your research.

### 8. RESEARCH DISCIPLINE CODES

List the primary and secondary codes for your research discipline, as per the lists provided in Appendix B.



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## 9. AREA OF APPLICATION CODE

List the primary and secondary codes for your area of application, as per the lists provided in Appendix B.

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## 10. PROJECT KEYWORDS

List up to five words that best describe the project. Note that these identified keywords may be used by the Ministry in searching for appropriate expertise to review the project (maximum 200 characters).

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## 11. COLLABORATING INSTITUTION(S)

If applicable, name other institution(s) that will be collaborating on the project (maximum 1000 characters).

If approved for an award, multi-institutional projects must have an Inter-Institutional Agreement (IIA) in place as soon as practically possible. The IIA must identify and address:

- The lead institution
- Governance structure
- Intellectual Property (IP) ownership and disposition
- Control and ownership of research equipment
- Financial arrangements, including allocations of contributions, expenditures and indirect costs.

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## 12. PRIVATE SECTOR PARTNER(S)

Provide a list of private sector partner(s) (PSP) involved in the project (maximum 1000 characters).

For the purposes of assessment, private sector partners can include:

- For-profit businesses
- Business organizations and/or not-for-profit research institutes funded primarily by relevant businesses

While private sector partners do not need to be located in Ontario, the lead institution must demonstrate that the project will make a positive impact on Ontario's research and commercialization capabilities.

In assessing the strength of the private sector commitment, researcher-owned sole proprietorships are not considered eligible private sector partners on a project in which the researcher is a named investigator or collaborator.

Contributions from charities, foundations and private philanthropists cannot be used as part of the private sector contribution but may be included as institutional contributions.

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### 13. RESEARCHERS' INTERESTS IN PRIVATE SECTOR PARTNERS

Indicate if any researcher involved in the project has any financial interest in any of the private sector partners named in the proposal. Describe the relationship between the researcher and the company (maximum 5000 characters).

All researchers are required to fully declare any interest they have in any of the private sector partners named in the proposal. In some cases, there may be less than arm's length relationships among certain private sector partners, institutions and researchers participating in the project (e.g. where the researcher is a part owner).

Such relationships will be reviewed on a case-by-case basis and may be acceptable, provided the partner:

- has its own physical facilities, separate from that of the university researcher;
- employs its own technical staff; and
- is under the management of someone other than the university researcher.

Where such relationships arise, they must be fully disclosed to the Ministry in the application.

The applicant must provide all information on the degree of ownership of researchers involved in the project and their role in the private sector company to ensure that the commercial activity is consistent with the lead institution's established policies on disclosures of commercial interests, as well as with its conflict of interest guidelines. The lead institution may be required to confirm this capability at the time of contract negotiation against criteria determined by the Ministry.

## RESEARCH EXCELLENCE

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### 14. PROPOSAL BRIEF

Describe in no more than three lines, using simple and non-technical language, the objective and key elements of this proposal, including the strategic value to Ontario.

This summary description may be used, in whole or in part, in press releases or similar materials.

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### 15. PROPOSAL ABSTRACT

Provide a proposal abstract of no more than 3500 characters, using simple and non-technical language. Do not include images and/or charts in the abstract.

This abstract may be used, in whole or in part, in press releases or similar material if the proposal is successfully funded.

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## 16. PROPOSAL DESCRIPTION

Describe your research plan and scientific methodology using a maximum of 65000 characters. References are not included in the maximum length restrictions and should be included in section 16a. Figures are not included in the maximum for this section and should be included in section 16b.

This section should situate your research within the context of current advances in your discipline and explain why your research is leading edge. How do your research goals, theory and hypothesis contribute to your field from a national and/or international perspective? Describe unique features of your research environment and how these may contribute to the probability of success.

If the project being proposed is a continuation of previous ORF-RE funding, please clearly describe how the new work being proposed is different and follows from the previous funding.

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### 16B. FIGURES

Figures can be inserted as any common image file format (jpg, bmp, png etc.). To preserve the appropriate aspect ratio in the form, the figures should be prepared in a landscape orientation. To insert a figure image click the 'new image' button, this will cause a large box to appear. Click anywhere within the box and a navigation window will open that will allow you to choose an image to insert. Images will appear in the application in the order in which they are added and cannot be reordered.

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## 17. PROPOSED INNOVATION

Describe what is new and significant about your proposed research in a maximum of 4500 characters. Explain how the project compares with state of the art research in your field locally and internationally as appropriate. Provide a description of the relevance of the research proposed both within the national/international context and, if applicable, within the context of previous Ontario government funding or ongoing Ontario research initiatives.

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## 18. PROPOSAL INTEGRATION

For proposals that include multiple sub-projects and/or multiple research topics, describe how you plan on integrating the projects/topics in a maximum 4500 characters. Explain how and why the various parts of the project are relevant and necessary to the project as a whole.

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## 19. RESEARCH COLLABORATION

If applicable, in a maximum of 5000 characters, describe the nature and level of inter-institutional and/or international research collaboration in your project.

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## 20. PRINCIPAL INVESTIGATOR AND CO-INVESTIGATOR(S)

Identify the Principal Investigator (PI) and each co-investigator.

In a maximum of 0.5 pages per investigator, please describe:

- Title, department and institution
- His/her relevant qualifications as well as his/her individual potential to make significant contributions to the research objectives
- The percentage of each investigator's time spent on the project, which should also be reflected in the budget.
- Whether the investigator is also working on another project submitted to or currently being funded by the ORF-RE program. Indicate the project's name and lead institution and specify the distribution of the investigator's involvement, should all projects be approved for funding.

For each investigator or key project staff listed, attach a CV (**maximum 3 pages**) to the application in Section 40.

## RESEARCH IMPACT

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### 21. RESEARCH IMPACTS

Applicants are required to describe the potential Research Impact and anticipated value of their proposed research in each of three categories:

1. Commercialization
2. Economic Impacts, and
3. Societal Impacts.

In addition, in section 22 applications must address the plan for Achieving Impact by describing the steps that are being taken to maximize the likelihood of realizing these benefits. To that end, applicants are strongly encouraged to begin engagement with partners as early as possible.

**A total of 57000 characters** is permitted for the Research Impact (Section 21). Each of the three impact types—commercialization, economic impacts, and societal impacts—must be addressed, but applicants may allocate characters as appropriate to the proposed project. In all cases, impacts may be short- or long-term but timeframes for achieving impact should be specifically addressed and are an important part of the review process.

It is strongly recommended that applicants consult their institution's industry liaison office, knowledge mobilization unit, or equivalent as well as their external partners in the completion of this section. Demonstrate this engagement where appropriate.

## COMMERCIALIZATION IMPACTS

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Describe the commercialization potential of your research, when it could be achieved and the anticipated benefits to Ontario. Describe how your research would contribute to commercialization outcomes such as spin-off companies, patents, licenses, and other forms of knowledge transfer to industry. Describe the technology (product or process) that would be developed from this IP and explain how potential customers would use this invention. Applicants are asked to describe the institutional IP policy in Section 26.

This section should provide a brief market analysis, including sources of information. Please note that your market analysis can be qualitative, but quantitative information will strengthen the application.

## ECONOMIC IMPACTS

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Describe the economic potential of your research beyond commercialization and when it could be achieved. Describe how your research, where applicable, will contribute to economic outcomes including—but not limited to—improved productivity, job creation, development of human capital, sustainable use of natural resources, regional development, improved public and private sector efficiency, trade growth, improvements to Ontario's international reputation as an innovation hub, and expanded access to valuable data assets.

Demonstrate how the economic benefit of the proposal extends beyond the private sector partners and beyond traditional IP and commercialization agreements.

This section should provide supporting analysis of the economic areas being discussed, including sources of information. Please note that your market analysis can be qualitative, but quantitative information will strengthen the application.

## SOCIETAL IMPACTS

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Describe the potential of your research to achieve societal benefits and when they could be achieved. Describe how your research will contribute to societal outcomes including—but not limited to—positive effects on human health, environmental wellbeing, poverty reduction, education, quality of life, public policy, and profound shift in understanding of a given discipline.

This section should provide supporting analysis of the societal areas being discussed, including sources of information. Please note that your analysis can be qualitative, but quantitative information would strengthen the application.

## ACHIEVING IMPACT

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## 22. PLAN FOR ACHIEVING IMPACT AND END-USER ENGAGEMENT

In a maximum of 22000 characters, describe the strategy for realizing the potential of the research, and for providing practical application and benefit to industry, the economy, and to wellbeing in Ontario in the short- and long-term. Describe the steps that will be and/or have already been undertaken to maximize the likelihood of achieving the Research Impacts discussed above.

As appropriate, identify the roles and responsibilities of members of the project team involved in realizing the Research Impacts. Describe the previous experience of the project team in appropriate types of knowledge transfer. Explain the roles of your industry and community partners, institutional liaison offices or other experienced advisors involved in the translation of your research. Applicants are encouraged to consider inter-institutional partnerships to maximize translation, such as partnerships between universities and Colleges of Applied Arts and Technology.

Describe the engagement that you will and/or have already undertaken with potential recipients of your research. This may include, but is not limited to, private sector partners, industry associations, consortia, governments, other researchers, the broader public sector, non-profit groups, community/patient groups, and philanthropic organizations. Describe the strategic alliances, partnerships, or licensing agreements you have, or plan to have, in place with these recipients.

Where appropriate please attach any End-User letters of support in Section 39.

Describe the vested interest of your partners in the research and how they demonstrate meaningful commitment through financial contribution to the project and/or evidence of practical interest in the research outcomes.

## DEVELOPMENT OF RESEARCH TALENT

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### 23. PLAN FOR THE DEVELOPMENT OF RESEARCH TALENT

Briefly outline your plan for improving the human capital of Ontario through the development of Highly Qualified Personnel (HQP) and use the proposal budget to support it. HQP include undergraduate students, graduate students, and post-doctoral fellows.

Identify the expected impact that this training may have on academic research, industry, and/or society. Describe how the meaningful engagement of HQP is integral to the project. Where possible, include examples of experiential learning, such as thesis/project topics derived from a company problem; soft skills training; first job/internships; entrepreneurship training; collaborative research; and/or co-op placements.

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### 24. TOTAL NUMBER OF HQP TRAINED

Indicate the total number of HQP you plan on training over the life of the project and ensure that the anticipated number of HQP is consistent with your proposed budget and milestones.

## PROJECT MANAGEMENT

### 25. PROJECT MANAGEMENT

Outline how the project will be managed:

- Identify the role and function of the project manager and other key project management staff.
- Describe the desired or established governance structure to manage the project; e.g. independent academic committee, Board of Directors, with a manager or executive director. Provide a resume of the project manager, if known at the time of application.
- Ensure the proposed governance structure is commensurate with the size, scope and complexity of the proposed project.
- If applicable, describe the project's data management strategy.

An institution must detail and confirm that the management of the project will be accountable and will have sufficient authority and independence to ensure that public funds are used appropriately. Projects must identify how they will provide accurate multi-year and in-year budget forecasts.

Additionally, outline how the research capacity will be sustained after completion of the project.

## OTHER PROJECT REQUIREMENTS

### 26. INTELLECTUAL PROPERTY

In accordance with the lead institution's current IP policy, describe how ownership and disposition of IP generated from the project will be determined. In cases where a consortium of applicants exists, the policy, as described in the Inter-Institutional Agreement (IIA) between the consortium members, will dictate the IP policy. The Ministry may request a copy of the institutional and/or relevant IP policy.

### 27. YOUTH OUTREACH PLAN

Describe the plan for annual youth outreach activities. All applications must include a plan for annual youth outreach activities primarily targeted at elementary and high-school students. The applicants may use up to 1% of the ORF portion of funding for related activities.

Applicants may wish to explore potential youth outreach activities available through the members of the [Science and Technology Awareness Network](#).

Youth engagement activities can include—but are not limited to:

- Engaging youth audiences as well as educators and the general public both on-campus and in the local community
- Expansion of current outreach activities, or starting new initiatives with an emphasis on activities that are free to youth and the public
- Partnering with other researchers in their institution(s) to undertake a broader outreach initiative
- Participation in outreach activities operated by other organizations, such as science awareness organizations
- Involving graduate students in outreach program design and delivery
- Apply provincial contributions to expenses incurred in developing and delivering the outreach activity, e.g. consumable supplies, development of working models, mileage
- Outreach activities can also include such initiatives as speaking opportunities, lecture series, workshops and demonstrations, student competitions and lab mentorship.

## MILESTONES AND DELIVERABLES

Using simple, non-technical language, list major milestones, the significance of these milestones (where appropriate) and expected project year of completion in the following categories:

- project management (section 28),
- research capacity building (section 29),
- research (section 30 and see additional instructions below),
- achieving research impacts (section 31),
- youth outreach (section 32), and
- other milestones (section 33).

In each section, insert additional rows as necessary. Note that each milestone has a 500 character limit.

These will be used to monitor and determine the project's progress against a specific project work plan from the date of ORF Research Excellence funding to the point at which the project is fully implemented.

A milestone is defined as a significant expected event or accomplishment in the life of the project resulting from research activities or a point at which an important change or resolution occurs.



Please use brief and succinct statements when describing significance. Not every milestone will be significant. Significance will need to be more fully detailed when presented in the discussion in the annual progress report.

Areas of significance to consider when building milestones include:

- Significance in advancing the science, discipline or current state of knowledge in the field of study.
- Significance to the institution's research capacity building. Will it attract, train and retain highly qualified personnel?
- Significance to the private sector partners on the project. Does it create a commercialization path/potential?
- Significance to Ontario. Will it create jobs? Will it brand Ontario as a leading jurisdiction for conducting research in the discipline/focus/area? Will it improve quality of life for Ontarians? How else will it affect the economy and society of Ontario?

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### 30. RESEARCH EXCELLENCE MILESTONES

In projects that have sub-projects, list milestones in chronological order under their respective sub-project. Where appropriate, a brief statement should be included which describes the significance of the milestone to the overall research project.

### PROJECT BUDGET

It is essential that applicants provide their best forecast of project expenditures and contributions in the budget template. Applicants should pay particular attention to whether their timelines are realistic. The decision to allow a grant extension will be viewed in the context of the Ministry's fiscal plan, and is likely to be granted only in very exceptional circumstances. Projects should not assume that extensions will be granted.

Please also note that the 'amount requested from ORF' is not necessarily the amount that will be received in that year. Projects will be subject to a final holdback amount and the actual payment will be determined based upon actual project revenue and expenses submitted through the Request for Payment process.

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### 34. ANNUAL BUDGET TABLES

Applicants are required to provide a zero-based budget that details all expenses and revenue sources that will support the operating needs of the proposed project.

Please note that in the budget tables, all 'Totals' will be calculated automatically.

#### EXPENSES:

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Please provide the amount for each category of eligible expenses that is anticipated in each year of the project. The ORF-RE grant can be used for the following eligible direct costs.

## PERSONNEL

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In all cases, salary and benefit expenses can only be claimed in proportion to the time spent working on the project.

Personnel costs can include salaries, stipends and related non-discretionary benefits of researchers, technical staff and management and administrative staff and assistantships for students.

The ORF funding can be used to cover up to \$20,000 for graduate student research assistants (MSc and PhDs) and \$50,000 for postdoctoral fellows (PDF). Institutions may top up the stipends extended to students and postdoctoral fellows at their discretion using other project funds.

## FACILITIES AND EQUIPMENT

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Up to a maximum of 10% of total direct costs may be allocated to facilities and equipment that is critically and explicitly needed to carry out the project and can include:

- Research equipment - Supplies, computer and communication equipment as well as software required for the research, including costs of purchase, refurbishment, transportation, extended warranties, importation costs, staff training for use, maintenance and operating costs (not including indirect costs such as power, insurance, etc.)
- Cost of renovations and alterations of existing space where essential for the research
- Leased space - Or institutional contributions of space when that space is newly developed, renovated, refurbished or leased

## OTHER DIRECT RESEARCH EXPENSES

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Other direct research expenses can include, but are not limited to:

- Commercially-available consumable supplies, reagents, etc.
- Costs for dissemination of research results
- Costs related to ensuring open access of research results
- Costs of holding a workshop or seminar, including hospitality costs of networking purposes for research related activities (note: Alcohol is not an eligible ORF expense under any circumstances).
- Consulting services provided by any individual unrelated to any of the project partners and subcontracted to provide service or knowledge of a highly specialized nature for up to one quarter per fiscal year. They must be essential to the research

and demonstrate they save the project time and money. Their fees should reflect reasonable market rates.

- Honoraria for guest lecturers
- Safety related expenses for field work, including immunizations, protective gear, etc.
- Reasonable out-of-pocket expenses for fieldwork, conferences and collaborative trips
- Reasonable travel costs to visit collaborating universities/colleges or business partners for the purpose of the project (amount may be limited at the discretion of the Ministry)
- Air travel costs - not to exceed full economy fares (amount may be limited at the discretion of the Ministry)

## MANAGEMENT AND ADMINISTRATION

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Management and administration costs may account for up to 10% of total direct costs and can include:

- Salaries and benefits of management staff/personnel directly involved with the project.
- Management and administration costs, including reasonable justifiable office supplies (amount may be limited at the discretion of the Ministry)
- Other costs, which can include items such as external financial audits of the project as defined in the grant agreement

## CONTRIBUTION SUMMARY

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The ORF-RE program will fund eligible direct operating costs, as well as a portion of indirect (overhead) costs. Up to an additional 40% of direct costs may be included as indirect costs. The program's 1/3 contribution is inclusive of both direct and indirect cost contributions. The maximum amount of the ORF grant that can be applied to indirect cost is 40% of the portion of the grant applied to direct costs.

As such, on a \$1M grant, the institution can take a maximum of  $\$1,000,000/1.4*0.4 = \$285,714$  from the grant toward indirect costs.

## INSTITUTIONAL CONTRIBUTIONS SUMMARY

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Applicants must be prepared to disclose the sources of their institutional contributions, which can include:

- Federal granting council (Canadian Institutes of Health Research [CIHR], Natural Sciences and Engineering Research Council [NSERC] and Social Sciences and Humanities Research Council [SSHRC]) awards directed to researchers of the institution where the funded research is a component of the overall ORF-funded

project. The industry portion of an NSERC CRD and an NSERC Industrial Research Chair will be considered as an eligible private sector contribution.

- The non-infrastructure portion of a Canada Research Chair award to an institution if the Chair is working on the project.
- Any research funding, philanthropic gift, or grants and gifts directed in general to the research institution and earmarked by the institution to an ORF-RE project or directed to the project itself.

Note: grants received for a specific purpose from the Ontario government or from an Ontario government agency, or funding which has already fully leveraged Ontario government funding, cannot be used as an institutional contribution toward the project.

## PRIVATE SECTOR PARTNER CONTRIBUTIONS SUMMARY

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Applicants are required to disclose all revenue sources for their project, including all private sector contributions.

- Private Sector Cash Contributions - Cash contributions must be fully detailed in the letter of support (LoS) from the Private Sector Partner (PSP). Refer to Section 39 for requirements for the LoS.
- Private Sector In-Kind Contributions - In-kind contributions need to be crucial to the project (i.e. if not contributed by the private sector, the institution would need to acquire the resources with institutional cash) and can include equipment or related warranties, materials and expendable supplies, software and databases/datasets, use of space or facilities, salaries (including benefits) of professional, technical, analytical, or project-specific administrative personnel and access to unique databases, high performance computing services and travel costs (may be limited) for essential time limited off-site work related to the project. When a private sector partner provides personnel with specialized knowledge or skills, ORF-RE will regard this as an in-kind contribution to be valued at that personnel's salary and benefit level in proportion to the time spent on the project. Such personnel will not be considered consultants.
- Private Sector In-Kind contributions must be detailed in the appropriate letter of support. These must describe how the value of the contribution was determined (e.g. pro-rated salary, best customer price, academic discount, published prices, etc.).
- These values must correspond with the values described in the budget breakdown and private sector partner tabs.

## ORF REQUEST

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Note that this amount will be automatically calculated as the difference between the total project expenses and the contributions from other sources detailed in the contribution summary.

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## 35. PRIVATE SECTOR PARTNER CONTRIBUTION DETAILS

Ensure that each partner and associated contribution is supported by a corresponding letter of support and that the totals correspond to the amount declared in the Contributions Summary above. The Private Sector letters of support should be attached in Section 39.

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## 36. BUDGET JUSTIFICATION

In a maximum of 30000 characters, provide a detailed justification for the amount requested in each expense category.

For personnel it is essential that you indicate the percentage of their time that will be dedicated to the project and pro-rate their salary accordingly. Senior personnel should all be listed separately. For other types of personnel, it may be more appropriate to consolidate their salaries. For all personnel you should indicate the duration for which they will be engaged in the project.

For Other Direct Research Expense, Facilities and Equipment and Management and Administration, provide a justification for the main expenses involved in completing the project. Include any assumptions that were used to develop your estimate.

When completing the justification, it is important that you provide sufficient information to allow reviewers to assess the resources requested in terms of whether they are necessary and appropriate for the proposed project.

## EXPERT REVIEWERS

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### 37. RECOMMENDED EXTERNAL EXPERT REVIEWS

The suggested experts should not have a conflict of interest (CoI) with the proposal or the PI. Please see *CoI Policy for Expert Reviewers* for additional information. It is recommended that you speak to potential reviewers listed on your application and alert them to the fact that they may be contacted to review your application. DO NOT provide more than three names in this section. A maximum of one out of the requisite three expert reviews will be obtained from a reviewer recommended by the applicant. **Note:** the Ministry reserves the right to choose reviewers and will choose additional reviewers to bring the total reviews to three.

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### 38. EXCLUDED EXPERT REVIEWERS

In this section, if desired, you may also provide up to **TWO** names of experts you do not want selected as reviewers.

## ATTACHMENTS

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### 39. LETTERS OF SUPPORT

## INSTITUTIONAL LETTERS OF SUPPORT

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Each application must be accompanied by a Letter of Support from the lead institution, indicating whether the goals of the proposed research are consistent with the institution's overarching research strategy. The letter must be signed by the Vice-President of Research or any other officer of the institution with authority to bind the institution. In the case of applications involving more than one institution, a letter of support should also be included from each collaborating institution, signed by the Vice-President Research or any other office of the institution with authority to bind the institution. All institutional letters of support should be compiled into a single pdf file with a cover page listing the documents contained within. The file should be named according to the following convention:

**Institution Name\_PI Last Name\_Ins LoS.**

## PRIVATE SECTOR PARTNER LETTERS OF SUPPORT

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All PSP letters of support should clearly articulate the amount being committed, the timeframe of the commitment and for in-kind support, how the value was determined. PSP letters should be compiled into a single pdf file with a cover page listing the letters contained within. The file should be named: **Institution\_PI Last Name\_PSP LoS.** Please note that, for projects successfully funded, the Ministry reserves the right to request a revised letter of support from a PSP during the contract negotiations.

## END USER LETTERS OF SUPPORT

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Include appropriate Letters of Support as a single pdf file with a cover page listing the letters contained within. The file should be named: Lead **Institution\_PI Last Name\_User LoS.**

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## 40. CVS OF NAMED INVESTIGATORS AND KEY PROJECT STAFF

For each investigator or key project staff, please attach a CV (**maximum 3 pages**) to the application, highlighting his/her recent contributions to research and capacity-building, including:

- Other research support currently held or applied for
- Training of highly qualified personnel, i.e., training of undergraduate students and technical/professional assistants
- Other significant achievements (peer-reviewed publications, patents, significant presentations, awards, honours, membership on committees etc.)

All CVs should be compiled into a single pdf file with a cover page listing the CVs contained within and named: **Lead Institution\_PI Last Name\_CVs**

## APPENDIX B: RESEARCH CODES

Use the Canada Foundation for Innovation research codes found below to complete Sections 8 and 9 as indicated.

### RESEARCH DISCIPLINE CODES (SECTION 8)

#### MULTIDISCIPLINARY

5000 Multidisciplinary

#### NATURAL SCIENCES AND ENGINEERING

10001 Multidisciplinary in NSE  
10100 Civil Engineering  
10200 Structural Engineering  
10300 Agricultural Engineering  
10400 Forest Engineering  
10500 Mining and Mineral Processing  
10600 Environmental Engineering  
10700 Industrial Engineering  
10800 Design and Manufacturing  
10900 Chemical Engineering  
11000 Biomedical Engineering  
11100 Materials Science and Technology  
11200 Mechanical Engineering  
11300 Fluid mechanics  
11400 Fuel and Energy Technology  
11500 Nuclear Engineering  
11600 Electrical and Electronic Engineering  
11700 Robotics  
11800 Information Technology  
11900 Artificial Intelligence  
12000 Pure Mathematics  
12100 Applied Mathematics  
12200 Statistics and Probability  
12300 Physics  
12400 Theoretical Physics and Chemistry  
12500 Astronomy and Astrophysics  
12600 Space Science  
12700 Condensed Matter Physics  
12800 Physical Chemistry  
12900 Analytical Chemistry  
13000 Inorganic Chemistry  
13100 Organic Chemistry  
13200 Polymer Chemistry  
13300 Earth Science  
13400 Geographical Information  
13500 Physical Geography

13600 Geochemistry and Geochronology  
13700 Geophysics  
13800 Atmospheric Science  
13900 Hydrology  
14000 Oceanography  
14100 Evolution and Ecology  
14200 Soil Science  
14300 Plant and Tree Biology  
14400 Genetics  
14500 Cell Biology  
14600 Microbiology  
14700 Molecular Biology  
14800 Biochemistry  
14900 Animal Biology  
15000 Food Science and Technology  
15100 Psychology  
15200 Life Sciences Related to Human Health and Disease  
18000 Other

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#### SOCIAL SCIENCES AND HUMANITIES

20001 Multidisciplinary in SSH  
20100 Anthropology  
20200 Archival Science  
20300 Fine Arts  
20400 Archeology  
20500 Library and Information Science  
20600 Communication and Media Studies  
20700 Criminology  
20800 Demography  
20900 Law  
21000 Education  
21100 Classics, Classical and Dead Languages  
21200 Mediaeval Studies  
21300 Interdisciplinary Studies  
21400 Religious Studies  
21500 Folklore  
21600 Geography  
21700 History  
21800 Modern Languages and Literature  
21900 Linguistics  
22000 Philosophy  
22100 Psychology  
22200 Industrial Relations  
22300 Management, Business, Administrative Studies  
22400 Economics  
22500 Political Science  
22600 Sociology  
22700 Social Work



22800 Urban and Regional Studies, Environmental Studies  
22900 Other

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## ARTS AND LETTERS

30001 Multidisciplinary in AL  
30100 Architecture  
30200 Visual Arts  
30300 Arts and Crafts  
30400 Theatre  
30500 Music  
30600 Dance  
30700 Literature  
30800 Media Arts  
30900 Varieties  
31000 Multidisciplinary and Multimedia Arts  
31100 Other

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## HEALTH SCIENCES

40001 Multidisciplinary in HS  
40100 Infectious and Parasitic Diseases  
40200 Neoplasms  
40300 Endocrinology  
40400 Thyroid  
40500 Diabetes Mellitus  
40600 Metabolism and Nutrition  
40700 Blood  
40800 Mental and Behavioural Disorders  
40900 Drugs - Pharmaceutical Science, Chemistry and Nonmedical Use of Drugs  
41000 Central Nervous System Organic  
41100 Diseases Affecting Speech/Vision/Hearing  
41200 Cardiology  
41300 Respiration  
41400 Gastro Intestinal Disease  
41500 Dental Diseases (Including Oral Biology)  
41600 Genito-Urinary System  
41700 Pregnancy/Childbirth  
41800 Musculo-Skeletal  
41900 Congenital Anomalies  
42000 Perinatal  
42100 Ill-defined Conditions  
42200 Accidents, Poisoning, Violence  
42300 Multidisciplinary Health Research  
42400 Population Health - General  
42500 Health Services Research General  
42600 Psychosocial Behavioural Research - General  
42700 Multiple Disease Relevance  
42800 Other

## AREA OF APPLICATION CODES (SECTION 9)

### 1. EXPLORATION AND EXPLOITATION OF THE EARTH

- 1.1 Mineral, oil and natural gas prospecting
- 1.2 Exploration and exploitation of the sea-bed
- 1.3 Earth's crust and mantle excluding sea-bed and studies of soils for agriculture (6)
- 1.4 Hydrology - excludes research on: water supplies and disposal (2.6) and water pollution (3.4 and 3.5)
- 1.5 Seas and oceans
- 1.6 Atmosphere
- 1.7 General and other research on the exploration and exploitation of the earth

### 2. INFRASTRUCTURE AND GENERAL PLANNING OF LAND-USE

- 2.1 General planning of land-use
- 2.2 Construction and planning of building
- 2.3 Civil engineering - excludes research on building materials and industrial processes (area 7)
- 2.4 Transport systems
- 2.5 Telecommunication systems
- 2.6 Water supply
- 2.7 Development of the North
- 2.8 General and other research on the infrastructure and general planning of land-use

### 3. POLLUTION AND PROTECTION OF THE ENVIRONMENT

- 3.1 Protection of atmosphere and climate
- 3.2 Protection of ambient air
- 3.3 Solid waste
- 3.4 Protection of ambient water
- 3.5 Protection of soil and groundwater
- 3.6 Noise and vibration
- 3.7 Protection of species and habitats
- 3.8 Protection against natural hazards
- 3.9 Radioactive pollution
- 3.10 General and other research on the environment

### 4. HEALTH

- 4.1 Medical research, hospital treatment, surgery
- 4.2 Preventive medicine
- 4.3 Biomedical engineering and medicines
- 4.4 Occupational medicine
- 4.5 Nutrition and food hygiene
- 4.6 Drug abuse and addiction
- 4.7 Social medicine
- 4.8 Hospital structure and organization of medical care

#### 4.9 General and other health research

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### 5. PRODUCTION, DISTRIBUTION AND RATIONAL UTILIZATION OF ENERGY

- 5.1 Fossil fuels and their derivatives
- 5.2 Nuclear fission
- 5.3 Radioactive waste management including decommissioning
- 5.4 Nuclear fusion
- 5.5 Renewable energy sources
- 5.6 Rational utilization of energy
- 5.7 General and other research on production, distribution and rational utilization of energy

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### 6. RENEWABLE RESOURCE PRODUCTION AND TECHNOLOGY

- 6.1 Agriculture
- 6.2 Fisheries and aquaculture
- 6.3 Forestry
- 6.4 General and other research on renewable resource production and technology

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### 7. INDUSTRIAL PRODUCTION AND TECHNOLOGY

- 7.1 Increasing economic efficiency and competitiveness
- 7.2 Manufacturing and processing techniques
- 7.3 Extraction and processing of non-energy minerals and derived products, including building materials
- 7.4 Products of the chemical industry
  - 7.4.1 Petrochemical and coal by-products
  - 7.4.2 Pharmaceutical products
- 7.5 Manufacture of motor vehicles and other means of transport
  - 7.5.1 Aerospace equipment manufacturing and repairing
  - 7.5.2 Manufacture of motor vehicles and parts
  - 7.5.3 Manufacture of other modes of transportation
- 7.6 Electronic and related industries
  - 7.6.1 Manufacture of office machinery and data processing equipment
  - 7.6.2 Manufacture of radio, television and communications equipment and apparatus
  - 7.6.3 Software development
- 7.7 Manufacture of electrical machinery and apparatus
- 7.8 Manufacture of non-electronic and non-electrical machinery
- 7.9 Manufacture of instruments
  - 8.1 Manufacture of medical and surgical equipment and orthopaedic appliances
- 7.10 Manufacture of food products and beverages
- 7.11 Manufacture of clothing and textiles and leather goods
- 7.12 All other manufacturing products, including wood and paper products
- 7.13 Recycling
- 7.14 General and other research on industrial production and technology

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## 8. SOCIAL STRUCTURES AND RELATIONSHIPS

- 8.2 Education, training, recurrent education and retraining
- 8.3 Cultural activities
- 8.4 Management of businesses and institutions
- 8.5 Improvement of working conditions
- 8.6 Social security system
- 8.7 Political structure of society
- 8.8 Social change, social processes and social conflicts
- 8.9 General and other research relating to social structures and relationships

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## 9. EXPLORATION AND EXPLOITATION OF SPACE

- 9.1 Exploration and understanding of space
- 9.2 Satellites
- 9.3 Launch systems
- 9.4 Space laboratories and space travel
- 9.5 General and other research on the exploration and exploitation of space

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## 10. OTHER RESEARCH

This code covers research which cannot be classified according to one of the other codes.