GenomeCanada

Request for Applications

2017 Bioinformatics and Computational Biology Competition

1. Overview

Genome Canada is seeking proposals for research projects to address any aspect of **bioinformatics**[1] and **computational biology**[2] (B/CB) as it relates to **genomics**[3] across all of Genome Canada's sectors, i.e., human health, agriculture, aquaculture/fisheries, forestry, energy, mining and environment,

The ongoing influx of large amounts of data from 'omics research underscores the need for new computational and theoretical tools in modern biology. These tools are essential for analyzing and integrating complex data sets and to better understand the associated biology. The lack of efficient B/CB tools and methodologies available to analyse these data sets and maximize the impact of the research is a major bottleneck faced by the genomics research community. Genome Canada has identified B/CB as a priority area with the goal to create an environment that supports the creation and evolution of enhanced B/CB tools and methodologies.

This Request for Applications (RFA) supports proposals under two streams:

- Stream 1: proposals mainly impacting the human health sector
- Stream 2: proposals mainly impacting one or more of the other sectors, i.e., agriculture, aquaculture/fisheries, forestry, energy, mining and/or environment.

Genome Canada recognizes that application of current technologies in genomics is creating health-related data sets of unprecedented size and complexity, such that advanced computational tools are required for their analysis. While these data are of potential enormous importance for health and wellness, extracting value from this vast amount of information is a critical challenge. Thus, advancing the field of B/CB through innovative or transformative ideas in the area of B/CB will be a key to enabling novel translational research applications in health-related areas.

Similarly, Genome Canada also recognizes that Canada's agriculture, aquaculture/fisheries, forestry, energy, mining and environment sectors have important opportunities to be part of solutions to many global challenges including food security, sustainable resource development and climate change. This is underpinned by the fact that Canada has a privileged supply of productive farm land, fresh water, unpolluted oceans and a rich supply of natural resources. The knowledge of the genetic make-up and gene functions of plants, livestock, fish, microbes

[1] The term bioinformatics is defined here as the development and application of computational tools and approaches for maximizing the use of genomics data.

[2] The term computational biology is defined here as the development and application of theoretical data-analytical methods, mathematical modeling and computational simulation techniques in the context of the study of biological systems.

[3] The term genomics is defined here as the comprehensive study, using high throughput technologies, of the genetic information of a cell or organism and its functions. The definition also includes related disciplines such as bioinformatics, epigenomics, metabolomics, metagenomics, nutrigenomics, pharmacogenomics, proteomics and transcriptomics.

and other species, and how these genes interact, has been increasing dramatically over the last 10 years. The application of this knowledge to the agriculture, aquaculture/fisheries, forestry, energy, mining and environment sectors has been largely untapped and is in need of further development of B/CB tools to take full advantage of the data generated by the latest genomic technologies.

2. Objectives

The major objectives of this RFA are to:

1) support the development of next generation Bioinformatics and Computational Biology tools and methodologies that will be required to deal with the large amounts of data produced by modern genomics technologies, analyze and integrate complex data sets and to better understand the associated biology; and,
2) provide broad and timely access of these Bioinformatics and Computational Biology tools to the research community.

To ensure that the objectives of the RFA are met, all applications must address the evaluation criteria established for the competition, i.e., research, benefits, management and financial (see Appendix 1).

3. Funding Available and Term

- A total of $12 million will be available from Genome Canada. Approximately 50% of the available Genome Canada funding will be invested in each stream as defined above.
- At least half of the requested funding for eligible costs for each project must be obtained through co-funding from other sources.
- Genome Canada will invest a maximum of $500,000 in an individual project (please note, however, that with the maximum investment of $500,000, plus co-funding that can exceed $500,000, a total investment of more than $1 million per project is possible).
- Projects requiring less than a total of $250,000 of Genome Canada funds will not be considered.
- Successful individual projects will be awarded funding for a term of up to three years.

4. Eligibility and Types of Proposals Being Sought

To be eligible for this competition, proposals must meet the following requirements:

- The proposal must respond to the objectives of the competition.
- The proposed research must be applicable to at least one of the two streams described above.
- The essential components and outcomes of the proposed project must be sufficiently targeted to the requirements of the genomics research community.

Applications that involve researchers from a variety of other disciplines including, but not limited to, biology, statistics and mathematics, are encouraged.

Of particular interest will be proposals addressing problems associated with current data handling and analysis and proposals addressing challenges arising from handling and analysis of data emerging from new technologies. Such tools and methods, in the long term, are expected to underpin Canada's national B/CB strategy and will

help the Canadian research community in maximizing the impact of data generated by new and future 'omics technologies.

In order to maximize the effectiveness of this RFA in advancing B/CB and its application to genomics in Canada, sharing of resources and expertise through inter-regional or international collaboration is encouraged at all levels.

5. Benefits

The ongoing need for efficient B/CB tools and methodologies available to analyse large genomics data sets is a major bottleneck faced by the genomics research community. Genome Canada recognizes that the real value of genomics research can only be realized through the development of novel B/CB tools and methodologies. The purpose of this RFA is to enable the B/CB community to develop these B/CB tools and methodologies to facilitate genomics research which will lead to benefits for the genomics research community and eventually Canada.

All applications must describe, with supporting evidence, the deliverable(s) that will be realized **by the end of the project.** Deliverables should have practical applicability in as short a time as possible after the end of the project and lead to benefits for the genomics research community.

Applications must include a plan and time-frame that outlines how the deliverables from the research will be transferred, disseminated, used, and/or applied to realize the benefits to the genomics community. The involvement of users in the development and execution of the research plan and realization of benefits would help demonstrate that the project deliverables are more likely to be taken up and applied. Users are defined here as individuals or organizations who will be beneficiaries of the project deliverables including, but not limited to, academic and private sector researchers and industrial partners.

Although open source/open access currently typifies the B/CB community, applicants are invited to articulate alternative options for community availability and downstream development as long as the dissemination plan ensures maximum community uptake. Preference will be given to applications with a high potential for community impact and/or uptake regardless of the type of dissemination plan proposed. Applicants are required to adhere to Genome Canada's *Data Release and Sharing Policies*.

6. Guidelines for Funding

Genome Canada's *Guidelines for Funding* must be adhered to throughout the competition and post-award management processes.

6.1. Exceptions to the Guidelines

Exceptions to the Guidelines specific to this RFA include:

- **Project Managers:** A dedicated Project Manager is not required.

6.2. Additional Guidelines

Additional Guidelines specific to this RFA include:

Ineligible costs:

- Salaries, benefits and associated costs for the performance of wet lab work.
- Costs for high performance computing infrastructure.

7. Application Process

Applicants are required to apply for funding through their regional Genome Centre. Applicants are also required to choose ONE of the two streams indicated above (see "Overview" section on page one of this RFA). Please note that Genome Canada will assemble two separate review committees, one dedicated to each of the two streams.

7.1. Registration

A brief Registration form will be used to provide early guidance on elements such as who is applying, whether the proposed research is applicable to Stream 1 or Stream 2, what the research team is planning to do, expected deliverables, approximate budgets and suggested reviewers. This will allow for screening for eligibility by the Genome Centres (followed by final decisions on eligibility by Genome Canada) and facilitate the early selection of reviewers for the peer review process. Information from eligible Registrations (i.e., name of project leader(s), lead institution, title of project, research areas and keywords) will be posted on the Genome Canada website to facilitate the identification of areas of potential synergy between applications from across the country so that applicants could consider engaging with other researchers on a common project.

7.2. Full Application

Full applications must address the evaluation criteria established for the competition, i.e., research, benefits, and management and financial. A final check for eligibility will be carried out.

Genome Canada may adjust its evaluation processes where warranted by the number or complexity of proposals received or other relevant factors. Any changes will be rapidly communicated through Genome Canada's website and through the Genome Centres.

7.3. Co-Funding

Genome Canada requires that at least 50% of the requested funding for eligible costs for each project be obtained through co-funding from other sources. The Genome Centres, working with the applicants, are responsible for securing co-funding. Co-funding for this competition must be for research activities that are an integral part of the Genome Canada approved project and must be for eligible costs specifically requested in the Genome Canada budget form in order to be considered as an eligible co-funding source. See the *Guidelines for Funding* for more details.

8. Competition Timeline

Requests for support of projects must be submitted to Genome Canada through a Genome Centre. The competition timeline outlined below includes both Genome Canada and Genome Centre deadlines. Please contact your regional Genome Centre for further information on their process and internal deadline dates.

Date	**Activity**
December 4, 2017	Launch of Request for Applications (RFA)
*January 30, 2018 Génome Québec	Registrations due at Génome Québec *Centre deadline dates will be earlier than Genome Canada deadline
February 1, 2018	Due date for registrations at Genome Canada
February 8, 2018	Review of eligibility of registrations by Genome Canada completed
*February 26, 2018 Génome Québec	Full Applications due at Génome Québec *Centre deadline dates could be several weeks earlier than Genome Canada deadline
April 9, 2018	Deadline for Full Applications at Genome Canada
Mid-May, 2018	Review process completed
Late June, 2018	Decisions by Genome Canada and Partners
Late June, 2018	**Notification of Decision**

9. Contacts

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Appendix 1 – Evaluation of Applications

Proposals submitted to Genome Canada are evaluated through a rigorous independent peer review process to assess their eligibility, research merit and potential for benefits to the genomics research community as well as to ensure that sound management and financial practices are implemented.

1. Eligibility Criteria

Each proposal will be reviewed for eligibility at every stage of the application process. The following criteria will be used.

- Does the project proposal respond to the objectives of the competition?
- Are the essential components and outcomes of the proposed project sufficiently targeted to the requirements of the genomics research community?

If considered eligible, the proposal will be reviewed using the criteria described below.

2. Review Criteria

The review criteria fall into three categories:

1) Research Proposal;
2) Benefits; and,
3) Management and Finance

Note that the descriptive phrases which follow the criteria below are not all-inclusive.

2.1. Research Proposal

- Research Context and Originality
  - To what extent does the proposed research into development of next generation tools and methodologies lead, extend and/or complement national and international work in the area?
  - To what extent does the proposed research reflect creative, original thinking?
  - To what extent will the proposed tools and methodologies be relevant to the users identified in the sector(s) targeted by the applicants?
  - To what extent will the proposed tools or methodologies increase the productivity of genomics research?

- Research Plans
  - How appropriate are the methods and approaches (including handling of data and resources) in terms of the research objectives?
  - How feasible is the research given the projected resources and time-lines?
  - How appropriate is the plan for sharing data and resources within the project and externally and does it comply with Genome Canada's policy on *Data Release and Resource Sharing*?

- Research Expertise
    - How appropriate is the expertise of the research team in terms of realizing the research goals?
    - How effectively will the project bring together expertise from complimentary disciplines?

- Research Environment
    - How suitable are the available facilities and equipment?

2.2. Benefits

- Deliverables
    - To what extent have the applicants identified appropriate deliverables in terms of their potential to have practical applicability to the genomics research community in the sector(s) targeted by the applicants?
    - What is the probability that the deliverables will be realized by the end of the funding period?

- Expected Benefits
    - How significant are the anticipated benefits described in the proposal to the genomics community in the sector(s) targeted by the applicants?
    - What is the probability that the benefits be realized by the research community within a short time-frame after the end of the project?

- Strategy for Realizing Benefits
    - How appropriate is the plan for access to, and dissemination of, the tools and methodologies developed and does it comply with Genome Canada's policies on *Data Release and Sharing*?
    - How well are next steps of how the deliverables from the research will be transferred, disseminated, used, and/or applied to realize the benefits explained in the sector(s) targeted by the applicants?
    - How high is the potential for community impact and/or uptake, regardless of the type of dissemination plan proposed?

- Expertise for Realizing Benefits
    - To what extent are likely users involved in the project and the strategy to realize benefits?

2.3. Management and Finance

- Management Plans and Expertise
    - How well does the management plan cover project governance, accountabilities of personnel, and processes for decision-making on research direction and strategy for realizing benefits?

  - How convincing is the management plan in terms of coordination of current and future partnerships?
  - How realistic is the project schedule?
  - To what extent do the project leaders have experience in managing projects with multi-disciplinary teams involving research and the application of results?
  - How good are the plans to ensure that an adequate number of highly qualified personnel (HQP), both support personnel such as technicians and trainees (e.g., post-doctoral fellows), are available to meet the needs of the proposed research through recruitment and/or training?

- Budget and Expenditure Controls
  - How reasonable is the proposed budget in terms of the anticipated level of effort and deliverables?
  - To what extent does the proposal provide assurance that expenditures from a funded project would be closely and critically monitored?

- Financing from Co-Funders
  - To what extent is the proposed co-funding plan well-documented, eligible and feasible?
  - Does the proposed co-funding directly support the objectives of the project?
  - How strong is the likelihood that the project will be able to secure at least 75% of the co-funding for eligible costs at time of the release of funds?