GenomeCanada

Request for Applications

2012 Bioinformatics and Computational Biology Competition

1. Overview

Genome Canada, in partnership with the Canadian Institutes of Health Research (CIHR), 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]**.** Proposals with applications across all of Genome Canada's sectors are welcome, i.e., agriculture, energy, environment, fisheries, forestry, human health and mining.

The massive and ongoing influx of data from 'omics research, in particular large-scale sequencing projects, 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 is a major bottleneck faced by the genomics research community. For these reasons, 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. In December 2011, Genome Canada's Science and Industry Advisory Committee (SIAC) held a workshop to discuss how best to invest funds secured in the 2011 Federal Budget as well as to gain insight into a broader, long-term strategy for B/CB in Canada. Shortly after the workshop, a Task Force was put in place to help Genome Canada move forward in this important area and to ensure that intelligence from the workshop was fully exploited. Recommendations made by the Task Force about the scope of a proposed Genome Canada Request for Applications (RFA) in the area of B/CB are included here.

CIHR is partnering on this RFA in support of those proposals in the area of human health because it recognizes that application of current technologies in genomics would create 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 fields of bioinformatics and computational biology will be a key to enabling the development of novel translational research applications in health-related areas.

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[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, including the function of specific genes, their interactions with each other and the activation and suppression of genes. For purposes of describing Genome Canada's mandate it also includes related disciplines such as bioinformatics, epigenomics, metabolomics, metagenomics, nutrigenomics, pharmacogenomics, proteomics and transcriptomics.

Through this Genome Canada and CIHR Strategic Partnership, Genome Canada will initiate a vital element of its Strategic Plan and CIHR will deliver on key objectives underpinning the CIHR Personalized Medicine Signature Initiative and the CIHR Data Harmonization Initiative.

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 by the research community to deal with the influx of large amounts of data produced by modern genomics technologies; and,
2) provide broad access of these new 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). Only those proposals demonstrating the highest degree of overall excellence will be funded.

3. Two Categories of Research Proposals

To maximize the benefits for the genomics community, two categories of proposal will be considered. Both categories are intended to stimulate the B/CB community to address real world challenges and currently recognized needs in the field. Applications should also encourage the involvement of researchers from a variety of other disciplines including, but not limited to, biology, statistics and mathematics.

One category will provide support for up to two years to allow researchers to investigate **small-scale**, innovative or transformative ideas with the potential for being disruptive. The other category will provide support for up to three years for multi-disciplinary teams that will tackle **large-scale**, complex problems with more applied outcomes. This longer term funding is intended to allow for the development of robust, user-friendly tools needed by the genomics research community.

All applications are expected to propose new approaches to data analysis and data interpretation in the area of genomics, including development of software tools and algorithms. 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.

4. Benefits

The lack of 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 in Canada and worldwide.

Applications must include a plan which explains the next steps of how the deliverables from the research will be transferred, disseminated, used, and/or applied to realize the benefits to the genomics community. Although open source/open access currently typifies the bioinformatics community, applicants are invited to articulate alternative options for community availability and downstream development as long as the dissemination plan ensures maximum community uptake, and is supported by the co-funder(s) (for large-scale projects). Preference will be given to applications with a high potential for community impact and/or uptake regardless of the type of dissemination plan proposed.

5. Parameters of the Competition

There is $6.25 million available for this competition with the Government of Canada providing $5 million through Genome Canada and $1.25 million through CIHR from the CIHR Institute of Genetics (CIHR-IG), the CIHR Institute of Cancer Research (CIHR-ICR), and the CIHR Institute of Infection and Immunity (CIHR-III). Additional funding from CIHR may become available through partnerships with other CIHR Institutes.

5.1. Large-Scale Applied Projects (LAPs)

- Approximately $4 million will be available to support LAPs.
- At least 50% of the requested funding for eligible costs for each project must be obtained through co-funding from other sources.
- There will be a maximum investment of $500,000 in an individual project by Genome Canada and/or CIHR (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 $500,000, including co-funding, will not be considered in this category.
- Successful individual projects will be awarded funding for a term of up to three years.

Applications to the large-scale applied project category will involve multi-disciplinary, collaborative teams that plan to tackle large-scale complex B/CB problems with direct applicability to genomics. The longer term, higher level of funding is intended to allow for the

development of robust, user-friendly tools that will benefit a large number of end-users. End-users are defined as all individuals or organizations who will be the ultimate beneficiaries of the project deliverables including, but not limited to, academic and private sector researchers and industrial partners.

The LAPs category also provides an opportunity for research teams to propose projects that could be part of larger national and international research initiatives, as long as other eligibility criteria are met.

5.2. Small-Scale Innovative Projects (SIPs)

- Approximately $2.25 million will be available to support SIPs.
- Co-funding is **NOT** required for SIPs.
- There will be a maximum investment of $250,000 in an individual project by Genome Canada and/or CIHR.
- Projects requiring less than $125,000 will not be considered unless very well justified.
- Successful individual projects will be awarded funding for a term of up to two years.

The small-scale innovative project category provides an opportunity for individuals or small groups to propose innovative and disruptive ideas with the potential for significant impact.

6. Guidelines for Funding

Genome Canada's *Guidelines for Funding Research Projects* 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:

- **Integrated GE^{3}LS:** An integrated GE^{3}LS component is not required.
- **Project Managers:** A dedicated Project Manager is not required but is an eligible expense and the engagement of an individual performing this role even part-time could be considered for the LAPs.
- **Science Advisory Boards:** A Science Advisory Board (SAB) 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

6.3. CIHR Guidelines

In addition, in order to receive funds from CIHR, their guidelines must also be followed. See the CIHR Funding Opportunity for a complete listing of all CIHR guidelines and policies.

7. Application Process

Applicants are required to apply for funding through their regional Genome Centre.

7.1. Registration

For both categories of applications a brief Registration form will be used to provide early guidance on elements such as who is applying, what they are planning to do, expected deliverables, approximate budgets and suggested reviewers. This will allow for screening for eligibility by the Genome Centres 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.

The subsequent application and review processes will be different for each category of application, reflecting the scale and term of the projects.

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.

7.2. Large-Scale Applied Projects (LAPs)

7.2.1. 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. A multidisciplinary committee of experts established for this competition will meet and discuss the applications. Only those proposals demonstrating the highest degree of overall excellence in terms of the review criteria will be funded.

7.2.2. 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 new or incremental research activities that are an integral part of the Genome Canada approved project. Co-funding must have been applied for on or after March 22, 2012 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. On a case-by-case basis, funding applied for before the specified date

may be considered eligible co-funding if these funds are specifically re-directed towards the project approved through this RFA. See the *Guidelines for Funding Research Projects* for more details.

7.3. Small-Scale Innovative Projects (SIPs)

7.3.1. 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. A multidisciplinary committee of experts established for this competition will meet and discuss the applications. Only those proposals demonstrating the highest degree of overall excellence in terms of the review criteria will be funded.

7.3.2. Co-Funding

Co-funding is **NOT** required for SIP applications.

7.4. CIHR Relevance Review for Health-Related Proposals

CIHR-IG and CIHR-ICR will have access to the complete full applications for the LAPs and the full applications for SIPs, in order to conduct a relevance review to identify projects that have potential application to health. Funding preference will be given to SIPs. The relevance review process will be conducted prior to the peer review meeting. If additional CIHR Institutes decide to participate in the competition, access to this material will also be provided to them to identify projects relevant to their mandate and/or priority areas.

8. Competition Timeline

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

Date	**Activity**
June 20, 2012	Launch of Request for Applications (RFA)
July 20, 2012	**Registration** due date - Genome Centres
July 23, 2012	Due date for eligible registrations – Genome Canada
July 27, 2012	Applicants notified by Genome Centres of eligibility of Registration
September 17, 2012	Deadline for **Full Applications** to Genome Centres
November 2, 2012	Deadline for Full Applications to Genome Canada
Mid-January, 2013	Review committee meeting[1]
Late January, 2013	Decisions by Genome Canada and Partners
Early February, 2013	**Notification of Decision**

[1] The review committee meeting will not include face-to-face meetings with applicants

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. Excellence in terms of the review criteria at the very highest of international standards must be demonstrated for funding to be awarded.

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 Genome Canada B/CB 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. Large-Scale Applied Projects (LAPs)

2.1.1. Research Proposal

- Research Context and Originality
  - To what extent does the proposed research 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 is the research relevant to the end users identified?
  - 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?

- 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?

2.1.2. 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?
    - 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?
    - 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?
    - 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?
    - 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 end-users involved in the project and the strategy to realize benefits?

2.1.3. 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?

2.2. Small-Scale Innovative Projects (SIPs)

2.2.1. Research Proposal

- To what extent will the proposal support transformative ideas with the potential for disruptive innovation within the B/CB community?
- To what extent does the proposed research reflect creative, original thinking?
- To what extent will the proposed tools or methodologies increase the productivity of genomics research?
- How appropriate are the methods and approaches (including handling of data and resources) in terms of the research objectives?
- How appropriate is the expertise of the applicant(s) in terms of realizing the research goals?

2.2.2. Benefits

- To what extent have the applicants identified appropriate deliverables in terms of their potential to have practical applicability to the genomics research community?
- What is the probability that the deliverables will be realized by the end of the funding period?
- How significant are the anticipated benefits described in the proposal to the genomics community?
- What is the probability that the benefits will be realized within a short time-frame after the end of the project?
- How appropriate is the plan for access to, and dissemination of, the tools and methodologies developed?
- How high is the potential for community impact and/or uptake, regardless of the type of dissemination plan proposed?

2.2.3. Management and Finance

- How good is the management plan, including accountabilities of personnel and processes for decision-making on research?
- How realistic is the project schedule?
- 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?