Enabling Bioinformatic Solutions (EBS) Funding Competition

Program Guidelines
December 9, 2019

GenomeAlberta
15 years of powering genomics research in Alberta

Contents

1.0. Overview: Alberta's Bioinformatics and Computational Biology Challenges

Bioinformatics and computational biology (B/CB) is a rapidly evolving area of the life sciences that utilizes diverse approaches to interrogate and interpret large, complex data sets. These analytical approaches are critical to the field of genomics to derive understanding from otherwise unwieldly data. Following consultations with provincial stakeholders, B/CB was identified as an area of regional importance. In support of this priority, Genome Alberta is partnering with Genome Canada, Alberta Innovates, and the Government of Alberta's Ministry of Economic Development, Trade, and Tourism (EDTT) to launch the Enabling Bioinformatic Solutions (EBS) program.

This competitive funding program is intended to support the development of bioinformatic and computational approaches that enable users to overcome limitations in understanding, analyzing and drawing conclusions from collected genomic[1] datasets. The purpose of this competition is advance collaborations leading to Alberta-based B/CB solutions for economically relevant sectors in Alberta: Agriculture and Health. The goal of the competition is to help strengthen Alberta's B/CB capacity, develop B/CB tools or pipelines to address current and unmet needs, maximize value from existing 'omics data sets, demonstrate expertise in technology development, and better position Alberta researchers for future funding success. This program is aligned with capacity building efforts in the province under BioNet Alberta – a network-based initiative for connecting resources and building B/CB in Alberta. While connected to the network under Genome Canada's Regional Priorities Partnership Program (RP3), the EBS funding competition is being independently coordinated and managed by Genome Alberta.

The EBS program will provide funding for bioinformatics-based research projects over a period of 18 months. Genome Alberta will support up to 75% and a maximum of $150,000 of eligible project costs. Research proposals are required to partner with data end-users in the agriculture or health sectors, and collaboration with the EBS program End-Users (Section 1.1.2) is strongly encouraged.

1.1. Genome Alberta

Genome Alberta is a publicly funded not-for profit corporation that invests primarily in large-scale genome sciences research projects and technology platforms focused on areas of strategic importance to the province (e.g. human health, forestry, plant and animal agriculture, energy, and environment). By working collaboratively with government, universities, and industry, Genome Alberta is a catalyst for a vibrant, life sciences cluster with far reaching social and economic benefits for Alberta and Canada. To date, the organization has managed a research portfolio with approved budgets of over $255 million. Please visit Genome Alberta's website for more information.

[1] 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, as long as the link to genetic information is clear.

1.1.1. Program Sponsors

Genome Alberta will be coordinating and managing the EBS program on behalf of sponsoring organizations that have contributed to the available funds. This includes the Government of Alberta's Ministry of Economic Development, Trade, and Tourism, Alberta Innovates, and Genome Canada; Hereafter, collectively referred together as the 'Funders' of the EBS program.

1.1.2. Program End-Users

In order to understand the current B/CB challenges and limitations in genomic data analyses within Alberta's research and innovation ecosystem, Genome Alberta held targeted stakeholder consultations with representative organizations in agriculture and health. The consultations for agriculture involved provincial representatives from Agriculture & Agri-Food Canada (AAFC) and Alberta Agricultural & Forestry (AAF). The consultations for health involved representatives of Alberta Precision Laboratories (APL) – a wholly-owned subsidiary of Alberta Health Services (AHS) for consolidated diagnostic laboratory services across the province. These stakeholder groups provided Genome Alberta with a scoping of where advancements and uptake of B/CB approaches would enhance the benefits realized for large genomic data sets. These stakeholders have also expressed interest in partnering with applicants and may have eligible co-funding available.

2.0. Eligibility and Program Structure

The EBS funding competition is open to Alberta investigators proposing research projects addressing current provincial challenges identified by program end-users (see Appendices 1 and 2). Proposals must describe how the solutions will be integrated and define benefits to Alberta with support from end users.

This program will support the development of enabling technologies that allow end-users to overcome limitations in understanding, analyzing and drawing conclusions from collected datasets. This program is not intended to support the generation of new data, and therefore, wet lab expenses will not be eligible. Proposals should be designed to enhance current research efforts and maximize benefit from existing data sets and B/CB tools already available nationally or internationally. Eligible expenses and activities include salaries for highly-qualified personnel and consumables for data access and analyses. Please consult with Genome Alberta if you have any questions on eligible costs.

Enabling technologies or approaches may include B/CB code, algorithms, data pipelines/workflows, user interfaces, databases and platforms, and strategies (e.g. statistical consultation) for experiment design. Applications will be accepted under two streams: Agriculture and Human Health. Examples of potential areas are provided below and note this is not an exhaustive list, rather the identification of current needs and challenges as identified by provincial end-users. The research community can develop solutions to address these current challenges, or propose innovative and novel approaches not described, particularly those that take advantage of existing provincial resources. Proposals that include direct partnerships with program end-users, AAFC and APL, are strongly encouraged.

Interested applicants are asked to submit a Registration that will be used to screen for eligibility. Eligible applicants will be invited to submit a Short Proposal that will be reviewed through a combined external peer review/due diligence process outlined in these guidelines. The review process may be adjusted or revised by the Funders based on degree of interest.

2.1. Stream 1: Solutions for Agriculture

This application stream will accept proposals that aim to impact the agricultural sector primarily. The need for a productive and sustainable agricultural is one of the key innovation targets highlighted by the Government of Alberta and echoed across the globe. As agriculture advances towards 'precision agriculture' (or, Smart-Ag), the field is set to incorporate more high-throughput data collection and analyses applications, such as the inclusion of genomic and associated meta data to improve management and production of livestock and crops. Alberta researchers have generated a wealth of data through previous investments in genomics and recognize the importance of B/CB tools to derive value from these 'big data' sets. The demand for data solutions remains a focus for the provincial innovation system and the needs of the industry. Genome Alberta has engaged government stakeholders to identify investable approaches in B/CB that will deliver beneficial tools in the agricultural sector. As this is an end-user driven strategy, proposed research projects will require a well-conceived translational strategy that ensures the tools will satisfy the needs of the end-user.

Based on stakeholder feedback, proposals that develop reproducible, scalable, and flexible enablers that would be eligible under this competition stream include, but are not limited to, the following broad categories areas:

- Integration and adaptation of existing bioinformatic tools into pre-developed pipelines and workflows
- Improvement of genomics data mapping and mining tools
- Novel approaches for genomics data integration and validations from multi-omic data sets
- Development of easy-to-use interfaces and platforms for interoperability
- Approaches to increase computational efficiency, including machine learning or artificial intelligence approaches

For more details on current stakeholder needs, please see Appendix 1.

2.2. Stream 2: Solutions for Human Health

This application stream will accept proposals that aim to impact the human health sector primarily. Discussions with the B/CB research community and experts in the provincial health care system have highlighted the need for better health informatics tools in the era of precision health. APL. Genome Alberta has engaged with APL to identify the current challenges and demands for B/CB solutions that could be adopted into the clinical system, including needs for analytical data pipelines for clinical data management and analyses. These solutions will be focused on pre-clinical development that includes a high-level strategy for clinical validation. As this is an end-

user driven strategy, proposed research projects will require a well-conceived translational strategy that ensures the tools will satisfy the needs of the end-user.

Based on stakeholder feedback, proposals that develop reproducible, scalable, and flexible enablers that would be eligible under this competition stream include, but are not limited to, the following broad categories:

- Standardization of genomics data management and analytical protocols for variant interpretation
- Approaches for robust data mining of genetic databases and health meta-data
- Automated workflows and increased computational efficiency to reduce turn-around time
- Clinician-friendly interfaces for disseminating and interpreting clinical sequencing
- Development of a pre-clinical B/CB testing platform (e.g. gold standard) to assess novel tools, pipelines, workflows
- Methods for multi-omic and meta-data integration; proof-of-principle applications for machine learning and artificial intelligence

For more details on current stakeholder needs, please see Appendix 2.

2.3. Parameters

- Up to CDN $750,000 in cash is available for this program from the Funders
- The maximum duration for a research project is 18 months and the Funders will contribute up to a maximum of CDN $150,000 per research project
- The Funders will fund up to 75% of approved eligible costs (up to $150,000), with the expectation that researchers will minimally secure an additional 25% (e.g. $50,000 a total $200,000 budget) of eligible co-funding (cash or in-kind) through existing resources or collaborative partnerships
- Proposals must be submitted to one of two streams: Agriculture or Human Health. Depending on proposed budgets and following an independent, peer-review process, it is anticipated that the top-ranked two projects from each Health and Agriculture streams will be funded, followed by the next highest ranked project from either stream
- Projects must be led by an Alberta-based investigator located at provincial or federal research labs, academic institutions, or their affiliated research institutes
- Proposals developing approaches applicable to multiple sectors will be strongly encouraged; however, applicants will still be required to identify a primary applicable stream at the time of application
- Proposals incorporating cutting edge computational approaches in artificial intelligence and machine learning are encouraged

2.4. Institutions eligible to receive funding from the Funders

Alberta academic institutions and their affiliated research institutes, provincial and federal laboratories are all eligible to receive funding from the Funders. As this program is tied to the

capacity building efforts within Alberta, funds from the Funders must be spent through an eligible Alberta institution.

3.0. Timeframe

Date	Process
December 10, 2019	Competition Launch
January 24, 2020	Registration Due
February 7, 2020	Invitation for Proposal Submission
March 6, 2020	Proposals Due
April 17, 2020	Notification of Award (NOA) to the Applicants
June 30, 2020	Deadline for Projects to have met all the conditions of the NOA
July 1, 2020	Start date of the Projects.
December 31, 2021	Conclusion of the Projects

4.0. Submission and Review Process

There is a two-stage application process for this competition:

1. Submission of a Registration
2. Invitation for Submission of a Proposal.

All competition forms are available on Genome Alberta's Website

4.1. Registration

Investigators interested in applying for the EBS program must first submit a Registration to Genome Alberta. The Registration will request a brief summary of the proposed work, anticipated participants, suggested reviewers for subsequent stages, and an estimated budget. The Registration will include 10 questions to screen for high-level eligibility, suitability of the topic area proposed, and alignment with the Competition objectives . In order to achieve a reasonable (25-35%) success rate of proposals submitted, it is anticipated that a maximum of 20 Registrations will be invited for full proposal development. Applicants will be notified shortly after submission if their Registration is invited for Proposal Development.

Applicants must submit a signed electronic copy on or before **January 24, 2020** to: RMercer@genomealberta.ca with the email subject line:

"EBS – REG – [Lead Investigator LAST NAME]"

Competitiveness for both the Registration and Proposal will be based on proposed research, partners, leveraging of existing resources, potential impact, and alignment with the mandate of Genome Alberta and increasing B/CB capacity in the province

4.2. Proposal Submission

An invitation is required at this stage for applicants to submit a Proposal. The Proposals will be reviewed for scientific and technical excellence, alignment with end-user needs, and potential impact for Alberta's genomics and B/CB research ecosystem.

The review team will be primarily national/international and multidisciplinary, consisting of scientific and industrial experts. Applicants will be given the opportunity to identify those experts who are not appropriate reviewers for their research projects. Reviewers will sign non-disclosure agreements and will have to declare all potential conflicts of interest. They will evaluate each Proposal taking into consideration the evaluation criteria presented below.

A Proposal must be submitted electronically by the deadline date of **March 6, 2020** to RMercer@genomealberta.ca with the email subject line:

"EBS - PROPOSAL – [Lead Investigator LAST NAME]"

Upon receipt, Proposals will be reviewed for completeness by the Funders. We will notify applicants if their Proposal is incomplete and give applicants 24 hours to provide the missing information. Incomplete Proposals and those not conforming to the template will not be reviewed further.

4.2.1 Proposal Evaluation Criteria

To ensure that the Funders' goals for the B/CB Solutions Competition are met and that the proposed research has a significant impact on the province, reviewers will be asked to address, and score the Proposals on the following questions:

General Eligibility

- All proposals are required to articulate the process and timeframe anticipated for user uptake
- Does the Project Lead hold a position at an academic institution in the province?
- Is the project B/CB-based? Does the project fit within the eligible research areas?
- Does the project target one or more of the eligible B/CB research streams/areas?
- Does the project have end user engagement and integration?
- Is the project's budget within the maximum allowable time and budget limits?

Research Project

- Does the Project Leader have relevant experience in the proposed area of research?
- Is there a clear and concise summary of the proposed research activities?

- Does the project exhibit scientific and technical excellence?
- Does the project exhibit end user engagement?
- Does the research build on existing strengths and expertise in genomics (including other -omics) and B/CB?
- Is the project organized into clear and concise activities?
- Is there a clear description of the proposed project including experimental design?
- Are the scientific goals and outcomes described?
- Is the project of strategic importance to Alberta's end-users

Handling of Data & Resources

- Does this proposed research project have strategy for sharing data and resources to the community?

Benefits to Alberta

- Does the project describe the potential impact of the project with respect to building provincial B/CB capacity?
- Does the team describe the downstream path to uptake of the proposed B/CB Solution, particularly for pre-clinical health tools?
- Does the project demonstrate end user engagement in the achievement of benefits to Alberta?

Administration and Budget

- Has the team appropriately filled out the title page with signatures?
- Has the team filled out and signed the Participating Organizations' Signatures page?
- Has the team provided a lay summary?
- Has the team provided a completed budget that is within the appropriate time frame, amount and eligible cost categories?
- Does the preliminary budget reflect the relevant categories?
- Does the final budget provided match the scope of activities proposed for the project?
- Has the team described a minimum of 25% in eligible co-funding?

4.3. Successful Proposals

The project titles, lay summary information, and contact information for successful Proposals will be posted on the Funders' websites. By submitting a Proposal, applicants authorize Genome Alberta to make such postings.

5.0. Eligible Costs

Eligible costs are defined as reasonable and incremental costs for items that directly support the objectives of the EBS approved project and include the following categories:

1. Salaries and benefits for HQP, researchers, trainees, technicians. *Note that salaries of researchers or senior management who are currently funded by their respective*

organizations are not considered eligible costs.

a. Includes graduate student stipends, according to the Applicant's institutional or departmental graduate student stipend policies.
b. Inflation for salaries, not to exceed two percent (2%) of total salary and benefits, for salary expenditures in year 2 of the project

2. Consumables such as day-to-day expenses incurred in conducting the research, including computational supplies (e.g. computers less than $2,500), fees for data/database access, and leases for research equipment required for the Project.

3. Reasonable and low administrative costs (<5% of total budget) including travel for project members, publication costs, office expenses, public outreach activities, and costs associated with the preparation of reports. *Note that institutional overhead costs are not eligible.*

4. Services from Others (S&T) includes the cost of services from a fee-for-service provider. Statements of Work from service providers must be included as part of the proposal and must include prices for services, the schedule of services to be provided.

5.1. Ineligible Costs

Ineligible costs that are not eligible for funding under the EBS program and which must not be included in a project application include:

1. Goods and Services Tax (GST), Provincial Sales Tax (PST), Harmonized Sales Tax (HST), or other similar taxes;
2. costs incurred prior to or after the Project funding period, as determined by the Funders;
3. infrastructure, including high-performance computing clusters/servers
4. wet-lab research and the generation of new data
5. hard goods or promotional materials;
6. travel for ongoing marketing in existing markets;
7. costs for the lease of office furniture, space and equipment;
8. costs of equipment attached to the building such as sinks, walls, doors;
9. costs associated with equipment attached to the building such as plumbing, framing, flooring installation;
10. land costs;
11. normal operation, salary and maintenance costs
12. patent costs;
13. any other indirect overhead costs; and
14. any other expense deemed by the Funders not to be an Eligible Expense.

Applicants can find additional resources for eligible/ineligible costs not mentioned in these guidelines in Genome Canada's Funding Guidelines. For specific questions around eligibility, please contact Genome Alberta.

5.2. Co-funding

There is a 25% of total project budget co-funding requirement for this program. Co-funding may take the form of cash or auditable in-kind contributions to a project that are directly supporting activities that are proposed with the scope of the current project. Projects are encouraged to leverage existing funding sources and provincial resources. Co-funding from program end-users, AAFC and APL, is eligible. Co-funding from other Genome Canada projects are not eligible.

6.0. Financial Accountability and Reporting

All approved projects are required to maintain the information necessary to enable the Funders to assess the ongoing performance of the projects and their activities. The Funders will put in place mechanisms to assess the ongoing performance of all funded projects to periodically determine whether funding should be continued, reduced, suspended, or cancelled. Dates listed below represent timelines associated with Reporting and Review activities for an approved EBS project with an 18-month term.

It is the responsibility of the participating institutions to ensure that sufficient records and supporting documentation are maintained and are available for review and audit for a period of five (5) years after the completion of the research project.

6.1. Project Progress Reporting

Projects will be required to provide a **Mid-Term** (9-month) scientific progress and simplified financial report, outlining research project progress compared to approved milestones, issues and delays, and justifications for variances in expenditures as compared to the approved budget within 30 days of that period end (i.e. due April 30th, 2021 with a July 1, 2020 start date). A reporting template will be provided to successful applicants at a later date. This report will be independently reviewed and assessed for the approved funding project team's ability to complete the approved milestones. The Funders reserve the right to cancel or reduce funding for the remaining project term if it is unlikely that the research project will meet its approved milestones.

The Project is expected to attend and present research at BioNet Alberta annual meetings and should include such anticipated expenses in the budget as appropriate.

6.1.1 Project Review Criteria

Genome Alberta will conduct a review of the Mid-Term report, including an external assessment as required, within 30 days of receiving the report. A formal decision on continuation, reduction, or cancellation of funding of the project will be made by at the end of that period. If the Funders determine funding is to be continued. If the Funders determine to cancel further funding, the 4th

quarter of funding that has already been provided will be considered winddown funding and project's final report will be due within 30 days of the end of the 4th quarter (July 30th, 2021).

6.2. Final Reports and Dissemination

Within three months of the completion of the work (expected completion December 31, 2021, report due March 31st, 2022), each research project will be required to submit to the Funders a **Final Report** that describes the accomplishments of the research project, a final financial report that reconciles actual expenditures with amounts budgeted and received (with justification for variances), the current state of any outcome developed as a result of the Funders funding, and a plan that outlines the activities that could be undertaken to further develop the technology to application within a two year time frame. A reporting template will be provided to successful applicants prior to the close of the project.

The Project will be required to disseminate final research outcomes at a BioNet Alberta symposium to be held Winter/Spring 2022.

6.3. Post-Project Follow up

Impact of Project outcomes is often realized after research activities conclude. As such, Projects will be required to report to the Funders on information related to uptake and impact of project research activities for a period of five (5) years after the Project concludes. Collection of post project impact information will occur, at most, on an annual basis

7.0. Intellectual Property

The Funders do not take an ownership stake in project intellectual property (IP). If any IP is developed or acquired in the project with more than one collaborator, ownership will be determined in accordance with each of the participants' (i.e., Federal or Provincial government departments or Crown Corporations, private sector companies, universities, research hospitals or any other participants) internal intellectual property policies and provincial and or federal legislation.

8.0 Conditions for Release of Funds

The Terms and Conditions of Funding will be issued after project approval by the Funders. The following are the minimum requirements to allow for the disbursement of funding:

1. Signed research agreements between the Funders, the lead organization(s) (private, government, and academic), the researchers, and the co-funders (if applicable) that establish the resolution of major areas and the roles and responsibilities of each party, such as contributions, IP ownership and management, data protection and release, a commercialization process, project management, funding term, termination policy, accountability and reporting, progress reviews, management of funds, financial policies, etc.;

2. Budget and milestones and their compliance with funding eligibility criteria, in accordance with the recommendations of the reviewers as approved by the Funders;

3. A clearly defined IP policy and plan for data protection, sharing of resources created by the project, and publication of results. IP created or acquired as part of a funded EBS project will belong to the researchers by whom the work was completed and/or their institutions, as the case may be. There will be an expectation that results from a funded project will become public through patent filings, research publications and submission of resources to public repositories.

8.1 Project Readiness

All applicants must demonstrate that they have satisfied all conditions for funding outlined in the Notice of Award and listed in section 8.0 above no later than June 30, 2020. Projects must be able to receive funding no later than July 1, 2020. The Funders reserve the right to withdraw their funding for any approved project that is not ready to receive funding by July 1, 2020.

Contact Information

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