



# Addendum to Genome Canada's Corporate Plan 2011–12

## 1. ABOUT THIS DOCUMENT

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The *Addendum to the Corporate Plan 2011-12* has been prepared in compliance with the terms and conditions stated in the Amending Agreement of December, 2011 between Genome Canada and Industry Canada (Article 1, clause 14.8):

*“By December 31, 2011, Genome Canada shall provide to the Minister an addendum to the 2011-12 Corporate Plan. This addendum shall provide the information required by Section 14.6 with respect to the Second Up-Front Multi-Year Funding. Information relating to the Second Up-Front Multi-Year Funding shall be included in all future Corporate Plans.”*

The information in this document outlines plans for those new programs and activities which will be implemented in 2011-12 as a direct result of the Government of Canada's 2011 federal budget announcement of \$65 million of new funding to Genome Canada. These plans align with Genome Canada's five national objectives as stated in the Funding Agreement. They are reflective of the Board of Directors' decisions to allocate funding to strategic priorities which will deliver social and economic benefits to Canadians. The implementation plans for the additional funding of \$65 million support the Government of Canada's Science and Technology Strategy.

## 2. AMENDMENT TO SECTION IV - *Plans for 2011-12*

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In 2011-12, Genome Canada will continue to deliver its mandate of implementing a national strategy in genomics research for the benefit of all Canadians in sectors of strategic importance to Canada; agriculture, environment, fisheries, forestry, and human health. It will continue to conduct, as required, on-going monitoring and interim reviews of its large-scale research projects and Science and Technology Innovation Centres in order to ensure progress against objectives as well as the meeting of agreed-to milestones. Genome Canada will continue to consult its research community and other stakeholders with respect to determining strategic priorities for Canada as well as assessing and staying apprised of international developments in science and research. Genome Canada will continue to seek out opportunities to leverage the Government of Canada's investment through the development of partnerships and collaborations.

In addition to those activities outlined in the Corporate Plan 2011-12 which are currently supported through funding commitments from previous funding agreements, the infusion of an additional Second Up-Front Multi-Year Funding of \$65 million from the Government of Canada will be allocated to the following activities to be undertaken or developed in 2011-12:

- A minimum of \$40 million of new funding will be targeted to a research competition focused on human health (applied genomics research and personalized health);
- \$5 million will be targeted as a continued funding contribution to Genome Canada's three international initiatives - \$2.5 million to the Structural Genomics Consortium (SGC); \$0.5 million to the Public Population Project in Genomics (P<sup>3</sup>G) and \$2 million to the International Barcode of Life (iBOL) project;
- \$1 million will be set aside for the implementation of new initiatives deemed to be of potential strategic importance or relevance to Canada;

- \$5 million will be targeted to the development of a Request for Applications in the area of bioinformatics and computational biology;
- Up to \$6 million will be targeted to ongoing operations support for the six Genome Centres for fiscal year 2013-14; and,
- Up to \$8 million will be targeted to ongoing operations support for Genome Canada for fiscal year 2013-14.

The above allocations were approved by Genome Canada's Board of Directors at their June 2011 meeting, with implementation pending the final execution of the funding agreement between Genome Canada and the Government of Canada.

## **2.1 2011 Competition on Genomics and Personalized Medicine**

A minimum of \$40 million of the \$65 million announced in the Government of Canada's 2011 federal budget was committed by Genome Canada's Board of Directors at its June 2011 meeting for the purpose of developing a large-scale applied research competition in Genomics and Personalized Health, with an expected launch date of December 2011. The competition parameters include:

- At least 50% of the requested funding for eligible costs to be obtained through co-funding from other sources.
- Genome Canada will invest up to a maximum of \$5 million in an individual project
- Projects requiring a total of less than \$1 million from Genome Canada will not normally be considered
- Successful individual projects will be awarded funding for a term of up to four years
- End user engagement must be included in the development and execution of the research plan to help ensure receptor uptake (e.g., industry, health authority)
- Ethical, economic, environmental, legal and/or social aspects (GE<sup>3</sup>LS) must be an integral component of the overall research plan and relevant in the pathway to application (GE<sup>3</sup>LS proposals could also be stand-alone projects).
- If all other eligibility criteria are met, projects targeted to international initiatives in e.g., epigenomics, rare diseases, proteomics, would be considered.

The Board of Directors, at its meeting of December 8, 2011, gave approval for funding partnership opportunity with the Canadian Institutes of Health Research (CIHR), and the Cancer Stem Cell Consortium (CSCC) for the 2011 Large-Scale Applied Research Project competition on Genomics and Personalized Health. These partnerships are seen as a win-win for all parties concerned.

The CIHR will contribute up to \$22.5 million to the competition. The partnership between Genome Canada and CIHR will: (i) build on the complementary mandates of Genome Canada and CIHR; (ii) maximize the effectiveness of the research communities, infrastructure and resources supported by both organization; (iii) increase the funding envelope for this competition allowing additional teams to be funded; (iv) demonstrates Genome Canada's and CIHR's ability and willingness to partner on critically important programs in human health; (v) provide the potential to bring the pharmaceutical industry to the table; and, (vi) further increases the potential for provincial government's involvement through both SPOR and the regional Genome Centres.

The CSCC will contribute \$5 million to the competition to support the highest ranking cancer stem cell research project, which falls above the Genome Canada cut-off for fundable applications.

### **2.1.1 Outcomes**

This competition is focused on projects with a potential to contribute to a more evidence-based approach to health and potential to improve not only the cost-effectiveness of the health-care system, but also to ensure that discoveries are translated into patient and population benefits. Examples of outcomes of the types of studies and end points that could be expected from this competition include:

- Determination of molecular markers of disease susceptibility that would allow individual behaviour change
- Development of markers that can inform dietary choices in disease prevention strategies
- Development of monitoring diagnostic tools for screening programs for severe chronic diseases
- Development of biomarker panels to stratify patients so that more targeted treatments can be offered that address the molecular pathology of the particular disease
- Development of markers that monitor responsiveness to medical interventions and allow individual behaviour change to improve health outcomes
- Economic analysis of each project demonstrating its contribution to the sustainability of the health system.

## **2.2 Genome Canada's International Initiatives**

### **2.2.1 Structural Genomics Consortium**

The SGC is an international consortium that aims to determine the three-dimensional structures of proteins of medical relevance (such as proteins from the parasite that causes malaria) and place them in the public domain without restriction on their use. To date, the project participants have submitted over 1,300 structures to the public domain. The SGC is deemed an excellent example of a model for a public-private partnership, with investments by several major pharmaceutical companies and their active participation in the project's governance.

In 2011–12, Phase III of the SGC began July 1, 2011 and was officially launched at Oxford, UK on September 28<sup>th</sup>. New developments include the announcement of a collaboration between the Structural Genomic Consortium (SGC) and Cerep, a world-leading biotechnology company, to develop open access biochemical and cell-based assays for the discovery of small molecule chemical probes and drug candidates on epigenetic targets.

Funds from Genome Canada's one year contribution of \$2.5 million of the \$65 million announced in the Government of Canada's 2011 federal budget will flow to the University of Toronto and will enable the Canadian part of SGC to operate successfully for the next fiscal year.

#### **Outcomes:**

The work undertaken by SGC in respect of the identification of three-dimensional protein structures offers important and critical information for new drug development. The output rate of SGC's research has been astounding:

- Purified over 2,000 human proteins & determined over 1,300 structures
- More than 25% of the global output of new human protein structures
- More than 50% of the global output of protein structures from human parasites
- An average output of two publications per week

The unique public-private partnership model of SGC has resulted in collaborations with more than 20 small and medium enterprises to develop and apply new technologies; the creation of two biotech companies; and recently, an agreement with Cerep, a world-leading biotechnology company, to establish a research hub in Toronto, Ontario.

### **2.3.1 Public Population Project in Genomics**

The P<sup>3</sup>G is an international consortium with the aim of fostering collaboration between researchers and projects in the field of population genomics and harmonized bio-banking. The consortium develops research tools for effective communication and collaboration between bio-banks to enable the international research community to share expertise and resources and facilitate knowledge transfer for the health of populations.

Genome Canada's funding support for Phase I of P<sup>3</sup>G ended March 31, 2011. Bridge funding from Genome Canada of \$0.5M of the \$65M announced in the Government of Canada's 2011 federal budget will allow the Consortium 18 months of additional time in which to secure new funding for its Phase II projects. P<sup>3</sup>G submitted a proposal summarizing the activities it will undertake during the 18 month bridge funding period. The proposal was reviewed by a committee of international experts who recommended funding up to a maximum of \$857,885 with \$476,603 from Genome Canada and the remainder of funding from Genome Quebec and the Canadian Institutes of Health Research's Institute of Genetics.

**Outcomes:**

Population studies of sufficient magnitude and scope to accurately inform social and economic policy and to answer complex questions in health research are both time-consuming and costly. Tools developed and shared by P<sup>3</sup>G play a crucial role in addressing this problem and enabling truly transnational and trans-cohort research projects. For example, the DataShaper tool allows for data to be synthesized from over 6 million study participants in 53 large cohorts in Europe, North America and Asia.

Canada is leading the effort to develop a national Data Harmonization Initiative. The concept proposed is a trans-disciplinary data harmonization infrastructure, comprising both research and service functions. The former would strengthen Canada's international advantage in the science of data harmonization and would build greater national capacity in this evolving discipline. The service component would offer open-source software, tools, training, expert advice and other research resources, enabling wider research exploitation of population data.

**2.4.1 International Barcode of Life Project**

The iBOL, an international consortium, is the largest biodiversity genomics initiative ever undertaken. Over 250 researchers from 25 countries, including biodiversity scientists, genomics specialists, technologists and ethicists, are working together to construct a DNA barcode reference library that will be the foundation for a rapid and inexpensive DNA-based identification system for all multi-cellular life. In the first phase of this project (2009–2015), iBOL collaborators will barcode five million specimens representing 500,000 species. To-date, Genome Canada has committed \$6.6 million to what is planned to be at least a \$100 million multi-partner effort over six years. This investment brings strong Canadian leadership to a large, high-profile, international initiative.

Funds from Genome Canada's one year contribution of \$2M of the \$65M announced in the Government of Canada's 2011 federal budget will allow for an additional year of funding support toward the consortium's activities.

**Outcomes:**

The work undertaken by iBOL is creating a unique world-wide resource – a DNA barcode library – that is offering tools to provide solutions for challenges in real-world situations such as food identification, conservation, ecosystem monitoring, forensics and control of agricultural pests and invasive species. For example, in its first 18 months of existence, over 52,000 new species were barcoded and 41 publications were directly attributed to iBOL. As well, there have been many practical applications and commercialization opportunities; for example, the FDA has recently announced the use and application of DNA barcoding for seafood identification in the United States.

**2.3 Bioinformatics and Computational Biology**

The massive and ongoing influx of data from "omics" research, in particular sequencing projects, underscores the need for new and large-scale experimental, computational and theoretical tools. Those tools are essential for analyzing and integrating the complex data to better understand the biology of living things, and to apply that understanding to the benefit of Canadians. Both Genome Canada's

Board of Directors and its Science and Industry Advisory Committee have identified computational biology and bioinformatics as priority areas for Genome Canada.

A maximum of \$5 million of the \$65 million announced in the Government of Canada's 2011 federal budget will be used to develop a *Request for Applications on Bioinformatics and Computational Biology* to be launched in late 2012.

Genome Canada convened a SIAC-led consultative workshop on December 5, 2011, with a view to deriving input from a broad spectrum of stakeholder communities, which will inform Genome Canada's strategy on bioinformatics and computational biology for the next five years. The information arising from the workshop will also impact the design and framework of the Request for Applications to be developed and launched in late 2012.

#### **Outcomes:**

Existing tools and approaches have only partially realized the information content and application value in existing data sets. New algorithms and user-friendly interfaces are needed, with capacity building required in both areas. To ensure the future productivity of Canada in computational biology and bioinformatics, a five-year roadmap is required.

The bioinformatics workshop was a first step to launching this initiative - an ongoing dialogue and series of activities that will bring together the different communities in Canada to develop a five-year roadmap for the fields of Bioinformatics and Computational Biology. The workshop brought together Canadian and international experts in areas such as, biology (users), computer science, machine learning, software development, systems biology, informatics, computation, mathematics, statistics, algorithm development, high throughput data analysis, network pathways, data visualization; as well as, representatives are from academia, industry, federal departments, federal funding agencies and other federally funded organizations (e.g., High Performance Computing, Mathematical Research Network - MITACS, Compute Canada).

Participants focused on the mid to longer-term needs (3 to 10 years) and brought forward several priority areas that will require further development. A task force has been created, made up of a sub-group of the workshop steering committee, and has been mandated to finalize the workshop report, propose a framework for a five year strategy and make recommendations on the content and structure of a proposed Genome Canada Request for Applications in the area of Bioinformatics and Computational Biology.

## **2.4 Operations Support for Genome Canada & Genome Centres**

Genome Canada delivers its mandate by funding and managing large-scale and interdisciplinary, internationally peer-reviewed research projects, and Science and Technology Innovation Centres (STICs). This is achieved by working with its primary partners—the six Genome Centres, located in the regions of British Columbia, Alberta, the Prairies, Ontario, Quebec, and the Atlantic. The relationship

between Genome Canada and each of the Genome Centres is defined by means of a funding agreement that not only acknowledges the independence of each Genome Centre, but also specifies the parameters in which each Centre is to operate and contribute to Genome Canada's overall mandate. The Genome Centres play significant roles in fostering regional expertise in genomics research, developing partnerships to strengthen regional leadership and competitiveness, facilitating access to the S&T Innovation Centres, creating unique and innovative public outreach programs, and most importantly, securing co-funding for projects from both domestic and international investors. The model in which Genome Canada operates was established in 2000. It called for Genome Canada and regionally based Genome Centres across the country to be independently incorporated

organizations that would work collaboratively in pursuit of agreed to national objectives in the area of genomics research.

The model has been judged as extremely effective in promoting and delivering Canada's investments and initiatives in genomics research. The external evaluation of Genome Canada undertaken in 2008-09 reported that, because of Genome Canada, there has been a "transformative impact on Canadian genomics research"; that Canada is now a "visible and respected world player with respect to the quantity and quality of Canadian genomics research", and; that "Genome Canada's large-scale project and GE<sup>3</sup>LS emphasis are both envied internationally". In addition, over \$1 billion in co-funding, largely raised through the efforts of the Genome Centres, has been added to the federal investment in genomics research made to date through Genome Canada.

Each Genome Centre is unique, with each operating under different provincial and/or regional conditions and funding environments. Each has its own strategic plan aimed at addressing regional priorities. And, they all have varying degrees of financial support from their province(s). Notwithstanding these differences, the leadership of Genome Canada and the Centres are deeply committed to maintaining and improving the future effectiveness and efficiency of the "collective" in pursuit of the national objectives. In fact, increased collaboration with respect to resource sharing and partnering activities will be critical components to ensuring the sustainability of the model in future years.

GENOME CANADA									
Forecast Cash Disbursements for Investment of \$65 Million									
<i>( In Millions of Dollars )</i>									
<i>(In Millions of dollars)</i>	11-12	12-13	13-14	14-15	15-16	16-17	Total Genome Canada	Estimated Co-Funding	Total Estimated Investment
<b>LARGE SCALE APPLIED PROJECTS</b>									
Competition in Applied Human Health			10.0	10.0	10.0	10.0	40.0	41.5	81.5
		0.0	10.0	10.0	10.0	10.0	40.0	61.5%	81.5
<b>PARTNERSHIPS</b>									
One Year Funding For:									
Structural Genomics Consortium (SGC)	1.9	0.6					2.5	7.0	9.5
P3G	0.2	0.3					0.5	0.5	1.0
International Barcode of Life (IBOL)	1.0	1.0					2.0	3.0	5.0
New Initiatives		0.5	0.5				1.0	3.0	4.0
	3.1	2.4	0.5	0.0	0.0	0.0	6.0	9.2%	13.5
<b>ACCESS TO LEADING-EDGE TECHNOLOGY</b>									
Yr1 - Bioinformatics/ Computational Bio. Competition			1.7	1.7	1.6		5.0	5.0	10.0
			1.7	1.7	1.6	0.0	5.0	7.7%	10.0
<b>GENOME CENTRE OPERATIONS SUPPORT</b>			6.0				6.0	9.2%	12.0
<b>GENOME CANADA OPERATIONS</b>			8.0				8.0	12.3%	8.0
<b>FORECAST CASH DISBURSEMENTS</b>	<b>3.1</b>	<b>2.4</b>	<b>26.2</b>	<b>11.7</b>	<b>11.6</b>	<b>10.0</b>	<b>65.0</b>	<b>100.0%</b>	<b>131.0</b>
									<i>December 2011</i>