

Corporate Plan

2012–13



GenomeCanada

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GenomeCanada

Corporate Plan 2012–13

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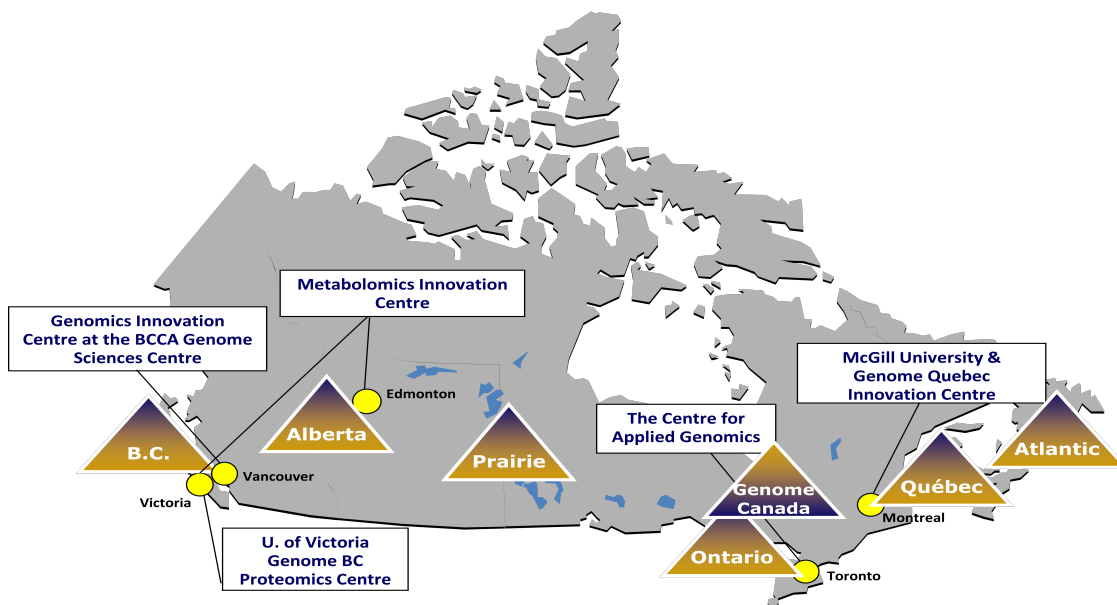
SECTION I – About Genome Canada

Established in February 2000 under the *Canada Corporations Act*, Genome Canada is a not-for-profit organization that invests in genomics¹ research in key sectors of strategic and economic importance to Canada, and fosters networks of expertise across Canada and globally with a view to generating economic and social benefits for Canadians.

Genome Canada's mandate is to develop, implement and maintain a national strategy in genomics research in sectors such as health, agriculture, environment, forestry and fisheries. Through its own programs and its coordination and collaborations with federal institutions, national and international stakeholders, Genome Canada has established itself as a keystone for genomics excellence in Canada, focused on implementing the Government of Canada's Science and Technology Strategy.

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.

Genome Centres and S&T Innovation Centres



¹ Genomics means the study of genes and their functions, namely genomics, proteomics, metabolomics, bioinformatics and other related fields of research.

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Collaborative national and regional leadership offers a potent solution to respond to needs and priorities across the country. This combined bench strength allows research results to be translated to where they can be used most effectively. Thus, livestock and energy projects are prominent in Alberta, crop improvement projects in the Prairies, aquaculture and wild fisheries projects in the coastal regions, forestry projects in western Canada and Quebec, and human health research projects in Atlantic Canada, Ontario, Quebec and British Columbia.

Genome Canada, in collaboration with the six Genome Centres, has raised over \$1 billion in co-funding commitments to supplement the \$980 million committed by the Government of Canada over the past decade. Co-funding partners include provincial governments and agencies, international non-governmental organizations and research institutes, industry, universities, and research hospitals. This effort has resulted in approximately \$2 billion in funding commitments to support 162 large-scale research projects, S&T Innovation Centres and six regional Genome Centres.

Genome Canada Portfolio - 2000 to 2011

Numbers of Projects/Innovation Centres by Sector and Region as at October 2011

Sector	Genome British Columbia	Genome Alberta	Genome Prairie	Ontario Genomics Institute	Genome Quebec	Genome Atlantic	Total
Agriculture	3	3	5	2	1	1	15
Energy	2	1	1				4
Environment	4	1		5	3	1	14
Fisheries	2					2	4
Forestry	5			1	3	1	10
GE ³ LS	3	1	2	4	3		13
Health	21	2	2	27	22	3	77
Technology Development	3	1	2	10	2		18
S&T Innovation Centres	4	2		2	1	1	10
Total	47	11	12	51	35	9	165

GE³LS = Ethical, Economic, Environmental, Legal and Social aspects of Genomics research

Table 1 shows the distribution of projects and S&T Innovation Centres across sectors and regions since Genome Canada's inception in 2000. All of Genome Canada's competitions are designed to support excellent genomics research projects; ones that respond to focused and specific Canadian needs and priorities, and have the potential to strengthen Canada's competitiveness in a global, knowledge-based economy. Underlying all of these research efforts is a sustained commitment to projects focused solely on the ethical, environmental, economic, legal or social aspects (GE³LS) of the research being undertaken or components thereof. Highlighting this element in funded Genome Canada research projects has enabled responsible and beneficial applications of genome science.

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Several of Genome Canada’s projects involve collaborations with the international research community. Genome Canada participates in specific international genomics research consortia, when it is deemed that it can significantly contribute expertise and leadership or that Canada will derive benefits from Genome Canada’s participation. Currently, Genome Canada has funding commitments in the following international projects: the Cancer Stem Cell Consortium, the Structural Genomics Consortium (SGC), the Public Population Project in Genomics (P³G), the International Cancer Genome Consortium (ICGC), the International Wheat Genome Sequencing Consortium, the International Mouse Phenotyping Consortium, and the International Barcode of Life Project (iBOL).

In the delivery of its mandate, Genome Canada is committed to applying the highest standards of accountability and transparency to its operations, informing Canadians about the exciting opportunities and promise that genomics holds, and reporting on achievement of results. Mechanisms and instruments such as corporate plans and annual reports, independent audit and evaluation studies, rigorous peer review and interim review processes, and financial audits provide a high level of assurance and oversight.

2011-12 and Beyond

Genome Canada is currently developing and putting into place programs and initiatives funded by the \$65 million grant from the Government of Canada which was announced in its 2011 federal budget. At Genome Canada’s June 2011 Board of Directors meeting, approval was given to allocate the funding from the Government of Canada as follows:

	(in millions of \$)
Large-Scale Applied Projects	
Competition in Applied Human Health	40.0
Partnerships	
Structural Genomics Consortium (SGC)	2.5
Public Population Project in Genomics (P ³ G)	0.5
International Barcode of Life (iBOL)	2.0
New Initiatives	1.0
Sub-Total	6.0
Access to Leading-Edge Technology	
Bioinformatics/Computational Biology Competition	5.0
Genome Centre Operations Support	6.0 (2013-14)
Genome Canada Operations Support	8.0 (2013-14)
Total	65.0

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A major initiative will be the launch of a large-scale competition in the human health sector; specifically, Genome Canada will be seeking proposals for large-scale research projects which focus on the application of genomics in the area of personalized health. Equally important will be a continued funding contribution by Genome Canada to several international initiatives (SGC, P³G, iBOL); funding for the area of bioinformatics and computational biology to address the issue of massive influxes of data arising from research projects, and the development of tools to analyze and integrate this complex data; funding set aside for the implementation of new initiatives deemed to be of potential strategic importance or relevance to Canada; as well as ongoing operations support for Genome Canada and the Genome Centres for fiscal year 2013-14. These programs and initiatives are explained in greater detail further in this document.

Development of a Strategic Plan

The first 10 years of Genome Canada focused on delivering its inaugural mandate – to develop, implement and maintain a national strategy in genomics research in sectors of strategic and economic importance to Canada. To that end, Genome Canada has focused on building research capacity and technological capability, funding large-scale genomics research, cultivating Canadian scientific expertise, establishing international leadership and building partnerships.

The next 10 years offer Genome Canada an opportunity to position Canada as a genomics research powerhouse of innovation. Genomics is a transformative technology that will play a key role in addressing the most pressing challenges facing society in the 21st century. Genomics is becoming widely recognized as a critical foundation for numerous applications that will contribute to the emergence of an internationally-competitive Canadian bio-economy. To this end, Genome Canada is committed to concentrating its future investments in research programs and initiatives which will bring the greatest economic and social benefit to society. Not only does it want to continue to support excellent genomics research, but it also wants to accelerate these results and discoveries into solutions to real-world challenges.

The undertaking of a comprehensive exercise to develop a strategic plan that will guide the organization for the next five to ten years began in earnest at the end of 2010 and gathered significant momentum in the spring and summer months of 2011. The exercise included broad stakeholder consultations over many months, leading up to the approval of the strategic plan by Genome Canada's Board of Directors in September 2011.

A bold new vision and mission was developed which is reflective of the enormous promise that genomics research offers. Going forward, Genome Canada is looking to place a greater focus on the translational aspects of the genomics research it supports; that is, developing applications that can lead to economic and social benefits for Canadians. This new emphasis will significantly change the way Genome Canada will do business – from the setting of strategic priorities; to the nature of the partnerships formed; to the re-

Vision

Harness the transformative power of genomics to deliver benefits to Canadians

Mission

To lead the Canadian Genomics Enterprise by:

- Connecting ideas and people across public and private sectors to find new uses and applications for genomics;
- Investing in large-scale science and technology to fuel innovation; and
- Translating discoveries into applications to maximize impact across all sectors.

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engineering of the programs designed; to the complex network of individuals and organizations (the *Canadian Genomics Enterprise*) required to deliver on Genome Canada's strategic plan.

A key ingredient to the success of the strategic plan will be continued support by Genome Canada's main investor, the Government of Canada. Genome Canada's strategic plan is designed to leverage to a greater degree the federal government's investments, as well as designed to align with the federal government's goals and priorities, including its Science and Technology Strategy.

Governance

Genome Canada operates within a governance framework that is reflective of its not-for-profit corporation status. It strives to achieve the highest operational and ethical standards and compliance with the laws, regulations, policies and procedures that apply to its operations and activities, as well as to ensure that decisions are based on principles of fairness and integrity that reflect consideration of all its stakeholders. This adherence to modern governance practices guarantees effective oversight of the corporation.

Genome Canada is governed by a Board of Directors comprising up to 16 individuals drawn from the academic, private and public sectors. These individuals bring unique skills and experiences as well as strong interests and insights to successfully fulfill Genome Canada's mission. The Board also benefits from the strategic advice and expertise offered by its Science and Industry Advisory Committee (SIAC), as well as the presidents of five major federal research funding agencies — the Canada Foundation for Innovation, the Canadian Institutes of Health Research, the National Research Council, the Natural Sciences and Engineering Research Council, and the Social Sciences and Humanities Research Council.

The Board of Directors has overall responsibility for the stewardship of the business and affairs of Genome Canada, and to help it discharge these duties, has in place a number of standing committees.

In 2011-12, the Board of Directors undertook a governance review exercise for the purpose of ensuring that it was operating as effectively and as efficiently as possible. The review assessed existing governance practices, recognized what was working well, and identified opportunities for improvement. A board governance workshop held in June 2011 discussed recommendations and outcomes related to three areas:

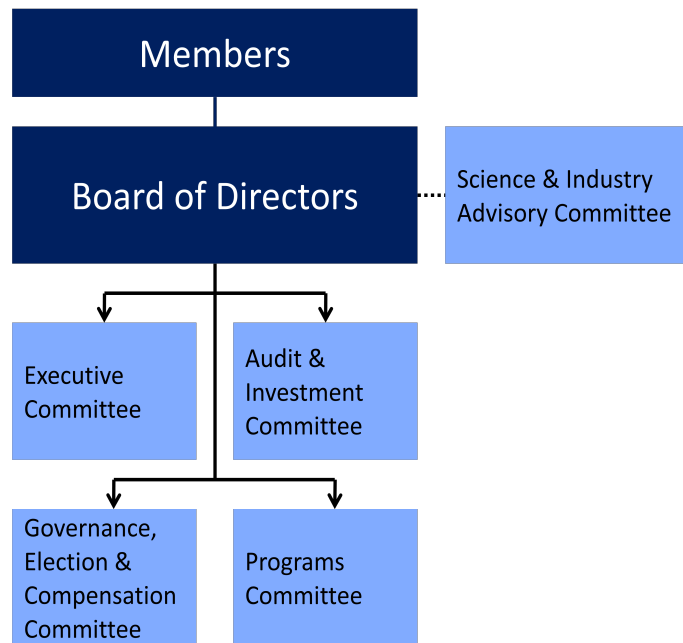
- the role of the Board of Directors
- the structure and roles of the standing committees of the board
- the relationships, linkages and role of the Genome Centres and the five federal research funding agencies

A Governance Action Plan was developed with specific recommendations to be implemented in 2011-12. These recommendations proposed new committee structures, ways to make board meetings more efficient, and new avenues to seek advice and actively engage in a collaborative way the Genome Centres and the five federal research funding agencies.

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The Board continues to place particular emphasis on the recruitment of new directors, ensuring that the skills and experience sought, not only complement the skills and experience of incumbent directors, but also will support the achievement of Genome Canada's new mandate for the next decade. In June 2011, the Board appointed three new directors. It also launched a Chair succession process with the intention of appointing a new Chair of the Board by June 2012.

Governance Structure



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About this Document

The corporate plan is a reporting requirement as stated in the funding agreement between Genome Canada and the Government of Canada (Industry Canada). The Corporate Plan 2012–13 reports on activities and performance for the fiscal year 2011–12 and outlines anticipated plans and activities for 2012–13. The plan reports only on activities for which there is a firm commitment of funds received from the Government of Canada.

The reporting of plans and activities in this corporate plan is organized around Genome Canada's five objectives:²

1. the development and establishment of a coordinated strategy for genomics research to enable Canada to become a world leader in areas such as health, agriculture, environment, forestry and fisheries;
2. the provision of leading-edge technology to researchers in all genomics-related fields through regional Genome Centres across Canada, of which there are currently six, one each in British Columbia, Alberta, the Prairies, Ontario, Quebec, and the Atlantic;
3. the support of large-scale projects of strategic importance to Canada by bringing together industry, government, universities, research hospitals and the public;
4. the assumption of leadership in the area of ethical, environmental, economic, legal, social and other issues related to genomics research (GE³LS), and the communication of the relative risks, rewards and successes of genomics to the Canadian public; and,
5. the encouragement of investment by others in the field of genomics research.

² Source: Genome Canada's Funding Agreement signed March 31, 2008

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Pursuing our Objectives: Performance for 2011-12

Since its creation in 2000, Genome Canada has been committed to developing, facilitating and financing the expansion of genomics research capacity in Canada, and to affirming Canada's stature on the world's genomics research stage. This section outlines Genome Canada's major activities and accomplishments for 2011–12 in fulfillment of its mandate and objectives.

OBJECTIVE 1

The development and establishment of a coordinated strategy for genomics research to enable Canada to become a world leader in areas such as health, agriculture, environment, forestry and fisheries.

Strategy

Genome Canada's approach to fulfill this objective is to actively seek out partnerships and collaborations in genomics initiatives with relevant Canadian and international groups which share common interests and goals. Participation and engagement in workshops, conferences, information sessions and symposia provide valuable information to ensure Genome Canada invests in excellent strategic priorities that align with its mandate. The Science and Industry Advisory Committee's advice is solicited in respect to environmental scanning and strategic prioritization. The Genome Centres offer key advice on regional needs. Relevant provincial, federal and international funding agencies are also approached in respect to the development of partnerships and collaborations.

What has been achieved?

In 2011–12, Genome Canada continued its involvement in a number of International Initiatives in which it currently has a significant funding investment. These International Initiatives support Canadian scientists who are recognized as international leaders in areas of strategic importance to Canada.

► **Structural Genomics Consortium (SGC)**—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. Genome Canada has committed \$31.2 million to the consortium since its inception in 2003.

In 2011–12, Phase III of the SGC began July 1, 2011 and was officially launched at Oxford, UK on September 28th. 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. As part of the collaboration, Cerep will open a laboratory in Toronto from which it will offer its screening and profiling services.

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The Phase III funding agreement between the various funding partners has been fully executed. A total of \$36.1 million and £8 million have been committed by the various funding partners including: CIHR \$2.5 million, Government of Ontario \$8 million, Wellcome Trust £8 million, Pfizer \$5.6 million, Novartis \$5.4 million, Lilly \$5.1 million, GSK \$5 million, Life Technologies \$2 million, and up to \$8 million of in-kind support from pharmaceutical companies.

Genome Canada's one year contribution of \$2.5 million of the \$65 million announced in the Government of Canada's 2011 federal budget was approved by its Board of Directors in June 2011. These funds will flow to the University of Toronto and will enable the Canadian part of SGC to operate successfully for the next fiscal year.

► **The International Barcode of Life (iBOL)**—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. During construction of the barcode library, iBOL participants will also be building the infrastructure needed to use it in real-world situations such as conservation, ecosystem monitoring, forensics and control of agricultural pests and invasive 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.

In 2011-12, as the result of an interim review in March 2011, steps were taken by the iBOL Board of Directors to strengthen the management structures and practices. At Genome Canada's Board of Directors June 2011 meeting, \$2 million of the \$65 million announced in the Government of Canada's 2011 federal budget was approved for an additional year of funding support toward the consortium's activities.

► **Public Population Project in Genomics (P³G)**—The P³G is an international consortium with the aim of fostering collaboration between researchers and projects in the field of population genomics. The consortium is recognized as an international leader in the field of population genomics and harmonized bio-banking. The goal of P³G is to facilitate the harmonization of samples and data collected from different international bio-banks. 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 P³G ended March 31, 2011. At Genome Canada's Board of Directors June 2011 meeting, up to \$0.5 million of the \$65 million announced in the Government of Canada's 2011 federal budget, was approved for 18 months of bridge funding. The bridge funding opportunity will allow the consortium additional time to secure new funding for its Phase II projects, which will focus on optimizing access and use and developing new models.

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P³G submitted a proposal summarizing the activities P³G will undertake during the 18 month period and an estimate of the budget required to achieve the objectives proposed. 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.

► **Cancer Stem Cell Consortium (CSCC)**—The CSCC was established in 2007, following extensive consultations as part of the Canada—California Strategic Innovation Partnership. Its mandate is to coordinate an international strategy for cancer stem cell research. Cancer stem cells are considered to be the major culprits at the root of many cancers, accounting for tumour growth and metastases, and their eradication will potentially offer enduring cancer cures. The seven current members of the CSCC are the Canadian Institutes of Health Research, the National Research Council of Canada, the Michael Smith Foundation for Health Research, the Canada Foundation for Innovation, the Stem Cell Network, the Ontario Institute for Cancer Research, and Genome Canada. Genome Canada serves as the secretariat for the CSCC.

To-date, Genome Canada has committed \$25 million to the consortium to support specific initiatives which are approved by the consortium's Board of Directors, including:

- Genome Canada has invested \$14 million in two joint Canadian-Californian projects funded through the Disease Team I competition (launched in February 2009) of which the goal is to fund the work of Disease Teams that would result in a cell based therapy or a therapy derived from stem cell assays for a particular disease or serious injury and an Investigational New Drug (IND) filing at the end of the four-year grant to enable Phase I clinical trials.

In 2011-12, CIRM and CSCC established a clinical development advisory panel (CDAp) to assess the progress of all the projects funded in the Disease Team competition including the two joint CSCC/CIRM teams. The CDAp provides advice to the teams and recommendations to the funders on the progress of the teams.

- CSCC partnered with CIRM on the Disease Team Therapy Development Award of which the goal is to support research teams that move cancer stem cell based therapies toward the clinic and support research from pre-clinical development to Phase I and Phase II clinical trials. A joint call for applications for the planning awards was launched in December 2010, with the expectation of decisions on the Planning Awards by May 2011 and for the Research Awards by summer 2012.

In 2011-12, none of the joint Canadian/Californian teams that submitted a Planning Award application were recommended for funding. Since only those teams receiving a Planning Award will be able to submit a full research application to the program, these teams are no longer eligible to apply for CSCC funding.

► **International Mouse Phenotyping Consortium (IMPC)**—In an effort to maximize the utility of the knockout mice created in the International Knockout Mouse Consortium (IKMC), Genome Canada participated in efforts to develop an internationally coordinated approach for phenotyping the mouse mutants being developed. A steering committee

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was established to coordinate initiatives in countries around the world. The goal of Phase I of the IMPC (2012-2016) is to generate and analyze approximately 4,000 mouse mutants from the International Knockout Mouse Consortium ES cell resource (including those generated by the NorCOMM project funded by Genome Canada). The IMPC is seeking to partner with bioscience industry to advance medicine through mouse models of human disease.

In 2011-2012, one of the successful applications to the 2010 Large-Scale Applied Research Project Competition, “NorCOMM2 - *In vivo* models for human disease & drug discovery”, was accepted as part of the Canadian and UK contributions to the IMPC. With the success of this project, Genome Canada has membership on the IMPC Steering Committee.

► **International Cancer Genome Consortium (ICGC)**—ICGC was launched in April 2008 to coordinate large-scale cancer genome studies in tumours from 50 different cancer types and/or subtypes that are of clinical and societal importance across the globe. Systematic studies of more than 25,000 cancer genomes at the genomic, epigenomic and transcriptomic levels will reveal the repertoire of oncogenic mutations, uncover traces of the mutagenic influences, define clinically relevant subtypes for prognosis and therapeutic management, and enable the development of new cancer therapies.

Genome Canada has played an active role in the development of the consortium through the ICGC’s Executive and Science Planning committees.

Currently, the ICGC has received commitments from funding organizations in Asia, Australia, Europe and North America for 39 project teams in 13 jurisdictions to study over 18,000 tumor genomes. Projects that are currently funded are examining tumors affecting the bladder, blood, bone, brain, breast, cervix, colon, head and neck, kidney, liver, lung, oral cavity, ovary, pancreas, prostate, rectum, skin, soft tissues, stomach and uterus. Over time, additional nations and organizations are anticipated to join the ICGC. The genomic analyses of tumors conducted by ICGC members in Australia and Canada (pancreatic cancer), Japan (liver cancer), Spain (blood cancer), the UK (breast, lung and skin cancer) and the USA (blood, brain, breast, colon, kidney, lung, ovarian, rectal, stomach and uterine cancer) are now available through the Data Coordination Center.

In 2011-2012, a 2010 Large-Scale Applied Research Project entitled, “Stratifying and Targeting Pediatric Medulloblastoma through Genomics” was accepted as part of the ICGC and as a result, Genome Canada has been acknowledged as a full member of ICGC with a seat on the Steering committee.

► **International Wheat Genome Sequencing Consortium (IWGSC)** —The IWGSC was established by a group of plant scientists, breeders, and growers dedicated to sequencing the wheat genome to enhance our knowledge of the structure and function of the wheat genome. By gaining increased understanding of the biology of agronomically important traits and deploying state-of-the-art molecular tools, plant scientists and breeders will be able to accelerate wheat improvement to meet the challenges of the 21st century. The Consortium is committed to ensuring that the

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sequence of the wheat genome and the resulting DNA-based tools are available for all to use without restriction.

In 2011-2012, a Large-Scale Applied Research Project entitled, “CTAG - Canadian *Triticum* Advancement through Genomics” was accepted as part of the IWGSC. The Coordinating Committee is responsible for: coordinating activities within the IWGSC and pertinent outside genome efforts; allocating responsibilities/tasks to IWGSC members; assessing and reporting on progress, and monitoring data release activities. The Project Leader on the CTAG project, has a seat on the Coordinating Committee of the IWGSC.

► **New Initiatives**— At Genome Canada’s Board of Directors June 2011 meeting, \$1 million of the \$65 million announced in the Government of Canada’s 2011 federal budget, was set aside in order to be able to provide opportunities to respond to new, strategic initiatives deemed to be of potential strategic importance or relevance to Canada.

What are the outcomes?

As a result of its ongoing collaborative work throughout 2011–12, Genome Canada’s partnership with relevant stakeholders affirms the importance of a coordinated, pan-Canadian approach to strategic investments in genomics research. Such an approach can be responsive to national priorities, allows for important economies of scale, and facilitates—through knowledge exchange and collaboration—an acceleration in research activities and thus potential benefits to society. It provides opportunities to establish Canadian leadership of, or participation in, international research initiatives in areas that address unique scientific questions of importance to Canada and the world.

The work undertaken by SGC to identify three-dimensional protein structures, offers important and critical information for new drug development. The output rate of SGC’s research is astounding:

- Purified over 2,000 human proteins and 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 an agreement with Cerep, a world-leading biotechnology company, to establish a research hub in Toronto, Ontario.

The work undertaken by P³G showcases Canada’s expertise in the development of data harmonization knowledge as well as its wealth of population data. 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 P³G 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.

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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.

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 U.S. Food and Drug Administration (FDA) has recently announced the use and application of DNA barcoding for seafood identification in the United States.

OBJECTIVE 2

The provision of leading-edge technology to researchers in all genomics-related fields through regional Genome Centres across Canada, of which there are currently six, one each in British Columbia, Alberta, the Prairies, Ontario, Quebec and the Atlantic.

Strategy

Genome Canada's approach to fulfilling this objective is to provide sufficient funding support (through a competitive process) for the S&T Innovation Centres for purposes of giving access to the latest technologies, expertise and infrastructure to, not only Genome Canada-funded researchers, but all researchers across Canada involved in genomics-related research.

What has been achieved?

► **S&T Innovation Centres**—Genome Canada provides state-of-the-art technologies, expertise and infrastructure to Genome Canada-funded researchers as well as more than 3000 others from academia and industry through its financial support of S&T Innovation Centres across Canada. These Centres provide the entire spectrum of genomics technologies, including DNA sequencing, genotyping, RNA expression, protein identification and quantification (proteomics), metabolomics and the most advanced bioinformatics analyses to manage the vast quantities of complex data produced. The Centres have three main areas of activity: engaging in collaborative research projects, developing technologies and methods, and providing services to Canadian and international researchers. Whether through fee-for-service or collaboration, the Centres provide a critical mass of experts who partner with researchers from project development through to data analysis and interpretation. The S&T Innovation Centres are funded based on the actual demand for technology services from their primary users, the Genome Canada-funded projects, as well as other genomics and proteomics researchers in Canada and abroad.

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In 2011–12, Genome Canada, in collaboration with the Genome Centres, continued to ensure maximum access and usage of the services provided by the S&T Innovation Centres. The S&T Innovation Centres are integral to keeping pace with advancements in cutting-edge technologies and providing ready access to the Canadian genomics stakeholders. The S&T Innovation Centres also play a vital role in establishing and maintaining Canada's world-wide reputation for excellence in genomics research.

Genome Canada's hiring of a Director of Technology Programs in November 2011 will further strengthen the planning, development and collaborative elements of the Innovation Centres. The Director is in a unique position to cultivate relationships with multiple stakeholders, including the Genome Centres, S&T Innovation Centre leaders, Genome Canada competition applicants, Canadian scientists, and external funding agencies in order to understand the needs of these communities and subsequently, translate these needs into maximizing access and usage of the expertise and technology at the S&T Innovation Centres.

To this latter point, planning has begun for the annual meeting of the S&T Innovation Centres Leaders, to be held in February 2012. Along with an exchange of information and sharing of ideas, particular emphasis will be placed on the creation of a National Network of S&T Innovation Centres with a mandate to work together collaboratively, while ensuring the highest quality genomics technologies and advice are provided to the research community.

► **2010 Science and Technology Innovation Centre Competition for Operations Support**—The Science and Technology Innovation Centre Competition, launched in May 2010, resulted in a two year (2011-12; 2012-13) investment of \$24 million by Genome Canada for the operational support of five Innovation Centres:

- Genomics Innovation Centre at the BC Cancer Agency Genome Sciences Centre (Vancouver)
- McGill University and Genome Quebec Innovation Centre (Montreal)
- Metabolomics Innovation Centre (Edmonton and Victoria)
- The Centre for Applied Genomics (Toronto)
- University of Victoria and Genome British Columbia Proteomics Centre (Victoria)

One Innovation Centre – The Integrated and Distributed Bioinformatics Innovation Centre (Calgary) – which had received previous operational support funding from Genome Canada, was not successful in this competition. Its funding support from Genome Canada ended June 30, 2011. Another Innovation Centre that had received previous operational support funding from Genome Canada – Microarray Facility at the Vancouver Prostate Centre (Vancouver) - did not submit a full application to the competition. Its funding support from Genome Canada also ended June 30, 2011.

► **Advancing Technology Innovation through Discovery**—A joint collaborative program between Genome Canada and the Canadian Institutes of Health Research was launched in July 2010. The underpinning of the collaboration was having the Genome Canada-funded S&T Innovation Centres join forces with Canadian researchers to apply the latest genomics technologies to identify the genetic causes of rare childhood diseases.

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In November 2010, with investments of up to \$2 million each from Genome Canada and the Canadian Institutes of Health Research, plus an additional \$2.5 million from other agencies, two consortium applications—one focused on rare pediatric cancers, and the other on rare Mendelian diseases—were approved for 18 months of funding. An Advisory Committee was put in place and it provides advice on a quarterly basis to the two Consortia and reports back to the Funders to help ensure that the Consortia achieve their stated objectives and milestones. The Advisory Committee has met twice in 2011-2012 (July 2011, October 2011) to review research progress of the two consortia, and was impressed with the results to-date:

- the Finding of Rare Disease Genes in Canada (FORGE Canada) Consortium has made the discovery of fourteen (14) potential disease-causing genes (with six (6) potentially being novel gene-to-disease links); and,
- the Canadian Pediatric Cancer Genome Consortium, has initiated the whole genome sequencing (WGS) of pairs/trios, for each of the four pediatric cancers chosen for study, using Illumina HiSeq 2000 technology.

What are the outcomes?

As a result of the ongoing funding support throughout 2011–12 of the S&T Innovation Centres, Genome Canada’s investments provide access to leading-edge technology and expertise to Canadian genomics researchers. These Innovation Centres are catalysts for Canadian science, not only bringing both business and visibility to Canada but also serving a significant and fundamental role in enabling discoveries. The Centres provide access to new and important knowledge and expertise in the field of genomics and proteomics, allowing researchers and users to design appropriate experimental protocols, receive high-quality, high-throughput genomics data at a competitive price and obtain access to data analysis expertise.

The joint collaboration with the Canadian Institutes of Health Research (“Advancing Technology Innovation through Discovery”) is most timely. It has been more than 20 years since the official commencement of the Human Genome Project and eight years since its completion. With the introduction of next-generation sequencing techniques, there are now indications of a paradigm shift, with renewed focus on whole genome sequencing to identify disease-causing genetic mutations. This joint venture is a great opportunity for Canada to be at the leading edge in disease gene discovery.

OBJECTIVE 3

The support of large-scale projects of strategic importance to Canada by bringing together industry, government, universities, research hospitals and the public.

Strategy

Genome Canada’s approach to fulfilling this objective is to issue calls for proposals in sectors of strategic importance to Canada: health, agriculture, environment, forestry and fisheries. The strategic focus of each of Genome Canada’s calls for applications is the result of extensive intelligence gathering and consultation with the Genome Centers, the Science and Industry Advisory Committee and other external stakeholders. Applications are selected for funding through a rigorous scientific peer review process involving international experts, as well as a due diligence process that examines the excellence of

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the proposals' financial and management elements. Central to Genome Canada's strategy is ensuring that the GE³LS implications and potential socio-economic benefits related to genomics research are addressed as a stand-alone proposal or as an integrated component of each proposal.

What has been achieved?

► **Competition III**—All final reports for this five-year competition were received and will be assessed to determine accomplishments and impacts relative to the project objectives.

► **Applied Genomics Research in Bioproducts or Crops Competition**— A strategic competition on applied genomics research in the areas of crops, bioenergy and bioproducts (launched in April 2008) resulted in 12 projects receiving a total of \$53 million in Genome Canada funding support.

An interim review of the 12 projects was undertaken in April 2011. The interim review allowed Genome Canada to evaluate each project with respect to the progress of the research, changes in research direction (made or proposed), the implementation plan for the remainder of the project, progress towards ensuring the social and/or economic benefits for Canada are realized, and the financial and management aspects of the project. The results of the interim review were positive, with most projects deemed to be “on track” in terms of meeting their objectives and milestones. Two projects were asked to provide an updated progress report to Genome Canada in order to re-evaluate performance versus the revised milestones or provide progress on specific activities.

► **2010 Large-Scale Applied Research Project Competition**— A strategic competition for large-scale research projects focused on the application of genomics research such that there would be a high potential for benefits for Canada (with an emphasis on economic benefits) was launched in May 2010. The competition included funding for projects targeting the areas of forestry and the environment, designated the Targeted Competition, as well as funding for projects targeting Genome Canada's other strategic sectors (agriculture, fisheries and human health), designated the Multi-Sector Competition. A total of 16 projects valued at approximately \$60 million in Genome Canada funding support were approved, in which nine projects were in the areas of forestry and/or the environment and seven projects were in the areas of agriculture, fisheries, and human health. Funds to these projects began to flow in the first quarter of 2011-12.

► **2011 Competition on Genomics and Personalized Health**— 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 purposes of developing a large-scale applied research competition in Genomics and Personalized Health, with an expected launch date of December 2011. The Canadian Institutes of Health Research (CIHR) is partnering with Genome Canada through this competition to collectively advance the Personalized Health research agenda. The competition parameters include:

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- This competition will be over a \$130 million investment in genomics research and personalized health - a minimum of \$40 million from the Government of Canada through Genome Canada and \$30 million from strategic partnerships (up to \$22.5 million from CIHR and \$5 million from the Cancer Stem Cell Consortium) plus matching co-funding
- 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, environmental, economic, legal and/or social aspects (GE³LS) must be an integral component of the overall research plan and relevant in the pathway to application (GE³LS 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.

► **Entrepreneurship Education in Genomics (EEG) Program**— In February 2011, Genome Canada launched a new pilot program called Entrepreneurship Education in Genomics (EEG). This program aims to support initiatives to educate the Canadian genomics research community about how to create and capture value from their research and translate their discoveries into marketable applications, products, technologies, systems and processes. The approved projects, if successfully rolled out over the term of the project (3 years), may eventually form the basis of a national program.

Ten registrations were submitted to Genome Canada. All of the registrations were found to satisfy the programmatic criteria established in the competition's Guidelines and as a result were invited to submit a full application. Six of the ten eligible registrations submitted a full application to Genome Canada on May 16, 2011.

The review committee for the Entrepreneurship Education in Genomics Program met to discuss and evaluate the proposals on June 27, 2011 in Toronto. The committee rated each proposal on the separate criteria and provided an overall recommendation for funding. The three most highly ranked applications were approved for a maximum contribution of \$1,053,230 from Genome Canada over three years:

- *Genomics Research Entrepreneurship to Accelerate Translation (GREAT)* (University of British Columbia)
- *Accelerating Genomic Innovation in Life-Science Enterprises (AGILE)* (Ivey Centre for Health Innovation & Leadership)
- *Boosting Entrepreneurial Skills and Training: BEST in Genomics* (Université Laval)

► **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

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Genome Canada's Board of Directors and SIAC 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 was approved by Genome Canada's Board of Directors at its June 2011 meeting for the purposes of developing a *Request for Applications on Bioinformatics and Computational Biology* to be launched in early 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.

- **Computational biology:** The development of mathematical and computational approaches for the modeling and analysis of biological data sets. The goal is to use novel scientific approaches to derive new knowledge and pose new hypotheses about complex biological processes.
- **Bioinformatics:** The application of existing tools and data sets to help solve research problems in the life sciences. The goal is to assemble useful tools that work on biological data to assist research in a manner analogous to engineering applications.

What are the outcomes?

Genome Canada's international peer review process, which assesses excellence and relevance to Canada's health, social and economic needs, together with its due diligence review of management and financial capabilities, ensures that funding goes to only the very best projects. These projects feature researchers who thrive in trans-disciplinary teams across geographic borders; and have the sophisticated management skills to ensure the success of large, complex projects on an international scale.

Genome Canada's commitment to supporting world-class research excellence in areas of strategic importance to Canada will not only allow Canada to maintain a leadership position within the international arena, but also accelerate the translation of benefits for Canada.

Applied Genomics Research in Bioproducts or Crops Competition

Research projects under the bio-products theme were required to employ genomic and proteomic approaches to understand and manipulate the underlying biological processes exploited in the production of economically viable and environmentally sustainable bioproducts, targeting, feedstock optimization, microorganisms for sustainable processing technologies, and value added-bioproducts. Early indications of outcomes include collaboration with the industries in the various sectors to develop processes to reduce the harmful by-products they produce and/or generated energy to help power their operations.

Research projects under the crop theme were required to employ genomic and proteomic approaches to foster an improved understanding of systems that govern plant growth, development and performance with focus on: basic plant genomics, application of plant genomics, and agriculture and food production sustainability. Early indications of

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outcomes include a significant impact including the complete sequence and annotation of the spider mite genome.

The 2010 Large Scale Applied Genomics Research Competition

A particular requirement of this competition was that the genomics research applications have a high potential for benefits for Canada, with an emphasis on economic benefits, as well as a targeted focus on forestry and the environment.

Each of the projects funded in this competition is focusing on important questions and challenges faced in their respective sector and involve end-users of the technology. For example, in the forestry sector, the projects are exploring the many ways to make Canada's forests more sustainable, including identifying common tree diseases; using genomics to develop short-rotation, fast-growing trees for use in biofuel production; and, studying the use of phytoremediation, a process that uses plants to clean up pollutants.

In the agriculture sector, the research will lead to improvements in the health of our livestock and crops, including conducting research into cattle and pig populations as well as creating the next generation of wheat.

Within in the health sector, the studies are looking for potential new treatments for cancer and rare diseases, while one project is part of an ambitious international partnership that is working to understand the function of each one of the 20,000 genes found in the human genome.

The 2011 Competition on Genomics and Personalized Health

There is a spectrum of activities that span what is referred to as the molecular medicine continuum from health maintenance and disease prevention, through early detection, to treatment of disease and disease prognosis. This competition is focused on projects working on any part of the continuum 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.

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The Entrepreneurship Education Program (EEG)

The EEG program will provide genomics researchers with a more comprehensive approach to entrepreneurship potentially leading to the acceleration of the conversion of scientific discoveries into commercial successes; thereby growing Canada's competitiveness in the global bio-economy. The funded EEG programs will assist researchers in understanding the processes and players involved in commercialization and provide them with the entrepreneurial skills they need to succeed.

Bioinformatics Workshop

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.

OBJECTIVE 4

The assumption of leadership in the area of ethical, environmental, economic, legal, social and other issues related to genomics research (GE³LS), and the communication of the relative risk, rewards and successes of genomics to the Canadian public.

Strategy

To foster Canadian leadership in the areas of ethical, environmental, economic, legal, social and other issues related to genomics research, Genome Canada continues to build on its National GE³LS Strategy. Genome Canada's approach to communicating the relative risks, rewards and successes of genomics research to the Canadian public is to develop innovative communication, education and public outreach programs and initiatives aimed at establishing visibility, credibility and awareness.

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What has been achieved?

In 2011–12, efforts focused on the following activities:

GE³LS:

In preparation for Genome Canada’s new competition on genomics and personalized health, input was provided in order to shape the GE³LS requirements of the competition. Related to past competitions, a complex, ten-year analysis of the characteristics of GE³LS activities was undertaken with a view to identifying trends and develop a best-practices approach to fuel further activities and encourage success. A draft report has been completed and is circulating among the regional GE³LS liaisons for discussion. The results of this report will be presented to the Genome Canada Board of Directors at an appropriate time.

In 2011, the first GPS (an Ottawa-based GE³LS series intended to broker a dialogue between policy-makers and researchers on issues that arise from the interface of genomics and society) event was held in April and its theme was “*Genomics Research and Intellectual Property*”. The next GPS event took place in September and focused on optimizing genomics research. The Policy Brief presented strategies to optimize the value of genomics research beyond commercialization - what the authors broadly defined as the “valorization” of research.

The final GPS event for 2011, exploring the interface between genomics and regulatory science, occurred in November as part of the Canadian Science Policy Conference (CSPC), thereby reaching a new and extended audience, and establishing a new model for GPS events.

Finally, an operational review of the GE³LS activities is underway to better align with Genome Canada’s efforts related to its new strategic plan, communications plan, mission and vision.

Communications:

As part of preparing a new Communications Plan for Genome Canada, an operational review of communications was undertaken in the last few months. This review included consultations with Genome Canada management, management and communications teams from all regional Genome Centres, members of Genome Canada’s Board and a small number of external stakeholders; principally media and other federal funding organizations.

Working with Genome Canada’s corporate development staff, a new Strategic Plan for the period 2012-2017 was completed and approved by the Board of Directors at its September 22nd meeting. The Strategic Plan was officially released in December.

A new Communications Plan was prepared and presented to the Board of Directors at its September meeting. Its purpose was to provide a framework for discussion under which the Communications program would develop going forward. Based on feedback received, a revised version of the plan was presented to the Board of Directors at its December meeting.

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In mid-November, Genome Canada's 2012 Federal Ask submission was submitted to the Government of Canada along with additional information documents submitted in response to follow-up questions and clarifications. The development of a communications plan to support the Federal Ask process was also developed with activities related to this plan to run until early 2012.

Several events were sponsored by Genome Canada in 2011-12. Of particular note was the International Congress of Human Genetics (Montreal, Oct 11-15, 2011) which attracted some of the top genetics researchers from around the world. The event is held every 5 years and some 7,000 delegates representing 65 countries attended.

Working with Genome Quebec, a Genomics Summit was organized (Montreal, Oct. 11, 2011) that targeted to key influencers in the genomics enterprise with a view to creating discussion and favorable views of genomics. The event attracted about 80 participants, representing many aspects of healthcare and research. A formal white paper containing future plans and recommendations is under development.

Other events of note – Genome Canada sponsored the 2011 Friesen International Prize in Health Research. Genome Canada has been a sponsor of this event since its inception. As well, Genome Canada has put in considerable effort to attract the 13th International Symposium on Mutation in the Genome 2013, with a suitable date and location in Canada yet-to-be announced.

A variety of significant media interactions, which featured Genome Canada's President and CEO, have taken place:

- A 20 minute national live CBC Radio Canada interview which served as an introduction and overview of Genome Canada and genomics.
- Two Genome Canada editorials in Biotech Focus Magazine. The first editorial was published in the September edition and emphasized the importance of genomics to the country and introduced the Genome Canada model. The second editorial was published in the November edition and opined on "next generation science", a notion combining traditional research and entrepreneurship.
- An interview with La Presse, concerning the Quebec component of Genome Canada's Entrepreneurial Education in Genomics (EEG) Program. The program was officially launched on September in a joint announcement by Genome Quebec and Université Laval.
- In December, the National Post published a special insert themed "Investing in Life Sciences". This initiative, led by Genome Canada, featured a story on Personalized Health, as well as a story relating to a Genome Canada commissioned study of the bio-economy.
- Other media activities featuring stories on Personalized Health in La Presse, and Forest Pest Management, featured in the Ottawa Citizen.

Work was undertaken to develop new corporate information documents for Genome Canada relating to genetics issues at play in the public domain. The documents will relate to Genetically Modified Organisms, Genetic Discrimination, and Direct-to-Consumer Testing, as well as a digest of genome success stories.

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As part of ramping up communications at Genome Canada, a search was undertaken to fill a new role – Director, Media and Communications. A candidate was chosen and commenced work in early November.

What are the benefits?

Genome Canada takes seriously the responsibility to consider the vast array of complex issues raised by genomics. This commitment, Genome Canada's investments in the area of GE³LS, and its national and international leadership, help ensure that a number of disciplinary perspectives are drawn from. By this means the concerns of Canadians can be addressed, their needs and expectations can be met, and the conditions are put in place for genomics and associated technologies to have the optimal impact on Canadian prosperity and quality of life.

Genome Canada-funded GE³LS research continues to expand across all sectors, such that Genome Canada can be viewed as a leading voice in federal public policy debates related to science and technology beyond life sciences and health, into environmental science and technologies, and natural resources and energy.

Genome Canada's communication and outreach activities in 2011–12 continue to showcase Genome Canada's partnerships with the Government of Canada and the Canadian scientific community, promote accountability for the investment of taxpayers' dollars, celebrate scientific achievements of Canadian researchers, and educate the Canadian public as to the relative risks, benefits and successes of genomics research.

OBJECTIVE 5

The encouragement of investment by others in the field of genomics research.

Strategy

Genome Canada's approach is to encourage investment by others in excellent large-scale genomics research projects through development of collaborative relationships with the private, public, and philanthropic sectors, both domestic and international. Genome Canada operates on the general principle that it will fund up to 50% of the eligible costs of research projects, with the remainder secured through co-funding by other organizations.

What has been achieved?

It is expected that Genome Canada will raise over \$1 billion in co-funding commitments to supplement the \$980 million committed by the Government of Canada over the past decade, resulting in approximately \$2 billion of total funding for genomics research across all sectors.

What are the benefits?

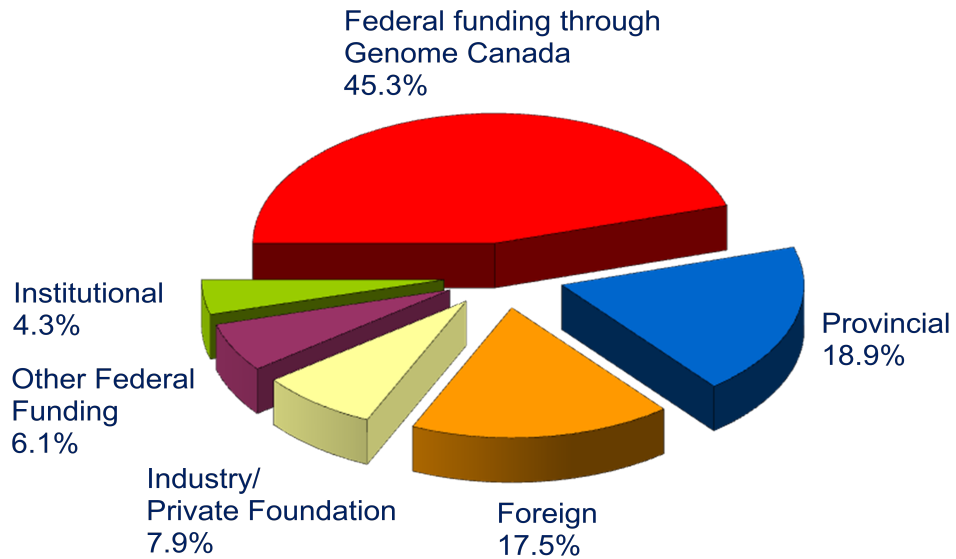
Effective research requires the collective efforts of many people and organizations. Investment by others, through various collaborative mechanisms, facilitates addressing research gaps and priorities and ensures that the investment funds the best research and the translation of that research into results for Canadians. Genome Canada's primary partners, the six regional Genome Centres, have played a central role in this success.

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Pursuing our Objectives: Performance for 2011-12

Funding Sources for Genome Canada-Approved Projects

Note: Chart below does not include funding and related co-funding of Genome Centres.



(As at November 2011)

SECTION III – Grant Management for 2011-12

The federal government, through Industry Canada, has committed a total of \$980 million in funding for Genome Canada since 2000–01. All funding is provided through funding agreements between Genome Canada and Industry Canada.

As a not-for-profit organization, Genome Canada has the flexibility to maximize the funding it receives from the federal government through careful and judicious investment. It also has the ability to raise additional co-funding from others, including other levels of the public sector as well as from the private sector.

Investment and Management of Funds

The Audit and Investment Committee supports the Board of Directors of Genome Canada in fulfilling its fiduciary responsibilities with respect to the management of funds. It meets quarterly and reports to the Board on the outcome of their deliberations.

The Committee is responsible for:

- overseeing the investment and management of funds received from the Government of Canada according to a Board-approved investment policy that outlines guidelines, standards and procedures for the prudent investment and management of funds; and,
- overseeing Genome Canada's policies, processes and activities in the areas of accounting and internal controls, risk management, auditing and financial reporting.

The newly created Programs Committee brings further oversight to the management of funds by ensuring research funding and activities are aligned to Genome Canada's strategic priorities. The Committee provides advice to the board of directors on research programs and projects, research partnerships and collaborations, competitions, and program evaluation.

Source and Use of Funds

Grants received from the federal government in 2000–01 (\$160 million) and 2001–02 (\$140 million) funded the large-scale research projects and S&T Innovation Centres that were approved in Competitions I and II, for up to four years (2002–06). These grants also funded the operations of Genome Canada and the first five Genome Centres.

The grant received from the federal government in 2003–04 (\$75 million) funded projects and associated S&T Innovation Centres that were approved for up to three years (2003–06) in the Applied Genomics Research in Human Health Competition.

The grants received from the federal government in 2004–05 (\$60 million) and in 2005–06 (\$165 million) funded the projects that were successful in Competition III for three years, the operations of Genome Canada and six Genome Centres for three years, and the renewal of six S&T Innovation Centres until the end of fiscal year 2007–08.

The grant approved by the federal government in March 2007 (\$100 million) has funded Competition III projects, the S&T Innovation Centres, Phase II of the Structural Genomics Consortium, and the operations of Genome Canada and the six regional Genome Centres through 2009–10.

SECTION III – Grant Management for 2011-12

The grant approved by the federal government in February 2008 (\$140 million) funded a competition in Applied Genomics in Bioproducts and Crops, two research projects through the Cancer Stem Cell Consortium, the International Barcode of Life project, the S&T Innovation Centres, the operations of six regional Genome Centres, as well as the operations of Genome Canada through to 2012–13.

The grant approved by the federal government in March 2010 (\$75 million) was used to fund large scale projects in forestry and the environment through a targeted competition; projects in other sectors such as health and agriculture through a multi-sector competition, and a competition for Science and Technology Innovation Centre Operations Support.

The grant approved by the federal government in December 2011 (\$65 million) will be used to launch a competition in applied genomics research on personalized health; contribute to the funding of Phase III of the Structural Genomics Consortium, and the International Barcode of Life project, provide bridge funding for the Public Population Project in Genomics, the International Barcode of Life project, and contribute to the operations of six regional Genome Centre and Genome Canada through to 2013–14.

Interest income of approximately \$90 million, earned through the federal investment, has allowed Genome Canada to launch other research initiatives over the preceding nine years, such as a bilateral research competition between Genome Canada and Genoma España, the Bovine Genome Sequencing Initiative, funding for two international consortiums (the Structural Genomics Consortium Phase I and the Public Population Project in Genomics), as well as a competition in 2007–08 for New Technology Development projects.

Cash Management

Genome Canada disburses funds on a quarterly basis through the six regional Genome Centres for approved research projects and S&T Innovation Centres. On a quarterly basis each Genome Centre is required to review the expenditures to date and estimate cash requirements for each project and innovation centre that it manages. It then submits a “draw request” to Genome Canada indicating the cash needs of the Centre for the subsequent quarter. The Genome Centres assess the project/innovation centre needs against the approved budget, actual expenditures, scientific progress to date and co-funding received from other sources. Genome Canada then conducts its own thorough review of the draw request submission before releasing funds.

Annual Audits

As a not-for-profit, incorporated organization, Genome Canada selects external auditors to undertake an annual audit of its financial statements; the external auditors for 2011–12 are Deloitte & Touche, LLP. Auditors are required to submit an audit plan to Genome Canada’s Audit and Investment Committee in February 2012 for review and approval. The audit is conducted within 45 days of each fiscal year-end in accordance with generally accepted Canadian auditing standards. The objective is to express an opinion on whether Genome Canada’s financial statements present fairly, in all material respects, the financial position, results of operations, and cash flow of the corporation. Upon completion of the audit, the financial statements and a summary of audit findings are presented to the Audit and Investment Committee and then in June 2012 to the Board of Directors for approval.

SECTION III – Grant Management for 2011-12

Recipient Audits

In 2006–07, Genome Canada developed and implemented a recipient audit framework in consultation with the Genome Centres. As part of this exercise, a risk assessment tool was developed to enable the Centres to identify projects and Innovation Centres that will undergo a detailed compliance audit. This framework was introduced to bring a common approach to recipient audits across Canada and to improve the management control framework within which genomics research is administered. A total of 16 recipient audits have been completed to date.

Summary of Receipts and Disbursements

Details (in millions of dollars)	Projects Funded	Actuals 2000-01 to 2010-11	Forecast 2011-12	Forecast Cumulative to 2011-12
RECEIPTS				
Government of Canada		766.0	55.1	821.1
Investment Income		87.2	0.8	88.0
		853.2	55.9	909.1
PROGRAM AND OPERATING DISBURSEMENTS				
Research Projects				
Competition I	17	80.6		80.6
Competition II	33	146.2		146.2
Competition III	33	203.0	2.9	205.9
Applied Genomics in Human Health	14	60.3		60.3
Applied Genomics in Bioproducts and Crops	12	18.0	15.0	33.0
Bovine Genome Sequencing Project	1	6.0		6.0
Multi-Sector	7		6.6	6.6
Forestry and Environment Competition	9		8.0	8.0
Entrepreneurial Innovation In Technology	3		0.3	0.3
Structural Genomics Consortium	1	31.2	3.0	34.2
Public Population Project in Genomics	1	15.7	0.2	15.9
International Regulome Consortium	1	2.6		2.6
International Barcode of Life	1	2.9	4.8	7.7
Genome Canada–Genoma España Competition	3	7.7		7.7
C. difficile / H1N1	2	0.3		0.3
New Technology Development	13	9.7		9.7
Canadian Stem Cells Consortium	2	2.5	1.7	4.2
Advanced Technology Innovation Through Discovery	2		1.6	1.6
	155	586.7	44.1	630.8
Science & Technology Innovation Centres	10	101.2	13.3	114.5
Genome Centres Operations		57.9	5.5	63.4
GENOME CANADA OPERATING EXPENDITURES		69.0	7.5	76.5
Total Disbursements	165	814.8	70.4	885.2
Excess (Deficiency) of Receipts over Disbursements		38.4	(14.5)	23.9
Opening Cash Balance			38.4	
Closing Cash Balance		38.4	23.9	23.9

* As at November 2011

SECTION IV – Plans for 2012-13

In 2012–13, Genome Canada plans to launch the first phase of its strategic plan. Bolstered by a new vision and mission, Genome Canada will put greater effort in designing programs and activities that translate research discoveries into new applications that can lead to economic or social benefits to society. It will continue to fund large-scale research projects and support cutting-edge technology, while committing to a substantial (by 12%) reduction from fiscal year 2011-12 levels, to the operating expenses of Genome Canada and the Genome Centres. It intends to expand its focus on sectors of strategic importance to Canada – agriculture, environment, fisheries, forestry, health – with the inclusion of two new sectors – energy and mining. It will continue to conduct ongoing monitoring and interim reviews of its large-scale research projects and S&T Innovation Centres in order to ensure progress against objectives as well as the meeting of agreed-to milestones. It will continue to consult and engage 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 commits to seek out opportunities to leverage the Government of Canada’s investment beyond the 1:1 ratio, through the development of partnerships and collaborations. Working in partnership with the six Genome Centres, Genome Canada will continue its leadership role in cultivating the complex and collaborative network of individuals and organizations – the Canadian Genomics Enterprise – who represent those who fund research, conduct research, translate its discoveries into applications, and use them for the benefit of society.

The following section outlines Genome Canada’s planned activities for 2012–13. For purposes of reporting and continuity, the activities align with the national objectives, as currently outlined in the funding agreements with Industry Canada. The intent, however, will be to transition in 2012-13 to Genome Canada’s new objectives, as outlined in its strategic plan. This transition however, will only be implemented, pending greater certainty in long-term funding from various stakeholders.

OBJECTIVE 1

The development and establishment of a coordinated strategy for genomics research to enable Canada to become a world leader in areas such as health, agriculture, environment, forestry and fisheries.

Planned Activities

- work closely with the six Genome Centres and the Science and Industry Advisory Committee to continue ongoing consultations as to genomics research opportunities in sectors of strategic relevance and priority to Canada - agriculture, environment, fisheries, forestry, human health, energy and mining;
- continue oversight and monitoring of the following international initiatives:
 - ✓ Structural Genomics Consortium—ongoing oversight of the projects and activities in Phase III
 - ✓ Public Population Project in Genomics—monitoring and oversight for the 18 month bridge funding period
 - ✓ International Barcode of Life—ongoing monitoring and oversight
 - ✓ Cancer Stem Cell Consortium—continue management of projects funded in the Disease Team I Partnership Program;

SECTION IV – Plans for 2012-13

- continue to participate as a member of the steering committees of the International Mouse Phenotyping Consortium, and the International Cancer Genome Consortium

OBJECTIVE 2

The provision of leading-edge technology to researchers in all genomics-related areas through regional Genome Centres across Canada, of which there are currently six, one each in British Columbia, Alberta, the Prairies, Ontario, Quebec, and the Atlantic.

Planned Activities

- S&T Innovation Centres—In collaboration with leaders of the Genome Centres, Genome Canada will continue to ensure maximum access and usage of the services provided. A major focus will be placed on establishing a national network of S&T Innovation Centres.
- Advancing Technology through Discovery Competition—continued oversight and monitoring of the two funded consortia

OBJECTIVE 3

The support of large-scale projects of strategic importance to Canada by bringing together industry, government, universities, research hospitals and the public.

Planned Activities

- Applied Genomics Research in Bioproducts or Crops Competition—continued monitoring and oversight of the 12 funded projects
- 2010 Large-Scale Applied Research Project Competition—continue monitoring and oversight of all successful projects from this competition
- 2011 Competition on Genomics and Personalized Health—manage the launch of competition with provision of information sessions through working collaboratively with the Genome Centres
- Entrepreneurship Education in Genomics Program—monitoring and oversight of the three successful projects from this competition
- Bioinformatics and Computational Biology Workshop—development of the request for applications for a 2012 *Bioinformatics and Computational Biology Competition*
- Brain Cancer Stem Cell & Terry Fox Research Institute (TFRI) Initiative – Partner with TFRI on a five year pan-Canadian translational cancer research project in adult glioblastoma multiforme (GBM)
- CFIA Partnership – development of a request for applications on the integration of genomic technologies for *Listeria monocytogenes* detection and surveillance using the Emerging Issue program

OBJECTIVE 4

The assumption of leadership in the area of ethical, environmental, economic, legal, social and other issues related to genomics research (GE³LS), and the communication of the relative risks, rewards and successes of genomics to the Canadian public.

SECTION IV – Plans for 2012-13

Planned Activities

- *Develop innovative models of collaborative research...*
The launch of the 2011 Competition on Genomics and Personalized Health will provide the GE³LS research community unprecedented opportunities to help transform advances in genomics into significant changes to health maintenance and disease prevention, early detection, and improved treatment of diseases, through large-scale projects, integrated projects, and through a subsequent, targeted GE³LS Request for Applications that will fund additional projects and/or consortia to enhance networking; coordinate overlapping research themes; address gaps; optimize synthesis of all the GE³LS research; and, facilitate the translation into practices and/or policies.
- *Shape the innovation continuum...*
Building on the successes of the GPS series, "Where Genomics, Public Policy and Society Meets," Genome Canada will engage in dialogues with an ever growing range of stakeholders to assist them in seizing the opportunities they uncover and to help them address the challenges they face along the innovation continuum.
- *Enhance accountability through engagement...*
Support for genomics depends in large measure on whether it responds to the Canadian public's needs, aspirations and values. This requires that there be a meaningful engagement between the public and key stakeholders. Genome Canada will begin to bring together diverse, interested audiences to explore the ramifications of genomics in society, set shared goals, and actively participate in guiding genomics and GE³LS research, and their applications.
- *To achieve communicating the benefits of Genome Canada genomics research funding to the Canadian public...*
Genome Canada will showcase its Genome Canada's partnership with the Government of Canada and the Canadian scientific community; promote accountability for the investment of taxpayers' dollars; celebrate scientific achievements of Canadian researchers; and educate the Canadian public as to the relative risks, benefits and successes of genomics research.

OBJECTIVE 5

The encouragement of investment by others in the field of genomics research.

Planned Activities

Genome Canada will continue to assess opportunities for future scientific and funding collaborations and will continue to nurture existing relationships to ensure effective completion of approved projects.

SECTION IV – Plans for 2012-13

Planned Receipts and Disbursements for 2012–13

The following table provides a preliminary estimate of the receipts and disbursements for 2012–13 and subsequent fiscal years. The estimate is based on statements of cash flow as presented to the Board of Directors at its December 2011 meeting. The operating budget for fiscal year 2012–13 will be presented to the Genome Canada Board of Directors for approval in March 2012.

Details (In millions of dollars)	Genome Canada				Estimated Co-funding For Those Years	Total Genome Canada & Co-funding	Percentage %
	Forecast Cumulative 2000-01 to 2011-12	Planned 2012-13	Planned Subsequent Years	Forecast Total			
RECEIPTS							
Government of Canada	821.1	64.0	94.9	980.0		980.0	43.7
Investment Income	88.0	0.7	0.8	89.5		89.5	4.0
Co-Funding					1,174.3	1,174.3	52.3
	909.1	64.7	95.7	1,069.5	1,174.3	2,243.8	100.0
PROGRAM DISBURSEMENTS							
Research Projects							
Competitions I, II and III	432.7			432.7	431.1	863.8	38.7
Multi-Sector	6.6	12.4	11.9	30.9	34.8	65.7	2.9
Forestry and Environment	8.0	10.7	10.3	29.0	31.2	60.2	2.7
Applied Genomics In Human Health	60.3			60.3	70.2	130.5	5.8
Applied Genomics in Bioproducts & Crops	33.0	15.0	7.0	55.0	60.1	115.1	5.2
Genomics and Personalized Health			40.0	40.0	40.0	80.0	3.6
Bioinformatics/Computational Biology			5.0	5.0	5.0	10.0	0.4
Bovine Genome Sequencing Project	6.0			6.0	63.4	69.4	3.1
Entrepreneurial Innovation in Technology	0.3	0.4	0.4	1.1	1.6	2.7	0.1
Structural Genomics Consortium	34.2	0.6		34.8	164.4	199.2	8.9
Public Population Project in Genomics	15.9	0.3		16.2	46.3	62.5	2.8
International Regulome Consortium	2.6			2.6	0.4	3.0	0.1
International Barcode of Life	7.7	1.0		8.7	8.7	17.4	0.8
Genome Canada-Genoma Espana Competition	7.7			7.7	7.8	15.5	0.7
C. difficile / H1N1	0.3			0.3	0.2	0.5	0.0
New Technology Development	9.7			9.7	9.7	19.4	0.9
Canadian Stem Cells Consortium	4.2	10.0	10.8	25.0	60.0	85.0	3.8
Advanced Technology Innovation Through Discovery	1.6	0.4		2.0	2.0	4.0	0.2
Other Initiatives		0.5	0.5	1.0	3.0	4.0	0.2
	630.8	51.3	85.9	768.0	1,039.9	1,807.9	81.0
Science & Technology Innovation Centres	114.5	11.4		125.9	47.1	173.0	7.8
Genome Centres Operations	63.4	4.8	4.8	73.0	87.3	160.3	7.2
GENOME CANADA OPERATING EXPENDITURES	76.5	6.6	6.6	89.7		89.7	4.0
Total Disbursements	885.2	74.1	97.3	1,056.6	1,174.3	2,230.9	100.0
Excess Receipts over Disbursements	23.9	-9.4	-1.6	12.9			
Opening Cash Balance		23.9	14.5				
Closing Cash Balance	23.9	14.5	12.9	12.9			

SECTION V – Performance, Audit and Evaluation

Genome Canada has a wide array of policies, systems and processes that have been developed over time to address issues of performance, audit and evaluation. In 2007–08, the Board of Genome Canada approved a performance, audit and evaluation strategy (PAES) to respond to specific requirements of the 2007 funding agreement with Industry Canada, and to ensure that a comprehensive and integrated approach to these functions was established and maintained. The PAES can be viewed in full on Genome Canada’s website. See <http://www.genomecanada.ca/en/about/accountability/>

Performance Audit

At the request of Industry Canada, a performance audit was carried out on Genome Canada in 2008–09 to ensure the economy, efficiency and effectiveness with which federal funds were used.

The audit concluded that:

- mechanisms are in place to ensure transparency and reduce conflicts of interest in the review and approval of applications for funding, as well as to monitor the progress of funded projects;
- funding themes are identified with input from the scientific community and through widespread consultations;
- international partnership opportunities are guided by documented criteria that include consideration of partners’ ethics and values; and
- performance measurement strategies and frameworks include defined performance measures.

The auditors’ final report may be viewed on Genome Canada’s website.

See <http://www.genomecanada.ca/en/about/accountability/performance-audit.aspx>

The material includes recommendations for improvement in a number of areas, along with management responses, which have been monitored by the Audit and Investment Committee.

Evaluation

The terms and conditions of Genome Canada’s funding agreements with Industry Canada specify that every five years it shall carry out an independent third-party evaluation of its grants to eligible projects, including its own activities and projects. It further states that the evaluation will measure overall performance in achieving the objectives identified in the funding agreement. Genome Canada underwent an interim evaluation in 2003–04 that concluded Genome Canada was on track towards meeting its objectives.

In 2008–09, Genome Canada underwent a full third-party summative evaluation to determine to what extent it had achieved its objectives and mandate. The evaluation concluded that overall, the rationale for Genome Canada remains strong and important and that there has been a “transformative” impact of Genome Canada on Canadian genomics research. It also pointed out a number of qualifications and observations; however, the evaluators emphasized that these were not serious issues but rather a reflection of the complex and rapidly changing environment in which Genome Canada operates.

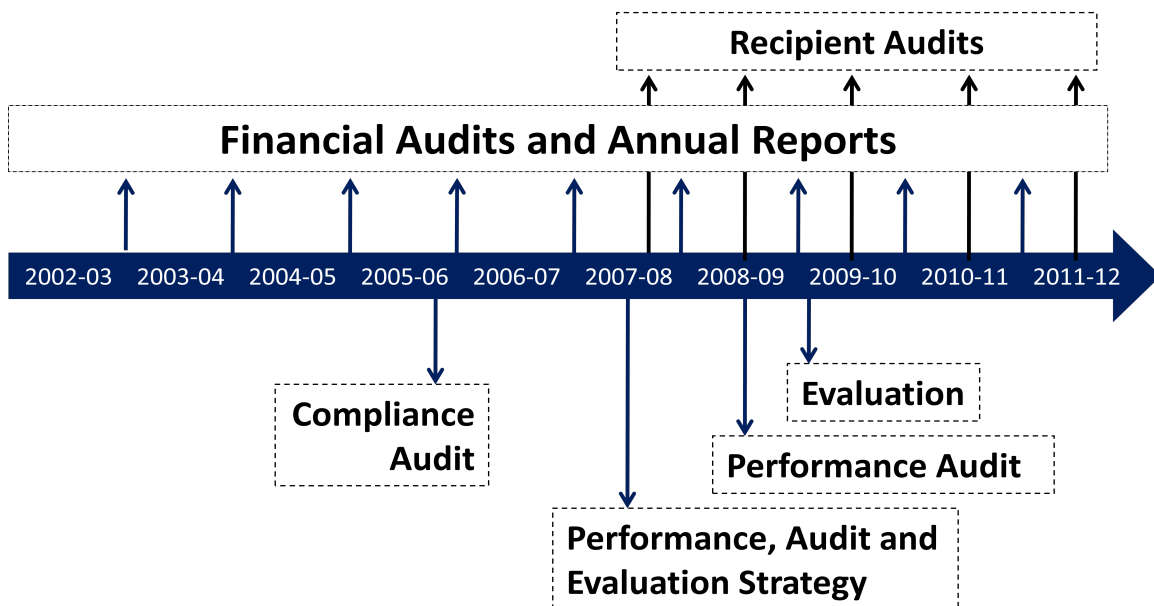
SECTION V – Performance, Audit and Evaluation

The evaluation report, as well as the details of an extensive bibliometric study on genomics research also conducted in 2008–09, can be viewed on Genome Canada’s website.

See http://www.genomecanada.ca/en/about/accountability/five-year_evaluation.aspx

In fiscal year 2011–12, Genome Canada focused on ensuring that adequate resources are in place to allow for continued work and development of corporate evaluation initiatives and activities. As an example, a full-time Director of Evaluations position was created and staffed in December 2011.

Performance Monitoring and Accountability



SECTION VI – Risks and Challenges

Risk Management

Risk management is integrated into all operational, managerial and governance activities of Genome Canada. Strategic risks arising from the external operating environment as well as the internal operational environment are assessed on an ongoing basis.

- At the project selection level, risk is managed and mitigated through a process that restricts funding to only those projects judged to have the greatest probability of success from both a scientific and managerial point of view. The viability of each project's success is further mitigated through ongoing monitoring and interim review.
- At the operational level, officers of Genome Canada identify risks and propose strategies for mitigating and reporting (e.g. due diligence routines for review of draw requests and for interim reviews of funded projects).
- At the managerial level, policies, systems, processes and procedures (administrative, financial, human resource management) are developed, implemented and monitored.
- At the governance level, the Board of Directors and its committees are aware of their risk management responsibilities and exercise modern governance practices with respect to policy approval and oversight.
- The Audit and Investment Committee regularly reviews Genome Canada's Risk Profile and mitigation strategies.
- The Genome Canada internal working environment culture is one that values honesty, integrity and ethical conduct.

Challenges

Over the past decade, and in concert with our stakeholders, partners and six Genome Centres, Genome Canada has created a strong foundation to take the Canadian Genomics Enterprise to the next level of research discovery including translating research findings into utility for Canadians and creating a competitive advantage for Canada.

To fully implement its five-year strategic plan, Genome Canada proposes a multi-year funding approach, as a means of demonstrating to external stakeholders, including the private sector, the federal government's interest and resolve to be seen in a leadership position in the use of genomics to encourage the growth of its bio-economy. Genome Canada will commit to augmenting the funding investments it receives from the federal government to proportions that are well above the traditional 1:1 ratio.

The challenge of this multi-year funding approach, however, is that it is being proposed within a fiscal environment that is uncertain at best due to recent international macro-economic events.

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