

Performance, Evaluation, Risk and Audit Framework (PERAF)

2012-2017

November 2015



GenomeCanada

Published by Genome Canada

Extracts from this document may be reproduced for individual use without permission provided the source is fully acknowledged. Reproduction in whole or in part for purposes of resale or redistribution, however, requires prior written permission from Genome Canada.

© Genome Canada 2015

Contents

1.0 Overview of the PERAF	3
2.0 Profile of Genome Canada	5
2.1 Overview of Genome Canada	5
2.2 Genome Canada's Current Strategic Direction	6
2.4 Funding Agreements with Industry Canada	7
2.5 Governance	8
2.6 Stakeholders	11
2.7 Resources	12
2.8 Logic Model	13
2.9 Description of Logic Model Components	15
3.0 Performance, Evaluation, Risk and Audit Framework (PERAF)	20
4.0 Performance Monitoring and Measurement	22
5.0 Evaluation	27
6.0 Risk	30
7.0 Audit	38
Appendix 1: Definitions	39
Appendix 2: Genome Canada Performance Indicator Framework	40

1.0 Overview of the PERAF

The purpose of this document is to present an updated version of Genome Canada's Performance, Evaluation, Risk and Audit Framework (PERAF), formerly known as the Performance, Audit and Evaluation Strategy (PAES). The strategy has been developed as a high level framework which addresses the key elements that Genome Canada has put in place to ensure accountability in the achievement of objectives from the perspective of performance monitoring, evaluation, risk, audit and reporting.

Genome Canada currently has in place a wide array of policies, systems and processes that were developed over time to address activities related to performance monitoring, evaluation, risk, audit and reporting. They were also developed to ensure compliance to the funding agreements signed with Industry Canada with respect to the use and accounting of funds received from the federal government.

The formation of the PAES was requested in the 2007 funding agreement between Genome Canada and Industry Canada that included a provision which called for these activities to be consolidated into one overarching Performance, Audit and Evaluation Strategy¹ that was to be updated as required. The 2007 PAES strategy received approval by the Board of Genome Canada and by the Minister of Industry Canada.

The 2013 funding agreement requires Genome Canada to provide to Industry Canada updates of its PAES as the core components are revised. With the launch of Genome Canada's new five year Strategic Plan in 2012 it was timely to review the Performance, Audit and Evaluation Strategy (PAES) and it was revised in accordance with the above stated funding requirements. This third revision of the PAES as a PERAF to include risk, accompanies a revised five year plan as presented in the 2016 Federal Ask.

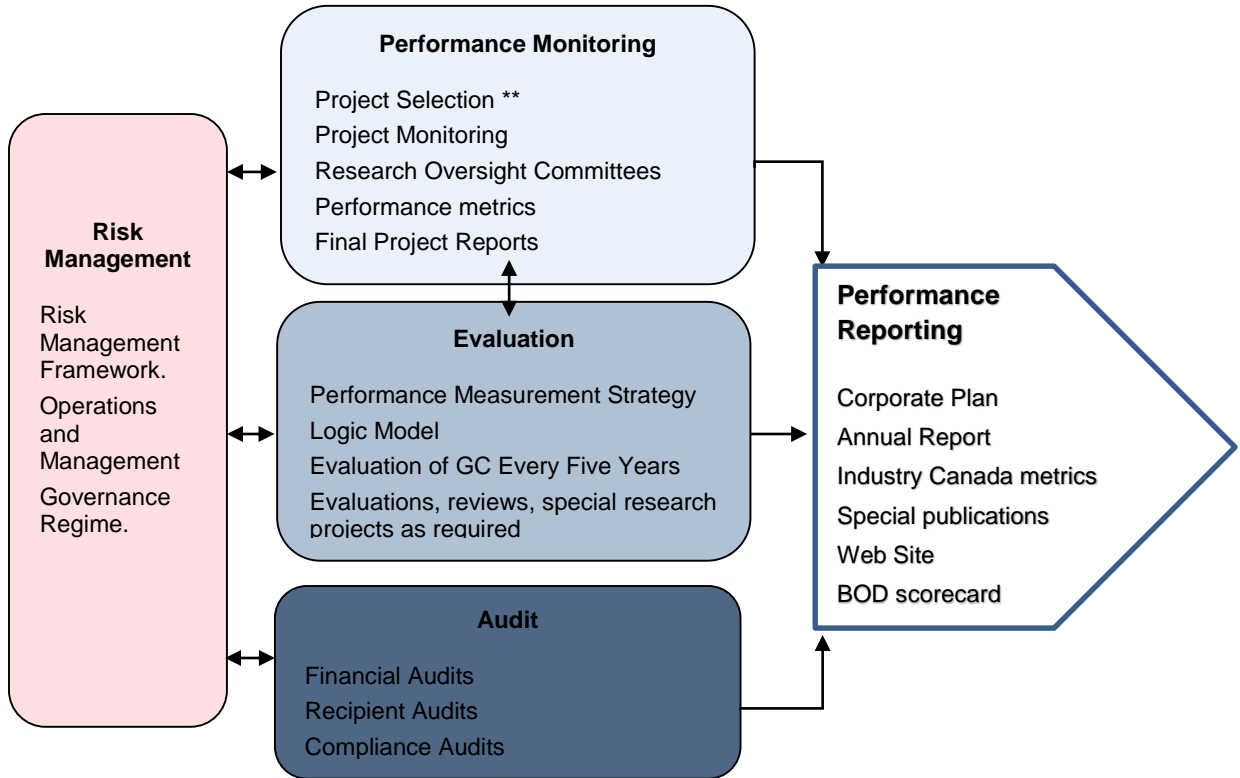
In the delivery of its mandate, Genome Canada is committed to applying the highest standards of accountability and transparency in its operations, and reporting on achievement of results. Mechanisms and instruments such as corporate plans and annual reports, independent audit and evaluation studies, rigorous peer review processes, and financial audits provide a high level of assurance and oversight. There are four components to Genome Canada's approach to performance measurement aimed at demonstrating accountability namely:

- Performance monitoring
- Evaluation
- Risk management
- Audit

In diagram 1 below each of the components, their underlying outputs and their integration into Genome Canada's accountability system are illustrated. More details are provided in the rest of this document.

¹ Article 8.2 of Funding Agreement with Industry Canada, dated March 29, 2007

Diagram 1: Genome Canada's system of accountability



* **For purpose of this document, the term "Project" means both Research Projects and GIN nodes.

2.0 Profile of Genome Canada

2.1 Overview of Genome Canada

Genome Canada is a not-for-profit organization, created and incorporated in 2000 under the *Canada Corporations Act* with a mandate to develop and implement a national strategy in genomics research for the benefit of all Canadians. Genome Canada seeks to deliver on this mandate by investing in large-scale genomics research initiatives in sectors of strategic and economic importance to Canada (i.e., health, agriculture, environment, forestry, fisheries, energy and mining), aiming to strengthen genomics research and technical capacity in Canada, and foster multi-sectorial partnerships nationally and globally. Genome Canada also works to ensure that genomics research efforts consider underlying ethical, environmental, economic, legal or social aspects (GE³LS).

Genome Canada has been funded by the Federal Government \$1.2 billion since it was formed in the year 2000. As of September 2015, most of the programs have been launched and over \$1.6 billion have been levered from co-funding partners (e.g., industry, federal agencies, provincial governments and agencies, international non-governmental organizations and research institutes).

Genome Canada's most recent funding agreement supports the following objectives:

- (a) Respond to societal needs by generating genomics discoveries and accelerating their translation into applications;
- (b) Attract greater investment in genomics research from a broad range of stakeholders, in particular the private sector;
- (c) Enhance the impact of genomics by transforming knowledge of the ethical, environmental, economic, legal and social challenges and opportunities into sound policies and practices;
- (d) Enhance the recognition of the value of genomics by increasing stakeholder appreciation of genome science, its applications and its implications.

Genome Canada delivers its mandate through six Genome Centres, one in each of the following regions: British Columbia, Alberta, Prairies, Ontario, Quebec and Atlantic. Aside from administering the funds to research projects, Genome Centres are responsible for identifying regional strengths and opportunities, monitoring compliance and performance, and securing co-funding from partners.

Genome Canada currently funds ten Genomics Innovation Network (GIN) Nodes, which provide researchers access to one or more high throughput genomic technologies and data analysis on a cost-recovery (fee-for-service) basis. Each Node also assists researchers in the development of research proposals by providing advice on

appropriate technologies, study design, data analysis and bioinformatics that improve the quality of the research.

In terms of structure, funding is contributed by Industry Canada directly to Genome Canada. Genome Canada is responsible for the development of strategies and partnerships at both national and international levels, and launches national competitions and a merit review process for the selection of research projects. Once the selection is completed the Genome Centres transfer the appropriate funding to the selected research projects.

Since its creation, Genome Canada and the regional Genome Center's, have carved out a distinctive niche within Canada's Science, Technology and Innovation "ecosystem", comprised of multiple agencies/companies in the public, private and not-for-profit sectors. It achieved this by building research capacity and technological capability, funding large-scale genomics research, cultivating Canadian scientific expertise, establishing international leadership and building partnerships.

2.2 Genome Canada's Current Strategic Direction

In 2012, Genome Canada launched a new five-year Strategic Plan (2012-2017) that included two new sectors, mining and energy. The new strategic plan reflects an important added focus for Genome Canada that recognizes the growing influence of genomics as a transformative technology that will play a key role in addressing the most pressing challenges facing society in the 21st century. The 2012-2017 strategic plan develops and delivered programs designed to fulfill Genome Canada's vision and mission:

GENOMECANADA VISION is to:

Harness the transformative power of genomics to deliver benefits to Canadians.

GENOME CANADA MISSION is to:

1. Connect ideas and people across public and private sectors to find new uses and applications for genomics;
2. Invest in large-scale science and technology to fuel innovation; and
3. Translate discoveries into applications to maximize impact across all sectors.

The 2016 Federal Ask presented nine strategies to realize Genome Canada's vision, deliver on the mission and ensure maximum benefits for Canadians through the application of genomics research into practical and profitable use in society. The strategies were as follows:

GENOME CANADA STRATEGIES:

CONNECT IDEAS AND PEOPLE ACROSS SECTORS TO FIND NEW USES AND APPLICATIONS FOR GENOMICS

1. Involve downstream sector experts and users in priority setting and program design
2. Establish strategic partnerships, in particular with industry
3. Create programs focused on regional priorities

INVEST IN LARGE-SCALE SCIENCE AND TECHNOLOGY TO FUEL INNOVATION

4. Support internationally -competitive large-scale science that is strategic and purpose-driven
5. Provide Canadian scientists access to leading-edge technologies

TRANSLATE DISCOVERIES INTO APPLICATION TO MAXIMISE IMPACT ACROSS ALL SECTORS

6. Invest in partnerships between academia and users, in particular industry, to support the application of genomics research
7. Foster an entrepreneurial culture in the scientific community
8. Inform policies and practices related to genomics research and its applications according to societal considerations
9. Promote Canadian genomics investments and their societal relevance and impacts

2.4 Funding Agreements with Industry Canada

All of Genome Canada's funding is provided through funding agreements with Industry Canada. The Federal Government, through Industry Canada, has committed a total of \$1.205 billion in funding to Genome Canada since its inception:

- \$160 million in Federal Budget 2000
- \$140 million in Federal Budget 2001
- \$75 million in Federal Budget 2003
- \$60 million in Federal Budget 2004
- \$165 million in Federal Budget 2005
- \$100 million in Federal Budget 2007
- \$140 million in Federal Budget 2008
- \$75 million in Federal Budget 2010
- \$65 million in Federal Budget 2011
- \$60 million in Federal Budget 2012
- \$165 million in Federal Budget 2013

Industry Canada sets out in its agreements with Genome Canada the objectives and anticipated results expected. In the most recent agreement, the objectives and anticipated results are as shown in Table 1.

Table 1: Contribution Objectives and Expected results from Federal Budget 2013 Funding

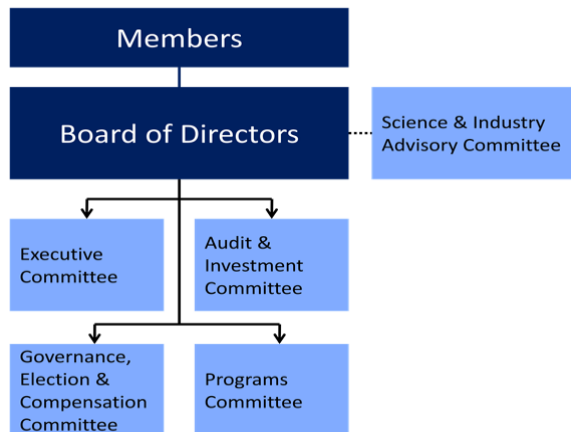
	Funding Agreement: Objectives-	Funding Agreement: Expected Results
1	Respond to societal needs by generating genomics discoveries and accelerating their translation into applications	The translation of research discoveries into application in the public and private sectors leads to socio-economic benefits either directly or through development toward, for example, commercialization; Canadian genomics research is enabled through the provision of leading-edge genomics, proteomics, metabolomics and bioinformatics technologies; Canada has a solid base of researchers that are trained to undertake future genomics research;
2	Attract greater investment in genomics research from a broad range of stakeholders, in particular the private sector;	Commitments of at least \$280M from other Persons for contributions, either financial or in kind, to fund the Genome Centres or their Research Activities in support of the Objectives
3	Enhance the impact of genomics by transforming knowledge of the ethical, environmental, economic, legal and social challenges and opportunities into sound policies and practices;	Increased breadth and depth of knowledge in genomics, including knowledge related to the ethical, environmental, economic, legal and social issues of genomics;
4	Enhance the recognition of the value of genomics by increasing stakeholder appreciation of genome science, its applications and its implications	Canada's international profile and visibility in genomics research is enhanced

2.5 Governance

Genome Canada operates within a governance framework that is reflective of its not-for-profit corporation status. It 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 mandate.

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

Governance Structure



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 federal research funding agencies, who are non-voting ex-officio-advisors to the Board — the Canada Foundation for Innovation (CFI), the Canadian Institutes of Health Research (CIHR), the National Research Council (NRC), the Natural Sciences and Engineering Research Council (NSERC), and the Social Sciences and Humanities Research Council (SSHRC).

Industry Canada's Science and Innovation Sector (SIS) is responsible for the ongoing management of the contributions to Genome Canada.

Operating Model

The model in which Genome Canada operates was established in 2000. It calls for Genome Canada and regionally-based Genome Centres across the country to be independently incorporated organizations that work collaboratively in pursuit of agreed to objectives in the area of genomics research. This was a visionary – and quintessentially Canadian – approach to collective, pan-Canadian action in determining priorities and delivering programs to achieve its objectives. That model has more than stood the test of time and has delivered enormous returns to the country. The Centres' important role ensures the integrity of the Genome Canada model, which with its national breadth and regional depth contributes to the success of the genomics enterprise.

The six Genome Centres are located in British Columbia, Alberta, the Prairies, Ontario, Quebec, and the Atlantic region. In the pursuit of fulfilling their objectives, the Genome Centres establish and support regional and sector specific research priorities. They do this by building relationships with key stakeholders in the private and public sectors and determining the needs of different types of users, for example industry or government regulatory agencies. This ensures the greatest impact for the dollars invested.

In addition, the Genomics Innovation Network GIN Nodes supported by Genome Canada is an integral part of the Canadian research landscape and provide genomics resources and services to both public and industrial scientists in both Canada and internationally. As genomics has become recognized as a valuable technology for industry, industrial use of the Nodes is increasing, with more than 100 projects already completed for industrial clients.

Diagram 2: The Genomics Enterprise in Canada



Federal investments in Genome Canada must be leveraged with co-funding from other sources. The Centres work with the project leaders and institutions to raise the required co-funding from various sources, such as provincial government departments and agencies, industry, institutions, and non-profits/charities. This ability of the Centres to raise co-funding is an indicator of the importance of the research regionally and its likelihood to have application and impact. Since 2000, the \$1.2 billion in federal funding received by Genome Canada has been leveraged by \$1.4 billion in co-funding.

In addition to working with applicants to secure the necessary co-funding, the six Genome Centres support genomics research at a regional level by assisting applicants in preparing competitive applications, facilitating access to genomics technology service providers, and helping projects with aspects of project development and management. The Genome Centres are responsible for selecting which projects to put forward to Genome Canada and, after Genome Canada's peer review process determines the successful projects, are also responsible for overseeing the post-award process, which includes the projects being reviewed and managed on a rigorous basis throughout their funding term to ensure they deliver the expected outcomes and maximize their impacts on Canadians and the economy. Several of the Genome Centres also obtain funding from other sources, primarily the provinces, to support regionally focused research programs and make a contribution to their operations. In addition, Genome Centre activities such as education, communication and public outreach build an awareness and enhanced receptiveness to the potential of genomics research to provide solutions for regional challenges.

Through agreements with Industry Canada, Genome Canada receives funding for the purpose of contributing to the regional Genome Centres. Genome Canada flows these funds to each Centre for distribution to the projects through their institutions and to contribute to their operations. This is done in accordance with the terms and conditions

of individual Funding Agreements that are signed with each Centre and a formal Notification of Award that specifies the conditions under which the contribution is made.

2.6 Stakeholders

Stakeholders are defined as the organizations participating in the delivery of the program and those directly or indirectly benefitting from it. All stakeholders are consulted by Genome Canada to optimize the value of investments in genomics research. For example stakeholders were consulted extensively in 2013 for the development of strategies for the forestry, fisheries and aquaculture, energy and mining, and agrifood sectors that will marry the challenges and opportunities in sectors important to Canada's bioeconomy with genomic solutions. Genome Canada's stakeholders include:

- **Genome Centres:** The six regional Genome Centres mentioned in section 1.3 are the main delivery agents assisting Genome Canada in administering the program, including the transfer of funds to ultimate recipients in support of selected research projects, monitoring and reporting of compliance and performance at the project level, and supporting research projects in securing co-funding from partners.
- **Researchers and their Host Institution:** Researchers are the applicants to the program and the ultimate recipients of the funds. They undertake the research in genomics in a Canadian research institution, such as a university, a research hospital, or a not-for-profit research organization.
- **Co-funding Partners:** Provincial governments, companies, industry associations, not-for-profit organizations, other federal government departments and agencies, and foreign research institutions are among the co-funders that contribute the majority of co-funding to individual research projects supported by Genome Canada. In addition, Genome Canada programs may also attract national co-funders for example in 2015 Western Grains Research Foundation and Genome Canada, announced a \$93-million investment in 11 new genomics research projects that address challenges and opportunities for Canadian agriculture, fisheries and aquaculture. This enabled both funders to pool their resources and invest in an area of strategic importance for both organizations.
- **Provincial Governments:** all provinces contribute to the co-funding of research projects. In addition, they support a portion of the operating costs of regional Genome Centres. A number of them also make investments in provincial genomics program delivered through Genome Centres, which enhance and complement national support through Genome Canada.
- **End-Users:** Stakeholders from the private, public sector and not-for-profits that make use of the knowledge generated from genomics research are sometimes involved early on as partners of the research or later on in translational research projects. The involvement of end-users in projects enhances the uptake and use of the research by making it more purpose-driven.
- **Federal Funders:** The federal granting councils and the CFI have partnered with Genome Canada in the launch of new competitions. For example, Genome Canada

and the CIHR partnered in 2012 to deliver 17 large-scale applied research competition in personalized medicine with a \$150M investment.

2.7 Resources

Genome Canada’s vision is to harness the transformative power of genomics for the benefit of Canadians. Since our inception in 2000, we have received \$1.2 billion in funding support from the Government of Canada. In collaboration with Canada’s six regional Genome Centres, we have more than doubled that investment to \$2.6 billion by leveraging every federal taxpayer dollar at a 1:1 ratio, and more recently at a 1:2 ratio

Since 2008, Industry Canada has signed five transfer payment agreements with Genome Canada, totaling \$505 million and requires that Genome Canada secure at least an additional \$624M in co-funding.

Industry Canada’s disbursements to Genome Canada for research projects vary every year, based on the projects funded and their cash flow requirements. Of the funding provided to Genome Canada, approximately \$6.6 million is allotted annually to support Genome Canada operations and \$4.8 million to support the six Genome Centres.

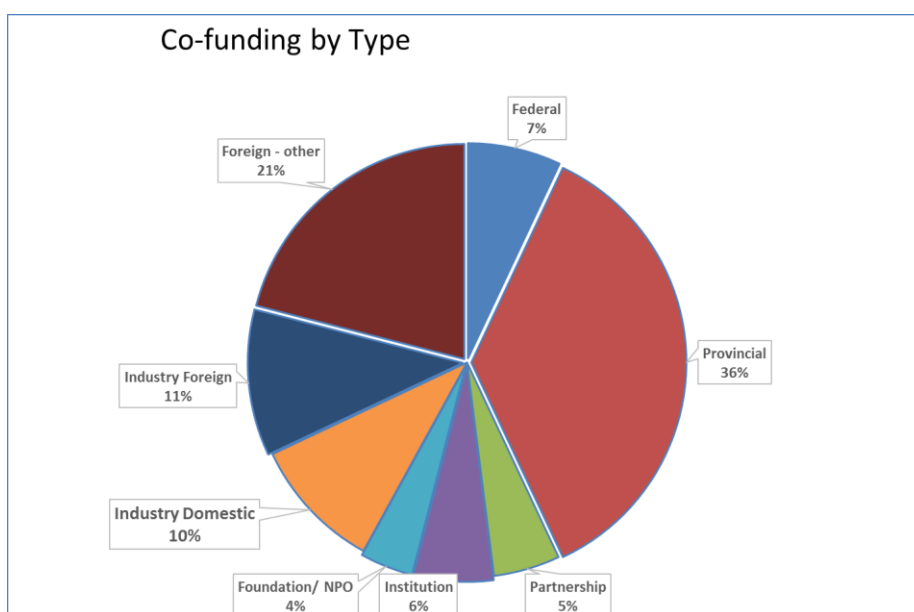
There are currently five transfer payments being managed with Industry Canada, which implement funding announced in Budget 2008, 2010, 2011, 2012 and 2013, as detailed in the table below.

Table 2: Genome Canada Funding Agreements with Industry Canada

Funding Agreement by Budget Year	Competitions and Projects Funded
Budget 2008 (\$140 million)	<ul style="list-style-type: none"> • Competition in Applied Genomics in Bioproducts and Crops. • Two research projects through the Cancer Stem Cell Consortium, the International Barcode of Life project. • Support for the S&T Innovation Centres, the operations of six regional Genome Centres, as well as the operations of Genome Canada through to 2012–13.
Budget 2010 (\$75 million)	<ul style="list-style-type: none"> • Multi-sector competition. • Competition for Science and Technology Innovation Centre Operations Support
Budget 2011 (\$65 million)	<ul style="list-style-type: none"> • Competition in applied genomics research in personalized health. • Funding for one year of Phase III of the Structural Genomics Consortium, and the International Barcode of Life project. • Funding for the Public Population Project in Genomics. • Competition in the area of bioinformatics and computational biology. • Contribute to the operations of six regional Genome Centre and Genome Canada through to 2013–14
Budget 2012 (\$60 million)	<ul style="list-style-type: none"> • Funding for Genomic Applications Partnership Program (GAPP). • Funding for renewal of STICs for two years.

	<ul style="list-style-type: none"> Funding of the Structural Genomics Consortium, and the International Barcode of Life project.
Budget 2013 (\$165 million)	<ul style="list-style-type: none"> Two competitions in applied genomics research Funding for Science and Technology Innovation Centres in 2015-16 and 2016-17 Funding for national and international partnerships Contribute to the operations of six regional Genome Centre and Genome Canada through to 2016–17.

Genome Canada has been funded by the Federal Government \$1.1 billion since it was formed in the year 2000. As of September 2015, most of the programs have been launched and over \$1.6 billion has been leveraged from co-funding partners (e.g.,



provincial governments and agencies, international non-governmental organizations and research institutes). The following is the most recent graph of the source of co-funding.

Diagram 3: Genome Canada leverage co-funding by type

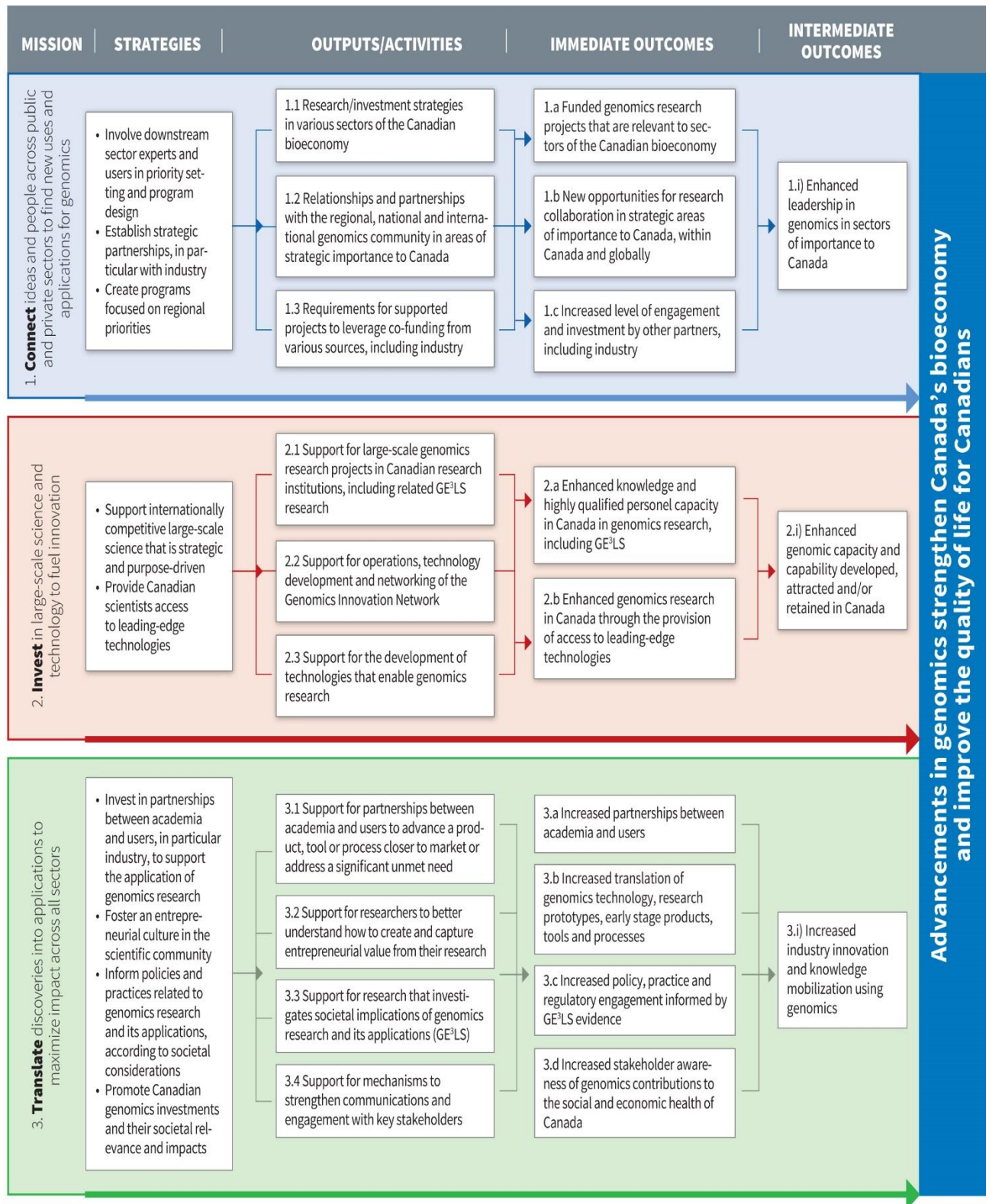
2.8 Logic Model

Genome Canada’s logic model is built on objectives set out initially in Genome Canada’s funding agreements and articulated in more detail in the Genome Canada’s Strategic Plan 2012-2017. It has been updated to reflect the 2016 Federal Ask.

The logic model detailed overleaf in diagram 4 focuses on the delivery of Genome Canada’s core funding objectives and it is set out according to its three key missions to

1. Connect ideas and people across public and private sectors to find new uses and applications for genomics;
2. Invest in large-scale science and technology to fuel innovation; and
3. Translate discoveries into applications to maximize impact across all sectors

Genome Canada logic model



Advancements in genomics strengthen Canada's bioeconomy and improve the quality of life for Canadians

Diagram 4: Genome Canada's updated Logic model

2.9 Description of Logic Model Components

Activities and outputs

The logic model demonstrates the core activities and outputs undertaken by Genome Canada and the Genome Centres with the Industry Canada contributions. Industry Canada's role in delivering the program is limited to establishing the broad parameters of the program in the funding agreement, making annual payments to Genome Canada based on the cash flow requirements, and monitoring the plans and progress of the delivery of the program.

The specific parameters of program delivery are determined by Genome Canada and the Genome Centres. Genome Canada is responsible for: consulting key stakeholders to determine the needs and priorities such as the development of sector strategies; developing and maintaining relationships and partnerships at the national and international levels; planning and designing programs, including the preparation of the program's strategic plan and the corporate plan to Industry Canada; creating new opportunities for research collaboration in strategic areas of interest to Canada; carrying out competitions and reviews for the selection of research projects; establishing funding agreements with the Genome Centres; making payments to Genome Centres based on the cash flow requirements of projects; and, monitoring and reporting to Industry Canada, through the annual report, on progress towards achieving expected results at a program level.

Genome Centres are responsible for the development of their own organisational strategies according to their regional strengths. These strategies guide program development and inform project selection.

Each research competition has distinct requirements for leveraging co-funding for research projects from other sources, determined by Genome Canada, and guided by the funding agreement with Industry Canada, which sets out total amounts of co-funding to be leveraged for each Industry Canada contribution. Genome Centres work with the ultimate recipients to secure funding from other partners, administer Genome Canada funds to ultimate recipients, monitor progress of research projects, and report on performance through the national database and in their annual reports to Genome Canada.

Research is undertaken by the ultimate recipients at Canadian research institutions (e.g., universities, research hospitals, not-for-profit research organization) through programs, including: large-scale research advancing knowledge in genomics and generating new discoveries (some may be international or national in nature); the leading-edge technologies provided through Genomic Innovation Network nodes that enable the large-scale research in genomics; the translational research projects that help advance the new discoveries into innovative application in the private and public sectors; and the research into GE³LS. Research into GE³LS is an underlying activity throughout the Genome

Canada program, as it is included in all research projects supported by Genome Canada, and enables the translation into application.

The primary outputs are the strategic plan, the sector strategies, the relationships and partnerships developed with stakeholders at the regional, national and international levels, the competitions and programs including co-funding requirements, the review, selection and support of research projects at various stages of the innovation spectrum (including GE3LS, and enabling technologies), and the corporate plans and annual reports.

Outcomes

The outcomes are identified in the logic model at three different levels: immediate, intermediate and ultimate outcomes. The following assumptions have been made in identifying the outcomes:

- **A new shift to support translation into application.** Since inception in 2000, Genome Canada's focus has been on building Canadian capacity in genomics research. As the organization matured it instigated a shift towards applied research, moving down path to translation, through the Large Scale Applies Research Programs (LSARPs). In the 2012- 2017 Strategic Plan Genome Canada made this shift explicit and included support for translation of discoveries into application through new initiatives such as the Genomics Applications Partnership Program. This program focuses on building collaboration between researchers and potential end-users of the research, to increase prototypes, early-stage products, tools and process that will lead to new innovations that will strengthen the Canadian economy.
- **Engagement through sector strategies.** Genomics is the study of the genetic make-up of life, and can advance fundamental knowledge of all life forms. Given that the life science is underpinning many sectors of the Canadian economy, genomics discoveries can generate new knowledge that can be applied in many of those sectors to generate new technologies and innovations. To date, Genome Canada identified the following sectors as potential receptors of Canadian genomics research: human health, agriculture, fisheries, aquaculture, forestry, energy, mining, and environment. It is expected that through strategies to engage in those sectors, the Genome Canada program will build partnerships and collaboration that will enhance genomics research support and capacity, and help translate new discoveries into applications and benefits for the Canadian economy. The sector strategies include the identification of challenges and opportunities in each of the sectors and their associated industries, and the potential role of genomics in addressing them.

Enhancing research capacity through co-funding. One of the advantages of large-scale research projects is that they allow for a larger scope with groundbreaking discoveries that can gain a lot of national and international visibility. However, their cost makes it nearly impossible for one funder to bear. For this reason, the Genome

Canada program has co-funding requirements, which have traditionally been 50 percent of the value of the projects. With the new shift towards increasing translation of discoveries into application and engaging the various sectors of the economy, it is expected that the research projects will require more engagement from end-users of the research, and attract more private sector interest and co-funding. It is also expected that with increased private sector engagement, the co-funding ratio will rise from 1:1 to a new target of 1:2. This increased co-funding, while maintaining Genome Canada resources, would result in increased support and capacity for genomics research in Canada. However, there is the risk of not being able to secure co-funding for some programs without long-term, substantial funding to be able to mobilize these partners and secure these funds.

- **Training the next generation of researchers.** Given that majority of the research takes place in Canadian academic institutions, there is an expectation that the supported research will have a spill-over effect on training the next generation of genomics researchers. Large teams led by an experienced researcher will allow for other less experienced researchers in a particular field to gain new capabilities as well as providing opportunities for cross training to develop their skills, thereby enhancing Canada's research HQP. Many of the researchers are highly skilled to work in academic settings which have traditionally, for the most part, meant working in isolation from the private sector. Academic researchers therefore don't always have the skills to position the research to demonstrate how it will address the challenges facing industry. In an effort to increase translation of genomics discoveries into application, Genome Canada's has an MOU with MITACS to support for genomics researchers gain skills to work more effectively with the private sector.
- **Enabling high quality research through the provision of leading-edge technologies.** As genomics is still maturing and advancing, Genome Canada must ensure that Canadian researchers have access to the latest technologies and experts who know how to develop the technologies further, as well as and help researchers with their experimental design and data analysis. In March 2015, Genome Canada launched its new technology platform funding model – the Genomics Innovation Network (GIN) – to better meet the ever-growing needs of the Canadian genomics research community. The Network builds on the past Science and Technology Innovation Centre model, but will place a greater emphasis on technology development, facilitate networking among the member technology platforms (designated as Nodes), and increase the number and diversity of technology platforms across Canada.

Genomics research is generating a massive and exponentially -growing influx of data. By 2020, it is estimated that data will be generated at more than a million times its current rate. This means that there is a greater need than ever for new tools to collect, store, manage and, most importantly, analyze the vast amount of data that is being generated. Existing tools and approaches have only partially tapped the

information content and value in existing data sets. New experimental and user-friendly computational modelling tools are needed that are user-friendly to meet the growing demand. The development of these tools is essential to ensuring that the research and user communities have the ability to exploit the data for maximum impact. Genome Canada recognizes bioinformatics and computational biology as a priority and has initiated the development of a National Bioinformatics and Computational Biology (B/CB) Framework, in partnership with the federal research funding agencies and other major stakeholders, including Compute Canada and CANARIE. In 2012, Genome Canada launched a Bioinformatics and Computational Biology B/CB Competition in partnership with the Canadian Institutes of Health Research.

- **The importance of GE³LS.** Just as technology underpins the genomics scientific endeavor, so does understanding the broad societal implications of genomics research and its applications. Genome Canada's GE³LS (genomics and its ethical, environmental, economic, legal and social aspects) research community is exploring issues, such as what advancements in the science and technology mean for society, how public confidence plays into the effective development of genomic applications in Canada, and how public policy can adapt accordingly, with the goal of identifying barriers to the uptake of genomics-derived applications in society early on in the process. Genome Canada's program is unique in its inclusion of research on the ethical, environmental, economic, legal and social issues of genomics as a component of all of its supported research projects.

In the immediate-term, the support for genomics research is intended to result in:

- Funded genomics research projects that are relevant to sectors of the Canadian bioeconomy;
- New opportunities for research collaboration in strategic areas of importance to Canada, within Canada and globally;
- Increased level of engagement and investment by other partners, including industry;
- Enhanced knowledge and Highly Qualified Personnel (HQP) capacity in Canada in genomics research including GE³LS;
- Enhanced genomics research in Canada through the provision of access to leading-edge technologies;
- Increased translation of genomics technology, research prototypes, early stage products, tools and processes;
- Increased policy, practice and regulatory engagement informed by GE³LS evidence; and,
- Increased stakeholder awareness of genomics contributions to the social and economic health of Canada.

In the intermediate term, the support for genomics research is intended to result in:

- Enhanced leadership in genomics in sectors of importance to Canada;

- Enhanced genomic capacity and capability developed, attracted and/or retained in Canada;
- Increased industry innovation and knowledge mobilization using genomics.

Ultimately, the contributions are intended to contribute to the advancements in genomics to strengthen Canada's bio-economy and improve the quality of life for Canadians.

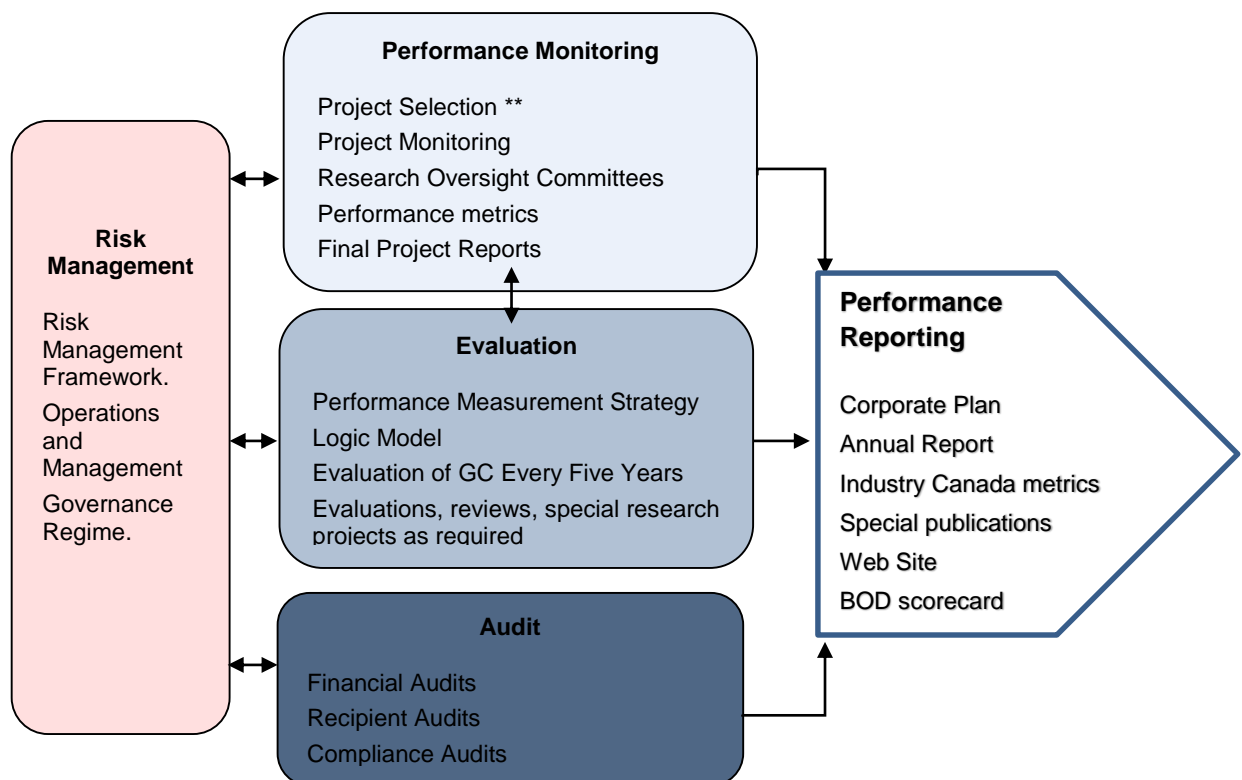
3.0 Performance, Evaluation, Risk and Audit Framework (PERAF)

In the delivery of its mandate, Genome Canada is committed to applying the highest standards of accountability and transparency in its operations, and reporting on its achievement of results. There are four components to Genome Canada accountability framework namely:

- Performance monitoring and measurement
- Evaluation
- Risk management
- Audit

In the diagram below each of the components, their underlying outputs and their integration in Genome Canada accountability system are illustrated. More details are provided in the rest of this document.

Diagram 5: Genome Canada’s system of accountability



**For purpose of this document, the term “Project” means both Research Projects and GIN nodes.

Genome Canada reports on its accountability initiatives through its primary public reporting documents the Annual Report and the annual Corporate Plan. The Funding Agreement with Industry Canada prescribes the areas to be addressed in each of these documents, many of which relate to performance-type information.

The Funding Agreement specifies that Genome Canada's *Annual Report* must have a statement of its objectives for the reporting year and a statement on the extent to which they have been met. It must also report on any evaluations that may have been undertaken during the year reported.

In respect to the *Corporate Plan*, Genome Canada must refer to short and medium term outcomes, successes in respect to previous year's plans, remaining challenges, anticipated results of planned activities and on-going performance management strategies.

4.0 Performance Monitoring and Measurement

Performance monitoring and measurement starts at the project selection phase, continues through the execution phase with effective project management and monitoring (including regular data collection by Genome Centres on established performance metrics, and monitoring by Research Oversight Committees), and ends with the assessment of final project reports.

- **Project Selection:** An independent International Science Review Panel, supported by external reviews of the science by peers, and information taken from an extensive due diligence process of financial and management aspects, assess and rank each of the proposals based on evaluation criteria as described in Competition Guidelines, and make recommendations for the approval to the Board of Directors.
- **Project Management and Monitoring:** All projects are overseen through the Genome Centres by Program Managers employed by the Centres who are responsible for on-going monitoring of project performance, active liaison with project leaders, managers and other members of the research team, and assessment of quarterly project reports. Projects also have a Research Oversight Committee (ROC), which is tasked with reporting to the Genome Centre on progress being made by the project. The ROC makes recommendations regarding continued funding and will provide advice and guidance to the research team to help ensure that the project achieves its milestones within the framework of the approved budget
- **Cash Management:** Genome Canada disburses funds on a quarterly basis through the six regional Genome Centres for approved research projects and GIN Nodes. On a quarterly basis each Genome Centre is required to review the expenditures to date and estimate cash requirements for Centre operations and 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. Genome Canada’s Finance Group also monitors co-funding that is recorded by Centres on a Genome Canada data base, and conducts regular site visits to Genome Centres to assess the efficacy of processes related to financial management of projects.
- **Ongoing Review:** For project commenced before 2012, after approximately 18 months of funding, a formal interim review was undertaken (again by an International Science Review Committee) to assess progress to date against

approved milestones and outcomes. Recommendations to the Board addressed whether projects should proceed as proposed, if they must respond to specific issues prior to continuation, or whether a site visit should be undertaken to review significant issues first hand. For projects funded post 2012 the interim review was replaced by a project Research Oversight Committee (ROC) and GINS have an Oversight Committee that provides ongoing feedback to projects based on quarterly reporting of progress, as well as identifying significant issues requiring the attention of the Centres and Genome Canada.

- **Final Reports:** Upon completion of each project, Genome Canada requires a Final Report from the Project Leaders. Currently reports provide information on the project outputs/outcomes relative to approved objectives in several categories including: research, technology transfer, training and recruitment, benefits to Canada, outcomes of public outreach, international linkages, outcomes of GE³LS activities, and a final financial accounting. The reports have been used primarily to collect data and metrics such as numbers of publications, patents, people trained, etc., which are summarized in public reporting of performance information, for example in the Annual Report. Further reporting can be requested up to five years post completion.
- **National Metrics:** In addition to the monitoring of financial expenditures the Genome Centres collect performance information on project outputs (e.g academic publications, FTE's, IP, company spin offs/advanced, conferences, media and leveraged funds) on a six monthly basis. The data is collected independently by each Centre and provided to Genome Canada to populate a national repository/ database. It contributes to a suite of indicators developed as part of the evaluation function that are reported to Industry Canada annually. The collection of ongoing metrics reduces the amount of information projects have to provide at final reporting stage and provides Genome Canada with more timely and comparative information on project outputs.
- **Performance Indicators:** Based on Genome Canada's logic model a performance measurement framework was developed. Performance indicators include both quantitative and qualitative metrics for both outputs and outcomes. These are collected through a variety of mechanisms including program records, quarterly reports to the Board of Directors, a financial database and the national metrics database. One off evaluative projects are also a key source for collecting data. As noted about an annual report of performance indicators and metrics is provided to Industry Canada with Genome Canada's annual report in June. Table 3 overleaf details these indicators. The full framework is contained in Annex 3.

Table 3: Anticipated Outputs & Outcomes and Performance Measure Indicators

MISSION ONE: CONNECT IDEAS AND PEOPLE ACROSS SECTORS TO FIND NEW USES AND APPLICATIONS FOR GENOMICS	
OUTPUTS	PERFORMANCE INDICATORS
1.1 Research/investment strategies in various sectors of the Canadian bio-economy.	Strategies in place for all targeted sectors of the bio-economy, developed in consultation with stakeholders from academia, industry and government.
1.2 Relationships and partnerships with the regional, national and international genomics community in areas of strategic importance to Canada.	Examples of competitions, programs, project or funding requests informed by regional, national, international relationships and partnerships.
1.3 Requirements for supported projects to leverage co-funding from various sources, including industry.	Amount and percentage of co-funding leveraged by type of organization, sector, competitions, and investment type (cash, in-kind).
IMMEDIATE OUTCOMES	PERFORMANCE INDICATORS
1.a. Funded genomics research projects are relevant to sectors of the Canadian bio-economy.	Examples of competitions, programs, projects or funding requests informed by sector strategies.
1.b. New opportunities arise for research collaboration in strategic areas of interest to Canada, within Canada and globally.	Examples of new research collaborations.
1.c. Increased level of investment by other partners, including industry.	Same indicator as 1.3.
INTERMEDIATE OUTCOMES	PERFORMANCE INDICATORS
1.i) Enhanced Canadian leadership in genomics.	Same indicators as 1.1, 1.2,1.3,1.a and 1.b.
	International assessment of Genome Canada's contribution to genomics research.
	Number and type of letters of endorsement.

MISSION TWO: INVEST IN LARGE-SCALE GENOMICS RESEARCH AND TECHNOLOGY TO FUEL INNOVATION

OUTPUTS	PERFORMANCE INDICATORS
2.1. Support for large-scale genomics research projects in Canadian research institutions, including related GE ³ LS research.	<p>Assessment of quality of projects and initiatives through international and national peer review.</p> <p>Number and \$ value of research projects funded by competition and sector.</p> <p>Same indicators as 1.1, 1.a</p>
2.2. Support for operations, technology development, and networking of the Genomics Innovation Network (GIN)	<p>Number and \$ value contribution to the nodes in the Genomics Innovation Network (GIN)</p> <p>Assessment of quality and continued relevance of the GINs.</p>
2.3. Support the development of technologies that enable genomics research.	Number, \$ value of projects supported in the development of new technologies to enable genomics research.
IMMEDIATE OUTCOMES	PERFORMANCE INDICATORS
2.a. Enhanced knowledge and HQP (Highly Qualified Personnel) capacity in Canada in genomics research including GE ³ LS.	<p>Number of HQP by competition/project and sector. Analysis of career trajectories.</p> <p>Number of bibliometric outputs per projects and citation analysis of highest impact research journal articles</p>
2.b. Enhanced genomics research in Canada through the provision of leading-edge technologies.	<p>Feedback by projects on the timeliness, quality and efficiency of GIN using a Likert scale.</p> <p>Number and type of services accessed.</p>
INTERMEDIATE OUTCOMES	PERFORMANCE INDICATORS
2.i) Enhanced genomic capability developed, attracted and/or retained in Canada	Same indicators as 2.1,2.2, 2.3, 2.a, 2.b

MISSION THREE: TRANSLATE DISCOVERIES INTO APPLICATION TO MAXIMISE IMPACT ACROSS ALL SECTORS

OUTPUTS	PERFORMANCE INDICATORS
3.1. Support for partnerships between academia and users to advance a product, tool or process closer to market or address a significant unmet need.	Number and value of projects supported that have user partners.
3.2. Support for researchers to better understand how to create and capture entrepreneurial value from their research	Number of researchers participating in initiatives that enhance their entrepreneurial knowledge
3.3 Support for research that investigates societal implications of genomics research and its applications (GE ³ LS)	Number and value of projects that includes GE3LS research, supporting knowledge dissemination of genomic research results in Canada
3.4 Support for mechanisms to strengthen communications and engagement with key stakeholders	Number and examples of knowledge dissemination initiatives in genomics in society
IMMEDIATE OUTCOMES	PERFORMANCE INDICATORS
3.a. Increased partnerships between academia and users.	Increase in number of research partnerships between academia and potential users of genomics derived knowledge
3.b. Increased translation of genomics technology research prototypes, early stage products, tools and process.	<p>Number of invention disclosures, patents, licenses.</p> <p>Examples of prototypes, early stage products, tools and process emanating from genomics research.</p> <p>Number of companies enhanced or established (number of employees, sector, revenues, and innovation).</p>
3.c. Increased policy, practice and regulatory engagement informed by GE ³ LS evidence	<p>Examples of expert witness testimony to parliamentary committees by GE3LS researchers.</p> <p>Number of workshops, initiatives, consultations, op-eds, social media or policy papers aimed at engaging policy and regulatory stakeholders</p>
3.d. Increased stakeholder awareness of genomics contributions to the social and economic health of Canada	Survey (Likert scale) to assess stakeholder awareness of social and economic value of Genome Canada genomic investments
INTERMEDIATE OUTCOMES	PERFORMANCE INDICATORS
3.i) Increased industry innovation and knowledge mobilization using genomics	<p>Examples of knowledge or discoveries used by end-users and receptor organizations to benefit Canadians.</p> <p>Same indicators as 3.1,3.2, 3.3, 3.4, 3.a, 3.b, 3.c, 3.d</p>

5.0 Evaluation

The establishment of an evaluation function is core to Genome Canada's ability to demonstrate accountability through evidenced based information that informs decision-making and provides the ability to communicate the impact of investments to stakeholders.

Genome Canada's funding agreement² with Industry Canada states that in consultation with Industry Canada, "*Genome Canada shall carry out an independent third-party evaluation of its grants to Eligible Projects, including the activities and projects of Genome Canada, according to a framework and time frame approved by the Board, but to be completed no less frequently than once every (5) five years. The evaluation shall measure its overall performance in achieving the Objectives identified in this Funding Agreement. The evaluation report shall be made public and a copy shall be sent to the Minister. The evaluation shall include a review of the following:*

- (a) *Output and operations of Genome Centres;*
- (b) *The research undertaken into GE³LS;*
- (c) *Efforts in relation to public communications and outreach;*
- (d) *Commercialization and corporate development; and*
- (e) *Overall results achieved.*

Evaluation strategy

To capture the impact of the current Strategic Plan, Genome Canada is undertaking a three-pronged approach to evaluation that meets both the requirements of the funding agreement with Industry Canada, and the needs of Management and the Board.

- **Assessments of Competitions:** The evaluation and review of competitions offers opportunities for learning and knowledge direction within Genome Canada and across the regional Genome Centre partners. They produce insight and recommendations that inform decision-making to improve areas such as program strategies, operational processes and policies. In addition they are used to ascertain the long term outcomes and impacts of projects.

Assessments include in-house reviews undertaken by internal resources; independent external evaluations; and horizontal evaluations with partner organizations (for example CIHR) as necessary. Competitions will be assessed as to the value added provided by a formal evaluation, it will take into account organizational need, the core evaluation strategy and budgetary constraints.

² Funding agreement, 2011, Genome Canada and the Minister of Industry

From 2012 onward competition guidelines state the evaluation requirements so that potential applicants can plan their own performance measurement strategies as they devise their research projects and clearly understand the output and outcome reporting requirements that will be required. Applicants will need to consider the resources that should be allocated to the collection of performance data during the project and subsequent to the finalization of the project when Genome Canada may require additional data to assess the longitudinal impacts of the research.

- **Five-year Evaluation of Genome Canada:** In line with the evaluation reporting requirements of Industry Canada, noted in the funding agreement, Genome Canada undergoes a full independent and external evaluation every five years. The next five year evaluation report is due to Industry Canada in March 2019.

The development of all five year evaluations need to take into account three contextual issues:

- Be in line with Treasury Board guidelines for evaluation as set out in their Policy for Evaluation, effective April 2009 Treasury Board policy³⁴;
 - Meet the criteria for evaluation set out in Genome Canada’s funding agreement with Industry Canada as described above; and,
 - Build on and follow up on the baseline data collected from the 2009/2014 evaluation, as appropriate, in order to measure and monitor longitudinal impacts and progress.
- **Thematic research:** The evaluation function also undertakes *ad hoc* research on issues of importance to Genome Canada. These thematic reviews/research projects cover a range from topics from Highly Qualified Personnel (HQP) development to Companies created or advanced. Topics are decided on an annual basis when developing the evaluation work plan and sometimes occur spontaneously to address a business need.

The following table set out the key time lines for the development of evaluation in Genome Canada:

Table 4: Timetable of the development of evaluation in Genome Canada

2005	<ul style="list-style-type: none"> • Interim evaluation completed
2008–09	<ul style="list-style-type: none"> • First Five Year evaluation completed in accordance with Industry Canada funding agreement.
2011	<ul style="list-style-type: none"> • The Board of Directors established a Programs Committee to oversee all performance measurement and evaluation activities of the organization. • Genome Canada appointed its first Director of Evaluation in December.

³ TBS Directive on the Evaluation Function, Annex A, <http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=15681§ion=text>

⁴ Treasury Board, April 1st 2009. Policy on Evaluation. <http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?section=text&id=15024>

2012	<ul style="list-style-type: none"> • Performance Measurement and Evaluation Strategy (PMES) was developed, including the identification of specific performance measurement indicators, in collaboration with Industry Canada • Performance Audit and Evaluation Strategy (PAES) was updated
2013	<ul style="list-style-type: none"> • Performance Measurement and Evaluation Strategy (PMES) updated. • National performance measurement system was implemented
2014	<ul style="list-style-type: none"> • Second Five Year evaluation which completed in March 2014.
2015	<ul style="list-style-type: none"> • Industry Canada Five year evaluation of Genome Canada completed

The capacity to undertake performance measurement and evaluation within Genome Canada is subject to human resources and financial resources being made available. Resources are allocated on an annual basis based on a proposed work plan and in line with the operational planning cycle at Genome Canada.

6.0 Risk

Genome Canada's Performance, Audit and Evaluation Strategy is supported by an Integrated Risk Management (IRM) Policy (2015), a framework which outlines the organization's approach to the management of risk. The policy includes methodology for risk identification, risk profiles, and related mitigating actions.

Risk management is integrated into all operational, managerial and governance activities of Genome Canada. It considers external strategic risks arising from the external operating environment as well as other internal operational risks.

- At the project selection level, the process is totally risk based, a process that ensures that only those projects judged to have the greatest probability of success from both a scientific and managerial point of view, are funded.
- At the operational level, officers identify risks and propose strategies for mitigating and reporting (e.g., due diligence routines for review of draw requests and for interim reviews);
- At the managerial level, policies, systems, processes and procedures (e.g., administrative, financial, human resource management, etc.) are developed, implemented and monitored and audited;
- At the Audit and Investment Committee level, the committee is mandated to address risk;
- At the governance level, the Board and its Committees are aware of its risk management responsibilities and exercise modern governance practices with respect to policy approval and oversight (e.g., the Governance Committee of the Board monitors and oversees a comprehensive governance manual); and
- The internal environment is one that promotes and values honesty, integrity and ethical conduct.

Genome Canada reviews and completes a formal risk assessment annually, that includes the risk profile update, risk assessment and action plan development. The plan is approved by the Board and the Board Audit and Investment Committee. The current risk profile and assessment is provided in the following page.

Table 10: Genome Canada Risk Assessment November 2015

	Risk Description	Likelihood Low (L) Medium (M) High(H)	Impact Low (L) Medium (M) High (H)	Strength of Mitigation Measures	Mitigation Measures
External Risk					
1	GC does not receive funding from Industry Canada in the Federal Budget	M	H	H	Effective government relationships are in place and maintained, both at political and bureaucratic level. A rigorous process for requesting funding, which includes submission of a Federal Ask document and engagement with key government staff, is in place and has a demonstrated track record of success. Third party endorsers are used to support the requests for funding. GC reviewing current wind down plan to be presented to Audit & Invest. Comm in March
2	GC is not supported by federal research funding agencies and science-based departments	L	H	H	Effective relationships are maintained; funding partnerships and collaborative relationships are nourished. Genome Canada’s strategy includes demonstrating its role in the federal science, technology and innovation ecosystem.
3	GC is not supported by stakeholders (e.g., provincial governments, industry, universities, researchers)	L	H	M	The Genome Centres and Genome Canada have developed strong stakeholder engagement strategies.
4	Genome Canada is not supported by the public.	L	M	M	Although this is not part of the primary GC mandate per funding agreements, GC maintains a ‘watch and brief’ on public issues. Some Centres have outreach and science education programs in place for the public.
Business Risk					

	Risk Description	Likelihood Low (L) Medium (M) High(H)	Impact Low (L) Medium (M) High (H)	Strength of Mitigation Measures	Mitigation Measures
5	Genome Canada is unable to achieve its stated outcomes as per its Strategic Plan	L	H	H	Status and progress towards achievement of Strategic Plan are measured and reported on a quarterly basis to the Board
6	Risk of having an inadequate and ineffective Board/ Committee structure with lack of clearly defined roles, responsibilities and ineffective processes to support good governance	L	H	H	Skills/ knowledge matrix used to identify gaps in Board membership. Recruitment strategy developed by Governance, Evaluation & Compensation committee is in place. Board has evaluation process; policies and by-laws. Board orientation process is being updated.
	Genome Centres				
7	Centres do not comply to provision(s) of the funding agreement with GC	L	M	H	Compliance is monitored by reporting requirements and through various operational policies and processes and regular meetings of each functional group, e.g., programs, finance.
8	Centre(s) do not have the financial support of their province(s) or become(s) otherwise unsustainable	M	H	H	Centres have strategies in place to establish and maintain strong relationships with their provinces and other key stakeholders in their region.
9	Centres enter into contrary business arrangement(s) / change of mandate, related to GC	L	H	H	Provisions of the Funding Agreement are clear; regular CEO meetings; GC CEO has observer status on all Centre Boards.
	Selection of Projects and Technology Platforms				
10	Programs are not created based on need and priorities established by GC	L	H	H	Programs are designed and created based on sector engagement strategies, which include input from key stakeholders and in consideration of priorities of the Government of Canada.
11	International expertise for peer review becomes impossible to attract	L	H	H	GC programs are promoted as innovative and every effort is made to make the reviewing experience

	Risk Description	Likelihood Low (L) Medium (M) High(H)	Impact Low (L) Medium (M) High (H)	Strength of Mitigation Measures	Mitigation Measures
					valuable, such as exposure to Canada's top scientists; reviewers are international and are provided modest honoraria for their time as they do not benefit from the Canadian funding system
12	Less than excellent research projects or technology platforms are funded through the selection process	L	H	H	Peer Review and Due Diligence processes are rigorous and continuously evaluated and improved.
13	Peer review and project selection process is perceived by researchers and partners to be less than excellent	L	H	H	Basic principles of the GC review process are vigorously promoted and enforced. Review committees are comprised of top international scientists.
14	Private Sector does not participate in programs, particularly GAPP. GAPP	M	H	M	Programs, GAPP in particular, are designed to promote private sector interest. Review processes are designed to be as timely as possible; modified as appropriate based on experience. Conflict and confidentiality policies are in place and monitored. Relationships with Industry are a key priority of the Centres with support from GC
	Funded Projects and Technology Platforms				
15	Progress on funded projects and technology platforms not effectively monitored by Centres and GC	L	M	H	Regular reporting and monitoring processes led by the Centres are in place and followed. Oversight Committees are in place for LSARPs and technology platforms, and quarterly reviews plus CET for GAPP projects;
16	Funding is not used as intended by recipients	L	H	H	Funds are subject to institutional controls; formal project compliance audits are done by Centres

	Risk Description	Likelihood Low (L) Medium (M) High(H)	Impact Low (L) Medium (M) High (H)	Strength of Mitigation Measures	Mitigation Measures
17	Project/program impacts/outputs/outcomes are not adequately measured and captured	M	M	M	Project output metrics are collected by Centres and Project leaders on a 6 monthly basis in a national database. Evaluation projects lead by GC include outcome based studies.
	Co-Funding				
18	Co-funding per the IC Funding Agreement with GC has not been met	M	H	H	Request in Federal Ask for long term funding (5 years) allows for longer planning horizon to be able to meet co-funding requirement; programs are designed with required co-funding; strategies in place to acquire up-front partnership funding that reduces need for project-specific co-funding; Centres work with projects to facilitate the raising of co-funding.
19	A significant co-funder cannot meet an agreed-to funding obligation	L	M	M	Monitoring of actual co-funding received is done by both the Centres and GC on a timely basis, with follow up where necessary.
20	In-kind co-funding is not eligible or directly linked to the project	L	L	H	Due diligence and rigorous supporting evidence is required for all in-kind co-funding.
21	Co-funding is perceived by researchers or applicants as a disincentive to competing for GC funds	M	M	M	Centres are responsible for working with projects to facilitate the raising of co-funding. GC has strategies in place to acquire up-front partnership funding that reduces requirement for project-specific co-funding (where possible). Sector development and engagement activities promote partnerships.
Financial and Operational Risk					
	Funding Agreement With Industry Canada				

	Risk Description	Likelihood Low (L) Medium (M) High(H)	Impact Low (L) Medium (M) High (H)	Strength of Mitigation Measures	Mitigation Measures
22	Provision(s) of Funding Agreement with IC not complied with by Genome Canada	L	H	H	Compliance policies are in place and monitored by GC. IC compliance audits are undertaken on a routine basis
23	Funding amount committed by Federal Gov't through existing IC agreement(s) is arbitrarily reduced	L	H	H	Dedicated resources are in place to maintain effective relationships with IC; strong governance processes programs, peer review processes and fiscal procedures are of highest quality
24	GC seen by third parties (e.g., Office of the Auditor General) as a government controlled entity	L	H	H	Governance policies and operational systems are in place that demonstrate independence. To date, AG has not required GC to be reported in this manner.
	Financial				
25	Unauthorized financial commitments and obligations are set up	L	H	H	Internal financial and administrative policies and controls are in place and monitored.
26	Operating Budget is over-committed / spent	L	H	H	Financial and budgetary controls and reporting routines are in place and monitored.
27	Operational funds are fraudulently used	L	H	H	Internal financial and administrative policies and controls are in place and monitored.
28	Investment portfolio is significantly devalued	L	H	H	Investment policy is conservative with goal to protect capital; policy meets funding letter requirement; compliance is monitored by Management and by Audit and Investment Committee on a routine basis.
	Operational				
29	Information technology and management tools are compromised resulting in loss of privacy and key corporate Information	L	H	M	Operating systems/networks continuously monitored; data and system back-up routines are in place.
30	Conflicts of Interest compromise corporate integrity	L	M	M	Conflict of Interest policy is in place and monitored; annual sign off by Board and Officers.

	Risk Description	Likelihood Low (L) Medium (M) High(H)	Impact Low (L) Medium (M) High (H)	Strength of Mitigation Measures	Mitigation Measures
31	Office accommodations not adequate in the event of required growth	L	M	M	Accommodation currently meets staff size of GC; management ensures that staff complement has skills, tools required without growing number.
Human Resources					
32	Ability to attract individuals to key senior staff positions becomes difficult	L	H	H	Competitive compensation and HR policies are in place
33	Overall level of job satisfaction of staff is low with resulting low productivity	L	H	H	Management endeavours to provide a positive and satisfying workplace environment. Staff are kept informed of all GC plans; performance plans and appraisal policies are in place; staff are eligible for performance pay once clear objectives have been achieved.
34	Turnover of key staff results in loss of corporate information and memory	M	M	M	Systems and documentation of key processes in place to lessen the impact of staff turnover; succession plan is in place and part of Board GEC committee responsibility.
35	Resources not adequate to fully achieve objectives of Strategic Plan	M	M	M	Progress on strategic and operational plans is continuously monitored and reviewed with key partners including the Centres, adjustments made as required.
Reputational Risk					
36	Actions of national or international partners reflect negatively on GC	L	H	M	Formal collaborative and partnership agreements are executed; maintain a continuous 'watch & brief' with Centres
37	Adverse event (financial/scientific/ethical) occurs in a funded project	L	H	M	Institutional rules, funding conditions, project monitoring in place.

	Risk Description	Likelihood Low (L) Medium (M) High(H)	Impact Low (L) Medium (M) High (H)	Strength of Mitigation Measures	Mitigation Measures
38	Actions or events related to genomics research occur at the national or international level that reflect negatively on GC	M	H	M	Issues management initiatives such as “ready to go” issues sheets and media training for senior staff. The public outreach and education initiatives of the Centres; maintenance of a ‘watch & brief’ with GC and Centres

Assessment Grid

Likelihood		Impact	
High	The frequency of the event occurring is perceived to be virtually certain or highly likely	High	Expected to have a very significant negative impact. The impact could be expected to have significant long-term effects and potentially catastrophic short-term effects
Medium	The frequency of the event occurring is perceived to be possible; 50/50	Medium	Expected to have moderate impact. The impact could be expected to have medium-term detrimental effects
Low	The frequency of the event occurring is perceived to be unlikely or remote chance	Low	Expected to have minor negative impact. The damage would not be expected to have a long-term detrimental effect

7.0 Audit

Genome Canada's audit activities are comprised of a number of components that together provide a comprehensive framework for the external examination of the organization's policies, programs, systems and procedures.

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 2015–16 are Deloitte & Touche, LLP. Auditors are required to submit an audit plan to Genome Canada's Audit and Investment Committee prior to commencement of the audit 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 to the Board of Directors for approval.

Recipient Audits: Genome Canada has 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 GIN Nodes (formerly Science and Technology 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.

Compliance Audits: Compliance audits are those that assess compliance with the terms and conditions of an agreement. As per the Funding Agreement with Industry Canada, both the Minister and the Auditor General have the right to initiate a compliance audit of Genome Canada. In fiscal year 2011-12 Industry Canada, as a routine practice, initiated a compliance audit of Genome conducted by an independent accounting firm. The stated objective of the audit was to assess Genome Canada's compliance with the requirements of the funding agreement that was in effect in fiscal year 2010-11. The resulting audit report concluded that "we are of the opinion that GC did comply with the requirements of its funding agreement with Industry Canada". Only one other compliance audit to date has been carried and it was done by Industry Canada in 2006, with no material observations raised.

Appendix 1: Definitions

Listed below are definitions of terms used in this document taken primarily from Treasury Board of Canada publications and those of other organizations including the Office of the Auditor General.

Compliance Audit: A compliance audit tests whether legal or statutory obligations have been complied with (rather than to test whether an entity is being managed efficiently, effectively and economically).

Evaluation: A formalized approach to studying and assessing projects, policies, programs, organizations and initiatives determining if they 'work'. Program evaluations can involve both quantitative and qualitative methods and social research.

Financial Audit: An audit of the financial statements of a company or other legal entity conducted by an independent external third party (typically by a firm of practicing public accountants) resulting in the publication of an independent opinion on whether or not those financial statements are relevant, accurate, complete, and fairly presented. The auditor's opinion is, by definition, the auditor's report on whether the financial statements are fairly presented and comply with generally accepted accounting principles.

Performance Audit (Previously referred to as Value for Money Audit): A performance audit is a systematic, purposeful, organized and objective examination of the activities of an organizational entity, including the examination of economy, efficiency and cost-effectiveness; procedures to measure effectiveness; accountability relationships; protection of organizational assets, and; compliance with authorities.

Performance: Actual achievements measured against defined goals, standards or criteria.

Performance measurement: The ongoing monitoring of the results of a program, project, policy or initiative, and in particular, progress towards pre-established goals.

Recipient Audit: An audit of a (Genome Canada) funded project conducted in accordance with Genome Canada's Recipient Audit Framework.

Results: Relate to what was achieved. They are the collection of impacts and outcomes associated with a program, project, policy or initiative.

Risk: The uncertainty of an event occurring that could have an impact on the achievement of objectives. Risk is measured in terms of likelihood and impact.

Appendix 2: Genome Canada Performance Indicator Framework

CONNECT IDEAS AND PEOPLE ACROSS SECTORS TO FIND NEW USES AND APPLICATIONS FOR GENOMICS

Outputs	Performance Indicator	Baseline	Target	Qual. / Quant.	Freq. of Collection	Data Source	Function Responsible for Data Collection	Data Mgt System
1.1 Research/investment strategies in various sectors of the Canadian bio-economy.	Strategies in place for all targeted sectors of the bio-economy, developed in consultation with stakeholders from academia, industry and government.	Genome Canada currently supports projects in 7 sectors: in agriculture, mining, energy, fisheries & aquaculture, forestry, health and environment	100% of sectors have a strategy in place. Sector Strategies are updated every 3 years.	Quant	Annually	Sector Strategy Docs	Corporate Dev	Excel spreadsheet
1.2 Relationships and partnerships with the regional, national and international genomics community in areas of strategic importance to Canada.	Examples of competitions, programs, project or funding requests informed by regional, national, international relationships and partnerships.	Strategic Plan 2012 onwards	No target set	Qual. / Quant.	Annually	Program and corporate development files	Program and corporate dev	Excel spreadsheet and word files
1.3 Requirements for supported projects to leverage co-funding from various sources, including industry.	Amount and percentage of co-funding leveraged by type of organization, sector, competitions, and investment type (cash, in-kind).	minimum co-funding requirement defined in funding agreements	co-funding by Budget year:	Quant.	Quarterly	Finance Files	Finance	Financial Database
			<u>Budget 2008:</u> \$141M by March 31, 2013 1:1 ratio			Finance Files	Finance	Financial Database
			<u>Budget 2010:</u> \$76M by March 31, 2015 1:1 ratio			Finance Files	Finance	Financial Database
			<u>Budget 2011:</u> \$66M by March 31, 2017 1:1 ratio			Finance Files	Finance	Financial Database
			<u>Budget 2012:</u> \$61M by March 31, 2017 1:1 ratio			Finance Files	Finance	Financial Database

			<u>Budget 2013:</u> \$280M by March 31, 2020 1:7 ratio			Finance Files	Finance	Financial Database
Immediate Outcomes	Performance Indicator	Baseline	Target	Qual. / Quant.	Freq. of Collection	Data Source	Function Responsible for Data Collection	Data Mgt System
1.a. Funded genomics research projects are relevant to sectors of the Canadian bioeconomy.	Examples of competitions, programs, projects or funding requests informed by sector strategies.	Zero as of beginning of the new 2012 strategic plan	No target allocated	Qual. / Quant.	Annually	Sector Strategy Docs	Corporate Dev	Excel spreadsheet
1.b. New opportunities arise for research collaboration in strategic areas of importance to Canada, within Canada and globally.	Examples of new research collaborations	Zero as of beginning of the new 2012 strategic plan	No target set	Qual.	Annually	Program and corporate development files	Program and corporate dev	Excel spreadsheet and word files
1.c. Increased level of engagement and investment by other partners, including industry.	Amount and percentage of co-funding leveraged by type of organization, sector, competitions, and investment type (cash, in-kind).	1:2 Cofunding ratio required in IC funding agreement	1:2	Quant	Quarterly	Finance Files	Finance	Financial Database
Intermediate Outcomes	Performance Indicator	Baseline	Target	Qual. / Quant.	Freq. of Collection	Data Source	Function Responsible for Data Collection	Data Mgt System
1.i) Enhanced leadership in genomics in sectors of	Same indicators as 1.1, 1.2,1.3,1.a and 1.b.							

importance to Canada.	International assessment of Genome Canada's contribution to genomics research. See also 2.a bibliometric data	In 2009 Survey 72% of PI's and 75% of Co-PI's felt that GC effectively increased the quality and quantity of genomics research in Canada. In 2009 survey 66% of PI's indicated that GC enabled Canada to become a world leader in genomics research, generally and in their specific area. In 2009 survey 50% of PI's believed that the genomics research effort would not have been well coordinated in the absence of GC.	50% of survey participants agreed (or strongly agreed) that GC enabled Canada to become world leader in Genomic research	Quant	Every five years	Bibliometric and citation analysis	Evaluation	Contracted research
	Number and type of letters of endorsement.	Strategic Plan 2012 onwards	No target set	Quant and Qual	Every Federal Ask	Letters of endorsement	Communications	Communication files

INVEST IN LARGE-SCALE SCIENCE AND TECHNOLOGY TO FUEL INNOVATION

Outputs	Performance Indicator	Baseline	Target	Qual. / Quant.	Freq. of Collection	Data Source	Function Responsible for Data Collection	Data Mgt System
2.1. Support for large-scale genomics research projects in Canadian research institutions, including related GE3LS research.	Assessment of quality of projects and initiatives through international and national peer review.	100% of program projects funded have been peer reviewed	100% coverage	Qualitative/ Quantitative	Per competition	External Reviews. Peer review reports	Programs	Word files and excel spreadsheet
	Number and \$ value of research projects funded by competition and sector.	As of beginning of GC in 2000	Value of research projects (Genome Canada funded portion):	Quantitative Qualitative /	Quarterly annually As required	Finance Files	Finance	Financial Database
			<u>Budget 2010</u> : \$30M in forestry/ environment; \$30M in multi-sector			Finance Files	Finance	Financial Database
			<u>Budget 2011</u> : \$40M in human health			Finance Files	Finance	Financial Database
			<u>Budget 2012</u> : \$5M in international partnerships			Finance Files	Finance	Financial Database
Same indicators as 1.1, 1.a								
2.2. Support for the operations, technology development, and networking of the Genomics Innovation Network (GIN), formerly called Science and Technology Innovation Centres.	Number and \$ value contribution to the nodes in the Genomics Innovation Network (GIN)	Funding renewal review 2012	Value of STICs supported:	Quant		Program and Finance files	Programs/ finance	Word and excel spreadsheets
			<u>Budget 2010</u> : \$24M			Program and Finance files	Programs/ finance	Word and excel spreadsheets
			<u>Budget 2013</u> : \$29M			Program and Finance files	Programs/ finance	Word and excel spreadsheets
	Assessment of quality and continued relevance of GINs. (formerly STICS)	2013 Biennial STIC/GIN survey	75% of STIC clients indicate they were either very satisfied or satisfied with their overall experience in dealing with the STICs.	Quant		STIC/ GIN funding reviews	Programs	Word and excel spreadsheets
2.3. Support the development of technologies that	Number, \$ value, of projects supported in the development of	<u>Budget 2011</u> : Support for bioinformatics and computational biology	No target set	Quant	annually	Program files Financial database	Programs/ Finance	Financial Database Word and excel spreadsheets

enable genomics research.	new technologies to enable genomics research.	<u>Budget 2010</u> : Support for ATID	No target set	Quant	annually	Program files Financial database	Programs/ Finance	Financial Database Word and excel spreadsheets
		<u>Budget 2014</u> : Funding for the Genomics Innovation Network operations in 2015–16 and 2016–17 as well as related technology development and collaborative projects.	No target set	Quant	annually	Program files Financial database	Programs/ Finance	Financial Database Word and excel spreadsheets
Immediate Outcomes	Performance Indicator	Baseline	Target	Qual. / Quant.	Freq. of Collection	Data Source	Function Responsible for Data Collection	Data Mgt System
2.a. Enhanced knowledge and HQP capacity in Canada in genomics research including GELS	Number of HQP by competition/project and sector. Analysis of career trajectories. Feedback by PI's and CoPI's on GC contribution to HQP development using a Likert scale.	In 2014 5yr Eval survey respondents agreed that GC support contributed to the quality of the training received by HQP, although the rates varied: 90% PI; 80% co-PI, 70% GE3LS, 60% stakeholders. Almost 70% of HQP reported that their involvement with GC-supported projects contributed to the quality of the training they received. Researchers and stakeholders (75-90%) agreed there is a growing need for HQP specialized in genomics research in Canada. 80% of researchers (all groups) agreed that GC support contributed to the attraction and retention of HQP in genomics.90% of PI's and 80% of Co-PI's reported that GC effectively increased	75% of PI's and CoPI's agree that GC support contributed to the quality of the training received by HQP. 75% of HQP report that their involvement with GC-supported projects contributed to the quality of the training they received. 80% of researchers (all groups) agreed that GC support contributed to the attraction and retention of HQP in genomics. 80% of PI's and 80% of Co-PI's report that GC has effectively increased the quality and quantity of genomics research in Canada	Quant	Every five years	Five year Evaluation survey	Evaluation	National metric database

		the quality and quantity of genomics research in Canada						
	Number of bibliometric outputs per projects and citation analysis of highest impact research journal articles	2014 5 Year Evaluation Baseline bibliometric performance 1996-2011 2009 5yr evaluation (2000-2009): 3370 publications 4864 conference papers	No target set	Quant	Every five years	Five year Evaluation survey	Evaluation	National metric database
2.b. Enhanced genomics research in Canada through the provision of access to leading-edge technologies.	Feedback by projects on the timeliness, quality and efficiency of GINS using a Likert scale.	2013 Bi-annual or biennial? STIC survey noted rating of STICs considered high by PI's on technical capabilities (80%) and operational capabilities (65%) In 2009 5yr evaluation survey -30% of PI's and 40% of Co-PI's reported higher adequacy of the Canadian genomics research infrastructure from 2002-2007	Rating of STICs considered high by PI's on technical capabilities (75%) and operational capabilities (75%) 65% of PI's and 65% of Co-PI's report a higher adequacy of Canadian genomics infrastructure from 2014-2019	Quant	Every two years	Program survey	Programs	Excel spreadsheet
	Number and type of services accessed.	2013 bi annual survey of STICs noted that 87% of Genome Canada projects funded since 2010 and requiring technology services accessed STICs services.	75% of projects requiring technology services accessed STICs services.	Quant	Every two years	Program survey	Programs	Excel spreadsheet
Intermediate Outcomes	Performance Indicator	Baseline	Target	Qual. / Quant.	Freq. of Collection	Data Source	Function Responsible for Data Collection	Data Mgt System
2.i) Enhanced genomic capacity and capability developed, attracted and/or retained in Canada.	Same indicators as 2.1,2.2, 2.3, 2.a, 2.b							

TRANSLATE DISCOVERIES INTO APPLICATION TO MAXIMISE IMPACT ACROSS ALL SECTORS

Outputs	Performance Indicator	Baseline	Target	Qual. / Quant	Freq. of Collection	Data Source	Function Responsible for Data Collection	Data Mgt System
3.1 Support for partnerships between academia and users to advance a product, tool or process closer to market or address a significant unmet need.	Number and value of projects supported that have user partners.	Budget 2012: GAPP program	Value of projects supported (Genome Canada funded portion):	Quant	Annually	Finance Files	Finance	Financial Database
			<u>Budget 2012</u> : \$26M plus \$4m focusing on genomics applied to human health (GAPP).	Quantitative	Annually	Finance Files	Finance	Financial Database
3.2 Support for researchers to better understand how to create and capture entrepreneurial value from their research	Number of researchers participating in initiatives that enhance their entrepreneurial knowledge	From 2012 onwards	No target set	Quant	Annually	Project metric reporting	Evaluation/Program	National Metric Database
3.3 Support for research that investigates societal implications of genomics research and its applications (GE ³ LS)	Number and \$ value of projects that includes GE ³ LS research, supporting knowledge dissemination of genomic research results in Canada	As of beginning of GC in 2000	No target set	Quantitative	Annually	Finance Files	Finance	Financial Database
	Feedback by PI's and CoPI's on GC contribution to GE ³ LS using a Likert scale.	In 2009 5 Year Evaluation survey 33% of PI's attributed Canada's standing in GE ³ LS to GC.	55% of PI's attribute Canada's standing in GE ³ LS to GC.	Quant	Every five years	Five year Evaluation survey	Evaluation	National metric database
3.4 Support for mechanisms to strengthen communications and engagement with key stakeholders	Number and examples of knowledge dissemination initiatives in genomics in society	From 2012 onwards	No target set	Quant	Annually	Project metric reporting	Evaluation/Program	National Metric Database
Immediate Outcomes	Performance Indicator	Baseline	Target	Qual. / Quant	Freq. of Collection	Data Source	Function Responsible for Data Collection	Data Mgt System

3.a. Increased partnerships between academia and users	Increase in number of research partnerships funded by GC between academia and potential users of genomics derived knowledge	GAPP program onwards	No target set	Quant	Annually	Program files Financial database	Programs/ Finance	Financial Database Word and excel spreadsheets
3.b. Increased translation of genomics technology research prototypes, early stage products, tools and process	Number of invention disclosures, patents, licenses.	2009 5yr Evaluation (2000-2009) 202 Patent Applications 53 Patents issued 196 Invention disclosures 19 Licenses granted 69 material transfer agreements 32 copyrights \$3051500 revenue from licenses and royalties	No target set	Quant	Annually	Project metric reporting	Evaluation/Program	National Metric Database
	Examples of prototypes, early stage products, tools and process emanating from genomics research	From Personalized health competition (2012) onwards	No target set	Qual and Quant	Per program completion	Final report	Programs	Excel spreadsheet
	Number of companies enhanced, advanced or established (number of employees, sector, revenues, and innovation) as a result of Genome Canada investment.	From establishment of GC	No target set	Quant	Annually	Project metric reporting	Evaluation/Program	National Metric Database
3.c Increased policy, practice and regulatory engagement informed by GE ³ LS evidence	Examples of expert witness testimony to parliamentary committees by GE ³ LS researchers	From 2015	No target set	Quant/ Qual	Annually	GE ³ LS monitoring	GE ³ LS	Word and Excel spreadsheet

	Number of workshops, initiatives, consultations, op-eds, social media or policy papers aimed at engaging policy and regulatory stakeholders	From 2005	No target set	Quant	Annually	Project metric reporting	Evaluation/Program	National Metric Database
3.d Increased stakeholder awareness of genomics contributions to the social and economic health of Canada	Survey (Likert scale) to assess stakeholders awareness of social and economic value of GC genomic investment	Audit of Elite Opinion Ottawa January 2013. On average, participants gave Genome Canada: 7.64/10 for contributing to the research enterprise. 6.75/10 for providing good ROI for Canada. 5.66/10 for contribution to Canadian economy	75% of external stakeholders believe Genome Canada has effectively increased the quality and quantity of genomics research in Canada 65% of external stakeholders believe Genome Canada has provided good ROI for Canada 50% of external stakeholders believe Genome Canada has contributed to Canada economy	Quant	Bi-Annually	Communication Survey	Comms	Word and Excel doc
Intermediate Outcomes	Performance Indicator	Baseline	Target	Qual. / Quant	Freq. of Collection	Data Source	Function Responsible for Data Collection	Data Mgt System
3.i) Increased industry innovation and knowledge mobilization using genomics	Examples of knowledge or discoveries used by end-users and receptor organizations to benefit Canadians.	GAPP program onwards	No target set	Qual	Annually	GAPP projects	Programs	Excel and work docs
	Same indicators as 3.1,3.2, 3.3, 3.4, 3.a, 3.b, 3.c, 3.d							