STRATEGIC PLAN
2020-2023

"Genomics positively impacts life, every day."

Genome BritishColumbia

Leading ▸ Investing ▸ Connecting

Genome BritishColumbia

Strategic Plan 2020–2023

"Genomics positively impacts life, every day."

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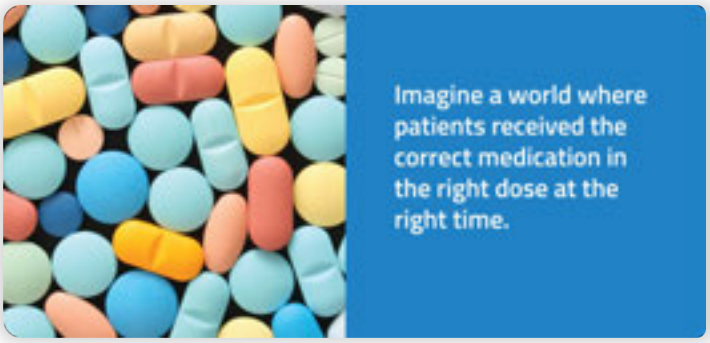
Table of Contents

Table of Contents 3
Introduction 5
Genomics Today 6
From Research to Innovation 8
Genome BC's Evolution and Support from the Province 9
Strategic Plan 2020-2023 11
Vision 11
Mission 11
Value Proposition 11
Strategic Framework 12
Strategic Levers 13
Strategic Mandates 16
Research Mandate 16
Innovation Mandate 20
Entrepreneurship and Commercialization Mandate 22
Communication and Societal Engagement Mandate 24
Co-Funding Strategy 26
Long-Term Deliverables 27
Corporate 27
Research 27
Innovation 27
Genomics and Society 27
Education 28
Communications 28
Entrepreneurship and Commercialization 28
Appendices 29
Appendix 1 — Organization 29
Appendix 2 — Plan Structure 30
Appendix 3 — Long and Medium-Term Deliverables 31
Appendix 4 — Logic Chart 34

Introduction

Since its inception in 2000, Genome British Columbia (Genome BC) has invested over $1B in genomics research and built a globally significant genomics research cluster in British Columbia. As genomics[1] have progressed, Genome BC's research focus has evolved as well, moving from predominantly discovery to one of application and translation[2]. Today, in addition to continuing paramount discovery-based research, the organization's programs advance products, services and companies with an emphasis on entrepreneurial support. In addition, education, genomics and society research[3], communications and public outreach all enhance Genome BC's portfolio of activities and continue to drive its credibility, visibility and relevance.



With this plan, Genome BC builds upon its achievements in order to deliver a future where genomics positively impacts our daily lives, transforms our health care, and offers practical solutions for humanity's biggest challenges, such as climate change, food security, and environmental protection. The result is the effective translation of genomics to benefit the people of British Columbia and beyond.

[1] Genomics is the science that aims to decipher and understand the entire genetic information of an organism (i.e. plants, animals, humans, viruses and microorganisms) encoded in DNA and corresponding complements such as RNA, proteins and metabolites. For the purpose of this plan genomics is defined broadly and includes genomics, proteomics, metabolomics, transcriptomics and other related disciplines.

[2] Genome BC defines stages of research as the following: discovery emphasizes the analysis of large volumes of experimental data with the goal of determining new knowledge; applied research is a methodology used to solve a defined, specific application; and, translational research applies findings from basic science towards defined end-user results.

[3] Social science and humanities research that addresses the societal implications of genomic applications.

Genomics Today

Where there is life, there is DNA.
Genomics is the science of reading, editing and writing DNA.

Since the mapping of the human genome was first completed in 2001, at a cost of over $2.7B, there have been enormous technological advances in genomics. Today we can read DNA faster and cheaper – in mere hours and at a cost of only $1,000 per genome – and this downward trend of cost and time is expected to continue. And through the development of portable sequencers we can apply this technology in real time, where and when needed. With these efficiencies, genome sequencing has truly become pervasive and accessible, leading to profound uptake and application of this technology. But sequencing genomes is only one aspect of its power.

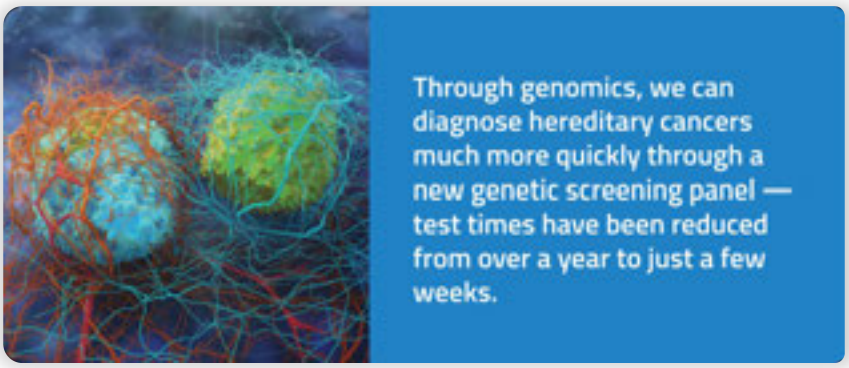
Genomics is at the core of a hand-held device that can monitor the transmission of forest pests and pathogens in real time and thereby protect Canada's forests.

Genomics has evolved with phenomenal speed into a dominant scientific and business force. The field has expanded to include the sequencing and interpretation of multi-omics and interdisciplinary approaches that involve artificial intelligence, computational biology, blockchain and other emerging disruptive technologies.

Technologies that allow us to change the DNA of an organism were developed well before the human genome was sequenced[4]. CRISPR, the latest gene editing tool, originally invented in 2009, makes gene editing simpler, faster, cheaper and more precise, and very accessible. CRISPR can help correct genetic mutations, modify traits and control pathogens. At the same time, however, this technology, applied irresponsibly, can create significant risks. Our continuing work in genomics and society supports the further development of regulatory frameworks and policies to safely support the implementation of genomics. The opportunities are seemingly endless and hold the promise of helping to solve many global challenges.

[4] BC's first Nobel Prize was won in 1993 by Dr. Michael Smith for his work on site-directed mutagenesis — a technique that allows researchers to alter specific parts of the DNA code and study how genes work, or why they don't work.

The emergence of synthetic biology affords a future where DNA is not only edited, but new DNA is written, broadening both the global potential and impact of the technology. Synthetic biology allows the creation of new, original life forms[5]. The investments in synthetic biology, both in research and in ventures, are growing rapidly.

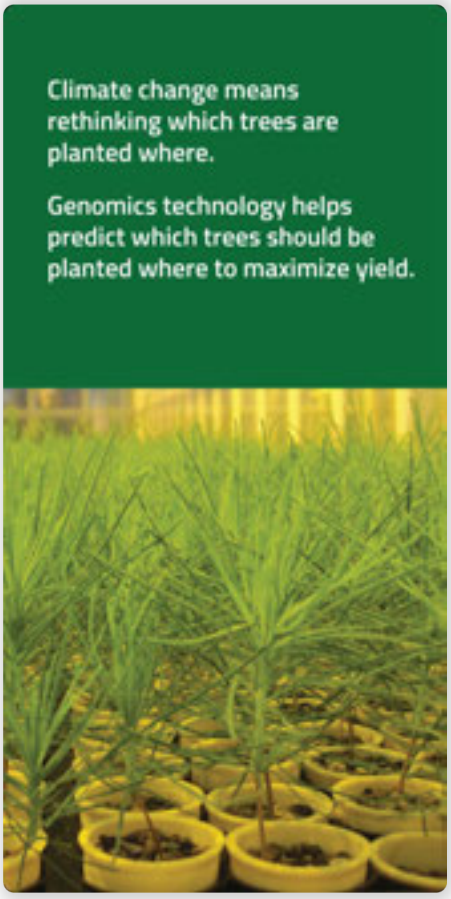


At its core, genomics is an interdisciplinary field drawing from multiple industries including biotechnology, biomedical devices, biopharmaceuticals and information technology. It has become a platform technology that is transversal – being applied and translated across all economic and social sectors and has become recognized as a credible and valuable tool with exponential growth potential for societal and economic benefits. However, with this added complexity comes a vast increase in data production. Genomic data is one of the fastest growing datasets in the world and requires sophistication to analyze and interpret the data to a point of actionable information, through bioinformatics – the convergence of biology and data sciences – in order to harness the benefits of this information.

Genomic progress creates the potential for large societal and economic benefits across all sectors. Established companies, such as Illumina and Roche Diagnostics are growing. New companies are emerging, and entire industries in agrifoods, health care and medical devices, and direct-to-consumer testing

[5] This science is already yielding promising benefits through, for example, the development of reprogrammed Car-T cells that specifically attack tumour cells and the synthesis of biopolymers that can replace fossil fuel-based plastics.

companies are being transformed by genomics. Industry research predicts the global genomics market to grow rapidly[6]. Anticipated changes to health care alone, are staggering, with precision health care expected to replace the existing delivery model, allowing for better prevention and treatment[7]. Similar transformations are underway in agriculture, natural resources, and environment. Unlocking this potential will not only require research, biological and computational technologies, and the translation of genomics into innovative applications, but it will also necessitate a transformation of social systems. Dealing with the legal, ethical, environmental, economic and social challenges will be essential to realize responsible genomic benefits.



Since inception, Genome BC has led and supported the ongoing research and dialogue required to identify and respond to the societal implications of genomics, including through its genomics and society activities. Unlocking the potential requires equal and simultaneous allocation of resources to research, innovation and the transformation of society's existing social systems. Genome BC recognizes its opportunity to lead and influence in this important area – to assist BC and Canada in realizing the positive impacts of genomics through responsible and positive applications.

From Research to Innovation

Genomics has progressed at an increasingly rapid rate. Advances in lab automation, sequencing, bioinformatics and analysis have expanded capabilities and reduced costs, making genomics accessible for an increasing number of day-to-day applications. Scientific research, basic and applied, continuously generates new discoveries, rapidly expanding the breadth and depth of scientific knowledge. But, the translation of these research outcomes into new products, services, processes, systems and social interaction is not a guarantee and needs to be pursued as

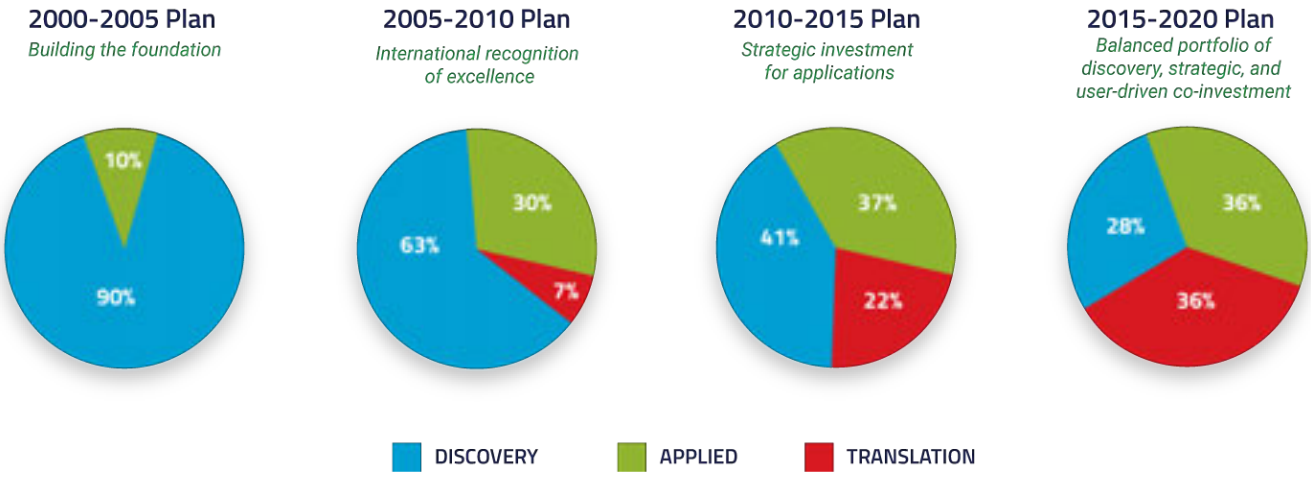
[6] https://www.grandviewresearch.com/industry-analysis/genomics-market

[7] https://www.pwc.com/ca/en/healthcare/publications/pwc-personalized-medicine-summit-green-paper-2015-06-en.pdf ; https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5989714/

systematically as scientific research. Ecosystems that successfully drive the acceleration of research and translation into new products, services and systems, will be better and more quickly able to leverage the benefits of genomics. Genome BC, in its role as ecosystem builder, will embrace this innovation process proactively and deliberately.

Genome BC's Evolution and Support from the Province

Genome BC was founded in 2000 as the regional genome centre serving the West Coast, as part of Canada's genomic enterprise[8]. Since our inception, we have appreciated the support of the BC provincial government which has provided core funding to Genome BC based on four consecutive five-year strategic plans:



NOTE: Illustration denotes funding allocation. Projects can be captured across categories.

At the conclusion of the 2015-2020 plan, Genome BC, through its strategic programs and projects, will have attracted significant co-funding, leveraging the cumulative provincial funding of $272M into an overall investment of over $1B for British Columbia. Genome BC will continue to leverage the strength of its strategy in order to capitalize on the trend of attracting external funds at a ratio of 1:4 to the benefit of all British Columbians.

Throughout the last 20 years, Genome BC has enabled the establishment and growth of a very comprehensive research ecosystem here in BC.

[8] The genomics enterprise refers to Genome Canada and the six regional genome centres across the country including: Genome Atlantic, Genome Quebec, Ontario Genomics, Genome Prairie, Genome Alberta and Genome BC.

BC had the highest citation rates in genomics of any province indicating that genomics research in BC is very strong. BC's papers in genomics were cited 70% more often than the world average, and about 20% of papers were among the 10% most cited worldwide[9].

Since 2000, Genome BC's strategic investments into research projects, and entrepreneurship and commercialization activities, have contributed ~$2.6B to BC's GDP, and created and enabled over 32,000 jobs[10].

Genome BC's organization and processes were designed to successfully compete for federal funding through Genome Canada's national funding envelope. To this end, Genome BC has consistently achieved an overall success rate of 28% of available funds – punching well above its weight and further illustrating the genomics excellence catalysed in BC since its inception.

While 51% of Genome BC's total funding continues to leverage Genome Canada programs, the provincial support has allowed us to develop our own funding mechanisms to complement Genome Canada initiatives, and ensure responsiveness here at home. This BC government support has enabled Genome BC to address provincial priorities and emerging issues – providing solutions to some of BC's pressing challenges. This strategic alignment and nimbleness are reflected through our research, as well as through activities in the areas of genomics and society and education and communication, all areas where Genome BC is occupying a leadership position within the Canadian genomic enterprise.

[9] Bibliometric analysis on genomics research in Canada, focusing on British Columbia, Science Metrix, June 2018.

[10] Economic Impact Analysis Summary Report, MNP LLP, 2018. https://www.genomebc.ca/wp-content/uploads/2018/12/0118_MNP_Economic_Impact_Executive_Summary_Dec2018.pdf

Strategic Plan 2020-2023

This plan is building on Genome BC's capability to keep pace with the rate of genomics progress and to align with the priorities of its stakeholders. Over time we have complemented our core research capabilities with sector specific activities, including working with industry, government and other stakeholders to apply genomics in relevant, responsible, and effective ways. We support commercialization and knowledge mobilization. Our education and outreach programs connect us to students, teachers and the engaged public, and we are increasingly active in the broader area of genomics and society. This plan assumes the continuity of Genome Canada's funding, builds on our current strengths and expands our reach into new areas to proactively and deliberately drive the responsible adoption of genomics practically in day-to-day life[11].

Vision

Genomics positively impacts life, every day.

Mission

Applying the power of genomics to pressing societal and economic challenges.

Value Proposition

To apply the power of genomics to better the lives of British Columbians and all Canadians through a high performing health care system and thriving agrifood and natural resources sectors.

We invest in research, facilitate innovation and drive the responsible uptake of genomics applications through expert services and societal engagement.

We are recognized for our cross-cutting genomic expertise, community building and connections. Our reputation and credibility are built on our accomplishments and capabilities.

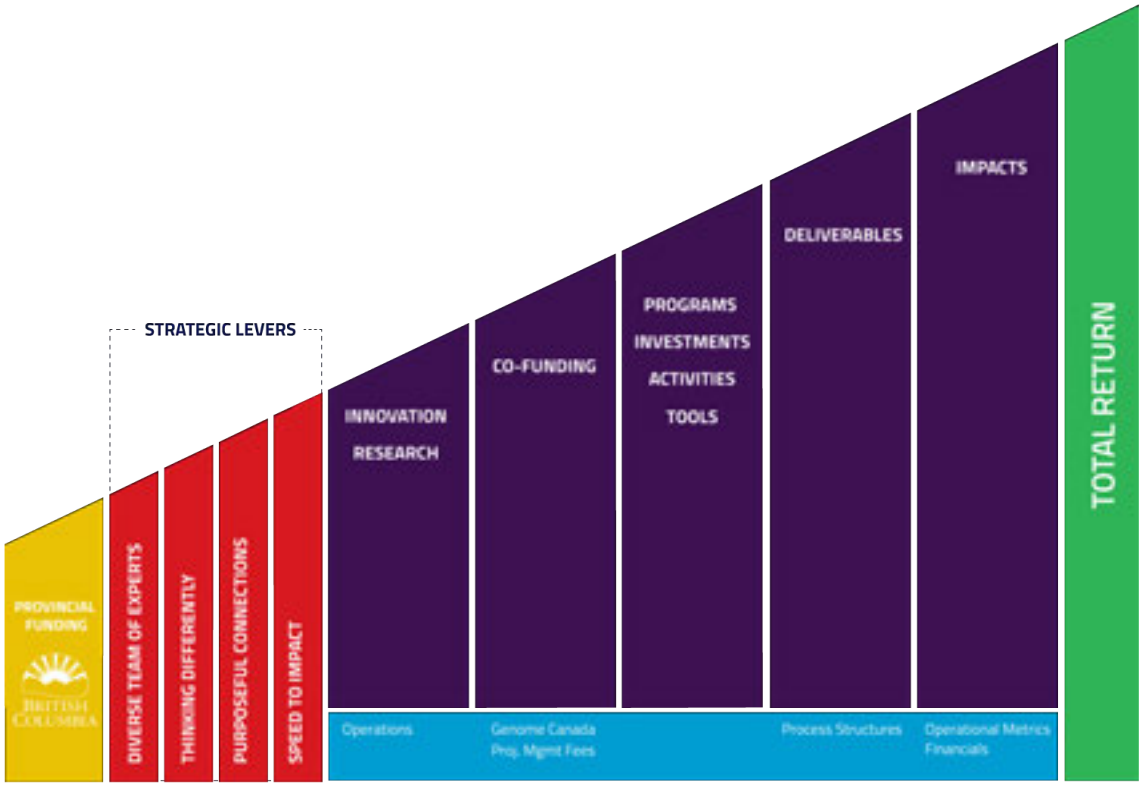
Our unique approach allows us to undertake and manage complex research and innovation, mobilize partner investment and mitigate risk in the translation and commercialization processes.

[11] see page 20 for Innovation Mandate

Strategic Framework

The fundamental business model of Genome BC remains unchanged since inception: Provincial funding is leveraged, with the support of co-funding partners, and invested in programs, initiatives and activities that drive deliverables[12]. These are measured systematically, and results are reported back to funders and stakeholders. The corporate organization, and its processes, enable these operations.

As part of the 2020-2023 Strategic Plan, two new elements have been added to the framework: first, through the strategic levers, Genome BC will define the priorities and capabilities required to deliver on its mission and value proposition; and, second, Genome BC will explicitly add innovation to its existing research mandate. The expansion into the innovation space will require the addition of new co-funding partners, the expansion of requisite programs, and new tools and additional metrics that specifically track innovation outcomes.



Genome BC's Strategic Framework

[12] For long-term deliverables see page 27 and for medium-term deliverables see Appendix 3 on page 32

Strategic Levers

The strategic levers define the organizational strength and areas of focus necessary to successfully deliver the strategy. Each lever addresses the capabilities, capacity and mindset that drives our operations, and each is brought to life by strategic initiatives, and reviewed annually as part of the rolling strategic planning process.

Diverse Team of Experts

The diversity and quality of our team is a key strength we will build upon. We proactively embrace equity, diversity and inclusion. As we identify with the vision, mission and purpose of Genome BC, we will be empowered to contribute, and individual engagement will deepen. To drive the overall excellence of our organization, we will:

Live our core values: The alignment of values and strategy is essential for success. We will explore, identify and demonstrate our corporate values, which will guide our decisions, behaviours and interactions. By living our values, we will strengthen organizational trust and cohesiveness.

Provide strong internal communication: The internal information flow allows staff to be empowered and engaged. Information drives transparency and allows us to optimize processes and mitigate frictions in our operational system. We will realize our capabilities through the alignment of and agreement on strategic and operational priorities.

Attract and retain great talent: Our transformative purpose, excellent work environment and competitive compensation and benefits, allow us to attract and retain outstanding people. Our feedback and performance review practices foster personal growth, raise the level of performance, enhance teamwork and enable accountability. We optimize personal and organizational excellence by valuing professional development. We care about the environment we operate in and we care for one another.

Thinking Differently

We operate in a complex environment and deal with a rapidly evolving disruptive technology. In addition to mastering the standard processes and activities to fulfil our mission, we need to stay attuned to finding better ways to solve complex challenges. To achieve new levels of operational success, we will:

Foster a creative culture: Fresh ideas are generated by open debate and respectful discussion set in a solution focused environment that allows for trial and error opportunities that result in important learnings. We will practice and encourage creative thinking and learn from failures.

Use best practices: We will identify and explore alternative models and best practices and will adopt other critically reviewed and validated approaches.

Use evidence: We will collect, analyse and provide data access to all team members to support evidence-based decisions.

Assess and correct: Existing and new approaches need to be assessed, corrected if necessary, and assessed again. We embrace constructive feedback.

Expand the research and innovation mindset: Building on Genome BC's recognized genomic expertise we will establish ourselves as thought leaders. When appropriate, we will institutionalize this thought leadership and assume the role of a think-tank for genomic research and innovation.

Purposeful Connections

Genome BC delivers on its mission by inspiring and supporting partners and requires purposeful connections with these partners to succeed. This lever speaks to Genome BC's ability to build and maintain relationships, through professional business development activities, across its operations. To drive impacts and deepen connections, we will:

Understand the ecosystem: We will identify and develop meaningful relationships with key ecosystem participants, understand the dynamics and identify the vital initiatives and activities within the ecosystem.

Conduct systematic outreach and connection activities: We will take a deliberate business development approach, including planning, budgeting of resources and activities, and the use of best practices reinforced by professional development.

Manage the connections: Once relationships are formed and networks are built, we will assign responsibilities and resources equipped with the right tools to manage these relationships proactively.

Assess for outcomes and impacts: Based on defined goals and metrics, the results of these business development activities will be reviewed, assessed and reported to enable continuous optimization and enhance credibility.

Communicate impact stories: By capturing relevant success stories and communicating them strategically, we will illustrate credible and responsible genomics application, enhance the profile and reputation of its existing partners and attract, and positively impact, new ones.

Speed to Impact

The time it takes to generate research outcomes and move them through to innovation, matters. The faster research outcomes can be translated into innovation, the quicker people will benefit. Accelerating initiatives, processes and activities requires a mindset that values speed. To cultivate such a mindset, we will:

Optimize for speed to impact: We will shorten time to impact. We identify, simplify and respond to opportunities. We employ tools to enhance efficiency. We measure our operations, processes and projects in order to optimize nimbleness, responsiveness and efficiency.

Support a culture of improvement: We constructively challenge the status quo and look for opportunities to improve.

Strategic Mandates

Research Mandate

As one of Canada's six regional genome centres, Genome BC is closely linked to Genome Canada's strategy, which is built upon three flagship programs: Large-Scale Applied Research Project Competition (LSARP); Genomics Applications Partnership Program (GAPP); and, Genomics Technology Platforms. These programs and platforms are the vehicles that afford Genome BC the opportunity to secure federal funds for British Columbia's research ecosystem and support the interdisciplinary teams that advance the application of genomic technologies across all industry sectors in BC. Genome BC has developed a strong core competency to identify and develop projects within these programs, in partnership with the regional research community, and successfully compete for Genome Canada funding. Our internal project management expertise positions us to successfully and diligently manage these projects.

In parallel, Genome Canada and Genome BC have partnered on the establishment and support of genomic infrastructure through three technology platforms. These platforms significantly enhance British Columbia's capacity and position of influence within the Canadian genomic research ecosystem. The unique federal-provincial partnership model allows us to work collectively and collaboratively with Genome Canada to leverage our funding, develop an ecosystem of expertise and ultimately optimize our collective impact.

Over the years, Genome BC has developed a suite of its own funding programs, to complement those offered by Genome Canada, to pursue specific regional priorities, including those in cooperation with both public and private partners (see Research Programs, Tools and Capabilities below.)

Genome BC funds research through a variety of programs. These projects range from small, proof-of-concept initiatives at $50,000 to larger investments of up to $250,000.

Large scale projects are funded alongside Genome Canada and range from $2 million up to $10 million.

Genomics have progressed at an astounding pace over the past twenty years. As the knowledge deepens, the field also expands, and new questions emerge. Fundamental and discovery-based genomics research remain very relevant. Thanks to strategic and substantive investments, both federally and provincially, Canada's and BC's research ecosystems are very competitive. The multi-sectoral approach of Canada's genomic enterprise is globally unique[13] and represents a strong differentiator in the global competition for research excellence.

By extension, Genome BC's research mandate is core to our purpose. In pursuit of this mandate Genome BC supports the expansion of knowledge, along the full spectrum from discovery to translation, strengthens the regional research enterprise and enables the growth of highly qualified scientists and researchers. The continued support of evolving technology platforms secures the infrastructure fundamental to this highly competitive research community. It is this research capacity that provides the building blocks for genomics to evolve through to application, translation and innovation. Genome BC's research mandate remains central to our value proposition.

Research Programs, Tools and Capabilities

Genome Canada Programs

Since inception, Genome BC has invested over half of all its available funds in Genome Canada co-funded projects:

	PLAN 1	PLAN 2	PLAN 3	PLAN 4*
Percentage of GBC funds that support GC programs	100%	52%	53%	53%

*Forecast to the completion of Plan 4

[13] In most countries genomics is funded on a sector by sector basis such as a stand-alone genomics health unit. In Canada, through the Genomic Enterprise, genomics is funded across all sectors, in an interdisciplinary fashion. This enables each sector to benefit from knowledge gained through developments of other sectors and translate that knowledge horizontally.

With Genome Canada's current funding cycle ending March 31, 2019, a new five-year plan that includes a funding request to Innovation, Science and Economic Development Canada (ISED) has been proposed. This plan provides for continuity of funding for research and technology platforms and, assuming continued federal funding for Genome Canada, these programs will remain central to Genome BC's research mandate and funding of academic researchers.

Genome BC will continue to assist in the preparation of all BC research teams competing for federal funding through Genome Canada's LSARP and GAPP programs, leveraging our competitive advantage with the goal of optimizing success and enhancing capacity for BC. This process of preparation also assists BC teams in being more competitive in other funding competitions, imperative to maintaining a competitive edge nationally and internationally.

Genome BC Programs

Capacity Building Program

This opportunity provides funding support for smaller scale projects with an aim of building capacity in strategic areas for BC. Unlike other large-scale opportunities, Genome BC's capacity building program looks to identify new investigators – enhancing the growth, credibility and reputation of new BC researchers. This is an important instrument for Genome BC to develop strategic areas, prepare scientists for larger competitions, such as LSARP and GAPP, and undertake pilot studies in key areas for validation and scalability.

User Partner Program

This program supports projects that provide innovative and cost-effective solutions to challenges from user partners across various sectors, which may lead to enhanced competitiveness and sustainability. This model encourages a collaborative research approach between sector partners and academia in BC. The program further seeks to develop and drive public private partnerships — a key component to advancing innovation in BC — which will lead to opportunities for follow-on projects and translational or commercialization opportunities.

Emerging Issues and Strategic Initiatives

Genomics is a very effective tool in the response to crises and emerging issues across all social and economic areas of importance. Thanks to its expertise and relationships, Genome BC is well positioned to facilitate real time genomic solutions whether through its role as funder and convener, or through its scientific expertise, networks and/or credibility and public trust. Such challenges typically demand a quick and practical approach to decision making and include processes that are responsive, but function within a robust governance framework. Genome BC maintains an organizational structure, decision process and culture that affords nimbleness, flexibility and speed.

Scientific and Research Leadership

Scientific excellence and knowledge are fundamental to Genome BC's credibility and long-term success. Led by the Chief Scientific Officer (CSO), this commitment to expertise permeates the organization. Recognizing early on the need for in-house business and scientific sector expertise to support industry and government, Genome BC has developed a staff complement that is proving to be a significant differentiator. Augmented by sector advisory committees comprised of external experts, Genome BC is well positioned to identify, develop and implement genomics solutions to many of society's challenges.

In 2003, SARS spread to 26 countries before it was quelled. The successful BC led effort to sequence the virus had far reaching consequences. In addition to vaccine development and research advancement, the SARS pandemic demonstrated to the BC community how a collective research capacity – with support from government and funding agencies – could be mobilized to achieve immediate, potentially life saving results.

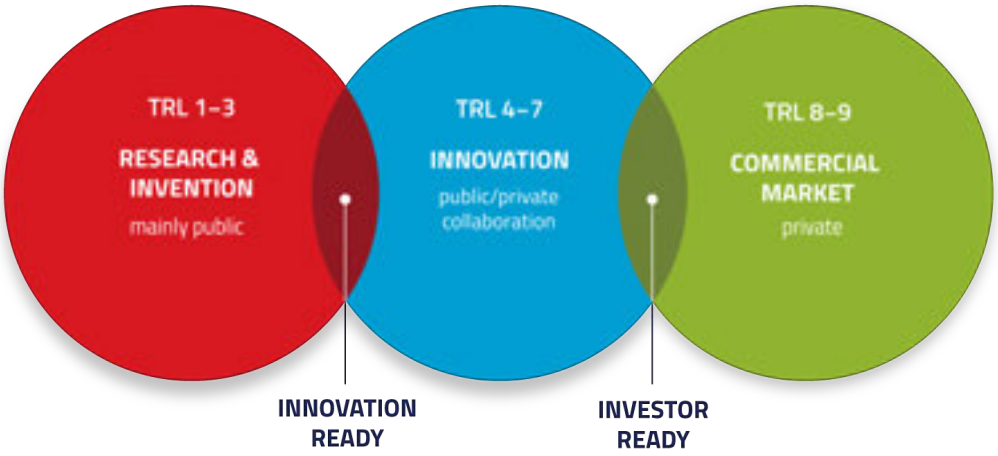
Research has demonstrated that genomic analysis of wetland sediment is an effective tool for surveillance of avian influenza in wild waterfowl. A new genomics based method was shown to be 37 times more sensitive for detection compared to existing programs.

Innovation Mandate

The term "innovation" is used in many ways, but for the purposes of this plan, Genome BC defines innovation as *the practical translation of ideas and research outcomes into new or improved products, services, processes, systems or social interactions*.

Innovation happens all around us and is not the exclusive domain of "innovation specialists." A child innovates by taking a stick and turning it into a toy, a researcher innovates by taking their original hypothesis and converting it into a new methodology, and an inventor innovates by transforming their idea into a new product. By funding applied and translational academic research, Genome BC has funded innovation in the past, particularly in the context of end-user-driven research. However, funding and program criteria have traditionally been focused on generating research outcomes, rather than innovation outcomes specifically. While Genome BC's traditional research mandate did not exclude innovation, this new plan includes innovation deliberately and with purpose. In pursuing our research mandate, we continue to fund and promote research that ultimately *harnesses the power of genomics.* In pursuing our innovation mandate, we will make sure this power is *applied to pressing social and economic challenges.* To do so, Genome BC will proactively, systematically and comprehensively facilitate the adoption of genomics and the removal of adoption barriers.

The Technology Readiness Level (TRL) methodology was originally developed by NASA and has subsequently been broadly adopted as an assessment of technology maturity. In the context of this plan, an adjusted TRL system (based on a 9-point scale) is used to illustrate the extension of Genome BC's overall mandate by the addition of innovation to the existing research mandate. Under previous strategic plans, Genome BC supported research projects generally would reach TRL 3[14] . At times projects would realize TRL 4 or even TRL 5, but these occurrences were outside of Genome BC's scope. With this plan, Genome BC will continue its support for discovery research (TRL 1-3) and add programs, funding and initiatives that proactively support the



Technology Readiness Level (TRL)

[14] For detailed definition of TRL, visit https://www.ic.gc.ca/eic/site/080.nsf/eng/00002.html

translation of research outcomes into TRL 5 and beyond to ultimately enable practical adoption or commercialization.

To fulfil this mandate, Genome BC will require dedicated resources, programs and tools. In order to maintain its research competitiveness, Genome BC will incorporate innovation capabilities gradually. Today innovation is not a core competency (as opposed to research), but as programs and initiatives are implemented over time this expertise will grow, resulting in the recognition of Genome BC as an organization with comprehensive capabilities in both genomic research and innovation.

Innovation Programs, Tools and Capabilities

Genome BC will develop a suite of programs, tools and capabilities to fulfil its innovation mandate. In doing so we will benefit from existing experiences, notably user-driven research[15] and commercialization[16] programs. We also have experience and capacity in the areas of genomics and society, education, and communication and outreach, which will become even more relevant in the delivery of the innovation mandate.

There are as many approaches to the advancement of innovation as there are jurisdictions. In Canada the federal government has retooled its innovation support at the large scale, institutional level with the Supercluster and Strategic Innovation Fund initiatives.

Genome BC participates in these programs and continues to study smaller scale, agency type models in Canada and abroad that appear to be best aligned with our environment.

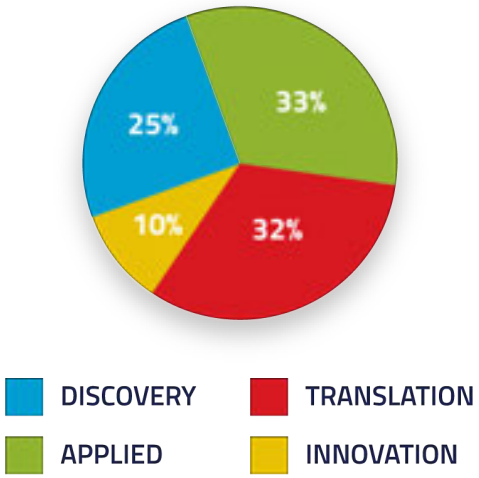
We are, among others, inspired by initiatives like the Fraunhofer Institutes in Germany, the Catapult Programme in the UK, the Ontario Centres of Excellence, the innovation policies and tools in Finland and the entrepreneurship support in Israel.

Each one of these examples, while exceeding our scale and scope significantly, offers insight that we can emulate and adjust to our own circumstances and ecosystem.

[15] These programs include Genome Canada's Genomic Applications Partnership Program (GAPP), and Genome BC's current GeneSolve and (now completed) User Partnership Programs (UPP). The design of these programs is to fund downstream research and development (R&D) projects that address real world opportunities and challenges.

[16] These include Genome BC's Industry Innovation Program (I² Fund) designed to provide commercialization support for companies developing innovative life science technologies in British Columbia (BC), and other Entrepreneurship Partner Programs such as HyperGrowth Life with BC Tech, e@UBC, and SFU Innovates.

Leading up to the implementation of this plan in 2020, Genome BC will examine programs, measures, and tools designed to advance and promote innovation nationally and internationally. We will develop our own set of innovation tools for genomics and implement a plan for the gradual provisioning of resources and introduction of these programs. Our approaches will be inspired by the experience of others and our own – to benefit BC. Individual initiatives and projects are already underway, such as the Ministry of Health (MOH) Pharmacogenomics (PGX) demonstration project and Regional Priorities Partnership Program (RP3) project, and others will be initiated as they are identified. The experience garnered through these early innovation projects will inform the direction of future programs.



Funding allocation according to 2020-2023 financial plan.

Entrepreneurship and Commercialization Mandate

Commercialization

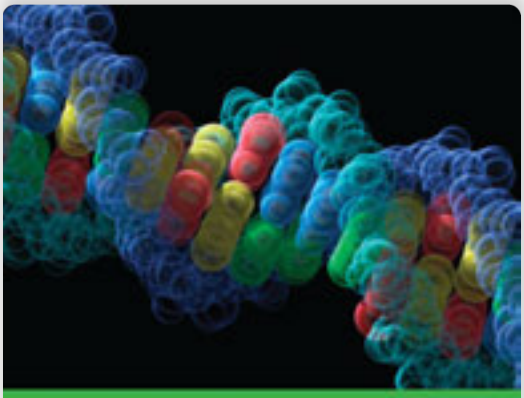
The Industry Innovation Program (I^2 Fund) started as part of the 2015-2020 plan and provides support for companies developing innovative life science technologies in the early stages of commercial development. The fund provides companies non-dilutive, low interest debt capital to bridge the period between early stage seed funding and series A venture capital financing. Companies are expected to repay the capital, accrued interest and potential royalties after four to five years. The fund targets a niche not addressed by private equity financing and viewed as a gap in today's innovation ecosystem. Over time the I^2 Fund is expected to become a self-sustained evergreen fund. Genome BC is in the process of validating the concept through on-going investments of an initial $17M. As part of this validation we will also determine the optimal size of this fund given receptor capacity, turnover, and repayment success.

To complement the capital provided, Genome BC also offers to the investee companies access to expert advice, networks and connections within the ecosystem. In addition to monitoring the

outcomes of the fund and adjusting as necessary, Genome BC will explore alternative commercialization funding models to ensure optimal support of the innovation mandate.

Entrepreneurship

As part of its 2015–2020 plan, and in response to an identified need for enhanced support, Genome BC initiated its Entrepreneurship Partnership Program (EPP). Designed to help build a strong life science ecosystem, the program aims to support existing incubators in their establishment of ventures targeted at supporting life sciences entrepreneurs. In this way, Genome BC also advances life sciences start-up companies by leveraging existing programs. The EPP provides Genome BC with important insights and access to the entrepreneurial community and strengthens the pipeline of opportunities for the I^2 Fund. We will continue to assess and review our entrepreneurship programs in the context of the Province's overall technology strategy and as part of our innovation mandate.



The EPP provided start-up funding for e@UBC in 2013 that represented about 25% of the e@UBC annual budget. Since then UBC has significantly expanded funding for its entrepreneurship program, which today is animated by 14 staff, a pool of entrepreneurs in residence and a network of mentors.

Genome BC's original funding provided the base for an initiative that five years later supports over 100 active ventures that have raised $155M in equity financing and employs more than 550 people. Comparable impacts have been achieved by investing in SFU's Venture Connection program.

Communication and Societal Engagement Mandate

Genomics and Society

In order to meet its research and innovation mandates, and achieve greater speed to impact, Genome BC will need a deeper understanding of the factors influencing the public's level of acceptance of genomics technology. Responsible innovation suggests addressing societal implications as early in the research phase as possible, with the involvement of end-users and stakeholders. Through its research and societal engagement activities, Genome BC will play a key role in helping to appreciate the requirements for a social license to utilize genomic technology. Implications regarding the use of genomics include the ethical, economic, environmental, legal and social concerns (GE^3LS). Social science theories and research methods are powerful tools that can be used to examine and recognize these societal implications, and what may be important factors in social acceptance of genomic technology. Another key driver of innovation is a clear regulatory pathway and understanding of potential economic impacts. This is addressed through the integrated GE^3LS research in both Genome Canada and Genome BC programs.

Genome BC will continue to build upon our capacity and leadership in the area of genomics and society. The timing is right, and the need is paramount. In order to ensure the development of responsible and informed regulatory systems and policy, we must increase our leadership in this critical area — it is this triumvirate of research, innovation and genomics and society that will drive responsible and acceptable adoption.

Education and Communication

Scientific literacy is essential. Advances in science and technology are rapidly changing our lives; it is affecting everything from how people engage with new products and services, to how students identify careers and prepare for them. Increasingly, people from all walks of life require a basic understanding of the principles of science, technology, engineering and math (STEM) and how they are applied. These skills, combined with other disciplines, teach us how to think critically, solve problems, and make informed decisions. They are becoming integral to every aspect of a person's life, from cradle to grave, and are increasingly important with the advent and uptake of consumer genomics. We need to educate and empower people to make informed decisions and critically question the interpretation of results.

For its contribution to science literacy, Genome BC has developed several communications and education outreach programs in aid of increasing awareness and understanding of genomics. Genome BC's Geneskool™ is a strong example of how science opportunities for youth can be enhanced, so that children grow up understanding, questioning and responsibly applying new technologies. In addition to a variety of programs, Geneskool supports teachers by providing hands-on classroom activities and workshops aligned to BC's grade 9–12 curricula to help educate students about this complex topic in new and interesting ways.

Genome BC's Geneskool positions genetics and genomics in the larger science education ecosystem through strategic partnerships and community development contributions. We foster collaboration and coherence amongst other organizations involved in promoting science as a signatory of the BC Science Charter[17] and core member of the nascent Symbiosis Ecosystem[18].

Genome BC has identified education as a priority and will catalyse the development of health care professional genomics education in BC. In support of our new plan and expanded mandate, Genome BC will work collaboratively with key partners, to develop new genomics educational opportunities for BC health care professionals to help support British Columbians in accessing, and interpreting genomics approaches to their personal health care.

Genome BC is committed to public outreach through thoughtful two-way dialogue — enriching an understanding of the life sciences as evidenced by our ongoing engagement of the media, industry, educators, students and public.

We will continue to leverage our extensive network of researchers, policy makers, industry partners, and entrepreneurs to help facilitate scientific literacy through our robust outreach programming across the Province.

[17] https://www.sciencecharter.ca

[18] https://www.scienceworld.ca/symbiosis

Through current and new initiatives, Genome BC will maintain a balanced influence on how new developments in science are communicated and discussed, and how public policy concerning genomics and its related issues evolve. GBC has identified education of health care providers as a pressing need in order to advance the implementation of genomics in clinical practice. To this end we will work collaboratively with all stakeholders to improve access to resources in this area. For genomics to be broadly adopted, policy makers, regulators, and the public will need to be afforded the opportunity to learn about genomics and its potential applications and implications. Genome BC will enable them to do so.

Co-Funding Strategy

Genome BC was founded as a regional genome centre as part of Canada's genomic enterprise and anchored by Genome Canada and its federal research funding. As a result, Genome BC has traditionally engaged Genome Canada as a co-funding partner. Genome Canada's plans beyond 2019 are consistent with its current scope, centred around funding for academic led large-scale applied and translational research projects, complemented by technology development and national strategic initiatives.

While Genome Canada has been, and is likely to remain, Genome BC's main co-funding partner, we will continue to explore additional co-funding partners to leverage our regional programs strategically and grow our collaborations with the world's best in areas of mutual interest and benefit. Furthermore, Genome Canada's mandate does not currently include innovation. To leverage investments in innovation, Genome BC will develop innovation specific co-funding relationships with partners from industry, government, and the not-for-profit sector to optimize our impact in this space.

Genome BC will proactively select potential regional, national and international partners and develop longstanding, strategic relationships. Once the partnerships are established, we will look to mobilize these partnerships for specific project opportunities. We will establish a company wide methodology to build, maintain and deepen relationships and collaborate on projects and initiatives with our co-funding partners. The relationships will be assessed annually to make sure the pool of partners remains current and consistent with the strategic and operational priorities of Genome BC. As examples, our national, North American, and international partners have included Brain Canada, The Bill & Melinda Gates Foundation, and Genomics England, respectively.

Long-Term Deliverables

Corporate

- Genomics is utilized in our daily lives and valued by British Columbians.
- All sectors benefit from the use of genomics as an essential platform technology.
- The health care system in BC has embraced precision health and the power of genomics.
- British Columbia is internationally recognized for its excellence and national leadership in genomic research and innovation.
- Genome BC is BC's trusted leader and champion of the application of transformational science and its translation into social and economic benefits.

Research

- BC's research ecosystem has the capacity and expertise to serve regional needs and make positive global impacts.
- BC is recognized for its strength in multi-disciplinary discovery and user-driven research across sectors.
- BC's technological genomic infrastructure is accessible to all researchers and end-users across the province.
- BC is the national leader in the establishment of an integrated genomic data framework.

Innovation

- Genome BC follows proven methodologies to achieve optimal innovation results.
- BC will be valued for innovative excellence in select areas of focus.
- Genome BC programs have built end-user capacity for the adoption of genomics.

Genomics and Society

- Genome BC is recognized as a key advisor and policy analyst for genomics and related biotechnology policy questions for BC.
- Genome BC is consulted as a thought-leader on questions related to the societal impacts of genomics-related technology applications.

Education

- » K-12 Geneskool is licensed and disseminated globally.
- » Genome BC offers an education program in genomics for health care professionals in BC.
- » BC medical students have access to genomic training tools.

Communications

- » The first genomic literacy campaign in Canada is established and conducted across BC.
- » Genome BC is recognized as the definitive source in Canada for information about genomics and related biotechnologies.

Entrepreneurship and Commercialization

- » The self-sustaining I^2 Fund drives the creation of high growth life sciences companies across all sectors.
- » BC is the place in Canada where entrepreneurs want to build their 'omics-based companies and Genome BC is seen as the "go to" partner and facilitator.
- » The life sciences ecosystem provides the necessary support to start-ups to become fast growth, scaled-up companies in BC.

Appendices

Appendix 1 — Organization

Appendix 2 — Plan Structure

This high-level strategic plan will be reviewed annually. Through that process the strategic plan will be updated to reflect the past year's progress, changes and the planning cycle will be extended by a year. The structure and key premises of the plan will remain constant unless a material change (e.g., new/different mandate for Genome BC or significant changes in funding) occurs which would then trigger the development of a new plan.

For each of the operational areas of the organization, the relevant executive(s) will be responsible for operating plans that define the strategies and tactics used to implement the strategic plan, and achieve the outcomes described in the long- and short-term deliverables. Each operating plan will have its own structure and timeframe in accordance with the specific requirements of the subject matter. Each executive is responsible for the recurring review, revisions, and updates of their plans.

Tactically, the strategic plan and the operating plans will be implemented on the basis of annual plans that are being prepared as part of the annual planning process. The annual plans define the overall corporate and functional goals and the milestones and activities necessary to realize the deliverables defined in the overall strategic plan.

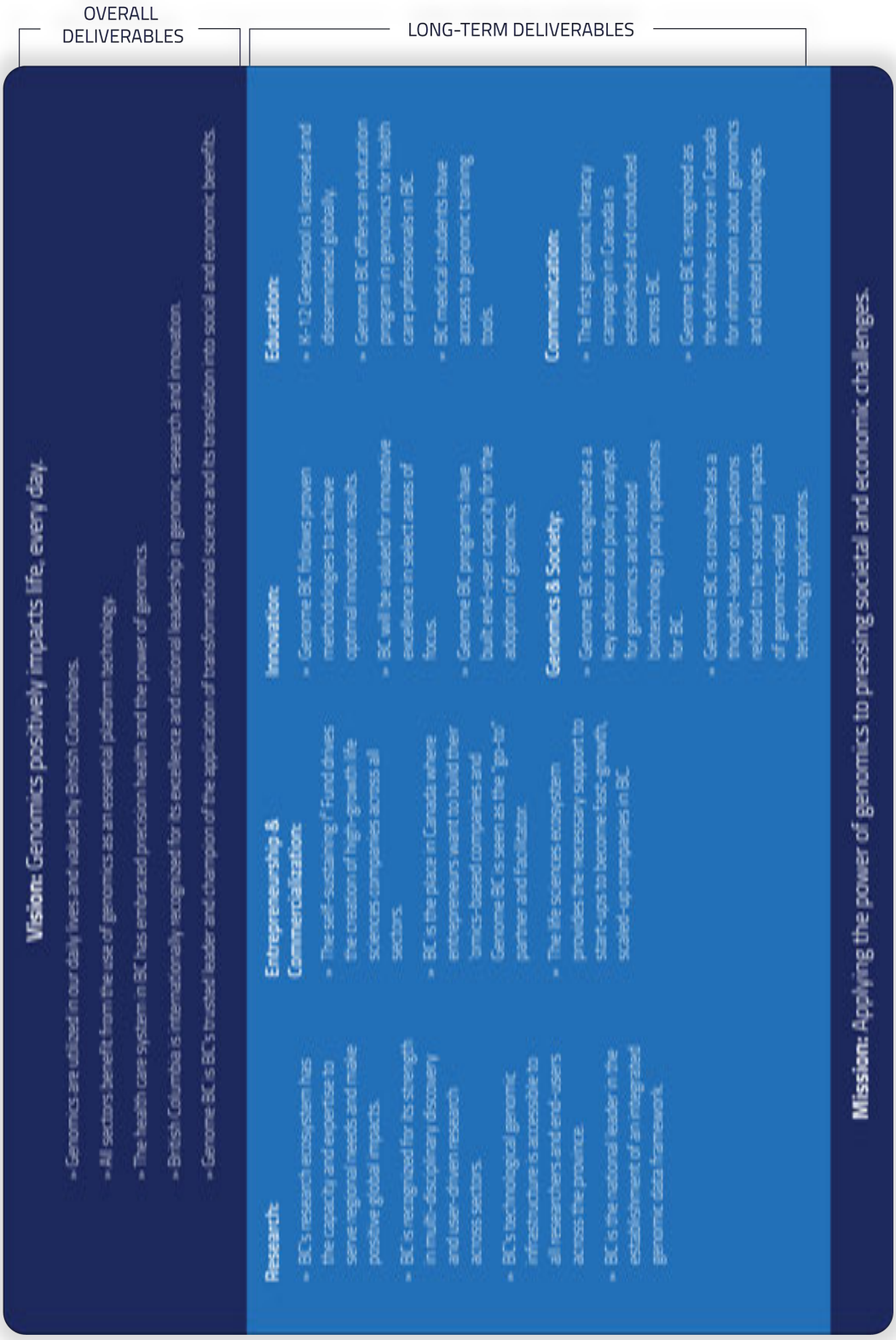
Appendix 3 — Long and Medium-Term Deliverables

PRIORITY AREAS	LONG-TERM DELIVERABLES	MEDIUM-TERM DELIVERABLES
Research	**BC's research ecosystem has the capacity and expertise to serve regional needs and make positive global impacts.**	» Develop and implement initiatives to support scientists participating in Genome Canada competitions. » Advance three projects with topics or areas where BC scientists can be internationally recognized. » Establish one program or initiative aligned with the United Nations' Sustainable Development Goals. » Advance a partnership with an international development organization.
	BC is recognized for its strength in multi-disciplinary discovery and user-driven research across sectors.	» Realize two SIP initiatives that support scientists that have never received funding from Genome BC or Genome Canada. » Approve at least five projects designed to solve industry or user challenges. » Develop and publish strategies to advance the use and application of genomics in each sector. » All large-scale projects include relevant and appropriate GE³LS component and most projects include an external expert able to quantify and determine social or economic benefit.
	BC's technological genomic infrastructure is accessible to all researchers and end-users across the province.	» Support high-throughput platforms that provide access to cutting-edge technologies. » Develop or participate in two programs focusing on technology development, including bioinformatics. » Support one platform, or partnership with an existing platform, that increases regional access to 'omics technologies.
	BC is the national leader in the establishment of an integrated genomic data framework.	» Establish one large-scale partnership with a data-driven BC hub. » Partner in one collaboration with an international big-data initiative.

PRIORITY AREAS	LONG-TERM DELIVERABLES	MEDIUM-TERM DELIVERABLES
Innovation	**Genome BC follows proven methodologies to achieve optimal innovation results.**	» Design, test, use and review for effectiveness three different approaches to accelerate innovation, including programs, processes, funding mechanisms, and other tools.
	BC will be valued for innovative excellence in select areas of focus.	» Establish and bring into operation one multi-disciplinary "centre of excellence" dedicated to galvanizing the adoption of best practices to advance innovation. » Deliver on three different advisory services to support and advance client-led projects.
	Genome BC programs have built end-user capacity for the adoption of genomics.	» Realize a sector-focused comprehensive training, information and knowledge exchange, and launch a user conference pilot to enable the uptake of genomics in that sector.
Genomics & Society	**Genome BC is recognized as a key advisor and policy analyst for genomics and related biotechnology policy questions for BC.**	» Develop and begin implementation of a three-year strategy for active participation in national and international conferences.
	Genome BC is consulted as a thought-leader on questions related to the societal impacts of genomics-related technology applications.	» Develop and launch a strategy to drive credibility and position Genome BC as thought-leader in the area of societal impacts of genomic applications in the health and agrifood & natural resources sectors. » Grow internal GE³LS expertise and support for scientists participating in competitions.
Education	**K-12 Geneskool is licensed and disseminated globally.**	» Hold the first Geneskool teacher camp and evaluate results to leverage opportunities for ongoing teacher engagement. » Develop and pilot the "Geneskool in a Box" suite of resources to support licensing. » Establish a teacher advisory committee to help inform Geneskool programs.
	Genome BC offers an education program in genomics for health care professionals in BC. **BC medical students have access to genomic training tools**.	» Develop an education initiative in support of growing health care professionals' awareness and understanding of genomics

PRIORITY AREAS	LONG-TERM DELIVERABLES	MEDIUM-TERM DELIVERABLES
Communications	**The first genomic literacy campaign in Canada is established and conducted across BC.**	» Establish a methodology and baseline measure for the public's awareness and understanding of genomics.
	Genome BC is recognized as the definitive source in Canada for information about genomics and related biotechnologies.	» Develop and launch an engagement strategy for consumers and end-users of genomics research.
Entrepreneurship & Commercialization	**The self-sustaining I^2 Fund drives the creation of high-growth life sciences companies across all sectors.**	» Obtain $3M in additional funding for the I2 Fund. » Grow the I^2 Fund portfolio to least 15 ventures with an invested asset value of over $12M.
	BC is the place in Canada where entrepreneurs want to build their 'omics-based companies and Genome BC is seen as the "go-to" partner and facilitator.	» Catalyze over five 'omics collaborations between industry, academia, and government.
	The life sciences ecosystem provides the necessary support to start-ups to become fast-growth, scaled-up companies in BC.	» Advance 45 SMEs and support the training of 100 life sciences entrepreneurs through the I^2 Fund and its accelerator partners.

Appendix 4 — Logic Chart



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