



Published October 2025

Mission-driven Research: How Genome Canada Tackles Complex Problems





Executive summary

Canada faces complex challenges—from climate change and health inequities to economic transformation—that demand more than traditional research can deliver. While investigator-initiated research remains essential for scientific excellence, it is not designed to generate innovative solutions to the pressing challenges we face today.

In 2020, Genome Canada made a strategic decision to transform its approach. **We committed to mission-driven innovation, focusing on delivering tangible solutions to clearly defined problems.** Rather than funding research with uncertain impacts, we now identify specific problems upfront, then build coordinated portfolios of research, infrastructure and partnerships designed to deliver concrete solutions.

This shift has reshaped how we work across six dimensions:

From disciplinary silos → **integrated solutions**

From individual projects → **coherent portfolios**

From research outputs → **delivered real-world solutions**

From risk aversion → **balanced innovation investment**

From neutral facilitation → **directional national leadership**

From basic coordination → **strategic ecosystem orchestration**

Five years into this journey, we have learned that mission-driven coordination enhances rather than compromises scientific excellence. The hardest challenge has been maintaining alignment across the ecosystem, but we have found that clear communication about specific problems and required solutions drives remarkable engagement when participants understand how they contribute to larger impacts.

Our experience offers practical lessons as Canada modernizes its research system. We have learned that strategic coordination around solution delivery can achieve transformative impacts impossible through traditional funding models.

Challenge-oriented thinking: The foundation

Canada faces profound challenges that genomics can address: climate change, health inequities, food security, sovereignty and national security, sustained economic growth. These are what scholars call “wicked problems”—complex, multi-faceted challenges with no simple solutions, where the problem definition itself is contested, and where solutions require coordination across multiple sectors and disciplines.

Traditional research funding typically supports investigator-initiated research within established disciplines where projects are independent and selected on their own merits via scientific peer review. This approach has driven tremendous scientific advances and remains crucial to advancing knowledge.

But research can also be strategically directed and focused, driving toward solutions to known challenges. From the Manhattan Project to the Human Genome Project, history shows that mobilizing scientific resources around ambitious goals can drive breakthrough innovations with far-reaching impacts.

Beyond grand challenges: The mission-driven difference

Simply pursuing a “grand challenge” doesn’t guarantee transformative results. Many challenge-based programs remain fragmented, funding isolated projects that, while excellent in their own right, fail to add up to systemic change. The key distinction lies in moving from challenge-oriented to mission-driven approaches.

Grand challenges typically identify broad societal problems and invite researchers to contribute solutions. While valuable, this approach often leads to:

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- + Scattered efforts across multiple, disconnected projects

 - + Lack of coordination between research, policy and implementation

 - + Limited pathways from discovery to real-world application

 - + Unclear success metrics and accountability structures

Mission-driven innovation, by contrast, creates focused campaigns with:

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- + **Clear, pre-articulated problems** requiring concrete solutions

 - + **Portfolio coherence** where individual projects collaborate toward common goals

 - + **Multi-sector coordination** bringing together researchers, industry and government

 - + **Market-shaping ambitions** to create new possibilities rather than fixing existing problems

 - + **Patient capital and long-term commitment** to see transformations through

The European Union’s Horizon Europe missions exemplify this approach: rather than broadly funding “climate research,” they set specific missions like “100 climate-neutral cities by 2030,” creating focused portfolios of research, demonstration projects, and policy coordination.

Six principles that guide our mission-driven work

Genome Canada has embraced mission-driven research and innovation as an organizing philosophy since 2020. This transformation rests on six core principles that fundamentally reshape how we think about funding, coordination and impact:

1) Solutions across sectors, not disciplinary silos

Each of our initiatives begins with a clearly articulated problem that requires integrated solutions. The Canadian Precision Health Initiative asks: How do we deliver genomic medicine equitably across Canada? Our Climate-Smart Agriculture Initiative asks: How do we build climate-resilient food systems? We bring together genomics researchers with clinicians, industry, policymakers and communities to deliver specific solutions, ensuring discoveries connect to implementation.



2) Coherent portfolios, not individual projects

When we articulate a problem, such as building sustainable food production, we design entire portfolios to deliver integrated solutions. *Crop research provides improved varieties. Data platforms enable farmer decisions. Engagement programs ensure adoption. Knowledge mobilization scales implementation.* We invest in the pieces needed to build the solution required.



3) Systems change, not just research outputs

We focus on changing entire systems, not just generating publications or patents. Our precision health initiative does not just aim to discover new genetic markers. It seeks to transform how healthcare is delivered by building the data infrastructure, clinical tools and data governance frameworks needed for genomic medicine to reach all Canadians equitably.



4) Balanced innovation investment, not risk aversion

We accept that transformative innovation requires risk-taking and tolerating failures along the path to breakthrough success. We also impose discipline through milestones required for continuing support, prioritizing delivery over exploration.



5) Directional leadership, not neutral facilitation

We do not just fund projects—we actively steer genomics research toward solutions for climate adaptation, pandemic preparedness and sustainable resource management, ensuring Canadian genomics capacity aligns with Canadian needs.



6) Strategic orchestration, not basic coordination

We leverage our national perspective to align provincial initiatives, connect researchers across regions and ensure distributed efforts reinforce rather than compete—all focused on delivering the solutions our missions require. Our experience shows that this orchestration often creates more value than our direct funding alone.



Translating principles into practice

Through initiatives like the Canadian COVID-19 Genomics Network, the Canadian Precision Health Initiative and the Climate-Smart Agriculture and Food Systems Initiative, we have developed operational practices that bring our principles for mission-driven innovation to life.

Here is how we work:

Front-loaded problem definition: We invest 12-18 months consulting end users, policymakers and communities to define specific problems, with clear success criteria, before any research funding flows. This upfront work builds shared understanding and commitment—and it is worth every minute of effort.

Balanced portfolio construction: We deliberately combine high-risk breakthrough projects with incremental advances, geographic distribution and methodological diversity—all working toward delivering common solutions. Mission success requires this kind of intentional balance.

Connective infrastructure: We fund hub projects focused on knowledge mobilization, standards development and cross-project integration. These hubs ensure individual project outputs combine into coherent mission-level impact rather than remaining isolated contributions.

Milestone-based management: Unlike traditional “fund-and-forget” models, we include provisions to terminate funding and reallocate resources based on milestone achievement. This active management ensures both accountability and flexibility to optimize outcomes as missions evolve.

Portfolio-level decision making: While maintaining rigorous technical peer review, final funding decisions rest with portfolio review committees that consider scientific merit alongside impact potential, risk profile, geographic distribution and equity implications. Building effective mission portfolios requires both scientific expertise and strategic judgment.

Solution-focused knowledge mobilization: We develop robust communications approaches targeting users, policymakers and the public through diverse channels—extending far beyond traditional academic outputs to ensure solutions reach those who need them.

Adaptive resource allocation: Rather than pre-allocating all funding at launch, we maintain flexibility to mobilize additional resources as projects evolve and new opportunities emerge. This allows missions to respond to early successes, pivot away from dead ends and capitalize on unexpected breakthroughs.

Ecosystem partnership, not solo operation: We recognize that transformative solutions require working within a complex system of partners. Mission success depends on identifying fellow travelers, understanding dependencies, building connection points and leveraging support systems across the entire ecosystem—in Canada and internationally. We don’t try to do everything ourselves. We enable and amplify the collective capacity of Canada’s genomics community.

Organization-wide alignment: We align all organizational functions—from program and business development to communications to finance—around mission success. This “mission control” approach ensures our capabilities adapt to mission needs rather than forcing missions to conform to existing structures.

Lessons learned: Reflections from five years of mission-driven innovation

Genome Canada's experience implementing mission-driven approaches over the past five years has generated valuable insights about the power and the challenges of this approach:

Institutional inertia is real: Change is genuinely difficult, and established systems naturally want to revert to familiar, independent processes. Sustaining mission-driven coordination requires constant attention and reinforcement of new ways of working, as the pull toward traditional siloed approaches remains strong throughout mission lifecycles.

Scientific excellence persists: Mission-driven coordination does not compromise scientific quality—it enhances it by connecting excellent research to meaningful applications. Projects within missions continue to generate outstanding scientific outcomes that have merit in their own right, while also contributing to larger societal goals.

Leadership as convener, not a performer: Successful mission-driven organizations excel at convening and coordinating rather than trying to perform all activities directly. Genome Canada's most effective initiatives leverage the extraordinary capabilities available across industry, academia and civil society through roundtables, working groups and collaborative networks, rather than attempting to create new capabilities from scratch.


Clear, achievable goals drive alignment: Mission success depends on laser-focused objectives with measurable outcomes, not open-ended discussions. When participants understand exactly what they're working toward and can see concrete progress markers, coordination becomes significantly easier and more effective.

Alignment drives enthusiasm: When institutions, individuals and organizations understand clearly why they are participating and what is expected of them—and when they can see how they can thrive while contributing to larger impacts—they engage with remarkable enthusiasm. Clear leadership and transparent communication about mission goals and expectations prove essential for generating this buy-in.

Leveraging existing capabilities multiplies impact: Rather than building parallel systems, mission-driven approaches achieve greater impact by strategically connecting and amplifying existing strengths across the ecosystem. Genome Canada's orchestration role—bringing coherence to distributed efforts—often creates more value than direct funding alone.

Progress over perfection enables innovation: Mission-driven leadership requires accepting that transformative innovation involves relaxing traditional risk-averse approaches. Recognizing that progress is more important than perfection allows organizations to fund ambitious projects and adapt quickly as missions evolve, while maintaining accountability through milestone-based management.

Adequate resourcing is essential for mission success: Transformative missions require sufficient investment to achieve their ambitious goals. Underinvestment in mission-driven initiatives proves penny-wise but pound-foolish when addressing complex societal challenges that demand coordinated, sustained effort across multiple sectors and timelines.



Complementary approaches are essential: Mission-driven initiatives build upon and complement, rather than replace, investigator-initiated research and project-level applied research. The foundation of basic research and training remains crucial for generating the knowledge and talent that missions mobilize toward specific challenges.

Coordination is the hardest challenge: The most difficult aspect of mission management often involves orchestrating alignment across the ecosystem. This coordination challenge operates at multiple levels: between federal and provincial priorities, across industry and academic perspectives, and among international partners working on shared global challenges.

Early and extensive consultation is essential: Ensuring mission success begins long before funding decisions are made. Front-loaded, inclusive consultation with end-users, industry partners, researchers, policymakers and affected communities is critical for defining challenges accurately and building legitimacy. This upfront investment in understanding diverse perspectives and needs prevents costly course corrections later and ensures missions address real-world priorities rather than assumed problems.

Ongoing transparent communication drives sustained engagement: Clear, consistent and transparent communication throughout the mission lifecycle proves essential for maintaining alignment and enthusiasm. When participants understand not only the mission goals but also how decisions are made, how progress is measured and how their contributions fit into the larger picture, they remain engaged even through inevitable challenges and pivots. This ongoing dialogue also enables continuous refinement of mission strategies based on stakeholder feedback and emerging insights.

Governance architecture matters: Successful missions require careful attention to “soft infrastructure,” such as steering committees, subject matter expert panels and clearly defined and ongoing decision-making structures and accountabilities. Since mission projects are not independent islands, teams need clear understanding of where they have autonomy and where they need approvals, along with trust in these governance processes.

Global challenges require global coordination: Wicked problems do not respect national borders, making international engagement essential for mission success. Canada’s genomics missions achieve greater impact when coordinated with similar efforts in other countries, sharing both approaches and outcomes across national boundaries.

Collective impact creates value: The fundamental insight remains that coordinated efforts are greater than the sum of their parts. When properly orchestrated, mission-driven approaches can achieve transformative impacts that would be impossible through traditional research funding models. Strategic coordination is crucial to addressing society’s most pressing challenges.



Looking forward: Informing Canada's research modernization

Budget 2024 announced plans to modernize Canada's research system through a new capstone organization bringing “strategic vision and coordination” to increase impact through “better coordination and stronger connections among diverse actors.”

Our five years of mission-driven practice has taught us lessons that may be relevant to this modernization:

- + **Strategic prioritization is essential.** In a country Canada's size, spreading resources evenly across all areas dilutes impact. Identifying and focusing on areas of strategic national priority delivers far greater returns than attempting to fund everything equally.
- + **Front-loaded problem definition creates alignment before funding flows.** Upfront investment pays massive dividends.
- + **Clear solution requirements focus diverse efforts** toward common goals without stifling creativity.
- + **Connective infrastructure ensures contributions combine effectively.** Individual excellence alone is not enough.
- + **Strategic orchestration multiplies impact beyond what direct funding achieves.** Our convening and coordination role often matters more than our dollars.
- + **Adaptive management maintains accountability while enabling flexibility.** Rigid plans do not survive contact with reality.

Most importantly, we have learned that focusing research on delivering tangible solutions to clearly articulated problems enhances scientific excellence by connecting outstanding research to meaningful outcomes. Mission-driven coordination creates more value precisely because research efforts combine to deliver solutions rather than remaining isolated.

As Canada considers how to modernize its research system, our experience suggests that strategic coordination around solution delivery can position the system for transformative impact on the challenges that matter most. We do not claim to have all the answers, but what we have learned along the way may help others considering similar journeys.

Genome Canada's mission focus areas 2025-2030

Genome Canada's large-scale, mission-driven initiatives leverage federal investment and co-funding from across sectors to align Canada's genomics ecosystem for transformative impact.

Precision health

The Canadian Precision Health Initiative is building modern, precision health care ecosystem enabling more personalized, predictive, preventative and cost-effective health care for all Canadians — regardless of geography, background or identity. The initiative will generate Canada's largest-ever human genomic data resource (100,000 human genomes).

Agri-food resilience

To strengthen the resiliency, environmental sustainability and economic viability of Canada's food production systems, the Climate-Smart Agriculture and Food Systems Initiative is investing in a portfolio of cutting-edge research projects. These projects are connected through cross-cutting data coordination and knowledge mobilization hubs designed to accelerate impact across the agri-food sector.

Bioeconomic growth and natural resources

This upcoming large-scale initiative will unlock the power of genomics to fuel Canadian productivity and economic growth while safeguarding the biodiversity and health of our forests, prairies, lakes and oceans.

*Genome Canada's strategic plan for 2025-2030 also includes accelerating the **commercialization and adoption** of genomic technologies and strengthening national **genomic data governance and coordination** — focus areas that underpin our targeted missions.*



Learn more at genomecanada.ca

Genome Canada's main office is located on the unceded traditional land of the Anishinabe Algonquin Nation.