Planning for our Future

Innovation Platforms Working Group Position Paper

Alberta Innovates Health Solutions

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INTRODUCTION

Alberta Innovates - Health Solutions's (AIHS) legislated mandate is to *"support, for the economic and social well-being of Albertans, health research and innovation activities aligned to meet Government of Alberta priorities, including, without limitation, activities directed at the development and growth of the health sectors, the discovery of new knowledge and the application of that knowledge".*

To deliver on its mandate, AIHS activities support the strategic framework of *Alberta's Health Research and Innovation Strategy* (AHRIS), which aims to improve the health and socio-economic status of Albertans through two strategic priorities: Wellness at Every Age and an Innovative Health Service Delivery System. The strategic priorities described in AHRIS encompass areas for research and innovation across the spectrum of health—from prevention to chronic disease to personalized medicine—and across the research spectrum of discovery to application.

The Innovation Platforms (IP) Working Group was established by the AIHS Board-appointed Oversight Committee as part of the organization's strategic implementation process. The strategic implementation process involves broad stakeholder engagement, the ultimate purpose of which is to recommend high quality initiatives for consideration by the AIHS Board of Directors. AIHS's implementation process will result in a suite of initiatives that closely align with AHRIS, support a balance of curiosity-based and problem-led health research, mobilize and use knowledge, and measure the impact of these strategic investments. The key determinants for AIHS will be: quality of the proposed initiatives, relevance to the strategic framework of AHRIS, and availability of resources.

The Innovation Platforms Working Group is composed of people who bring the perspectives from the broad groups of stakeholders relevant to AIHS's mandate in Alberta's health research enterprise, including: the Government of Alberta (GoA), private industry, the health sector (including Alberta Health Services), knowledge translation and technology commercialization proponents, the post-secondary institutional system, and perspectives from outside Alberta.

Background and Context

What are Innovation Platforms?

Definition of Innovation Platforms:

AHRIS defines Innovation Platforms as "a technological and organizational environment conducive to discovery and knowledge development that will help fuel innovation." Thus, an Innovation Platform is more than just infrastructure, it is a roadmap for innovation, an approach that:

- *Integrates "technology push" and "market pull" to drive technically actionable and meaningful innovations;*
- *Drives technological, scientific and conceptual innovation to advance research in health*
- *Leverages a variety of competencies and assets (including those of partners);*

- *Cuts across traditional organizational boundaries to capture province-wide opportunities and enable seamless handoffs of ideas and projects across the discovery to application research process.*

Innovation Platforms are essential frameworks for focusing innovation activities and initiatives, with success requiring integrated cross disciplinary groups of highly skilled and entrepreneurial people working collaboratively—both within and beyond a single institution.

*Guiding Principles (*or *Key Success Factors)*

The IP Working Group identified the following key success factors to be considered in the development of IP recommended programs and initiatives:

- **Scope**
  Innovation Platforms are inherently collaborative, multi-faceted, and widely accessible. To be classified as an Innovation Platform, the platform must be focused on innovation activities and initiatives, require integrated collaboration, and involve cross-disciplinary groups of highly skilled and entrepreneurial people.

- **Inclusion of Outcomes/Measurements of Success**
  Appropriate evaluation and outcomes measures are crucial to any innovation platform development. Metrics to be considered could include (as appropriate and applicable) the number of commercialization opportunities, improved academic results, improved health, etc.

- **Leveraging**
  Impact is maximized through leveraging opportunities, financial or through in-kind contributions. Innovation Platform development will consider the value of a pan-Alberta approach, and encourage increased leveraging of the resources and expertise available across the province to multiple users and applications.

- **Recognition of the importance of Knowledge Translation**
  Innovation platforms can play a complementary role in the knowledge translation and exchange process, helping fill the critical gap between discovery and application, and enabling active connections with the public, not for profit, community-based innovators, industry, health professionals and practitioners (including within AHS's Strategic Clinical Networks), and decision-makers.

- **Evaluation**
  Evaluation of results is foundational to successful Knowledge Translation. Appropriate evaluation and monitoring should be integrated into any innovative platform programs and initiatives, and results should impact and inform additional research questions/approaches.

- **People**
  Highly skilled people are integral to successful innovation platforms. Incentives and mechanisms to train and fund high-quality staff, and to sustain this expertise within innovative platforms, are required.

- **Integration**
  Innovation Platforms in Alberta should be developed and guided according to the principles outlined in AHRIS. Integrating new platforms into Alberta's overall strategy and health system is critical to success so that we ensure their broad use and access, and maximize their impact.

- **Recognition of the full continuum of research and innovation**
  Designed programs and initiatives will recognize the value of research across continuum, from curiosity to issue driven.

- **Adoption of a broad definition of "health research" and "health researcher"**
  Health research and innovation is conducted in a wide range of disciplines beyond the traditional domains, such as social sciences, environmental protection, various branches of engineering, agriculture and food, information and communications technologies.

Key Issues and Opportunities

From its discussion of the health research environment and review of the current state of IP, the Innovation Platforms Working Group made several key observations. These observations act as strategic considerations for the development of instruments and activities to be implemented by AIHS. The key strategic observations are as follows:

Strategic Observation 1

AIHS must take advantage of opportunities to build on existing provincial strengths in innovation platforms.

As a coordinated provincial health research and innovation strategy, AHRIS presents an opportunity for Alberta Innovates – Health Solutions to build upon:

- its past investments in Alberta (with a focus on the support of people as the key engine of the system);
- its engagement with primary stakeholders in the areas of health services, delivery, and policy, ensuring the application of critical research and innovation efforts in the province.

Strategic Observation 2

AIHS must develop and maintain effective collaborative linkages within the provincial research and innovation enterprise in order to fulfill its mandate and capitalize on opportunities.

A coordinated provincial health research strategy presents an opportunity for Alberta to build on its past investments in Alberta researchers and infrastructure. The IP Working Group discussed the necessity of ensuring that AIHS activities are aligned with other organizations—which have agendas and mandates with common points of interest—while still maintaining the integrity of the unique aspects of AIHS's role in the provincial framework. These collaborations will help ensure the delivery of optimal health and socio-economic outcomes through the support of world-class research and innovation.

Partnerships with all relevant stakeholders, in particular within the Alberta Innovates system, with the GoA, the post-secondary institutions, industry, and with the health delivery system, are crucial to AIHS's success. Within the context of this collaborative environment, the roles and responsibilities of each entity must be clearly identified, understood, and coordinated.

Strategic Observation 3

AIHS must seek to define needs and exploit the gaps and transition points within the continuum from health research to innovation.

A focus on gaps or transition points could enhance the competitiveness and sustainability of the provincial health research enterprise, while supporting innovation and reducing the loss of momentum.

Strategic Observation 4

In order to meet its mandate, AIHS must improve the ability to measure health outcomes including socio-economic and other tangible outcomes.

Alberta Advanced Education and Technology identified accountability as a principle informing the restructuring of the provincial research and innovation framework. Their framework requires clear and specific outcome accountabilities for each organization within the system. As well, there is a requirement for effective performance measures and indicators of performance for the system as a whole and each of the organizations in the system.

Evaluation is foundational to Innovation Platforms; each AIHS initiative or program will require an evaluation strategy to define and measure its success in relation to IP. The evaluation strategy will be determined at the front end of the activity and should be based on principles and guidelines. Evaluation should be an interactive loop, feeding back to the original idea or action to help measure success.

Alberta requires more expertise in the area of performance management and outcome measurement; capacity building is required. A broad discussion on performance management best practices should be coordinated to determine how performance management is evolving. This discussion should include a wide array of stakeholder integration to ensure proper evaluation criteria is met.

Strategic Observation 5

AIHS must enable clear communications among its stakeholders (including all Working Group members) in order to deliver on its organizational mandate.

The IP Working Group discussed the importance of clear communication among and across the Foundational Working Groups to prevent duplication of effort. The Working Group recognized the close relationship between the three Foundational Working Groups–Highly Skilled People, Innovation Platforms, and Knowledge Translation–and the value of facilitating communications, such as joint meetings, cross-representation at Group meetings, regular discussions with and amongst the Co-Chairs as well as to the broader community via stakeholder consultation processes.

Recommendations

Using the IP-related actions outlined in AHRIS as a structure and the Position Paper as a reference point, the Working Group recommends the following as potential AIHS Innovative Platforms initiatives.

1. Support an Innovative Infrastructure funding opportunity as a component of the Collaborative Research and Innovation Opportunities (CRIO) Program

Description: A novel, *flexible* program which could be offered as a component of the CRIO portfolio. The Innovative Infrastructure opportunity would be used to put outstanding groups or unique teams of Alberta researchers on the leading edge of discovery, knowledge translation, and innovation. Any type of infrastructure (human resources, equipment, database, data registry, etc.) would be eligible for support. **Objectives:** The objective of the Innovative Infrastructure opportunity is to support and maintain infrastructure essential to the success of Alberta's health researchers and innovators.

Context: The Innovative Infrastructure opportunity would be provided as a component of the CRIO Program. Funding from this program will not be used to provide Canada Foundation for Innovation matching funds.

Applicants would have to provide evidence of:

- the infrastructure's potential impact on the research of the collaboration;
- the infrastructure as essential to the nature of the research work;
- a description of the operating funds in place to support the research being catalyzed through the requested infrastructure.

2. Support Innovative Networks

Description: AIHS would support innovative networks to collaborate with national and international initiatives. Funded networks would be expected to act as a provincial resource, sharing data and knowledge in order to support an efficiently functioning, integrated health research and innovation system in Alberta.
Objectives: To facilitate effective interdisciplinary health research and innovation networks in Alberta; to enable these networks to take better advantage of national and international opportunities; and to improve Alberta's position on the national and international research and innovation scene.

The ability of these networks to attract additional resources in Alberta and externally would be a consideration for AIHS support.

Context: Support would be provided through the CRIO Program.

3. Support Innovative Systems Level Platforms

Description: Alberta's health research and innovation stakeholders need efficient and effective provincial "systems platforms," such as access to data, clinical trials platforms or human health ethics, to enhance Alberta's appeal as an attractive jurisdiction for health research investments. AIHS will take a leadership role in identifying and/or supporting systems level platforms. AIHS's experience in facilitating the harmonization of health ethics and clinical trials in Alberta will act as a model for addressing other identified systems level platforms issues.
Objectives: To provide Alberta a competitive advantage in accelerating research; to facilitate the rapid uptake of research results; and to make Alberta a more attractive jurisdiction for increased national and international investments.

4. Support Innovative Training Units (Training Programs)

Description: Alberta's greatest health research and innovation resource is its highly skilled people who have been developed or attracted to Alberta by our universities, health system, and/or the private sector. AIHS would provide support for training units (training programs) that stakeholders identify as critical in building Alberta's research and innovation capacity. These training units will be:

- focused on building capacity for translational activity and/or in areas of identified need for Alberta (for example, bioinformatics);
- complementary to individual trainee support provided for Graduate students and postdoctoral fellows through the AIHS Graduate and Post-graduate training awards;
- provincial in scope;
- interdisciplinary.

Objectives: To provide a provincial resource which targets specific training units that focus on the development of capacity to meet the needs of priority health research and innovation areas in the province.

APPENDIX A
STATE OF THE AREA

The provincial Innovation Platforms landscape has continued to evolve in recent years. The reorganization of the provincial research and innovation system included the creation of the Alberta Innovates corporations in January 2010. Each of these corporations, including Alberta Innovates - Health Solutions, is giving strong consideration to various aspects of IP as they position themselves within the new system.

Alberta Asset Map for Health Research Platforms, prepared by International BioPharma Solutions Ltd. in September 2011, focuses on all the health research platforms that support health research in the province and analyzes how well they are aligned with AHRIS. Assets (platforms) include both Innovation Platforms and other support components.

Strengths identified in the Asset Map were in several areas of basic research, such as virology, prion research, genotyping, and bioinformatics. Basic research strengths that have led to some translational successes include metabolomics, nanotechnology, neuroscience, and stem cells. Strengths in translation include:

- Imaging, where a number of innovations are, or are expected to be, significantly improving patient outcomes, particularly in cancer;
- Rehabilitative medicine, including neurological subspecialties and reconstructive sciences;
- Cardiovascular research where all platforms are considered to be translational;
- Bioengineering, with the province's expertise in this field underpinning its strengths in nanotechnology, medical device development, and tissue bank management.

According to the information gathered in the Asset Map, Alberta has 33 probable Innovation Platforms (i.e., cross-disciplinary expert researchers, collaborative environment, translational activities, and informatics capability).

Technological Platforms

The Asset Map identifies 124 Technological Platforms in Alberta. These include those related to genomics, imaging, animal models, nanotechnology, biosafety, stem cell facilities, and others. There is overlap in many of the scientific facilities at the institutions, which is not surprising as many of the areas have experienced convergence (e.g. genomics, nanotechnology, and informatics), and are involved in a broad array of research activities.

Genomics

The Asset map identified 34 facilities in Alberta that are housing genomics equipment. At the time, there is only one facility with a next generation sequencer, an important instrument for today's genome sequencing projects. This is housed at the Alberta Ingenuity Centre for Livestock Genomics

Technology at the University of Alberta. This facility focuses on agricultural genomics. More conventional sequencers can be found at the University Core DNA Services at the University of Calgary and the Applied Genomics Center at the University of Alberta.

Compared to other provinces, genomics is not a strong area for Alberta as it lacks next generation sequencers. Nonetheless, Alberta has a large number of other assets for genomics research, but 91% of those assets are essentially basic research facilities. This includes those areas in which Alberta has national prominence such as genotyping, bioinformatics, and metabolomics. However, the Pan Alberta Metabolomics Platform (PanAMP) (which has international prominence) has become a clinical trials support unit as well as a basic research facility, thereby shifting its focus somewhat towards health outcomes. The metabolomics community at the University of Alberta has also identified novel metabolomics biomarkers for asthma, pregnancy complications, bacterial pneumonia, and inflammatory arthritis.

Imaging

According to the Asset Map, 34 facilities in Alberta have strong capabilities in imaging people, animals, cells and materials. These imaging platforms include eight facilities that specialize almost exclusively in imaging: the Mio-imaging Facility at the University of Lethbridge, the Cell Imaging Centre and the MR Research Centre in the department of Biomedical Engineering at the University of Alberta, and the Bone Imaging Laboratory, Microscopy and Imaging Facility, Seaman Family MR Research Centre, and the Experimental Imaging Centre at the University of Calgary. Although the Quantitative Imaging Centre's primary focus is petroleum recovery and advanced materials, it could also be used for health related applications.

Thirteen of the 34 imaging platforms have translational capabilities either as probable or fledgling Innovation Platforms. A number of innovations are, or are expected to be, significantly improving patient outcomes, particularly in cancer.

Animal Models

The Asset Map identified fifteen facilities as developing animal models for use in health research. These models range from transgenic mice and zebra fish to mouse and catfish immunological models. Five are situated within probable innovation platforms while ten are far more aligned with basic research initiatives.

Nanotechnology

Nanotechnology (nanotech) has utility in electronics, materials construction, machinery and tools, pharmaceuticals, and health care. Nanotech can be applied to the latter two applications for miniaturized diagnostic implants (for early diagnosis and monitoring of illnesses), nanoscale coatings to improve the bioactivity and biocompatibility of implants, ultra-precise drug delivery systems, sensors for Lab-on-a-Chip, and bone tissue regeneration. The Asset Map identified seven facilities

that are applying nanotechnologies to health research. The nanotech platforms include the National Institute for Nanotechnology, a pan-Canadian facility headquartered in Edmonton.

Biosafety

Alberta has Biosafety Level 2 and 3 facilities at five locations; one is within a probable innovation platform (CEGIIR), while another is involved in translation (PPRF). The other three are more closely aligned with basic research.

Other Technological Platforms

Many of the institutions listed in the Asset Map have a wide range of facilities and equipment. These facilities and their technologies do work on issues related to biochemistry, chromatography, flow cytometry and cell sorting, histochemistry, histopathology, microbiology, spectrophotometry, and stem cells.

Information Based Platforms

The Asset Map identified 33 information based platforms that are involved in health research. No doubt many of the other facilities identified throughout the report also have informatics platforms not specifically identified.

Alberta has some significant information based platforms. For example, Alberta NETCARE is a potentially important resource for researchers and those conducting clinical trials. Alberta NETCARE accesses the provincial Enterprise Master Person Index (EMPI), which links patient demographics, unique life time identifiers, and facility based record numbers to facilitate one person, and one record view of health history; however, this information is currently safeguarded for primary use. There is an opportunity to expand the content and use of EMPI for clinical trials. With appropriate safeguards and certain policy changes, more of this linked patient data could be made available for population health studies and to improve efficiency and effectiveness in health services.

Health Informatics

Health informatics is a discipline at the intersection of information science, computer science, and health care. Health informatics generally refers to the management of patient or health information in some manner. The Asset Map identified 12 health informatics facilities in Alberta.

Bioinformatics

There are seven bioinformatics facilities in Alberta. Six bioinformatics facilities are heavily involved in the management of genomics data. The Flow Cytometry Facility at the University of Alberta, analyzes data from flow cytometry and cell sorting.

Alberta does have some issues in the bioinformatics area; there is a lack of appropriate hardware and software and, as with the rest of Canada, the province faces a shortage of qualified personnel. This hinders analysis and interpretation of genome sciences and other molecular data.

Patient/Database Registries

Patient databases and registries contain anonymized healthcare data and patient information to allow researchers access to them, and are often related to a specific disease type.

Human Resource Based Platforms

All the health research platforms involve training of some kind, from skills in basic science techniques to patient management; the Asset Map identified 28 specific training facilities. As well as the training offered at the province's three research intensive universities, 14 other educational institutions in the province also offer potentially relevant training.