



ANNUAL IMPACT REPORT FOR HEALTH INNOVATION 2019-20

albertainnovates.ca



Acknowledgements

This report is a summary of the outcomes and progress to impacts achieved in 2019/20 resulting from research and innovation investments by Alberta Innovates' Health Innovation portfolio and the associated grant and awards that report in Researchfish®.

The outcomes and early impacts demonstrated by Alberta Innovates through our health research and innovation investments reflect the achievements being made by our researchers and members of their research groups, trainees, partners, and many more. We gratefully acknowledge the effort of our research community and partners in compiling and submitting their achievements for this report.

ISBN: 978-1-894927-95-6 (Print)

ISBN: 978-1-894927-96-3 (Online)

Contents

Executive Summary 3

Introduction 5

Measuring Achievements 6

Revised Method of Analysis 7

Health Innovation Strategies 7

Strategic Investments 7

Collaborations and Partnerships 8

Provincial Platforms 8

Supporting Research and Innovation Projects 9

Building Research and Innovation Capacity 9

- Highly Skilled Personnel (HSP) 9
- Further Funding 10
- Awards and Recognition 11
- Research Tools and Methods 12
- Research Databases and Models 12
- Software and Technical Products 13

Expanding Teams Through Collaboration 13

In-Kind Contributions Through the Use of Facilities 16

Industry Engagement 16

Sharing Evidence 16

- Engagement 17
- Influence on Policy and Practice 19
- Artistic and Creative Products 20
- Publications 21

Health and Wellness Impacts 23

Contributing to Social and Economic Prosperity 25

- Intellectual Property and Licensing 25

Supporting Health Innovation 26

Provincial Platforms 26

- Alberta SPOR SUPPORT Unit (AbSPORU) 26
- Health Research Ethics Board of Alberta (HREBA) 28
- A pRoject Ethics Community Consensus Initiative (ARECCI) 28
- Alberta Clinical Research Consortium (ACRC) 29
- Alberta Data Institute (ADI) 30

Summary 33

References 35

Appendix A: Methods, Data Sources and Timeframes 36

Revised Method of Analysis for the 2019/20 Report 36

- Data Collection 36
- Data Management and Quality Assurance 37
- Analysis 37

Appendix B: Strategic Investments 38

Tables

Table 1: Top Sources of Additional Funding 11

Figures

Figure 1: AI's Research and Innovation Impact Framework 6

Figure 2: Building Human Research Capacity 9

Figure 3: Growing AI's Investments 10

Figure 4: Types of Award Received 11

Figure 5: Types of Research Material Created 12

Figure 6: Types of Research Databases and Models Developed 12

Figure 7: Software and Technical Products 13

Figure 8: Timing of Collaborations and Partnerships Relative to Grant or Award Start Year 14

Figure 9: Collaborators and Partners Around the World 15

Figure 10: Collaborators and Partners in Canada 15

Figure 11: Purpose of Engagement Activities with Industry Partners and End-Users 16

Figure 12: Types of Engagement Activities 17

Figure 13: Geographic Reach of Engagement Activities 17

Figure 14: Primary Audiences for Engagement Activities 18

Figure 15: Primary Outcomes of Engagement Activities 18

Figure 16: Types of Influences on Policy, Practice, Patients, and the Public 19

Figure 17: Outcomes of Influences on Policy, Practice, Patients, and the Public 20

Figure 18: Type of Creative Product 20

Figure 19: PRIHS project graphic record: South Zone Indigenous Patient Navigation Model 21

Figure 20: Medical Products, Interventions and Clinical Trials 25

Figure 21: Intellectual Property and Licensing 25

Figure 22: ADI Client Engagement Process 31

Figure 23: ADI Development Approach 31

Executive Summary

Alberta Innovates is committed to evolving Alberta's research and innovation system to be more responsive to the needs of Albertans and more focused on impacts. This includes supporting research and innovation activities that focus on the priorities of Albertans, as well as working with our partners to cultivate a more seamless innovation system with a clear path from discovery to impact.

Alberta Innovates has a long history of collaborating with other funders to advance impact assessment in the health sector. This includes serving as a leader in the development and use of shared impact assessment tools and frameworks. Each year since 2014/15, Alberta Innovates has published an annual impact report to:

- Demonstrate to Albertans how investments in research and innovation contribute to health and wellbeing, as well as to economic diversification in the province.
- Share the impact-related evidence that helps inform our decision-making with the broader innovation ecosystem; and
- Assist the research community in responding to the need to report on the achievements they make through publicly funded research activities more comprehensively and consistently.

The 2019/20 Annual Impact Report highlights the ways in which Alberta Innovates is making a difference for Albertans through our strategic investments in health research.

Health Research and Innovation (R&I)

Impact Highlights 2019-20



Catalyzing Health R&I
FROM DISCOVERY TO IMPACT

\$32.8 MILLION
in Annual Investments



206*
Active R&I Project and People Investments

Collaborating to accelerate health R&I

Pursuing partnerships and engagement to identify needs and translate evidence



547
Engagement Activities



621
Partnerships



47
Teams Engaging with Industry

Making health R&I easier to do in Alberta

Advancing knowledge and building capacity through new discoveries and enabling platforms



28

Facility In-Kind Contributions

27

New Research Tools/Methods Developed



More streamlined ethics review, completed in

57 days

on average, for faster study start-up

Launch of the ADI dataxch.ai technical platform featuring

250,000
datasets from

3,500
sources



578
Publications



Enhancing health and wellbeing

Moving research into practice to improve health and the healthcare system



10

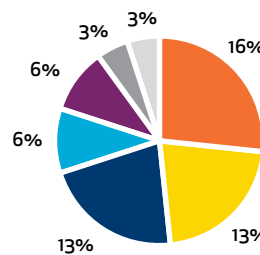
New Medical Products/Interventions Developed

46

Opportunities to Influence Policy & Practice



Opportunities to Influence Health Policy and Practice Outcomes



- Improved workforce: education/skills
- Improved well-being: quality of life, morbidity, survival
- Efficient and effective service delivery
- Improved service accessibility
- Effective solutions to societal problems
- Improved environmental sustainability
- Improved regulatory environment

Helping grow our economy

Developing talent, attracting investment, and generating novel discoveries that contribute economic benefits



2,262

Highly Skilled People Supported



\$57.6M

Leveraged Funding



5

Intellectual Property Applications Protected

*This report is a summary of the outcomes and progress to impacts achieved in 2019/20 resulting from research and innovation investments by Alberta Innovates' Health Innovation portfolio and the associated grant and awards that report in Researchfish®.

Introduction

Alberta Innovates (AI) invests in Research and Innovation (R&I) to improve the health and well-being of Albertans and create social and economic benefits. The Health team delivers a robust R&I portfolio that engages clients and provides supports and services across the innovation spectrum, with the aim of building a strong and resilient R&I health ecosystem for a healthy population. AI focus areas and investment in the health sector include:

Health System Transformation

- Supporting R&I projects to facilitate the development and adoption of novel solutions that will transform health care delivery for patients in Alberta and improve health outcomes through the development of new treatments, technologies, and models of care.
- Linking health systems with small and medium-sized enterprises (SMEs) to facilitate the co-design of solutions that address real-world health problems; and
- Continuing to implement a shift towards supporting a digital future by deploying additional resources and retooling existing mechanisms to support digital health enablement.

Talent and Ecosystem Capacity Development

- Delivering opportunities aligned to sector needs that support the development of highly skilled people through training and early career development programming to generate the talent needed for the future economy.
- Funding opportunities to train, attract, and maintain leading researchers and innovators in Alberta.

Health Innovation and Technology Acceleration

- Accelerating the translation of new discoveries into care by partnering with key entities in the innovation field, from medical device makers to SMEs.
- Supporting health-technology companies with market access, providing opportunities for health system partnerships and real-world data generation
- Reducing barriers to innovation by coordinating and integrating Alberta's R&I system through provincial platforms and collaborative partnerships that:
 - Increase the prevalence and quality of patient-oriented research.
 - Facilitate high quality, integrated and efficient clinical research.
 - Provide a streamlined model for human health research ethics review; and
 - Put secondary health and health-related data to work.

Emerging and Strategic Opportunities

The support AI provides through its Health portfolio (herein referred to as "Health Innovation") enhances the science knowledge base in Alberta. Alberta Innovates' investments are used to advance high-quality R&I projects and innovative solutions that address the needs of the population. This report provides an overview of the achievements made through the support and services of AI Health Innovation in 2019/20.

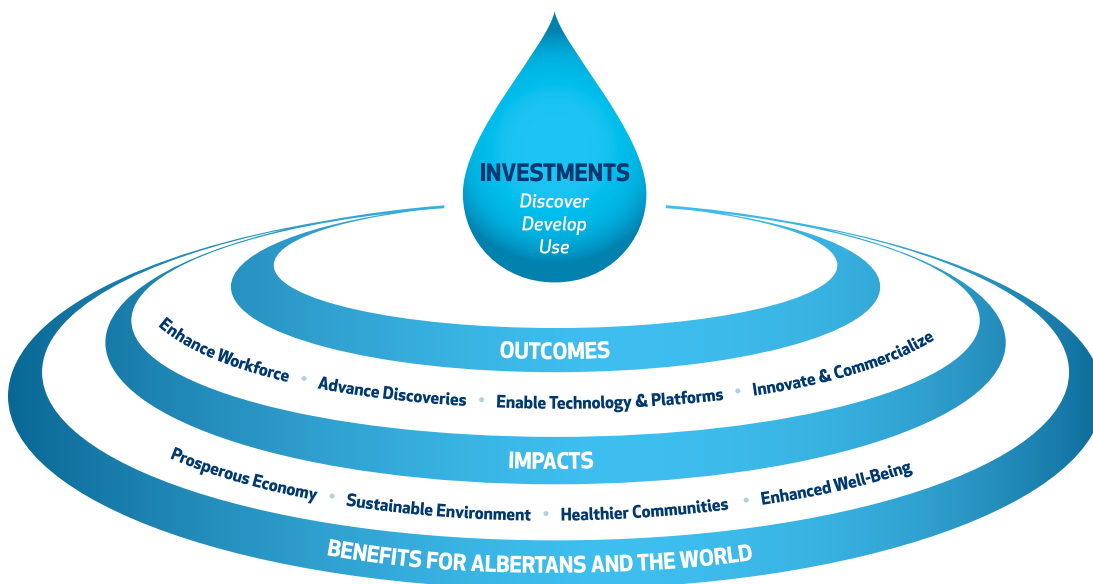
Measuring Achievements

The outcomes and impacts of AI's support and activities are not always immediately apparent. This is because of the time required between when research is initiated, new knowledge is generated, when specific applications (e.g., new products, policies, or practices) are developed, and when they are ultimately put into use. Additional time lags are often experienced before widescale adoption/diffusion of knowledge and or innovation is achieved. Alberta Innovates uses a splash and ripple metaphor to communicate outcomes and impact that illustrates the dynamic and diffuse nature of R&I (Figure 1).

Alberta Innovates uses a series of indicators to monitor the progress being achieved through its investments in projects (i.e., awards and grants provided to innovators) and people (i.e., studentships, fellowships and chairs). An online reporting system, Researchfish®, is used to ensure routine and systematic data collection on these indicators across a portion of AI's health-research related grant investment programs. This data includes information self-reported by award holders as well as some information captured from external third parties and sources (e.g., other funders). In 2019/20, a total of 206 grant recipients completed a Researchfish® report.

Data on the progress being achieved by other initiatives in Health Innovation, such as provincial platforms, partnerships and collaborations is collected from the leads of those initiatives as well as through administrative systems.

Figure 1: AI's Research and Innovation Impact Framework



Revised Method of Analysis

As our research and investment processes evolve, so too has our approach to the analysis of the information collected from our researchers. Beginning with this report, our approach to analysis has changed, and this new approach allows us to improve the process of data extraction and transformation. This report reflects only those activities reported for the 2019/20 fiscal year and only for those researchers who submitted a report in this period. Given these changes, data in this report cannot be compared to that of previous years' annual impact reports and represents a new baseline. For further detail on the revised methods of analysis used for this report, refer to Appendix A.

Health Innovation Strategies

Alberta Innovates' Health Innovation investments aim to catalyze the development, growth and sustainability of an impact-focused health innovation ecosystem and economy in Alberta, and implements different approaches for achieving impact. These include strategic investments, partnerships and collaborations, and provincial platforms.

Strategic Investments

A key mechanism through which Health Innovation helps enhance workforce capacity and develop talent for highly skilled people to engage in collaborative, multidisciplinary R&I activities is through our strategic investments. In 2019/20, these investments generated benefits such as:

- Dr. Lewis' research team developed new technologies designed to securely contain biohazardous material that will enable researchers and small businesses across Canada to join the fight against COVID-19 and radically accelerate the pace of drug development.
- In the era of COVID-19 and other mental health challenges, Dr. Silverstone established the Centre for Online Mental Health Support (COMHS), a free online interactive tool to support individuals experiencing anxiety, stress, and depression in response to large-scale catastrophic events.
- Dr. Wang's team compiled and analyzed over 2000 laboratory-confirmed cases of COVID-19 and provided evidence to an international government review of the quarantine period, suggesting it be extended to ensure effectiveness.
- The Paschke and Eszlinger Lab at the University of Calgary developed a low-cost testing procedure to provide diagnostic information for clinical decision making in relation to thyroid conditions. The ThyroSPEC™ panel was successfully validated by Alberta Precision Laboratories' (APL) and has been implemented for routine testing in Alberta.

Collaborations and Partnerships

In partnership with the broader system, the Health Innovation team delivers valuable funding and services to support clients in achieving economic and health outcomes for the province of Alberta. AI works through partnerships and collaborations to accelerate the process of generating evidence and putting health solutions into practice that serve the needs of Albertans. This includes brokering linkages that bring different organizations and people together to jointly overcome barriers within R&I in the life sciences. In addition to pooling expertise and leveraging resources, these linkages also stimulate the exploration of cross-sector opportunities to expand and optimize the use of research to achieve health outcomes and contribute to broader social and economic impacts. These partnerships and collaborations also assist AI in attracting additional investments to Alberta to support R&I, foster new technologies and solutions (e.g., digital health) and contribute to the creation of a thriving health sector.

To translate research into solutions, Alberta Innovates collaborates with partners in the health system, publicly funded post-secondary institutions, small and medium-sized enterprises (SMEs), multinational enterprises (MNEs), government and others. These collaborations and partnerships also assist in targeting solutions to meet the identified needs of the health system and to create an environment for innovation that will make a difference in the lives of Albertans. As AI embraces digital health and data-enabled innovation to help achieve modernized and integrated care models, accelerate health research and engage stakeholders, we are developing key partnerships with industry, health service delivery providers, academic institutions, non-profits, and citizens.ⁱ

Provincial Platforms

Health Innovation also invests in several provincial platforms to assist researchers and innovators in overcoming barriers and challenges in R&I, towards the goal of increasing the success of research and accelerating the application of new knowledge.

Key focus areas for the provincial platforms in 2019/20 were: integrating and making health data available for secondary use (e.g., research); provision of expertise and training for patient-oriented research to support a health system that is person-centered and evidence-based; and streamlining processes for ethics review and clinical research to ensure high quality, efficient, integrated clinical health research in Alberta. These platforms and the diverse connections that underpin them optimize the ability of our health R&I ecosystem to identify and respond to Alberta's health needs.

ⁱ Note that this report does not include all of Alberta Innovates' industry partnerships and collaborations. Within Health Innovation, some recently implemented industry partnerships and collaborations were excluded as it is too early to report on their progress, outcomes, and impacts.

Supporting Research and Innovation Projects

In 2019/20, the progress and achievements of 206 award holders (72 researchers/ teams and 134 research trainees) were monitored through Researchfish^{®ii} and are reported in aggregate herein.

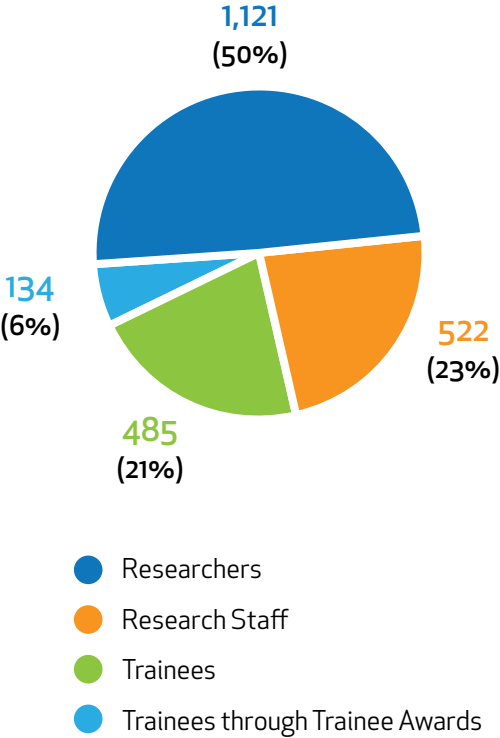
Building Research and Innovation Capacity

Alberta Innovates invests in building research capacity by providing grants to researchers to employ and train staff in the research process as well as grants directly to trainees to enable them to develop skills and knowledge. Research funding agencies worldwide recognize that investing in capacity building is a cost-effective way to advance healthcare, improve problem-solving, and reduce the gap between evidence and practice. By investing in trainees today, we are developing talent and building stronger researchers for the future knowledge workforce and economy.

HIGHLY SKILLED PERSONNEL (HSP)

Fifty-seven research teams reported that they were directly supporting the research activities of 522 highly skilled persons including research, project management and knowledge translation staff. In addition, these teams indirectly supported 485 post-doctoral fellows and graduate trainees, undergraduate/summer school, and health professional degree students by providing mentoring, training opportunities and research experience. Overall, in 2019/20, grants and awards provided through Health Innovation investments directly or indirectly supported 2262 people (includes collaborative Leads, Co-Leads and research team members), research staff and trainees (Figure 2).

Figure 2: Building Human Research Capacity



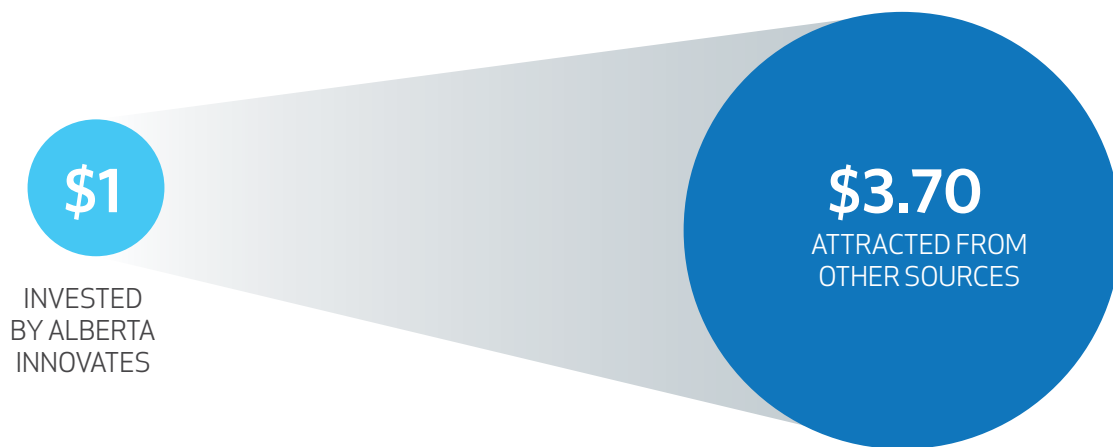
ⁱⁱ This represents ~47% of health research grants and award investments managed by Health Innovation in 2019/20. Investments excluded from reporting in Researchfish[®] included some legacy grants and awards, as well as other funding types such as travel and conference grants, transitional funding (to post-secondary institutions), etc.

FURTHER FUNDING

The high caliber of researchers supported by AI is broadly recognized. This is exemplified by the additional investments that they attract. AI Researchers attracted more than \$54 million in additional funding as follow-on grant and award applications with other funding agencies in 2019/20. In addition to this supplemental funding, many investigators received financial contributions from their collaborators/partners.ⁱⁱⁱ This amounted to more than \$3 million received in 2019/20.

The two sources of additional funding – external grant funding and contributions from partners/ collaborators – equates to a total of \$57,648,195 in additional funding for Alberta’s health R&I ecosystem. The funds attracted translates to approximately an additional \$3.70 in financial support for every \$1 invested by AI (Figure 3).

Figure 3: Growing AI’s Investments



Canadian Institutes of Health Research (CIHR), which provided \$29 million through 22 individual grants and awards, was the largest single contributor of additional funding to researchers (Table 1).

ⁱⁱⁱ Approximately 21% of collaborations/partnerships reported included direct financial contributions from partners. However, the proportion and the value of direct contributions is likely underreported as contractual confidentiality agreements limit reporting related to 3% of the collaborations/partnerships reported by AI researchers.

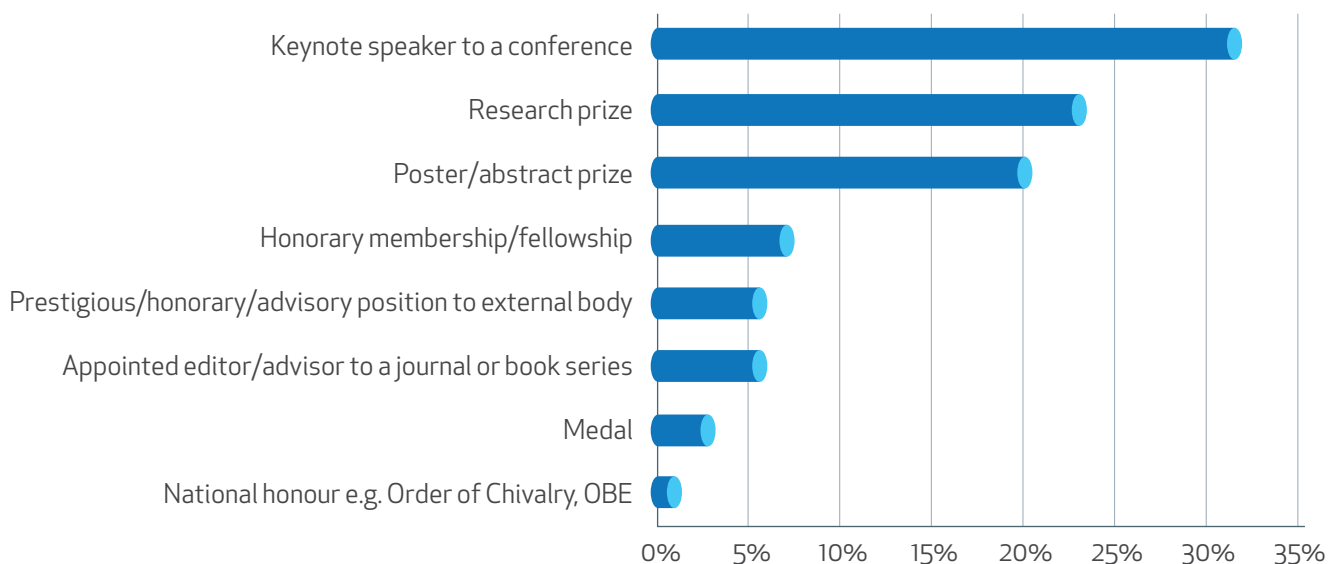
Table 1: Top Sources of Additional Funding

Organization	Number of Grants	Total Amount
Canadian Institutes of Health Research	22	\$29,160,632
Governance of Alberta Ministry of Economic Development, Trade and Tourism	4	\$14,280,000
Natural Science and Engineering Research Council of Canada (NSERC)	4	\$2,000,000
Social Sciences and Humanities Research Council (SSHRC)	1	\$1,980,640
Canadian Cancer Society	2	\$1,836,145
Genome Canada	2	\$1,155,000
Others (various sources)	50	\$4,182,775
Total	85	\$54,595,192

AWARDS AND RECOGNITION

Many of the health researchers/ research teams supported by AI are recognized for their research. Alberta Innovates funded researchers and trainees collectively received 179 new awards and recognitions in 2019/20. Eighty-two percent of these involved research prizes, poster or abstract prizes, a personal invitation to be a keynote speaker, or prestigious/ honorary/ advisory position to an external body reflecting opportunities where they could share and advance the research supported by AI (Figure 4). Recognition of AI’s supported researchers and innovators extended well beyond Alberta’s borders with 27% and 32% of awards and recognitions being at the national or international level, respectively.

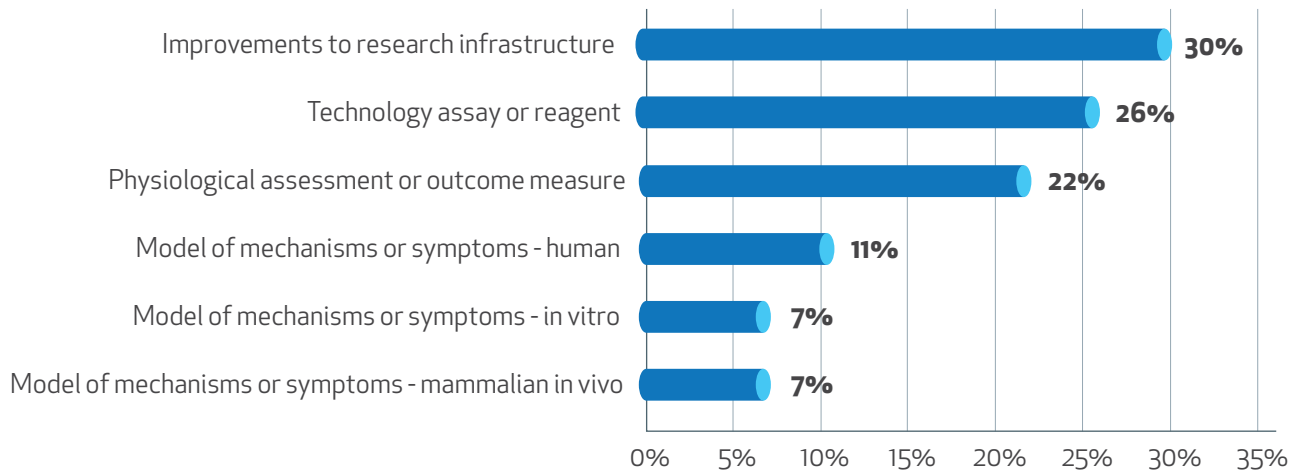
Figure 4: Types of Award Received



RESEARCH TOOLS AND METHODS

Novel materials are sometimes created as a necessary component of a research project, and these outputs make new lines of enquiry possible. The people and projects supported by Health Innovation generated 27 research tools and methods in 2019/20. Thirty percent of the research materials were improvements to research infrastructure and 26% were technology assays or reagents (Figure 5). Thirty-three percent of the research materials had been shared with others.

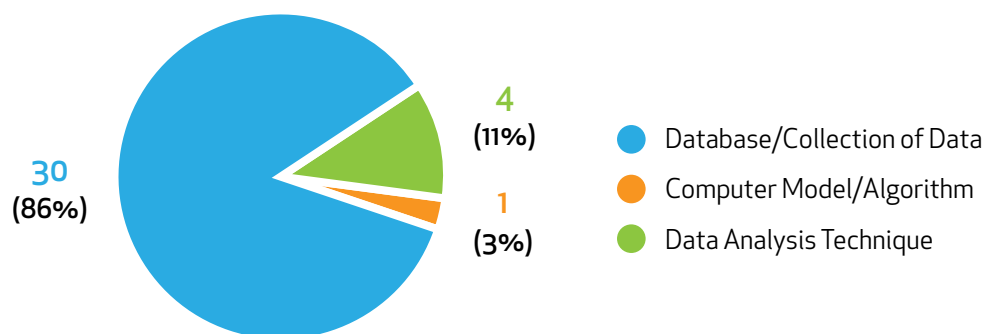
Figure 5: Types of Research Material Created



RESEARCH DATABASES AND MODELS

Researchers often develop new databases, datasets, or models during their projects that can make a significant difference to their research or that of others. All funded investigators reported 35 such developments in 2019/20 and these predominantly consisted of databases (Figure 6). The reach of AI's investments was further enhanced albeit indirectly as 23% of the reported databases, datasets, and data analytic techniques were shared with other research and innovation groups.

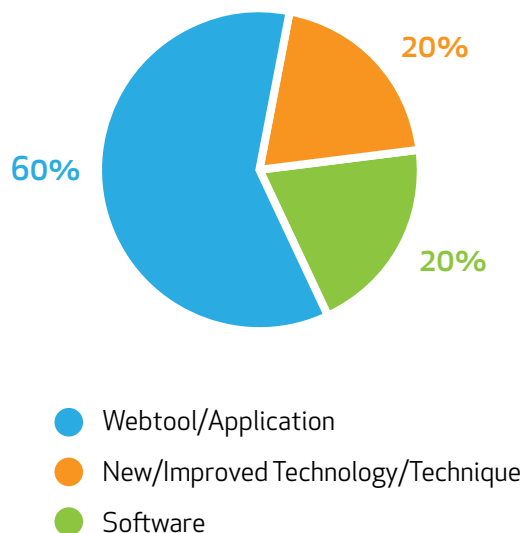
Figure 6: Types of Research Databases and Models Developed



SOFTWARE AND TECHNICAL PRODUCTS

The development of software and technical products represents another way in which research and innovation is advanced and/or translated into new products or services. In 2019/20, five software and technical products were developed through five grants (Figure 7). Three of these products were made available online as a webtool/ application.

Figure 7: Software and Technical Products



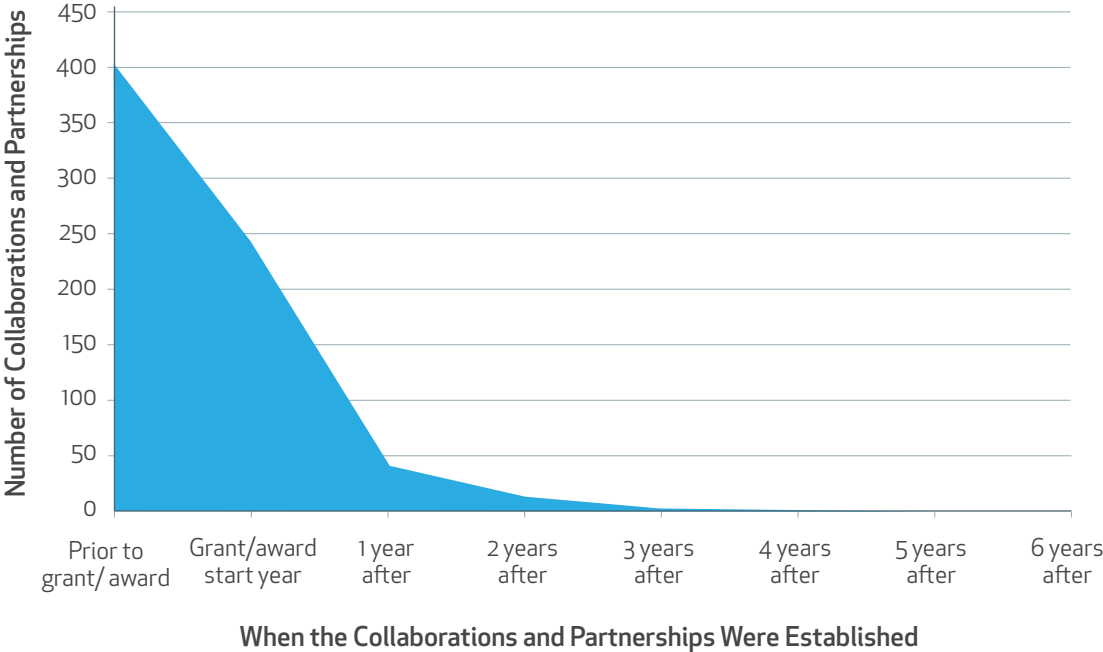
Expanding Teams Through Collaboration

Collaborations and partnerships assist in building research capacity, creating a shared understanding through the exchange of information and advancing or accelerating R&I through the sharing of resources. Researchers and innovators typically work with a variety of partners and collaborators in different sectors and seldom rely on a single source of funding to advance their work. Collaborations often enable projects to proceed through in-kind supports or provide a different perspective that ensures the research and innovation is robust and enhances the potential for broad reaching impact.

Collaborations and partnerships often involve multiple organizations. Ninety-five (46%) AI funded researchers/ research teams reported 621 active collaborations in 2019/20. Most collaborations and partnerships were established with other researchers in the academic or university sector (37%) and with publicly funded groups (28%), followed by hospitals and not-for-profit organizations (each at 13%), the private sector (8%), and Learned Societies (1%).

Many collaborations and partnerships were formed within the first two years the AI grant was awarded (40%), though researchers continue to establish collaborations and partnerships throughout the duration of their research project (Figure 8). Fifty-eight percent of the collaborations and partnerships were formed before the start of AI's investment support, indicating that these long-lasting collaborations support a body of work larger than that for which the AI grant was awarded.

Figure 8: Timing of Collaborations and Partnerships Relative to Grant or Award Start Year



Collaborations were established with researchers in 24 countries other than Canada (Figure 9), although most of the collaborations were in Canada (82%) and, more specifically, Alberta (53% of Canadian collaborations) (Figure 10).

Figure 9: Collaborators and Partners Around the World

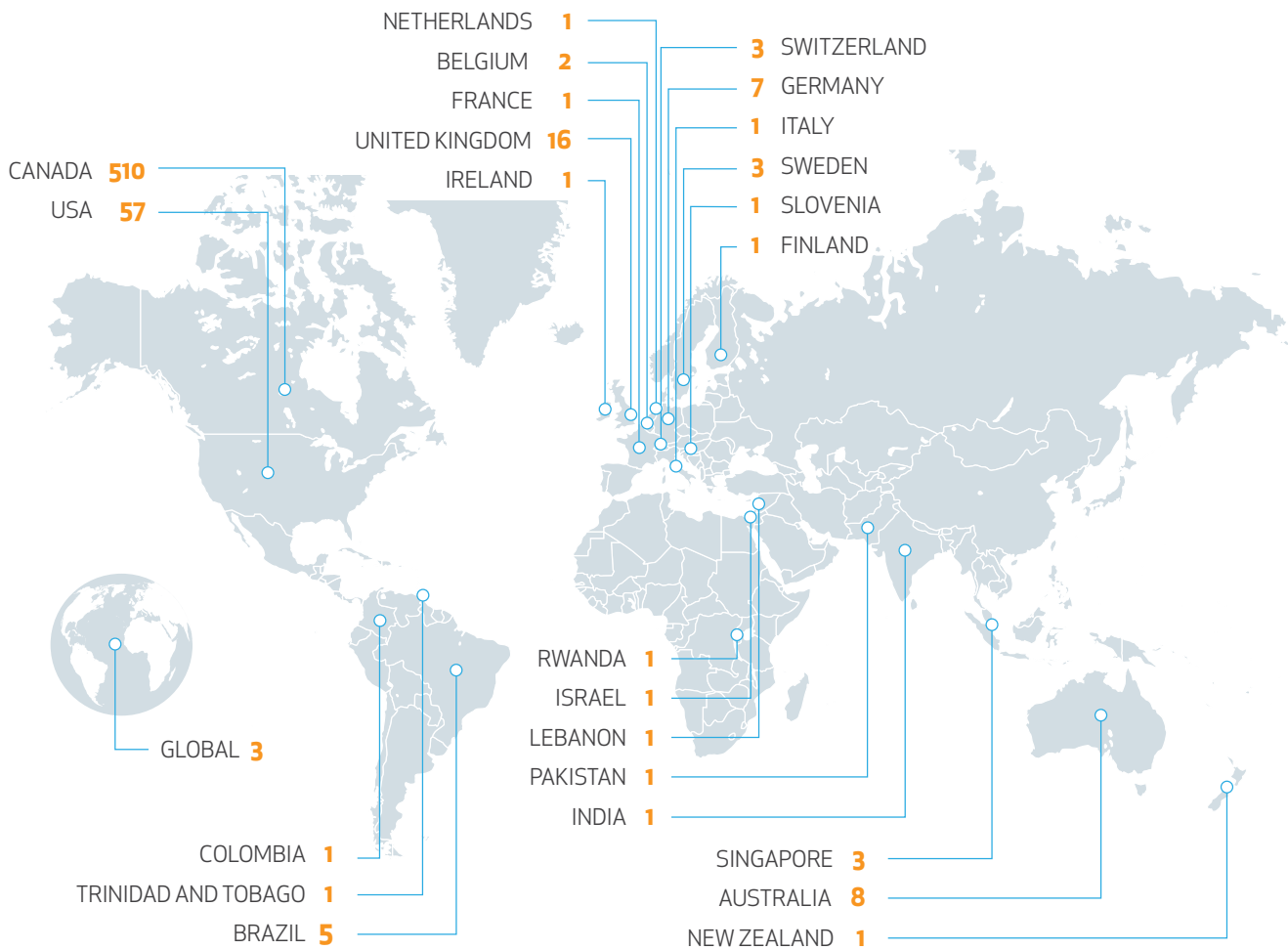
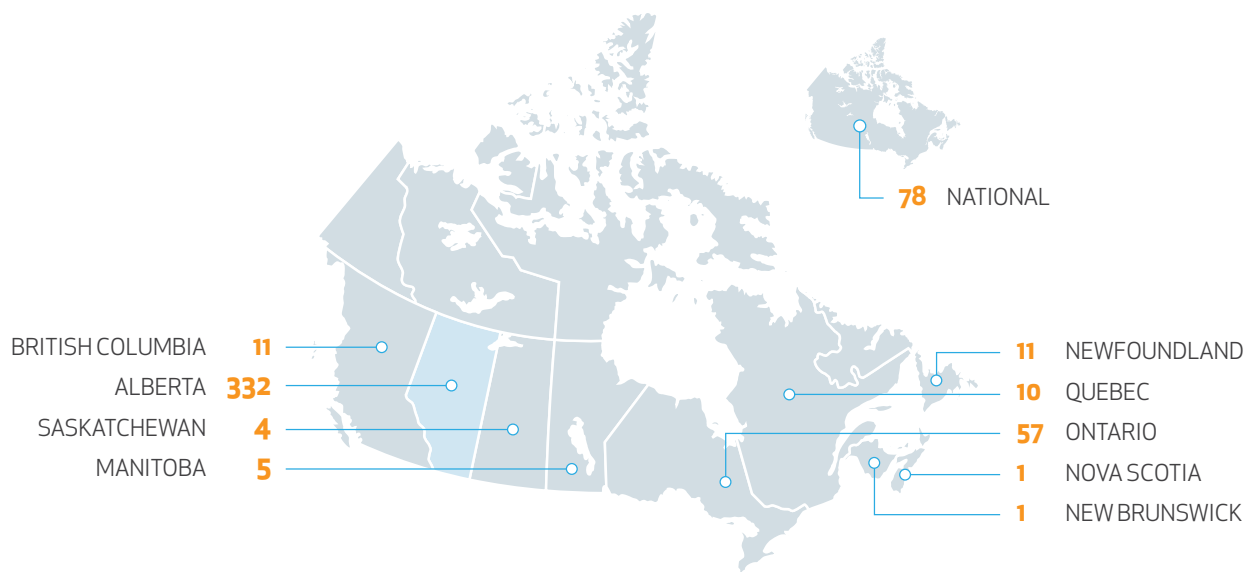


Figure 10: Collaborators and Partners in Canada



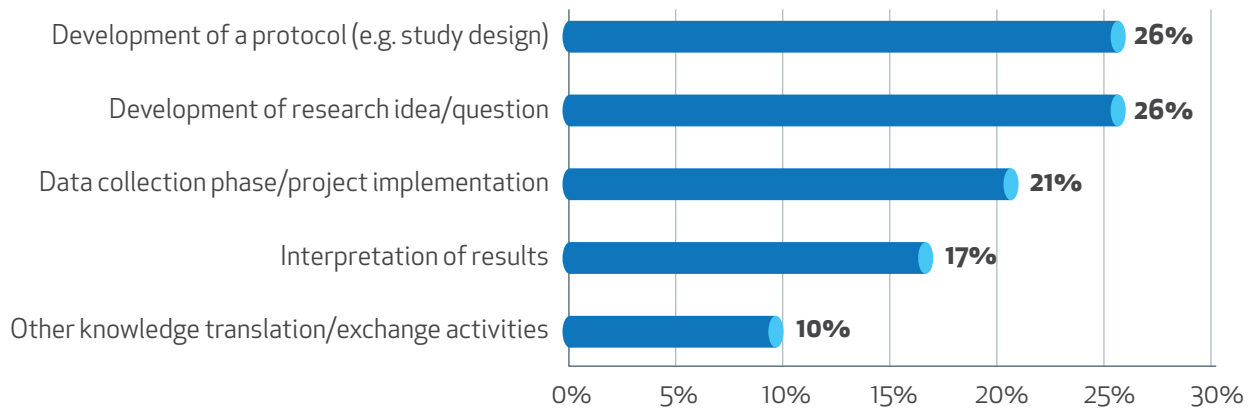
IN-KIND CONTRIBUTIONS THROUGH THE USE OF FACILITIES

The use of research infrastructure facilities is a form of collaboration where researchers negotiate the access to use of facilities or equipment to complete their research without needing to build or procure their own. In 2019/20, 18 researchers negotiated the use of 28 facilities or services to support their research.

INDUSTRY ENGAGEMENT

Engagement activities with industry partners and end-users were further explored among researchers receiving support (excluding trainee awards). Forty-seven (64%) investigators reported engagement with industry partners at some point during their research project. The purposes of engagement with industry are shown in Figure 11. There are often multiple purposes for engagement, and among those engaging industry, the most frequently reported purposes were for the development of research protocols (study design) and research ideas/questions.

Figure 11: Purpose of Engagement Activities with Industry Partners and End-Users



Sharing Evidence

Researchers and innovators contribute to science, knowledge, and better understanding of human health when their findings and insights are shared with others. This sharing demonstrates progress along the pathways to impact but does not in itself constitute an outcome or impact. Rather, outcomes begin to occur after knowledge moves beyond the researchers in a way that guides the decisions and actions of innovators (e.g., policy and decision makers, practitioners, industry, service providers, other researchers, patients, and the public). The mechanisms researchers and innovators use to share the project findings are engagement activities, developing tools that make the information easier to understand and disseminate, and publishing their findings so the information can be shared internationally.

ENGAGEMENT

Relevant and appropriate engagement activities – the means through which researchers and innovators meaningfully involve a broad range of stakeholders in their activities – are another important way of progressing research and innovation along the impact pathway. These engagement activities can occur at any time throughout the process depending on the purpose of engagement (e.g., to assist with the design of the project, to communicate findings, or to gather feedback on findings). Overall, 547 engagement activities were undertaken in 2019/20. These activities, which were predominantly in the form of talks or presentations (Figure 12), were mainly conducted locally or regionally (Figure 13) and were primarily provided to professional practitioners (Figure 14). The most frequent known or reported outcome of engagement activities were plans made for future related activity (Figure 15).

Figure 12: Types of Engagement Activities



Figure 13: Geographic Reach of Engagement Activities

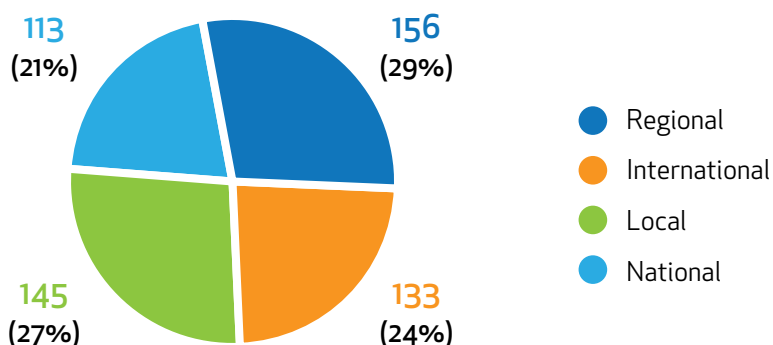


Figure 14: Primary Audiences for Engagement Activities

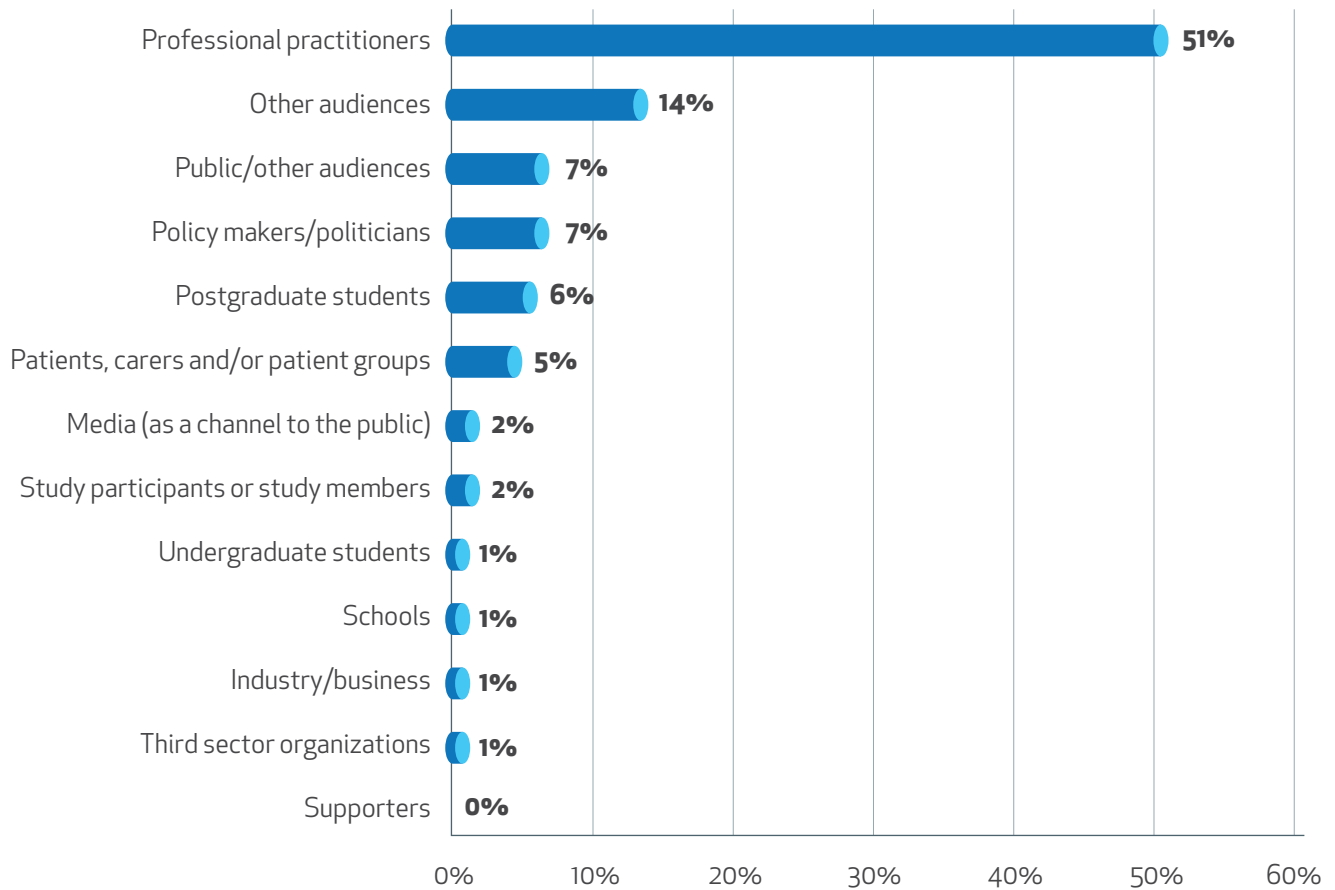
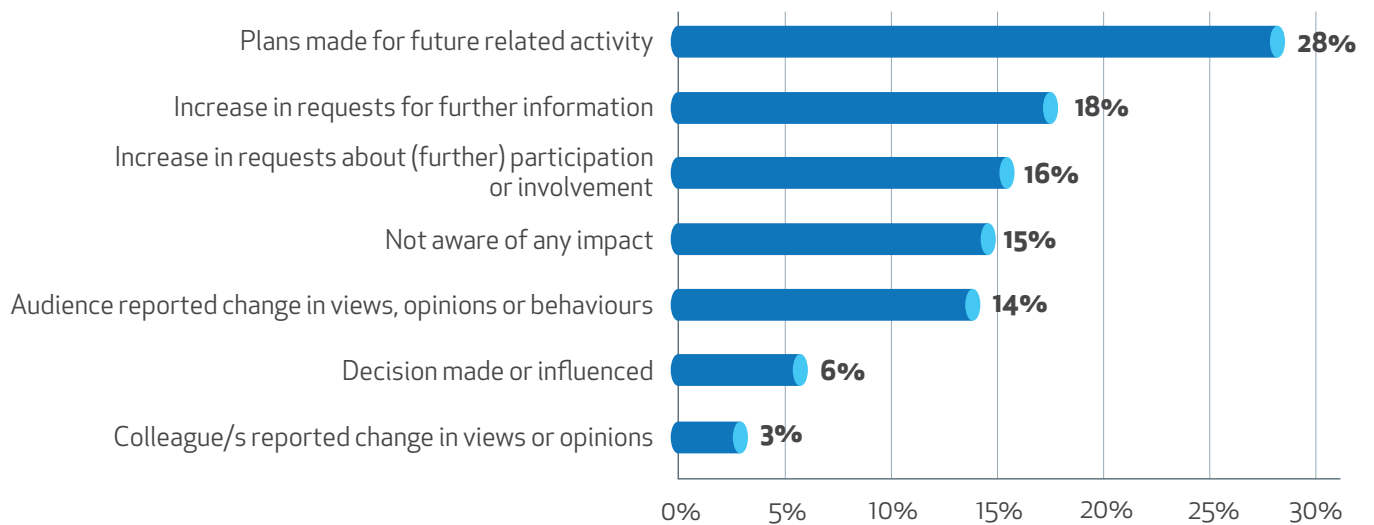


Figure 15: Primary Outcomes of Engagement Activities



INFLUENCE ON POLICY AND PRACTICE

In the context of health, the intended purpose of enabling decisions is for health-related knowledge to be adopted and used by organizations or individuals to affect or create health or health-related impacts. To do so, knowledge must first be translated into various innovations that include new or revised policies, practices, products or processes (including services). These in turn serve as the pathways to affecting or achieving improvements in health and well-being.

Sixteen grant and award holders reported 46 opportunities to influence policy, practice, patients, and the public in 2019/20. Citation in a policy document accounted for the most common method of influencing policy (26%) (Figure 16). The most frequently reported known outcome of the influences on policy and practice were improved educational and skill level of the workforce (16%). Other notable influences in health outcomes included improvements in public well-being (quality of life or morbidity or survival), effective and efficient public service delivery, improved access to public services, and effective solutions to societal problems (Figure 17).

Figure 16: Types of Influences on Policy, Practice, Patients, and the Public

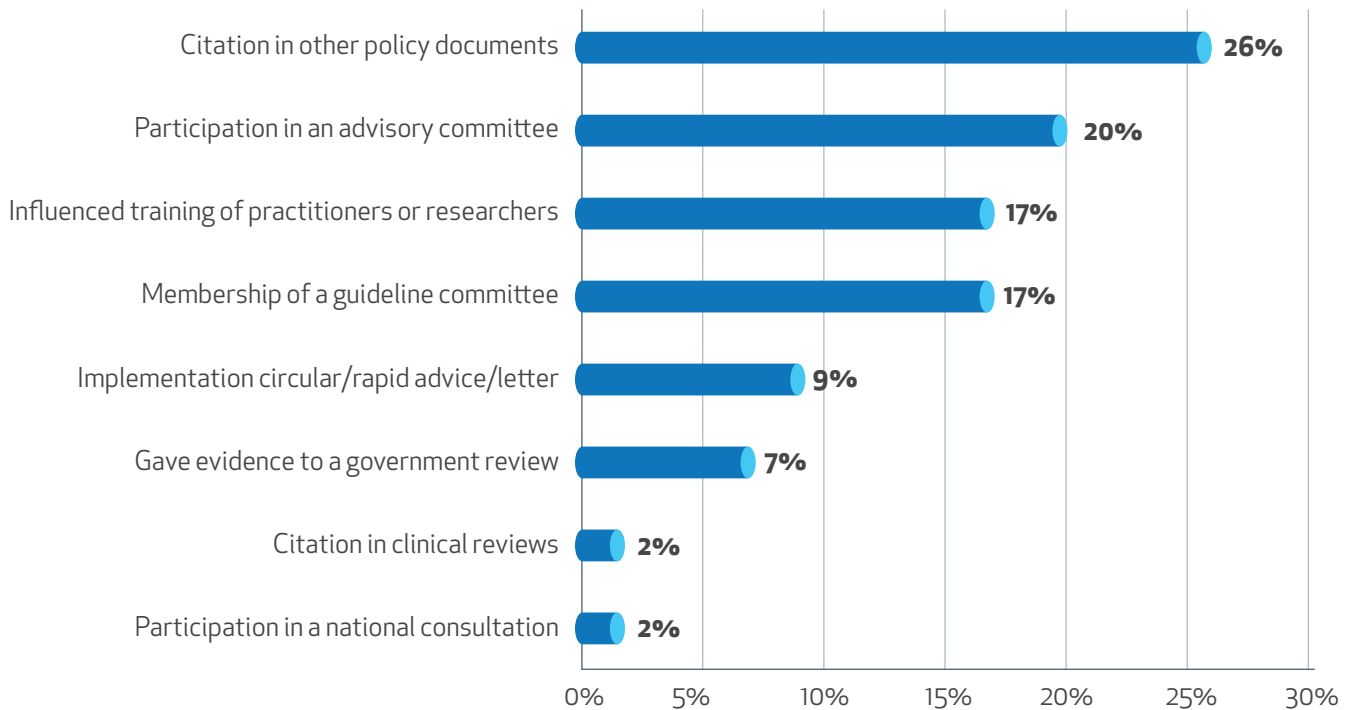
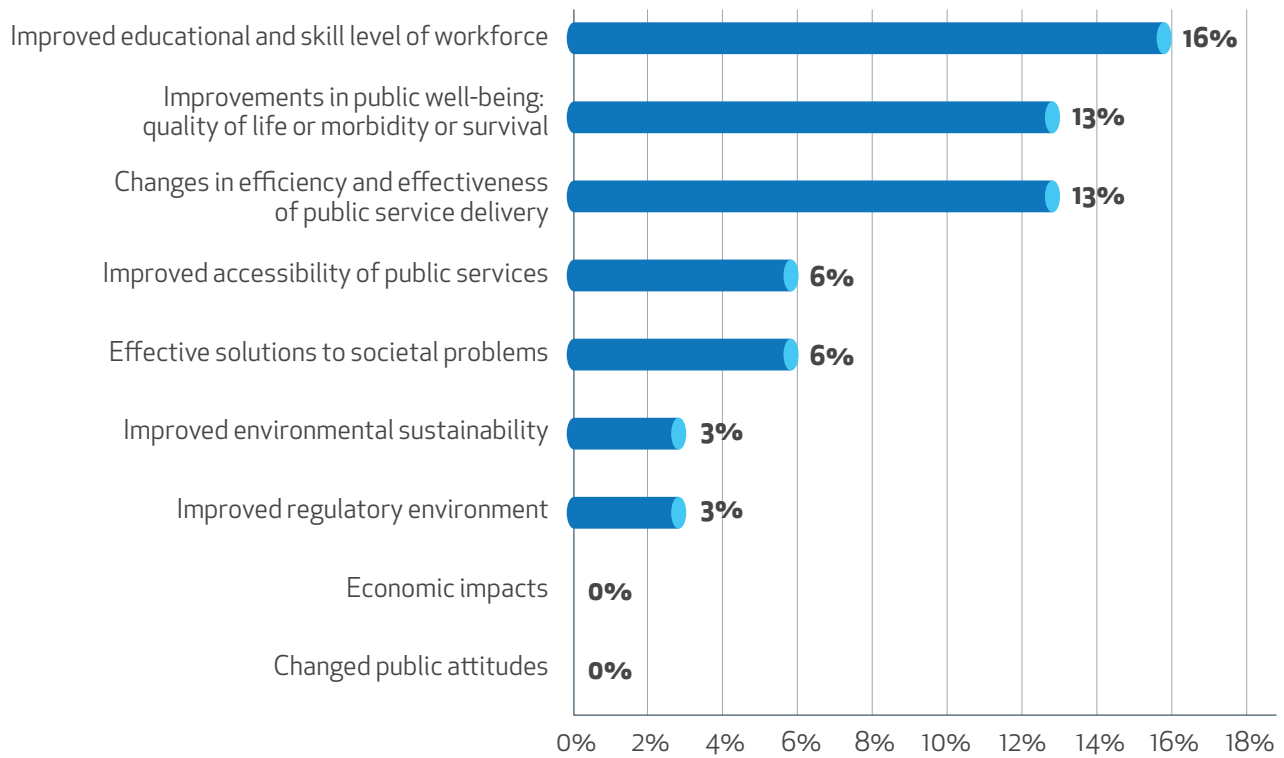


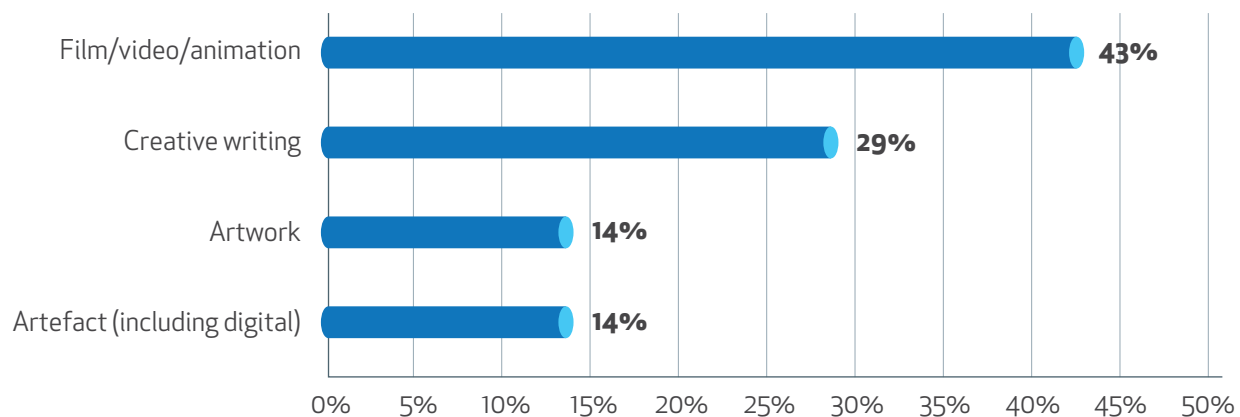
Figure 17: Outcomes of Influences on Policy, Practice, Patients, and the Public



ARTISTIC AND CREATIVE PRODUCTS

Artistic and creative products have been used effectively by researchers to share knowledge and make it more accessible to targeted stakeholder groups such as patients, the public, and health practitioners. Eight artistic and creative products were developed in 2019/20 (Figure 18).

Figure 18: Type of Creative Product



Examples of some of the artistic products are described below:

- A series of animated videos aimed at clinicians, patient stakeholders and policy makers were produced to provide an overview of the BETTER program^{iv}, describing how the program helps save healthcare costs and engage patients to improve their health through improved cancer and chronic disease prevention and screening.
- A graphic recording (Figure 19) by artist Aaron Russel was created from a co-design engagement session lead by Co-Investigators, Katherine Chubbs and Dr. Melissa Potestio and participants from the Kainai First Nation, Piikani First Nation, Metis and Inuit, community members and staff from Alberta Health Services (AHS), and identifies challenges and solutions to Indigenous people's access/navigation of healthcare services.

Figure 19: PRIHS project graphic record: South Zone Indigenous Patient Navigation Model



Source: <https://together4health.albertahealthservices.ca/south-zone>; retrieved February 19, 2021

PUBLICATIONS

Publications are more than a public record of research – they are a key engagement strategy that enable researchers to communicate and share information with their peers to advance science and knowledge. Successful publication also draws attention to the investigators, their institutions and their funding sources and therefore is commonly taken into consideration for funding decisions and academic recognition or promotion. Overall, investigators contributed 629 publications to the pool of scientific literature and 578 (92%) of these were journal articles.

^{iv} The BETTER Program is a training process developed for individuals within health practice settings to become experts in chronic disease prevention and screening (source: <https://better-program.ca/the-program/about-the-program/>).

IMPACT BRIEF

PIVOTING TO ADDRESS COVID-19

Several AI-funded researchers were able to apply their knowledge and research to support the efforts to understand, contain and develop a vaccine for COVID-19

Dr. Ian Lewis

**Translational Health Chair in Metabolomics,
University of Calgary**

Federal regulations stipulate that any laboratory work that amplifies or concentrates the SARS-CoV-2 virus must be undertaken in biosafety level 3 laboratories, of which there are only a handful in Canada. This means that researchers across the country who could be participating in the COVID-19 response have been sidelined, hampering the pace of drug development, sterility testing, and other core virus research. To address the issue of scarcity of level 3 laboratories, Dr. Lewis and his team have developed a biohazard containment device designed to securely contain microscale viral cultures, along with a host cell line, behind a virus-impermeable membrane. This device allows viral infections-and pharmaceutical inhibition of this process to be detected via metabolomics analysis of the virus-free culture medium. The device allows biosafety level 2 laboratory staff to perform drug screening assays and other detailed biochemical investigations without any direct exposure to the virus. Once implemented, this technology will enable researchers and small businesses across Canada to join the fight against COVID-19 and radically accelerate the pace of drug development.

Dr. Peter H. Silverstone

Professor, Department of Psychiatry, University of Alberta

Dr. Silverstone and his team were investigating the health effects on adolescents of the wildfires that consumed Fort McMurray in 2016. In response to COVID-19 and other mental health challenges, in March 2020, Silverstone established the Centre for Online Mental Health Support (COMHS) as a non-profit initiative of the charitable organization Blankets of Love. COMHS offers free online interactive webinars with information on mental health; techniques for managing depression, anxiety, and other challenges; information for helping children and teenagers; the science behind mental health; etc. The tool provides support to individuals experiencing anxiety, stress and depression as a response to large-scale catastrophic events.

Dr. Edwin Wang

Translational Health Chair in Cancer Genomics, University of Calgary

Dr Wang was awarded a 7-year Translational Health Chair in Cancer Genomics in 2015. His team compiled and analyzed patient-level information from 2,015 laboratory-confirmed Covid-19 cases including 99 children in 28 Chinese provinces. This cohort represents a wide-range spectrum of Covid-19 disease with both hospitalized and non-hospitalized cases. Dr. Wang's team found that the full range of incubation periods of the Covid-19 cases ranged from 0 to 33 days. He was then able to provide evidence to a government review of the quarantine period, suggesting the period should be extended to ensure the quarantine is effective. Following his presentation, one third of the 31 provinces in China including Beijing changed the incubation periods for imported travelers to either 21 days or 28 days. Dr Wang's analysis results were also published in public media so may have indirectly influenced quarantine periods in other countries.

Health and Wellness Impacts

It is often cited that it takes an average of 17 years to translate research discoveries from the lab to the marketplace, or from the bench to the bedside. However, early evidence of contributions to health and health-related impacts within the period of funding are often available and serve as leading indicators of translational potential. Some AI-funded researchers have identified impacts of their work during the grant period. For example, one researcher identified changes in determinants of health outcomes from their research in 2019/20.

In addition to improved health outcomes, 10 new medical products, interventions or clinical trials were reported by AI funded researchers. Thirty percent of these products were either diagnostic tools (non-imaging) or interventions aimed at improved management of diseases and health conditions (Figure 20). Some examples of these innovative developments include:

- (Development stage - Initial development): The Mobile EMG (Electromyography) device involves both hardware and software development, where the device converts EMG signals from the biceps and triceps of a physiotherapist into a measurement of force, which can be used in diagnoses of strength and related pathology in patients.
- (Development stage – Initial development): Saliva and urine qPCR Cytomegalovirus (CMV) monitoring as an alternative to peripheral blood in high risk solid organ transplant recipients. This project examines whether urine and or saliva molecular diagnostic assays (qPCR) monitoring, a more accessible testing option currently used for surveillance monitoring of CMV in solid organ transplant recipients, could predict CMV DNAemia and present an alternative monitoring strategy.
- (Development stage - Small-scale adoption): A Long Term Care (LTC) care and referral pathway was developed that enables LTC site physicians to consult with Emergency Department (ED) physicians on the best care plan for residents experiencing an urgent medical condition. When a transfer from the LTC site to the ED is determined, the ED physician has knowledge of the resident's baseline and history prior to the resident's arrival which improves ED efficiency and reduces the resident's length of stay.
- (Development stage – Small-scale adoption): In response to COVID-19 and other mental health challenges, in March 2020, the Centre for Online Mental Health Support (COMHS) started offering online interactive webinars with information on mental health; techniques for managing depression, anxiety, and other challenges; mental health information for children and teenagers; science behind mental health; etc. More details about this intervention are captured in Dr. Peter Silverstone's story in the PIVOTING TO ADDRESS COVID – IMPACT BRIEFS section on page 22.
- (Development stage – Market authorization): Achievement highlighted in the IMPACT BRIEF - IMPROVING DETECTION AND DIAGNOSIS on page 24.

IMPACT BRIEF

IMPROVING DETECTION AND DIAGNOSIS

While thyroid nodules are identified in approximately 5% of the population^v, the incidence of thyroid cancer occurs in about 5 – 10% of these and accurate classification is difficult. The Paschke and Eszlinger lab at the University of Calgary is developing a new diagnostic tool to improve thyroid cancer diagnosis.

Dr. Ralf Paschke

Cumming School of Medicine, University of Calgary

Dr. Markus Eszlinger

Cumming School of Medicine, University of Calgary

According to the Thyroid Foundation of Canada, one in ten Canadians have some form of thyroid condition and many are undiagnosed. A poorly functioning thyroid gland is associated with a variety of other disorders in addition to cancer, so early and accurate diagnosis is important.

Fine needle aspiration cytology (FNAC) is a procedure that uses a thin needle inserted into a tumor to collect a sample of cells. These cells can be examined to determine if the tumor is malignant or benign. However, in approximately 20% of cases, it is impossible to determine if cancer is present, and the patient must then undergo diagnostic surgery. For about 80% of these patients, the surgery is unnecessary. Improvement in diagnosis of the cells obtained from the FNAC procedure would reduce the number of patients that undergo unnecessary surgery, thereby reducing the risk of health complications as well as reducing health system costs.

“

We demonstrated the applicability of mass spectrometry-based mutation detection (MassARRAY) to indeterminate fine-needle aspiration cytologies (FNAC) to provide diagnostic information for clinical decision making.

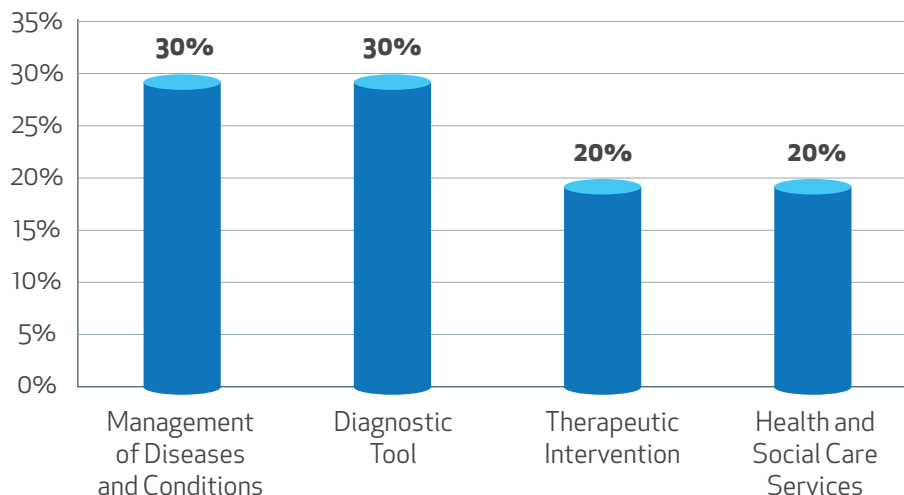
- Dr. Ralf Paschke

The research team at the Paschke and Eszlinger Lab at the University of Calgary have developed a low-cost testing panel using a mass spectrometer for routine testing of thyroid nodule cells when the diagnosis cannot otherwise be determined.

The ThyroSPEC™ panel was successfully validated for routine application by Alberta Precision Laboratories' (APL) Molecular Pathology Lab in Calgary and has been implemented for routine reflex testing of indeterminate thyroid FNAC procedures at APL.

^v Thyroid Foundation of Canada, 2020. <https://thyroid.ca/resource-material/information-on-thyroid-disease/thyroid-nodules/>

Figure 20: Medical Products, Interventions and Clinical Trials



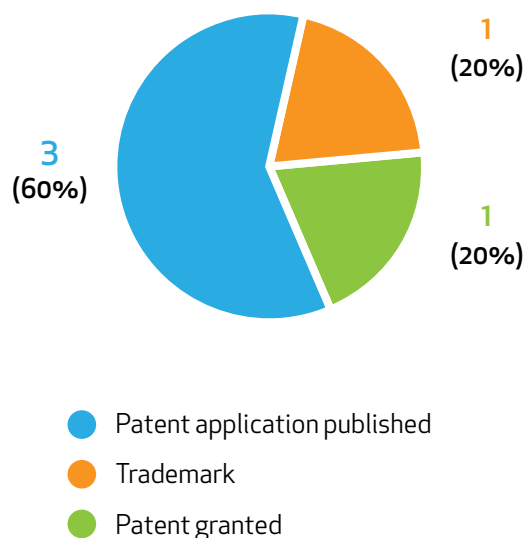
Contributing to Social and Economic Prosperity

Commercialization activities reflect more immediate and measurable market acceptance of the products of academic research and innovation. It also provides an early indication of the work being done by researchers and innovators that may potentially contribute to broader economic and societal impact.

INTELLECTUAL PROPERTY AND LICENSING

Five (2%) researchers/ research teams reported 5 instances of intellectual property and licensing in 2019/20. Most of these consisted of published patent applications (Figure 21).

Figure 21: Intellectual Property and Licensing



Supporting Health Innovation

Alberta Innovates recognizes innovation as a key contribution to reverse the trend of rising healthcare costs in Alberta. The aim is to improve patient outcomes and health system performance through the development and or implementation of state-of-the-art healthcare innovation. Alberta researchers and companies, with the support of Alberta Innovates, have an opportunity to play a role in shaping how the health industry and its innovations evolve.

To this end, Alberta Innovates invests in several R&I initiatives in the form of Provincial Platforms to establish or enhance the required activities and capabilities for innovation success in Alberta. Alberta Innovates also helps build and foster innovation through partnerships and collaborations. Collaborating with partners in the health system, post-secondary institutions, small and medium sized enterprises (SMEs), multinational enterprises (MNEs), government and others, helps accelerate the translation of research into innovative solutions. Alberta Innovates assists in targeting those solutions to meet the identified needs of the health system and creating an environment for R&I that will make a difference in the lives of Albertans. By transforming research into innovative solutions health, economic and social impacts will be accelerated and increased.

Provincial Platforms

In addition to funding research, Alberta Innovates invests in provincial platforms – clusters of support services and capacity building initiatives aligned to provincial and national strategies that are designed to address barriers and improve inefficiencies in Alberta’s R&I environment.

Alberta SPOR SUPPORT Unit (AbSPORU)

Patient-oriented research in Alberta is being accelerated and its quality and quantity improved through the efforts of the Alberta SPOR SUPPORT Unit (AbSPORU).^{vi} Launched in 2014/15 from a \$48 million federal-provincial partnership between Alberta Innovates and CIHR, this platform connects researchers, trainees and health system stakeholders with a provincial network of capacity development opportunities, expert advice and research support services with a focus on the patient perspective. This platform enables new discoveries in health research and implementation of innovations in the health system to happen faster because researchers and end-users have more timely access to data, critical expertise, infrastructure and services tailored to their R&I needs. The Unit also helps ensure that more R&I activity is directed at and responsive to patient priorities.

^{vi} Information about AbSPORU is available at <https://albertainnovates.ca/our-health-innovation-focus/the-alberta-spor-support-unit/>

In 2019/20, AbSPORU received more than 500 (504) requests for research support services, with 61% of clients requiring data access and/or analytics related services. The Unit's Data Platform facilitates access to 59 health databases and provides analytic services for health research. In 2019/20, the Data Platform completed most of its 243 data access requests in approximately six weeks, and some in under 10 days, helping to sustain the number and quality of patient-oriented research projects using administrative data, and contributing to the accelerated pace of research in Alberta.

AbSPORU has achieved high levels of service quality. Based on results of an independent evaluation in 2019/20, 88% of clients were satisfied with the Unit's services overall and 96% were satisfied with the Data Platform services specifically. The Data Platform continues to expand the scale and scope of its services – maintaining response times, increasing the number of datasets available for research and linkages – despite growing demand and request complexity.

In the area of POR training, workforce and skill development, the successful pilot of the Unit's Health Data Analytics and Knowledge Translation Certificate courses were some of the Unit's key capacity building achievements in 2019/20. Overall, close to 1100 individuals participated in AbSPORU's various training and outreach events. Also, developmental work on the AbSPORU Implementation Science Collaborative (ISC), a key mechanism of the Unit's contribution to Learning Health Systems (LHS) advanced: a pan-provincial interdisciplinary steering committee was established and an operational model developed to guide the ISC's implementation in Alberta.

Finally, the COVID-19 pandemic which emerged in Alberta and Canada in late 2019/20, while disruptive to health research more generally, presented an opportunity to demonstrate the value of AbSPORU's unique business model. Its virtual network structure enabled the Unit to sustain support for clients throughout the pandemic as well as its ability to rapidly respond to the needs of partners at CIHR in coordinating and providing reciprocal rapid reviews for COVID funding and research activity aimed at advancing our understanding of the pandemic and its potential solutions.

AbSPORU's COVID-19 Response – Data Analytics Support Services. Since the emergence of COVID-19 in Alberta, the Data Platform has been at the forefront of COVID data analytics, working with the Alberta Health Services (AHS) Emergency Coordination Centre (ECC) to assist with outbreak modelling and capacity planning. This work includes the development and evaluation of models to help understand patient risk and how best to transition patients safely through the healthcare system.

Health Research Ethics Board of Alberta (HREBA)

Alberta Innovates provides secretariat support to the Health Research Ethics Board of Alberta (HREBA), a research ethics board (REB) governed by Health Canada and the US Food and Drug Administration. The Board provides ethical reviews and ongoing ethical oversight of cancer and community-based research involving humans, personal information, and biological samples. HREBA is composed of a cross-disciplinary team including doctors, members of the scientific community, non-scientific members with specific expertise, including ethicists, lawyers, privacy experts and community members from across the province. The board's role is to safeguard the rights and welfare of individuals who volunteer to participate in research by ensuring ethical principles have been considered and applied prior to the research being initiated. HREBA also reviews non-research projects in Alberta such as quality improvement studies conducted in the community which require REB review for peer review publication or organizational requirement (as in cancer)

Key HREBA achievements for 2019/20 include:

- Approval of 448 new research applications and 3,937 post-approval activities for ongoing studies, and
- Decrease in average days to REB approval: the time from submission of an application to approval was 57 days (down from 63 days in 2018/19).

The services provided by HREBA support quality ethical research, and the accelerated turnaround of REB decisions means that health researchers in Alberta experience fewer delays and can start their studies sooner.

A pRoject Ethics Community Consensus Initiative (ARECCI)

Established in 2008, A pRoject Ethics Community Consensus Initiative (ARECCI) is an Alberta Innovates platform that provides support to project leads in assessing and addressing risks in non-research projects through decision-support tools, training opportunities and an ethics consultation service.^{vii} At the heart of ARECCI is the recognition that not all projects require REB approval despite having an ethical risk due to the involvement of people, their information, or sensitive nature.

The ARECCI program helps individuals, groups and organizations minimize ethical risks in projects. In using two decision support tools, "ARECCI Ethics Guideline Tool" and "ARECCI Ethics Screening Tool", individuals can identify a project's ethical risks, determine the category of risk and the appropriate ethics consultation. Since inception, nearly 20,000 individuals have accessed the online decision support tools. Feedback from individuals who have used the decision support tools have requested more focus on health applications and plans to enhance the ARECCI tools with stakeholder input will be developed in the upcoming year. As part of the continuous improvement process, the online version of the ARECCI Ethics Guideline Tool is also being revised to be more responsive to user needs.

^{vii} Information about ARECCI is available at: <https://albertainnovates.ca/programs/arecci/>

A parallel initiative under-development is looking at the Ethics of Innovation (EOI) with respect to innovation projects that involve data and the application of artificial intelligence and machine learning, such as digital health. The goal of EOI is to assist individuals, groups, organizations, and companies in identifying and minimizing the ethics risks that may arise in the development or adoption of such innovation projects. Big data innovation projects face different ethical challenges than traditional health research. Determining how best to use digital health data requires the consideration of ethical dimensions of data collection, data use and subsequent application in innovation projects. Alberta Innovates uses an EOI ethical framework to assist innovation project sponsors with identifying, addressing and incorporating risks in the ethical, legal, and social implications (ELSI) of their project, as well as security, policy and regulatory/best practices.

In digital health, big data applications have the potential to transform health systems with information that can be used to improve patient outcomes and health system performance: to optimize the use of this data and applications for learning health systems, ELSI, security, policy and quality considerations must be designed from the beginning and assessed throughout innovation projects. Alberta Innovates EOI Initiative is helping to advance this work in Alberta.

Alberta Clinical Research Consortium (ACRC)

Clinical health research exists to improve quality of life. The vision of the Alberta Clinical Research Consortium (ACRC) is high quality, efficient, integrated clinical health research in the province. Working with representatives from Alberta Health Services, Alberta Innovates, Alberta SPOR SUPPORT Unit, the Alberta College of Physicians & Surgeons, Covenant Health, Government of Alberta – Jobs, Economy and Innovation Ministry, University of Alberta and University of Calgary, one of the key strategies is training and building capacity for a highly qualified workforce. Training is an essential requirement needed to conduct well-controlled clinical trials that result in protected patients, data integrity, and the evidence needed to show the effectiveness of a treatment.

Since in the onset of COVID-19, the ACRC has also been a catalyst and active member of a provincial COVID-19 Clinical Trials Preparedness Group that was struck to deal with the issues that clinical health researchers would face during the pandemic. The ACRC convened the group to address how to determine if research projects are essential vs. non-essential, how to provide remote monitoring access for essential studies, addressing personal protective equipment (PPE) supplies for research staff, and developing processes for essential research to continue safely. Members of that group are working to develop protocols and policies within their respective organizations to help address these issues.

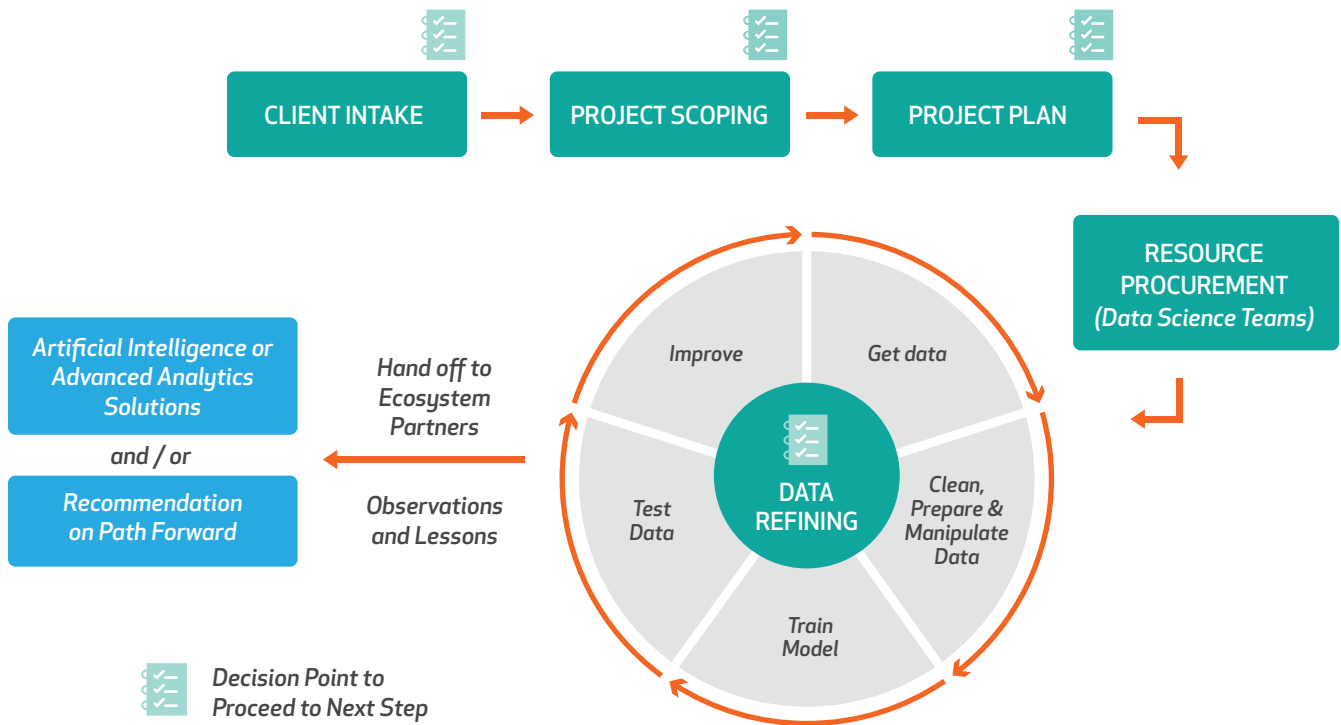
One of its most high in demand events, the ACRC's Alberta Clinical Health Research Conference was held in Calgary in September 20, 2019. The sold-out event attracted over 180 individuals and featured an interview with a research participant, plenary presentations on emerging areas of clinical research interest, concurrent sessions on available tools and services, provincial initiative updates, information booths, and network opportunities. From the evaluation survey, 100% of respondents indicated that the event was well-organized, and they benefited from attending. Additionally, over 90% were satisfied with the conference and would recommend it to others. The conference is one of many activities the ACRC undertakes to help build and sustain clinical research capacity in Alberta and ensure researchers and study staff are aware of emerging trends, informed of changes in regulations and equipped to investigate new treatments and procedures with the potential to improve the quality of life for Albertans. More specifically, the conference provides clinicians and researchers with continuous learning as required by Health Canada and meets the ACRC training recommendations which are updated as needed to support Alberta's clinical health research workforce in performing quality studies.

The ACRC team also supports the implementation and provides ongoing support for the EDGE research management system in Alberta working with Alberta Health Services (AHS) and Covenant Health. The collaborative information system is utilized by AHS Health Services Access, Covenant Health Research Centre, AbSPORU and ARECCI. The EDGE system is also used to populate select data in 'real time' into the AHS Connect Care (electronic medical records) system. These partners and programs utilize EDGE to track, assess, manage, and report on the hundreds of requests for access related to research in AHS and Covenant Health, and for service requests in AbSPORU and ARECCI. As this is a collaborative, shared information system, organizations can choose what is shared with other groups, thereby creating a more efficient and streamlined research and innovation ecosystem.

Alberta Data Institute (ADI)

The Alberta Data Institute (ADI), launched in 2018, facilitates innovation by providing Alberta researchers and entrepreneurs with technical services for the development of industry-led, advanced applications that require large amounts of data, including artificial intelligence. ADI provides clients the opportunity to prototype data-driven ideas, de-risk early-stage innovation and increase their data maturity and capabilities. ADI supports client projects with high potential to generate outcomes with economic and social benefits for Alberta through services and assistance in project planning, procurement, data curation, cleaning, and refinement as well as application/product development: Figure 22 outlines ADI's project development support process.

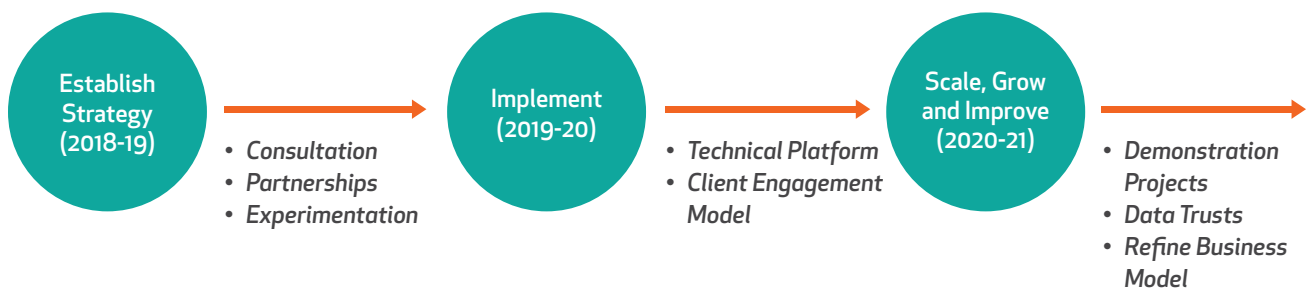
Figure 22: ADI Client Engagement Process



Data-driven innovations are expected to emerge in all sectors to support initiatives in food safety, smart agriculture, environmental monitoring, pipeline management, healthier Albertans and more. The solutions generated through data-driven innovations and ADI services can be used by clients to address business needs in automation, client engagement, insights, and analytics, or to improve efficiencies. The services provided by ADI are also intended to help innovators ensure trust and control of data when sharing between partners and collaborators.

The Alberta Data Institute’s development is based on a three-phase approach (Figure 23).

Figure 23: ADI Development Approach



Key ADI accomplishments in 2019/20 included:

- development and launch of the ADI Technical Platform, Dataxch.ai, thereby enabling access to 250,000 datasets from 3,500 sources
- development and implementation of the ADI Client Engagement Model,
- launch of a partnered hackathon with Cybera Inc. “Flattening the Curve and Promoting Economic Recovery through Innovation”, and
- Growth in strategic partnerships, collaborations and clients including:
 - Canadian Agri-Food Automation and Intelligence Network (CAAIN) partnership to support data governance and data-driven innovation for CAAIN members
 - ATB Financial partnership to support the ATB Ventures program
 - Pacific Institute of Mathematics Science (PIMS) partnership
 - Protein Industries Canada (PIC) SuperCluster Advisory Committee membership, and
 - Multiple demonstration projects (n=6) engaged with clients in the Health and Clean Resources sectors.

The Health sector project examples are highlighted below and illustrate some of the work underway in Alberta to facilitate data driven innovation with the potential to improve health, wellness, and prosperity.

CHESTPAIN AI

The goal of this project is to develop an algorithm that predicts with a high probability that chest pain is related to cardiovascular disease. Currently, validated tools exist that physicians can use to score the likelihood of coronary artery disease as the cause of chest pain. This tool is retrospective and static and does not consider individual nuances. It is conducted manually by clinical staff and the predictive accuracy is low. Using real-world data to develop a predictive algorithm is expected to improve predictive capability. Not only can complex patterns in the data be observed that may be missed in conventional approaches, but also a machine learning model can continue to learn and increase its predictive capacity over time. New data is continuously entered and run through the model and the model revises itself based on this new information. This project is in the Data Refining Stage.

FRAILITY INDEX

The goal of this project is to improve patient care for an ageing population by generating a frailty index (FI) to be available as an electronic medical record (EMR) point of care tool. There are many tools, screening options, and indexes available, but nothing that is available as an EMR point-of-care frailty index (FI-EMR). This is the solution being proposed. Frailty is a complex state that requires information and input from several domains beyond medical information, e.g. social data, and with current tools, it takes more time to assess frailty than physicians have available. It would be valuable to physicians to know which domain of well-being (social, physical, mental, functional, etc.) is the driver of frailty for a patient and to be able to incorporate this information into the patient’s personalized care plan. This project is in the Planning and Resourcing Stage.

Summary

Alberta Innovates aims to be recognized nationally and internationally as a go-to organization for supporting and influencing the development of cutting-edge innovations and practices. Through R&I, we aim to improve patient outcomes and contribute to improved healthcare processes and systems, as healthcare and system costs currently make up nearly half of the provincial budget. Increased innovation is one of the drivers of economic diversification and job growth and offers potential pathways to help bend the health care cost curve in Alberta.

This report demonstrates Alberta Innovates contributions to health R&I in Alberta. It describes the strategies that Alberta Innovates undertakes to ensure that Alberta's researchers and innovators are overcoming challenges and have a clearer path to innovation.

The results and advancements highlighted in this report reflect the efforts of our researchers and trainees as well as the collective efforts of many public and private organizations. It is through the building of human capacity and infrastructure, and the leveraging of partnerships, expertise and resources in R&I that Alberta will be best able to address the health needs of Albertans, both now and in the future.

Moving forward, Alberta Innovates' investments in the Health sector will include a focus on:

- Project investments that are designed to rapidly launch partnerships or to prototype the potential for a program.
- Program investments that aim to scale and spread support in areas of strategic interest.
- Platform investments that enable and accelerate health R&I; and
- People investments to develop competencies and a skilled workforce in areas that align with strategic interests.

In 2020/21, Alberta Innovates Health Innovations and Provincial Platforms will continue to shift towards supporting a future focused on Digital Health. This work will involve:

1. Deploying resources and retooling existing mechanisms to support ecosystem enablement projects. This includes:
 - a. the development of Business to Business (B2B) partnerships that support digital innovation,
 - b. a renewed focus on value-extraction from existing investments, and
 - c. implementing mechanisms for talent development for the digital future.
2. Focusing on data as an enabler, using data to identify opportunities and develop solutions.
3. Supporting digital technology development and implementation. For example
 - a. designing new and retooling existing programs to support entrepreneurial activity in digital health, and
 - b. developing digital solutions that enable and improve client engagement.
4. Supporting innovation in healthcare production and distribution.
 - a. partnering with health systems to enable innovation testing and adoption, and
 - b. launching and engaging in initiatives that empower patients, providers, and communities to better achieve health outcomes.
5. Identifying and supporting emerging health industries in Alberta. For example,
 - a. alternative medical products (e.g., cannabinoids),
 - b. virtual healthcare management, and
 - c. precision-health.

In 2020/21, Alberta Innovates will develop a Digital Health Strategy and framework to advance Digital Health initiatives in Alberta. Emerging opportunities in Digital Health include development of machine learning models to better predict clinical outcomes, virtual models to guide patients in self-care management and the prevention of disease through healthier lifestyles, and improving upon provincial platform technologies, secondary use data and services for digital health. The adoption of a Digital Health Strategy builds on Alberta's strengths in artificial intelligence and health research, is responsive to increasing consumer demands in health, and aligns to emerging technology trends that have already impacted other sectors.

References

- 1 American Institutes for Research. (2012). Innovative methods in stakeholder engagement: An environmental scan (AHRQ Publication No. 12-EHC097-EF). Rockville, MD: Agency for Healthcare Research and Quality. effectivehealthcare.ahrq.gov/topics/stakeholders-engagement-others/research-2012-1
- 2 Balas E, & Boren S. (2000). Managing clinical knowledge for health care improvement. In: JH van Bommel & AT McCray (Eds.) Yearbook for medical informatics. (pp. 65-70). Stuttgart, Germany: Schattauer Verlagsgesellschaft mbH.
- 3 Grant J, Cottrell R, Cluzeau F, Fawcett G. (2000). Evaluating “payback” on biomedical research from papers cited in clinical guidelines: applied bibliometric study. *BMJ*, 320:1107-11. [bmj.com/content/320/7242/1107](https://www.bmj.com/content/320/7242/1107)

Appendix A: Methods, Data Sources and Timeframes

Alberta Innovates' Annual Impact Report for Health Innovation: 2019/20 reflects information from multiple data sources. The primary source for impact-related data for our strategic investments is an electronic impact data collection system (Researchfish®). The information in this system includes numerous grants and awards, including those of trainees. As the grant and award process is dynamic, the programs included in the Annual Impact Report vary from year to year (e.g., new programs are implemented by Alberta Innovates and others closed) as do the specific projects funded within each program.

Revised Method of Analysis for the 2019/20 Report

As our research and investment processes evolve, so too has our approach to the analysis of the information collected from our researchers. Beginning with this report, our approach to analysis has changed, and this new approach allows us to improve the process of data extraction and transformation. Data reported in Researchfish® for grants and awards includes results achieved during the fiscal year of April 1, 2019 to March 31, 2020. This report reflects those activities reported for the 2019/20 fiscal year and only for those researchers who submitted a report in this period. Given these changes, data in this report cannot be compared to that of previous years' annual health impact reports and represents a new baseline.

DATA COLLECTION

Data for the AI Annual Health Impact Report 2019/20 was collected through AI's electronic impact data collection system (Researchfish®). Information related to the progress to and achievement of outcomes and impacts for investments in Alberta Innovates' provincial platforms, partnerships and collaborations were gathered from the lead representative(s) for the initiatives. For these initiatives, the data was predominantly limited to progress to and the impacts achieved between April 1, 2019 and March 31, 2020. In a few cases, milestones that were necessary to achieve progress to impact are mentioned even if the milestones were reached prior to April 1, 2019.

DATA MANAGEMENT AND QUALITY ASSURANCE

Some necessary steps were taken to clean the data submitted by researchers in Researchfish®. For example, if a country or organization name was manually entered by the researcher, AI ensured that a consistent nomenclature was used (e.g., no space after the name; “Australia” instead of “Australia, Commonwealth of”; full name of an organization instead of an acronym).

For reported publications, journal articles that were imported into Researchfish® by researchers and accompanied by a PubMed identification number (PMID) or Digital Object Identifier (DOI) were not further verified. If a publication was manually entered and or if a PMID /DOI was not included, AI’s research librarian verified the reported entry, and if needed, re-coded the entry (e.g., published journal article, abstract, in press, etc.,). Conference proceedings/abstracts, policy briefing reports, working papers, books, and monographs were accepted as reported.

The Researchfish® data used for this report is predominately self-reported by AI-funded researchers, and an audit was not done to verify the accuracy of reported data. Additional information about the methodology and quality assurance processes in relation to the use of Researchfish® data are available in the [AIHS Annual Impact Report: 2014-15](#).

ANALYSIS

This report is focused on the returns on investment that AI is realizing across a portfolio of health R&I funding program investments. The analysis of quantitative results was limited to descriptive statistics and completed using Microsoft Excel software. Throughout the report, percentages were rounded up or down to the nearest whole number. This rounding may result in not all percentages summing to 100 percent in a given section or table. Further funding, which is funding that was received from another source after the start date of AI funding and before the end of the AI funding period, is a key indicator used by AI. However, Researchfish® collects data on further funding that includes records that predate the start date of the AI funding. This required AI to remove further funding records that predated the start date of the AI award, so that a further funding ratio could be calculated. As well, to avoid circularity, further funding that was provided by AI was removed from the further funding ratio calculation.

Appendix B: Strategic Investments

Funding Opportunity	Description	Number of Grants/ Awards Active in 2019/20	Total Investments in 2019/20
AB/Sanofi-Health Innovation Fund	The Alberta/Sanofi Health Innovation Fund supports health research capacity development in the area of drug development, the refinement of health policy, the identification of health outcomes and overall health research community collaborations.	1	\$0
Accelerating Innovation into CarE (AICE)	Provides funding support to generate real-world evidence in a clinical setting for new technologies developed by SME innovators that have the potential to address priority needs of Alberta's health system. The funding enables the health system to test and validate the impacts of new technologies, particularly on disease pathways or workflow, with the intent of informing adoption and improving the health system and overall health of Albertans. <i>50% total project costs up to \$150,000 per project; maximum of 18 months</i>	2	\$0
Alberta/ 3M Awards	This is a Collaborative Program partnership between Alberta Innovates and 3M. The scope of the Collaboration is in the areas of Translational Health Research, Worker and Public Safety, Industrial, Electrical and Telecommunication projects focused on the development, use and/or application of innovative technological platforms or validation of current products and technologies or research approaches in the creation of new knowledge and its potential transfer to commercialization.	3	\$0
Alberta/ Eli Lilly Translational Research Fund Opportunity	Collaboration between Eli Lilly, Alberta Innovates and Alberta Health to support targeted translational research and innovation projects that will impact the health of Albertans. <i>\$1.5M total Fund.</i>	2	\$0

Funding Opportunity	Description	Number of Grants/ Awards Active in 2019/20	Total Investments in 2019/20
Alberta/ Novartis Translational Research Fund Opportunity	<p>A partnership with Novartis Pharmaceuticals Canada Inc., this fund supports translational research and innovation projects with a strong potential to advance Multiple Sclerosis (MS) patient care and/or research over the short or medium term (three to five years). The Opportunity will support the development of research and innovation projects in the priority topic areas identified by Novartis and the province of Alberta: development and implementation of evidence-based care; delivery of patient care; advancement of MS research and innovation; and patient engagement.</p> <p><i>Up to a maximum of \$100,000 per year for up to 3 years</i></p>	3	(\$24,344.10)
Alberta/ NovoNordisk Infrastructure Development Grant	<p>The Novo Nordisk and Alberta Innovates collaboration supports development of database infrastructure that will integrate patient reported outcomes into a surveillance system with the objective of strengthening and improving health and health care delivery for diabetic patients.</p>	1	\$0
Alberta/ Pfizer Translational Research Fund Opportunity	<p>We partner with Pfizer Canada Inc., Western Economic Diversification (WD) Canada, and Alberta's Innovation and Advanced Education ministry to support research and innovations in shared priority areas that show promise of commercial development into new products and services for improving health and addressing needs in the health system.</p> <p><i>Up to \$200,000 for up to a maximum of 18 months.</i></p>	2	\$172,395
APHI Development Grant	<p>A partnership with Genome Alberta to facilitate the coalescence of multi-sectoral teams, catalyze their activities in precision health and enhance Alberta's competitiveness in upcoming national and international precision health funding opportunities.</p> <p><i>No set maximum amount. Anticipated range is \$100K - \$300K. Duration is 18 months.</i></p>	1	\$0
Canadian Institutes of Health Research eHealth Innovation Partnership Program (CIHR eHIPP): Stream II eHIPP solutions for transitions in care gaps	<p>eHealth Innovation Partnership Program (eHIPP), is a collaborative funding program designed to create a new generation of cost-effective patient- and population-centered health care solutions by supporting partnerships between Canadian technology companies and 'innovation communities' to co-develop and integrate innovative e-health solutions that deliver real-world health care value.</p> <p><i>Total Project values up to \$375,000 per year for four years from all partners (\$46,875 per year from AI)</i></p>	2 (includes 1 grant funded through the Alberta Cancer Prevention Legacy Fund [ACPLF])	\$0

Funding Opportunity	Description	Number of Grants/ Awards Active in 2019/20	Total Investments in 2019/20
CIHR Partnership – Chronic Disease	<p>A funding opportunity to translate existing and new knowledge generated by basic biomedical, clinical, and population health research into testing of innovations that can improve clinical science and practice and foster policy changes, leading to transformative and measurable improvements in patient health outcomes, and in efficiency and effectiveness of healthcare delivery within five years.</p> <p><i>Alberta Innovates matched funding of \$4.89 million for a period of support from January 1, 2016 to December 31, 2020.</i></p>	2	\$978,000
CIHR Partnership – Rewarding Success	<p>To change the paradigm of how research is rewarded, the Rewarding Success program was designed to incentivize research teams and their healthcare partners to enhance value-based care, health system sustainability, and health outcomes. The research teams and their partners will design, implement, and evaluate interventions in healthcare organization(s) that aim to produce healthcare cost savings and/or improved health system efficiency.</p>	1	\$1,200,000
CIHR Partnership – SPOR Networks	<p><i>The pan-Canadian SPOR Network in Primary and Integrated Health Care Innovations is a key CIHR initiative under the Strategy for Patient-Oriented Research that builds on regional and national assets in community-based health care foster alliances between research, policy and practice.</i></p>	1	\$0
CIHR SPOR Innovative Clinical Trail Multi-Year Grant	<p>Program supports for innovative clinical trials using designs that are alternative to traditional Randomized Controlled Trials with application in areas ranging from product development to health system improvement.</p> <p><i>Operating grants of up to \$1.5 million each over four years are available from CIHR through the Strategy for Patient-Oriented Research (SPOR) to build capacity in innovative clinical trials. Alberta Innovates will consider providing matching funds to Alberta-based applicants that are successful in this CIHR competition.</i></p>	2	\$345,531

Funding Opportunity	Description	Number of Grants/ Awards Active in 2019/20	Total Investments in 2019/20
Collaborative Research & Innovation Opportunities (CRIO): Project, Program, Teams, and Cancer Prevention Research Opportunities	<p>Funding for collaborative research in priority areas for Alberta that engage knowledge-/end-users for the purpose of producing new knowledge and translating that knowledge to improve health and the healthcare system.</p> <p><i>Award values vary by CRIO program types ranging from \$250,000-\$1,000,000 annually with award durations ranging from three to a maximum of five years.</i></p>	19 (includes 5 grants funded through the ACPLF)	\$1,927,558
Health Effects of the Alberta Wildfires	<p>In development with the Canadian Institutes of Health Research and the Canadian Red Cross, this grant supports research that works to minimize the health impacts that the provincial wildfires and subsequent evacuations have had on Albertans. The research grant focuses on: pediatric resiliency related to mental health and addiction; adult resiliency related to mental health and addiction; and occupational health (e.g., workforce PTSD, exposure to air pollution/smoke affecting the respiratory system).</p> <p><i>\$250,000 per year for a maximum of two years</i></p>	2	\$0
Merck for Mothers	<p>A Partnership between AHS, AI, and Merck Canada, the Merck for Mothers initiative is a key investment to support research designed to help address health disparities and create health service improvements for Aboriginal women in Alberta.</p>	1	\$0
Partnership - CIHR Applied Health Chairs	<p>The CIHR Applied Health Chair program targets specific population and public health research priorities that align with other strategic initiatives to maximize synergies and impact.</p>	2	\$0
Partnership - CIHR Teams	<p>A CIHR program AI partnered with to fund a project that aims to advance Canadian research on bariatric care and medical management of severe obesity in adults as well as children and youth across the continuum of care.</p>	1	\$0
Partnership for Research & Innovation in the Health System (PRIHS)	<p>A funding partnership with Alberta Health Services that supports the activities of the Strategic Clinical Networks focused on improving patient care and value for money in Alberta's health system.</p> <p><i>Up to \$250,000 per year for up to three years</i></p>	13	\$5,111,735

Funding Opportunity	Description	Number of Grants/ Awards Active in 2019/20	Total Investments in 2019/20
Precision Health Grant - LSARP 2017	<p>Alberta Innovates and Genome Alberta are pleased to provide support for the development of full applications for the Genome Canada 2017 Large Scale Applied Research Project Competition in Genomics and Precision Health. This support is intended to assist Alberta teams to be more competitive in the upcoming competition.</p> <p><i>A total of \$20,000 is available to each Alberta-led team* who is invited to submit a full application by Genome Canada.</i></p>	1	\$107,875
Training and Early Career Development	<p>These grants and awards support the training of future leaders in the health research and innovation environment, so that they gain broad experience that will help them succeed in launching careers in academia, industry, government or elsewhere. This portfolio includes:</p> <ul style="list-style-type: none"> • Graduate Studentships and Postgraduate Fellowships • MD-PhD Studentships • Clinician Fellowships <p><i>These awards range in value from \$30,000 to \$70,000 per year with career development allowances of between \$2,000 and \$5,000 per year. Visit Health Innovation's TECD webpage more details on each active program.</i></p>	134 (including 5 grants funded through the ACPLF)	\$3,313,031
Translational Health Chairs	<p>A partnership with Alberta's Comprehensive Academic and Research Institutions to recruit translational health leadership in priority areas to improve health and the health system.</p> <p><i>From \$250,000 to \$600,000 per year for 7 years</i></p>	10 (includes 1 grant funded through the New Investigator Award program)	\$3,667,858



Suite 1500, 10104 - 103 Avenue
Edmonton, Alberta
T5J 4A7

Phone: (780) 423-5727

Toll-free: 1-877-423-5727

Fax: (780) 429-3509

E-mail: health@albertainnovates.ca

albertainnovates.ca

