

# BRINGING INNOVATION TO LIFE

INNOVATION-BASED GROWTH  
IN CANADIAN LIFE SCIENCES

JANUARY 2018





The Public Policy Forum works with all levels of government and the public service, the private sector, labour, post-secondary institutions, NGOs and Indigenous groups to improve policy outcomes for Canadians. As a non-partisan, member-based organization, we work from “inclusion to conclusion,” by convening discussions on fundamental policy issues and by identifying new options and paths forward. For more than 30 years, the PPF has broken down barriers among sectors, contributing to meaningful change that builds a better Canada.

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Thank you to our partners:



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# EXECUTIVE SUMMARY

The global market for life sciences and the broader bio-economy is enormous: worldwide health care spending is estimated to reach US\$8.7 trillion by 2020,<sup>1</sup> the medical devices market is currently estimated at \$US336 billion,<sup>2</sup> and the global bio-economy is estimated to reach US\$1 trillion by 2030.<sup>3</sup> Canada has a strong foundation of research, institutions and skills and significant commercial activity in these areas, but it is clear that untapped potential exists and Canadian firms are well positioned to take advantage.

The federal government has made innovation-based growth a centerpiece of its economic strategy, with a broad [Innovation Agenda](#), a more targeted [Innovation and Skills Plan](#) and numerous specific programs and initiatives announced in recent budgets. These initiatives have understandably taken a broad, sector-agnostic approach to encouraging innovation-based economic growth. As such, they do not necessarily target the unique and specific opportunities and challenges facing Canadian life sciences firms; without this particular context, these initiatives risk missing the mark for life science firms.

Canadian life sciences companies operate within a complicated economic, technological and political environment. Global political and economic uncertainty matched with relatively risky and long-term capital investment requirements and increasingly rapid scientific and technological advances creates significant challenges for companies in this space. Added to this is a complex policy environment involving the intersection of federal and provincial regulations and jurisdictions, large Canadian health care systems, intellectual property and more. These are compounded by challenges shared with companies in other knowledge sectors, including attracting and retaining appropriately trained talent, access to global markets and retaining high-potential growth firms in Canada.

Balancing these challenges are a number of significant strengths: world-class universities, hospitals and other institutions that support cutting-edge research and technology development, exceptionally well-educated graduates, strong economic fundamentals and a fertile system for entrepreneurs.

In order to maximize this potential and to address the particular challenges facing the life sciences sector, Public Policy Forum (PPF) conducted a series of interviews and roundtable discussions across Canada with leaders from the sector. These discussions explored opportunities and challenges for the sector through the lens of federal innovation policy. This report seeks to summarize these discussions via a series of

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<sup>1</sup> Deloitte. 2017. [2017 global life sciences outlook. Thriving in today's uncertain market.](#)

<sup>2</sup> Government of Canada. 2017. [Medical devices industry profile.](#)

<sup>3</sup> Organization for Economic Cooperation and Development. 2009. [The Bioeconomy to 2030 – Designing a Policy Agenda.](#)

recommendations for how the federal government’s innovation policy can best support the needs and potential of this vital Canadian sector.

The report makes eight recommendations under three broad themes: **National leadership, ingredients for growth and adoption and deployment.** The recommendations are:

### **National leadership**

1. The federal government should adopt a national life sciences strategy.
2. Adopt a ‘whole-of-government’ approach to life sciences innovation.
3. Significantly improve the quality of data about the sector and make it publicly available.

### **Ingredients for growth – the federal innovation agenda**

4. Invest in talent attraction, development, and retention – with an increased focus on talent for sales and executive leadership.
5. Continue efforts to expand and attract capital, open markets and supply chains, and build strong local ecosystems.
6. Support research excellence, including in basic research, and promote a strong user-focus in applied research programs.

### **Adoption and deployment**

7. Revisit health care procurement, and move from cost-based to value-based systems.
8. Services not programs.



# SOMMAIRE

Le marché mondial des sciences de la vie et de la bioéconomie au sens large est colossal : on estime que d'ici à 2020, les dépenses consacrées aux soins de santé dans le monde s'élèveront à 8,7 billions de dollars US<sup>4</sup> ; le marché des dispositifs médicaux est actuellement estimé à 336 milliards de dollars US<sup>5</sup> ; et la bioéconomie mondiale devrait atteindre 1 billion de dollars US d'ici à 2030<sup>6</sup>. Le Canada possède une base solide en matière de recherches, d'institutions et de compétences ainsi qu'une activité commerciale importante dans ces domaines, mais il existe encore clairement un potentiel inexploité et les entreprises canadiennes sont bien placées pour en tirer profit.

Le gouvernement fédéral, avec un [Programme d'innovation](#) de portée générale, un [Plan pour l'innovation et les compétences](#) mieux ciblée et de multiples programmes et initiatives spécifiques annoncés dans les derniers budgets, a fait de la croissance fondée sur l'innovation une pièce maîtresse de sa stratégie économique. Ces initiatives ont naturellement suivi une approche générale, indépendante du secteur, afin d'encourager la croissance économique fondée sur l'innovation. En tant que telles, elles ne visent pas nécessairement les perspectives et les défis uniques et spécifiques qui se présentent aux entreprises canadiennes du secteur des sciences de la vie ; sans ce contexte particulier, ces initiatives risquent de rater la cible des entreprises du secteur des sciences de la vie.

Les entreprises canadiennes des sciences de la vie doivent composer avec un environnement économique, technologique et politique difficile. L'incertitude politique et économique mondiale jumelée au risque lié à des besoins d'investissement de capitaux à long terme ainsi qu'à la rapidité des avancées scientifiques et technologiques créent d'importants défis pour les entreprises de ce secteur. Vient s'ajouter à cela un contexte politique complexe dû, entre autres, au recoupement des réglementations et des compétences fédérale et provinciales, à la taille des systèmes de santé canadiens et aux questions de propriété intellectuelle.

Un certain nombre de points forts permettent de contrebalancer ces défis : des universités, des hôpitaux et d'autres institutions de premier ordre qui soutiennent la recherche et le développement de technologies d'avant-garde, des étudiants extrêmement bien formés, de solides bases économiques et un système productif pour les entrepreneurs.

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<sup>4</sup> Deloitte. 2017. [2017 global life sciences outlook. Thriving in today's uncertain market.](#)

<sup>5</sup> Gouvernement du Canada. 2017. [Profil des instruments médicaux de l'industrie.](#)

<sup>6</sup> Organisation de Coopération et Développement économiques. 2009. [The Bioeconomy to 2030 - Designing a Policy Agenda.](#)

Afin de maximiser ce potentiel et de relever les défis particuliers auxquels est confronté le secteur des sciences de la vie, le Forum des politiques publiques (FPP) a organisé une série d'entretiens et de tables rondes avec des responsables du secteur dans l'ensemble du Canada. Ces discussions ont porté sur les perspectives et les défis pour le secteur sous l'angle de la politique fédérale en matière d'innovation. Le présent rapport vise à résumer ces discussions à travers plusieurs recommandations sur la façon dont la politique du gouvernement fédéral en matière d'innovation peut soutenir au mieux les besoins et le potentiel de cet indispensable secteur canadien.

Le rapport contient huit recommandations divisées en trois thèmes généraux : **leadership national, ingrédients essentiels à la croissance, et adoption et déploiement**. Les recommandations sont les suivantes :

### **Leadership national**

1. Le gouvernement fédéral doit adopter une stratégie nationale en matière de sciences de la vie.
2. Adopter une approche pangouvernementale axée sur l'innovation dans le secteur des sciences de la vie.
3. Améliorer sensiblement la qualité des données sur le secteur et mettre ces données à disposition du public.

### **Ingrédients essentiels à la croissance – programme d'innovation du gouvernement fédéral**

4. Investir dans le recrutement, le perfectionnement et la fidélisation de talents, en se concentrant plus particulièrement sur les talents en matière de vente et de leadership exécutif.
5. Poursuivre les efforts visant à attirer et augmenter les capitaux, à ouvrir les marchés et les chaînes logistiques, et à mettre en place de solides écosystèmes locaux.
6. Soutenir l'excellence en matière de recherche, notamment fondamentale, et promouvoir les programmes de recherche appliquée axés sur l'utilisateur.

### **Adoption et déploiement**

7. Reconsidérer la fourniture des soins de santé et passer d'un système basé sur les coûts à un système fondé sur la valeur.
8. Des services, pas des programmes.



# INTRODUCTION

Canada's economic future will be driven by globally competitive companies working at the forefront of knowledge and technology. These companies are built on innovation and skills, cornerstones of economic growth and prosperity. Canada enjoys significant advantages in these areas, but must not be complacent as countries around the world are driving their own economic growth through significant investments in research, innovation and skills.

To this end, the federal government has made innovation and skills cornerstones of its economic policy. The 2017 federal budget focused on jobs, skills and learning while leveraging strong infrastructure, pillars of an innovative and prosperous economy.

To focus the impact of investments, the government has identified key economic sectors which promise to promote a Canadian advantage and an opportunity for growth. Among these is the life sciences sector. Life sciences are traditionally understood as branches of science that study living organisms and life processes. In practice, the life sciences sector is defined by the application of biology in products, processes and technologies in areas such as human health, biotechnology, agriculture and agri-food, and more. It is a highly dynamic and innovative sector: a source of highly-skilled jobs, fast-growing firms and expanding global markets

Few areas offer greater opportunity for economic growth. Worldwide, health care spending is projected to reach US\$8.7 trillion annually by 2020.<sup>7</sup> Much of this growth will come from exciting developments in precision health, biotechnology, biomedical engineering and other new areas. And there is more than economic potential in this nascent life sciences revolution. New drugs and novel treatments have the potential to alleviate human suffering in Canada and worldwide. Biotechnology is leading to cleaner and more efficient manufacturing, resource development and energy production. Life sciences are fueling novel approaches to the mitigation and adaptation to climate change, and are increasing food yields and nutrition for the benefit of people worldwide. Countries worldwide are ramping up efforts to capture this economic potential through investments in research, skills and innovation.

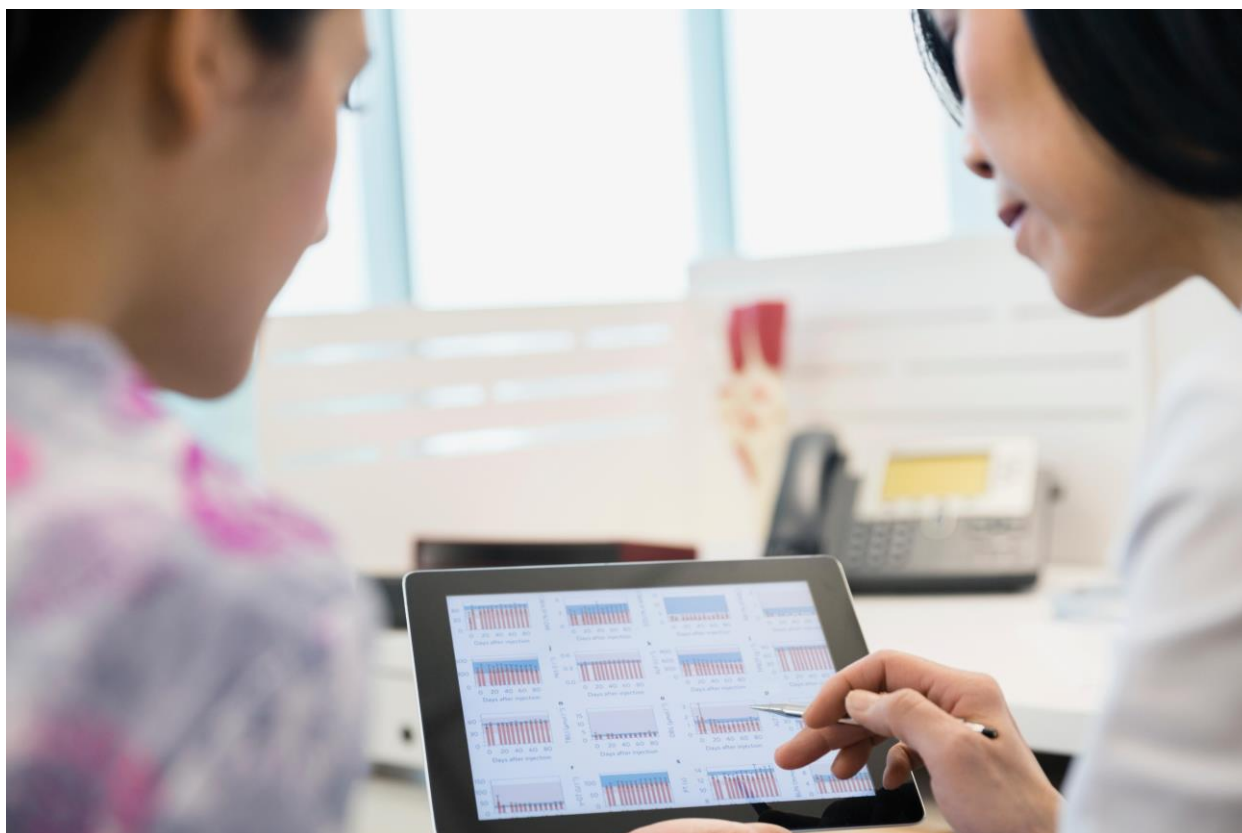
Canada is exceptionally well-positioned to lead the development of innovative solutions to global economic opportunities and social challenges. It is essential that the federal government's focus on innovation-based growth align with the challenges and opportunities in the Canadian life sciences sector. To that end, PPF launched a conversation with companies in the Canadian life sciences sector and across the broader bio-economy. In June 2017, PPF hosted four roundtables in key life sciences

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<sup>7</sup> Deloitte. 2017. [2017 global life sciences outlook. Thriving in today's uncertain market.](#)

hubs: Vancouver, Toronto, Montreal and Ottawa. These roundtables brought together stakeholders from the private sector, government, not-for-profits and academia, and were supplemented by additional interviews with experts and business leaders across the country.

This project identified intrinsic policy challenges and opportunities particular to the life sciences sector including: data and definitions regarding the scope, breadth and impact of the life sciences sector; jurisdictional issues between different orders of government; the intersection of competing mandates between government departments; the tension between necessary regulatory oversight and economic growth and between budget pressures and the increasing availability of innovative but expensive therapies; and the Canadian single-payer health care system. These challenges make it all the more important to understand the specific context in which companies in this sector evolve and to ensure government policies and programs are best positioned to achieve the desired outcomes of innovation and growth.



# CONTEXT

## State of the Sector

The life sciences sector has tended to focus on areas related to human (and sometimes animal) health: drugs and pharmaceuticals; medical devices and equipment; research, testing and medical labs; and agricultural feedstock and chemicals. Increasingly, however, the platforms and products that have driven innovation in these areas are finding application in a much broader set of sectors, including clean tech, agri-food, fisheries and aquaculture, energy, natural resources and more.

Canada enjoys a strong life sciences sector:

- Canada is home to the second largest life science cluster in North America - the Quebec-Ontario Life Sciences Corridor - with other significant clusters of activity in Vancouver, Alberta, and Atlantic Canada.
- Pharmaceutical companies employ more than 28,000 people and generate more than \$9 billion annually (2016),<sup>8</sup> with more than half of this production exported internationally.
- The Canadian medical device industry's exports totaled \$3.1 billion (2016) in a global market valued at US\$336 billion.<sup>9</sup>
- Life sciences companies are also central to Canada's agriculture and agri-food sector (which totaled \$108.1 billion in 2014)<sup>10</sup> and the clean tech sector (\$11 billion in 2014 and growing fast).<sup>11</sup>
- Life sciences are not only an economic pillar in Canada's major cities: Canada's smallest province, Prince Edward Island, has a thriving bioscience cluster, with dozens of companies and more than 1,500 employees in the sector.

Canada also possesses the fundamentals necessary to grow the sector further: strong research, world-class universities and hospitals, a single-payer public health care system and emerging clusters of life science innovation that include entrepreneurs, researchers, clinicians, companies and capital. Canada also enjoys a strong and vibrant network of industry associations, research organizations and not-for-profits dedicated to knowledge translation and commercialization that support innovation-based growth across the country.

## Federal Policy Context

The life sciences sector finds itself at the nexus of jurisdictions and departments. Provinces and territories administer and deliver most health care services in Canada, whereas the federal government's role in health care includes setting national principles through the [Canada Health Act](#), financial support to provinces and

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<sup>8</sup> Government of Canada. 2017. [Pharmaceutical industry profile](#).

<sup>9</sup> Government of Canada. 2017. [Medical devices industry profile](#).

<sup>10</sup> Agriculture and Agri-Food Canada. 2016. [An Overview of the Canadian Agriculture and Agri-Food System 2016](#).

<sup>11</sup> Working Group on Clean technology, Innovation and Jobs. 2016. [Final Report](#), p. 13.

territories and other functions. Similarly, economic development and innovation are shared responsibilities between levels of government. It is beyond the scope of this report to describe and investigate the jurisdictional issues around health care beyond general comments. However, we recognize that this jurisdictional complexity often creates challenges with the regulation, evaluation, commercialization and adoption of innovation.

At the federal level, life sciences companies primarily engage with two government departments in the development and deployment of innovation. Innovation, Science and Economic Development Canada (ISED) works with companies to improve conditions for investment, enhance innovation and increase global trade. Health Canada works with companies on rules, regulations and approvals. Both departments support research and development through various initiatives and programs. Additional departments may also have regulatory, policy, commercialization and trade impacts on the sector including Global Affairs Canada, Agriculture and Agri-Food Canada, Environment Canada, Fisheries and Oceans and others, not to mention the obvious role played by Finance Canada and other central agencies. Other arm's length organizations that are federally funded, administered or regulated that affect the sector include the Patented Medicine Prices Review Board (PMPRB) and the Canadian Agency for Drugs and Technologies in Health. Finally, there is a strong research and innovation ecosystem that supports the sector, including organizations like the Canadian Institutes for Health Research (CIHR), the Natural Sciences and Engineering Research Council (NSERC), Genome Canada and more. This complex governmental environment poses unique challenges to the sector, as described below.

ISED has developed and is deploying numerous policy initiatives to boost innovation across the Canadian economy. In 2016, the Government of Canada released the [Innovation Agenda](#) which outlined three areas of focus: People, Technologies and Companies. Building on this Innovation Agenda, the 2017 Budget launched the [Innovation and Skills Plan](#) and announced the creation of two entities: Innovation Canada and Innovation Solutions Canada. Innovation Canada will coordinate and streamline the services and support provided to Canadian entrepreneurs and innovators. Innovation Solutions Canada will, as a procurement program, provide early-stage research funding to potential suppliers, therefore de-risking investments, in return for early access to new technologies.

The Innovation and Skills Plan focuses on four key themes:

- **Skills.** Equip Canadians with the tools, skills and experience necessary for an evolving workforce and attract more top talent from around the world to grow the economy.
- **Research, technology, and commercialization.** Increase the quantity and impact of business research in Canada, build more effective links between industry and academia, and improve commercialization of Canadian ideas.

- **Program simplification.** Ensure business innovation support is responsive and straightforward and meets the needs of Canadian innovators.
- **Investment and scale.** Increase opportunities for small firms to scale up through effective access to domestic and foreign capital, retain high-growth companies in Canada and expand exports of Canadian goods and services.

These themes have been supported by a number of programs and initiatives designed to drive innovation broadly across the Canadian economy, including:

- **Strategic Innovation Fund:** \$1.26 billion over five years to “attract and support new high-quality business investments.”
- **Innovation Superclusters Initiative:** \$950 million over five years to strengthen innovative ecosystems.
- **Venture Capital Catalyst Initiative:** \$400 million over three years for late-stage venture capital funding administered through Business Development Canada (BDC).

According to Kevin Page, founding president and CEO of the Institute for Fiscal Studies and Democracy, in advance of Budget 2017, the Government of Canada spent \$8.3 billion a year on 82 programs and eight tax measures to enhance innovation.<sup>12</sup> These figures do not include complimentary programs in skills and training.

These policies and programs are designed to promote innovation-based growth across the economy, with a particular focus on cutting-edge, world-leading technologies and processes. This approach ensures broad applicability across sectors but may need to be adapted or supplemented to address the specific challenges and opportunities of a specific sector such as the life sciences.

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<sup>12</sup> Institute for Fiscal Studies and Democracy. 2017. [Skills and Innovation: Where's the money?](#)

# TOWARDS A LIFE SCIENCE STRATEGY

PPF convened a series of roundtables where participants outlined some of the key challenges facing the sector along with potential solutions. What drove the discussion was a desire to identify what steps could both support a sector that is already strong and innovative and help it reach new heights. Participants were passionate, engaged and committed to building a successful life sciences sector here in Canada and unequivocally agreed that Canada has all of the key ingredients to drive further growth of life sciences companies in this country.

While conversations ranged broadly, key themes and common observations emerged and pointed to steps that can be taken to support innovation-based growth in the sector. This report groups these themes and observations - along with recommendations - into three broad themes: **National leadership; ingredients for growth; and adoption and deployment.**

## NATIONAL LEADERSHIP

The life sciences sector is inherently complex. Diverse global and local markets and health care systems, a mix of large, established, multi-national firms and small, ambitious start-ups, a risky, long-term investment environment, fast-moving research and innovation involving academic, government and industrial research – all these contribute to a dynamic and challenging economic context for the sector. Life sciences policy is also complex, due to the intersection of federal and provincial regulation, jurisdictional issues, health care systems and intellectual property and more. This leads to a confusing and often inefficient approach to many challenges which inhibits growth. Solutions and policy prescriptions lack coordination and are sometimes even contradictory.

As such, a consistent theme in the discussions was the need for government leadership - particularly **strong and high-profile national leadership by the federal government** in those areas where it can have the biggest impact. This can be accomplished through the following recommendations.

### 1. **The federal government should adopt a national life sciences strategy**

Jurisdictions around the world have used strategies to boost the development and growth of targeted industries. These strategies, when focused and measurable, can be important tools to align government priorities and activities with relevant needs and opportunities. Strategies present an opportunity for governments to set ambitious goals and priorities and to outline medium to long-term plans.

Given the size of the global life sciences market - along with its enormous growth potential, it is not surprising that numerous countries have developed national strategies for the sector or its various

components. For example, the UK government recently published recommendations for a life science strategy.<sup>13</sup> The identification of priority areas in the case of the life sciences would require a balance of existing strength, potential for economic growth and impact on Canadians' health.

A federal strategy would accomplish numerous important goals. First and foremost, it would demonstrate commitment - both nationally and internationally - to the **life sciences sector as an engine of innovative growth**, helping to attract investment and to point the way forward for government policy.

Second, it would need to establish **clear priorities for public investment and policy development**, providing clarity and support for the development of long-term priorities for companies and organizations that support them. Third, the establishment of clear and specific objectives would provide an opportunity to **track performance and make evidence-based decisions** about new investments, programs and policies - specificity in objectives leads to specificity in outcomes.

Finally, such a strategy will necessarily **balance the competing policy priorities** that impact the life sciences and healthcare. Roundtable discussions made clear that there are three significant and sometimes competing policy priorities for the sector: economic growth for life science companies, sustainability of health care systems driven by life sciences, and patient health and wellness. Addressing any of these policy priorities in isolation risks undermining efforts to promote the others. As will be discussed further below, these objectives do not necessarily exist in opposition, but coordination and complementarity are key for effectiveness.

A federal plan should integrate and enable provincial life sciences initiatives and strategies. For example, the Quebec government launched its life sciences strategy in 2017, making it the only provincial government with a current strategy specifically for this growing sector. Quebec's plan focuses on two key areas, precision medicine and big data in healthcare. It has four measurable objectives tied to specific, quantifiable goals: to increase investments in research and innovation, to support the creation of innovative companies and ensure their growth,<sup>14</sup> to attract new private investments and to better integrate innovation in the healthcare system and social services.

## **2. Adopt a 'whole-of-government' approach to life sciences innovation**

The most significant challenge - and frustration - identified during the roundtable discussion was the often conflicting policy imperatives received from ISED, Health Canada and other departments. There is a sense that ISED's efforts to spur innovation with supply-side incentives - tax policy, direct funding programs,

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<sup>13</sup> Bell, J. Office for Life Sciences. 2017. [Life Sciences Industrial Strategy – A report to the Government from the life sciences sector](#).

<sup>14</sup> Government of Quebec. 2017. [L'innovation prend vie: Stratégie Québécoise des sciences de la vie 2017-2027](#).

incentives for capital - are frustrated and often undone by the regulatory requirements implemented by Health Canada, the federal price regulator (the PMPRB) and provincial health and insurance systems.

The federal government can improve this situation in three ways. First, it can establish clear cross-department mechanisms to ensure efforts made on the one hand are not undone inadvertently by the other. Perhaps the economic growth tables announced in the 2017 budget will go some way to helping this effort. Provincially, some governments are addressing this challenge with the establishment of offices dedicated to supporting this whole-of-government approach to health innovation - most notably in Ontario with the establishment of the Office of the Chief Health Innovation Strategist and more recently, with the announcement that Quebec would launch a similar office.

Second, the federal government can undertake an examination of current policies and regulations through the lens of innovation and economic growth. Such an undertaking would not be meant to loosen necessary rules and regulations, but rather to identify where there may be inadvertent barriers to innovation that have compromise solutions.

Third, it can establish clear objectives that support innovation, affordability and wellness. In particular, this means adopting a strong value-based approach to health care in place of what is currently perceived as a cost-management approach. For one example, the federal government is a purchaser of drug treatments through the Non-Insured Health Benefits (NIHB) Program. The federal government could design value-based or outcomes-based reimbursement frameworks as a model for the rest of the country. The establishment of effective incentives for departments that include innovation-fueled benefits like cost-avoidance may also be useful.

Currently, the federal, provincial and territorial governments coordinate strategy and policy through ministerial roundtables and regular contact between officials, resulting in good, broad strokes alignment. However, participants expressed frustration at the frequent disconnect between provincial and federal departments, and felt that the sector would significantly benefit from tighter coordination and more finely tuned interventions on both sides in order to align priorities, investments, objectives and more. This is true, for instance, in the establishment and delivery of programs (Mitacs, Genome Canada, CFI) and policies (Canadian Scientific Research and Experimental Development Tax Incentive Program). Roundtable participants also highlighted the importance of aligning broader policies that impact innovation between the levels of government, including education and immigration.

### **3. Significantly improve the quality of data about the sector and make it publicly available**

The currently available data about the economic performance of the Canadian life science sector is spotty and inconsistent. Some of this is due to varying definitions of what constitutes life sciences across Canadian jurisdictions. The federal government should commit to establishing clear definitions for the sector and to regularly collecting and publishing economic impact data by sub-sector,



geography and more. This data is essential to demonstrate the sector's impact, to attract foreign direct investment, to understand trends and challenges across the country and to inform evidence-based policy making.

Furthermore, the federal government should seek opportunities to leverage the centralized data of Canadian "single payer" healthcare systems. For instance, data could be used to measure impacts and outcomes of specific interventions, thereby providing a mechanism to better evaluate value vs. cost in designing reimbursement strategies. Personal health data could also be made more easily available to patients, thereby supporting innovation in personalized health management and opening opportunities for patients to proactively manage wellness.

## INGREDIENTS FOR GROWTH: THE FEDERAL INNOVATION AGENDA

As described above, the federal government's 2016 Innovation Agenda identifies three broad areas of focus: **people, technologies and companies**. Roundtable participants identified numerous challenges and opportunities that align with these areas, some of which they share with other high-growth sectors but others which are unique to the life sciences.

### **4. Invest in talent attraction, development and retention - with an increased focus on talent for sales and executive leadership**

There was clear consensus among participants that Canada enjoys a significant competitive advantage in its talent pool, particularly in the education and training of highly-skilled technical talent at Canada's universities, colleges and polytechnics. Initiatives to increase **opportunities for work-integrated learning** through co-op and internships were applauded as essential for supplementing cutting-edge knowledge with practical and applicable skills. With a few exceptions in emerging areas, companies had little trouble identifying and recruiting people with appropriate technical skills.

Nonetheless, participants identified a few areas in which talent shortages are an impediment to growth, particularly among small and medium sized companies: **sales, management and executive leadership**. Participants felt that there was a significant shortage of people in sales and management with the requisite technical knowledge to help grow their businesses. An increase in work-integrated



learning experiences and a broadening of opportunities for Masters and Ph.D. students in the life sciences to pursue industry-linked projects would help to expand the skill sets of technically-trained talent and open opportunities for graduates to explore careers in sales and management. With few large firms to serve as training grounds for research and development managers, programs that provide management training to science students and graduates are particularly valuable. Additionally, it is important to look beyond the STEM disciplines (science, technology, engineering and mathematics) towards business, management and other disciplines in order to support firm growth.

A separate challenge was identified for high-growth companies facing scale-up difficulties: the recruitment of executive leadership with experience growing companies. Experienced executive leadership in the sector was identified as a major advantage for managing growth and attracting capital, but with relatively few Canadian high-growth success stories, there is a paucity of home-grown executive leadership available. Participants agreed that - particularly given the decreased enthusiasm for immigration in many peer nations - Canada has a significant opportunity to recruit such talent from overseas, particularly from the United States. This will require a proactive approach

to recruitment and immigration. The [Global Skills Strategy](#) announced in June 2017 was identified as an important first step, particularly the establishment of a Global Talent Stream and amendments to the Express Entry immigration system to better respond to labour market needs. Participants recognize that recruitment - particularly for experienced executives - may pose complex immigration challenges and urge government to continue streamlining procedures to take advantage of Canada's opportunity.

## **5. Continue efforts to expand and attract capital, open markets and supply chains, and build strong local ecosystems**

Capital is the fuel that drives growth during the scale-up of successful companies. There was much discussion about the current state of capital available in Canada for life sciences companies: while there is certainly regional variation, participants felt that Canadian capital markets for life sciences are generally appropriate and that Canadian governments are taking positive steps to support and promote investment. In particular, participants credited the continuation of the Venture Capital Action Plan via the Venture Capital Catalyst Initiative in Budget 2017, the opening of the Strategic Innovation Fund to additional sectors including life sciences and the launch of the Innovation Superclusters Initiative. Nonetheless, participants identified additional opportunities for support.

Venture capital has long been a challenge for scaling-up Canadian life science firms. Participants agree that the Canadian funding ecosystem remains underpopulated for life sciences and that there is a dearth of sophisticated investors working with life sciences companies; still, most felt that there was capital available for high-potential firms though there was a feeling that more could be done to increase the availability of Canadian capital to Canadian firms. Suggestions from participants included extending flow-through share structures to life science firms, incenting Canadian institutional funds to invest in Canadian firms and the establishment of patent boxes and shared tax credit schemes. It is beyond the scope of this report to weigh the relative value of each of these suggestions, but the federal government should continue to seek mechanisms to ensure that there is a healthy supply of capital available to life science firms, and that this capital spans the growth range of Canadian firms.

Another powerful engine for growth is the opening of international markets and access to global supply chains. The federal government can play an important role in both of these areas. Life sciences are a global market and many of the Canadian companies saw greater opportunities overseas than at home. Canada enjoys a strong network of Global Affairs Canada Trade Commissioners who can support Canadian firms seeking markets overseas, many of whom have experience and knowledge with the sector. Targeted and focused efforts for the sector - particularly in markets with significant export potential - will help Canadian firms build market share abroad.

Finally, participants emphasized the importance of strong local and regional ecosystems for starting and growing successful companies. Vibrant ecosystems play an especially important part in creating “stickiness” for Canadian firms who might otherwise face a choice to move or be acquired in order to support growth and they serve as powerful attractors of talent and capital. Types of ecosystems include clusters - which are concentrated geographically - but also include broader networks that link companies and other institutions with a common purpose. Essential ingredients identified by participants include the presence of one or more large anchor firms, small dynamic companies, research universities and colleges, and - importantly - support organizations and platforms that initiate and support cross-sector collaboration and cooperation. The superclusters initiative was applauded as a good mechanism to support and grow productive ecosystems; however, this initiative will only support a small number of clusters across multiple sectors. Nonetheless, the federal government can continue to support emerging ecosystems through existing programs that support research collaboration, platforms and local cooperation. Many local ecosystems are already nurturing clusters and are developing local cluster strategies.

#### **6. Support research excellence, including in basic research, and promote a strong user-focus in applied research programs**

Canada’s life science sector is built on a strong foundation of excellent science. Canadian researchers punch significantly above their weight, publishing about four per cent of the world’s most important research papers with only two per cent of the population.<sup>15</sup> Canada performs even better in emerging life science disciplines; since 2011, Canadian researchers have published more than four per cent of global publications in personalized medicine, neurodegeneration, proteomics and bioinformatics and regenerative medicine.<sup>16</sup> Canada’s research universities are among the world’s best, consistently ranking Canada as a world-leader in research and education. This is essential - there is a strong correlation between the most innovative countries and those who invest significantly in R&D. These investments are particularly important for highly-technical sectors like life sciences, where cutting-edge knowledge and skills provide a competitive advantage.

These advantages must not be taken for granted; Canada risks undermining its advantage after a decade of neglect for fundamental research and continues to under-produce highly-skilled PhDs relative to peer nations.<sup>17</sup> The government should adopt the recommendations of the [Naylor report](#) to strengthen the foundations of Canadian research and increase the production of top talent.

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<sup>15</sup> Canada’s Fundamental Science Review. 2017. [Investing in Canada’s Future: Strengthening the Foundations of Canadian research.](#)

<sup>16</sup> Ibid.

<sup>17</sup> Science, Technology and Innovation Council. 2015. [State of the Nation 2014.](#)

More worryingly, industry research spending has fallen substantially. Canadian pharmaceutical business R&D expenditure dropped to \$870 million in 2015 from a high of \$1.33 billion in 2007.<sup>18</sup> Business spending on R&D has also dropped significantly in the agriculture and agri-food sector, from \$180 million in 2008 to \$130 million in 2013.<sup>19</sup>

Roundtable participants noted the strong roster of federal programs available to support research and innovation in the sector, including CIHR, NSERC, Genome Canada, IRAP, Mitacs and SR&ED. Participants felt that these programs were valuable and helped them achieve their objectives. However, there was widespread agreement that these programs would significantly benefit from increased coordination and a significant focus on client needs rather than program requirements. Participants noted that these programs were sometimes complicated and time-consuming to access or were unknown to potential users. Increased coordination, better alignment with participant needs and a higher profile could significantly increase the impact of these programs.

Finally, there was a strong sense among participants that Canada could do more to leverage its existing research strengths and opportunities in health data, clinical trials, and precision health. These three areas represent high growth potential segments of the sector and all present particular opportunities for Canada: single-payer systems mean that many provinces collect enormous data sets for big data analytics, Canada's diverse population and highly-skilled workforce present a clear opportunity to expand clinical trials, and strong platforms in genomics combined with integrated health systems present an ideal development ground for precision health.

## ADOPTION AND DEPLOYMENT: A SIGNIFICANT OPPORTUNITY

So far, much of the focus of the recommendations in this report has focused on the supply-side of innovation - promoting growth of companies and development of research and innovation to support them. However, it became clear during the roundtables that the greatest potential for driving innovation and growth rests on the demand side of innovation - through adoption and deployment. There was widespread consensus that governments - federal, provincial and territorial - can significantly improve innovation-based growth of Canadian life science companies by adopting new and innovative products and processes through the health care system and elsewhere, which is often thwarted by current policies. Discussions resulted in three recommendations in this area.

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<sup>18</sup> Government of Canada. 2017. [Pharmaceutical industry profile.](#)

<sup>19</sup> Agriculture and Agri-Food Canada. 2016. [An Overview of the Canadian Agriculture and Agri-Food System.](#)

## **7. Revisit health care procurement, and move from cost-based to value-based**

One significant frustration identified by roundtable participants was with current procurement rules in health care systems. There is an impression that the current system adopts decision-making based on cost-reduction rather than a broader definition of value. Participants felt that innovative health solutions may be more expensive in up-front costs, but often represented higher value in the long-term in both health outcomes and overall health system costs. Nonetheless, current procurement and regulatory systems are not sufficiently calibrated to evaluate and capture the long-term value and thus may stymie the adoption of innovation. Given that healthcare is under provincial jurisdiction, the federal government may be somewhat limited in its options for direct action; however, given the investments being made in growing innovation-based Canadian firms, the federal government should explore mechanisms to work with provinces to ensure that innovative Canadian products and processes find a place in the Canadian market.

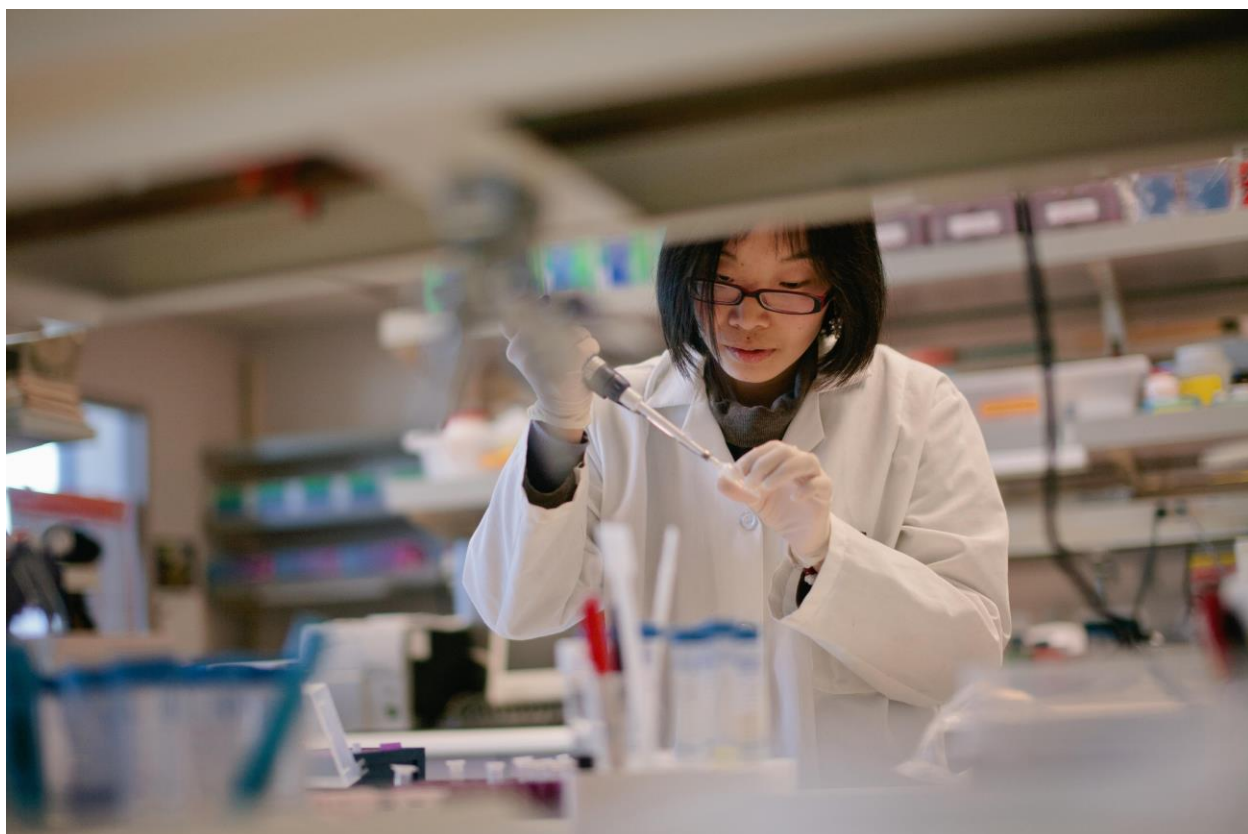
Canadian single-payer healthcare systems pose additional challenges and opportunities for innovative health solutions. The first challenge is scalability. For many new, innovative companies, they may have only a single local customer - the provincial government. This poses a significant growth challenge for small companies who may struggle with supplying such a large market right out of the gate. Thus, one participant characterized Canada as a “nation of pilots” - where small pilot-programs are successfully run in various hospitals or other settings, but where the jump to full-scale adoption in a provincial health system poses too daunting a challenge. The federal government can assist with some of the challenges with rapid scalability through suggestions listed above around talent and capital. But the federal government has an opportunity to work with provinces to ensure that Canadian companies have a healthy and achievable path to growth here in Canada, and aren't forced to move to the U.S., where more steady and stepwise growth may be possible.

## **8. Services not programs**

A consistent theme of the discussions was a clear emphasis on building productive and supportive partnerships with government rather than increases in funding or arms-length support programs. Participants cited the challenges of growing a company and bringing a product to market, particularly in the highly-regulated life sciences sector. Several participants cited examples where working closely with government officials allowed them to identify possible challenges and opportunities early on, understand how to address government policy and regulatory needs and, in some cases, clear up misunderstandings between government departments that would otherwise have left them stuck and frustrated. Understandably, entrepreneurs and business leaders are focused on their products and their customers; navigating government programs and policies smoothly can help improve time-to-market and reduce costs associated with launching innovative products and services, as well as provide greater clarity to companies around gaining regulatory approvals and

market access. All of these will make it easier for companies to attract private investment for innovative new products.

Accordingly, the federal government should investigate mechanisms by which it can work cooperatively with Canadian firms to help navigate programs and regulations. A particular focus should be placed on small firms who may have neither the expertise nor the bandwidth to navigate this easily. Ideally, this approach would be coordinated with provincial governments in order to truly streamline efforts for Canadian firms. Successful cooperation would promote the growth of Canadian firms and send a strong signal internationally that Canada is committed to supporting innovation in life sciences, attracting further investment and growth.



## CONCLUSION

Canada finds itself at an exciting and important moment in the development of its national life sciences sector. A strong foundation of research and skills, a successful track record of commercialization and entrepreneurship, and a policy environment that emphasizes innovation and growth are valuable Canadian advantages in a competitive global marketplace for new ideas, new products and new solutions to persistent and important challenges.

It is clear that the bio-economy presents enormous opportunities for Canadian companies and offers significant personal and social benefits to Canadians' health, environment and more. The observations and recommendations contained within this report were built on conversations between Canadian leaders from companies and other organizations in life sciences and associated sectors. They reflect an optimistic and ambitious sense of Canada's potential in the sector and underline the many positive factors in policy, programs and practices already in place.

They also point to some significant challenges and barriers. The Government of Canada has committed an Innovation and Skills Agenda to supporting innovation-based growth in multiple areas including the life sciences sector. The recommendations of this report – grouped under the themes of national leadership; ingredients for growth; and adoption and deployment – are meant to support this agenda, and to provide a life-sciences/bio-economy perspective on broad innovation policy ideas. Echoing one of the key recommendations of this report, cooperation and collaboration between government and the sector will ensure the right policy instruments are in place to support the continued development of life sciences and the bio-economy and will help Canada assume global leadership in this important sector.



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