

# BioFUTURE|2030

An Economic Growth Plan for Nova Scotia's Health and Life Sciences Sector



Lead Organization: BioNova | [www.bionova.ca](http://www.bionova.ca) | @BioNovaNS | **October 2018**

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# Commitment to Growth

Our Health and Life Sciences industry is uniquely positioned to move our economy into a prosperous future. BioFuture 2030 is a bold industry-led initiative and an opportunity to do things differently.

## Vision

**A connected and collaborative Health and Life Sciences community that reaches its full potential, providing prosperity for Nova Scotians.**

As members of industry, government, and partners, we commit to work together to support the vision and be part of a movement of people and organizations who are championing Nova Scotia's Health and Life Sciences sector to grow our economy and strengthen our capacity.

We believe that:

- Fostering an ecosystem of world-class researchers, facilities, and entrepreneurs is a shared responsibility.
- Investing in life-changing research will strengthen and grow capacity of the Health and Life Sciences Sector.
- Speaking with a unified voice to promote the success and vibrancy of Nova Scotia's Health and Life Sciences Sector is a shared commitment.
- Championing the collaborative process will enable the human, financial, policy and other resources to help businesses grow and enable Nova Scotians to participate in and benefit from an advancing Health and Life Sciences Sector – making BioFuture 2030 a success.



Malcolm Fraser  
President & CEO, Innovacorp

**innovacorp**  
EARLY STAGE VENTURE CAPITAL



Steve Armstrong, PhD  
President & CEO, Genome Atlantic



**GenomeAtlantic**



John Rogers  
Interim President & CEO, Halifax Partnership

**HALIFAX  
PARTNERSHIP**  
CONNECT. COLLABORATE. PROSPER.



Laurel Broten  
President & Chief Executive Officer,  
Nova Scotia Business Inc.

**n | s | b | i**  
Nova Scotia Business Inc.



Daryl Genge  
President & CEO, Springboard Atlantic

**Springboard**  
Bringing Research to Life  
Faire vivre la recherche

# Acknowledgements

## A message from the Chair

On behalf of BioNova, it was our pleasure and privilege to lead the development of the first economic strategy for Nova Scotia’s Health and Life Sciences sector.

I would like to thank the BioFuture 2030 Advisory Group who volunteered countless hours, sharing their ideas about what it will take to grow our sector. Having this high level of business consultation and engagement is vital to building a thriving Health and Life Sciences sector with a shared vision.

BioFuture 2030 allows us to see what is possible. This strategy sets some ambitious goals that will benefit our sector, our community, and move our economy into a prosperous future.

Over the next three years, I look forward to celebrating our success as we bring this strategy to life. Continued collaboration between industry and government will be instrumental in implementing this strategy. I look forward to expanding the number of life science champions who are ready to roll up their sleeves and help us realize the full potential of our sector.

Sincerely,  
  
Kevin Sullivan  
Chairperson, BioNova  
CEO, Appili Therapeutics

.....

## A message from the Executive Director

What makes BioFuture 2030 truly remarkable is the collaborative process from which it was developed.

The collaborative process tapped into the expertise of a wide-variety of industry and government leaders. This helped ensure BioFuture 2030 aligns with the priorities and expectations of business, government and relevant organizations.

Our life sciences industry is uniquely positioned to move Nova Scotia’s economy into a prosperous future. Collectively, our sector is tackling Nova Scotia’s biggest challenges which include: improving the sustainability of our healthcare system, developing tools to assist our aging population, providing Big Data health solutions, and taking on climate change with clean energy bioproducts. These also present our largest growth opportunities.

I would like to personally thank Neil Ritchie at Invicta Health for his in-depth research and consulting services. Neil interviewed all individuals who actively participated in the development of BioFuture2030.

We have the right ingredients, the talent and resources needed to grow our sector, develop products that will change the world and transform Nova Scotia’s economy. BioFuture 2030 is the recipe that pulls it all together.

BioFuture 2030’s success depends upon fostering ongoing collaboration. There is no doubt we can accomplish more

together than we can individually. I am thrilled to be launching the first economic strategy and am confident we have what we need to grow our Health and Life Sciences sector.

Sincerely,  
  
Scott Moffitt  
Executive Director, BioNova

**BioFuture 2030 Advisory Group:**

- Neil Ritchie, Invicta Health
- Lidija Marusic, Innovacorp
- Alex McCann, Nova Scotia Business Inc. (NSBI)
- Dina Kalogeropoulos, Atlantic Canada Opportunities Agency (ACOA)
- Don Douglas & Johannes Larsen, National Research Council – Industrial Research Assistance Program (NRC-IRAP)
- Doris Grant, Dalhousie University Industry Liaison and Innovation (ILI)
- Chris Mathis, Springboard Atlantic
- Steven Beyea, BIOTIC
- Bobby Sutherland, Innovative Medicines Canada
- Sue Coueslan, Natural Products Canada





**Thawing Times**

Sample Type	Volume	Thawing Time (min)
Cell Culture Media	100 µl	10
	1 ml	15
	5 ml	20
Protein Samples	100 µl	10
	1 ml	15
	5 ml	20
DNA/RNA Samples	100 µl	10
	1 ml	15
	5 ml	20



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# Executive Summary

The economic potential of our Health and Life Sciences sector is incredible. Not only are Health and Life Sciences companies at the cutting edge of science and technology, they are the largest investors in R&D in the world. The biopharmaceutical industry is the single largest investor in Life Science business R&D - investing \$1.2 trillion globally since 2008, with a forecasted annual spend of US \$182 billion by 2022<sup>1</sup>. No wonder it has been identified as a priority sector in the Atlantic Growth Strategy.

Nova Scotia has an established Health and Life Sciences cluster that is home to over 100 companies, revenues in excess of CAN \$300 million, over 1,500 corporate employees (only company employees) and an average salary approaching \$25,000 above the provincial average, all of which will grow through the efforts from BioFuture 2030. We also have business incubation centres and shared core research facilities that are facilitating ground-breaking research at Dalhousie University, the IWK, Nova Scotia Health Authority and within the Innovacorp Enterprise Centre.

Members of our Health and Life Sciences community represent some of the most innovative people in the region. Individually, BioNova's member companies are improving our healthcare system, providing healthier foods to the world, and developing clean energy bioproducts.

**BioNova Member Companies provide globally relevant products in medical devices, natural health products, digital health, pharmaceuticals, vaccines and bioproducts.**

These innovators see the untapped potential of the Health and Life Sciences. It's what helps them attract millions in investment dollars and drives them to succeed. But they also recognize if we are to become an economic powerhouse, there needs to be a coordinated action plan.

**Immunovaccine, Appili Therapeutics and ABK Biomedical, just three Nova Scotian companies, raised CAN \$70.7 million since December of 2016.**

BioFuture 2030, an economic growth plan for Nova Scotia's Health and Life Sciences sector, meets that need. BioFuture 2030 is an economic strategy with a clear vision, defined economic goals, and a plan to reach them.

BioFuture 2030's Vision: A connected and collaborative Health and Life Sciences community that reaches its full potential, providing prosperity for Nova Scotians.

## Goals

- Increase the number of Health and Life Sciences companies from 100 to 200
- Increase the total number of private sector Health and Life Sciences employees from 1,500 to 4,200
- Increase the average income per employee from \$61,500 to \$102,000
- Increase total annual sector sales from \$300M to \$1.1 B / year



The assets in Nova Scotia's innovation corridor are world class. BioFuture 2030 is industry led and as such it focuses on ensuring companies have better access to these incredible funding and incubator facilities and programs. It is a unified action plan that maximizes our talents and resources, makes us more globally competitive, and ultimately grows the Health and Life Sciences sector for the betterment of our economy.

**With a target of approximately 2,700 new employees at an average salary of CAD \$61,500 per year, applying a multiplier of 2.8 (a value accepted by the Health and Life Sciences industry across Atlantic Canada) to represent the total potential impact will be in the order of CAD \$472 million per year by the 2030 timeframe, without correcting for the anticipated increase in average income levels. Additionally, the export revenue values are forecasted to more than triple to CAD \$1.1 billion per year. Considering that revenues doubled from 2004 to 2011<sup>2</sup> it is anticipated that with accelerated growth initiatives introduced by the BioFuture 2030 plan, the new targets are achievable.**

The success of this plan requires the support of committed and capable organizations that also see the potential of the Health and Life Sciences sector as a pillar of Nova Scotia's new economy. In launching BioFuture 2030, we are building on the excitement and spirit of collaboration generated during the consultation phase.

**Dominic Barton, Managing Director of McKinsey & Company and Chair of the Federal Government's Advisory Council on Economic Growth, identified healthcare and Life Sciences as a key sector to drive economic growth in Canada<sup>3</sup>.**

A **BioFuture 2030 Implementation Team** will be established to provide strategic oversight and keep the implementation of the plan focused. BioNova will serve as the secretariat for BioFuture 2030, coordinating many of the initiatives in support of the goals and tactics. BioNova will also be measuring progress of the plan against the BioFuture 2030 goals and reporting on the strength of our bioeconomy. We hope you are as inspired and energized by this plan as we are and invite you to join one of our action teams to put BioFuture 2030 into action and help to grow our Health and Life Sciences sector.







# Why BioNova and Why Now?

**If we are to grow our Health and Life Sciences sector and realize our full potential, we need a plan. This is where BioNova comes in.**

BioNova is the industry association leading the advancement of the Health and Life Sciences sector in Nova Scotia.

**We CONNECT. BioNova is the place where like-minded companies and organizations come to meet and make meaningful business connections that translate into real business growth.**

**We SELL Nova Scotia's Health and Life Sciences Sector. BioNova's membership represents the majority of Health and Life Sciences companies in and associated with Nova Scotia. Our actions, as the organization who focuses solely on promoting the Health and Life Sciences sector, are driven from our mandate to act on the behalf of industry to accelerate development.**

**We IDENTIFY opportunities for growth. We proudly represent some of the most innovative people in the world. We have talent, infrastructure and a business environment to support growth. We have over CAN \$1 billion in exits and follow-on investment over the past five years. Our Health and Life Sciences sector has clear and demonstrated success.**

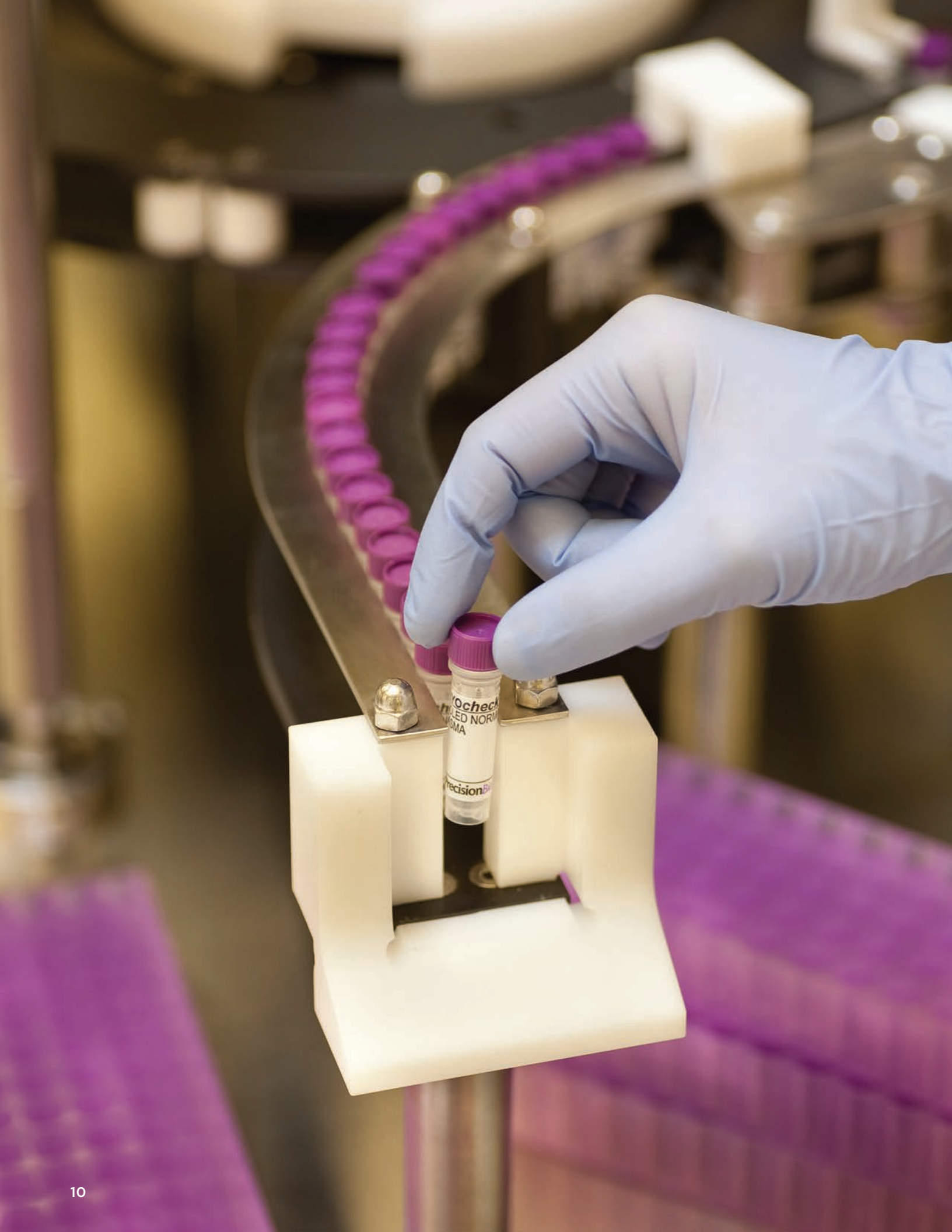
Our understanding of the unique needs of Health and Life Sciences companies enables us to provide the highest quality targeted services and support to start-ups, scale-ups, established businesses and strategic partners.

Through extensive industry-wide engagement, involving six months of consultation and over 50 information gathering sessions, we produced this unified action plan.

Together, we have developed a strategic growth plan that identifies the key actions needed to ensure our Health and Life Sciences industry and its associated assets are fully exploited.

Our unique perspective, means we are well positioned to build a truly collaborative model for the implementation of the strategic plan.

The success of this plan depends on the continued collaboration among our leaders. Urgent and directed responses are needed if Nova Scotia is to improve its economic situation and provide an attractive environment for the people who wish to live here.



# Strategic Vision

**A connected and collaborative Health and Life Sciences community that reaches its full potential, providing prosperity for Nova Scotians.**

**Action is needed now. Nova Scotia contains the key ingredients to create an economic powerhouse in the Health and Life Sciences. Ingredients need to be combined in the correct order and under the proper conditions. A recipe is needed to get the desired result. BioFuture 2030 is the recipe.**

BioFuture 2030 is an industry-led initiative to spur economic growth through sector development.

## The Strengths of Our Sector

The Health and Life Sciences sector brings added benefits to the province from the fact that they are born exporters. The markets are not local and for the most part, not within Canada. Global exporting is a reality for every company and is a primary consideration from the day they incorporate.

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### Exporters by Default





## **The Health and Life Sciences sector provides highly paid positions, averaging \$61,500/yr, which eclipses our provincial average.**

Over the past decade, venture investing in Health and Life Sciences has outperformed venture investing in Tech<sup>4</sup>. Recent investments prove this point with Immunovaccine, Appili Therapeutics and ABK Biomedical, just three Nova Scotian companies, raising CAN \$70.7 million since December of 2016. Investment is a sign of confidence in the quality of businesses being developed and the robustness of the technologies under development.

### **The Nova Scotian Strengths**

Nova Scotia provides an excellent environment for the development of high growth potential Health and Life Sciences companies. Nova Scotia and Atlantic Canada is home to ample support programs for companies to establish themselves, access their markets and to build critical value.

Our scale results in a level of nimbleness that is not seen in larger jurisdictions. Access to key decision makers, funders, supporters and stakeholders is more efficient, resulting in a reduced time to market and at less cost.

Nova Scotia is home to highly-valued and market-applicable technologies, along with research abilities and infrastructure that are globally recognized.

Our location is ideal for companies wishing to enter the North American market, with business costs that are more

favourable than larger centres in Canada and the United States. Our location is also advantageous for global customer communications where companies can reach Europe in the morning, the West Coast in the afternoon and Asia in the evening.

Our transportation infrastructure is well celebrated as is our well-educated work force. The lifestyle options in Nova Scotia are an ever-increasing attraction and retention tool for those seeking balance, enjoyment and a more relaxed and simple way of life while still having access to amenities found in larger locations.

With continued emphasis on our collaborative model, this environment will continue to allow companies to invest in Nova Scotia, establish here, scale and create significant economic impact.

In Nova Scotia, we are home to a robust Health and Life Sciences sector with well evidenced successes. The Health and Life Sciences sector is home to over 100 companies, revenues in excess of CAN \$300 million, over 1,500 corporate employees (only company employees) and an average salary approaching \$25,000 above the provincial average<sup>5</sup>.

- 600 products in market
- 200 products in development
- CAN \$80 million committed to future sector R&D
- 90 percent of manufactured products are exported
- Exporting to 80+ countries



## Nova Scotia's Health and Life Sciences Expertise



### Medical Technologies

The Medical Technologies area develops products used in the diagnosis and treatment of medical conditions. The areas included are:

**Diagnostic imaging:** products used to diagnose or monitor conditions via imaging technologies, including products such as MRI machines, computed tomography (CT), x-ray imaging and optical biopsy systems among others.

**Non-imaging diagnostics:** products used to diagnose or monitor conditions via non-imaging technologies, which can include patient monitoring and in vitro testing equipment (IVD's). IVD's are medical devices and accessories used to perform tests on samples, (e.g., blood, urine and tissue that has been taken from the human body) in order to:

- Help detect infections like strep throat or HIV
- Diagnose a medical condition such as an elevated cholesterol level
- Prevent disease by allowing early intervention
- Monitor drug therapies to ensure intended patient outcomes

Devices can range from simple tests to sophisticated DNA technology including reagents, calibrators, control materials, kits, software, and related instruments.

#### Research and other equipment:

equipment used for research or other purposes, including analytical and life science tools, specialized laboratory equipment and furniture such as hospital beds.

**Therapeutic devices:** products used to treat patients, including therapeutic medical devices, tools or drug delivery/infusion technologies.

**Assistive Devices:** products intended to improve mobility, which include crutches and wheelchairs.

Additional examples include pacemakers, artificial heart valves, hip implants, adhesive bandages (Bandaid®), synthetic skin, scalpels, medical laboratory diagnostic instruments, cholesterol level test kits, strep throat swabs and microbiological growth media.



### Pharma & Vaccines

The Pharmaceutical and Vaccines area includes companies and researchers who work to develop ways to treat a host of illnesses, whether it be a therapeutic or drug to treat a disease or a vaccine intended to prevent a disease.

This area includes classic pharmaceutical development which involves biochemical synthesis to develop a drug or the production of

biopharmaceuticals by using living organisms such as bacteria, yeast or mammalian cells to produce the drug.

From vaccines for various cancer treatments to a new class of anti-infectives, to topical treatments for pain, Nova Scotians are working on the forefront of drug discovery and development.



### Natural Health Products

The Natural Health Products (NHP's) & Functional Foods area develops and produces nutritional supplements and food products which contribute to good health and may have a health claim.

Natural health products are naturally occurring substances that are used to restore or maintain good health. They are often made from plants, but can also be made from animals, microorganisms and marine sources. They come in a wide variety of forms like tablets, capsules, tinctures, solutions, creams, ointments and drops.

Natural Health Products in Canada are defined and governed by Health Canada and include:

- vitamins and minerals
- herbal remedies
- homeopathic medicines

- traditional medicines like traditional Chinese and Ayurvedic (East Indian) medicines
- probiotics
- other products like amino acids and essential fatty acids

Omega-3's used for overall heart health is an example, produced here in Nova Scotia.



## Digital Health

Digital health is defined as the convergence of the digital and genetics revolutions within health and healthcare – the intersection of healthcare and technology. Digital health is empowering us to better track, manage, and improve our own and our family's health. It's also helping to reduce inefficiencies in healthcare delivery, improve access, reduce costs, increase quality, and make medicine more personalized and precise. As healthcare evolves it will continue towards the following:

- Personalized medicine – treatments that are designed for the individual.
- Self directed healthcare – the patient will manage their health.

As such, digital health is an umbrella term for all healthcare related applications, technologies and delivery systems that result from the confluence of medicine, genomics and

the technologies that comprise the digital space. There are a number of specialties within digital health, with the following being the most common:

- Telemedicine and Telehealth – remote clinical services, disease prevention and digital health promotion. Nova Scotia's 811 Telecare service is a prime example.
- mHealth (mobile health) – medicine and public health practices supported by mobile devices and wireless infrastructure. Examples include remote patient monitoring, disease and epidemic tracking, remote data collection, health and wellness apps, etc.
- Big Data – data science techniques to analyze large and complex datasets. Examples include genomics analysis for personalized medicine, pharmaceutical R&D related to mechanisms of action, and web and social media data analysis (interaction analysis).
- Wearables and implantables – wireless medical devices and biometric sensors gathering and interpreting medically useful information. Examples include cardiac monitors, blood glucose tracking and implantable defibrillators.
- HealthIT (Health Information Technology) – the application of information processing. Examples include electronic health records (EHR), electronic medical records (EMR), laboratory information systems (LIMS) and Picture Archiving and Communications Systems (PACS).



## BioProducts

The BioProducts area use biologically sourced materials, biotechnology or life science disciplines and understanding to transform the natural resources into new, higher value, products. The essential building block of bioproducts is biomass, organic matter that is or was once living. Sources of biomass come from all areas including marine, agricultural, forestry, municipal waste, among others and have traditionally been viewed as waste. The opportunity is waste resource utilization with the important step for Health and Life Sciences being the extraction from or transformation of biomass into high value products. Increasingly, specialty crops are being grown, not as food, but for key high value components.

- Biofuel being produced from marine algae to replace the use of hydrocarbons
- Agricultural growth enhancers produced from seaweed
- Cellulose-based biochemicals extracted from wood waste that can be used for the textile, automotive and manufacturing industries
- Specialty crop production to produce omega-3's for the Natural Health Product market
- Pharmaceutical ingredients being isolated from lobster and other shellfish processing waste



## Nova Scotian Examples:

- A new pharmaceutical to treat antibiotic resistant microorganisms - Appili Therapeutics
- A natural health product derived from fish oils, used to treat cardiac health issues - DSM Nutritional Products
- A medical device to filter harmful byproducts during surgery - DMF Medical
- A bioproduct derived from seaweed to support agricultural food production - Acadian Seaplants Limited
- A digital health company that uses data analytics to screen medical images for better detection of breast cancer - Densitas

Nova Scotia has examples of collaboration that have led to excellent end results and we need to create the capability to spread and scale these innovative approaches. Interactions across disciplines provide a distinct advantage for innovative research and this can transform into a local strength. Collaboration will play a key role in the future of our sector and the implementation of this strategic plan. The following are examples of local collaborative initiatives that have led to research investments, global expansion, increased value for stakeholders, the creation of good jobs and an overall benefit for the local economy.

**BIOTIC** (BIOmedical Translational Imaging Centre) is a multi-site imaging center that is embedded in the IWK Health Centre and Nova Scotia Health Authority (NSHA). Multidisciplinary and cross-functional teams, provide expertise in all facets of imaging research and development, collaborating on commercial development projects with industry partners as well as research and development projects with a number of institutions. The BIOTIC team co-develops medical technologies as well as creates new imaging techniques and methods for diagnosing and monitoring treatment.

**InnoviCares** is a free card that helps Canadians save money on select, brand-name prescription medications. The card can be used with an existing drug plan or on its own and more

than 1.5 million Canadians are already saving money with the card. STI Technologies Limited is a healthcare technology company that developed the system and was recently acquired by Quintiles IMS (now IQVIA), a global leader in exploring better patient outcomes via human data science.

**Acadian Seaplants Limited** is the world leader in marine plant products for people, animals and plants. Acadian Seaplants Limited is globally recognized for their processing of seaweed-based products and for the cultivation and processing of unique seaweeds for global food markets. The development of Acadian Seaplants Limited is a Nova Scotian success story which capitalized on the local availability of expertise provided by the National Research Council, a collaboration which has assisted in their overall success. Several noteworthy aspects of operations include: the advanced methods used to harvest seaweeds as a sustainable, renewable resource and the technologies created to process the natural seaweed resources into value-added finished products for sale in international markets. These activities have brought knowledge-based employment to Atlantic Canadians and environmentally safe benefits to users of the finished products.

**ABK Biomedical** is a medical device company that has designed imageable microspheres for minimally invasive treatment of cancerous and benign tumors. The successful commercialization of ABK Biomedical's innovation will benefit patients, lead to new business opportunities and more well-paying jobs for Nova Scotians as the microspheres are set to compete in global markets. The technology that is driving this game changer was developed by researchers at Dalhousie University.

**Nova Scotia and Atlantic Canada have an established Health and Life Sciences Innovation community with infrastructure, assets, programs and organizations that have supported the development to date and are poised to support additional growth in this sector of our economy.**

When visitors from abroad see the inventory of local organizations and capabilities assembled in Nova Scotia and regionally, they are impressed and often comment that what we have here is unique and not commonly seen in other jurisdictions. When evaluating what we have here, comparisons are made to the origins of highly successful Health and Life Sciences clusters elsewhere, like Boston, Massachusetts and Minneapolis, Minnesota.

*Minnesota has developed numerous firsts in medical advances and is now one of the largest producers of medical devices in the world<sup>6</sup>. In the early days, Minnesota had high quality clinical health infrastructure (Mayo Clinic) focused on clinical practice, education, research and the patient. They also had a high-quality university with a medical school (University of Minnesota). However, they realized that top quality research does not beget commercial economic success. They developed a plan and connected the dots to combine basic research, applied and translational research, education and training to generate commercial purpose. It connected engineers and scientists, clinical physicians, and surgeons with business minded individuals to develop solutions. The state college system was dialed-in to provide tailored content to support the development of personnel associated with local companies<sup>7</sup>. They also had similar origins in that they were originally a resource-based economy that made the transition.*

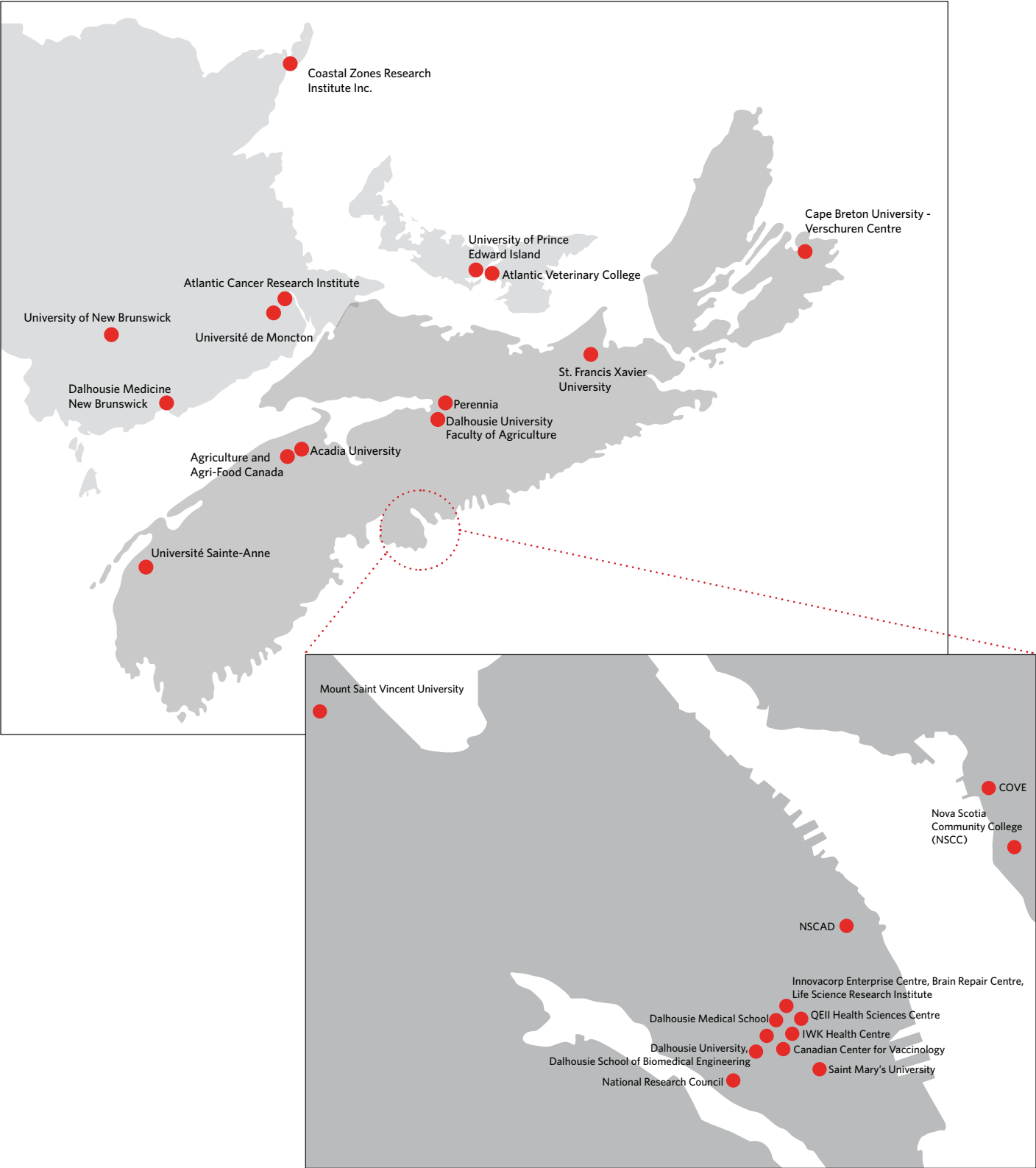
**Our challenge is to replicate best practices such as the Minnesota example, coordinating and collaborating to get full value from our assets and capabilities.**



### Research as an Economic Driver

Large Health and Life Sciences companies operate under a new model of collaboration and partnerships to drive their innovation. This represents a significant opportunity for Nova Scotia to effectively utilize the resources and infrastructure we already have. Further developing 'research as an economic driver' is also a mechanism to ensure a return on investment for public dollars used to support our universities, colleges and health systems – the return on investment will lead to highly paid research jobs, commercialization of research and the formation of new companies as well as a revenue line item for these organizations that will lessen the burden for the Province of Nova Scotia. To accomplish this, a collaborative environment that is supported by an open for business attitude and policies to attract investment is required.

Our Innovation Assets





Primary Goals

To achieve our vision, BioFuture 2030 identifies four goals that leverage the potential and collaborative strength of the Health and Life Sciences sector.



The Health and Life Sciences sector employs significant numbers while remaining in a pre-revenue state for extended periods due to the nature of product development, safety and efficacy testing requirements and a high regulatory burden among others.

The longer term nature of company development and revenue realization is normal, but requires higher capital investment which is offset by high long-term returns.

The 2030 average income of \$102,000 represents a 23% increase beyond assumed increases of 2% per year

The 2030 sector sales revenues of \$1.1B represents a 92% increase over the projected sales figure based on the past 10 years of historical sales growth data

Employee numbers represent corporate employees and do not include healthcare, government or university/college sector employees.

## Putting the Plan Into Action

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We have the science, talent and infrastructure to grow globally competitive companies. Our sector is creating high-value jobs for Nova Scotia and across Canada, but to sustain and build upon this success, we need a plan.

BioFuture 2030 lays the foundation to realize the incredible potential of our Health and Life Sciences sector. BioNova will lead the implementation of the economic growth plan, coordinating action teams and monitoring progress against the goals.

Ongoing collaboration and engagement from provincial and federal leaders, private sector, post-secondary institutions and partnering with industry associations will also be critical to successfully implement BioFuture 2030.

## What Success Will Look Like

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**START-UPS** | Increased number and quality of start-ups entering the ecosystem



**EXISTING COMPANIES** | Accelerated growth of existing and established companies



**ATTRACTION** | Attracting and retaining high growth potential companies and investment to the province



**SUSTAINABILITY** | Increase in the level of sustainability of the Health and Life Sciences ecosystem as an important driver of economic growth for Nova Scotia

# Why Health & Life Sciences?

The Health and Life Sciences sector delivers high value as it not only provides high quality jobs and impact on the local economy but healthcare innovation also impacts patient outcomes in a positive way.

The definition of Health and Life Sciences is broad. At its simplest, Health and Life Sciences refers to any of the sciences that deal with living organisms. The connection to, use or technological application of these sciences constitutes the development of a Health and Life Sciences product by a Health and Life Sciences company.

More simply, a Health and Life Sciences company is defined by two criteria:

- Uses biological sciences in the development, use, evaluation or implementation of a product, technology or service (e.g. biochemistry in pharmaceutical development)
- Has a market that is within the Health and Life Sciences disciplines (e.g. healthcare)

In Nova Scotia, Health and Life Sciences companies encompass two key areas of concentration:

## **Health & Medical Technologies:**

including medical devices, diagnostics, pharmaceuticals, vaccines, digital health and analytics, as well as animal

and fish health and nutrition, and natural health products and functional foods.

## **Bioproducts/Bioresources:**

including but not limited to biomaterials, biochemicals, bioenergy, and biofuels.

It is important to note that additional Health and Life Sciences activities also encompass tertiary contract services, research and analytics, contract manufacturing, contract research, data analytics, among others.

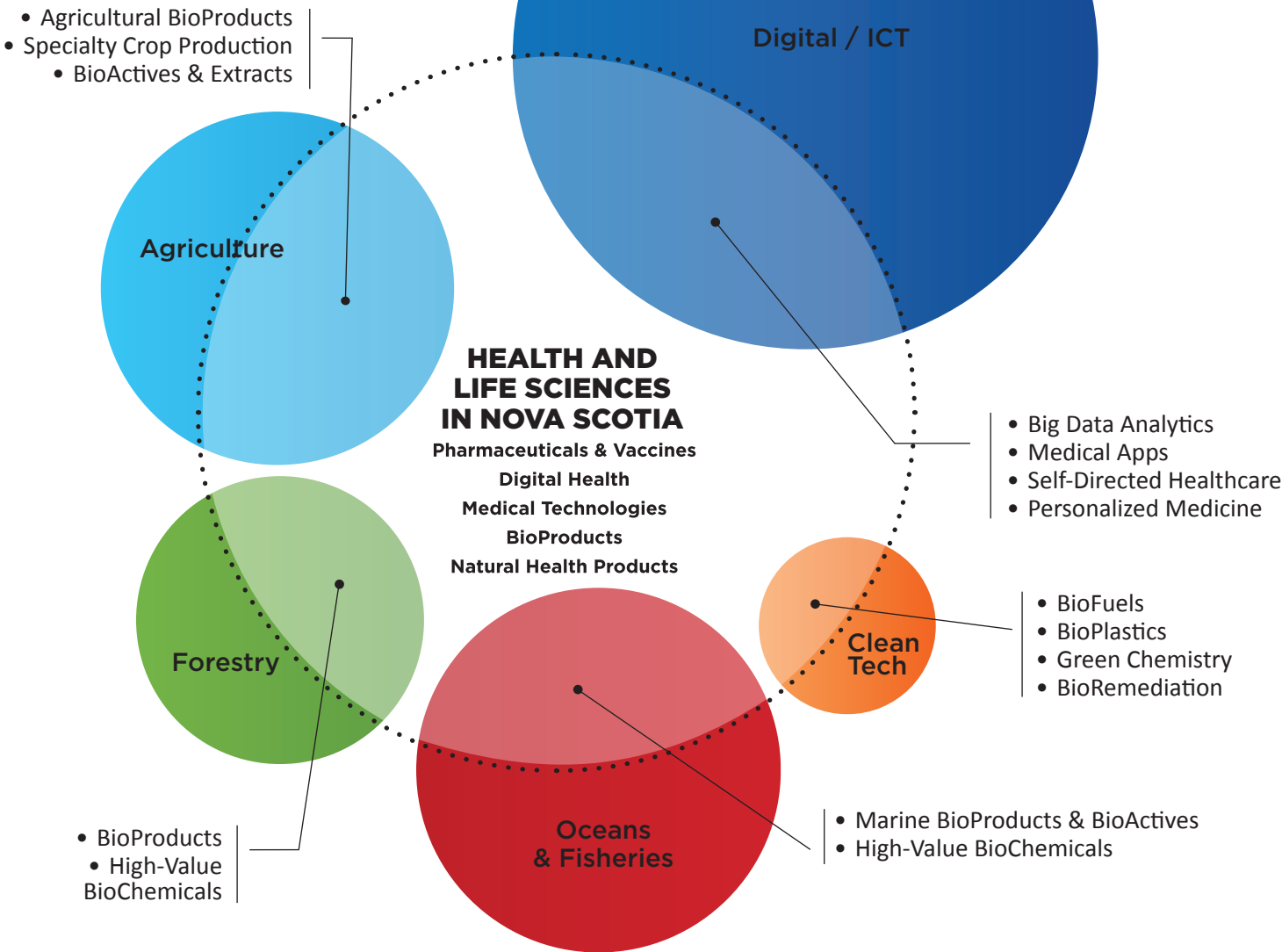
Within this definition, Health and Life Sciences has a direct and long-standing overlap based on the fundamental sciences and their application within aspects of ICT, ag tech, forestry tech, oceans tech and clean tech.





# Untapped Opportunities Realized Through Collaboration

The Health and Life Sciences sector in Nova Scotia drives innovation in other high-potential industries



Through technological advances, the Health and Life Sciences industry is transforming traditional industries like forestry, fishing and agriculture. It is creating breakthroughs that can impact health and the environment. Bioproducts from biomass can produce medicines, fine chemicals, functional foods, bioplastics, transport fuels and generate electricity and heat. Big data, cloud computing and analytics are also creating new opportunities for advancement of Health and Life Sciences through digital health and precision medicine.

## Health and Life Sciences Success and Trends

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The translation of Health and Life Sciences research into novel products and services with commercial value is driving innovation and is creating a new “bioeconomy” of the future.

**In 2016, Life Sciences represented the second largest investment area in Canada, with 103 deals attracting CAN \$730 million<sup>8</sup>.**

**In Canada, Health and Life Sciences is a priority sector that is growing to meet national and global demand. The global market for Health and Life Sciences products continues to be an attractive area of focus with forecasted growth as follows:**

**Pharmaceuticals:** sales are forecast to grow at an impressive annual compound rate of 6.5 percent in the next five years. Worldwide sales are expected to be US \$1.06 trillion in 2022<sup>9</sup>.

**Orphan drugs:** the orphan drug market is expected to almost double in the next five years, reaching US \$209 billion in 2022<sup>9</sup>.

**Personalized medicine:** the global personalized medicine market is forecast to reach US \$2.4 trillion in 2022 at a CAGR of 11.8 percent, more than double the projected 5.2 percent annual growth for the overall health care sector<sup>9</sup>.

**Medical technologies:** worldwide medtech sales are forecast to grow at an annual compound growth rate of 5.1 percent, reaching US \$521.9 billion by 2022. In vitro diagnostics is expected to remain the largest medtech segment with annual sales of US \$70 billion by 2022<sup>9</sup>.

**Bioproducts:** forecasted to reach US \$714.6 billion by 2021 from US \$466.6 billion in 2016 at a CAGR of 8.9 percent<sup>10</sup>.

**The performance of our domestic Health and Life Science industry continues to be an impressive contributor to the economy of Canada.**

**Bioproducts:** over 200 Canadian firms producing and/or developing bioproducts. Over 3,000 people employed. CAN \$1.3 billion in bioproduct sales<sup>11</sup>.

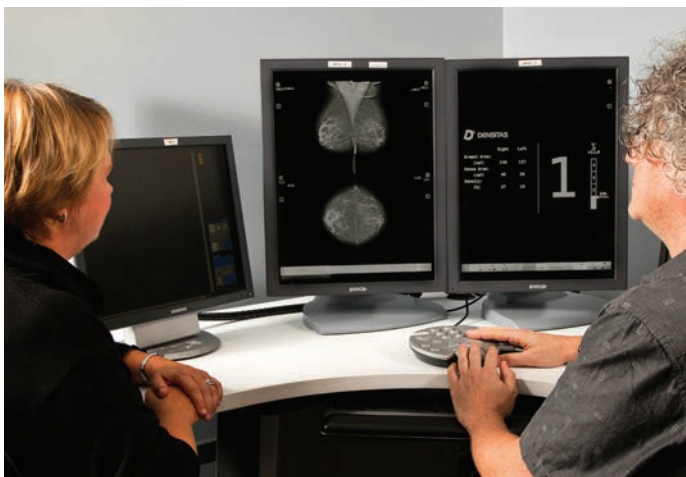
**Medical Technologies:** the Canadian medtech industry employs more than 35,000 Canadians<sup>12</sup>. From 2011 to 2016, Canadian medical device exports increased from CAN \$1.8 billion to CAN \$3.1 billion<sup>13</sup>. Canada ranks 1<sup>st</sup> in the G7 and 2<sup>nd</sup> globally in terms of cost-effectiveness for the establishment and operation of medical devices manufacturing facilities<sup>14</sup>.

**Pharmaceuticals:** Canada employs 28,500 people while being home to the 10<sup>th</sup> largest global market. Global exports surpassed CAN \$10 billion in 2016<sup>15</sup>.

**Functional Foods and Natural Health Products:** more than 750 Canadian companies, garnering more than CAN \$11 billion in revenues in 2011<sup>16</sup>.

Our national demand for health-related technologies shows no signs of slowing, which has created a net increase in the amount of product being imported into Canada over the past few years. This increase creates a domestic market which is not being filled by products researched, designed, tested and manufactured in Canada. To put this in perspective, the trade gap for medical technologies in Canada increased from CAN \$4.7 billion in 2011 to CAN \$5.5 billion in 2016, a 17 percent increase<sup>13</sup>. The trade gap for pharmaceuticals increased from 2001 to 2016 by 30 percent to reach CAN \$7.2 billion<sup>15</sup>. Medical technologies and pharmaceuticals alone account for a Canadian-based market, unmet by Canadian product, of CAN \$12.7 billion. This represents a significant opportunity to develop, manufacture and adopt innovative Canadian technologies and enjoy the economic benefits and healthcare outcomes from appropriate adoption. It is expected that local adoption of Canadian made innovation will also have an important impact on the global export of these technologies.

In the Natural Health Product (NHP) area, Canada is fortunate to have one of the most highly regulated systems in the world. It may create additional regulatory burden locally, but it fosters an image of quality for products from Canada and should provide a softer landing for these products in global markets. Under the purview of the Natural and Non-prescription Health Products Directorate (NNHPD) within Health Canada, any health claim requires the clinical efficacy data to support and prove the claim. The additional benefit of this is accelerating global demand for high quality Canadian products. It is also accelerating the movement of these types of products into mainstream healthcare and personal health management, benefiting patients and driving down the cost of healthcare. An ideal example is the use of the Natural Health Product omega-3, which has been shown to promote overall heart health. This NHP has progressed through clinical validation and is now an approved pharmaceutical product called EPANOVA®, sold by AstraZeneca. EPANOVA® is a prescription omega-3 used to reduce triglyceride levels in adults with severe hypertriglyceridemia.



*“ There is no shortage of innovation in health care. Every part of the health sector is full of brilliant people with brilliant ideas. But for innovation to flourish, there needs to be strong leadership from government, health care administrators, clinicians and other stakeholders to create the right incentives and clear away the barriers to adoption and diffusion.”*

- Miles Ayling, Director of Innovation, NHS England



# Future Drivers and Sustained Growth to Benefit Nova Scotia

Our consultations and research revealed a number of fundamental drivers that will influence the development of our Health and Life Sciences products in the coming years, regardless of whether a company is classified as a medical technology company, a natural health product company or other. Lifestyle and an aging demographic, chronic

disease management, self-directed healthcare, concerns over climate change, natural resource sustainability, waste stream utilization and alternative sources of manufacturing ingredients, among others, will all play a role in future demand. The following are recognized as key overall drivers of future Health and Life Sciences companies:



## Growing Recognition of the Importance of Ocean Organisms

**Microbes, algae, sea plants and seafood are providing novel sources of energy, food, bioproducts, bioactives and medicines**



## Growing Commitment to Environmental Sustainability

**Increasing demand for green, biologically sourced replacements for chemically derived products — bio-based products such as bioplastics, biopolymers, biocomposites, bioderived chemicals and biofuels**





## Renewed Emphasis on Population Health and Big Data

Novel vaccines, anti-infectives and “Big Data” are transforming our abilities to tackle diseases at a population level

## Growing Emphasis on Preventative and Participatory Health

The use of natural health products to improve health and well-being and the use of digital health tools for self-directed care is expanding, moving an acute based healthcare system towards a preventative model







## Growing Power of Personalized Medicine

The dramatic cost and time reduction in genomics is creating more precision in the diagnosis and treatment of disease

## Aging and Chronic Disease Management

Illness from chronic diseases and long-term management are creating new opportunities for technologies that reduce dependence on institutions and care givers and promote healthy, independent living









# The Implementation Projects

Achieving success with BioFuture 2030 will result in unprecedented improvement and industry growth for Nova Scotia. The framework has been established, the challenges have been identified and what is needed are the tactical efforts to get us there.

The BioFuture 2030 Strategy has five key projects, each with well defined outcomes that will cause a positive impact on sector growth. Each of the five projects have been developed to maximize the impact and to ensure alignment with partner organization goals. They are also in full alignment with the overall vision of a **connected and collaborative Health and Life Sciences community that reaches its full potential, providing prosperity for Nova Scotians.**

We will achieve outcomes by building on existing infrastructure where possible and avoid duplication of efforts. We will also build bridges and leverage other economic sectors and best practice organizations to ensure we take advantage of their resources and capabilities through a collaborative approach.

## Project 1.0

**Making Connections to Fuel the Pipeline**  
*Business Development Tools for Faster and More Efficient Company Growth*



## Project 2.0

**Talent Attraction Database & Network**  
**HR Recruitment & Retention**



## Project 3.0

**Improving the Ecosystem - A Policy Team**  
*Advocating for and Building a Better Business and Innovation Ecosystem*



## Project 4.0

**Unified Value Proposition and Messaging**  
*A Tool to Unify Stakeholders and Sell Our Strengths*



## Project 5.0

**Sales & Business Development Training Program**  
*Build the Sales Culture*





## Project 1.0

### Making Connections to Fuel the Pipeline

*Business Development Tools for Faster and more Efficient Company Growth*

#### **ACTION: MAKING CONNECTIONS**

Under the direction of the project Chair, we will initiate the conversation and activities required to build a foundation of collaboration amongst the organizations that deliver business development tools, programs, and support mechanisms for our local companies. In doing so, we will foster the sharing of information, and existing services so that there is less duplication of effort and a better match of business development tools and programs to best in class organizations that have a mandate to assist companies. A more thoughtful approach that identifies the needs of the individual company and matches that with existing programs and services will maximize the impact of business development tools and mitigate overlap. We will identify a pathway from product idea to spread and scale of the adoption of those products and make connections between companies and business development tools that will meet identified roadblocks in the pathway.

BioFuture 2030 will strive to support and fund existing organizations, their programs and services based on their expertise and optimal ability to support companies. By doing so, organizations will be supported within their existing mandates but will be given an opportunity to deliver key growth metrics (or results) in support of the goals of BioFuture 2030.

The Connections Project will encompass several initiatives that result in accelerated company development. These efforts are intended to overcome the 'point in time' nature of available programs and services that are currently being offered. Mapping out the typical stages of company

development and overlaying this with available business development tools will better match services to the needs of our entrepreneurs and companies.

The Pathway will serve as the source material to prepare a commercial guide as a reference tool for Health and Life Sciences companies. Project 1.0 will facilitate easier access and awareness of available programs and services, further supported by an active Health and Life Sciences Acceleration Team to meet and advise local companies and influence identified investment attraction or foreign direct investment opportunities.

**Identify, support and fund the best suited organizations programs and services that support companies in their pathway to success. Identify program gaps, supporting and funding the most appropriate organizations to fill those gaps**

**Create a practical guide that links company life cycle stages to business development tools**

**Enhance the Funding Navigator to ease program and service identification**

**Launch the Life Science Acceleration Team to support organic growth and investment attraction**

#### **Strategic Goals Supported:**

Increase the number of Health and Life Sciences companies from 100 to 200

Increase the total annual sector sales from \$300M to \$1.1B per year

Increase the average income per employee from \$61,500 to \$102,000

## Project 2.0

### Talent Attraction Database & Network

#### *HR Recruitment & Retention*

#### **ACTION: RECRUIT AND RETAIN**

Under the direction of the project Chair, the project will develop an international network and database of individuals with an affinity for Atlantic Canada and who are connected to the Health and Life Sciences industry. The network and database will be a source of potential skill sets coupled with experience to offset the known human resource deficiencies within the sector. As a searchable database, it will be utilized by industry and local stakeholders to expedite the search for talent and will offer an opportunity to market the sector and its vision to those abroad. The project is also intended to enhance the uptake and retention of recent graduates through the use of mentorship, internship or coop programs to facilitate connections to industry and assist them in gaining valuable experience. Further training programs related to R&D commercialization and industry partnering will establish a commercial mindset and attract entrepreneurially driven researchers.

**Create** *Come to Nova Scotia Health and Life Sciences, a talent database based on known gaps*

**Introduce strategies to hire, engage and retain recent graduates**

**Encourage formal training in R&D commercialization & industry partnering to attract entrepreneurially-minded researchers and improve translational activities**



#### **Strategic Goals Supported:**

Increase the number of Health and Life Sciences companies from 100 to 200

Increase the total number of private sector Health and Life Sciences employees from 1,500 to 4,200

Increase the total annual sector sales from \$300M to \$1.1B per year



## Project 3.0

### Improving the Ecosystem - A Policy Team

*Advocating for and Building  
a Better Business and  
Innovation Ecosystem*



#### **ACTION: BUILDING & ADVOCATING**

Under the direction of the project Chair, the project will create an institutional-industry relations plan that engages research institutions (health authorities, universities, colleges and research institutes) and key stakeholders, creating an innovative and business-friendly environment through strategy and policy changes that support the development of collaborative partnerships.

The idea of ‘research as an economic driver’ represents a significant growth opportunity that if supported properly, will generate considerable revenue, increase industry investment, support local employment and ease the funding burden for institutions. Utilizing our research-intensive system and marketing favorable policies will increase the attractiveness for commercially-minded and funded researchers. Researchers who are intent on translational research (research intended to be commercialized) will result in more industry partnerships, start-ups and overall economic impact.

Encouraging local innovation will be caused by advocating for local purchasing of innovative and value added products. Buying local will not only support sector development, but also improve the total cost of healthcare, improve efficiencies and improve patient outcomes. In support of sector development, a ‘first customer’ provides much needed customer validation while local jurisdiction purchasing removes any question of credibility when going to global markets.

Through effective policy, all stakeholder organizations will continue to fulfill their individual goals while supporting the greater economic mandate of provincial growth.

**Create institutional-industry relations strategy to highlight opportunities**

**Encourage institutions to incorporate commercial innovation into their growth plans**

**Showcase policies that build an efficient and attractive Health and Life Sciences ecosystem**

**Create Chief Innovation Officers in institutions and government**

**Create an environment that fosters the adoption of innovation with local purchasing and encourage procurement systems based on value not price**

**Advocate for economic development programs to accelerate growth**

#### **Strategic Goals Supported:**

Increase the number of Health and Life Sciences companies from 100 to 200

Increase the total number of private sector Health and Life Sciences employees from 1,500 to 4,200

Increase the total annual sector sales from \$300M to \$1.1B per year



## Project 4.0

### Unified Value Proposition and Messaging

*A Tool to Unify Stakeholders and Sell Our Strengths*

#### **ACTION: COMMUNICATING. PROMOTING & SELLING**

Under the direction of the project Chair, the project will increase the awareness of the Health and Life Sciences sector as a significant present and future contributor to the economy of Nova Scotia. The successes of companies, their growth, employment of highly educated professionals in well paying positions creates a significant economic benefit and sets the stage for the value proposition for Nova Scotia to be a destination of choice for companies looking for a favorable landing site or a location for organic development. Exploiting our nimble nature, collaborative environment, valuable R&D, educated workforce, location, assets, among other factors by all involved with Health and Life Sciences is an important consideration. By creating a unified message, with a clear value proposition, each individual organization will be advertising the same message and will be building linkages to our collective assets.

To establish life sciences as a high priority sector and to advertise Nova Scotia as a Health and Life Sciences company destination, it is necessary to develop integrated communications and messaging tools for industry, government and institutions.

**Build consistent and unified messaging on the strengths and attractiveness of the Health and Life Sciences sector**

**Increase awareness of the present and future economic impact of the Health and Life Sciences**

**Sell Nova Scotian Health and Life Sciences, attracting companies and talent**



#### **Strategic Goals Supported:**

Increase the number of Health and Life Sciences companies from 100 to 200

Increase the total number of private sector Health and Life Sciences employees from 1,500 to 4,200

Increase the average income per employee from \$61,500 to \$102,000

Increase the total annual sector sales from \$300M to \$1.1B per year



## Project 5.0

### Health and Life Sciences Sales & Business Development Training Program

*Build the Sales and Business Development Culture*

#### **ACTION: ALWAYS BE SELLING**

Under the direction of the project Chair, the project will develop a Health and Life Sciences specific program for existing and new industry businesses to acquire the sales and business development skills, tools and processes necessary for businesses to be globally competitive. The program will encompass specific sales training for professionals, as well as training for non-sales company employees to build the overall sales culture needed. Activities needed to develop and enact this training program include curriculum development, partnership agreements with potential service delivery partners, recruitment of participants, instructional design for curriculum and long-term planning to have the program adopted by an institution.

**Build an international sales & business development training program for Health and Life Sciences companies**

**Showcase opportunities for youth to engage with experienced corporate sales & business development professionals**

**Promote an understanding of what it means to be globally competitive**

**Improve the sales culture**

**Filling a gap that is not being addressed**

#### **Strategic Goals Supported:**

Increase the number of Health and Life Sciences companies from 100 to 200

Increase the total number of private sector Health and Life Sciences employees from 1,500 to 4,200

Increase the average income per employee from \$61,500 to \$102,000

Increase the total annual sector sales from \$300M to \$1.1B per year





# Measuring Success

BioFuture 2030's vision for a connected and collaborative Health and Life Sciences community is exciting.

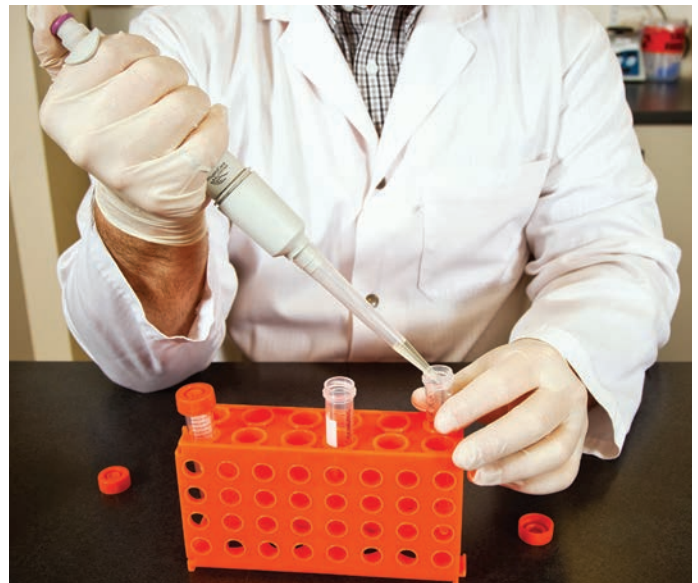
Yet, any economic plan, no matter how well thought out and comprehensive, means little if the direction and ideas in the plan are not fully embraced and put into action. How well we implement BioFuture 2030, therefore, is as important as the plan itself. Who does what, and how the process will unfold are what is needed to ensure success.

**BioFuture 2030 identifies goals and specific projects with aims and tactics that support the vision.** Each project identified has a comprehensive roll-out completed and will require an implementation plan to be finalized by the lead organization in collaboration with the Action Team. Each project will have a dedicated Action Team that will evolve as needed over the course of development.

**Action Teams are intended to continue the collaborative model, allowing participation and an opportunity to embrace the organizations who are best suited to ensure success.**

Guiding our success will be an advisory group to provide strategic oversight and keep the implementation focused – the **BioFuture 2030 Implementation Team**. Provincial and federal governments will use BioFuture 2030 as a guide for making decisions and leading initiatives in support of the goals and tactics as outlined in the implementation plans. Some tactics will require additional financial and human **resources from public and private sector partners to implement.**

BioNova will serve as the secretariat of BioFuture 2030. BioNova will be the coordinating organization responsible for tracking and measuring progress against the goals. As the life sciences industry association, BioNova will also lead many of the actions defined in the implementation plans. It will prepare and present an annual report card on the strength of our bioeconomy. This report card will act as a tool for measuring success against the plan, **providing insight on new opportunities and identifying areas where course correction is needed.**





# An Ask for Commitment

Our Health and Life Sciences industry is uniquely positioned to move our economy into a prosperous future. BioFuture 2030 is a bold industry-led initiative and an opportunity to do things differently. What is needed to ensure success is a commitment to the vision of this strategy: **a connected and collaborative Health and Life Sciences community that reaches its full potential, providing prosperity for Nova Scotians.**

**All Health and Life Sciences related organizations are asked to support unprecedented growth with a commitment to strengthen our capacity and foster growth by:**

- Investing in life-changing research
- Fostering an ecosystem of world-class researchers, facilities and entrepreneurs
- Supporting policies that help businesses grow and enable Nova Scotians to have direct benefit from our advancements in Health and Life Sciences
- Speaking with a unified voice to promote the success and vibrancy of our sector
- Championing the collaborative process, providing the human, financial and other resources to make BioFuture 2030 a success



# Driving the Process

**Growth within the Health and Life Sciences sector requires alignment by committed and capable organizations that also see the vision of Health and Life Sciences for our province, as a pillar of the new economy.**

## **Purpose and Scope**

The purpose of this plan is to outline the goals, tactics, and priorities needed to achieve growth of the Health and Life Sciences industry in Nova Scotia. The plan builds a framework for action and is a milestone in a continuous process of engagement of key stakeholders. It is an attempt to build consensus on what actions need to occur to promote growth. The plan also highlights the Health and Life Sciences opportunity and strengths of our industry, an organizational structure for implementation of action items and next steps.

As an industry-led initiative it was recognized from day one that a truly collaborative approach is required to gain buy-in and participation from all stakeholders. As such, the methodology was developed with this in mind, a BioFuture 2030 Advisory Group was formed to ensure the process was inclusive and responsive throughout all aspects of the data gathering and analysis.

Throughout the process, BioNova and Invicta Health conducted research from jurisdictions within Atlantic Canada, Canada, the United States as well as various European destinations.

**Primary Research:** included personal interviews, industry round table discussions as well as the solicitation of industry feedback throughout the development of the strategic plan.

**Secondary Research:** consisted of literature reviews on innovation and economic growth from local, national and international life science sources to identify trends, best practices and sector development shortcomings.

## **The BioFuture 2030 Advisory Group consisted of:**

- BioNova
- Invicta Health
- Innovacorp
- Nova Scotia Business Inc. (NSBI)
- Atlantic Canada Opportunities Agency (ACOA)
- National Research Council Canada – Industrial Research Assistance Program (NRC-IRAP)
- Dalhousie University Industry Liaison and Innovation (ILI)
- Springboard Atlantic
- BIOTIC
- Innovative Medicines Canada
- Natural Products Canada



The BioFuture 2030 Advisory Group built consensus among those key individuals and organizations supporting the growth of the Health and Life Sciences industry as a pillar of the new economy.

The BioFuture 2030 Advisory Group also provided critical feedback and direction during the strategic information gathering and interpretation phase. The result was the formulation of key strategic priority areas.

**Life Science Action Teams:** as engagement grew, participants from key organizations were invited to select action teams. Teams were formed based on the three stages of development needed in support of Health and Life Sciences opportunities:

- **Building** a breakthrough R&D engine – fueling the pipeline
- **Building** commercial value from R&D
- **Offering** programs and services to support the development of globally competitive companies

The Action Teams participated in a series of ongoing meetings over a two-month timeframe to gather ideas about what could be done to facilitate growth and to remove barriers to growth in each of these three key areas. Over 50 regional organizations were represented and provided input into the development of this plan.

***“... the single most significant impediment to change and renewal is the lack of a shared vision and commitment to economic growth and renewal across our province and among our key institutions and stakeholder communities”***

**- Now or Never: An Urgent Call to Action for Nova Scotians, Ivany Commission**



# 10 Key Strategic Priority Areas

The results of the data gathering and interpretation presented ten key strategic priority areas:

- 1 Accelerate research commercialization
- 2 Expand business development activities and capabilities
- 3 Increase activities that support commercial research
- 4 Increase availability of funding
- 5 Increase the impact of government and government institutions
- 6 Demonstrate institutional leadership
- 7 Adopt institutional HR policies and practices that promote commercial activity
- 8 Undertake focused marketing, promotion and awareness
- 9 Implement competitive programs and incentives
- 10 Find new ways to promote collaboration

Within these ten key strategic priority areas were key actions and recommendations which have been develop into an initial group of projects deemed priority items that will have the largest initial impact to meet the intended objectives. As the implementation moves forward, other projects may be added to address other suggestions and to continue towards the intended goals.

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## An important aspect of the information gathering process was the staging of company growth. For simplicity, growth was divided into three stages:

- Breakthrough discovery and initial value creation
- Building commercial value
- Building a globally competitive company

First, a breakthrough discovery is made in a laboratory that is novel, useful and non-obvious. Often a patent is filed to protect the intellectual property which creates the initial commercial value. Specialized scientific expertise

and sufficient amounts of capital are required to validate the discovery and take it out of the laboratory and into the commercial world. Building commercial value for R&D has inherent risks and often private investment can be attracted once public investment has reduced the risk. As the research advances, further knowledge is generated which can lead to wealth generation for founders, even if the company remains in a pre-revenue stage, with no final product. Finally, the greatest impact on the economy, on health and on society occurs when globally competitive companies produce and distribute products. To enter the global marketplace, publicly funded programs and services are required to facilitate local product manufacturing and export. Ultimately, high value products with a global reach can create significant wealth and provide significant personal and corporate tax revenues.



These stages of growth are mirrored by the approach taken in this plan, targeting the three important steps to success. These steps have been linked to the following key steps to support overall sector growth:

- **Building** a breakthrough R&D engine – fueling the pipeline
- **Building** commercial value from R&D and
- **Offering** programs and services to support the development of globally competitive companies

The consultation process specifically targeted these three steps, with the three action teams, to gather pertinent information to support the additional primary and secondary research, shaping the path forward.

## Implementing BioFuture 2030

Building a truly collaborative model has been emphasized throughout the development of this strategic plan. The implementation phase will require this to continue with the first step being the establishment of the **BioFuture 2030 Implementation Team**. This is a formal group of stakeholder organizations to facilitate implementation of the BioFuture 2030 strategic plan. BioNova’s ongoing role will be to act as secretariat and will manage the tactical project development, track development and report on progress being made. The model to be used provides a framework for organizations to come together, create partnerships, and realize mutual objectives.

### The main principles of the model are:

- A clear reason for collaboration exists
- Collaborative work satisfies the individual needs of participants
- Governance is light. Work is directed by partially self-governing collaborative teams
- Structure is light. Teams dissolve when the work is done
- Leadership is present at the table, meaning action which has impact can be taken



# #DYK

**#DYK:** PhotoDynamic signed-up 50 clinics before it finished clinical testing



**#DYK:** Acadian Seaplants is the world's largest manufacturer of marine plant products



**#DYK:** Sona Nanotech is the world's first producer of toxin-free gold nanorods for diagnostic and medical applications



**#DYK:** Global government regulators ensure public safety by using Scotia Rapid Tests to screen for paralytic, amnesic and diarrhetic shellfish toxins



**#DYK:** Spring Loaded Technology is manufacturing the world's first compact bionic knee brace in Dartmouth, Nova Scotia



**#DYK:** BIOTIC has some of the most advanced imaging equipment used to develop new products in collaboration with industry



**#DYK:** BioMedica Diagnostics has attracted top international talent to Windsor, Nova Scotia



**#DYK:** Immunovaccine is a world leader in Immuno-Oncology



**#DYK:** MedMira owns the medical technology patent on the world's fastest rapid test



**#DYK:** Appili successfully closed a \$3.2M seed financing round on the same day it opened the doors to its state-of-the-art lab



**#DYK:** From a simple saliva sample, Athletigen can give you genetic insight on nutrition, sports psych, and athleticism



**#DYK:** In Dartmouth, Nova Scotia, Nature's Way has manufactured more than 3,000,000 bottles of NutraSea Omega-3



**#DYK:** Precision BioLogic's CRYOcheck™ line of frozen diagnostic products has been helping labs deliver accurate results for 25 years



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