next generation prosperity

PRINCE EDWARD ISLAND

BioAlliance

Strategy for Prince Edward Island
BioScience Cluster Development

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INTRODUCTION

1.1 Next Generation Prosperity: Economic Growth & Sustainability in Prince Edward Island

Advances in science and technology are now key drivers of Canada's economic growth. New and emerging economic industries like information technologies, nanotechnology, biotechnology, and alternate energy are creating opportunities for regions that successfully establish the conditions for growth in these sectors.

Prince Edward Island's economy has seen steady growth in the past decade, in sectors such as aerospace, information technology, and tourism. These, along with primary resource/processing sectors such as agri-food and seafood, have served to build an economy valued at approximately $4.0 billion in gross domestic product (GDP).

Prince Edward Island is clearly on a path to self-reliance, but the traditional engines of our economy are not expected to be the engines of future wealth creation and employment. We have been pushing the limits of our natural resource base in agriculture and fisheries, seeking ever-declining margins. Our next generation of well-educated and skilled young people is not looking for career opportunities in these sectors to sustain their families. **Unless job opportunities in the knowledge economy are available in PEI, our next generation will continue to go elsewhere, further compromising our ability to build a sustainable economy for the future.**

Enabling the emergence of new economic sectors will take a concerted, coordinated effort at all levels among businesses, institutions for technical and professional training, research and development, and government.

1.2 From the "Limited" to the "Limitless"

The bioscience sector represents a tremendous opportunity for Prince Edward Island to expand its economy in the knowledge-based sector. Several key reasons exist for focusing on bioscience:

- The bioscience sector is one of the **fastest growing and most dynamic** sectors of the new economy nationally and internationally.
- **Commercialization of innovations** in biosciences will lead to improvements in human and animal health and nutrition, environmental quality and industrial processes.
- The bioscience sector holds the potential for improving the economic status of Prince Edward Island through **new business development, export of products and services, high-wage jobs, and stable year-round employment.**
- **The bioscience sector can create jobs at a range of skill levels** for both highly trained Islanders and highly qualified personeel from other regions who will be attracted by the culture and quality of life, along with the access to new technology that Prince Edward Island offers.
- The bioscience sector can **build on the province's natural "roots"**, including a growing research and development base and successful bioscience businesses, as well as the natural capital of our agri-food, fisheries, marine, and forest resources. Public policy support and commitment from all levels of government has been strong.

There is good reason to believe that successfully growing the bioscience sector in Prince Edward Island can provide very large and sustainable economic returns for businesses, families and our communities.

1.3 The PEI Bioscience Cluster Initiative

While a number of important initiatives and plans are in motion, until now there has been no comprehensive strategy in place to guide the growth and development of the PEI Bioscience Sector. In the fall of 2004, a group of leaders from industry, academia and government identified the need for a collaborative process to coordinate the development and implementation of a strategic plan to grow the PEI Bioscience Sector.

In March, 2005, the Prince Edward Island BioAlliance Inc. was formed. **Its purpose is to facilitate collaboration and growth within the network of individuals and organizations dedicated to building the bioscience-based economic sector of Prince Edward Island (Figure 1).**

Figure 1: Prince Edward Island's Bridge to the Next Generation

Its Board of Directors (Appendix I) represents private sector bioscience-based businesses, research and academic organizations and government agencies. The commitment and support of these stakeholders is critical to develop and implement a strategic plan for PEI Bioscience Cluster development.

The purpose of this document is to outline this exciting vision for the Prince Edward Island Bioscience Cluster and to present key plans and strategies designed to achieve the challenging growth targets proposed by the BioAlliance.

1.4 Vision

The Prince Edward Island Bioscience Cluster is a respected network of bioscience business innovation and research excellence, founded upon outstanding collaboration, within an effective business environment.

The Cluster is a recognized contributor of economic, health, environment and social benefits to the province, Canada and the world.

1.5 Enabling Conditions

To be successful, this strategy must be founded on several enabling conditions:

A Shared Economic Vision

At the core of our shared vision is the understanding that economic 'status quo' is not an option, and new 'legs' must be built under Prince Edward Island's economic platform.

Secondly, our vision of a vibrant, productive bioscience cluster is based on a collaborative model involving research excellence and commercialization, industry-research partnerships, market-driven business development opportunities, human capital investment, and immigration of new skills (Figure 2). This is a systemic model, designed to create the conditions for economic growth and development.

Prince Edward Island's leaders in the bioscience sector consider this vision a natural direction for the Province that builds on existing competencies: a growing research and development base, successful bioscience companies, and the ability to attract and retain skilled technical and professional human resources.

Leadership

A successful strategy will require credible leaders from industry, government, and academic, research and financial communities, working together to maintain a clear vision and ensure action, accountability and results. The stakeholders of the Prince Edward Island BioAlliance are listed in Appendix II.

Strategic Focus

Even large jurisdictions recognize they lack the expertise and resources to excel in all areas of biotechnology. A coherent strategy must be focused on competitive niches and existing capacity. Dramatic advances in research and development of next-generation technologies are currently being made around the world. Clearly competition in this sector is intense and global competitors will be chasing similar economic opportunities.

Partnerships and Collaboration

Successful jurisdictions in the knowledge-based economy are characterized by strong industry leadership, collaborative industry-research partnerships, and strong communication links among all partners. Given our size, these partnerships should extend regionally, nationally and internationally, creating external business-to-business relationships and research networks.

Long-Term Commitment

Technology communities have learned that success takes time. Commitment for the long-term on the part of all partners is essential. Maintaining momentum by celebrating measured milestones and achievements is also critical.

Support of Government at All Levels

Building our knowledge-based economy in Canada must involve a coordinated effort among all players. There is a very clear role for the federal and provincial governments in funding R&D infrastructure and basic research, contributing to early stage seed capital and labour and skills development, and creating a supportive regulatory, taxation and business-attraction environment.

1.6 Our Success Story: Five Years of Development Result in the Emergence of a Bioscience Cluster in Prince Edward Island

Prince Edward Island's bioscience sector has experienced remarkable results in the past five years and is now positioned to launch a cohesive strategy, coordinated by the PEI BioAlliance Inc., which will propel the cluster to the international stage. All stakeholders are firmly committed to actively participate in this exciting initiative that will lead to next generation prosperity in Prince Edward Island.

A brief review of the success stories of the past five years shows that the achievement of uncommon economic results, through the growth and development of the Prince Edward Island Bioscience Sector, is absolutely attainable. The timeline below (Figure 3) highlights some of the recent accomplishments in this cluster, which now employs over 400 people in private sector businesses with revenues of over $60 million.

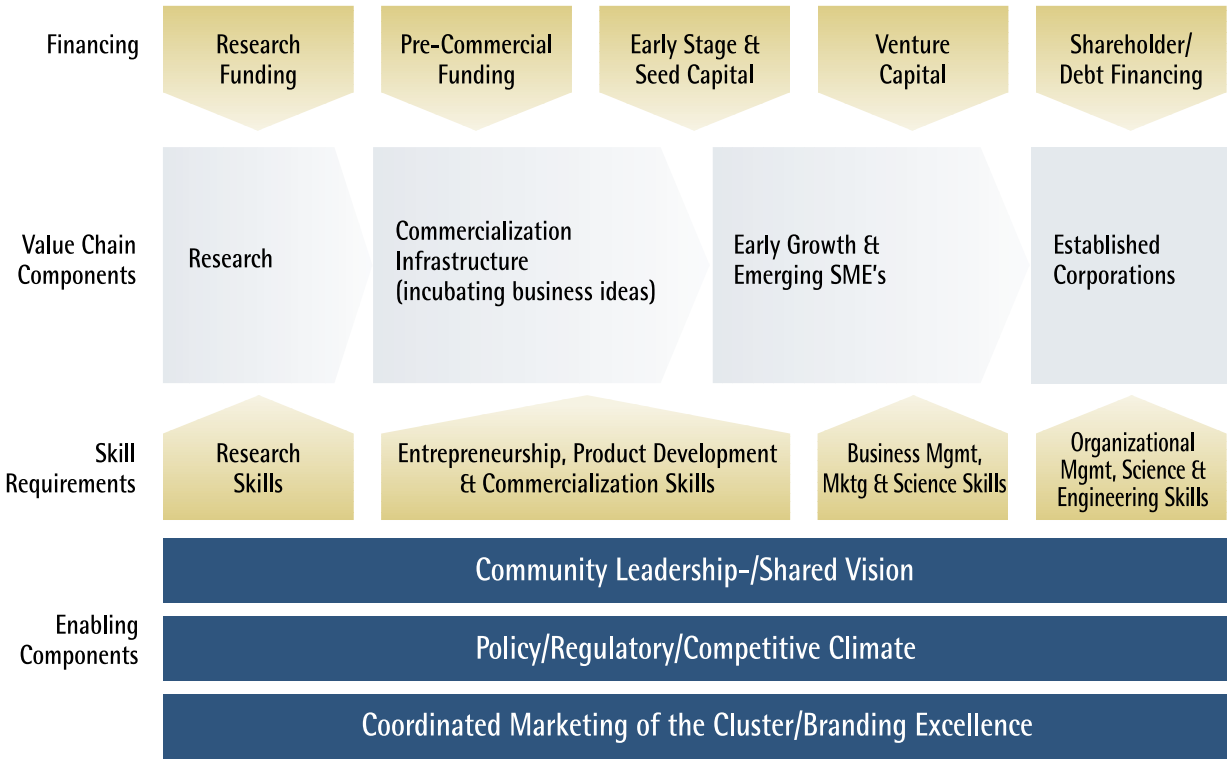


Figure 2: PEI Bioscience Cluster Development Conceptual Model

MRSB Consulting Inc

OUR TECHNOLOGICAL & MARKET FOCUS

2.1 Working with the Real Power of Nature

In 2002, a *PEI Bioresources Technology Cluster Roadmap Steering Committee* reviewed nearly 100 potential areas of opportunity and concluded that the Prince Edward Island Bioscience Sector should focus on **technologies and products related to bioactive compounds and their application to human and animal health and nutrition.**

Today the scope of the Prince Edward Island Bioscience Cluster encompasses a variety of Bioscience/Life Science-related technologies, with a focus in two key areas:

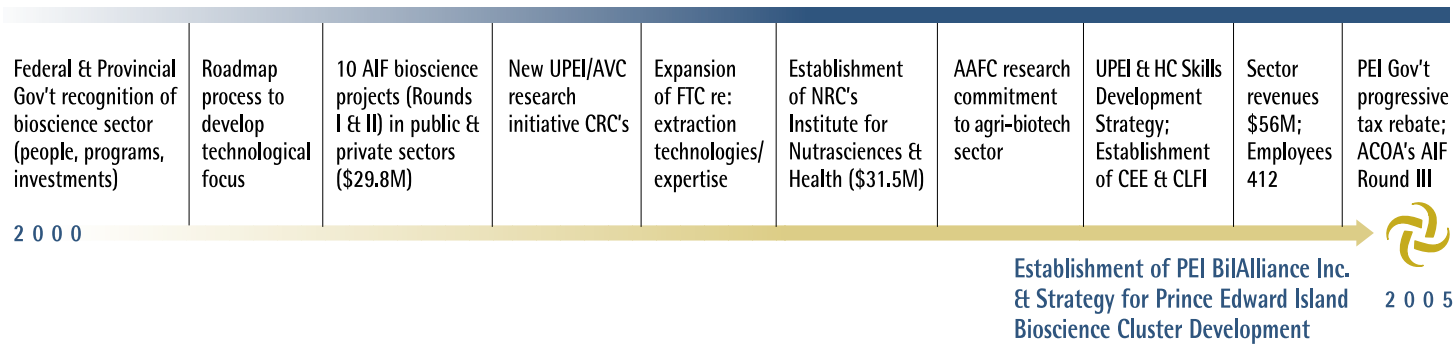
- **Technologies and products related to bioactive compounds and their application to human, animal and fish health and nutrition (Table 1).**
- **Bioproducts, converting biomass to value-added products relating to energy, materials, non-food crops, and environmental sustainability.**

Our strategic focus builds on Prince Edward Island's expertise and resources: a growing research and development base; successful bioscience businesses; and natural capital of agri-food, fisheries, marine, and forest resources.

We will continue to encourage business development across a full array of technologies and applications in the Bioactives Utilization Continuum (Figure 4). However, a sector focus is essential if Prince Edward Island is to build a critical mass of high quality research and development expertise and infrastructure.

Table 2 lists a number of applications of biotechnology that are currently being evaluated as potential developmental focal points for the Prince Edward Island Bioscience Cluster.

Figure 3: Over the Past Five Years, We've Achieved Several Important Milestones



APPLICATIONS				
Product	Human Health	Animal/Fish Health	Human Nutrition	Animal/Fish Nutrition
Diagnostics	✓	✓		
Therapeutics (including vaccines)	✓	✓		
Prophylactics	✓	✓		
Biopharmaceuticals & Intermediates Nutraceuticals	✓ ✓	✓ ✓	✓	✓
Functional Foods/Feed Additives	✓	✓	✓	✓
Infectious Disease Control Products				
-Antibiotic Substitutes	✓	✓		
-Antimicrobials	✓	✓		
- Antifungals	✓	✓		

Table 1: Potential Commercial Applications of Bioactive Compounds

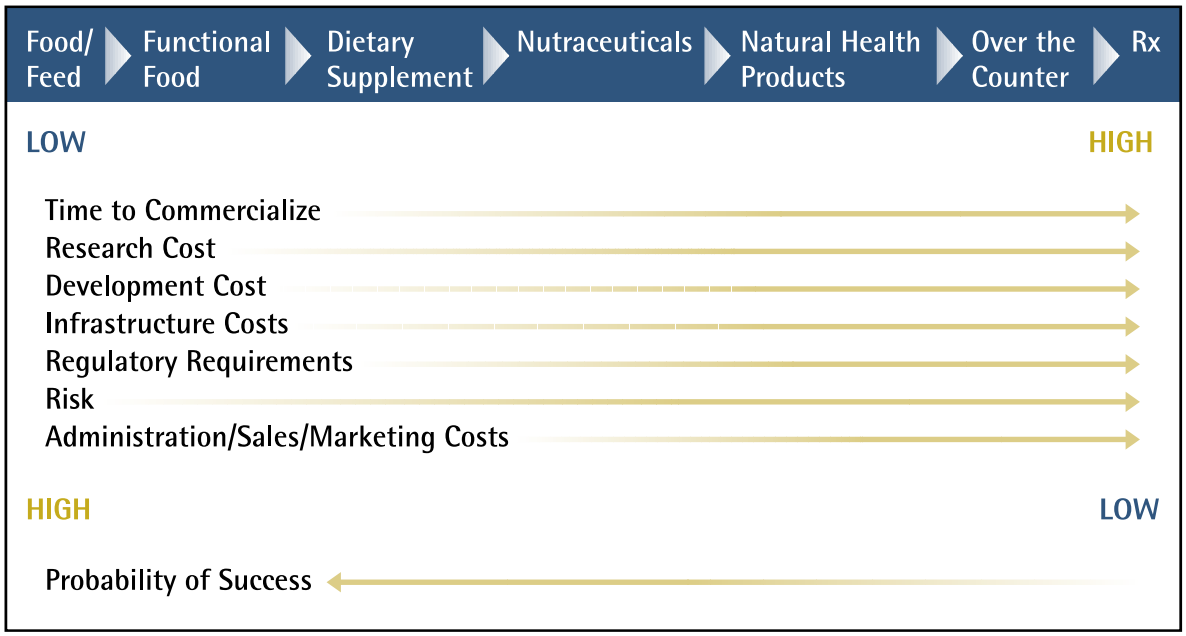
Table 2: Potential Areas of Focus

- Bioactive compounds in the treatment of neurological and obesity-related diseases
- Bioactive molecules from BSE free (certified) sources
- Fish health product development
- BioProcessing technologies
- Livestock/companion animals health and nutrition products
- Bio-products: non-food, non-pharma

The first, for example, relates to the research and development focus of the National Research Council's Institute of Nutrisciences and Health. This clearly represents one "magnetic pole" for research and business development within our cluster. But more are necessary if we are to establish a credible and sustainable bioscience cluster and achieve our growth objectives.

A focus on one or more of these areas does not mean "picking a winner", but it does mean investing in research capacity, commercialization, infrastructure, human resources and new business development in that particular area of market opportunity.

Figure 4: Bioactives Utilization Continuum



2.2 Value Capture: Maximizing Economic Impact

Establishing a coherent plan for supporting economic development within the bioscience sector requires a realistic assessment of the development stages where Prince Edward Island can be competitive. Recent global trends would suggest that commercial production of globally oriented consumer products will be located in low-cost environments like China or India. Marketing and sales will be located close to target populations.

For products in the various sectors of the Bioactives Utilization Continuum, development time lines, regulatory processes, development costs, infrastructure requirements, risk, and probability of success are very different (Figure 5). These factors are also very different depending on whether the application is one in fish, companion animal, or human health and nutrition.

Given Prince Edward Island's current infrastructure, labour force, location and technological capabilities, maximizing the economic impact of investment in the bioscience sector can be best achieved through emphasis on (Figure 5):

- **Value creation*** in Research and Product/Process Development and Commercialization components of the value chain.
- **Value capture*** in the production of bioactives with shorter development cycles (fish and animal health and nutrition).
- **Value capture*** in the production of nutraceutricals, intermediates, active pharmaceutical ingredients (API's) and other bioactives for human health applications.
- **Value attraction*** by creating an environment of research excellence and business success that increases research expenditures and attracts new businesses that see value in executing their business plan within the Prince Edward Island Bioscience Cluster.

* Terminology adapted from Ottawa Life Sciences Council, with thanks.

It is important to note that economic impact occurs at all points in the product development, production, marketing and sales cycle.

The successful implementation of this vision and our ability to create, capture and expand value within the sector requires a "balanced portfolio approach" to sector development. This portfolio should include:

- Commercialization of research and in-licensing leading to development of new products and new business start-ups.
- Attraction of established companies with intellectual property, human resources and market targets that compliment the technological and market focus of the cluster.
- Expansion of existing Prince Edward Island bioscience-based companies that have a proven track record of business success.

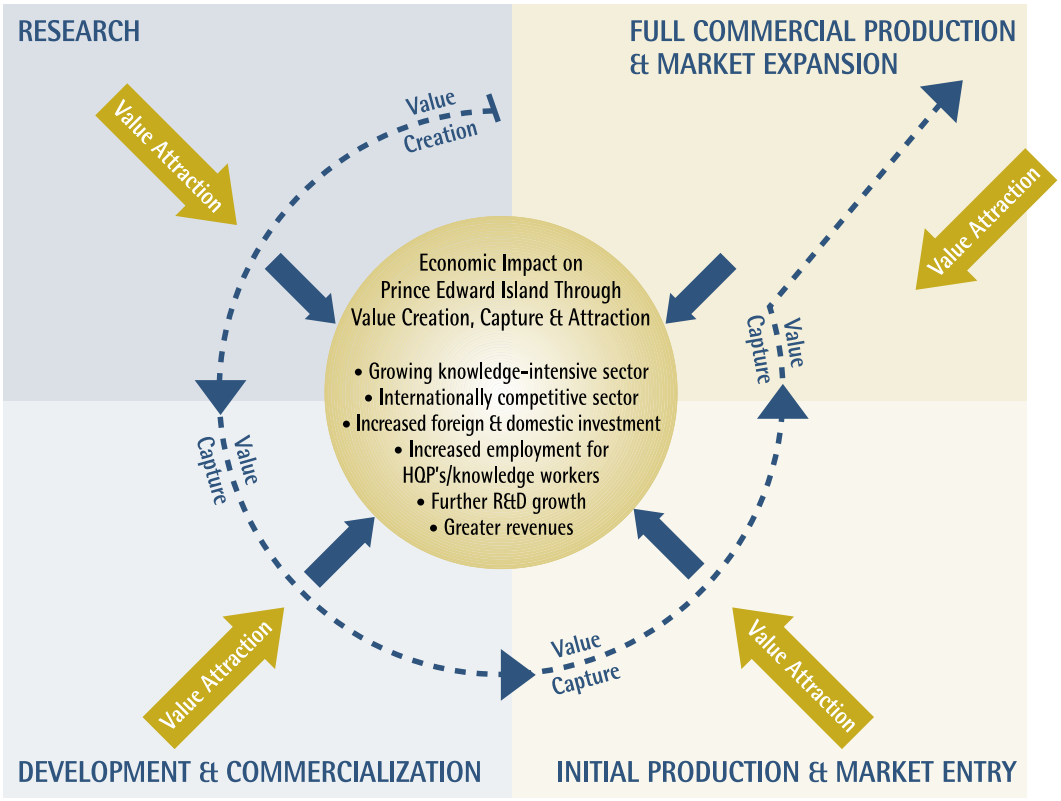


Figure 5: Maximizing Economic Impact of Bioscience Sector to Prince Edward Island

GOALS AND STRATEGIC DIRECTIONS FOR PEI BIOSCIENCE CLUSTER DEVELOPMENT

3.1 Goals

It is critical that the PEI BioAlliance achieve acceptable results in the following areas:

1. Increased economic impact of the bioscience sector in PEI.
2. Increased bioscience R&D investment in PEI by both the public and private sectors.
3. Improved access to public and private financing for biotech commercialization and new business development.
4. Increased availability of qualified human resources within the bioscience sector of PEI, in the management, technical and scientific knowledge areas.
5. Increased recognition of PEI Bioscience Cluster.
6. Improved public policy environment to support the growth of the PEI Bioscience Cluster.
7. Increased collaboration and communications within PEI Bioscience Cluster, and with other bioscience clusters, both nationally and internationally.

3.2 Prince Edward Island Bioscience Cluster Development Targets to be Achieved by 2010

- Increased R&D expenditures from $15 million to $40 million.
- Increased private sector employment from 400 to 1,000 within this knowledge-intensive sector.
- Increased private sector revenue from $60 million to $200 million.
- Expanded internationally competitive private sector.
- New public and private direct investment in infrastructure and research and development.

3.3 Strategies & Plans

Stakeholders have identified a systemic plan to create a supportive environment for cluster growth and development. While this plan sets out a strategic direction for the next three five years, it is our intention to develop annual work plans, taking into consideration achievements in the shorter term. The strategies are discussed below.

(A) Identify and Build on Core Competencies

- The Cluster's activities should continue to expand and build on core competencies of the private sector, research and academic communities, within the area of bioactive compounds and their application to human and animal health and nutrition.

- To achieve our growth targets, it will be essential to establish two to three internationally-recognized Innovation Centres, with multiple private and public sector research and development partners. These Centers will provide product/process development and commercialization facilities as well as a business receptor mall function for anchor tenants and new businesses. Like the National Research Council Institute for Nutrisciences and Health (NRC-INH), they will become important 'magnetic poles of attraction' for highly qualified personnel and new businesses and investment.

Areas of expertise to be considered include:
- Fish Health & Nutrition Product R&D
- Bio-processing Technologies
- Livestock/ Companion Animal Health and Nutrition
- Bioactive Food Ingredients/Nutraceuticals
- Bioproduct development from waste stream biomass and bioresources.

(B) Increase Investments in Infrastructure

- Establish strong relationships with funding agencies (ACOA, BDI, NRC-IRAP, NSERC, etc) based on BioAlliance credibility and record of achievement.
- Enhance UPEI- based resources to attract private sector investment in bioscience infrastructure, programs and people at the university.
- Based on consensus and direction re: core competencies, review the BioAlliance technical capability inventory, conduct a gap analysis, and identify priority infrastructure investments.
- Establish a Bio-Economy Industrial Park to provide new and expanding businesses with appropriate development space and infrastructure.

(C) Increase Investment in Research & Development

- Establish 15 to 20 fully-funded academic and industrial research chairs in public and private sector organizations within the Bioscience Cluster. The Research Chairs should be drawn from the best expertise available around the world in the specific areas of Cluster technological focus and be supported with graduate students and post-doctoral fellows.
- Implement the PEI Business Development Inc. R&D Investment Program for pre-commercial industry-led innovation.
- Implement a plan to increase industry and public sector uptake of federal and provincial research support programs.
- Clarify Food Tech Center's role in bioscience research and innovation.
- Support AAFC's efforts to refocus their research expertise through their partnership with NRC-INH and UPEI.
- Enhance scientific collaboration between public and private sector researchers and international partners.
- Support Canadian Food Inspection Agency's expanded role re: international transmission of fish diseases, through a CFIA-AVC partnership in fish disease diagnostics and management.
- Enhance SR & D tax credit advisory services for businesses.

(D) Improve Commercialization Processes

- Implement a 'best practice' governance model for technology commercialization at UPEI and identify resource requirements to enhance commercialization processes within the PEI biosciences cluster.
- Enhance pre-commercial technology evaluation capacity within the PEI biosciences cluster.
- Review Intellectual Property policies and processes of private and public sector institutions to ensure opportunities for commercialization are maximized.
- Assess the merits of a Pre-Clinical Trials facility for health and nutrition product development.

(E) Increase Access to High Quality Human Resources

Access to highly qualified human resources is a key success factor for the long-term sustainability of the Prince Edward Island Bioscience Cluster. The BioAlliance will identify and support initiatives that will develop the skills and knowledge base within the province and will help to attract new skills and talent to the Province and to Canada.

- Conduct a PEI biotech sector HR supply-demand study.
- Establish Student placement programs, scholarships and sponsorships for BSc, MSc, PhD, and MBA students in the bioscience sector through industry/ NSERC assignments.
- Expand Post-Grad offerings at UPEI in Science and Veterinary Medicine.
- Establish a Biotechnology Program at Holland College.
- Support changes to immigration policies to increase PEI's access to highly trained personnel.
- Recruit aggressively to support BioAlliance private and public sector HR development.
- Promote science/ biotechnology and management careers at junior-high, secondary and post-secondary levels.

(F) Support Early Stage Companies

Long-term growth of the Cluster will require supporting programs and infrastructure for early stage companies.

- Establish a bioscience business accelerator, consisting of office/research units, supported by shared services including admin support, bio-informatics, strategic business advice, bookkeeping, etc.
- Establish a bioscience business mentoring service for early stage companies.
- Establish a provincial Bioscience Development Fund to provide early stage companies staged access to risk capital on a conditional repayment basis.
- Identify potential angel investors and establish an Angel Investor Network.

(G) Support Local Business Growth & Expansion

Business development agencies should employ development strategies that accelerate the growth of local bioscience businesses, particularly those with capabilities related to the core competencies being developed within the PEI Bioscience Cluster. Expansion of these companies will be a key component of cluster development.

- Establish a Bioscience Development Fund to provide existing bioscience businesses with access to capital on a conditional repayment basis.
- Increase access to equity investments to support growth of existing bioscience businesses.
- Enhance market access support to private sector businesses.

(H) Establish a Provincial Tax Rebate for PEI-Based Bioscience Companies

It is recommended that PEI bioscience companies receive tax-free status (to include property, corporate and provincial sales tax) for a ten-year period.

(I) Enhance Business Development Coordination Between Partner Agencies

A number of federal and provincial government agencies currently work together in prospecting and business development activities for Prince Edward Island. With the introduction of the NRC's Industrial Partnership Facility and technology transfer capabilities at UPEI, good communications and coordination of these activities is more important than ever.

- Establish a Working Group on New Business Development to coordinate efforts among BDI, ACOA, NRC-INH, UPEI and FTC.
- Develop an integrated Bioscience Business Prospecting Strategy focusing on:
  - Leads from industry research contracts.
  - Leads from business relationships of local industry.
  - Leads based on core capabilities/ platform technologies of local businesses.

These efforts will build on PEI's advantage of being a small province with good communication networks, strong public-private relationships and a team approach to cluster development.

(J) Build Strong Internal BioAlliance Relationships

As the coordinating organization within the PEI Bioscience Cluster, the PEI BioAlliance Inc. will support and encourage collaboration and partnerships among its members.

- Establish Working Groups to ensure collaborative Strategic Plan development, priority-setting and implementation.
- Benchmark the BioAlliance in terms of key indicators, establish ongoing measurement systems and report results.

- Continue BioNetworking sessions.
- Use relationship-building tools on the BioAlliance web site.
- Focus on building trusting relationships between and among businesses and researchers
- Develop Annual Conferences.

(K) Raise the Profile of the PEI Bioscience Cluster

The PEI BioAlliance Inc. is the body responsible for implementing a highly coordinated, comprehensive marketing and communications strategy for the Bioscience Cluster. Priority actions should include:

- Develop and execute a Brand Development process for the BioAlliance.
- Clarify roles and responsibilities of stakeholders.
- Develop internal and external communications strategies.
- Strategically partner with national and international organizations and agencies as a means of raising the profile of BioAlliance.

(L) Advocate for Positive Public Policy Response

To maintain momentum and build long-term support for bioscience sector growth and development, key stakeholders will collectively and aggressively pursue strong economic policy coordination among federal and provincial agencies.

(M) Establish Bioscience Cluster Benchmarking & Reporting Processes

Ongoing benchmarking, measurement and reporting on key indicators of success will be a core function of the PEI BioAlliance Inc.

OUR PRIORITY STRATEGIC INITIATIVES SUMMARIZED

The key initiatives for the development of the PEI bioscience cluster are summarized as:

- Identify & build on core competencies
- Increase investment in infrastructure
- Increase investment in research and development
- Improve commercialization processes
- Increase access to high quality HR
- Support early stage companies
- Support local business growth & expansion
- Establish a provincial tax rebate for PEI-based bioscience companies
- Enhance business development coordination between partner agencies
- Build strong internal BioAlliance relationships
- Raise the profile of the PEI Bioscience cluster
- Establish Bioscience Cluster benchmarking and reporting processes

OUR COMMITMENT TO PEI BIOSCIENCE CLUSTER DEVELOPMENT: A COMMUNITY EFFORT

Advances in technologies of biological systems are solving problems and creating new opportunities in human and animal health care, nutrition, food safety and environmental protection around the world.

PEI has an opportunity to benefit economically and socially by focusing on its strengths: a growing research and development base, successful bioscience companies, and natural resources.

PEI has a proven track record of bioscience sector development over the past several years. Now we have a well-researched plan for continued success in bioscience cluster development. This plan will require significant investment in infrastructure, human resources, and business development. That's what it will take to produce the uncommon results we will aggressively pursue.

The pursuit of bioscience cluster development and next generation prosperity for PEI can only be achieved as a collaborative effort and with the commitment of all partners in the PEI BioAlliance and the community at large. We look forward to ongoing dialogue with our partners as we shape and define our future direction.

APPENDIX 1: STAKEHOLDERS OF PRINCE EDWARD ISLAND BIOSCIENCE CLUSTER

While BioAlliance participation continues to grow, listed below are private sector, research, academic institutions, government agencies, and not-for-profit organizations actively involved in the development of the Prince Edward Island Bioscience Cluster.

Private Sector Companies

Active Botanicals Inc.
Agrigenesis
Aqua Bounty Canada
ARK Biomedical Canada
Atlantic AgriTech Inc.
Atlantis BioActives Inc.
BioExx Inc.
ChitoXanSys Limited
DCL BioVectra
Fortius Nutrition Inc.
Novartis-AquaHealth Inc.
OvoPharm Limited
Progressive BioActives Inc.
Tube-Fab Inc.
Viro Technologies Inc.

Research & Academic Institutions

Agriculture & Agri-Food Canada Crops and Livestock Research Centre
Canadian Food Inspection Agency
Holland College
Institute for Human Health Research
National Research Council – Institute for Nutrisciences & Health
PEI Food Technology Centre
PEI Health Research Institute
University of Prince Edward Island & Atlantic Veterinary College

Government Agencies

Atlantic Canada Opportunities Agency
Business Development Inc./Technology PEI
Industry Canada
International Trade Canada
National Research Council – Industrial Research Assistance Program

Not-For Profit Organizations

Prince Edward Island BioAlliance Inc.
Innovation and Technology Association of PEI (ITAP)

APPENDIX II: BOARD MEMBERS, PRINCE EDWARD ISLAND BIOALLIANCE INC.

Alan Andreason, Fortius Nutrition Inc.
Rory Beck, ACOA PEI*
Pete Desai, Desai and Desai Inc.
Regis Duffy, DCL BioVectra, Chairman
Garth Greenham, Aquahealth-Novartis
David Healey, National Research Council-IRAP*
Joan Kean-Howie, National Research Council-IMB/INH
Wade MacLauchlan, University of Prince Edward Island
Brian McMillan, Holland College
Michael O'Brien, Province of Prince Edward Island, Development & Technology
Shane Patelakis, Progressive Bioactives Inc.
Manon Proulx, Agriculture & Agrifood Canada*

Rory Francis, Executive Director

**Observer Status*

APPENDIX III: ACRONYMS

AAFC	Agriculture and Agri-Food Canada
AIF	Atlantic Innovation Fund
AVC	Atlantic Veterinary College
CEE	UPEI's Centre for Enterprise and Entrepreneurship
CFIA	Canadian Food Inspection Agency
CLFI	Holland College Centre for Labour Force Innovation
CRC	Canada Research Chairs
FTC	Food Technology Centre
HC	Holland College
HQP	Highly qualified people
NRC	National Research Council
INB	NRC's Institute for Marine Biosciences
INH	NRC's Institute for Nutrisciences & Health
IRAP	NRC's Industrial Research Assistance Program

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