Alberta's Agriculture Research and Innovation Strategic Framework

Alberta
AGRICULTURE, FOOD AND RURAL DEVELOPMENT
INNOVATION AND SCIENCE

Acknowledgements:

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"…action without knowledge… knowledge without action". Gwyn Morgan suggests these are two limitations to our future progress.

Time, November 2002

The purpose of this framework is to bridge these two solitudes.

Executive Summary

Alberta is committed to implementing a strategic research and innovation plan that lays the foundation for the province's growth. Commitment and collaborative engagement towards a powerful strategic vision for innovation has already produced tremendous results for the province…Albertans have done this before. Research coupled with industry engagement during the last two decades of the 20th century turned the tar sands into a major economic driver for Alberta's 21st century.

Agriculture leaders seeking to create a major new crop for Western Canada summoned courage, scientists, industry and governments whose collective efforts turned rapeseed into a world leading multi-billion dollar canola industry. These are but two examples of how collaborative science, industry and government can create the foundation for new endeavors with broad industry impact. For the 21st century, research and innovation are becoming even more so the engines of our economic, social and environmental well-being.

The Opportunity

The Life Sciences now present an opportunity to strengthen and grow Alberta's major economic sectors including agriculture, health, forestry and energy. Alberta's new Life Sciences Strategy creates a framework for growth of new strengths and development of current industries by:

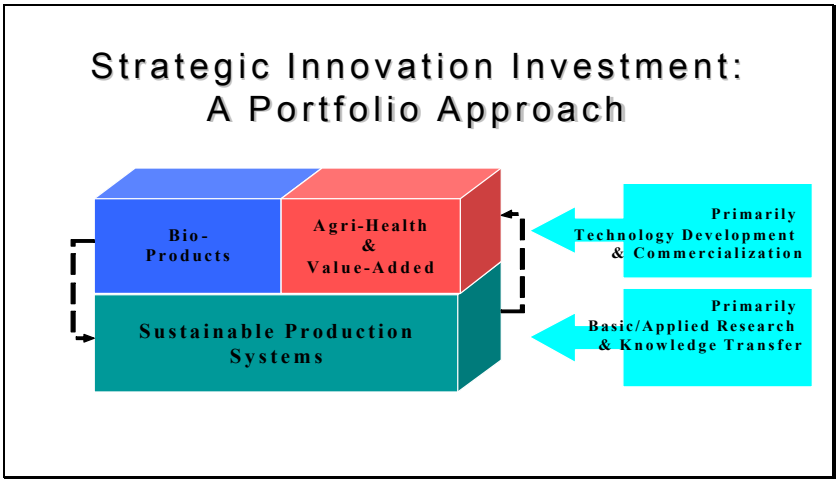
- Developing leadership in the life sciences
- Increasing research excellence
- Improving the environment for life science businesses
- Training, attracting, and retaining high quality life sciences workers, researchers, and managers
- Engaging the public in productive dialogue on life sciences development

Agriculture is a fundamental element to the emergence of Alberta's Life Sciences sector. Success in developing the agriculture research and innovation system will enhance the success of individual sectors and allow for growth in crosscutting areas such as nutrition and health, bio-products and biomaterials that engage all life sciences sectors.

The current Alberta agriculture economy produced $8.2 billion in primary product sales, and $9.9 billion in value-added product sales[1] in 2001. The Value-Added Food and Health Products Sector represents an opportunity of $7.6 billion in growth for the province by 2010 and beyond, while Bio-products priorities identify a $2.5 billion opportunity for industry growth driven by opportunities in biomaterials, bioenergy, and bio-industrial chemicals. Together an industry target of $20 billion value-added and $10 billion primary on a sustainable basis is achievable by 2010.

Success in these two growth areas will be built upon a foundation of the solid production base of Alberta's agricultural industry (see Figure 1). This foundation also requires additional research, development, and commercialization support to provide for **sustainable growth of a viable production base**. Strategic investment in innovation, including applied research and technology commercialization, in these three areas represents a clear opportunity for Alberta. The payoff to these strategic investments will be contingent on a foundation of research and development for sustainable production systems. Business cases will be developed to identify the research and development needs and opportunities in each of the above three areas.

Figure 1. Strategic Innovation Investment



[1] Value added measured as wholesale value of manufactured foods and beverages, year ending March 2002

The following outcomes (which provide the basis for performance evaluation of the strategy) are attainable in the first five years, as a direct result of the strategic innovation investment:

- Attract $272 million in private investment (see Table 1) to commercialize technologies and products created and enabled by the system
- Through leveraging, utilize $234.5 million in federal and international funding to build on existing and new agencies' capacity in science and innovation
- Attract and establish nationally and internationally recognized scientific leaders in priority life sciences areas
- Attract and train over 300 new highly qualified personnel for Alberta's life sciences research and innovation system (grad students, technicians, knowledge workers, business managers)
- Create 125 products/technologies and 70 new companies utilizing intellectual property generated by the system

Table 1.

SOURCES AND USES OF FUNDS 2003-2008 ($ MILLIONS)						
	Sources of Funds					
of Funds	Alberta Public	Other Funders[2]	Federal Public[2]	Int'l[3]	Private Investment	Total
Senior Scientific Personnel	$30	$15	$30	$10	$10	$95
Program/Support Costs[4]	$50	$15	$50	$10	$10	$135
Equipment	$12.5	$2.5	$12.5			$27.5
Facilities	$40		$37			$77
Knowledge Transfer	$20		$20		$2	$42
Technology Commercialization	$50	$20	$50	$5	$250	$375
Support Services[5]	$10	$2	$10			$22
Total	**$212.5**	**$54.5**	**$209.5**	**$25**	**$272**	**$773.5**

[1] Includes AHFMR, AIF, AVAC, Industry Development Funds, Producer Groups/Boards/Commissions
[2] Includes NRC, WED, CFI, CIHR, AAFC, NSERC
[3] Includes USDA, NIH, ATO, other international research collaborators
[4] Includes technicians, graduate students, industrial science placements, other research program support costs
[5] Includes communication, competitive intelligence, due diligence and other related costs

The Goals

Alberta's agriculture strategic research and innovation framework is composed of six goals, which must be achieved with alignment across the research and development continuum and within the life sciences context. The goals are described as follows:

- ***Goal 1:*** *Alberta's Agricultural Research and Innovation System is focused and guided by industry and public needs, Alberta's comparative advantage and market opportunities.*
- ***Goal 2:*** *Alberta's Agricultural Research and Innovation System has effective mechanisms to communicate internally and externally.*
- ***Goal 3:*** *Alberta's Agricultural Research and Innovation System delivers more products, practices and processes.*
- ***Goal 4:*** *Alberta's Agricultural Research and Innovation System attracts private and public investment.*
- ***Goal 5:*** *Alberta's Agricultural Research and Innovation System is transparent and accountable.*
- ***Goal 6:*** *Alberta's human resource capacity supports R&D, commercialization and innovation activities.*

Implementation of the strategy is based on a portfolio investment approach across the innovation continuum, from basic discovery research to successful technology commercialization delivering products to consumers, driving product sales, knowledge transfer, and economic growth.

The guiding principles for the strategic framework are building a critical mass of world-class scientific personnel in disciplines critical to Alberta's unique needs, supporting it with **appropriate levels of research program funding**, utilizing talents as the **engine for innovation**, and ensuring **discoveries are supported with knowledge transfer, technology commercialization expertise and industry partnerships. Building research excellence with a collaborative spirit, global networks, and links with entrepreneurial skills are the essential ingredients for success.**

The Investment Portfolio

Implementation of the plan will require an incremental Alberta public investment of $212.5 million over five years catalyzing a total of $773.5 million investment for Alberta's Agriculture Research and Innovation System. The total investment portfolio to enable the plan is summarized in Table 2.

Table 2.

Strategic Research & Innovation Investment Portfolio 2002 - 2008		
Current (2002) Investment/yr ($ millions)	**Strategic Area**	**Future (2008) Investment/yr ($ millions)**
18	Value-Added Food and Health Products	70
5	Bio-Products	60
110	Sustainable Production	140
2	Economics, Marketing and Social Sciences	10
135 (primarily public investment)	**Total**	**280** (public & private investment)

Some catalytic provincial funding investment will be required for new R&D facilities, infrastructure to support companies such as business incubation capacity, and support for building expertise in technology commercialization including management of intellectual property, licensing and contracting skills, technology prospecting outside of Alberta, etc.

Resources for knowledge and technology transfer will continue to be available for delivery through a number of public and private sources including Alberta Agriculture, Food and Rural Development (AAFRD), the provincial applied research associations, and numerous agri-business product and service providers.

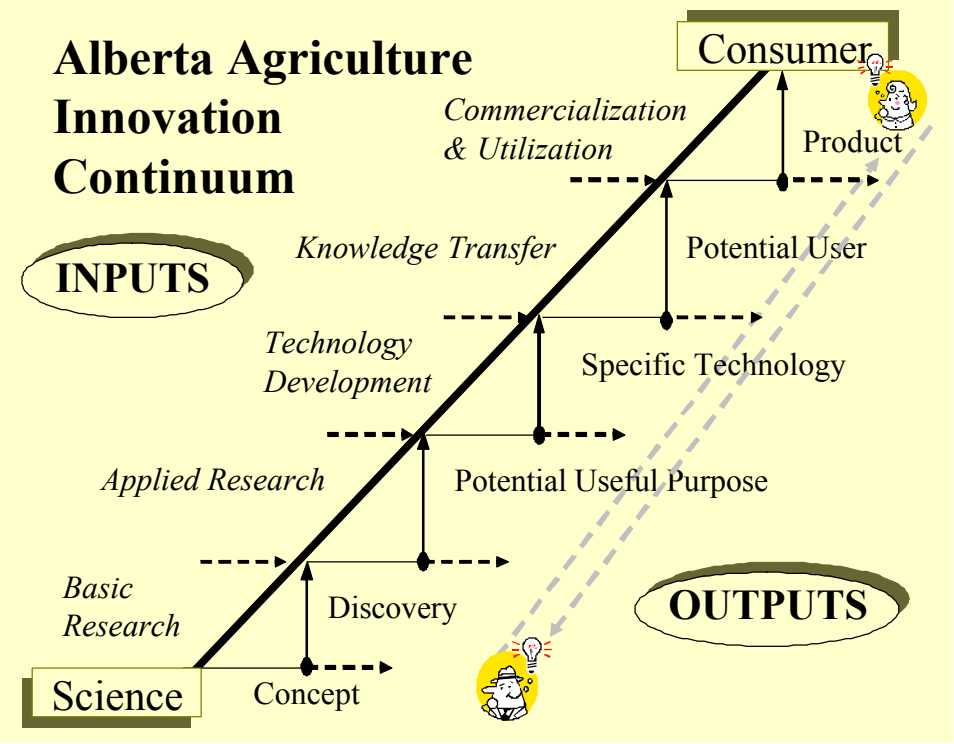
The majority of risk/growth capital for the creation of new companies will be provided through private investment. This level of enhanced private investment must be facilitated via policy changes, support of investment vehicles such as capital access funds, pension funds, investment tax credits and flow through share mechanisms comparable to those currently in place for other Alberta industry sectors (mining, oil and gas exploration) and in other jurisdictions. These policy recommendations are aligned with those forthcoming from the Alberta Science and Research Authority (ASRA) Innovation Task Force, the Joint Alberta

Economic Development Authority (AEDA)/ASRA Access to Capital Task Force, and the Alberta Economic Development Value-Added Strategy. An investment portfolio approach will be used to capture short, medium and long-term opportunities. It will be a combination of capturing known economic opportunities and longer term discovery.

Leadership and Governance

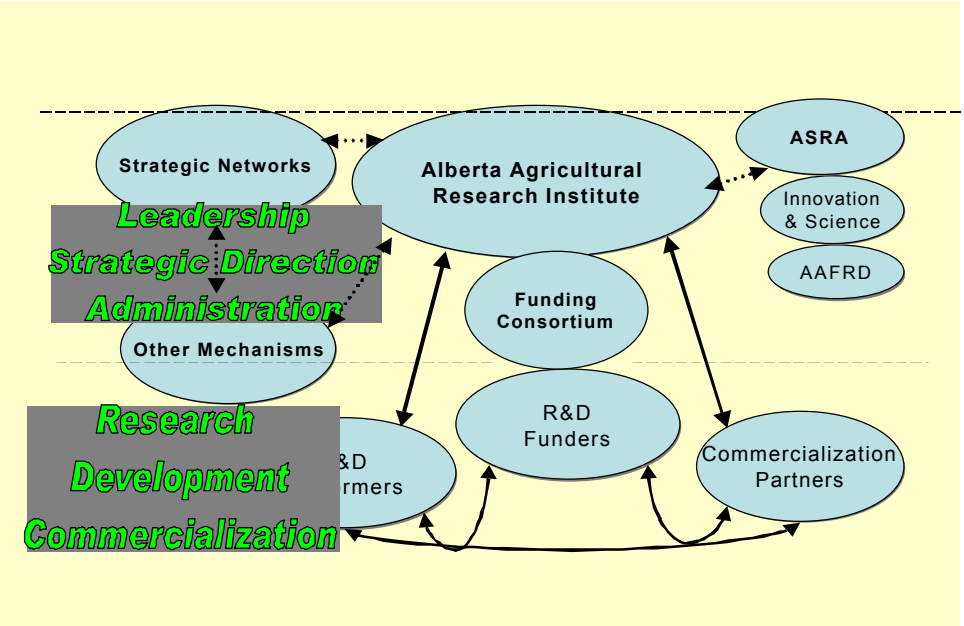
Development of Alberta's Agriculture Strategic Research and Innovation Framework has proceeded in alignment with the Life Sciences Strategy development process and is a cooperative effort of AAFRD, the Alberta Agricultural Research Institute (AARI) and industry partners. Sectoral science plans are being developed by the strategic networks established by AARI. Over 100 Alberta industry, institutional and government leaders have participated in the development of this framework. Funders, Strategic Networks, Research Performance, Technology Transfer, and Technology Commercialization interests, share a motivation with all stakeholders to capture the value and benefit of well-directed scientific endeavors. The development of the Strategic Framework has created new collaborative pathways leading to the emergence of a new governance model. Converting the Framework to a working Business Plan with responsibility and accountability across the continuum (Figure 2) is one of several first implementation steps. The models, the roles and responsibilities, and the participants are further identified in the Governance section.

Figure 2. Alberta Agriculture Innovation Continuum



Under the leadership framework of the new governance model, the Strategic Networks and other mechanisms as required will provide recommendations regarding the strategic direction and priorities. The Networks will include representation from stakeholder groups across the research and innovation continuum and are directly accountable to AARI. AARI and the Funding Consortium, in collaboration with stakeholders, will set the strategic agenda, establish the strategic priorities and ensure that investments are aligned with the strategic direction and facilitate the attraction of extra-provincial and industry resources to the strategic direction. Implementation is based on a portfolio investment approach across the innovation continuum, from basic discovery research to successful technology commercialization, delivering products to consumers, driving product sales and economic growth. Industry leadership, strategic direction, priorities and investment is a prerequisite for process.

Figure 3. Provincial Agriculture Research & Innovation System Governance Model



Throughout the continuum, from research concept through to final consumer benefit, this model will ensure all initiatives balance economic, market, social, and environmental priorities. Achieving success is about capturing growth opportunities through strategic investment to help Alberta develop a leadership position in agriculture research and innovation by 2008 and beyond.

Alberta's Agriculture Strategic Research and Innovation Framework

Science, technology, knowledge and innovation drive the future of a sustainable value-added agriculture industry for Alberta.

Introduction

Advancements in science, innovation and technology commercialization are affecting all industries, including agriculture, as never before. The science, knowledge and information component of Alberta's agriculture sector is a key to its future competitiveness and sustainability. The rate of global advancement and competition is unparalleled in the evolution of our agriculture industry. Leadership is defined by the ability of an economic sector to address its near term needs, while at the same time building a lasting capability of its people and its physical resources. ***Alberta's research and development system is a key component of meeting this leadership challenge*.**

As a key natural resource based industry, ***agriculture in Alberta is a growth industry*** focused on value adding and renewability of its products and basic resources. A profound transformation to high value food and non-food products and knowledge application linked to health, energy, information technology (IT), forestry and environment sectors characterize the new direction. Equally challenging are the ongoing efforts aimed at sustaining and enhancing primary production and the basic resources of ***land, water, air and people*** to increase opportunities in Alberta's rural community.

Agriculture's value added sector is approaching $10 billion today and is poised to reach $20 billion or more through the next decade. The challenge to continue building a competitive and sustainable primary sector is vital to positioning

agriculture and ***Alberta as a national and global leader***. The outcomes of growth, environmental enhancement and rural development are being pursued simultaneously. The role of research technology and knowledge development and innovation is a key success factor. **Industry leadership, strategic direction and investment are essential ingredients to move forward to that position of leadership. The strategic approach identified in this Framework provides the steps necessary to attaining that position.**

To develop this Strategic Research and Innovation Framework, an open, collaborative and multi-stakeholder consultation process involving hundreds of stakeholders province-wide was conducted. Industry and institutional leaders came together to review numerous opportunities, and have developed an agricultural research and innovation strategy for the benefit of Albertans. The linking of purpose and capacity is the implementation challenge; capturing growth opportunities through strategic investment portfolios moves Alberta to advance its leadership position in agriculture research and innovation.

Vision: *The Alberta Agricultural R&D System is innovative, collaborative, market focused, and stimulates sustainable growth and development for Alberta's benefit.*

Alberta will implement a Strategic Research and Innovation Framework for agriculture that lays the foundation for the industry's growth to 2008 and beyond. This Framework is about **"change"** in Alberta's Agricultural Research and Development System. The current state of the Agricultural R&D System in Alberta has been well analyzed, and it is clear that changes are required to help build and enable the agricultural industry in Alberta to achieve its growth goals in a sustainable manner. At the same time, this Strategic Framework will pursue research and technology excellence for Alberta.

To assist in developing the goals, outcomes, strategies and actions for Alberta's Agriculture Strategic Research and Innovation Framework, an environmental scan of the industry was conducted. Several emerging trends, issues and opportunities for Alberta's agri-industry were identified.

Industry Trends

The total number of census farms in Alberta fell from 59,000 in 1996 to 53,652 in 2001. At the same time the number of Alberta commercial farmers (sales > $100,000/year) declined to about 17,000. Farms are expected to become increasingly bimodal and diverse. About 44 percent of all farm operators are over 50 years old, with fewer younger farmers entering the industry. The industry is experiencing parallel consolidation of the farm supply industry.

The average agri-industry annual gross sales are approximately $9 billion. The value of the agri-processing sector is $10 billion in shipments. The latter employs 22,000 people, and generates an additional $3.4 billion value-added. The ratio of Alberta agri-processing receipts to farm receipts is approximately: 2.66 for irrigated area, 1.05 for the rest of Alberta, and 1.25 for all Alberta, as compared to Oregon at 1.7, Washington State at 2.1 and Ontario at 4.5 plus.

Change Agents

Over the next decade, there are six over-arching trends that will likely continue to drive changes to the structure, conduct and performance of agri-industry in Alberta:

- Globalization of our culture, commerce, and communications is increasingly all pervasive, resulting in accelerated growth and adjustments to change.
- Consumer demand for natural, wholesome, safe, high-quality food products.
- Growing concerns about the sustainability of our ecosystem.
- Increased risk and uncertainty, especially due to climate, political

instability, and increasing slow/ineffective institutional response times.

- Accelerated developments in science and technology to try to successfully balance growth with environmental sustainability and quality-of-life objectives.
- Continued but dispersed urbanization/suburbanization.

The Competitive Environment

There are several factors in the global environment that are affecting Alberta's R&D system:

- Traditional factors, e.g., proximity to markets will continue to decline in importance, while technology, social capital and market infrastructure will continue to increase in importance.
- Multinational corporations increasingly have growing impact on private R&D investment patterns in the province.
- Alberta's competitors are generally far ahead of Alberta in changing R&D systems to meet the demands of the new global marketplace and infrastructure and management systems needed for success.
- A key element of a systemic approach to agri-R&D is having strong, world-class research based universities and related institutions that generate new technologies and attract investment and a critical mass of highly skilled, highly motivated people.

Strategic Opportunities

Key market opportunities for Alberta have been identified:

- ***Fully prepared gate-to-plate foods.***
- ***Identity-preserved commodities, functional foods and nutraceuticals.***
- ***Natural health products from biological sources.***
- ***New environmentally friendly cost-reducing production technologies.***
- ***Increased emphasis on sustainable agriculture/multiple-use resource management; resource enhancement and environmental credits.***

- ***Increased custodial responsibility by the rural community for environmental amenities.***
- ***Bio-fuels, bio-diesel, bio-lubricants, and bio-plastics.***
- ***Production of bio-mass for industrial processes and uses, and carbon credits.***
- ***Global competitive technology and knowledge, applicable to primary production efficiency.***

Parallel Growth Strategies

Concurrently, a number of parallel industry growth strategies are being developed across the province to help position Alberta as a global competitor and leader in research excellence and innovation. One of those strategies is ASRA's Integrated Life Science Strategy for Alberta. Life Sciences presents an opportunity to strengthen and sustainably grow major sectors of Alberta's renewable economy, including agriculture, health, forestry and environment. The life sciences framework will enhance the success of these individual sectors and encourage the evolution and growth of crosscutting areas such as nutrition and health, bio-products and biomaterials that engage all life sciences sectors.

Agriculture is a key element of the Alberta Life Sciences Strategy. Within agriculture there is a long history of turning research and innovation into success. **Agriculture's future depends on building toward a successful life sciences sector, and in turn agriculture is key to a successful life sciences sector emerging in Alberta.** Alberta's Agriculture Strategic Research and Innovation Framework intersects with other strategic initiatives in the province in both public and private sectors, namely the Agriculture and Food Growth Strategy, Value-Added Strategy, Alberta Energy Research Institute and Alberta Forestry Research Institute Initiatives, and Universities, Colleges, Provincial Government Departments, and Federal Government Departments.

The Alberta Agriculture Strategic Research and Innovation Framework is designed to intersect with these other growth and R&D-related plans and strategic initiatives to ensure that Alberta's Agricultural R&D System is aligned, has strong leadership and accountability, is well resourced, provides for commercial opportunities and is well recognized locally, nationally, and globally. These initiatives will drive an industry based on sustainable growth, market focused, economically profitable, socially acceptable and responsible stewardship of our resources (water, soil and air).

The benefits of developing such a framework are numerous. Building a strategic shared vision for the Provincial Agricultural R&D System, particularly around the science, technology, knowledge and innovation components, will enable the system to achieve strategic growth targets and outcomes. This vision will position Alberta as a national/global leader in agriculture and related sciences.

Through a new shared vision and collaborative leadership and governance model, stakeholders will be better able to capture the value of R&D, and convert it into commercial products and knowledge utilization in Alberta. The Framework will ensure efforts and resources are focusing on priority areas, and will align and guide investment in the Provincial Agricultural R&D System, along with accountability. It will also address the human resources required for the industry and for R&D. This new framework will serve as a focal point for public policy. The new governance model will result in increased system productivity, efficiency and investment.

New Governance Model

The foundation of the Provincial Agricultural Strategic Research and Innovation Framework is a new governance model that is innovative, collaborative and inclusive. This approach brings the research capacity and funding capacity in Alberta together with strategic network partners, to identify the research priorities and the outcomes necessary to our agricultural industry's future. This model further builds on the existing diversity and strengths of the agricultural research and innovation system by providing a flexible and responsive mechanism for the successful utilization and commercialization of knowledge and products. Due diligence, accountability and targeted outcomes will ensure that the shared vision is attainable.

Achieving success will be about opportunities, outcomes and wealth creation that benefits Albertans and is driven by cost-effective co-investment by government and industry. Achieving success depends on strategic investment to take research discoveries through the continuum of innovation, applied research, technology development, commercialization and market entry, ultimately meeting final consumer/market needs.

Strategic investments will be contingent on a foundation of research and development for sustainable production and processing systems that function within a framework of opportunity for application, commercialization and market entry. Strategic investment of both public and private investors will ensure that Alberta discoveries are commercialized and released by Alberta companies and investors, and the economic value benefits Alberta. To become a global leader, Alberta must become a preferred location for the commercialization of science and technology.

From the Beginning – A Collaborative Stakeholder Approach

Realizing that collaboration is key to building a successful strategy, a collaborative process was used to develop this Research and Innovation Strategy to achieve its success. This Strategy has evolved through an open, collaborative and multi-stakeholder consultation process involving hundreds of stakeholders province-wide.

The Provincial Agricultural R&D System is comprised of numerous stakeholders. These stakeholders include R&D performers, R&D performing organizations, R&D funding organizations, industry, producers and others within and near the agriculture industry. Agriculture is a leading life science sector participant that collaborates and interacts with other sectors and industries, including: Energy, Forestry, Health, Environment and Information Technology. These linkages and interactions are vital aspects in developing a systemic, interactive agricultural R&D system.

Three separate focus groups were brought together in June 2002 to launch the first stage of strategic framework development. The first group included funders and industry representatives, the second included technology transfer, commercialization and industry representatives and the third one included researchers and industry. These same three focus groups were consulted again in the Fall of 2002 at the final stages of the strategic framework development, to review and ensure the strategy and direction were on-track.

Approximately sixty stakeholders provided input to questions regarding the current research, development and commercialization system in Alberta. They also provided their vision of the system and discussed issues and strategies needed to move the industry closer to the desired outcomes. A representative group of stakeholders were identified to assist in developing a draft Strategic Framework for the R&D System. At the same time, three Strategic Networks

were responsible for identifying strategic research priorities, which are incorporated into this framework.

The following guiding principles for the Agriculture R&D System were developed for the Framework:

1. **Market driven towards end products that meet the 2010 targets of the sector.**
2. **Focused on fostering research, development and commercialization in Alberta.**
3. **Collaborative outcomes to provide sustainable environmental, social and economic benefits to Albertans.**
4. **Optimizing use of Alberta's R&D resources.**
5. **Future-focused and builds on Alberta's strengths and comparative advantages.**
6. **Encourage collaboration across geographic, sectoral, institutional and disciplinary boundaries.**

Setting Direction + Strategic Investment = Meeting Goals

Three market priority areas for strategic investment are the core of the Agriculture Strategic Research and Innovation Framework. The three market priority areas include: agri-health and value added products, bio-products and sustainable production systems. These market priorities have the potential to create new industries propelling Albertans' economic and social well-being in the future.

The majority of investment in sustainable production systems will support basic and applied research, while the investments in the agri-health and value-added products and bio-products sectors will be weighted towards product and technology development, knowledge transfer and commercialization. This Strategic Research and Innovation Framework serves as a framework for all stakeholders whose individual plans will help create the outcomes identified. Implementation will occur among and through all stakeholders, driven by the goals, strategies and outcomes of this framework.

The implementation of the Agriculture Strategic Research and Innovation Framework, and as a direct result of the strategic investment, the following outcomes are attainable:

- **Attract $272 million in private investment.**
- **Leverage $234.5 million in federal and international funding.**
- **Attract and establish nationally and internationally recognized scientific leaders.**
- **Attract and train over 300 new highly qualified personnel.**
- **Create/attract new companies.**

Goals/Strategies/Actions = Outputs + Outcomes

Alberta's Agriculture Strategic Research and Innovation Framework is comprised of six goals, which must be achieved with alignment across the research and development continuum and within the life sciences context. Specific strategies and outputs support achievement of these six goals. A number of actions have been proposed through stakeholder consultations and are included to support the strategies and goals. These actions will require further discussion, review and analysis, and revisions to build the Implementation Plan for this Framework. The six goals focus on alignment, communication, commercialization, investment, accountability and leadership, and human resources.

Goal 1: Alberta's Agricultural Research and Innovation System is focused and guided by industry and public needs, Alberta's comparative advantage and market opportunities

Goal 2: Alberta's Agricultural Research and Innovation System has effective mechanisms to communicate internally and externally

Goal 3: Alberta's Agricultural Research and Innovation System delivers more products, practices and processes

Goal 4: Alberta's Agricultural Research and Innovation System attracts private and public investment

Goal 5: Alberta's Agricultural Research and Innovation System is transparent and accountable

Goal 6: Alberta's human resource capacity supports R&D, commercialization and innovation activities

Goal 1: Alberta's Agricultural Research and Innovation System is focused and guided by industry and public needs, Alberta's comparative advantage and market opportunities

Outputs

- R&D priorities are aligned to industry and public needs.
- Strategic priorities provide clear direction for building resources, capacity, and investment.

Strategy	Proposed Actions
1. Develop a competitive intelligence (CI) center for Alberta's R&D system.	Develop an R&D Intranet knowledge management (KM) site to strengthen the R&D system's efficiency and capability in harvesting, storing, managing, and sharing information.
	Develop a skills database for use by Alberta's R&D system participants.
	Provide CI and KM training opportunities to R&D system participants.
2. Have a process in place to establish and renew priorities.	Implement an ongoing system for collecting information and knowledge concerning Alberta's comparative advantage, market, and public needs to be utilized in the R&D system decision-making process.
	Build a mechanism to annually review and set priorities through a transparent and inclusive process.
3. Ensure R&D resource allocations are supported by strong due diligence processes.	Develop due diligence processes that support sound funding and resource decisions that are consistent with the strategic framework.
	Develop and expand the R&D funders round table.
	Develop an R&D research performers round table.
	Align the R&D system with the Alberta's technology transfer/innovation/commercialization capacity.

Goal 2: Alberta's Agricultural Research and Innovation System has effective mechanisms to communicate internally and externally

Outputs

- R&D system participants are well informed and aware.
- More informed public, stakeholders, shareholders, research performers, and investors.
- Engaged and knowledgeable stakeholders.
- Enhanced public trust in R&D.

Strategy	Proposed Actions
1. Increase awareness of the Agricultural R&D system research successes and activities.	Regularly (quarterly) publish Alberta R&D success stories using a variety of communication methods.
	Showcase Alberta R&D locally, nationally, and internationally.
	Recognize and meaningfully reward research excellence.
	Plan annual stakeholder 'bear pit sessions' to share success, share emerging priorities, and identify gaps.
	Develop public relations plan including media relations.
2. Create mechanisms to build industry & science partnerships/alliances for investment, communication, and efficiency.	Facilitate think tanks for all stakeholders in the R&D system to encourage innovative thinking and identify technology and market opportunities.
	Conduct research conferences and discussion forums to showcase research, development, and commercialization successes.
	Utilize a network approach to facilitate discussion and decision-making among stakeholders.

Goal 3: Alberta's Agricultural Research and Innovation System delivers more products, practices and processes

Outputs

- The R&D system collaborates and/or aligns to produce more impactful commercial endeavors.
- Commercial partners actively seeking benefit from Alberta's research performing capacity.
- More opportunities are seized, new products and processes are developed at a faster pace.
- R&D is a larger economic engine for the Alberta economy.

Strategy	Proposed Actions
1. An aggressive commercialization sector delivers technologies from within Alberta and beyond.	Utilize competitive intelligence to "harvest the world" for technology opportunities.
	Review research already undertaken in Alberta to determine commercialization potential.
	Develop and implement a consortia approach to funding development, technology transfer, pre-commercialization and commercialization opportunities.
	Provide opportunities for global networking among scientists and technology specialists.
	Link to other commercialization initiatives (i.e. ASRA's Innovation Task Force)—key initiatives include: • New business start-ups • Strategic technology development and application • Financing • Manufacturing knowledge and technology transfer • Teaming and collaboration
2. Align infrastructure capacity with strategic priorities and future R&D needs.	Carry out gap analysis of current infrastructure and prioritize direction.
	Optimize use of present resources.
	Create new business incubators adjacent to R&D facilities.
	Create analytical and business capacities within incubator facilities.

Goal 4: Alberta's Agricultural Research and Innovation System attracts private and public investment

Outputs

- Increase in start-up companies.
- Alberta's R&D system will attract substantial private and public investment each year.
- Established commercial enterprises increase internal science and technology development capacity.

Strategy	Proposed Actions
1. Build high quality scientific investment opportunities.	Funders and research performers work together to create high quality scientific program submissions aligned with strategic priorities.
	Examine proposals through a robust scientific and industry peer review process.
	Engage industry in priority setting to ensure submissions meet industry and public needs and reflects profitability focus.
	Develop mechanisms to assess return on investment (i.e. whole cost accounting).
	Provide ongoing monitoring and analysis of Alberta's R&D competitiveness in investment attraction relative to other jurisdictions (i.e. CI functions).
	Develop competitive incentives for investment and commercialization, e.g. research tax credits, flow-through shares.
	Address public policy issues, e.g., endowment fund, intellectual property and regulatory barriers.
	Assist researchers and small businesses in identifying and attracting industry funding and support.
2. Improve access to capital for pre-commercialization and early development R&D activities.	Link to other investment initiatives (eg. Joint AEDA/ASRA Access to Capital Task Force, AAFRD Investment Attraction Group).
3. Improve Alberta's ability to access key federal resources.	Investigate opportunities in potential partnerships.
4. Increase commercial investment in Alberta new products, practices, and processes.	Showcase Alberta's R&D performing capacity to potential commercialization partners.
	Link commercialization priorities and opportunities with research priorities.
	Resolve receptor capacity issues.

Goal 5: Alberta's Agricultural Research and Innovation System is transparent and accountable

Outputs

- Stakeholders support a leadership framework resulting in increased system productivity, efficiency, and investment clearly aligned with priority areas of focus.
- Collaboration and partnerships create new and enabling capacity.

Strategy	Proposed Actions
1. Establish a leadership model that meets the needs of the R&D system.	Develop a suitable governance model for Alberta's R&D system.
	Design an accountability system with clear agreed upon measures that are regularly updated and monitored; and design due diligence processes that support sound funding and resource decisions.
	Build and facilitate partnered funding mechanisms that support the funding consortium and aligns system with the strategic priorities.
	Create and annually review and update a Strategic Agricultural R&D Business Plan in consultation with stakeholders.
	ASRA to establish a clear and uniform policy for Intellectual Property management across Alberta's R&D system.
2. Facilitate the development of collaborative partnerships that maximize efficiency and effectiveness.	Develop new reward and recognition systems that encourage collaboration, partnerships, and networking.
	Develop and engage R&D stakeholders in a networking/leadership program.

Goal 6: Alberta's human resource capacity supports R&D, commercialization and innovation activities

Outputs

- Human resources aligned with strategic priorities and future needs.
- New highly qualified personnel (scientists, technicians, commercialization, and innovation staff) are recruited and working in Alberta's R&D system.

Strategy	Proposed Actions
1. Align HR capacity with strategic priorities and future agricultural R&D needs.	Conduct a needs assessment on human resource requirements and determine where there are gaps in system (align with strategic priorities).
	Actively fill HR gaps in Alberta's R&D system in alignment with strategic priorities.
	Assess human resource requirements on a biannual basis.
2. Attract and retain scientific and business capacity in key strategic areas.	Design innovative recruitment programs to attract new personnel including scientists, technologists, etc. to Alberta.
	Establish critical mass that will drive scientific excellence in key strategic areas.
	Create a recruitment package with support for infrastructure, operational and human support to attract personnel in key strategic areas.
	Provide opportunities for secondment in outside jurisdictions across the R&D system (inter-institutional, funders, performers, stakeholders, research/technology/commercialization specialists).
	Implement programs for leadership, networking, commercialization, innovation, and team building competencies.
	Increase funding opportunities for training in technology transfer and commercialization activities.
	Establish attractive IP policies for researchers.
3. Expand training opportunities for technicians and support staff	Increase university and college capacity to increase the number of technical staff, undergraduate and graduate students.
	Develop and deliver industry training programs.
	Implement training programs to address key research, technology, and industrial competencies.

Strategic Investment Portfolio for Alberta's R&D System

Current investment (2002) in agricultural R&D totals $135 million per year from all sources. With this Strategic Framework and anticipated investment, by 2008 the yearly investment in agricultural R&D will be increased and sustained at $280 million per year. The implementation of this Strategic Framework will require an Alberta public investment of a total of $212.5 million from now until 2008, to achieve a sustained $280 million per year by 2008.

Table 3. Sources and Uses of Funds 2003-2008 ($ Millions)

	Sources of Funds					
Uses of Funds	Alberta Public	Other Funders[3]	Federal Public[2]	Int'l[3]	Private Investment	**Total**
Senior Scientific Personnel	$30	$15	$30	$10	$10	**$95**
Program/Support Costs[4]	$50	$15	$50	$10	$10	**$135**
Equipment	$12.5	$2.5	$12.5			**$27.5**
Facilities	$40		$37			**$77**
Knowledge Transfer	$20		$20		$2	**$42**
Technology Commercialization	$50	$20	$50	$5	$250	**$375**
Support Services[5]	$10	$2	$10			**$22**
Total	**$212.5**	**$54.5**	**$209.5**	**$25**	**$272**	**$773.5**

The incremental Alberta public investment of $212.5 million to 2008 is the catalyst required to create a portfolio of $773.5 million for new initiatives in Alberta's Agriculture Research and Innovation System. This will be linked to

[1] Includes AHFMR, AIF, AVAC, Industry Development Funds, Producer Groups/Boards/Commissions
[2] Includes NRC, WED, CFI, CIHR, AAFC, NSERC
[3] Includes USDA, NIH, ATO, other international research funders
[4] Includes technicians, graduate students, industrial science placements, other research program support costs
[5] Includes communication, competitive intelligence, due diligence and other related costs

national and international research and industry globally. The total resource portfolio to enable the framework is summarized above in Table 3. It is anticipated that this framework will enable a 1/3:1/3:1/3 split between Alberta public dollars, federal dollars and private industry dollars for agricultural research and innovation. R&D is a critical component of achieving the industry's future growth target of $20 billion value-added and $10 billion primary on a sustainable basis. This strategic framework ensures the industry's ability to capture opportunities that will help achieve these growth goals.

Early stage investment will include facility capacity and new research science capability in disciplines vital to meeting the strategic investment priorities. Balancing investments in basic and applied research science capacity with knowledge transfer and technology commercialization will be required early into the period for which the Framework is designed, to meet the investment attraction required from industry. **Some catalytic provincial funding investment will be required to support new company creation infrastructure such as business incubation capacity, and support for building expertise in technology commercialization including management of intellectual property, licensing and contracting skills, technology prospecting outside Alberta, etc**. It is anticipated that resources for knowledge and technology transfer will continue to be available for delivery through AAFRD, the provincial applied research associations, agri-business, commodity groups and private organizations. **The majority of risk/growth capital for the creation of new companies will be provided through private investment.**

Table 4. Total Amount of Investment In Agricultural R&D

Total Amount of Investment In Agricultural R&D From 2002 to 2008 ($ millions)						
	Alberta Public	Other Funders[4]	Federal Public[5]	Int'l[6]	Private Investment	**Total Portfolio Investment**
At Current Investment Level	293.5	95	200.5	5	83.5	**677.5**
Proposed Additional Investment Level	212.5	54.5	209.5	25	272	**773.5**
Total Portfolio Investment	**$506**	**$149.5**	**$410**	**$30**	**$355.5**	**$1451**

Through the collaborative stakeholder approach, combined with information from the environmental scan and other knowledge, key strategic opportunities and initiatives have been identified as priorities for strategic investment over the next few years.

Table 5 below outlines the current R&D investment in these areas and recommends the level of investment required by 2008 in order to 'capitalize' on these opportunities.

[1] Includes AHFMR, AIF, AVAC, Industry Development Funds, Producer Groups/Boards/Commissions
[2] Includes NRC, WED, CFI, CIHR, AAFC, NSERC
[3] Includes USDA, NIH, ATO, other international research funders

Table 5. Strategic Investment Portfolio

2002 $ million/yr	STRATEGIC AREA	2008 $ million/yr
$ 18	Value-Added Food and Health Products[7]	**$ 70**
	• crop-based food, food ingredient and fermentation products • agri-based health, therapeutic and wellness products • value enhanced fresh and processed meats and co-products	
$ 5	Bio-Products	**$ 60**
	▪ bio-materials (bio-polymers, fibres and bio-composites) ▪ bio-energy/fuels, co-generation and byproducts utilization ▪ bio-chemicals (lubricants, cosmetics, resins, and Industrial chemicals)	
$ 110	Sustainable Production Systems	**$ 140**
	Interaction of Agriculture With Water, Soil and Air Resources • enhanced water, soil and air management (systemic approach) • climate change and amelioration technologies	
	Crop Opportunities • crop and crop product value-added and diversification • strategies for disease and pest management • nutrient efficient cropping systems • food safety	
	Livestock Opportunities • meat quality influenced by genetics and production management • animal welfare and care • animal health-strategies for prevention and control • animal genetics and proteomics applications for animal health and meat quality • food safety	
$ 2	Economics, Marketing & Social Sciences	**$ 10**
	• Marketing, policy, regulation • Competitive intelligence • Consumer behavior, rural enhancement and development	
$135	**Total Investment**	**$280**

The majority of investment in sustainable production systems will support basic and applied research, while the investments in the agri-health, value-added and bio-products sectors will be weighted towards technology development, knowledge transfer and commercialization. To enable the growth of this research capacity, investments in facilities and equipment totaling $52.5 million

[7] Includes food safety issues including preservation, handling, processing technologies, identity preservation, rapid analysis and monitoring

(see Table 3) will be required in the first two years of the strategy implementation. There is opportunity to invest in current research facility expansion across the province including the universities, colleges and the Alberta Research Council.

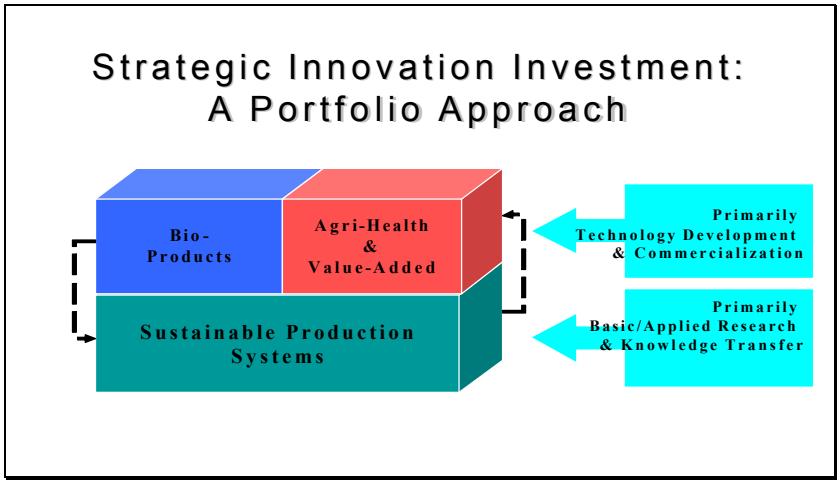
Several platform technologies will support the future development of the strategic investment portfolio opportunities identified for agriculture. These platform technologies (proteomics, bioinfomatics, genomics, nanotechnology) for developing leading edge science, are largely supported by the Life Sciences Strategy and the continued ASRA investment and support. These platform technologies and opportunities span the entire Life Sciences Industry, of which agriculture is a key component.

Enhanced private investment must be publicly-facilitated via policy changes including support of investment vehicles such as capital access funds, pension funds, investment tax credits and flow through share mechanisms comparable to those currently in place for other Alberta industry sectors (mining, oil and gas exploration) and other jurisdictions. These policy recommendations are aligned with those forthcoming from the ASRA Innovation Task Force and the Joint AEDA/ASRA Access to Capital Task Force.

The strategy of regularly collecting and analyzing information and knowledge concerning Alberta's comparative advantage, market opportunities and consumer needs through the Strategic Networks will provide the governance system with the necessary knowledge and information to achieve maximum private and public benefits. Achieving success is about capturing growth opportunities through strategic investment portfolios to help Alberta develop a leadership position in agriculture research and innovation by 2008 and beyond.

Strategic Networks and Priorities

Figure 4. Strategic Innovation Investment



Value-Added Health and Food Products

Several opportunities have been identified in the value-added health and food products areas. Health and wellness products using bioactives obtained from agricultural sources represent a significant opportunity for Alberta. Aging demographics and consumers taking responsibility for their health are fueling nutraceutical, functional food, personal care, alternative medicine and pharmaceutical markets. New products are emerging containing dietary fibres, peptides, antioxidants, oliogosaccharides, polyunsaturated fatty acids, just to name a few. The possibilities for proprietary blockbuster products are attracting global food, pharmaceutical, chemical and venture capital firms' interests. Further development work for R&D is required to capture this opportunity.

Alberta's advantages in crop production also provide the foundation for establishing a new $2-3 billion world scale extraction, conversion, fermentation, and proprietary trait industrial sector. The large global food ingredient and fermentation markets are expanding, with innovation leading to new and enhanced consumer and industrial products. Wheat, coarse grains, oilseeds and

pulses currently exported are excellent feedstocks for the extraction and conversion of starch, protein, oil, fibre and cellulose into valuable ingredients and derivatives with distinctive functionalities and nutritional benefits and uses in food, feed, and pet foods, as well as industrial feedstock for further manufacturing.

Priority investments in meat R&D can build on existing Alberta R&D capacity and competitive strength in livestock production, meat quality, and food safety. Increasing the value, volume and share of Alberta's meat products in domestic and export markets is seen as key to the industry. Value-enhanced products will enable Alberta food processors to reach discriminating domestic and international customers with a variety of new, appealing, nutritious and safe meat products.

Food safety continues to be an issue of high importance. Leading edge developments, products and processes in preservation, handling, processing, identify preservation, rapid analysis and monitoring are required to ensure that Alberta continues to be a competitive player in the global marketplace.

Bio-Products

Bio-products offer Alberta a major opportunity to meet global market demands for new materials, products and technologies based on our resources. Bio-materials include bio-composites (building products, agri-fibres) and bio-polymers (bio-plastics). Novel applications of science and technology can create new value-added ways to sustainably use Alberta's agriculture and forestry products. This priority area provides for significant regionally-based growth from Alberta strengths (crops and forest resources), industry, research infrastructure and a critical mass of innovative researchers.

Bio-energy is an opportunity to meet energy and transport industry market demands for alternative fuels and clean renewable sources of energy and

potentially beneficial properties including lubricants, oxygenation and hydrogen content enhancement. Bio-energy includes bio-fuels and co-generation (including bio-gas). Through science and technology oriented to utilize Alberta agriculture and forestry commodities and waste streams, new energy sources can be developed. Advanced technologies in cellulosics could convert a costly byproduct to a valuable energy and fibre input. Globally, energy supplies are limited, population demands are increasing, society is seeking new processes for reduced emissions, and policies are encouraging these industrial developments. Currently, the Alberta bio-energy industry is limited, but interest is emerging. Alberta has significant resources to 'tackle' this opportunity, and expansion in this area will lead to a significant growth in the utilization of Alberta agriculture and forestry products.

Bio-industrial chemicals offer new ways of supplying naturally derived chemical products for global industrial markets. Bio-industrial chemicals include chemical feedstocks (platform chemicals) bio-lubricants, bio-cosmetics and resins. With novel applications of science and technology, new ways to utilize Alberta agriculture and food products can be discovered. Globally, consumers are seeking alternative bio-degradable products, and policies and programs are encouraging green chemicals and products. Bio-industrial chemicals provide a 'bridging' opportunity to build capacity in technology development and commercialization efforts through which all can jointly act. This priority area enables Alberta's diverse and globally competitive chemical sector to source new technologies and meet global industrial companies' needs in seeking innovative products. It also provides the agricultural sector with new large volume utilization of crops and waste residuals for high-valued products.

Sustainable Production Systems

The production and sales of raw commodities from crops and livestock account for almost $9 billion to Alberta's economy. Arising from this production capacity is a diverse range of products specific for their quality, structural and/or functional

properties. There are opportunities for the creation of new marketable traits and specific differentiated products from crops and livestock products. The development of genetics and management practices will produce a diversity of specific traits to meet market and value-chain needs. This priority provides the foundation to meet the needs to support the bio-products and value-added health and food product priority areas.

Nutrient efficient cropping systems are a priority for sustainable production. Developing alternative methods for long-term nutrient balance management is key to increasing the efficiency in crop and livestock systems. Development of specific traits designed to increase efficiency in plants' and animals' utilization will be a priority. There is potential to enhance the economic return and reduce wastes through a more efficient conversion of inputs to economic product, capturing and holding more components in the system (eg. carbon credits) and reducing their movement beyond the agricultural system (environmental risk). Water supplies are under increasing demand, and in many years decreasing supply. This availability of water may be a limiting factor to growth. Increased efficiency in water management and use, combined with advancements in crop genetics and other technologies that will reduce the amount of water required for production to help overcome these challenges.

Livestock genomics is an area of importance for Alberta as it provides the platforms upon which improvements in meat quality and nutritional properties in meat and meat products can be achieved.

Animal health strategies are key to economic returns and market expectations for safe and healthy food. Continuous work in disease management and prevention will be a priority. Examples include having a strategy for large disease outbreaks (i.e. Foot and Mouth disease). Leading technologies and discoveries leading to new vaccines, diagnostics and management for serious animal health issues.

Animal welfare and care are an important component of the system, and setting standards of practice based on science for factors such as housing facilities, feeding pens, handling facilities, etc. are important. These standards are designed to minimize the stress to the animal and enhance their well-being and production.

Crop disease and pest management are key factors facing farm managers. Utilizing leading edge tools and methodologies to develop a systemic approach to dealing with diseases and pests will be a key component for growth. The priorities will be on diseases and pests that are significant threats to the agriculture industry, and that affects crops of significant value to the 'value-chains' in the system. For example, sclerotinia in canola, fusarium head blight in malt and feed barley, and wheat, late blight in potatoes and potato beetle infestations, and diseases such as ascochyta in chickpeas and other specialty crops.

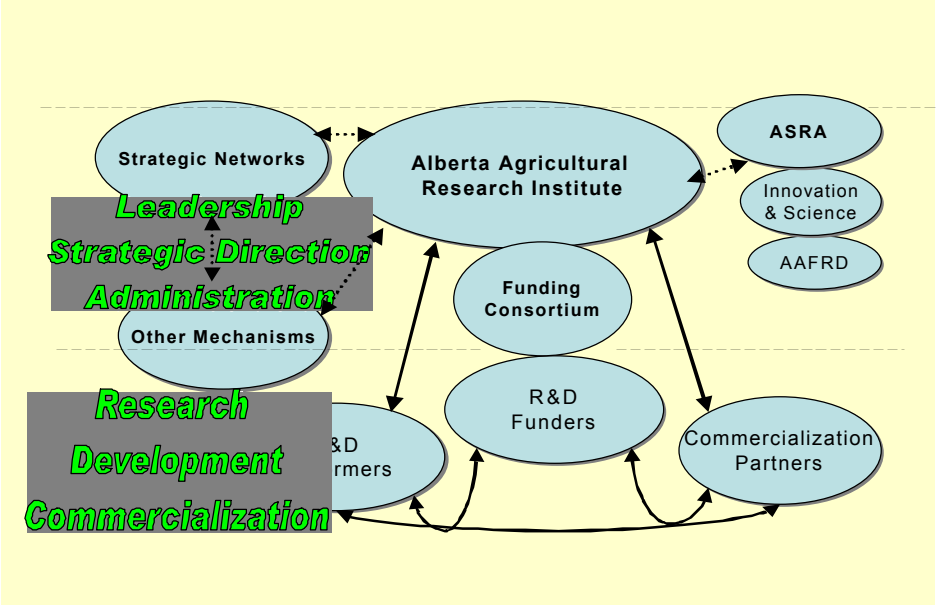
Economics, Marketing and Social Sciences

For these three priority areas to achieve success, leading-edge competitive intelligence processes to understand the opportunities and priorities as presented by the market and industry, and/or 'harvesting the world' strategies will be key. This also includes a focus on regulations, policy changes and marketing that support the above priorities. Other factors that need to be considered as part of the system include social sciences, rural sociology, consumer attitudes/rural attitudes and rural renewal.

Leadership and Governance

For the Alberta Agriculture Strategic Research and Innovation Framework to be successful, a new leadership and governance model will be implemented. The key shift, and foundation of this new governance model, is one that is innovative, collaborative and inclusive. **The priority is to accelerate the collaboration and strategic alignment emerging in the current system, and to expand new collaborative models among agriculture research funders and other stakeholders throughout the R&D continuum.** This model creates a strategic approach for research and funding capacity in Alberta, ensuring that the research and innovation needs required to drive our agricultural industry's future are identified (inclusively by stakeholders) and are met through strategic investment portfolios. **Key to the success of this framework will be accountability, due diligence, leadership and clearly defined outcomes.**

Figure 5. Agricultural Research & Innovation Governance Model



Implementing the new Research and Innovation Strategy on a foundation that is inclusionary and collaborative, is a key success factor to positioning Alberta as

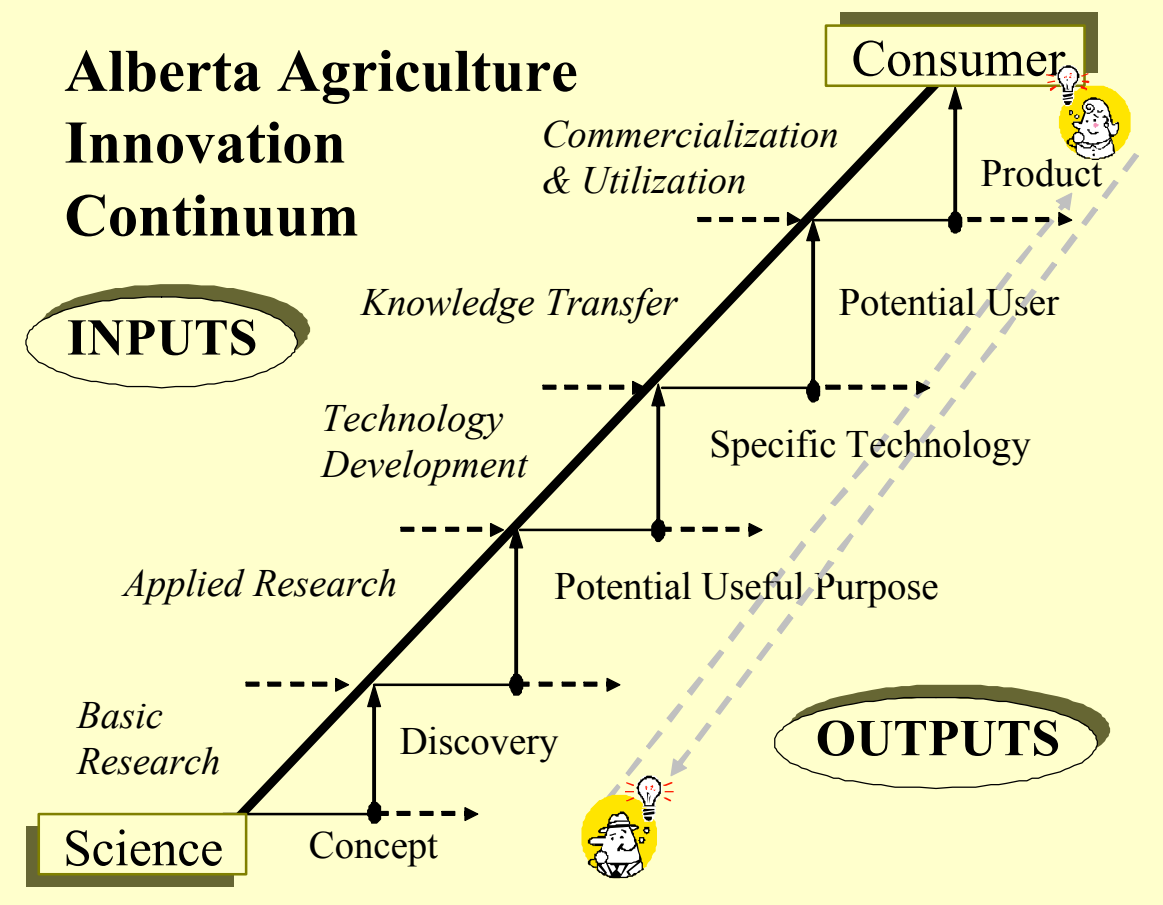
one of the world leaders in agriculture research and innovation. The Strategic Research and Innovation Networks, including industry, producers, performers, and other stakeholders, are responsible for identifying key opportunities and priorities for Alberta's agricultural industry. This process of information development and sharing, direction and priority identification will result in the alignment of capacity toward science and technology products and knowledge critical to achieving economic, social and environmental goals.

Strategic Networks are constituted of representatives from the full innovation continuum, from basic research through to technology transfer to the ultimate use of the knowledge, technology and/or products (see Figure 6). The Strategic Networks and other mechanisms as required will provide recommendations regarding the strategic direction and priorities. The Networks will include representation from stakeholder groups across the research and innovation continuum and are directly accountable to AARI. Three Strategic Research and Innovation Networks will be created and are listed below:

1) Value-Added Food and Health Products Strategic Network
2) Bio-Products Strategic Network
3) Sustainable Production Systems Strategic Network

Representatives on each Strategic Network will include industry--from producers through the value chain to the marketplace, NGOs, commodity organizations, Federal and Provincial governments, R&D and commercialization members and representatives from other sectors as necessary.

Figure 6. Alberta Agriculture Research and Innovation Continuum



AARI and the Funding Consortium, in collaboration with stakeholders, will set the strategic agenda, establish the strategic priorities and ensure that investments are aligned with the strategic direction and facilitate the attraction of extra-provincial and industry resources to the strategic direction. AARI will work with the Agriculture Funding Consortium and other research funders to direct significant investment to the opportunities and priorities identified by the Strategic Networks. Competitive intelligence, scientific review and due diligence processes are key to this approach and accountability will be an on-going function of AARI, assisted as appropriate by the Funding Consortium. AARI will also recommend policy in support of the strategic direction, priorities and goals in the Strategic

Research and Innovation Framework. Under this collaborative model, stakeholder consultation and input will continue to be an on-going priority for framework renewal and the overall R&D System Business Plan. Regular review (annual or biannual) of the roles, responsibilities, outputs and outcomes will use the Framework and System Business Plan as a basis for accountability.

Six public agriculture R&D funders [AARI (Alberta Agricultural Research Institute), ACIDF (Alberta Crop Industry Development Fund), ALIDF (Alberta Livestock Industry Development fund), DLFOA (Diversified Livestock Fund of Alberta), AVAC Ltd. and the AFC (Agriculture and Food Council)] have collaborated to form the Agricultural Funding Consortium. The Agricultural Funding Consortium will continue to evolve and expand to include other critical funders in the R&D continuum as the system is implemented including other Life Sciences, sectoral funders (AIF, AHMFR), and others. This Consortium directs funding towards specific strategic priorities, and through this governance model, increased system productivity, efficiency, investment, and accountability will result. **One of the greatest benefits the Funding Consortium brings is the ability to provide critical mass in supporting the Province's strategic research and innovation priorities, while simultaneously honouring the specific mandates of each individual funder.**

The Research Performers, Funding Consortium, and AARI will work together to create high quality scientific projects that are aligned with strategic priorities, and with Alberta's technology transfer/innovation/ commercialization capacity. A robust scientific and industry peer review process stewarded by AARI will examine proposals and select those that reflect the priorities and strategic direction, at the same time as focusing on specific outcomes.

One underlying principle of the entire system is scientific excellence, which will guide decisions about outcome driven research priorities and ideas. Research performers, including Universities and Colleges, the Alberta Research Council,

Federal and Provincial government researchers and other external research performers, will focus their efforts on outcome driven research and scientific excellence. This focus on scientific excellence will help draw larger financial contributions to the strategic priorities from extra-provincial and industrial funders.

The ability for this new model to achieve the growth targets for 2010 and beyond will be highly dependent on innovative, value-added components of the economy, such as new crops and livestock products, new technologies and new knowledge. This will be accomplished through a system that links good science to industry needs and economic opportunities for the growth and sustainability of the agriculture and food system. For example, through this system innovations resulting from research and development efforts can quickly be utilized by farmers, processors, manufacturers, and other end users, to accelerate growth or meet new sustainability and/or social challenges from competitors or needs expressed by the public.

This new leadership and governance model, championed by AARI, will ensure that Alberta's research and innovation system is aligned, has strong leadership and accountability for the Strategic Framework, is well resourced, provides for commercial opportunities and is well recognized locally, nationally, and globally.

Under this new model, linkages among the various stakeholders of the system will be more closely aligned, featuring more multi-disciplinary, cross-sectoral programs and projects, and more multi-institutional linkages. Through the process of aligning research, technology transfer and commercialization, the system encourages stakeholders to shop the world for applicable technologies, including those transferable from other jurisdictions and economic sectors.

Producer and industry associations, applied research associations, and other like-minded partners including ARC (Alberta Research Council), AAFRD, AAFC, OCCI (Olds College Centre For Innovation), IRAP (NRC-Industrial Research Assistance Program) and AESA (Alberta Environmentally Sustainable Agriculture) Program, will be encouraged and supported to build the collaboration necessary for innovation.

Figure 7. Participant and Stakeholder Roles, Responsibilities and Goals

Who	AARI and Funding Consortium	Strategic Networks	Research Performers	Technology and Commercialization Players
Key Players	• AARI • Industry Development Funds • Ag and Food Council • AVAC Ltd. • Additional funders as necessary	• Industry (from producers to marketplace) • NGOs • Commodity/Industry/ Applied Research Organizations • Federal and Provincial Governments • R&D and Commercialization members • Other sectors as necessary	• Universities/Colleges • ARC/NRC and other similar institutions • AAFRD • AAFC • OCCI • Private	• Agribusiness, Commodity/Industry/Applied Research Organizations • Universities/Colleges • ARC/NRC and other similar institutions • AAFRD • AAFC • AVAC • Processors/Manufacturers • Other Sectors
Roles & Resp.	• Strategic Direction and Priority Setting • Policy • Due Diligence Processes • Investment Portfolio and Leverage • Accountability processes • Framework and Business Plan Renewal • Balancing EMSE* priorities	• Environmental Scan • Global Networking • Proposal Building • Develop R&D partnerships • Identifying R&D Strategic Priorities and Outcomes	• Scientific Excellence • Basic **and** Outcome Driven Research • Innovation • Education and Training • Knowledge of Science Opportunities	• Technology Commercialization • Best Management Practices • Knowledge Transfer • Evaluation and Assessment of Technology and Products
Outputs	• AB Agricultural R&D Framework Business Plan (renewal) • Investment Portfolio • Attraction of Federal and Industry Funding • All Goals	• Opportunities and Priorities for the Agricultural Industry • Science Plans to deliver Priorities • Partnerships/ Team Building • Product and Technology • Goals 1, 3 and 4	• Goals 3, 4 and 6	• Goals 3, 4 and 6

*Environmental, Market, Social and Economic

This collaborative stakeholder approach increases the opportunities for commercial investment into Alberta new products, practices and processes, ensuring opportunities are not missed. Through collaborative efforts, capacity and capability for commercializing technology will be available. Support for creating business incubation capacity, and support for building expertise in technology commercialization including management of intellectual property, licensing and contracting skills and technology prospecting outside of Alberta will be available. The governance model ensures ongoing review and analysis of the best of models from elsewhere, and incorporating strategies that will strengthen the system to meet the growth objectives.

Key Critical Components of an Effective R&D System

To establish an effective R&D System, stakeholders identified the following critical components as essential:

- **Leadership, direction, and agreement on an R&D Strategic Framework.**
- **Enhanced collaboration and partnerships throughout the R&D System.**
- **Alignment of R&D System with industry goals and needs.**
- **Advanced human resource capacity aligned with strategic direction and outcomes/priorities.**
- **Strategies and actions that address the needs of the full R&D System.**
- **Increased public and private investment over the long-term.**
- **Public/private mechanisms for action, i.e., networks, teams, organizations.**
- **Public sector funding for priorities and private sector funding for commercialization.**
- **Effective communication with other global knowledge providers relative to our strategic priorities.**
- **Accountability for goals, outputs and outcomes**

Under the strategic leadership of AARI and the Funding Consortium, these key critical components will be incorporated into the system, ensuring the system productivity through the continuum will be timely, efficient and seamless. **The guiding principles for strategic investment in this system are building a critical mass of world-class scientific personnel in disciplines critical to Alberta's unique needs, supporting it with appropriate levels of research program funding utilizing talents as the engine for innovation, and ensuring discoveries are supported with technology commercialization expertise and industry partnerships. Building research excellence with a collaborative spirit global networks and links with entrepreneurial skills are the essential ingredients for success.**

Accountability

As a systems model, accountability and due diligence will prevail throughout the continuum including the priorities, goals, strategies and resources within this Framework. Achieving success depends on due diligence and accountability through concept, innovation, applied research, technology development, commercialization and market entry, and ultimately the creation of value for final consumers and end users.

Through the process of implementing this Framework and the resultant Business Plan**, the new governance structure will establish specific accountability for both the long and short term**. The governance structure is accountable for all goals and to achieving maximum private and public benefits. This Strategic Research and Innovation Framework serves all stakeholders whose individual business plans will create the outcomes identified.

AARI is accountable for effective use of resources and building quality research capacities to achieve the outcomes targeted by this Framework. Due diligence and accountability will be built into policy and strategic direction, and investment portfolios. Proposals selected to receive funding, will reflect the priorities and

strategic direction and specific outcomes of the strategic framework. **Quality scientific, technology transfer and commercialization proposals will be built in an atmosphere of due diligence, selective investment portfolios, collaborative science and clear strategic priorities.**

Stakeholders under this governance structure are accountable to ensure all initiatives balance economic, market, social and environmental priorities. Consumers and end users will look to the governance structure for accountability in the products, innovations and services introduced to the market.

AARI, together with individual stakeholders and investors including the Funding Consortium, are accountable for implementation and financial management of initiatives and outcomes. To evaluate the performance and outcomes, a variety of indicators or measures can be applied and will need to be established in the early implementation stage. These may include factors such as, number of contracts, total investment attraction, total new investment, number and diversity of products and innovations commercialized, number adopted by the marketplace, success of technology transfer and commercialization activities, overall financial performance and others, often validated by arm's length agencies.

Outcomes

The Alberta Agriculture Strategic Research and Innovation Framework establishes the foundation for the industry's growth to 2008 and beyond. This strategy will create the capacity to develop a stream of products and innovations necessary to achieve growth targets. The goals, strategies and actions established for this Strategic Research and Innovation Framework will be implemented through the leadership and governance of AARI.

In the first five years of implementation of the Agriculture Strategic Research and Innovation Framework, and as a direct result of the strategic investment, the following outcomes will serve as a base for accountability:

- **Attract $272 million in private investment to commercialize technologies created and enabled by the System**
- **Leverage $234.5 million in federal and international funding through existing and new agencies and programs focused on science and innovation**
- **Attract and establish nationally and internationally recognized scientific leaders in priority life sciences areas**
- **Attract and train over 300 new highly qualified personnel for Alberta's life sciences research and innovation system (grad students, technicians, knowledge workers, business managers, etc.)**
- **Create 125 new products/processes and attract 70 new companies, utilizing intellectual property generated by the system**

For the R&D system to move forward and effectively convert R&D to commercializable products, innovation and knowledge utilization, the governance model identified must be adopted immediately. Research performers will actively seek benefit from alignment with commercial partners, at the same time that commercial partners will actively seek benefit from Alberta's research performing capacity. New and enabling capacity will be created through collaboration, partnerships, and new investment.

Under the leadership AARI and the Funding Consortium, resources will be focused on priority areas, and R&D priorities will be aligned with industry and public needs. Focusing on strategic priorities will provide clear direction for building human resources, infrastructure and innovation capacity. New financial resources and R&D personnel will be attracted to

Alberta, and additional highly qualified personnel will be working in the Alberta Agricultural R&D System by 2005.

Accountability and due diligence are two of the principles underlying this new governance model, and will be utilized to ensure excellence and maximum return on investment across the system at every stage of research and technology development. Increased system productivity and efficiency builds the business case for investment. All R&D system participants, including stakeholders, shareholders, research performers, investors and the public will be more engaged and knowledgeable about the system. Stakeholders will strengthen their commitment to the shared vision and to achieving the strategic outcomes. This will result in enhanced public trust in Alberta's Agricultural R&D System.

R&D efforts will intersect with other related plans and strategic initiatives in Alberta. This will ensure that Alberta's Agricultural R&D System is aligned, has strong leadership and accountability, is well resourced, provides for commercial opportunities and is well recognized locally, nationally and globally. These initiatives will drive an industry based on sustainable growth and an industry that balances economic, market, social and environmental priorities.

While collaboration is key, the new governance model challenges stakeholders and organizations to develop and to implement their individual business plans within this overall provincial framework. The Alberta Agriculture Research and Innovation Strategy will provide the leadership and mechanism, for success and governance will remain the responsibility of all collaborators. However, individual organizational business plans will, where needed, be aligned with and complementary to the overall research and innovation framework. This is a necessary accountability to achieve growth targets and to maximize wealth creation opportunities in a sustainable manner.

Implementation

The new governance model will implement this Framework. Implementation is based on a portfolio investment approach across the innovation continuum, from basic discovery research to successful technology commercialization, delivering products to consumers, driving product sales and economic growth.

Throughout the continuum, from research concept through to final consumer benefit, this model will ensure all initiatives balance economic, market, social and environmental priorities. Achieving success is about capturing growth opportunities through strategic investment portfolios to help Alberta develop a leadership position in agriculture research and innovation by 2010 and beyond.

Immediate steps for moving forward include:

- Adopting and implementing the new governance model
- Moving from the Framework to a Business Plan and its implementation
- Engaging Strategic Networks to finalize the science plans necessary to deliver on the Strategic Priorities
- Utilizing the Framework to guide 2003 and beyond research and development investments (current and new)
- Linking with Alberta's Life Sciences Strategy to ensure this Framework's priorities are met
- Initiating the strategies and actions in support of the goals

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