



# Innovation and Commercialization Assessment



# **Innovation and Commercialization Assessment SouthGrow Regional Initiative**

## **Submitted to:**

SouthGrow Regional Initiative  
C/O Alberta Finance and Enterprise  
105, 200-5<sup>th</sup> Avenue South  
Lethbridge, AB T1J 4L1

## **Submitted by:**

Westwinds Management Solutions Inc.



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## EXECUTIVE SUMMARY

Innovation, technology and commercialization are related and form a part of a process. Throughout the process, key players have a role and the existence of critical success factors determine the likelihood of accomplishments. **Innovation** is basically a new product or process that people/industry can buy and utilize. It typically starts with an idea, an invention or a concept for a technology. **Technology** is essentially know-how and/or knowing how to make and use tools for a job. The practical application of the knowledge results in a capability that is valuable to the marketplace whether as a process, method or item. Through these definitions, it is important to note that the idea, invention or **technology** cannot be called an **innovation** until it is **commercialized**. **Commercialization** is the successful market sale on a regular basis of a given product or service by a particular entity. The market place turns an idea, invention or technology into an innovation, through its development, distribution and sale. The combination of technology and the market creates the innovation which boosts **productivity** by giving the company that utilizes the innovation a **competitive edge**. *Therefore, innovation boosts productivity and drives economic growth.*

Federally and provincially, the governments have a focus on bringing technology to market. In addition to action plans, governments at both levels have provided support. The federal government has federal research laboratories in each province, federal government assistance programs, direct granting programs, as well as innovation intelligence that is accessible. The provincial government has made it one of its priorities to assist Alberta entrepreneurs to progress from research to innovation. In addition, the province has five research institutes, diverse sources of funding, and research facilities. Within the province, there are also a variety of industry organizations, agencies, technology service centres, investor networks, and special funders that play a key role in the innovation effort.

Within the SouthGrow region, the Lethbridge Research Centre, the University of Lethbridge and Lethbridge College play a key role in research and innovation. In fact, there is a large amount of diverse research being conducted at these institutions and play significant and distinct roles in advancing research into the marketplace. Each institution has an individual or office dedicated to transferring technology or ensuring applied research is brought to the market. In addition, there is significant innovation activity occurring at the individual or independent organization level as evidenced by the patent activity.

In terms of next steps for SouthGrow Regional Initiative, there does seem to be a gap in the awareness that residents in the region have of the research and innovation assets that already exist within the region, the caliber of the research being conducted, the external funding being attracted to the area, the opportunities available as a result of the research for investment, and the expertise that exists that may assist individuals to innovate, whether leading to increased productivity in their businesses/organizations or to new products and processes which may be commercialized. Therefore, **SouthGrow can play a role in becoming a “communications and marketing portal” for the research and innovation in the region.**

Through the assessment, it has been concluded that there are various types of supports available in the research and innovation area, with the exception of those cases where an individual or an organization has developed an idea and is ready to commercialize it. If value-added research is not required, the technology transfer assistance available at the University or the Research Centre is not appropriate. Therefore, the individual that has “built a better mouse trap” but does not require further research into it is left to his own devices to bring it to market. Therefore, **it is recommended that SouthGrow investigate the feasibility of a market-focused product commercialization centre that includes technology development advisors and has a strong link to area business development centres.** This recommendation aligns with three of the nine action

items the province's three-year plan, *Alberta's Action Plan - Bringing Technology to Market*. By investigating the feasibility of such a centre and developing a business plan for it, SouthGrow Regional Initiative has the opportunity to start a centre that can provide technical assistance to innovators, help them to secure external funding and advocate on their behalf in order to bring technology to market.

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## 1.0 BACKGROUND

SouthGrow Regional Initiative is one of twelve regional economic development alliances in Alberta. SouthGrow is a member-driven, non-profit regional economic development alliance for south central Alberta. SouthGrow is the youngest regional economic development alliance in Alberta and was registered and incorporated on April 28, 2004 as a non-profit corporation under The Companies Act of Alberta. Twenty-seven communities, with a population of over 140,000 participate in the regional economic development alliance.

The member communities are:

- Blood Tribe
- City of Lethbridge
- County of Lethbridge
- Cardston County
- MD of Taber
- Vulcan County
- County of Warner
- Town of Cardston
- Town of Claresholm
- Town of Coaldale
- Town of Coalhurst
- Town of Magrath
- Town of Milk River
- Town of Picture Butte
- Town of Raymond
- Town of Taber
- Town of Vauxhall
- Town of Vulcan
- Village of Barons
- Village of Carmangay
- Village of Champion
- Village of Coutts
- Village of Lomond
- Village of Milo
- Village of Nobleford
- Village of Stirling
- Village of Warner



SouthGrow is well established with businesses in traditional sectors such as agriculture, manufacturing, industrial machinery and equipment, architecture, engineering and construction, transportation, metal fabrication and tourism. Recently, the region developed the alternative energy sector through participation in the Southern Alberta Alternative Energy Partnership (SAAEP).

SouthGrow has a strong base in institutional research and development, and private ventures have been “spun off” as a result of research and development through the University. In addition, the province has recently announced increased support in the area of innovation and commercialization. Given the strength of the traditional sectors, the existence of two post-secondary institutions, and the location of several government research oriented agencies in the region, SouthGrow views the assessment of innovation and technology commercialization assets, systems and supports in the region a priority. In having this assessment conducted, all sectors are being analyzed as it is understood that innovation and commercialization can and does occur in all industries (traditional and emerging).

The assessment consists of:

- An explanation of technology, commercialization and innovation.
- A discussion of how technology, innovation and commercialization relates to productivity.
- An inventory of agencies and support services available federally, provincially, and regionally.
- A listing of some of the examples of businesses/individuals in the SouthGrow region that are involved in innovation.
- Recommendations for possible next steps for SouthGrow.

## 2.0 INNOVATION, TECHNOLOGY, COMMERCIALIZATION & PRODUCTIVITY

Innovation, technology, and commercialization are related and in fact form a part of a process. Throughout the process, key players have a role and the existence of critical success factors determine the likelihood of accomplishments. The extent of accomplishments translates into indicators of capacity for innovation. To better explain how technology, commercialization and innovation are related, some key definitions are presented below:

**Innovation** is basically a new product or process that people/industry can buy and utilize. It typically starts with an idea, an invention or a concept for a technology.

**Technology** is essentially know-how and/or knowing how to make and use tools for a job. The practical application of the knowledge results in a capability that is valuable to the marketplace whether as a process, method or item.

**Commercialization** is the successful market sale on a regular basis of a given product or service by a particular entity. Typically, there are a series of activities (known as the commercialization process) that lead to commercialization and these activities are typically carried out by an entity that utilizes resources, finances and other assistance to ensure success.

Having defined these terms, the question may still remain: is there a relationship between technology, commercialization and innovation? The answer is definitively “YES”. The relationship is more of a *process* that relies on critical success factors and key players.

Specifically, the idea, invention or **technology** cannot be called an **innovation** until it is **commercialized**. The market place turns an idea, invention or technology into an innovation, through its development, distribution and sale. Therefore, the technology must be something that the market can use or that it needs. The process of commercialization determines whether the technology will result in innovation. Quite simply, a good technical ideal may not become a successful innovation if it does not address a need because the market place will reject it.

The question may still remain: Why is innovation important? The answer is *productivity*. The combination of technology and the market creates the innovation which boosts **productivity** by giving the company that utilizes the innovation a **competitive edge**. *Therefore, innovation boosts productivity and drives economic growth.*

### INNOVATION PROCESS

The process of innovation is simply a series of stages that connect the idea to the marketplace. It is the process of transforming knowledge into new products, processes or services. The process starts with an **idea, invention or technology** that people/industry needs. The idea, invention or technology is developed through research. The idea or invention is then taken from the laboratory to the industry through **technology transfer**.

Within Canada, technology is transferred through consulting companies, patent agencies and brokerage agencies (which sell new ideas) and through industrial associations and research institutes. In addition, federal and provincial governments help private business to gain access to and commercialize the results of government research through technology centres and offices of technology transfers.

**Commercialization** occurs when resources, finances and other assistance are used to ensure that the idea, invention or technology will succeed in the market. The commercialization process is the process by which an entity, its collaborating users and suppliers and its financial sources work



together ensure market needs are met, achieving commercialization. It is important to note that the credibility of the perceived market, the appropriateness and quality of the business plan and the match of resources determine the likelihood of securing external financing often necessary for successful commercialization.

The next stage in the process is diffusion or **distribution** of the new idea, invention or technology beyond the first users. It is when the idea, invention or technology is used by the market, that is becomes an **innovation**.

## **PLAYERS/PARTNERS IN INNOVATION**

Throughout this process, “players” or “partners” are involved to ensure success. The three main categories are government, industry and post-secondary institutions. They each have a role to play in the innovation process and a coordinated effort by all three ensures that innovation is strongly supported.

### **Government:**

- Develops strategy to ensure innovation efforts increase.
- Forms and implements policies that support innovation.
- Supports innovation through incentives and funding, either directly or through industry and post-secondary institutions.
- Provides access to expertise that assists innovation to progress.
- Provides expertise in the form of research institutes.

### **Industry:**

- Funds innovation that boosts productivity and helps economic growth.
- Provides expertise to research and aids in the commercialization and distribution process. In fact, beyond the researchers, consulting companies, patent agencies, brokerage agencies, and industrial associations play a key role in the process.

### **Post-Secondary Institutions:**

- Provide critical thinking that is essential to innovation through qualified researchers, engineers, scientists and technicians.
- Conduct basic and applied research. In fact, the 50-degree granting universities in Canada carry out about one-quarter of the research and development in Canada.
- Serve as points of contact between the university research community and industry through offices of technology transfer, which help raise research funds, earn money on patents and demonstrate the value of dealing with the private sector.

## **INDICATORS OF CAPACITY**

There are several indicators (or measures) of capacity for creativity, invention and innovation. Intellectual property (IP) is the main indicator. Intellectual property, when used strategically, can increase competitiveness. The Canadian Intellectual Property Office defines intellectual property (IP) as “creations of the mind, such as inventions, literary and artistic works, as well as symbols, names, pictures, designs and models used in business. Patents, trade-marks, copyrights, industrial designs, and integrated circuit topography are referred to as IP rights.”

**Patents** represent a potential innovation. A patent is essentially permission by the government giving the right to exclude others from making, using or selling an invention. The Canadian Intellectual Property Office has a database ([www.patents1.ic.gc.ca/intro-e.html](http://www.patents1.ic.gc.ca/intro-e.html)) that provides access to over 75 years of patent descriptions and images and consists of over 1,500,000 patent documents.

**Trade-mark** is a word, symbol or design (or any combination of these features), used to distinguish the wares and services of one person or organization from those of others in the marketplace. The Canadian Intellectual Property Office has a database (<http://strategis.ic.gc.ca/app/cipo/trademarks/search/tmSearch.do?language=eng>) for Canadian pending and registered trade-marks.

**Copyrights** are protection for literary, artistic, dramatic or musical works (including computer programs), and three other subject matter known as: performance, sound recording, and communication signal. The Canadian Copyrights Database (<http://strategis.ic.gc.ca/app/cipo/copyrights/displaySearch.do?language=eng>) includes all copyrights which were registered as of October 1, 1991, pursuant to the *Copyright Act*.

**Industrial Design** includes the visual features of shape, configuration, pattern or ornament (or any combination of these features), applied to a finished article of manufacture. The Canadian Industrial Designs Database (<http://strategis.ic.gc.ca/app/cipo/id/displaySearch.do?searchType=design&language=eng>) includes all industrial designs that were registered as of December 1861, pursuant to the *Industrial Design Act*. The descriptions are searchable only for industrial designs registered as of June 15, 2002.

**Integrated Circuit Topography** is a new form of intellectual property and is having a growing impact in virtually all fields of industry. Topographies are innovative, three-dimensional circuit designs used in many different products. Examples of such products are automobiles, industrial robots, cameras, spacecraft and computers.

Intellectual property management (protection) is critical to the entire process otherwise commercialization would simply be the signal for competitors to do likewise and destroy the business return for the innovator. The fostering of this competitive environment assists with productivity as companies strive to remain profitable and “ahead of one another”.

Other indicators of capacity for innovation in an area are invention disclosures, spin off companies, licenses and material transfers.

## CRITICAL SUCCESS FACTORS

There are essentially three main critical success factors for innovation:

- Expertise - universities, research facilities, industry, government labs, inventive individuals and other “knowledge” infrastructure that develops new technologies and a skilled workforce.
- Funding - early stage venture capital financing to help bring technologies to the market.
- Support - industry associations and other organizations that link the key players (inventors, suppliers, customers, etc.) and firms that are capable of developing and adopting new technologies that are market oriented.

These three critical success factors result in an environment that fosters innovation. Therefore, an innovative environment is one where there are skilled, well-educated people/workers with the ability to think critically and have access to venture capital and funding and where there is support from post-secondary institutions, industry and government.

## SUMMARY

The following diagram graphically summarizes the relationship between technology, commercialization, innovation and productivity as well as the role of key players at various stages and indicators of capacity.

NOTE: While the diagram shows the steps in the innovation process as consecutive, in reality often the steps are iterative. For example, sometimes, fairly early on in the process at the idea stage, the commercialization entity may be identified and in fact involved.

## Key Players

Individuals  
Industry  
Government  
Post-Sec. Instit.

Tech. Transfer  
Experts/Offices

Consulting Companies  
Patent Agencies  
Brokerage Agencies  
Industrial Associations  
Research Institutes

Industry

## Innovation Process

Technology  
Invention  
Idea

Development  
through research

Technology  
Transfer

Transfer of  
technology from  
lab to industry

Commercialization

Using investment  
and marketing to  
bring know-how  
or tool to market

Distribution

A new product or  
process that meets the  
needs of the market

Innovation

## Indicators of Capacity

IP  
Patents  
Trademarks  
Copyrights  
Industrial Design  
Integrated Circuit  
Topography

Intellectual Property  
Inventory  
Invention Disclosures  
Spin Off Companies  
Licenses  
Material Transfers

**Innovation** boosts **productivity** and drives **economic growth**.

### **3.0 FEDERAL SUPPORTS**

The Government of Canada reports that it has traditionally spent much less on research and development in relation to the size of its economy than the United States or Japan. Instead of creating new products, Canada tends to import innovations from abroad. As a result, the country's high technology trade deficit grows every year, meaning the country imports much more technology than it exports.

Since the Government of Canada balanced its budget in 1997-1998, it has pursued a more focused effort to fund research and innovation. In fact, in 2002, the government launched its innovation strategy with the key goal of progressing Canada's innovation efforts. In 2007, the Government of Canada launched its science and technology strategy "Mobilizing Science and Technology to Canada's Advantage". This strategy acknowledges that innovation was essential to Canada's future competitiveness and productivity, and that increasing private sector research and development and its commercialization was the key to success. Through these strategies, the government strives to build on investments already made in research and innovation, making essential research and technological expertise available to firms of all sizes and facilitating access to venture capital financing.

The Government of Canada supports research and innovation through:

- Federal research laboratories in every province.
- Federal government assistance programs.
- Direct granting programs.
- National Research Council, which carries out a broad range of scientific activities.
- Innovation intelligence that is easily accessible and covers a diverse range of topics.

#### **FEDERAL RESEARCH FACILITIES**

The following federal government research facilities operate across Canada:

- Agriculture and Agri-Food Canada
  - Atlantic Cool Climate Crop Research Centre (St. John's)
  - Atlantic Food and Horticulture Research Centre (Kentville)
  - Brandon Research Centre
  - Cereal Research Centre (Winnipeg)
  - Crops and Livestock Research Centre
  - Dairy and Swine Research and Development Centre (Lennoxville)
  - Eastern Cereal and Oilseed Research Centre (Ottawa)
  - Food Research and Development Centre (Saint-Hyacinthe)
  - Greenhouse and Processing Crops Research Centre (Harrow)
  - Horticulture Research and Development Centre (Saint-Jean-sur-Richelieu)
  - Lacombe Research Centre
  - Lethbridge Research Centre
  - Pacific Agri-Food Research Centre (Summerland)
  - Pest Management Research Centre (London)
  - Potato Research Centre
  - Saskatoon Research Centre
  - Semiarid Prairie Agricultural Research Centre (Swift Current)
  - Soils and Crops Research and Development Centre (Sainte-Foy)

- Canadian Space Agency
- Environment Canada
  - Air Quality Research Branch,
  - Climate and Atmospheric Research Directorate,
  - Atmospheric Environment Service, Environment Canada
  - Canadian Meteorological Centre Centre Saint-Laurent
  - Emergencies Engineering Division - Environmental Technology Centre
  - Emergencies Science Division - Environmental Technology Centre
  - Emissions Research and Measurement Division - Environmental Technology Centre
  - Environmental Adaptation Research Group (EARG)
  - Environmental Technology Centre
  - Green Lane - Prairie and Northern Region
  - Laboratory Alert Baseline Observatory - Atmospheric Environment Service
  - Microwave-assisted Processes Division - Environmental Technology Centre
  - National Water Research Institute
  - Special Programs Division - Environmental Technology Centre
  - Wastewater Technology Centre
- Fisheries and Oceans
  - Bayfield Institute
  - Canadian Hydrographic Service
  - Maurice-Lamontagne Institute
  - Pacific Biological Station
  - St. Andrews Biological Station
- Health Canada
  - Environmental Health Program
  - Food Program
  - Health Protection Branch - Ontario Region
  - Laboratory Centre For Disease Control
  - National Laboratory for Analytical Cytology
  - National Laboratory for Bacteriology
  - National Laboratory for HIV Genetics
  - National Laboratory for HIV Pathogenesis
  - National Laboratory for HIV Reference Services
  - National Laboratory for Sexually Transmitted Diseases
  - National Laboratory for Special Pathogens
  - National Laboratory for Viral Oncology
  - National Microbiology Laboratory
- Industry Canada
  - Communications Research Centre
- National Defence
  - Communications Security Establishment
  - Defence R&D Canada
  - Defence R&D Canada - Atlantic
  - Defence R&D Canada - Ottawa
  - Defence R&D Canada - Suffield
  - Defence R&D Canada - Toronto
  - Defence R&D Canada - Valcartier
  - Quality Engineering Test Establishment

- National Research Council
  - Canadian Astronomy Data Centre (CADC)
  - Canadian Infrastructure Technology Assessment Centre (CITAC)
  - Integrated Manufacturing Technologies Institute (NRC)
  - NRC's Herzberg Institute of Astrophysics
  - NRC's Steacie Institute for Molecular Sciences
  - NRC Biotechnology Research Institute
  - NRC Canadian Hydraulics Centre
  - NRC Canadian Police Research Centre
  - NRC Centre for Surface Transportation Technology
  - NRC Industrial Materials Institute
  - NRC Institute for Aerospace Research
  - NRC Institute for Biodiagnostics
  - NRC Institute for Biological Sciences
  - NRC Institute for Chemical Process and Environmental Technology
  - NRC Institute for Information Technology
  - NRC Institute for Marine Biosciences
  - NRC Institute for Marine Dynamics
  - NRC Institute for Microstructural Sciences
  - NRC Institute for National Measurement Standards
  - NRC Institute for Research in Construction
  - NRC Plant Biotechnology Institute
  
- Natural Resources Canada
  - Canada Centre For Remote Sensing
  - Canadian Explosives Research Laboratory
  - Canadian Forest Service Atlantic Forestry Centre
  - Canadian Forest Service Laurentian Forestry Centre (LFC)
  - Canadian Forest Service Northern Forestry Centre
  - Canadian Forest Service Pacific Forestry Centre
  - CANMET Energy Diversification Research Laboratory
  - CANMET Energy Technology Centre (CETC)
  - CANMET Mining and Mineral Sciences Laboratories
  - CANMET Western Research Centre
  - Explosives Regulatory Division / Division de la réglementation des explosifs
  - Geodetic Survey Division
  - Geological Survey of Canada (Quebec)
  - Geological Survey of Canada Atlantic
  - Geological Survey of Canada GSC: Pacific - Sidney Subdivision (Pacific Geoscience Centre)
  - Geological Survey Of Canada (Calgary)
  - Geological Survey Of Canada Headquarters
  - Geological Survey Of Canada Pacific
  - Materials Technology Laboratory (CANMET Minerals and Metals)
  
- Transport Canada
  - Transportation Development Centre (TDC)

## **FEDERAL GOVERNMENT ASSISTANCE PROGRAMS**

The federal government has a variety of assistance programs. The following are some of the programs available:

- **Business Development Bank of Canada (BDC)** can help finance innovation needs and provide advice on how to build the team, test prototypes, develop new processes and increase profitability.
- **Canada Foundation for Innovation (CFI)** is an independent corporation created by the Government of Canada to fund research infrastructure. The CFI's mandate is to strengthen the capacity of Canadian universities, colleges, research hospitals, and non-profit research institutions to carry out world-class research and technology development that benefits Canadians.
- **Canada Revenue Agency - Scientific Research and Experimental Development Program (SR&ED)** is a federal tax incentive program, administered by the Canada Revenue Agency (CRA), that encourages Canadian businesses of all sizes, and in all sectors to conduct research and development (R&D) in Canada. It is the largest single source of federal government support for industrial R&D.
- **Canadian Dairy Commission (CDC)** is committed to promoting growth and innovation in the manufacture and use of dairy products and components. Its Dairy Marketing Program provides support to both dairy product manufacturers and food processors, facilitating access to the technical support and expertise required to develop new and innovative dairy and finished food products to bring them to market. The Canadian Dairy Commission partners with food science centres, universities, and industry associations.
- **Networks of Centres of Health Excellence** mobilize research and commercialization by bringing together partners from the academic, industry, public and non-profit sectors. There are four programs (Networks of Centres of Excellence, Centres of Excellence for Commercialization and Research, Business-Led Networks of Centres of Excellence, and Industrial Research and Development Internship program) that conduct leading edge research and knowledge transfer activities. These are a joint program of the Natural Sciences and Engineering Research Council of Canada, the Social Sciences and Humanities Research Council of Canada, the Canadian Institutes of Health Research and Industry Canada.
- **Industrial Technologies Office (ITO)** is an agency of Industry Canada and provides financial support for leading edge research and development by Canadian industries.
- **DND/NSERC Research Partnership Program** is a partnership of the Department of National Defence (DND) and the Natural Sciences and Engineering Research Council (NSERC) in order to collaborate fully in the development of an innovative, knowledge-based economy. The program provides funding for university-based research, research training and research-related activities carried out in collaboration with DND and Canadian-based companies.
- **Canadian Institutes of Health Research (CIHR)** is the major federal agency responsible for funding health research in Canada.
- **Canadian Network for the Advancement of Research, Industry and Education (CANARIE)** supports a variety of initiatives to develop innovative applications and technologies to advanced broadband networks.
- **Canadian Technology Network** is a network of over 300 experts in technology and business that advise innovative small and medium sized enterprises and provide them access to specialized resources.
- **Science and Technology Internship Program with SMEs** provides financial assistance to innovative small and medium-sized enterprises (SMEs) in Canada to hire post-secondary



science, engineering, technology, business and liberal arts graduates. Graduates work on innovative projects within the SME and may participate in research, development and commercialization of technologies.

- **Industrial Research Assistance Program (IRAP)** provides a range of both technical and business oriented advisory services along with potential financial support to growth-oriented Canadian small - and medium-sized enterprises. NRC-IRAP supports innovative research and development and assists clients to become commercialization-ready with their new products and services.
- **GlobeSAR2** is a geomatics technology transfer program focused on the use of RADARSAT for improved resource management in Latin America. The GlobeSAR-2 Program provides exposure to Canadian geomatics companies through technology transfer and identification of commercial opportunities.
- **Western Economic Diversification Canada (WD)** invests in technology clusters in the key sectors of life sciences (biotechnology, genomics, proteomics, health technologies), information and communication technology (new media, wireless technology, telehealth, geomatics) and other technologies such as synchrotron, environmental technologies, composite materials and micro/nanotechnology. WD also makes direct investments by funding technology commercialization offices at universities and other research institutions and funding internships to create highly qualified personnel with expertise in technology and commercialization. Through its offices, WD invests to help the region compete in the knowledge-based economy, creating a more diversified economic base and new skilled employment for western Canadians by focusing on Technology adoption and commercialization, research and development, technology skills development and knowledge infrastructure.

These are the more recent federal government funding programs. In addition, there are a variety of major funding programs in social sciences and humanities, natural sciences and engineering and medical and health.

## MAJOR FUNDING PROGRAMS

Federal government funding programs exist in a variety of areas:

- **Social Sciences & Humanities**
  - **Social Sciences and Humanities Research Council (SSHRC)** - SSHRC funded research encourages innovation in areas such as the economy, education, health care, environment, immigration, globalization, language, ethics, peace, security, human rights, law, poverty, mass communication, politics, literature, addiction, pop culture, sexuality, religion, Aboriginal rights, the past and the future.
- **Natural Sciences & Engineering**
  - **Natural Sciences and Engineering Research Council (NSERC)** - NSERC makes strategic investments in Canada's capabilities in science and technology. It supports university students and postdoctoral fellows in advanced studies, funds university professors and encourages Canadian companies to invest in university research and training.
  - **National Research Council (NRC)** - NRC is composed of a variety of institutes and programs organized into the areas of life sciences, physical sciences, engineering, technology and industry support and corporate services.

- **Medical & Health**
  - **Canadian Institutes of Health Research (CIHR)** - The Canadian Institutes of Health Research (CIHR) is the major federal agency responsible for funding health research in Canada. It strives to be at the forefront of the creation of new health knowledge, and to translate that knowledge from the research setting into real world applications.
  - **Health Canada** funds programs for science and research activities such as the Health Policy Research Program, the Natural Health Products Research Program and the past Toxic Substances Research Initiative.
  - **Genome Canada** is the primary funding and information resource for genomics and proteomics in Canada. Genome Canada has established five Genome Centres across the country (Atlantic, Quebec, Ontario, Prairies and British Columbia) and invests and manages large-scale research projects in key selected areas such as agriculture, environment, fisheries, forestry, health and new technology development, as well as research projects aimed at studying and analyzing the ethical, environmental, economic, legal and social.
  - **The Canadian Health Services Research Foundation (CHSRF)** promotes and funds management and policy research in health services and nursing to increase the quality, relevance and usefulness of this research for health-system policy makers and managers. In addition, the foundation works with these health-system decision makers to support and enhance their use of research evidence when addressing health management and policy challenges.

## NATIONAL RESEARCH COUNCIL

The National Research Council (NRC) is the Government of Canada's premier organization for research and development, active since 1916. It is governed by a council of 22 appointees.

NRC is responsible for:

- undertaking, assisting or promoting scientific and industrial research in different fields of importance to Canada;
- establishing, operating and maintaining a national science library;
- publishing and selling or otherwise distributing such scientific and technical information as the Council deems necessary;
- investigating standards and methods of measurement;
- working on the standardization and certification of scientific and technical apparatus and instruments and materials used or usable by Canadian industry;
- operating and administering any astronomical observatories established or maintained by the Government of Canada;
- administering NRC's research and development activities, including grants and contributions used to support a number of international activities; and
- providing vital scientific and technological services to the research and industrial communities. This mandate is discharged to a great extent through the operation of the NRC Industrial Research Assistance Program, the NRC Canada Institute for Scientific and Technical Information and the Canadian Technology Network.

The NRC is composed of over 20 institutes and national programs located in every province in Canada and playing a major role in community based innovation. The NRC institutes and programs are organized into the areas of:

- Life sciences
- Physical sciences
- Engineering
- Technology and industry support
- Corporate services

The specific areas of research and industry support are:

- **Aerospace** 1 research institute, one technology centre
- **Biotechnology** 6 research institutes
- **Engineering and Construction** 3 research institutes, 3 technology centres
- **Fundamental Sciences** 3 research institutes
- **Industry Support** 1 institute, one national program
- **Information and Communications Technologies** 2 research institutes
- **Manufacturing** 3 research institutes, one technology centre

Over the years, a number of specialized agencies and services have grown out of NRC. These include:

- Atomic Energy Canada Ltd.
- Canadian Space Agency.
- Communications Security Establishment
- Defence Research Board
- Medical Research Council (now known as Canadian Institutes of Health Research)
- Natural Sciences and Engineering Research Council

## INNOVATION INTELLIGENCE

The “Innovation in Canada” portal ([www.innovation.gc.ca](http://www.innovation.gc.ca)) provides information on:

- Business intelligence, including lists of guides and experts as well as information on patents and trademark databases.
- Commercialization and specifically on how the federal government is planning to develop marketable products or services and how these will be available for sale to commercial markets. In addition, the Minister of Industry has created a panel of experts to advise the Government on commercialization of new technologies and products.
- Financing innovation.
- Human resource solutions for the innovative environment.
- Protecting intellectual property, including lists of intellectual property brokers and searchable patents and copyrights databases in Canada, United States and the world.
- International programs for Canadian innovators as well as a searchable database of international research centres for potential partnerships.
- Techniques for managing a comprehensive technology and innovation plan.
- Expertise and technologies available for transfer in Canada whether for licensing, joint development or sale.
- Product development and marketing.
- Setting up a research contract or alliance as well as links to Canadian researchers at universities, private companies and public sector labs.
- Transferring technologies to upgrade production or processes.

## 4.0 PROVINCIAL SUPPORTS

### SUSTAINING THE ALBERTA ADVANTAGE

In 1997, Alberta Science and Research Authority's strategy discussion paper "Sustaining the Alberta Advantage" was released. This discussion paper revealed some startling statistics:

- Science and research investment per capita from all sources in Alberta is the second lowest of major Canadian provinces and is growing at the slowest rate.
- The proportion of post-secondary graduates, knowledge workers, scientists and engineers in the work forces is growing more slowly in Alberta than in British Columbia, Ontario and Canada as a whole.
- Venture capital investment in Alberta's high-knowledge sector represents only 3% of total Canadian investment.
- Alberta's low personal taxes and absence of retail sales taxes and capital taxes are not sufficient to overcome the tax and fiscal environment for research and development offered in most other provinces.
- The level of science and research investment from all sources in Alberta is about \$850 million per year, which represents about 1% of the Alberta economy. In order to sustain the advantage, that investment needs to increase significantly by 2010.

Over ten years later, the concern over research, technology and innovation continues in the province. In 2007, the Minister of Advanced Education and Technology developed a Task Force to provide strategic advice to the Government of Alberta on Value-Added and Technology Commercialization. Specifically, by the summer of 2007, the task force consisting of six members plus a chair was to explore opportunities to:

- Encourage value-added growth and productivity in sectors;
- Encourage investment and research in knowledge-based industries;
- Encourage the growth of venture capital in Alberta;
- Support the development of Centres for Excellence in commercialization; and
- Develop new markets for value-added products.

The task force recognized that in 2006, total venture capital investment in Alberta (for non oil and gas companies) was less than \$40 million - less than 2% of the venture capital invested in Canada. In fact, Alberta rarely attracts more than 3.5% of the venture capital investment made in Canada, far below its proportional economic output or population base.<sup>1</sup>

After reviewing and evaluating more than 40 written submissions from industry, academia and other interest groups and consulting with various government departments, the task force presented seven recommendations. These recommendations were reviewed during the development of the 2008 budget, and the result was an action plan.

### BRINGING TECHNOLOGY TO MARKET

One of the Minister of Advanced Education and Technology's key priorities is "to enhance value-added activity, increase innovation, and build a skilled workforce to improve the long-run sustainability of Alberta's economy." As part of this focus, initiatives to encourage technology commercialization and increasing the Canadian venture capital invested in Alberta will be encouraged in order to create the province's *Next Generation Economy*.

Based on the recommendations of the Task Force on Value-Added and Technology Commercialization, the provincial government developed a three-year plan, *Alberta's Action Plan* -

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<sup>1</sup> "Task Force on Value-added and Technology Commercialization" report. May 31, 2007

*Bringing Technology to Market*, to assist Alberta entrepreneurs to progress from research to innovation. The plan aims to create sustainable knowledge-based jobs and opportunities for Albertans and consists of nine action items:

1. Enhancing an already strong tax environment by implementing a **science and research experimental development (SR&ED) tax credit** to boost investment in R&D in Alberta. The credit will be worth 10 per cent of a company's eligible expenditures up to \$4 million, for a maximum credit of \$400,000.
2. Establish a **\$100 million Alberta Enterprise Corporation** to attract and strengthen venture capital investments in Alberta. The corporation's expert board will invest as a limited partner in a range of venture funds, which will in turn invest in promising companies, generate multiple sources of funds and attract more venture capital to Alberta to invest in early-stage technology companies.
3. Strengthen access to regional business development services. These **Business Development Centres** will provide tangible business advice to those who need it or re-direct inquiries to those who can, supporting innovative entrepreneurs and assisting regions to diversify economies and adapt to knowledge-based and value-added sectors.
4. Introduce new **technology development advisors** who have knowledge of relevant technology and familiarity with current product development issues. The province-wide network of technology development advisors will assist with technology, business, finances, human resources and product improvement in order to broker relationships and cooperation between companies and innovation agencies.
5. Offer **innovation vouchers** which will be redeemable for services companies needs such as access to labs, design and fabrication centres, marketing management and intellectual property services. Innovation vouchers are meant to assist in getting more new technology companies to the demonstration or initial funding stage.
6. Encourage **market-focused product commercialization centres** with direct links to services provided by business development centres and technology development advisors. These centres will assist start-up companies in the area of market analysis assistance, technical equipment, access to labs or test facilities, engineering and design expertise, technical and market validation or accreditation services, prototyping support, product positioning, production planning, and perhaps a chance to demonstrate a new product in an actual customer setting.
7. Create a **demonstration fund for testing new products**, matching innovators with end users. Here, companies work with strategic client partners to identify a suitable plan for the project, the technology used, critical challenges, costs, other contributions, market-oriented outcomes and timelines.
8. **Expand IVAC Capacity Builder Program offered by AVAC Ltd.** IVAC is a new investment initiative from AVAC which provides investment and other assistance to Alberta businesses in the ICT, life sciences and other industrial technology sectors to help them get to the best possible start in their fields. The Capacity Builder Program is directed at pre-commercial seed and pre-seed stage technology companies who need assistance in getting to the investor-ready stage in order to attract third party risk capital.
9. **Launch Youth Technopreneurship Program**, a broad provincial initiative to unite the efforts of industry, educational institutions, service agencies, government and other organizations to support and encourage young entrepreneurs. The program will enable colleges, technical institutes and local communities to provide a period of incubation support to new technology-oriented business ventures.

## **ALBERTA'S RESEARCH PRIORITIES**

The Province has a solid base of research activity, value-added and technology companies and agencies and programs already supporting technology commercialization and the discovery and development of innovative value-added products. It is anticipated that this base will be strengthened by the nine action items discussed above.

The Government of Alberta continues to develop a more diverse, knowledge-based economy and makes strategic investments in key priorities areas of:

- **Energy** - The Government is committed to energy research given that Alberta's conventional oil and gas supplies are declining. Therefore, there is an emphasis on research that recovers the significant amount of conventional oil left behind as well as less energy intensive methods to extract heavy oil and bitumen. Research also focuses on the reduction of the impact of greenhouse gases and other emissions. In August 2006, the government announced dedicated funding of \$200 million over three years towards research, advanced technologies, market development and innovative projects focusing on energy supply and protection of the environment.
- **Information and Communications Technology (ICT)** - Alberta Advanced Education and Technology is committed to fostering education, infrastructure, research and education in ICT.
- **Life Sciences** - Life sciences sector offers opportunities to transform Alberta's traditional economies whereby science, technology, products and processes related to living things, especially in the area of health, food, agriculture, forestry and environment can lead to new developments. The growing knowledge of life sciences in the context of other sectors such as energy, information and communication technology and nanotechnology is leading to innovation and improvement such as nano-bio therapeutics and medical devices.
- **Nanotechnology** - Nanotechnology bridges the full spectrum of science, cuts across various industries and is expected to lead to the creation of entirely new industries. The government is committed to applying provincial funding to strategic initiatives enhancing opportunities for sustained private-sector investment and encouraging nano businesses to establish in Alberta.

## RESEARCH INSTITUTES

The province has five research institutes which serve as a resource to government and industry in the priority areas:

- **Alberta Life Sciences Institute (ALSI)** works collaboratively with industry, research institutions, and government to maximize innovation opportunities in the life sciences areas, including health, agriculture, forestry, and energy. Key opportunities are in the areas of bio products innovation, health innovation, resource management innovation and platform technologies.
- **Alberta Information and Communications Technology Institute (AICTI)** supports the development and growth of the Information Communications Technology (ICT) sector in Alberta by providing strategic advice and policy guidance to government on public funding and investments in ICT related research and innovation.
- **Alberta Energy Research Institute (AERI)** promotes energy research, technology evaluation and technology transfer in areas including oil and gas, heavy oil and oil sands, coal, electricity, and renewable and alternative energy. AERI also promotes consortia and builds networks by integrating the knowledge, skills and investment potential of industry players, federal and provincial governments, research providers and universities.
- **Alberta Agriculture Research Institute (AARI)** enhances the economic contributions of the Alberta agricultural and food industry through support for research, development and technology transfer, with a strategic emphasis on life sciences. AARI has three newly created networks: Bio Products, Sustainable Production (Crops and Livestock), and Agri-Health and Value-Added.



- **Alberta Forestry Research Institute (AFRI)** enhances the contribution of science and research to the economic, environmental and community sustainability of Alberta and promotes the global competitiveness of its forestry sector.

## SOURCES OF FUNDING AND SUPPORT

In addition to funding that is available through the research institutes, related programs and agencies are another source of funding:

- **Alberta Science and Research Investments Program (ASRIP)** - ASRIP is administered by Advanced Education and Technology and is a large competitive funding program that supports selected science and research initiatives that meet the province's needs and objectives of assisting quality and excellence in research, building Alberta's capacity for innovation, and promoting initiatives of strategic benefit to Alberta. ASRIP funds research through two distinct funding streams: Research Infrastructure and Enabling Research Application and Technology Transfer.
- **Small Equipment Grants Program (SEGP)** - SEGP is administered by Advanced Education and Technology and is a competitive funding program that supports selected science and research initiatives of strategic importance to Alberta.

*Both ASRIP and SEGP are competitive cost-shared programs that operate in coordination with the Canada Foundation for Innovation (CFI).*

- **Alberta Science and Research Authority (ASRA)** - ASRA represents Alberta's academic, business and research communities, advises government, and promotes science and research in the areas of energy, ICT, and life sciences.
- **Alberta Heritage Foundation for Medical Research (AHFMR)** - AHFMR supports researchers who generate knowledge whose application improves health and quality of life in Alberta and around the world. It is a \$1.4 billion endowment fund established for medical research and supports biomedical and health research in the province.
- **Alberta Ingenuity Fund** is an endowment established by the Government of Alberta to build science and engineering research expertise. The Alberta Ingenuity Fund has New Faculty Awards, Scholar Awards, Student Scholarships, Industry Associates Program enabling Alberta companies to recruit Master's and Doctoral graduates, MITACS Internship Program and Centre Program Awards whereby major grants are offered to outstanding research groups at universities and colleges.
- **Alberta Research Council Inc.** specializes in converting early stage ideas to marketable products and services and delivers innovative science and technology solutions, meeting the priorities of industry and government. The ARC directs government investment to applied research and development focusing on energy, life sciences, engineered products and services and integrated resource management.
- **Informatics Circle of Research Excellence (ICORE) Inc.** is part of the government's strategy to attract world class information and communications technology (ICT) researchers to the province. It includes researchers in the field of informatics in the areas of computer science, electrical and computer engineering, physics, mathematics and other related disciplines. Grant programs are available for visiting professors, recruitment of researchers, industrial chair establishment, chair establishment, and graduate student scholarships.

These players work in a coordinated effort to advance Alberta technology into the global economy.

## PROVINCIAL GOVERNMENT RESEARCH FACILITIES

There are a number of specialized provincial government research facilities. Some have been discussed earlier and most are related to the Alberta Research Council, Canada's largest provincial research organization, working with customers and partners to bring technologies into commercial use.

- Advanced Industrial Materials and Processes - Manufacturing Technologies - Alberta Research Council
- Alberta Environmental Centre
- Alberta Research Council
- Alberta Research Council's Biotech facilities (the largest publicly owned biotechnology fermentation and processing facility in Canada, utilized by organizations ranging from small businesses to larger multinational corporations and governments)
- Analytical Chemistry - Alberta Research Council
- Heavy Oil & Oil Sands Group - Alberta Research Council
- TRLabs (Telecommunications Research Laboratories), Alberta

## KEY PLAYERS IN THE PROVINCE

Various key players are integral in order to foster an environment conducive for innovation. The following lists organizations, association, agencies and networks in the province that are key players.

### Industry Organizations and Associations

- Alberta Chambers of Commerce
- Alberta Council of Technologies
- Alberta Food Processors Association
- Alberta Forest Products Association
- Alberta Geomatics Group
- Alberta ICT Council
- Association of Professional Engineers, Geologists, and Geophysicists of Alberta
- Association of Science and Engineering Technology Professionals of Alberta
- BioAberta
- BioProducts Alberta
- Canada Business (Government of Canada)
- Canadian Manufacturers and Exporters
- Consulting Engineers of Alberta
- Environmental Services Association of Alberta
- InfoTech Alberta
- Metro Edmonton Health Industries Association (MEHIA)
- Petroleum Technology Alliance of Canada
- Resource Industry Suppliers Association (RISA)
- WiTec Alberta

### Agencies (Service Providers)

- CETAC-West
- WestLink Innovation Network (Calgary)



- SAIP (Southern Alberta Intellectual Property) Network (partnership of UTI/University of Calgary, Red Deer College, and SAIT Polytechnic)

### **Technology Service Centres**

- Advanced Technology Centre (Edmonton)
- Agrivalue Processing Business Incubator
- Alberta Centre for Advanced MNT (Microsystems and Nanotechnology) Products (ACAMP)
- Alberta Research Council
- Business Link
- Calgary Technologies Inc (CTI)
- Canadian Environmental Technology Advancement Corp. West (CETAC-West)
- Centre for Innovation in Manufacturing, Red Deer College
- Centre for Research and Innovation, Grande Prairie
- Cybera
- Digital Alberta
- Leduc Food Processing Centre
- NAIT Prototype Development Program
- NAIT Shell Manufacturing Centre
- NanoMems Edmonton
- Networks of Centres of Excellence
- NEWT (Network for Emerging Wireless Technologies Inc.)
- NINT Innovation Centre (NIC)
- Northern Alberta Business Incubator
- Precarn Alberta
- SAIT Applied Research and Innovation Services
- TEC Edmonton (Technology, Entrepreneur and Company Development; a partnership of the University of Alberta and Edmonton Economic Development)
- TRLabs
- University Technologies International Inc. (UTI) - University of Calgary's technology commercialization services

### **Investor and Investor Networks**

- Alberta Venture Channel
- ATB Financial - Alberta
- AVAC
- AVNet
- Bank of Montreal
- Bridgewater Bank
- Canadian Western Bank
- CIBC
- Citibank Canada
- Citizens Bank of Canada
- Deal Generator
- Dundee Bank of Canada
- iNOVIA Capital, Edmonton
- Royal Bank of Canada
- Scotiabank
- Toronto-Dominion Bank
- Venture Alberta
- Venture Capital Association of Alberta

- Venture prize

### Special Funders

- Business Development Bank of Canada (BDC)
- Community Futures
- Export Development Corp (EDC)
- National Research Council - IRAP
- Natural Sciences and Engineering Research Council of Canada (NSERC)
- Sustainable Development Technology Canada (SDTC)
- Western Economic Diversification Canada

### OTHER RESOURCES IN THE PROVINCE

In addition to the provincial key players and research institutes discussed above, other research and technology sources in the province include:

- **Calgary Innovation Centre (CIC)** helps innovators, businesses and entrepreneurs develop their ideas and bring them to market. The Calgary Innovation Centre builds links and relationships among people who contribute to the innovation commercialization process. The Centre is especially geared to small and medium sized businesses in the technology sector and designed to help entrepreneurs move through the typical stages of business growth.
- **Centre for Innovation Studies (CIS)** is a not-for-profit company founded in Calgary in 2001 and has been established to be a centre of excellence on technological innovation. The Centre aims to expand knowledge of innovation dynamics (i.e. how ideas are transformed into commercial value), shares that knowledge with others - particularly companies - who can benefit from it, and focuses on strengthening innovation in Alberta and Canada to overcome the innovation gap.
- **Telecommunications Research Laboratories (TRLabs) - Edmonton and Calgary.** TRLabs is Canada's largest research consortium (industry, university, government) in information and communications technology. TRLabs operates five laboratories in Western Canada where university professors, graduate students, industrial partners and staff researchers work together to conduct applied research.
  - TRLabs was founded in Edmonton in 1986 by Nortel, the University of Alberta and the Government of Alberta. The Edmonton laboratory serves as the organization's corporate headquarters and conducts research in Photonics, Network Systems, and Wireless. It is located on the University of Alberta campus.
  - The Calgary laboratory was opened in 1991 and serves as the centre for TRLabs' Wireless research program. It is affiliated with the University of Calgary and is co-located with NEWT in the wireless industry cluster in NE Calgary.
- **Industrial Research Assistance Program - Alberta and Northwest Territories** NRC's Industrial Research Assistance Program helps small and medium-sized Canadian firms build their capability in technology and innovation. Industrial Technology Advisors (ITAs) offer direct technical assistance, access to the latest technological advances, expertise, facilities, and resources, as well as cost-shared financing of innovative technical projects.

## **5.0 INNOVATION PERFORMANCE - SOUTHGROW REGION**

The SouthGrow region consists of twenty seven member municipalities, covering the south central portion of Alberta. SouthGrow is known for the traditional industries of Agriculture, Industrial Machinery & Equipment, Metal Fabrication, Tourism, and Manufacturing. More recently, SouthGrow has been developing a cluster in emerging areas such as Alternative Energy. Through the various opportunity identification studies that have been conducted, it is clear that there are examples of innovation in all industries in the SouthGrow Region. In fact, after reviewing the main critical success factors (expertise, funding and support) for innovation, the SouthGrow region seems to have the “ingredients” which foster innovation.

### **Location**

The SouthGrow region is 18,604 square kilometers and accounts for 2.9% of the provincial total land area. SouthGrow includes Lethbridge, which is a regional hub and a key centre on the north/south corridor. The region has air, rail and highway service, including major highways 3, 4 and 5 as well as the Alberta portion of the CANAMEX corridor, which is scheduled for completion in 2011. The region encompasses several ports of entry, including the Sweetgrass/Coutts, which is Alberta’s only 24-hour port of entry. The cities of Calgary and Edmonton are about 235 km and 514 km respectively from the centre of the SouthGrow region.

### **Demographics**

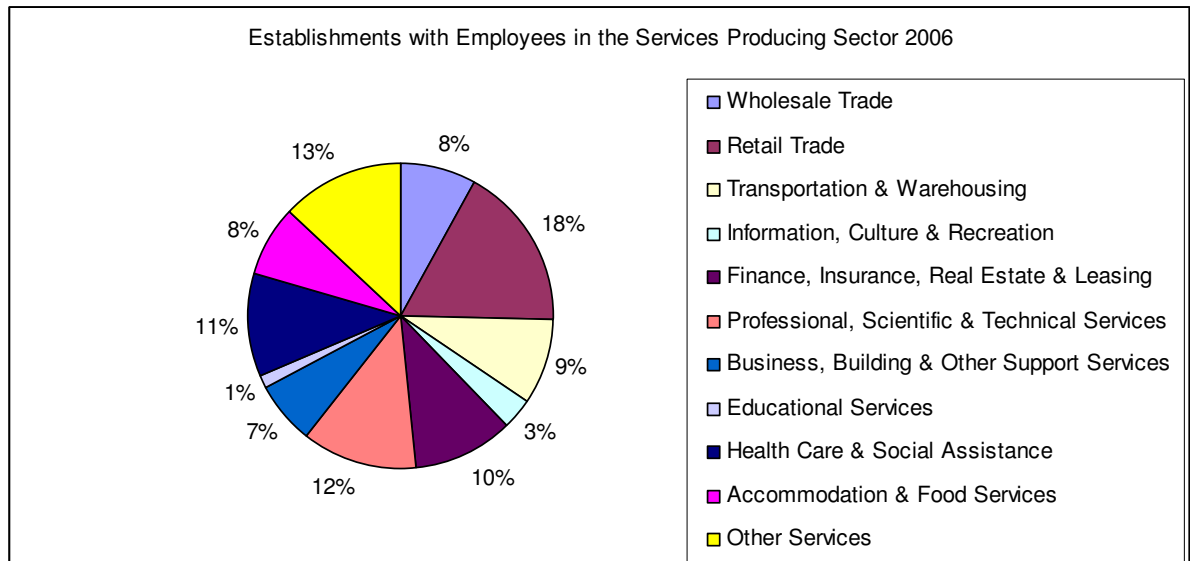
SouthGrow’s population in 2006 was 131,008 and accounted for an increase of 6.8% between 2001 and 2006, according to Statistics Canada. This region’s population accounts for 4.0% of the province’s population. Some of the growth can be attributed to immigration, with Lethbridge placing fifth in the province’s top ten destinations (2006) within Alberta for immigrants (permanent residents only).

About two-thirds of SouthGrow’s population (2006) is between the ages of 15 and 64, with a relatively even distribution between males (66.5%) and females (65.3%). While the average individual income for all tax filers (2005) in the region was \$23,945, 4.3% reported an individual gross income over \$80,000. The average “couple income” for all tax filers for the region was \$73,550, with 19.2% of all “couple” tax filers reporting a combined gross income of \$100,000 and over.

### **Economic Structure**

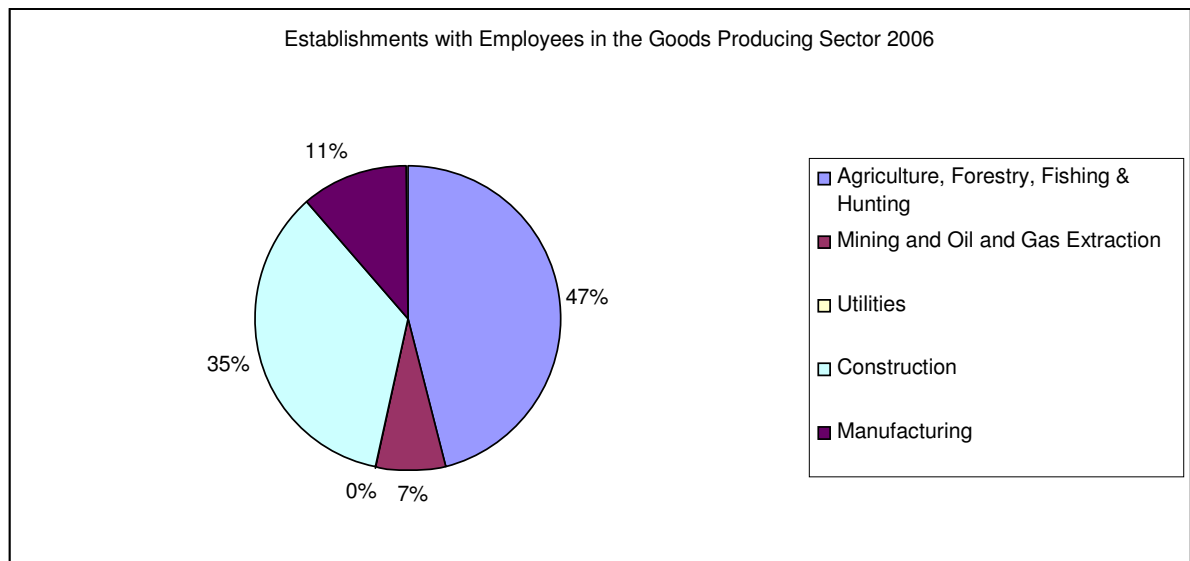
The region’s economy is diverse. In 2006, 68.8% of all business establishments with employees in the SouthGrow region were classified in the services-producing sector, which includes retail trade, accommodation and food services, and public administration. It should be noted that the “professional, scientific and technical services” sector accounted for the second largest concentration of establishments in the services-producing sector, at nearly 12%. The professional, scientific and technical services sector increased by 6.0% from 2005 and 2006 and accounted for an increase of 10.7% from 2001 to 2006, showing the greatest growth in the services-producing sector. It should be noted that 99 percent of the establishments in this category are small businesses (1 to 49 employees).

The region's largest employers are in the health care and educational services sectors: Chinook Health Region, University of Lethbridge, City of Lethbridge, Alberta Government Offices, and Lethbridge College.



Source: Alberta Finance and Enterprise - Regional Economic Indicators

In the goods-producing sector, agriculture, fishing & hunting and construction are the largest industries.



Source: Alberta Finance and Enterprise - Regional Economic Indicators

### Economic Performance

The SouthGrow region has been experiencing growth. In 2006, the total building permit value for the region increased by 25.5% (roughly 57.2 million) from 2005. The residential building permit value region increased by 34.1% (roughly \$37.0 million), with the number of single family housing starts in the increasing by 43.4% (288 units) during the same period. Commercial and institutional building has also been growing. As of June 30, 2007 there were 40 major projects in all industries for the region that were proposed, planned, under construction or completed with a total value of \$1 Billion.

With the increase in construction, the emphasis on trades training remained as a focus and experienced growth. From December 31, 2001 to December 31, 2006, the number of newly registered apprentices for the SouthGrow region increased by 102.9 percent (313 to 635) and accounted for 2.5% of all of the newly registered apprentices in Alberta. This represents an annualized percentage growth for the region from December 31, 2001 to December 31, 2006 of 15.2%, surpassing the provinces' annualized percentage growth (12.2).

## **Education Skills and Learning**

### ***Secondary Schools***

The SouthGrow region's basic education (Kindergarten to Grade 12) needs are met through the Horizon School Division #67, Kainai Board of Education, Lethbridge School District #51, Livingstone Range School Division, Palliser Regional School Division and the Westwind School Division #74. The Holy Spirit Roman Catholic Separate Regional Division No. 4 oversees the separate school system, while the Greater Southern Francophone Education Region No. 4's Ecole La Verendrye meets the Francophone needs.

### ***Post-Secondary Education***

Two major post-secondary educational institutions are in the SouthGrow region: The University of Lethbridge and Lethbridge College.

**The University of Lethbridge (U of L)** is grounded in liberal education and committed to community-minded research, the development of centres of excellence and including students in research endeavors. The U of L has more than 8,100 students from 85 countries and has more than 26,000 alumni worldwide. It offers more than 150 degree/program options through six Faculties and Schools - Arts & Science, Education, Fine Arts, Health Sciences, Management and Graduate Studies - and offers a Doctor of Philosophy (PhD) program in six areas of study. In 2008, the institution's total active external research funding totals \$20 million.

The U of L is among the top ten primarily undergraduate universities in Canada, ranking sixth overall according to Maclean's 2007. The U of L also recorded seven top-ten placements:

- 2 - Medical Science Grants
- 3 - Library Acquisitions
- 5 - Library Expenses
- 5 - Resources overall
- 6 - Overall Research dollars
- 7 - Student/Faculty ratio (18 to 1, average)

**Lethbridge College (LC)** was Canada's first public community college, providing high quality, innovative programs and services and enabling learners to achieve their educational and career goals. LC is grounded in workforce development. Through more than 70 diverse career development and training areas with one-year certificate, two-year diploma, apprenticeship, pre-employment and applied degree programs, it will serve a projected 3,650 full-time equivalent students in 2008-2009. The College's vision is to become one of Canada's finest comprehensive college, offering a range of excellent programming from apprenticeship to baccalaureate degrees. It is the lead institution North America for delivery of the international BZEE standard of Wind Turbine Technician training and is expanding programming in support of Southern Alberta's evolving renewable energy industry.

## Knowledge Performance

The SouthGrow region's assets include world-class post-secondary institutions, leading government research facilities, resourceful municipalities and diverse businesses, all of which are participating in innovation. This section explores that knowledge performance that is taking place at each of these levels.

### The University of Lethbridge

In 2008, the University of Lethbridge's total active external research funding totals \$20 million. There are 214 funded active researchers from 17 programs. There are also nine Canadian Research Chairs on campus.

The University of Lethbridge Office of Research Services is responsible for this funding and is a central support to the research community at the U of L. The Office provides:

- funding information
- advice on the preparation of grants and contracts
- support for internal research funding
- research accounting assistance
- research partnerships facilitation with industry and other stakeholders
- assistance in the protection of intellectual property
- negotiation and administration of licensing agreements
- communication and marketing of the intellectual property
- administrative support to committees that review and approve research involving animals, human subjects, biohazards and radioisotopes

Various committees ensure that research takes place and guidance is provided as required:

- Alberta Heritage Foundation for Medical Research (AHFMR) Awards Committee
- Animal Welfare Committee
- Canadian Institutes of Health Research (CIHR) Internal Peer Review Program Committee
- Human Subject Research Committee
- Natural Sciences and Engineering Council of Canada (NSERC) Scholarship Selection Committee
- Research Committee
- Travel Committee
- University SSHRC Committee

A variety of internal research grants are available for faculty and students to encourage and support research activity:

#### FACULTY:

- AHFMR Postdoctoral Fellow Recruitment Program
- AHFMR Visiting Lecturer grant Competition
- CFI Infrastructure Operating Fund (IOF)
- Community of Research Excellence Development Opportunities (CREDO) Program
- Demonstration and Prototype Development Funding Opportunity
- Intellectual Property Development Funding Opportunity
- Internal SSHRC Grant (ISG)
- The University of Lethbridge Travel Fund
- University of Lethbridge Research Fund
- University of Lethbridge Research Grant in Lieu of Salary

#### STUDENT:

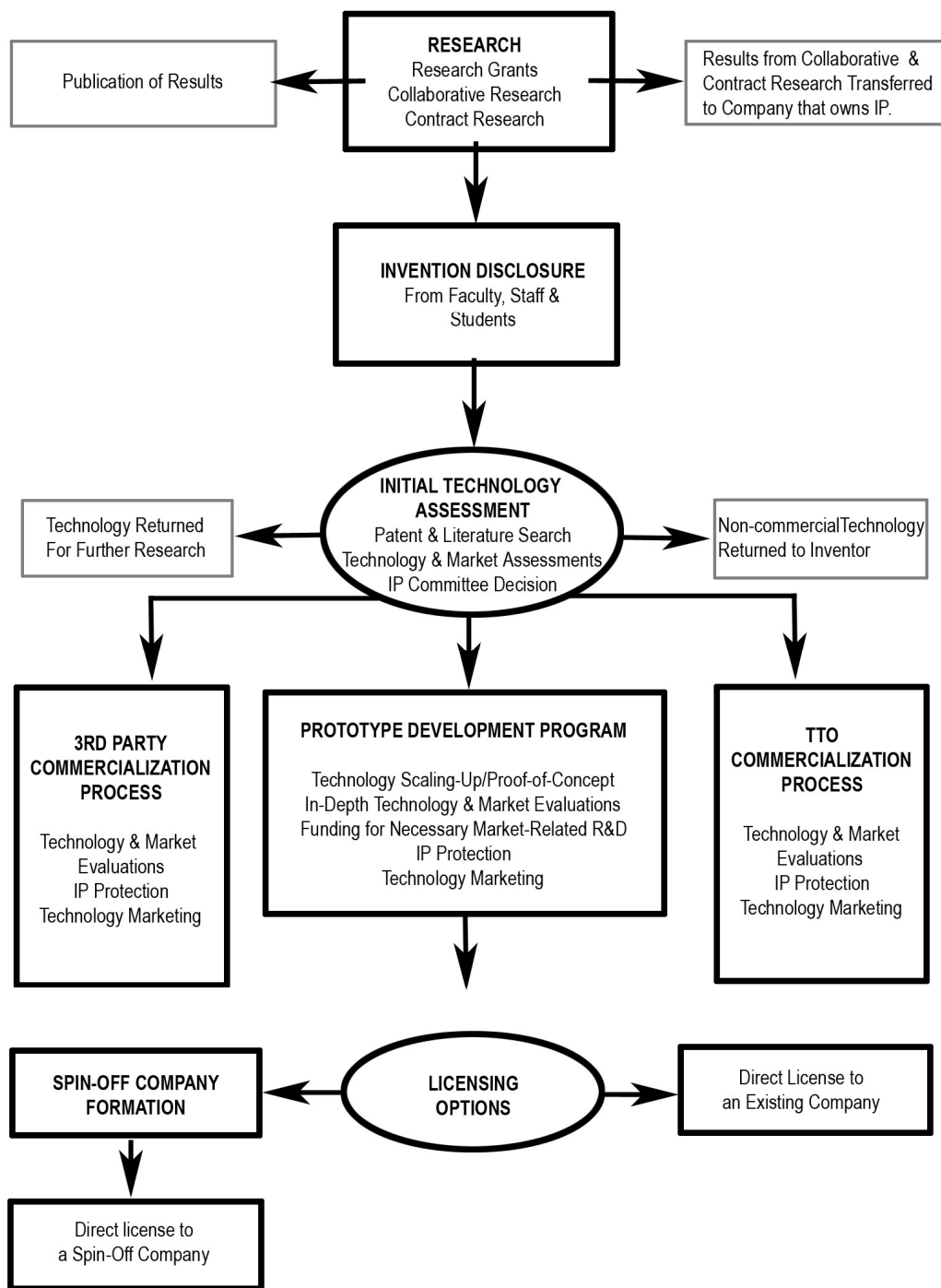
- AHFMR Summer Studentships

- Alexander Graham Bell Canada Graduate Scholarships and NSERC Postgraduate Scholarships
- CIHGR Canada Graduate Scholarships - Master's
- Graduate Student Travel Assistance Program
- NSERC Undergraduate Student Research Awards
- SSHRC Canada Graduate Scholarships - Master's
- SSHRC Doctoral Awards
- Undergraduate Research Enrichment

Within the Office of Research Services, the Technology Transfer Office was created in 2002. The Technology Transfer Office is responsible for the overall development, organization, management and commercialization of the University's intellectual property. The office handles the legal issues and aspects of the protection, development, and marketing and also acts as a liaison between administration, faculty, students, industry, investors, and government. Specifically, the Technology Transfer Office:

- Facilitates disclosure from university researchers.
- Identifies research with commercial potential.
- Assesses and evaluates technology, including feasibility studies, clinical trials, prior art and patent searches, and market research.
- Manages intellectual property, including the protection of intellectual property such as patents, trademarks, and copyrights, consulting, licenses and start-up companies.
- Manages intellectual property agreements, including memorandums of understanding, letters of intent, inter-institutional agreements, sponsored research agreements, miscellaneous intellectual property agreements, confidentiality agreements, and material transfer agreements.

The Technology Transfer Office has a typical process that it follows in assisting research progress to the transfer of technology. While steps may differ depending on the different types of intellectual property and whether a company is new or existing, the following is the typical process for commercialization:



It is important to note that intellectual property management within the University involves:

- Creators being obligated to disclose their intellectual property.
- The institution owning the intellectual property and taking responsibility for commercialization if the intellectual property is assigned to the University.
- Complete intellectual property management, including assessment, patenting, agreement management, and commercialization (licensing, start-up).



As of November 2008, the patents (or applications) that the University holds are:

- US application 20080052790
  - o Composition and method for enhancing plant transformation and homologous recombination.
- US patent 5,985,605
  - o DNA sequences encoding phytases of ruminal microorganisms.
- US patent 6,137,032
  - o Xylanase obtained from an anaerobic fungus.
- US patent 6,552,250
  - o Diacylglycerol O-Acyltransferase (DGAT)
- International WO 02/095029
  - o Nucleic Acid and Protein Sequences of Bovine Epidermal Growth Factor

Currently, the university research initiatives that are available for licensing are:

▪ **Communications and Information Sector:**

- o “Development of Novel Reconfigurable Computing Architecture”
  - Current encryption implementations present a great challenge when considering constraints such as memory, power, computation resources and mobility. Reconfigurable computing can serve as an excellent method to develop hybrid cryptosystems on restricted computing environments and wireless devices. Reconfigurable architecture increases the flexibility of system structure (hardware) and the efficiency of computation resources (software) thus reducing the total cost of hardware Intellectual Property (IP) protection. In this project, the researchers wish to use reconfigurable computing and architecture design to protect hardware IP against piracy.

▪ **Health and Life Sciences:**

- o “Bidirectional Power Generation Bicycle Prototype Development Opportunity”
  - Conventional bicycles have a sprocket wheel fixed on the axis of a crank-pedal system. The sprocket wheel always rotates together with the crank-pedal in the same direction (single directional power-generation). The novel feature of this technology is the modified structure of the sprocket wheel to generate forward-power for a bike no matter if the rider pedals forward or backward. The new design will have the following advantages: it will alternate working conditions postponing fatigue during long-time cycling; and it will increase bicycling efficiency and effectiveness; and it will offer better muscle lengthening conditions for higher power output.
    - o NOTE: The patent application has been filed and this is in the process of being commercialized.
- o “Assessment, Designing and Development of Vegetable Oils for Specific Application”
  - The University of Lethbridge in collaboration with AVAC is developing technology for fast assessing and developing vegetable oils with functional and nutraceutical properties to be used in specific food application and for human consumption. The partnership is offering compositional assessment and testing performance of oils under typical utilization conditions with state of the art equipment and expertise. This approach can lead to:
    - o Significant cost savings for processors and developers of oils for specific application.
    - o Make development of oil for specific application faster, simpler and with cost benefits.

- “Non-Chemical Control of a Large-Scale Agricultural Pest”
  - In Canada, the present grasshopper infestations are the most severe in years, and are poised for further expansion depending on climate change. Between 1985 and 1991, 7.7 million ha in Saskatchewan and Alberta were sprayed to control grasshoppers at a cost of \$326 million. Concerns about the environmental and human health aspects have led to increased interest in the development of microbial agents for grasshopper bio-control. *Metarhizium anisopliae*, a fungus that targets grasshoppers and locusts, have been commercialized for niocontrol in Africa and Australia. A Canadian isolate of this fungus has been discovered and has demonstrated highly effective control of grasshoppers under laboratory conditions. The researchers have been looking for commercial collaborators in the agricultural industry to further develop this technology with a view to commercialize the technology as well as produce a product that can be sold directly.
- “Increase Activity of Medicinal Plants”
  - The University of Lethbridge in collaboration with Agriculture and Agri- Food Canada is developing technology for producing plants with determinate growth habit. Many plant species that are used commercially as a spice or for nutraceutical purposes originated from tropical areas, have an indeterminate growth habit and so do not produce sufficient amounts of quality seed in western Canada where growing seasons are short. A determinate plant type will not only produce high quality seed consistently in this area but also will be easy to harvest thus reducing cost of production. The researchers have been looking for commercial collaborators in the nutraceutical or pharmaceutical industry to further develop this technology with a view to commercialize the technology as well as produce genotypes that can be sold directly.
    - NOTE: Patent applications have been filed pertaining to this research.
- **Physical Sciences:**
  - “Spectroscopic Studies and Instrumentation to Enable Accurate Measurements of Greenhouse Gases and Constituents of Planetary Atmospheres”
    - The University of Lethbridge is developing technology that allows innovative molecular studies of interest for remote sensing applications. The development of advanced infrared sounders has steadily increased the needs for an accurate “forward model” for the calculation of atmospheric radiative transfer. This results in enhanced accuracy requirements in the spectroscopy used to compute atmospheric transmittances with the higher spectral resolution of the new generation of instruments. The research contributes to the spectroscopic characterization of molecules found in the Earth and planetary atmospheres by high-resolution laboratory spectroscopic studies and will enable more accurate modeling of infrared radiative transfer in the terrestrial and planetary atmospheres. The research results can be useful in the analysis of high resolution atmospheric spectra such as those acquired by ground-based, balloon- and aircraft-borne experiments. In turn, it can contribute to a better understanding of climate change processes and global warming. The technology can also be used for trace gas analysis, where one possible application is pipeline leak detection and environmental monitoring, and resource exploration.
  - “Rural Infrastructure Digital Elevation Model” (RIDEM)
    - RIDEM is a tool that creates grid- based flow direction matrices from digital elevation models (DEMs). The unique approach is that RIDEM accounts for anthropogenic small-scale terrain features such as roads, ditches, culverts, and irrigation canals, which significantly improves watershed delineation in flat

areas with rural infrastructure. Commercially available GIS software packages simulate landscape drainage patterns based solely on the elevation values represented in a DEM. However, due to the generalization of terrain features within the DEM, and the inability of conventional grid-based routing algorithms to account for the divergent flow patterns that occur in irrigated landscapes, conventional grid-based routing algorithms fail to accurately predict drainage patterns. The derived drainage patterns often are grossly simplified and, therefore, unrealistic. This property of conventional grid-based flow routing restricts the scale of processes that can be successfully modeled.

RIDEM provides a means to accurately define the runoff contributing areas in disturbed landscapes. RIDEM is a stand-alone computer program, coded in Visual Basic, that imports and exports DEMs in ArcGIS format. The program was created with the intention to accurately delineate watersheds for water quality monitoring stations in the Oldman River basin in southern Alberta, Canada. Prior to the development of RIDEM this process was not possible because of the disturbance features in the area (viz. roads, ditches, culverts, and irrigation canals), and the coarse resolution of the elevation data set currently available.

The University of Lethbridge has several **Centres for Excellence** and is involved in leading edge research in a variety of key areas:

### **Gaming Research:**

The School of Health Sciences is home of the University of Lethbridge site for the **Alberta Gaming Research Institute (AGRI)**, a partnership among three Alberta universities that is funded by the Government of Alberta, and is a partner in a unique collaborative nursing partnership with Lethbridge College. AGRI's mandate is to support and conduct high quality research in all areas of gambling (economic, biopsychological and health care, government and industry policy, sociocultural).

### **Health Management Research:**

The Faculty of Management is home to the **Centre for Health Management Research**, which encourages health related research and facilitates dialogue between stakeholders focused on changing the health care system from a curative to a preventative system. The stakeholders include government policy makers, primary and tertiary health care providers and researchers, and worksite health promotion experts and researchers.

### **Imaging:**

The **Alberta Terrestrial Imaging Centre (AITC)**, a first of its kind in North America, which brings world-class satellite imagery to the province is located in downtown Lethbridge and affiliated with the U of L. The Alberta Terrestrial Imaging (ATIC) is a partnership between Luncus Geomatics Corporation and the University of Lethbridge. The U of L campus is home to the Direct Receiving Station (DRS). The DRS includes all the equipment and data collection hardware needed to capture and produce SPOT imagery. ATIC serves as the primary receiving and distribution station for all North American SPOT imagery acquisitions and provides Canadian researchers with direct access to a library of over 500,000 Canadian SPOT images acquired from 1986 to present. Researchers can work with AITC to directly control the SPOT satellite constellation to acquire new imagery. ATIC's application focus includes land cover mapping, agriculture, resource management in forestry, energy resource management and exploration, emergency response, water resources, climate change, urban and municipal applications, arctic research, global change research. Research at ATIC is focused on the development of software and methodologies to facilitate the processing of multispectral/hyperspectral remote sensing data in support of the sustainable development of various ecosystems.

### **Injury Control Research:**

The **Alberta Centre for Injury Control Research (ACICR)** is a provincial centre with a mission to contribute to the reduction in the mortality, morbidity and overall burden of injury in Alberta. ACICR is committed to advancing the impact of injury prevention, emergency response, treatment and rehabilitation of injuries in Alberta promoting stakeholder collaboration, capacity building and evidence-based practice in the field of injury control and research. The Centre receives core funding from Alberta Health & Wellness and is housed with the University of Alberta, Faculty of Medicine and Dentistry, Department of Public Health Sciences in Edmonton with satellite offices in Red Deer and Lethbridge (at the School of Health Sciences).

### **Marketing:**

The **Centre for Socially Responsible Marketing** is located in the Faculty of Management and encourages the creation and dissemination of knowledge on social and nonprofit marketing. The Centre fosters research in three related areas of social welfare: social marketing, corporate social responsibility, and not-for-profit marketing.

## Neuroscience:

The **Canadian Centre for Behavioural Neuroscience (CCBN)** is a 50,000 square foot research facility constructed and opened in 2001 and is the only research facility of its kind in Canada, where internationally acclaimed faculty members engage in leading-edge brain research. It represents a world-class research facility designed to provide a highly interactive and unique environment for behavioural neuroscience research. The Centre studies normal brain processes and processes affecting recovery from brain disorders, disease and injury. In July 2006, a 10,000 square foot addition was added and the Centre now houses office, laboratories, vivariums, and general equipment installations for twelve principal investigators, their students, visiting scientists, technical staff, and one private neuroscience research company (NeuroInvestigations Inc.). At this time, the CCBN also added two major research tools to its expanding abilities to study the brain with the installation of two magnetic resonance imaging (MRI) units that are among the most powerful in the province for research purposes. One will be used for small animal research and the other used for human subject research.

On October 24 2008, Bruce McNaughton, a Arizona-based neuroscientist joined the University of Lethbridge Canadian Centre for Behavioural Neuroscience. McNaughton is the first person to receive the Polaris Award from the Alberta Heritage Foundation for Medical Research, worth \$10 million. This coupled with matching dollars from the U of L and Informatics Circle of Research Excellence (iCORE), makes for a \$20 million package over 10 years. McNaughton's research focuses on the biological basis of memory and mapping out brain activities. His work will provide foundations for other research that could help prevent brain disorders like Alzheimer's disease.

## Population & Economy:

The **Prentice Institute for Global Population and Economy**, established in 2006, will focus on the long-term challenges of demographic, economic and social issues related to changes in world population patterns.

## Teaching:

The **Centre for the Advancement of Excellence in Teaching and Learning (CAETL)** is operated by an Advisory Council of Teaching Chairs and Teaching Fellows and provides services that promote and sustain outstanding inspirational teaching in the U of L's learning environment. Services include teaching consultation, workshops for new professors and graduate students, partnerships and mentorships with professors, peer consultation, and technology integration workshops.

## Water:

The University of Lethbridge has taken a leadership position in water research because of its strategic importance to the economy and quality of life in southern Alberta. The U of L will soon be home to the **Alberta Water and Environmental Science Building**. More than 100 new graduate students will study at the facility, which will support research on watersheds, water ecology and commercial water use to support sound management decisions about Alberta's water resources today and in the future. The **Canadian Centre for the United Nations' Water for Life program** is located at the U of L and promotes international commitments made on water and water-related issues. The U of L is also a key player in the **Alberta Ingenuity Centre for Water Research** and the **Water Institute for Semiarid Ecosystems**. The Alberta Ingenuity Centre for Water Research has four research themes: watersheds, water economy, safety of water & wastewater and economics, policy and risk.

## Lethbridge College

Lethbridge College (LC) hired its first Director of Applied Research and Innovation in March 2008. The Applied Research Office provides leadership and encourages innovation at Lethbridge College through development of applied research and commercialization activities that support the college's mandate and goals.

The College is involved in several applied research programs at this time:

- The **Living Home Project** is a partnership of LC, the City and Cedar Ridge Homes to create sustainable homes in the SunRidge area of the city. The three-bedroom home will be built to maximize the benefits of sun and wind. It is expected to have solar panels and also a green roof on a garage featuring plants, which will keep it cool and reduce storm water runoff.
- **Simulated Patient Health Environment for Research and Education (SPHERE)** is a unique patient care simulation training facility located at LC. SPHERE's showpiece is a \$250,000 human patient simulator (HPS) able to replicate a diverse range of health situations and emergencies. The facility reduces the need for teaching technical skills at the bedside and results in greater patient safety by reducing errors. It allows learners to practice skills as often as required at no risk to patients. The U of L is able to take advantage of the facility through its Baccalaureate Program in nursing offered collaboratively with LC, as is the Fire Department and the Chinook Health Region where EMTs and nurses can refresh their skills with nursing students at both sites. The HPS is being used to create a CD ROM and on-line training material.
- **The Citizens Society Research Lab** is operated out of political science classes, whereby students conduct two public opinion polls annually as a means to teach students effective polling techniques. These polls are industry-driven and have been conducted in the past for the Lethbridge Regional Police Service, Allied Arts Council, and Global Television.
- **Open Source Learning Lab** is a call centre that uses non-proprietary open source software to develop a virtual call centre. The bundling of the software with the techniques utilized have the potential to replace traditional call centres for select purposes.

In addition to these programs, LC also has a **Centre for Excellence**:

The **Aquaculture Centre for Excellence (ACE)** is located on campus and is a partnership of Lethbridge College, Alberta Agriculture Food and Rural Development and the Alberta Fish Farmers Association. It is considered to be Western Canada's leading aquaculture facility. ACE's mandate is to enhance the aquaculture industry through applied research. ACE conducts work in three major areas: Aquaponics (the production of plants using water from fish culture), grass carp development and applied research relating to aquaponics, water conservation, water quality and aquatic ecology, and the study of diseases particular to fish.

ACE has been in the process of commercializing four technologies:

- Triploid grass carp is widely used in Alberta for biological control of aquatic weeds. As a result of the research, ACE was able to determine the most effective stocking densities and management strategies for biological control. This knowledge has been transferred to farmers who sell fish.
- ACE is the only facility licensed to hold grass carp brood stock in Alberta. ACE produces triploid fish and test each individual for triploidy. ACE then wholesales these sterile fish to commercial fish farmers who sell them to end users. The plan is that once financial profitability is achieved, the grass carp production activity will be spun off as a separate company.
- In 2005, it was able to produce 20,000 certified triploid grass carp fingerlings with 8,000 of these large enough to use to control aquatic vegetation in private, licensed ponds in the

- Spring of 2006. They will be sold into the retail market through members of the AAA (Alberta Aquaculture Association).
- Ace is using triploid silver carp for algae control and this is in the commercialization phase.
  - In 2004, ACE was testing the alkali tolerant Blackwater strain of rainbow trout, from interior plateau of BC, for survival and growth rate in the alkali lakes and ponds of southeastern Alberta. In 2004, the plan was to commercialize it in Alberta if the strain was successful by transferring the knowledge to a private, commercial operator who would then produce these fish for sale in Alberta.
  - In 2004, ACE started a project to develop molecular tests for the common diseases of trout. The goal was to produce test kits that can be used by fish farmers on their own farms. Commercialization was targeted for 2009.
  - Other research undertaken in 2005 included spring viremea testing protocol for grass carp, biological filter evaluation, and PCR molecular disease typing.

ACE is also diligent with transferring knowledge to fish farmers through articles published in “Aquaculture in Alberta”, a twice yearly aquaculture newsletter that reaches the 3,000 individuals licensed to hold fish in Alberta.

### **Lethbridge Research Centre**

The **Lethbridge Research Centre (LRC)** is one of the largest within Agriculture and Agri-Food Canada’s (AAFC) national network of 19 research centres. LRC has 54 research scientists, 21 post-doctoral fellows and a total staff of 350. There are 80 PhD-level scientists at the LRC and emeritus researchers John Dormaar, Ph.D., Soil Organic Chemistry; and Peter Harris, Ph.D., Weed Biocontrol are associated with the Centre’s programs. LRC is operating out of 25,000 square meters of laboratory/office complex and has 500 hectares of adjacent land. There is an Insect-Microbial Containment Facility, a greenhouse and controlled climate growth facilities, facilities for dairy, sheep and beef cattle, including a research feedlot, a weather station with 100 years of climate records and an Agricultural Technology Centre which tests agricultural implements. In addition to its principal location, it operates three sub-stations in:

- Onefour, where studies on livestock and range management are conducted on 17,000 hectares of short prairie rangeland.
- Stavely, where the management of foothills rangeland are studied on 400 hectares of rough fescue rangeland.
- Vauxhall, where irrigated crop production and drainage studies take place on 190 hectares (irrigation and drainage research).

LRC’s research focuses in the areas of environmental health, bioproducts and bioprocesses, food safety and nutrition, and sustainable production systems and it is the lead centre for the national beef research program. Specifically, LRC:

- Conducts research in new technologies to advance the efficiency, profitability and environmental sustainability of beef production.
- Finds new strategies and techniques to preserve and enhance beef production and quality.
- Gains additional knowledge of the behaviour and welfare of cattle.
- Conducts research in new technologies to produce crops that are suitable for dry and irrigated lands, and are adapted for sustainability to the Canadian prairies.
- Breeds new crop varieties (potatoes, wheat, beans, forages) with improved yield, quality and disease and insect resistance, and develops production systems that will contribute to reducing costs of production, increasing value and achieving sector competitiveness.
- Researches to support food safety and quality regulations, consumer nutritional needs and preferences, and develops new products and processes.
- Discovers crop, soil, water and manure management strategies that protect the environment, maintain biodiversity, reduce greenhouse gas emission, improve soil, water and air quality and make efficient use of water.



- Conducts research on new management strategies to control weeds, crop and livestock pests, while maintaining environmental quality.

Early research at the Research Centre focused on the inoculation of alfalfa, irrigation technology, grains, livestock, insect pests, plant diseases, and techniques to control soil erosion. As challenges evolved over the years, the type of research conducted also evolved. Examples of past research include:

- Changing gene combinations by crossbreeding in order to improve crop varieties.
- Potential of insects to recycle dung in pastures whereby the rate at which the dung pat is broken down and returned to soil is accelerated.
- The potential of earthworms to enhance the chemical, biological and physical properties of soils and improve its health and quality.
- The biological control of toadflax, a serious weed of rangelands that competes with forage species.
- The potential alternative uses of crops such as soft white spring wheat for ethanol production.
- The examination of the combined effects of the high digestibility and diosgenin content of fenugreek to enhance the rate and efficiency of animal growth.
- The investigation of carbon cycling in agricultural ecosystems.
- Measuring stress objectively in sheep, which can reduce growth performance and meat quality.
- The study of the biology and foraging behaviour of bumblebees as crop pollinators.
- Monitoring herbicides at the part per billion level.
- The feed value of weed.
- Enhancing feed utilization through enzyme supplementation.
- New insight into the livestock production and the human health interface.

Specific projects that seem to be approved in 2008/2009 that involve LRC researchers are listed below:

- Plant Research
  - “Integrated biotechnological approaches for development of antioxidant potatoes with improved resistance to late blight and Colorado potato beetle.”
  - “Dynamic plant-based environment control to improve energy use efficiency in greenhouse crop production.”
- Animal Science Research Projects
  - “Emerging parasitic disease in Canadian cattle”
- Environment and Ecology Research Projects
  - “Range management strategies that enhance ecosystem function”
  - “Development of novel biological control strategies for invasive alien plant management with insects: improving predictions, efficacy and safety.”

LRC’s key technology development and transfer mechanisms involve Agriculture and Agri-Food Canada’s Office of Intellectual Property and Commercialization, which is responsible and accountable for the development and administration of all processes and procedures regarding the identification, protection and deployment of AAFC’s intellectual property. The Office of Intellectual Property and Commercialization promotes its technology licensing opportunities on its website and encourages industry partners to participate. Recently, it seems as though a technology transfer officer has been added to the staff at LRC.

### **Canadian Food Inspection Agency (CFIA) - Lethbridge Laboratory**

The CFIA Lethbridge Laboratory is the original veterinary research laboratory in Western Canada, dating back to 1905. It is known locally as the Animal Diseases Research Institute (ADRI). Its role is to deliver diagnostic testing, research and scientific advice in support of the National Animal



Health Program (NAHP) and National Food Safety Program (NFSP) of the Canadian Food Inspection Agency (CFIA). The Lethbridge lab leads a network of six CFIA labs in the west. The research facilities include:

- Biosafety level 2 and 3 laboratories.
- Biosafety level 2 laboratory animal facilities
- Biosafety level 3 livestock isolation facilities, suitable for work with traditional and non-traditional livestock species (cattle, elk, bison).
- Specific pathogen free research facilities for cattle and sheep herds.
- Micro-array facilities and equipment.
- Bio-containment facility

The key research areas are: Bacteriology; Virology; and Pathology, including TSEs (Transmissible Spongiform Encephalopathies). All of the rabies diagnosis work for western Canada and much of northern Canada is done in the Lethbridge lab and work continues on anthrax. The Lethbridge lab played a key role in the diagnosis of BSE during two outbreaks, the first in 1993 involving imported animals, and the other in 2003 when the first case of domestic BSE was diagnosed. In both cases, all animals from infected herd or herds and most animals that were traced from the index herds were shipped to Lethbridge for diagnosis and eradication by burning in special facilities. Of note is that the Lethbridge lab is earmarked an OIE (animal health disease monitoring organization) BSE Reference Lab.

The CFIA - Lethbridge Laboratory's key technology development and transfer mechanisms include research and development collaborations and partnership programs.

### **Municipalities**

Several municipalities are involved in large initiatives pertaining to innovation, specific to technology.

#### **City of Lethbridge:**

Economic Development Lethbridge (EDL) has partnered with the City of Lethbridge, Lunctus Geomatics Corporation and the Government of Alberta to create a business case proposal for a Technology Transition Centre. This proposed centre would help stimulate new company development in specific high-tech fields related to programs at the University of Lethbridge, Lethbridge College and other research facilities.

#### **○ Vulcan and area:**

Vulcan Business Development Society's Vulcan Innovation Project allows the society to fully develop a number of advanced technology projects as well as the skills needed to sustain these innovative projects. Partners include: Vulcan Business Development Society, Vulcan and District Waste Commission, Palliser School Division, Lethbridge College, and Digital Alberta. The Vulcan Innovation Project received \$1.5 million from Rural Alberta Development Fund and projects include a virtual rural college and 'Green' energy initiatives. The expected results of the project include:

- Increased access to technology and skills training for local business, organizations and individuals.
- New delivery options for skills training.
- Retention and attraction of youth by offering more high quality employment.
- Creation of new jobs in the technology sector.
- Development of 'home grown' technology projects that can be easily adapted by other rural Alberta communities.

Lethbridge College will support the development of the Rural Virtual College providing skills development programs for rural youth and residents, while Digital Alberta will be involved by working with local community organizations to develop new, innovative ways of using technology to assist in their development and/or promotion.

## Industry

There are diverse examples of innovation throughout the SouthGrow region. Below are some of the examples by municipality. *The list was developed by requesting information from municipal representatives (economic development officers and chief administrative officers) and is by no means exhaustive, but gives some idea of the range of innovation:*

### CARDSTON

#### SECTOR: IT- Computer Services

- **Empower Group** - Empower Group develops recruiting software that measures employee effectiveness.

#### SECTOR: Professional, Scientific, Technical

- **Total Comfort Solutions (TCS Inc)** - Total Comfort Solutions markets innovative hydronic heating and cooling systems and hydronic mechanical equipment which address the need for affordable, energy efficient HVAC (heating, ventilating, and air conditioning). TCS Inc. has seen its technology and HVAC products installed in over 90 commercial properties and numerous homes in Canada and the United States. Many more are in design and under construction. The technology has been recognized by the Canadian Government for its affordable efficiency through awards and grant funding. Natural Resources Canada has granted TCS Inc. research funding. Several facilities utilizing the TCS system have received grant funding for energy efficient design including the Alberta Plus pilot program developed by Energy Solutions Alberta, an initiative of Climate Change Central, and the CBIP Grant.

### MILK RIVER

#### SECTOR: IT- Computer Services

- **Open BSD ([www.openbsd.org](http://www.openbsd.org))** - The OpenBSD project produces a **FREE**, multi-platform 4.4BSD-based UNIX-like operating system. The company emphasizes portability, standardization, correctness, proactive security and integrated cryptography. OpenBSD supports binary emulation of most programs from SVR4 (Solaris), FreeBSD, Linux, BSD/OS, SunOS and HP-UX. OpenBSD is freely available from an FTP sites, and is also available in an inexpensive 3-CD set. The company is also involved in computer programming and seismic data transcription.

### VULCAN

#### SECTOR: IT- Computer Services

- **BCCHardware** - BCCHardware's volunteer staff reviews computer hardware, and computer related hardware. The company provides software reviews, and other consumer electronic reviews. The company's website also has an active forum community. While BCCHardware originally reviewed software that was either borrowed from staff or purchased by staff, today, the company receives products from companies in exchange for publishing a review. The company does not receive payment from any companies that have their products reviewed.
- **Database Information Technology Systems (DBITS)** - DBITS is a computer systems company that is a system integrator and value added reseller of Radio Frequency Identification (RFID) Inventory Management System. The core technology skills also include database

management, information management, and Linux corporate systems. The company is currently developing a Registration Event Management System (REMS), a multi-module solution for the convention industry. It supports all aspects of convention management, while collecting marketing (demographic) and performance data. Specifically, a chip placed on a conference or event registrant's name tag tracks and stores all of the registrant's movements during an event for later analysis

## LETHBRIDGE

### SECTOR: Professional, Scientific, Technical

- **Alpha AgResearch** - Alpha AgResearch negotiates cooperative research agreements with public research institutions on behalf of client corporations, designs, executes and analyzes field crop experiments and manages research programs for client corporations. Alpha AgResearch specializes in agronomic research, particularly those projects with relevance to precision agriculture and remote sensing. Products and services include aerial photography/airborne sensing, image analysis, remote sensing applications, agronomic research.
- **Blue Sky Spectroscopy Inc.** - Blue Sky Spectroscopy Inc. is a wholly Canadian-owned and operated company with headquarters in Lethbridge. Formed by Dr. David Naylor in 2003 as a high-tech spin-off of his research program at the U of L, the company is privately owned and operated. Its highly qualified staff, all with post-graduate degrees, specialize in providing custom spectroscopic solutions with emphasis on infrared Fourier transform spectrometers. The company specializes in complete system development from the optical, mechanical and electronic design through to manufacture, assembly, integration and verification of state-of-the-art instrumentation. Product lines include single pixel Fourier transform spectrometers, hyperspectral imagers, infrared radiometers, and radiative transfer model. Customers include the Canadian Space Agency, research facilities and universities in Europe and the US. In April 2008, the European Space Agency (ESA) contracted Blue Sky Spectroscopy Inc. to develop software to create, visualize, and analyze hyperspectral images for its Herschel mission, an infrared space observatory, which will explore the formation of galaxies and stars.
- **HydroLogics Inc.** - HydroLogics Inc.'s key employees, Dan Heer and Dean Randle, have developed a new computer model for the South Saskatchewan River Basin, the anchor water resource in Southern Alberta. The model can help in improved water and river basin management. It can tell users the impact of proposed changes in water use. For example, the model can outline the potential impacts, good and bad, from a license transfer, leading the proponent of change to the right decision. The U of L has earned the proprietary rights to the public domain computer model and has become the hub for Alberta access to the program. The company has developed similar water management models for several rivers and river basins in parts of the U.S.

### SECTOR: IT- Computer Services

- **Apps & More Software Design Inc.** ([www.theboss.net/appsmore](http://www.theboss.net/appsmore)) - Apps & More Software Design Inc. maintains an ongoing research and development program exploring the application of modern computing techniques to engineering and applied science problems. The current emphasis is on object oriented programming and occasionally makes available either as shareware or freeware, generic software modules developed for internal projects that could be of interest to the programming community.

### SECTOR: New Media/Multi Media

- **Framework Animation** ([www.frameworkanimation.com](http://www.frameworkanimation.com)) - Framework Animation was established in 1992 as a direct response to the need for a high quality 3D visualization service for the architectural community. Since then, the company has expanded into many other areas, including the production of graphics and animation for broadcast, oil patch engineering and agriculture.

#### SECTOR: Geomatics

- **GeoTech Mapping Solutions** ([www.geotecmapping.com](http://www.geotecmapping.com)) - GeoTech Mapping Solutions specializes in the application of GIS, development of geo-referenced databases and technologies related to natural resource management and environmental science. Products and services include database management/data conversion, geographic information processing, geomatics consulting, photogrammetric mapping/cartography, image analysis, remote sensing applications, and education and training in geomatics.
- **lunctus Geomatics Corporation** ([www.terraengine.com](http://www.terraengine.com)) - lunctus Geomatics Corp. is a privately owned company which provides geomatic services and software to support industry specific solutions. lunctus Geomatics is becoming the leader in the receiving, production, archiving and dissemination of satellite imagery in Canada. lunctus offers a range of services including, imagery acquisition & processing, ground station operations & data reception, web map services (WMS), and custom application development. lunctus is the Canadian SPOT channel partner and exclusive distributor of SPOT imagery in Canada. lunctus serves its customers with the first commercial ground station in Canada - a \$4 million investment in infrastructure; proprietary data management software; TerraEngine; select mosaic products and infrastructure partners like SPOT IMAGE and TELUS COMMUNICATIONS. lunctus has successfully completed contracts for the Federal Government, Provincial Government and First Nations.
- **Neatline Technologies Inc.** ([www.neatline.com](http://www.neatline.com)) - Neatline concentrates on the database side of spatial information technologies. The focus of Neatline's business is the integration of database development and GIS development. Services include database management/data conversion, geographic information processing, geomatics consulting, geomatics software development, data distribution and warehousing.

#### SECTOR: Alternative Energy

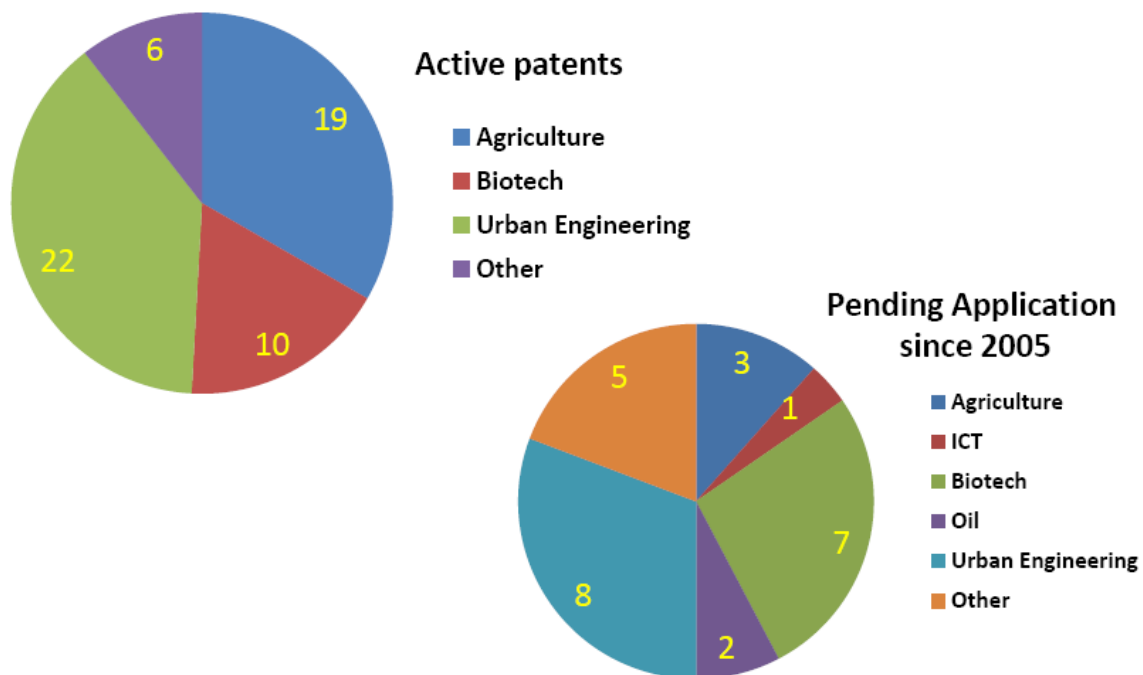
- **ECB Enviro North America** - ECB is a bio-gas processing facility that will turn organic waste to energy products. The facility will use local livestock manure and food processing waste as feedstock, creating an innovative value-added opportunity in the community. Bio-gas methane is a bio-fuel made by anaerobic digestion of organic waste to generate methane gas, electricity or thermal energy. The Lethbridge facility is expected to generate three megawatts of electricity while also providing 110,000 giga joules of thermal energy that can be used in district heating systems or in neighbouring facilities that require heat for activities such as grain drying.
- **Kyoto Fuels Corporation** - Kyoto Fuels is a 33 million litre per year (9 million gallon) biodiesel biorefinery located in the County of Lethbridge. The facility will be able to accommodate a variety of starting materials including animal fat, waste greases and vegetable oils. The plant will supply ASTM quality biodiesel and biodiesel blends to Western Canada and the Northwest United States.
- **BioKing** - BioKing, a Netherlands company, is building a biodiesel fuel processing equipment assembly plant. BioKing's equipment can convert all known vegetable and animal fats into fuel usable in diesel motors. The company has already sold equipment to

customers in Western Canada, and it's expecting to supply a developing Asian market as well as U.S. and Canadian customers from its Lethbridge base.

- **OnFarm Energy Efficiency Pilot Program** - The two-year pilot project showcasing the benefits of energy efficiency on farms in the Lethbridge area began in 2006 as a partnership between Climate Change Central and the Agricultural Technology Centre of Alberta Agriculture, Food and Rural Development (AAFRD). The \$1 million program, funded by Alberta Innovation and Science's Innovation Program and AAFRD, aimed to help Alberta dairy, swine and poultry producers reduce costs and improve environmental performance through increased energy efficiency of operations. The program featured 100 energy efficiency audits of farms in the Lethbridge area, providing producers with recommendations and costs of improvements, financing options and environmental benefits.

### Patent Activity

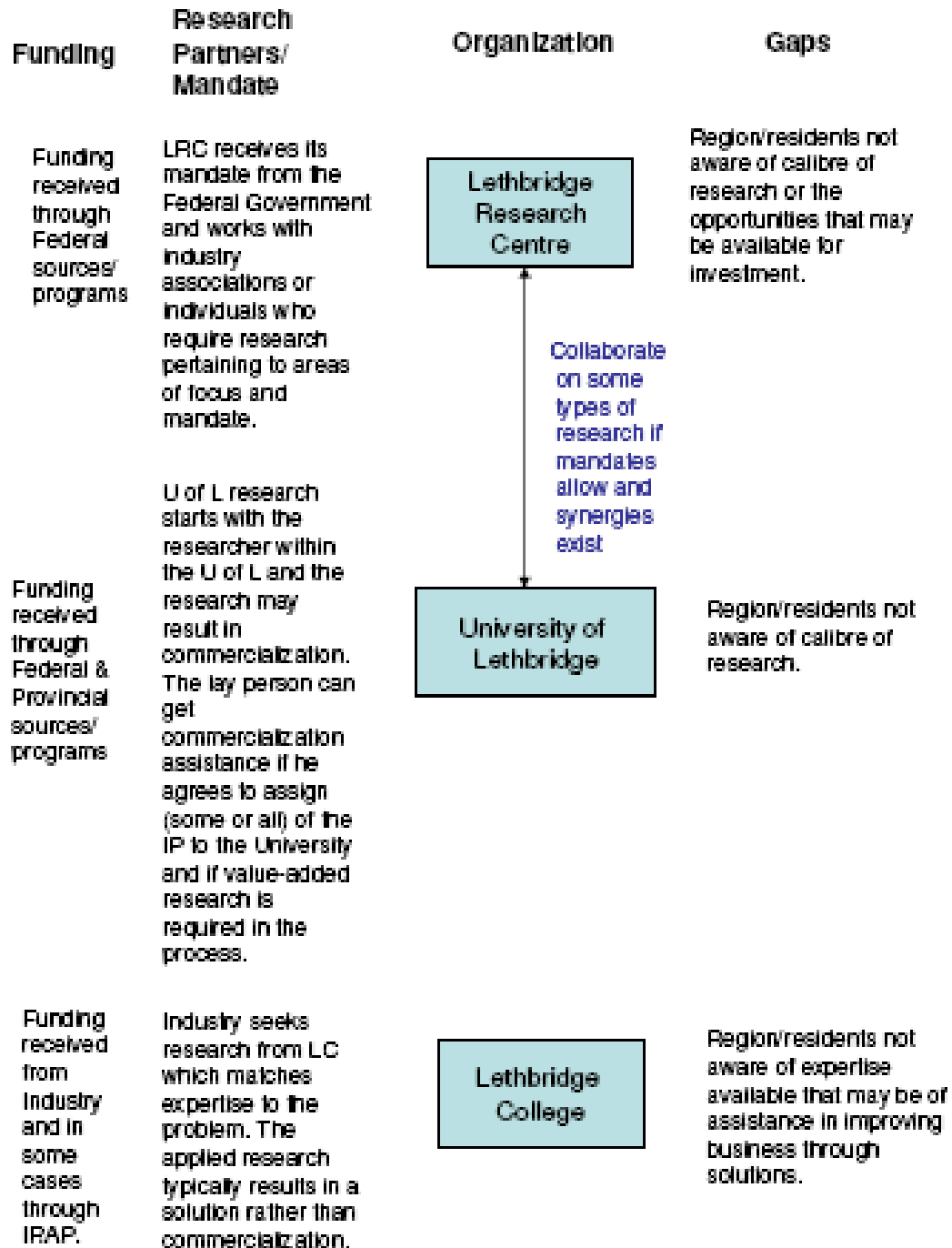
The University of Lethbridge Technology Transfer Office conducted an analysis of USPTO Patent and Patent Applications from Lethbridge. The following illustrates the activity:



These patents and patent applications does not include those through the University of Lethbridge, Lethbridge College or the Lethbridge Research Centre and therefore filed by independent individuals.

## 6.0 CONCLUSIONS

1. The following summarizes the type of research being conducted in the region through the organizations and the gaps that may exist.



2. The University of Lethbridge has identified its future direction in the research area:
  - a. The areas of future strategic research are in environment and life sciences, where by a critical mass of intellectual capacity, leading edge facilities and equipment and cross-disciplinary approaches and services will be encouraged.
  - b. World class research laboratories will be encouraged that bring the added benefits of highly educated scientists and engineers, external investments, and physical infrastructure.
  - c. The four areas that will continue to receive focus will be:
    - i. Alberta Water and Environment Science Building through which sustainable use of water will be promoted, water resource management will be improved and research and education will continue. Key research themes will be the health of our water (water safety and quality, riparian health, and soil salinity), and water resources management (irrigation, consumption patterns, water use policy development, and climate change and modeling).
    - ii. Canadian Centre for Behaviour Neurosciences (CCBN) through which research will continue on systems-level neuroscience with rodents, human neuro-psychology and cognitive neuroscience. The key technologies and facilities that will receive focus are the mouse models for translation research (for stroke, parkinsons, alzheimers, spinal injury, pain, anxiety, epilepsy) and neuroimaging (MRI, NMR, dense array electroencephalography).
    - iii. Plantbiois and the Canadian Triticale Initiative, specializing in plant transformation technology. The University is in the process of patent application and hope to work collaboratively with AAFC.
    - iv. Alberta Terrestrial Imaging Centre (ATIC) and expanding its use to agriculture, natural resources, forestry, fisheries and oceans, mine site manufacturing, ecosystem monitoring, water contamination monitoring, and oil and gas.
3. Lethbridge College, through its Office of Applied Research will focus on making the region aware of the expertise available at the College and seek partnerships with those in industry seeking problem identification and/or solutions to problems.
4. The Lethbridge Research Centre derives its mandate from the national office and will continue to work with industry associations to research solutions related to its key areas of focus.
5. Economic Development Lethbridge (EDL) is investigating the feasibility of a centre that would help stimulate new company development in specific high-tech fields related to programs at the University of Lethbridge, Lethbridge College and other research facilities.
6. There is patent activity in the region, but it is not known what assistance these individuals received through the process and what challenges they faced. Based on this assessment, it is surmised that the most assistance the individuals could have received was from organizations such as community futures on business start-ups but they were left to their own resources and research to get to the patent application stage.

## 7.0 RECOMMENDATIONS

Based on the assessment, the following recommendations for further action are made:

1. There seems to be a gap in the awareness that residents in the region have of the research and innovation assets that already exist within the region, the caliber of the research being conducted, the external funding being attracted to the area, the opportunities available as a result of the research for investment, and the expertise that exists that may assist individuals to innovate, whether leading to increased productivity in their businesses/organizations or to new products and processes which may be commercialized. Therefore, **SouthGrow can play a role in becoming a “communications and marketing portal” for the research and innovation in the region.** Based on preliminary discussions with the research managers or technology transfer officers at the Lethbridge Research Centre, University of Lethbridge and Lethbridge College, there is a need for communication and all three agree that SouthGrow would be the ideal economic development mandated organization to work collaboratively on this. Furthermore, representatives from all three organizations have agreed to work with SouthGrow on this to design the system and provide information on an on-going basis if SouthGrow were to play such a role.
2. Through the assessment, it has been concluded that the following types of supports are available in the research and innovation area:
  - Federally mandated research which can be conducted by the Lethbridge Research Centre as well as in conjunction with industry associations, resulting in solutions and opportunities impacting industry.
  - University researcher driven research which may result in commercialization, but initially beginning with the researcher’s area of interest.
  - Applied industry driven research, focused not necessarily on publication or commercialization but more driven towards identifying applied problems and solutions to assist business and industry in the region.
  - Individual driven research where value-added research is required by the Lethbridge Research Centre, the University of Lethbridge or Lethbridge College.

There may be a gap, however, in those cases where an individual or an organization has developed an idea and is ready to commercialize it. If value-added research is not required, the technology transfer assistance available at the University or the Research Centre is not appropriate. Therefore, the individual that has “built a better mouse trap” but does not require further research into it is left to his own devices to bring it to market. The commercialization process is often difficult and if proper supports are not applied, the process may fail. The patent activity in Lethbridge alone proves that innovation is taking place at the individual level and this may increase if proper supports are available. Therefore, **it is recommended that SouthGrow investigate the feasibility of a market - focused product commercialization centre that includes technology development advisors and has a strong link to area business development centres.**

Supporting this recommendation are three key points that the province’s three-year plan, *Alberta’s Action Plan - Bringing Technology To Market* highlights:

- a. Strengthen access to regional business development services. These **Business Development Centres** will provide tangible business advice to those who need it or re-direct inquiries to those who can, supporting innovative entrepreneurs and



assisting regions to diversify economies and adapt to knowledge-based and value-added sectors.

- b. Introduce new **technology development advisors** who have knowledge of relevant technology and familiarity with current product development issues. The province-wide network of technology development advisors will assist with technology, business, finances, human resources and product improvement in order to broker relationships and cooperation between companies and innovation agencies.
- c. Encourage **market-focused product commercialization centres** with direct links to services provided by business development centres and technology development advisors. These centres will assist start-up companies in the area of market analysis assistance, technical equipment, access to labs or test facilities, engineering and design expertise, technical and market validation or accreditation services, prototyping support, product positioning, production planning, and perhaps a chance to demonstrate a new product in an actual customer setting.

Provincial funding should be investigated for such a feasibility study and related business case. SouthGrow can help develop such a centre in order to advance the area's innovation efforts, whereby technical assistance is provided to innovators, they are assisted with securing external funding and there is advocacy on their behalf in order to bring technology to market.