

Rural Colleges Innovative Practices Review



Report to:

Northern Labour Market Clearinghouse

Submitted by:

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Executive Summary

Project Objectives

This project required an assessment of innovative models and best practices of rural resource-based colleges for application to northern Alberta colleges in regard to their economic, social, community and business needs. Northern Alberta colleges have many growth pressures and rural specific issues which create a need for innovative practices and ways to better serve the remote communities. It was hoped that research into this issue can help generate new ideas for innovative changes.

The objectives included: a review of selected literature, case studies of Canadian and international experiences, and a brief survey of selected northern Alberta college staff. From this review a first generation “toolkit” of ideas was developed and is offered for stimulating and guiding innovative changes into the college system for more effective regionally-based service delivery and impact. Use of any tools will be up to interested parties and colleges.

Findings

Some of the main trends driving the Alberta College system include:

- Student focus continues as the core focus but a greater role is developing in applied research as part of the normal college operations;
- Increased federal and provincial funding for college research and innovation activities;
- Need to increase the use of e-technology and other new approaches of engagement;
- Demographic issues, both internal and within the community;
- Competitive pressures not often well aligned with funding;
- Redefining the college role in the community.

From the research, the Alberta and the Quebec system were both reviewed for innovative developments. Some key findings are:

- Alberta – the province is moving to a regional innovation network (RIN) provincial system which will have 8 RINs, up from 5 RINs currently. Northern Alberta is involved only with the Centre for Research and Innovation (CRI) in Grande Prairie Regional College (GPRC);
- In northern Alberta, it appears that only GPRC (CRI) is active in commercial innovation;
- Pressures are increasing for better engagement models with community and small and medium sized enterprises (SME);
- Competition for students and new delivery approaches is increasing;
- Many Alberta colleges are innovating and others need to take action or face future issues.

International models and findings include:

- Globally a renewed emphasis appears to exist on product and process innovations which can create economic activity;
- Regional models are commonly being developed as needed;
- Resource conditions in the community will help determine the approaches used;
- Colleges are innovating and some are collaborating with businesses.

Toolkit for Improvement Changes

From the research a total of 10 tools are offered to stimulate ideas and suggest new and innovative ways of engaging rural remote communities, businesses, and students for more impact. These are summarized in the appendix. They are also noted in a brief companion report to this main report.

The tools are assessed as internal and external tools and need to be considered for implementation at a local level. Implementation can be done and should involve experienced and qualified independent assistance as needed. Risks of failure and lack of adequate change processes are often seen in these areas.

Acknowledgement

We appreciate the assistance provided to us from the steering committee, including: Natalie Butler, Sharon Shultz, Ernest Shanahan, Kellan Eckstrom, and Allen Geary. Any errors or omissions are unintended.

If any college or economic development agency requires assistance on applying or adapting these ideas into the local or regional context we are prepared to help as needed. We have worked with other colleges, companies, regional economic development agencies and research organizations to improve their focus, understand local and market needs and to create appropriate strategic plans.

A highly active area is in developing a strong and sustainable regional innovation network, entrepreneurship, business innovation, and manufacturer growth assistance. Other ideas may be also generated from the community.

All the best,

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Introduction and Objectives

Northern Alberta consists of a vast area of both developed and undeveloped communities and resources which is seeing many growth challenges from resource developments and population growth. The Northern Alberta Development Council (NADC) located in Peace River facilitates the Northern Labor Market Information Clearinghouse which is comprised of four northern Alberta colleges. These members include: Grande Prairie Regional College (GPRC), Keyano College (Fort McMurray), Northern Lakes College (Slave Lake) and Portage College (Lac La Biche). Each college also has satellite locations for service delivery and operations.

Each of these colleges fulfills a role in their region, and for their stakeholders. Operationally they have some core programs which may be similar but they also attempt to develop their own specific ways of responding to local needs as is possible.

The Northern Labour Market Information Clearinghouse (the Clearinghouse) is a joint initiative that was created in 1995 between the Northern Alberta Development Council (NADC) and the northern Alberta post-secondary institutions. The role of the Clearinghouse is to provide information on local labour force data, training needs, and economic development. The Clearinghouse has developed about 121 reports on labour market information and trends which affect the north.

Project Objectives

From the RFP, the objectives were to conduct literature research and create a toolkit of ideas for local application and specifically:

“Provide a user-friendly toolkit of innovative ideas for the college community in northern Alberta. This involves a complete investigation of innovative models, within Canada and internationally, of regional and/or community social and economic development by regional post-secondary institutions. The analysis of the innovative models and the resulting recommendations must be applicable to northern Alberta colleges.”

The colleges are viewed as important drivers of local and regional economic development. The completion of the toolkit will provide innovative alternatives for the colleges. It is expected the toolkit will help the colleges to achieve their mandates within their communities and regions.

The scope of the work relied mainly on desk research. Two meetings with the committee were held in addition to several phone calls regarding progress and findings. The findings are reported below.

Innovative College Practices - Canada

Findings reported below are based on both literature reviews and the consultants' personal experience in the college system. The approach taken was to highlight innovative practices which can be applied to the rural remote colleges in northern Alberta.

Trends Affecting Alberta Colleges

The post-secondary system is dynamic and continually improving as a result of local and national issues. Some of the interesting trends noted for the Alberta college system include:

- Some colleges are moving to university status and applied degrees;
- College mandates now include a requirement for “regional stewardship” and applied research;
- Programs are changing to reflect the market needs for adult education in technology, environment and other areas;
- International students are becoming more common place;
- Colleges are developing more market-based programs and services to meet business and industry needs;
- Alberta colleges are developing applied research programs to link with the Alberta Innovates Technology Futures (AITF) strategy of regional innovation networks;
- The federal government is planning a major expansion in funding for college-based research through NSERC programs (Natural Sciences and Engineering Research Council of Canada). (Note the Federal Government June 2011 budget indicates new investments into the college system for innovation and commercialization).

Other issues which face the college system are noted below at the end of this section and indicate a number of things which Alberta's college staff view as important. The next section reviews the Alberta and Quebec systems innovative ideas and practices.

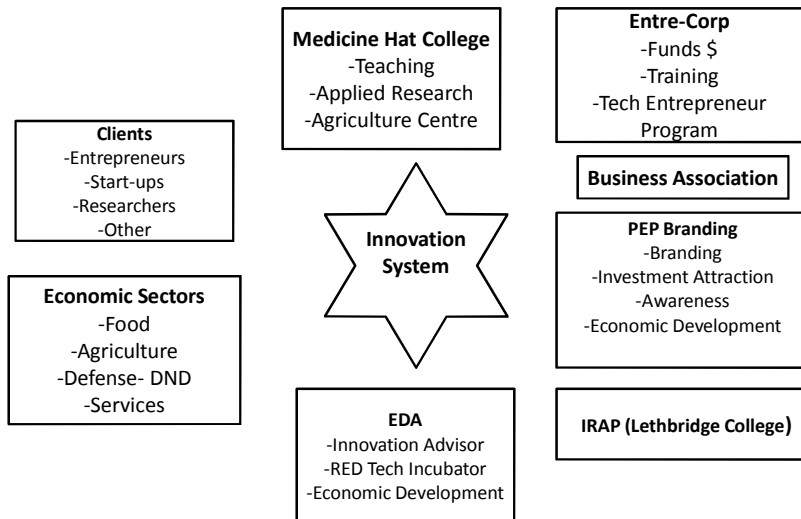
Alberta College Practices

1. Medicine Hat College-The Medicine Hat region has developed its own innovation system, and is constantly improving its innovative approach. A number of organizations are involved in the effort. Palliser Economic Partnership (PEP), Economic Development Alliance (EDA), Entre-Corp, and Industrial Research Assistance Program (IRAP) are jointly addressing the innovation issue.

PEP is the regional economic alliance and works on community readiness, investment attraction, marketing and branding, and other related activities. Entre-Corp (CFC-Community Futures Corporation) is involved in business counseling, small business financing and related assistance and training. It is also involved through the Technology Strategy (<http://www.apexalberta.ca>). This is a new three year strategy and is currently operating in its second year.

A new project is underway in the region to develop a manufacturing cluster and network to allow for sourcing out of region markets, learn new training ideas and improve competitiveness. A recent study indicated that the region would suffer due to the many small SMEs in the region which were not improving relative to global competition. This network is based on a proven process to engage business through learning events, meetings and outside experts. The regional innovation system is described in the diagram below (Source: TBMC).

Innovation System- Medicine Hat Region



A very interesting innovation group located in the region is The Canadian Centre for Unmanned Vehicles as a not for profit federal organization with a mandate to facilitate the development of the Canadian unmanned vehicle sector. Its main office is located in Medicine Hat Alberta, where much of their responsibilities take place; however, there are some staff members stationed in different parts of the country that provide a very important geographical perspective. It received funding from Western Diversification and Alberta's Rural Development Fund.

The main objective of this new organization is to focus Canada on this new research and commercial area, provide leadership, educate the public on unmanned vehicles, and introduce the global markets to Canadian technology. Some of the activities and service include: "unmanned systems standards work, influencing research, applications and technology solutions development, training, provision of facilities (such as access to test ranges and UAS launcher services), publishing studies, consultancy, promoting civil and commercial use of unmanned systems and stimulating Canadian economic growth" (Systems, 2008). This area is very advanced for the prairies, and if it continues it can be a significant new way to engage and develop new business activity.

Apex Alberta (located in Medicine Hat) is designed to facilitate and develop the technology industry, and better connect with others in the world.

"Our name is a symbol of our promise — to be the focus point for the technology sector within Southeast Alberta — providing unparalleled service and expertise in connecting people, technology and ideas to advance technology within the region."

The South East Alberta Technology Strategy (SEATS) is a collaboration among the public, educational, and non-profit organizations, attempting to develop the regional technology sector.

Community Futures Entre-Corp Business Development leads the alliance. Apex Alberta is SEATS marketing initiative. Their mandate is to:

- Promote technology-based initiatives to attract and retain quality people, companies, products and services in Alberta;
- Leverage existing technology-driven projects and initiatives to increase technological investment;
- Increase collaboration between technology sector companies to create new, locally developed products and services with global potential;
- Provide strategic support for Medicine Hat College education, training programs, and applied research projects;
- Foster and maintain a technology network that creates learning opportunities, cultivates knowledge transfer, and provides innovative access to capital.

The Economic Development Alliance (EDA) serves the Medicine Hat region in an economic development role and recently developed a new innovation function within the organizations. The vision of the EDA is to ensure that everyone is aware that Southeast Alberta is the most prosperous "center of choice" which retains and attracts investment by businesses and families, supporting a high quality of life. The EDA is focused on a mission to establish Southeast Alberta as the hub for regional economic development through collaborative partnerships, stimulating growth and wealth for the region. With this direction in mind, the EDA then focuses on six key sectors which include:

- Alternative Energy;
- Oil & Gas;
- Value-Added Agriculture;
- Technology;
- Advanced Manufacturing;
- Tourism.

The EDA has a specific innovation advisor hired to match businesses with government programs, and address innovation gaps that businesses may need to overcome. This Innovation Facilitator serves the Southeast region and is targeted to help inventors, innovators and small companies which are expanding and growing. The region has participated in the innovation voucher grant program of the province. The region received no voucher grants in the first round but was successful with 7 of 12 applicants in the second round. The innovation position was funded for one year by IRAP, and it is hoped a new Technology Development Advisor position will be filled by the new innovation plan by the Alberta Government.

The college in Medicine Hat is developing a new applied research area and is focusing on light manufacturing and entrepreneurship. The college is new to this area.

2. Olds College-Olds College has a number of initiatives underway to build student learning, community involvement, and business supports.

Student learning is based on a traditional learning model with resident students at the campus and in several satellite sites (Calgary, Balzac- TBD). In addition, the college has used the Supernet- a web-based delivery system to support its offerings to other non-resident students. The college has changed its courseware substantially over the last few years with a focus on meeting the emerging trends and learner needs.

Community involvement is very strong and the college has developed several projects to involve

the community:

- High school located at the south end of the campus;
- Community e-learning center with support from Bell and others;
- Industry advisory committees to review and confirm college offerings and emerging needs.

Community involvement also includes industry advisory committees on programs, sponsorships, input to feasibility studies, and business planning projects. Advisory committees are developed with 5-6 industry experts with specific course knowledge, who can help understand potential future student job openings and training needs.

New programs are reviewed with feasibility studies, surveys and business plans in a go/ no-go process to assess industry and public support prior to implementation activities and major commitments. Current examples include the equine centre of excellence, wetlands research and biofuels programs. The NSERC grant was tied to the biofuels applied research program and has attracted industry investment in a pilot plant at the campus.

A novel activity for the college is the area of applied research and innovation through the Olds College School of Innovation (OCSI). The OCSI has evolved over the last 10 years from a concept to an operating entity with about 10 staff and facilities of about \$20 million in investments for offices, bioprocessing labs, and other related facilities. The OCSI was the first college-based applied research centre in western Canada to develop, and has since become a model for a number of colleges. This centre was one of the first of its type in Canada. The concept was to develop a centre of innovation located at the Olds College which would serve industry in several project areas.

The focus areas for the new centre were:

- Bio-processing in functional foods;
- Composting and renewable bio-energy;
- Small agri-business products and services.

The innovation project (started in 2000) was to set up the Olds College Centre of Innovation (now the School of Innovation). The first step was a feasibility analysis and a business plan in 1999 and by 2000 (10 months later) it was operating with a new CEO. Originally consultants prepared a \$17m business plan and to date it has attracted about \$20m, and now is operating with about 6 staff (scientists, technical staff and special processing equipment). See <http://www.oldscollege.ca/schools/ocsi/index.htm>. The innovation model has changed a few times to reflect industry and public sector response and acceptance. The initial model was developed with the idea of a chief scientist, technicians, and a business manager for industry liaison.

A new Board of Directors was developed within the concept of a for profit innovation company to serve and compete in the marketplace. A CEO and senior scientist were recruited from Saskatchewan, as well as several other technicians. The scientist and the Innovation centre leader were in charge of managing a break-even or profitable budget within the centre. However, this was not accomplished and an organizational change was required. The innovation centre was initiated to work with the Olds College system as a school of innovation, which allowed for sharing of resources, facilities, staff, and students within the college. As a result, the board of directors was eliminated and the school was changed to report to the VP Academic. The chief scientist and several senior technical staff are in a process of changing to a bio-fuel and soil reclamation specialization from their previous bio-processing focus. Some

bio-processing equipment is being moved to the Ag Discovery Place in Edmonton due to the changes.



This centre is primarily focused on the Olds College students and site, where local entrepreneurs and some specialized bio-processing companies completed their projects. However, this model did not achieve a high level of business commitment; even though, it had received funds from many provincial and federal sources. Therefore, it never became a sustainable business model in its original form. The School serves an important contribution in the area of composting, bio-processing and in small-scale bio-diesel applications for rural Alberta.

3. Red Deer College-Red Deer College (RDC) has a number of similar student, community and business training and linkages to help build the region. We highlight the innovation and manufacturing areas as interests for central Alberta.

The Central Alberta Regional Innovation Network (CARIN) is located in Red Deer and is aimed at supporting new technologies and ideas. CARIN works in collaboration with the Red Deer College, and presents students with an opportunity to invent and implement unique designs. It is a partnered approach with CAEP (Central Alberta Economic Partnership) and Red Deer College and others.

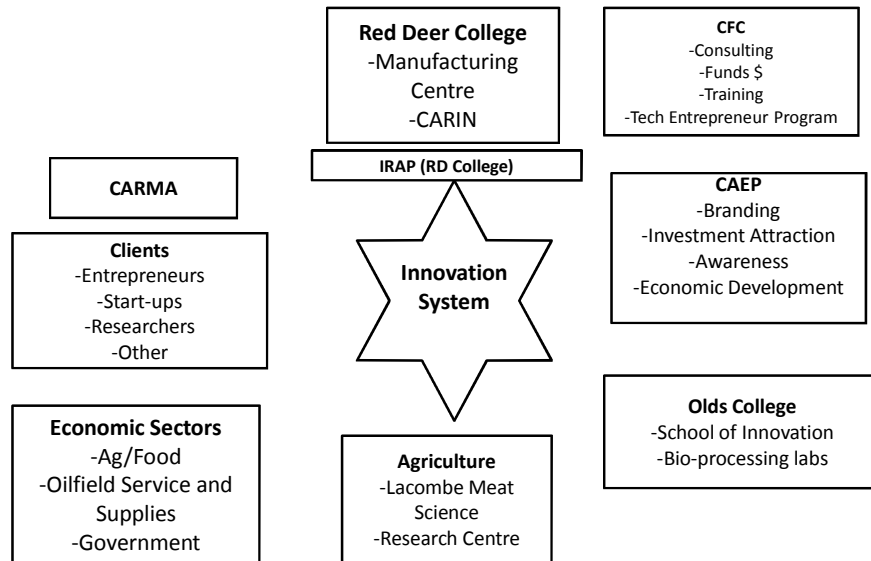
“Through prototyping new innovations, together we aim to catalyze new business opportunities for the community and region.”

Moreover, the success of this organization has demonstrated the need for a program with similar goals that communities in southern Alberta could benefit from. Red Deer College has enhanced the manufacturing specialty with rapid prototyping and welding equipment. The college developed the Central Alberta Regional Innovation Network as a way to connect with central Alberta manufacturers and business on student education, applied research, and better interfaces.

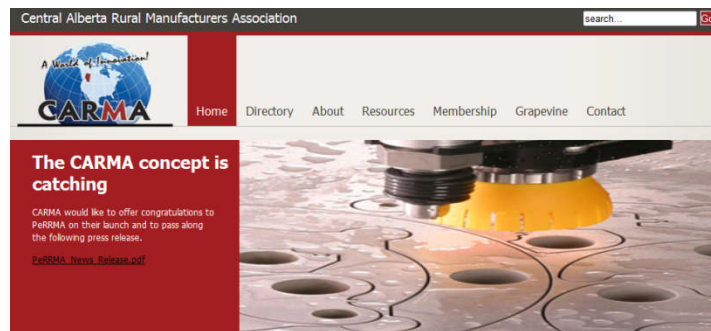
The organization is comprised of a partnership among CAEP, RDC, CFC (Community Futures Corporation), the City of Red Deer, and industry with representation. It has worked well to represent the service providers in the region. It was also recognized that the central Alberta region was isolated for manufacturers to meet each other and gain specialist knowledge and services. Through a study process of the region, a plan was developed to address the gap. In

2008 a new rural association called Central Alberta Rural Manufacturers Association (CARMA) was developed to help these isolated rural manufacturers (food, wood, oil and gas, services) to gain knowledge to remain competitive and share ideas. See <http://centralalbertamanufacturers.ca> for more information. This regional approach also allows for access to provincial programs and grants (such as \$400,000 from RADF- Rural Alberta's Development Fund- in 2008 for CARMA). The general innovation system is described in the diagram below (Source: TBMC).

Innovation System- Red Deer Region



CARMA is highly successful and uses monthly learning events to engage and keep businesses directly involved, and is led by an experienced manufacturing engineer in the region. It has received grant funds and program support from CAEP and others to help to actively link manufacturer's needs in innovation and competitiveness. This model of linking education and applied research to a direct business group is highly important to ensure engagement and business driven activity. Many times public organizations do not understand private sector issues and assume their agendas match rural businesses. This latter approach often leads to failure.



4. Lakeland College-Lakeland College is a diversified college in Vermilion and Lloydminster, and has a strong agriculture history. The College has developed a number of niche courses in

the areas of environment, firefighting, agriculture, and recently has developed a new niche in applied research.

Lakeland College recently received an NSERC grant for \$2.3 million to develop several new areas of applied research in energy related areas. The funding will support the growth and expansion of renewable energy use in the region by preparing trainees for evaluating, demonstrating, and comparing technologies, and for developing new, adaptive, and cost-effective bridging technologies. The School of Environmental Sciences is coordinating the research project area and expects to focus on renewable energy uses for industry and business in addition to training of students.

5. Grande Prairie Regional College—Grande Prairie Regional College (GPRC) has similar student, community, and business training supports for the region. We highlight a new regional centre to address innovation which has proven to be well received, and which has attracted new funds for the region.

A new focus in innovation in the Grande Prairie region is now operating. The new Centre for Research and Innovation (CRI) is located at Grande Prairie College and started in August 2008. The funding for this centre came from Alberta's Rural Development Fund, amounting to \$3.5 million over a three year term. The new centre is located at the college as a standalone area, and reports to the VP of Administration. Some other funds have also been promised to the CRI. The College rents space for which Alberta Advanced Education & Technology has provided 3 years of funds. IRAP may support 1 project per year and innovation vouchers are being actively sought out (6 in year 1 and 6 for year 2). See <http://www.gprc.ab.ca/community/cri>.

The CRI has a focus on rural ventures in the Peace region:

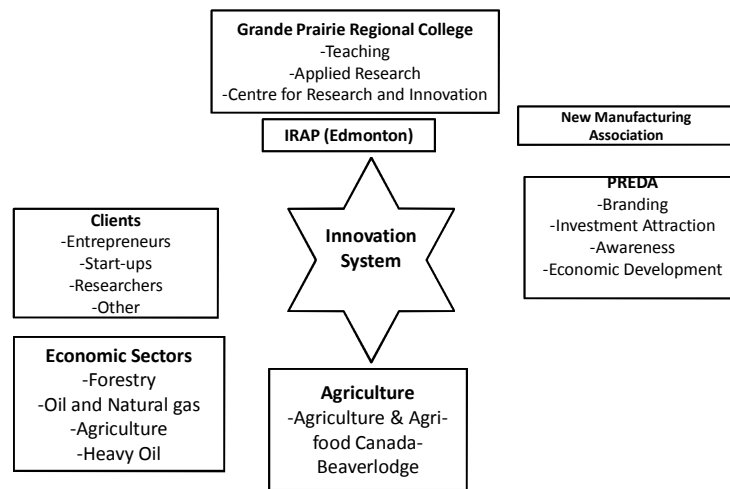
“The issue for the Peace Region, like other rural regions in the province, is that business growth can no longer be tied exclusively to traditional natural resource development. In order to become part of the new diverse and knowledge-based economy, entrepreneurs and innovators in the Peace region need access to innovation services. For example, a patented agriculture feed system is being proposed by a local entrepreneur but market research and prototyping is lacking and is a barrier to commercialization. In another instance, technical expertise for plastic product design and studies of methods of fabrication do not exist in the region. In yet another case, forestry productivity improvements require regional research but such research lacks committed infrastructure and dedicated leadership.

Other product opportunities for developing or enhancing business exist in the development and marketing of computer games and software; or in providing assessments of community needs for particular products, services and businesses. These types of projects would add to the economic diversity of the Peace region.”



CRI provides leadership and resources to meet the needs of the region for client innovation, productivity, and competitiveness, and in doing so, has a vision to *“Making the Peace Region the Best Place in Canada to Innovate”*. The CRI has an Executive Director, three main staff, 4 adjunct staff as needed, and a Manager of Innovation and a Manager of Applied Research. The CRI will also soon have an Advisory Committee of 3 from the Peace Region Economic Development Alliance (PREDA), 4 from the College, and 5 from the community at large. The CRI actively travels to Edmonton and elsewhere to seek out new opportunities. It works with PREDA to find new projects and funds. The diagram below indicates the system (Source: TBMC).

Innovation System- Peace Region



CRI's core businesses are:

- Build better capacity to do applied research;
- Foster and Develop a Culture of Innovation; and
- Provide (innovators and SMEs) access to the best level of services and resources that will enable commercialization of new products and services.

Operationally the CRI has offices in the GPRC and another business office in Centre 2000, which is co-located in the Chamber of Commerce building. The CRI facilitates business linkages to innovation service providers and provides an advisory function to the regions' businesses. However, distance and diversity in the north between Grande Prairie and the businesses located in the Peace River, High Level, and Fairview regions present some service delivery issues.

6. Northern Lakes College – Northern Lakes College has developed a responsive small northern community college model (with many sites) which has completed some very interesting training projects in this highly diverse area. Northern Lakes does not conduct much applied research and has a main campus in Slave Lake and offices in Grouard. It delivers continuing education into many small communities through many sites and is highly responsive to local needs in this approach. Programs include upgrading, apprenticeship, workforce development and transfer studies.

7. Alberta- North Project- Alberta-North was a novel college collaboration committed to northern communities, northern learners and northern needs. It was a partnership among 7 post-secondary institutions committed to making distance education accessible to students in northern Alberta and the Northwest Territories. The 5th annual Alberta-North Access Symposium was held in 2010. Professional development opportunities for post-secondary staff were the focus of the Symposium. The experiences covered: developing, teaching, facilitating, and administering distance education.

The project intent was that adult learners in the north have a right to access affordable, equitable educational and training opportunities. Alberta-North created bridges that allowed northern residents to participate and succeed in post-secondary education and training in their community. On-site facilitators at over 87 Community Access Points (CAP) provided learning support services, meaningful information and offered resources needed to build readiness and develop skills. Through the Community Access Points, Alberta-North provided distance education programs and learning support services to citizens in 60% of Alberta's geographic area, for 9% of the province's total population and 51% of its Aboriginal population. These best practices of partnering distance learning in Aboriginal support programs, was very successful.

What can be learned from this model? Collaboration with college partners and an outreach model works well to effectively meet the needs of small remote communities. The administration has been passed to eCampus Alberta effective July 1, 2011 and the community access points will continue under stewardship of the northern institutions, and the website will continue. The types of student support services under the CAP model may be expanded in Alberta.

8. Keyano College—Keyano College is located in the Wood Buffalo Region and is highly linked to the oil sands developments, trade and technology, upgrading, and applied research. Keyano has 7 learning campuses and centres to deliver local learning as needed.

Keyano is developing some interesting industry based projects to help train students and develop new ideas. A unique partnership between Total E&P Canada Ltd., Keyano College, and the Greentech Greenstart Project brought a mobile greenhouse to the College in 2008 to plant the seeds of student success in earth and environmental sciences. The greenhouse, its hybrid tow vehicle and program support, together valued at over \$150,000, was donated by Total E&P Canada to facilitate hands-on science education to local and regional schools. In 2008, the College received the League for Innovation of the Year Award for Keyano's Learner Assistance Program (LAP) and recently they received one award for services to students with disabilities.

Keyano currently has two major environmental research projects underway:

- Amphibian Ecology and Health in the Canadian North" where the researcher is looking at the impacts of oil sands mining on amphibian health in the boreal forest. Sponsors include Keyano, Alberta Conservation Association, Canadian Wildlife Federation, and Environment Canada – this is a collaborative effort between 4 researchers each located

at Keyano, Environment Canada, Atlantic Veterinary College and San Diego Zoo Institute for Conservation Research.

- Field survey to quantify large mammal abundance at the Syncrude Southwest Sand Storage area” which is a 3 year project currently in its 2nd year of operation to assess the degree to which large mammals interact with a tailings pond in the southwest sand storage area of Syncrude site. Sponsorship is from Syncrude for \$400,000 over 3 years.

Keyano has a unique opportunity to support oil sands development with training, aboriginal education, water and wastewater recycling, and a number of other areas in applied research and innovation. However, the regional innovation system is not as developed (or advocated) as in other regions.

9. Campus Alberta Central-The government of Alberta recently introduced sweeping changes to many elements of the organization of post-secondary education in the province. One of these changes was to create a new classification system for institutions, each type having a different mandate. In the case of those classified as Community Comprehensive Institutions (CCI's) the mandate included responsibility for “stewardship” over a designated geographical region. The concept of stewardship was not defined in any specific way but is generally considered to provide assistance to communities and individuals wishing to access post-secondary education and training, as well as supporting the work of community agencies providing non-credit learning opportunities of various kinds. The Central Alberta region was unique in that responsibility for stewardship was assigned to the institutions of Red Deer College and Olds College. They are very different, with Red Deer College being a conventional comprehensive community college offering a broad range of programs, whereas Olds College is a non-comprehensive and highly specialized institution offering a narrow range of programs to a national market.

Both colleges had been active in the Big Country Educational Consortium, which had been serving at least part of the Central region. The actual delivery of programs had been somewhat limited both by lack of demand for the kind of specialized programs offered at Olds College and the financial and operational challenges faced by Red Deer College as it struggled to meet the needs of rapid expansion in the City of Red Deer. Other provincial institutions had also served the area sporadically. The greatest impediment to providing credit programming was due to the difficulty of assembling the critical mass of students needed for a viable delivery in any of the small communities being served. The region was also characterized by the existence of several well-organized local education agencies in towns such as Hanna and Innisfail.

After carefully consideration and public consultation the two colleges created Campus Alberta Central (CAC) as their joint vehicle for addressing regional stewardship.

Innovative Concepts

Governance: CAC is an independently governed joint venture owned equally by the two institutions. The governance model was developed by Olds College and the Chinooks Edge School Division in the creation of the Community Learning Campus in Olds. A board appointed jointly by both colleges governs CAC. It has a mandate from the colleges containing a mission and an outcomes document and is accountable for delivering the desired results. This board employs an Executive Director and staff to manage the operations of the CAC. The mission of the CAC is to serve the needs of the central region effectively and the approach is not predicated on furthering the interests of the two local CCI's. Investing this kind of neutrality into

CAC decision-making was considered necessary in order to insure a sound policy-based operational environment

Commitment to Distance Learning: All CAC communities with community engagement sites are connected to the Supernet and the VC network, operating out of the Bell E-learning Center at Olds College. Albertans are very well served with distance learning opportunities offered through both Athabasca University and eCampus Alberta. They also have access to a multitude of offerings available globally on the World Wide Web. Virtually every mainstream undergraduate degree and diploma program is available in this modality, and very significant public resources have been invested. CAC's policy is to replace any attempts to provide sub-optimal face to face deliveries with a system that strongly support individuals pursuing their post-secondary education through distance learning. This will leverage value out of the investment already made in program development and make more efficient use of whatever scant resources may become available from government. CAC's support will take two forms: the provision of a robust technology platform at each community engagement site, along with the development of an equally robust suite of student supports aimed at improving outcomes for distance learners.

Community Owned and Operated: When it created the stewardship mandate for CCI's the government did not chose to provide any operating funds in support of the new effort. Consequently, the CAC has elected to offer services through a network of community owned and operated engagement sites. Some sites were established prior to the creation of CAC and were funded by various programs such as the Rural Alberta Development Fund. In other cases, communities had already created centers of their own, usually by aggregating the resources made available to libraries, Community Adult Learning Councils, and Community Literacy organizations. These self-supporting centers were chosen as the model for the CAC delivery system and, therefore CAC communities are expected to make learning a part of their strategic plan and invest accordingly. In many ways these centre's can be seen as community learning franchises. Communities become responsible for local organization, facilities and staff, insuring that the interests of local stakeholders are documented and communicated. This is based on the understanding that educational institutions are generally unable to do this kind of work effectively. CAC, in turn, provides a sophisticated technology platform and program assistance. These are well beyond the capability of most community-based organizations so the division of effort is efficient and effective.

10. Summary of Alberta Rural College Review

A brief review of the college innovation approaches used in Alberta shows quite a variety in adapting to local conditions and using creativity to attempt to engage with business and people.

Some of the common findings are:

- The regions reviewed have a definite approach which is inclusive and links to current resources in the region;
- A clear communication approach and look has been attempted to portray how innovation is supported locally with local contacts and resources;
- A budget has been sourced from provincial and in some cases federal funds;
- A proactive approach is employed to ensure local access to the new innovation voucher program and other programs which are being developed;
- Coordination among agencies is used to avoid conflicts and to maximize business benefits and meet local needs.

The Alberta system is changing with a number of key drivers for the near future:

- Regional approaches are being used and will be used more for economic development delivery and organization;
- The Alberta innovation system is now being organized into regional innovation networks with collaborative efforts focused on services to SMEs which are smaller, and technology oriented growth businesses;
- Alberta is moving towards a focus on energy developments, computer and information technologies, applied research, environment, agri-food and many other knowledge-based focused areas lead by four innovation corporations;
- Demographic issues such as aging populations and a declining workforce will challenge all communities;
- Continued consolidation of industry and business changes due to competition;
- Focus on productivity and competitiveness will be important for the business sector.

The top concerns seem to be:

- Meeting the challenges of the regional stewardship obligations assigned to comprehensive community college-without any funding;
- Addressing the need for increased ICT (information and communication technology) deployment with constrained budgets;
- Finding new ways to collaborate with other colleges, even sharing of core operations, while maintaining a degree of autonomy;
- Dealing with an aging demographic, especially in the north, and maintaining a critical mass of enrolment with a shrinking college-age population;
- Providing degree completion options for learners within the current tiered institutional structure in the north;
- Meeting the skill needs of the economy as we come out of recession with severely strained college finances.

Quebec College Practices (CEGEPs)

A recent survey by the Federation des CEGEPs highlighted and stimulated the thinking of stakeholders in the Quebec college network.^a This section provides ideas that may be transferable to northern Alberta post-secondary institutions.

The priority of most Quebec colleges is to innovate within the college learning environment to respond to the community and business needs. They have specialized, and the two tables below indicate some of the program focus areas.

Table 1 - Breakdown of Colleges by Sector of Innovation

College program <ul style="list-style-type: none"> • Training offer • Teaching • Support for academic success Projects at these colleges are meant to create a smoother transition between levels of education to ensure academic continuity.	85.3%
Educational environment	76.5%

^a Federation des CEGEPS, Innovation in the CEGEPs, From the Stakeholders' Perspective, Research Report, Autumn 2006.

<ul style="list-style-type: none"> • Health and psycho-social services • Sociocultural activities and facilities • Guidance and job placement • Training offer • Learning environment <p>These colleges provide students with a living environment that features all the resources they need to reach their full personal potential.</p>	
<p>College administration</p> <ul style="list-style-type: none"> • Financial and physical resource management • Human resource management • Online service development <p>These colleges aim at developing new management practices and tools that will help the teachers.</p>	67.6%
<p>Regional development</p> <ul style="list-style-type: none"> • Support for economic or regional development • Developing centres of excellence <p>Many colleges focus on regional development to obtain a meaningful role in the community.</p>	64.7%
<p>Opening up to the world</p> <ul style="list-style-type: none"> • Internationalization of training • Mobility • International cooperation • Recruiting foreign students <p>These are colleges that use innovations that give their training programs an international dimension.</p>	64.7%
<p>Research</p> <ul style="list-style-type: none"> • Discipline research • Applied research <p>Pedagogical research</p>	55.9%

The table below indicates the type of innovation in the college system.

Table 2 - Breakdown of Innovations by Type of Innovation

Social	48.3%
Organizational	27.8%
Organizational and Technological	13.5%
Social and Technological	7.3%
Organizational, Social and Technological	1.5%
Technological	1.5%

Nearly half of the documented practices included social innovation characterized by the introduction of a new service, approach, policy or program that is proposed as a solution to a social problem. It mainly takes the form of new services for students, faculty, plus regional and international communities. An example of social innovation was the introduction of a cooperative program for young people with cognitive impairment at the John Abbott College.

Organizational innovation involves the implementation of a new organizational method such as the creation of new structures or advanced management techniques. Innovations tended to consist of either external relations-new forms of collaboration or partnerships, operations-new

operations management systems, or management-new ways of attributing responsibility and decision-making powers. An example of organizational innovation is the creation of a non-profit organization devoted to developing and supporting evaluation practices.

College Francois-Xavier-Garneau collaborated with the Universite Laval and formed an independent agency which processes and archives data, delivering a unique evaluation practice for all Quebec colleges.

Technological innovation usually includes social and organizational innovation. It refers to the purchase or utilization of new products or the development of technologies. The Wind Turbine School in Gaspesie is an example of a college program based on technological innovation. The college works with industry to develop courses and expertise in the wind turbine field. The college acquired a wind tunnel, a wind turbine braking system, two weather stations, a wind farm simulation program and a 55kW wind turbine. This project is industry- driven and future-focused on innovations.

Common Objectives of Innovating Colleges

The main reason Quebec colleges innovate is to make their service delivery better, by developing and improving the quality of student services. The second objective tends to be to improve the college's image or visibility. They innovate to increase their competitiveness to attract and retain students and stand out from their competitors.

Table 3 – Objectives of Innovating Colleges

Developing or improving the quality of student services	58.3%
Improving the college's image or visibility	57.9%
Improving relations and maintaining or developing partnerships	54.8%
Developing or improving the training offer	51.7%
College management or optimization of resources	43.6%
Regional development and improving the services provided to the community	42.1%
Improving academic success and diploma acquisition	39.0%
Managing human resources and the work environment	38.6%
Developing research and transfer of knowledge	30.5%
Recruiting students	28.6%
Improving access to education	22.4%
Improving the job placement rate and internship offer	18.9%
Improving student or teacher mobility	10.4%
Other	11.6%

Innovation Planning

Innovations that take place in CEGEPs tend to be thought out, prepared and organized in advance. In over 75% of cases, a detailed plan of the steps to be taken had been drawn up. These included pre-determined objectives, an implementation schedule, an action plan, and a resource allocation schedule. In almost 60% of cases, however, colleges did change the initial project during implementation, and in just under half the situations the final results did not match the initial strategy. Despite detailed planning, organizations may need to change the initial project.

Obstacles to Innovation

About 85% of innovations encountered at least one obstacle to implementation. Financial and physical constraints were the main barrier in over half of the innovations. Work overload and the time factor slowed the implementation of innovation in half the situations, but was considered as a significant obstacle in less than 15% of the innovations. Colleges rely above all on their internal strength when innovating. They recognize external factors as ideal conditions for the development of college innovation, but they do not see them as necessary prerequisites.

Geographic location does not have to be an obstacle. In certain areas of rural Quebec, 90% to 95% of secondary school students enroll in the local college. The local client base is very loyal due to proximity, cost, sense of belonging, and the range of programs available. In those areas, where a higher percentage of the local client base is lost to the urban colleges, the rural colleges offer special programs that draw students from across the province.^b

Coordination, leadership, and the presence of qualified staff to implement the innovation and commitment of the executive and staff were real factors of success in over 90% of cases. *“Perseverance and ongoing support for the project, as well as its relevance to the needs of the milieu, were determining factors in over 90% of innovations.”*^c Innovative colleges adopt training strategies that involve staff participation. This training supports and stimulates innovation and also promotes its assimilation. The organizational culture and training are essential to the innovation process.

System Perspective of College Innovation

Multiple components and interactions make up a college innovation system. The system is comprised of the links and interactions among three levels: the organization, the immediate environment, and the global environment.

The first level of an innovator college includes the individuals who comprise the organization. Individuals are the central element and the determining factor in an institution's capacity for innovation. The most important personal qualities and skills are the capacity to generate ideas, to take calculated risks and initiative, to form and maintain relationships and the ability to transform ideas into products, processes and services. Innovator colleges have an organizational culture that fosters staff initiative by providing them a “margin of maneuver” through open communications and staff autonomy. Innovation depends heavily on human resources and not just on the role of scientific and technical staff. One third of innovations required hiring additional staff for implementation. Skills and competencies in the area of information technologies were the most crucial ones to source.

Communication with the students is essential to obtaining information needed for the formulation of innovative ideas. Innovative colleges regularly conduct activities to evaluate the services and needs of their students. The college's primary goal is to develop or improve the services offered to students. The students are the major force behind all social change and offer teaching institutions imagination, development, and awareness.

^b Bacon, Gilles. Certain Issues Faced by Regional Colleges in Quebec. College Canada, Volume 6, Issue 1

^c Federation des CEGEPS, Innovation in the CEGEPs, From the Stakeholders' Perspective, Research Report, Autumn 2006.

The second level is the innovator college's immediate environment, its networks, partnerships, and its business context. Business partners are among the instigators of nearly a third of the innovations and are associated with one or more other stages of the process in roughly 90% of the projects.

The proximity of businesses and accessibility to their management provides an advantage to rural colleges when seeking partnerships with local businesses. These businesses tend to be smaller, quite diversified, less prosperous and reluctant to invest in training. Colleges must be cautious in the services they offer to the business sector and not compete with existing private services. While having large corporate employers in the area, such as Alcan and Bombardier, is beneficial, dependency on a single industrial sector is risky. More successful models have included developing products that target a broad client base in the specific area of expertise and forging strategic alliances with private consulting firms.

Rural colleges are often the most senior local education authority and become the hub for local economic, social, cultural and sporting development.^d Students provide a large recruiting pool of part-time jobs and skilled labour. The college provides the community with local cultural and sports infrastructure. Many colleges own and operate cultural or sports facilities that they must maintain as part of the community.

The immediate environment also includes governmental departments and agencies, the local and regional community, employment agencies, enterprises, associations, non-profit groups, researchers and the scientific community. Colleges compete with other institutions and therefore adopt some characteristics of private enterprise. They innovate to improve their services but also because they want to achieve better student recruitment. The global environment of innovator colleges is largely defined from governmental policy, over which the colleges have little or no influence. These include the budget parameters dictated by government funding, the legislative and regulatory framework governing the colleges, and the pool of available human resources including scientific research.

Steps To Develop an Innovative College

Observations from the research report on innovation in the Quebec college system are useful:

- Pay careful attention to select team members with excellent coordination and leadership skills. They should excel at idea generation, be able to take calculated risks and enjoy forming strong community and business relationships;
- Do organization-wide training to ensure that the entire college is onside;
- Expect changes during the implementation of the innovation;
- The organization must be structured in a manner that allows staff autonomy;
- It is important that the organization develops strong ties with the local business sector and also with the students attending the college. Setting up strong networks and partnerships is a priority.

Selecting the Innovative “Niche”

^d Bacon, Gilles. Certain Issues Faced by Regional Colleges in Quebec. College Canada, Volume 6, Issue 1

The matrix below provides the possible niches that could be developed in an innovative college. The darker cells within the matrix are the combinations that were most prevalent in the Quebec college system. One approach to select an appropriate innovation “niche” would be to identify and rate the options that would be appropriate for the northern rural colleges.

Quebec College Matrix

	Sector					
	College Program	Educational Environment	College Administration	Regional Development	Opening to the World	Research
Developing or improving the quality of student services						
Improving the college’s image or visibility						
Improving relations and maintaining or developing partnerships						
Developing or improving the training offer						
College management or optimization of resources						
Regional development and improving the services provided to the community						
Improving academic success and diploma acquisition						
Managing human resources and the work environment						
Developing research and transfer of knowledge						
Recruiting students						
Improving access to education						
Improving the job placement rate and internship offer						
Improving student or teacher mobility						
Other						

Thunder Bay

Thunder Bay is developing a more integrated approach to linking innovation and entrepreneurship with Aboriginal groups and others to help create economic development.

Confederation College in Thunder Bay is developing a new niche in bio-energy in bio-fuels, biomass, wind, and solar projects. It is also developing a new research Centre to be a highly visible model for renewable and green energy products. Negahneewin College of Academic and Community Development (associated with Confederation College) is trying a new approach to using traditional knowledge by using geospatial technologies and mapping. In the land use studies project specialized courses and training help community organizations and businesses in decision-making. The new approach is meant to promote understanding, assessment, and new innovations through collaborations and use of GIS technology.

These two proactive approaches of applied research and stronger Aboriginal linkages with technology should lead to new economic opportunities through applied research and other collaborations.

Summary of Alberta, Thunder Bay and Quebec Findings

Based on the research completed in the Alberta, Thunder Bay, and Quebec college models a number of college innovations are occurring in the areas of community development, economic

development, applied research and innovation. This is mainly due to competitive pressures by communities, businesses, and students.

Some of the key findings include:

- Colleges which are innovating tend to reflect regional economic demands, business, and student interests;
- More applied research is occurring and is being built into the core college operations;
- Specialization is occurring at the college level based on the skill and knowledge base;
- Some colleges are investing to help spur these changes in the specialization;
- Colleges will need to strategically plan for the desired changes which involves both internal and local leadership;
- Community and students will benefit from these innovations which can be broad-based, or specific in nature;
- Alberta is moving to a regional innovation system and many colleges are already adapting to this new funding and system model.

The summary table below provides more comments on the key features noted from the research. The focus of the tables below is on rural resource- based colleges which were seen to be innovative in practices relating to students, community, and business.

Table 4- Innovative Practices- Quebec, Thunder Bay, Alberta Colleges

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
1. Canadian						
Quebec CEGEP	Student learning and community engagement	-Rural colleges develop specialization - Provide smoother transition between levels of education	- develop products that target a broad client base in the area of expertise and forge strategic alliances with local firms.	- access to management is easier in rural areas -communities with regional colleges become closely knit	-direct economic benefits to community of \$15k per student/yr -valuable source of local skilled labour -college is hub for local economic, social, cultural and sporting development.	-Is a systems approach which is highly linked to Quebec programming and community needs
Thunder Bay, ON Confederation College, partners	New technology development in green tech and in traditional knowledge projects	-Confederation College assists industry in tech developments with students	-developed continuing education lines for new students, upgrading and beyond	-not known -KGAP (knowledge and geospatial application program) used	-use of Confederation College and Negahneewin College of Academic and Community Development	-tailored approach to aboriginal education and new technology developments
2. Alberta						
Medicine Hat College	Serve students in region	-Starting to develop innovation model	-upgrading and diplomas			
Lethbridge Community College See	Develop aquaponics and carp projects	-focus on regional needs, water, irrigation, tech				
Olds College	Link community to E-campus platform and needs	-Multi-site campuses -use Supernet -regional focus -cost-recovery	-upgrading -specialty courseware -ag courseware	-extremely well rec'd and effective -cost-sharing with student	-student enrolments -remote delivery models	-is a good model which allows breadth and depth of courses for many interests -Supernet is not well utilized yet and can be expanded
Olds College	Develop host site for rural	-provide labs and technical expertise	- new investments in bioprocessing	-raised over \$20m to date	-has received NSERC funds and company	-was a new approach for Cdn college system

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
	innovations in college Develop strong community connections	-focus on bioprocessing for central Alberta projects, co-located with college	-new science and tech staff -collaboration with U of A -students on industry projects	-many industry projects -now a focus on bio-fuels	projects -has many industry partners for new programs	in 2000 -provides a new way for colleges to undertake applied research and company projects - requires a special business model to meet college mandate and sustainability goals
Red Deer College	Develop rural innovation and manufacturing focus	-provide manufacturing facility and innovations for rural manufacturers in RD region, co-located with college	-CARIN- Central Alberta Regional Innovation Network -CARMA- Central Alberta Rural Manufacturers Assn -is a dual link to manufacturers for student and project interface	-has secured funds for new building, welding and rapid prototyping equip -completed industry projects with students	-has been recognized as a good model of dual portals to the college system -unclear as to industry impact -has received \$450 k from ARFD for the CARMA project	-the dual approach of the innovation model and the new manufacturing association is seen to be novel and valuable for the region -use of a senior level manufacturing person has helped to develop and sustain the project
Lakeland College	Develop a focus on student learning and applied research in 3 areas.	Work in the AB and SK areas of interest including ag, environment and energy	-applied research in agriculture, energy, environmental sciences, emergency services, health and wellness, human services, manufacturing and construction	Received a \$2.3m grant from NSERC for integrating renewable energy and conservation technologies to support project development and applied research work which will benefit several sectors	-is starting to develop a focus in renewable energy - Lakeland joins the prestigious ranks of just three other Alberta colleges —and only 28 in Canada—supported by NSERC’s CCI program	Shows how the college has developed a process for developing applied research and in new areas
Grande Prairie College	Develop regional rural innovation and economic development -partnered with PREDA	entrepreneurship and pathfinding support for new innovations and projects in the region, co-located with college	-Centre for Research and Innovation (CRI) -provides service delivery for innovation projects for business and	Received a \$3.5m grant from RADF over 3 yrs to carry out initial startup and operations	Have been successful in advocacy and in securing innovation voucher grants for regional businesses -started in 2007 and is recognized for efforts	Shows how a college can work in a region to access and support business developments. May have a sustainability issue

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
	and Innovation Network	-strategic lines-innovation services, applied research, partnering, rural service model	entrepreneurs -uses internal staff and third party experts			post grant
Northern Lakes College See 6	Link rural community to the core offerings	-multi-site campuses -use of Supernet and regional focus	-upgrading in rural communities	-very well received	-appears to be a valid model for delivery to aboriginal communities	-was closed due to change of budgets
Keyano College	Develop oil sands and related industry supports	-aboriginal education and rural community developments	-student education trades, tech, transfer, upgrading	-good community support		-high potential for service and research related to oil sands developments

Website References:

1. See <http://www.mhc.ab.ca>
2. See www.oldscollege.ca
3. See <http://www.rdc.ab.ca/Pages/default.aspx>
4. See http://www.lakelandcollege.ca/applied_research
5. See <http://www.gprc.ab.ca/community/cr>
6. See <http://www.northernlakescollege.ca>
7. See <http://www.keyano.ca>
8. See www.confederationon.ca

Innovative College Practices- International

International College Practices

The international review is summarized in the table below and indicates a number of similar issues which have been noted for the Alberta and Quebec college models.

The review included:

- USA rural colleges;
- Australian colleges;
- Global innovation systems;
- General findings from other related studies.

The main themes of the research indicate many colleges are responding to changing markets for student learning and also for a greater linkage to the business and community interests. Roles of colleges are changing to more leadership models with stronger technical knowledge. It is highly likely that colleges will need to upgrade their competencies, skills, and labs to compete in the future of a global marketplace.

Summary of International Findings

The lessons derived from the international review included a number of key findings:

- In the USA, rural colleges tend to focus on the region and its local priorities;
- The USA college system often links to the manufacturing extension partnership (MEP) office for applied research and business supports;
- Colleges tend to work within an industry cluster or a network model;
- Technical colleges tend to focus on a dual purpose of student and business needs;
- International people exchanges are used to build and transfer knowledge;
- A high focus on students and their needs is common;
- Innovation is a trend in most centres in the world, and systems link to research and development groups;
- Colleges are continuing to change with use of the internet and new social and communication models of delivery.

The table below provides a summary of the main findings and features noted in the literature research.

Table 5- Innovative Practices- International Rural Colleges

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
College Focus- from the research						
Stuart Rosenfeld, Technical Colleges, Technology Deployment, and Regional Development , 1998	Technical colleges are unusual and even unique among public educational institutions in the explicitness and intensity with which their economic aims complement their educational goals. Nearly every technical college system was formulated or has been reformulated to serve both the student bodies and regional economies. This economic value of technical colleges is based on an inherent flexibility that allows them to respond quickly to the demands of the workplace caused by growth, technology, and/or economic readjustment.	Colleges are often regional institutions, and the programs and services of technical colleges are intended for local and commuting students and nearby firms. Faculty are encouraged to think globally but act locally. This regional focus presents the technical colleges with the opportunity for cluster specialization, which some colleges have seized	Depends on the role of the college in the region. Some roles include: -The technical college provides SMEs with their best source of information and best de facto human resource department for the firm too small to support a human resource development function internally. -Colleges provide neutral environments for association—through evening continuing education programs, symposia and meetings, CEO breakfasts, and other social/professional/educational events in which local business people have a chance to discuss common economic issues. -The entrepreneurial college understands the value of associative behavior	Categories of college focus include: -education -upgrading skills -technology intermediary and deployment -foster strategic alliances Technical colleges, which are regionally committed and connected, possess a store of technical expertise and knowledge, are able to adapt quickly to change, and are better able to successfully bridge the gap between civic and economic, individual and industry interests than most institutions. The major evidence is the views of employers,	Colleges work in region well and help build clusters and have certain effects, including: -education effects -economic effects -changes in college programs to university means fewer technical skills -faculty may be resistant to change -balancing interests -reluctance of SMEs to invest	Report concludes to: -encourage and facilitate alliances -nurture business leadership -have flexible scheduling -use broker networks for outreach -adopt learning technologies -incent cluster specialization and clusters -target parents and non-traditional populations -encourage innovations -include colleges in regional planning

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
			<p>and assumes roles as broker and facilitator.</p> <ul style="list-style-type: none"> -The more pro-active colleges have organized business alliances to intentionally accelerate learning, collaboration, and business transactions 	<p>especially SMEs who look to contract with technical colleges for an increasing range of services.</p>		
<p>S. Rosenfeld, Community College/ Cluster Connections, Specialization and Competitiveness in USA and EU, 1998</p>	<p>Regional colleges role in economic development</p>	<p>Specialization is a response to particular concentrations of needs in regional economies. Distinguishing characteristic of global industrial geography is that related businesses tend to cluster. Businesses form around these natural poles because they find advantages to be near their suppliers, customers, sources of technology, services, and competitors.</p>	<ul style="list-style-type: none"> -Understand the specialty needed and build capacity -A feature of successful clusters is the presence of a labour force with the skills and knowledge required by the local industries and an education and training enterprise able to continually generate new entrants and upgrade the skills of existing workers. -community colleges fit well with SMEs -colleges focus on regional business needs -colleges can react faster to regional developments -clusters form in regions and need to better “match” with college capacities 	<p>Not known</p>	<p>Case study experience indicates colleges that address regional economic development provides stronger impacts. Differences appear- NA colleges help acquire skills, explore career options, are large comprehensive programs, may lack national standards, many students returning to school</p>	<p>Review of 4 colleges in 3 countries. Colleges specialize, build expertise, and link themselves to specific clusters. The nature of the clusters and local circumstances shaped the decisions</p>

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
			- colleges effectively function as service and technology brokers for small and mid-sized business enterprises			
RTS, International Exchange Process-A Guidebook on Trans-National Learning for Community & Technical Colleges, 2000	International exchanges to improve global knowledge and competitiveness	-global not regional	-Faculty -student -administrators All can benefit to gain new perspectives, spur innovation, increase career development, build interest, enhance professional development, promote economic and professional networks	Not known	Very positive as people develop through new learning models and ideas from outside. Gain personal and professional networks	Step 1- decide on programs to include Step 2- conduct advance admin visit Step 3- create exchange checklist (travel, lodging, ground travel, term, expenses, funds, objective, participants, insurance, health Step 4- evaluate and communicate successes
C. Liston and L. Swanson, Innovation and Replication Can Community College Successes Be Repeated?, 2001	Reviews how replication and learning of shared practices can help rural colleges positively in a community	Document best practices and innovations of colleges then share knowledge	Actions include: -build from natural environments -entrepreneurial training -community college and local alliances -community partnership in planning -quality of leadership -linked college system learns faster -use a system for choosing benchmark practices, then disseminate	The networks generated when one college repeats another college's program can reduce the effects of small scale and isolation felt by many rural community colleges. Replication is an efficient way for small colleges to create effective programs for their area. Connecting with other colleges and envisioning	Evidence suggests colleges help communities: -Represent creative alliances with businesses, other educational institutions, or related agencies; -Overcome skill shortages, allowing businesses to operate at capacity and/or expand; -Provide displaced, underemployed workers or youth a second chance; -Bring new	

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
				solutions used in other economic environments are activities that foster ideas.	information about technology, markets, or better business operations to small and mid-sized firms; -Encourage or support entrepreneurship; -Raise productivity by improving technical education programs; -Enhance links with and knowledge of the international economy	
AU Dept of Education, Training and Youth, Innovation and Best Practice in Schools: Review of Literature and Practice, 2001	Review of at risk youth and reasons they disengage in school programs	International review of practices across countries	<ul style="list-style-type: none"> -Responding to youth -Bring about change -Student focused -Curriculum changes -Community oriented -Systems changes Understanding youth 	<p>Not known</p> <p>Common BP characteristics are:</p> <ul style="list-style-type: none"> -A shared vision for the delivery of high quality services. -A strategic plan, develop through a consultative process, set out short, medium and long term goals. -A commitment to continuous improvements. -Flatter organisational structures supported by 	Not known but school culture is a key factor, role of the school relates to leadership, high levels of commitment of staff, school climate, curriculum and orientation to work and teaming	Best practice is a concept that has been widely adopted in education and the human services. Some argue that because there is no one right way to teach students or counsel clients, 'good practice' is a better term. What is regarded as best or good practice will change over time as improvement continues and more is learned.

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
				responsibility, empowerment of staff, and good communication -A cooperative participative culture with effective communication and consultation processes. -A focus on service users, both internal and external		
S. Rosenfeld, Networks and Clusters The Yin and Yang of Rural Development , 2002	Reviews EU/ USA rural network programs for regional developments and college roles	Focus on -brokers- to facilitate business -network multipliers- who assess collaboration opportunities -incentives- for business to participate -information and awareness -institutional hubs- to provide allied services and coordination	-build from agri cooperative movement -focus on collaborations -link with rural colleges -rural networks are soft networks and likely driven by need or crisis -expose businesses to best or better practices	Lessons learned -firms will cooperate -networks can be formed by brokers -incentive grants have small value -networks need trust but also create a forum -learning is a good network outcome -rural networks rarely are self-sufficient -networks can improve the quality of lives	Provides evidence from Denmark, Italy and USA models -Shows a number of examples of various networks and use of brokers to stimulate -Shows how modern businesses in the global economy are working together to compete -Shows how networks will move to help in building clusters for an industry with specialized services and knowledge- shows how regional colleges are needed in networking roles and as a service provider	Shows how many regions in the world are using these models to build competitive industries and how regional colleges often are rural leaders in the developments

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
					-shows how these models help in the learning process	
Stuart Rosenfeld et al, Targeting Clusters, Achieving Excellence, 2003	The model of a cluster-based workforce delivery system is based on (1) college practices observed in the world, (2) direct experience with cluster building strategies, and (3) emerging theories and innovations.	Concentrating on clusters gives a college a chance to stand out. Not every college can provide high quality education, training, and services to all industries. By specializing, institutions and systems can assemble the expertise and resources to achieve excellence.	Key lines: -build a cluster based system -package education and training around the cluster -serve as the resource centre for the cluster -supply information and spur innovations -track the needs and outcomes -create broad linkages -expand outreach and access -find funding	Colleges that have been most successful at focusing on a cluster typically cobble together revenues from a variety of sources. Self sufficiency is not a reasonable expectation for activities aimed at innovation and improvement of programs or services that address special needs	Based on experience with college input	Provides a model for developing a local community college offering with a cluster based strategy
S Rubin et al, Invigorating Rural Economies: The Rural Development Mission of Mississippi's Community Colleges, 2005	The college-community link and especially the community development and economic development mission in 5 states	Five themes: -build human capital -nuture social capital and strong healthy communities -work regionally -find competitive niche -culture of entrepreneurship	Practices include: -build human capital-training, workforce development and upgrading - nurturing social capital-convene events, develop community leaders, develop new resources, community engagement -work regionally- cross-state projects, leadership roles, regional workforce	Not known	Appears strong based on operations in 5 states and a survey of 119 in 12 colleges. Appears positive and proactive model	Research shows economic and community development part of community college mission. Colleges do many things to make communities better. Colleges provide leadership and often are not funded for these aspects. Need mindset changes, create awareness and knowledge of new models, enhance funding,

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
			<p>efforts, multi-county high speed inet</p> <ul style="list-style-type: none"> -competitive niche- capitalize on assets, support clusters, advanced tech centres. <p>Identify new opportunities</p> <ul style="list-style-type: none"> -culture of entrepreneurship- skills, support local business, innovations, link to a system 			expand community-based benchmarks
RTS, Art of Economic Development , Community Colleges for Creative Economies, 2005	How community colleges support economic development	National comments. Whereas universities are expected to anchor creative milieus and attract the most talented students, community colleges are expected to support local industry, attract business investment, and educate residents of all ages and abilities in all communities	<ul style="list-style-type: none"> -Create a new strategy -Focus on issues and share solutions -Products with pizzazz in creative enterprise clusters - Imaginative workers -Incorporate art and design in technical and commercial programs -Teach business and entrepreneurial skills -Provide business services -Find innovative ways to attract students -Partner with organizations to reach out -Define economic opportunities, skill needs and pathways -Support professional development and cross- 	Not known	Based on case study and expert reviews of common findings for creative colleges methods	Despite their achievements, few think of community colleges as bastions of creativity or particularly “cool” places. Effective, yes; but not places with strong reputations for arts, culture, or being “cool,” not places that are likely to attract students— or, for that matter, alumni, retirees, and knowledge-intensive companies

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
			institutional learning -Designate lead colleges -Establish internship programs Design creativity benchmarks for colleges			
Regional Technology Strategies, Creating Local Wealth, Opportunity and Sustainability through Rural Clusters, 2009	Review of best practice in rural clusters for economic and community development from multi-country experts' experience.	Focus on the role of rural clusters for growth. The evolution of rural clusters almost always builds upon existing competencies and connections. They either emerge as an offshoot of cluster products or technologies, spin out new clusters that build on strong elements of its supply chain, or generate new demands among the existing customer base.	Most clusters have been boosted by some variation on one of two types of strategies. The first, "specialization," influences the use of public or private sector resources or services in ways that make them more directly relevant to a particular kind of industry. The second, "association," tries to influence relationships and increase interactions among firms. The information for the 50 rural clusters provides evidence of the following types of interventions, with education and training the most common form. <ul style="list-style-type: none"> • 28 Networking • 39 Education or training • 25 Services including entrepreneurial • 25, Research and technology development 	Based on review of 50 case studies and a workshop of 20 experts.	Evidence of the 50 clusters: <ul style="list-style-type: none"> • 6 were the result of an industrial recruitment effort, including Mississippi attracting Futorian Furniture; Northern Alabama getting Daimler-Benz and Honda assembly plants, and General Electric Plastics moving into the Berkshires. • 40 were started by local firms, such as Crowley Farms in Vermont. Cheese cluster, J.B. Williamson's catfish farm in Mississippi, or National Log Construction in Montana's log home cluster. • 4 were intentional state government strategies- Casinos in Tunica, Mississippi 	Clusters evolve. New forces include: better access to information and markets through digital communications, the convergence among technologies and industries, and a desire among families with children and older populations for a smaller city lifestyle have given rise to new clusters in places able to provide the necessary amenities. The role of entrepreneurs also is key and not all developments are planned

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
			<ul style="list-style-type: none"> • 26 Marketing • 17 Capital or infrastructure 		and wine in the North Carolina's Yadkin Valley	
Ed Lazowska (University of Washington and the Computing Community Consortium, Unleashing Waves of Innovation Transformative Broadband for America's Future Version 18: April 18, 2009	USA strategy for broadband use by the education system and colleges to provide broad service and knowledge delivery for rural and remote communities	A broadband strategy with a comprehensive, coordinated investment in education and health care institutions to advance broadband at the high end – to increase competitiveness.	Education systems is central: <ul style="list-style-type: none"> -colleges and universities are innovation incubators -colleges and universities drive networking - Colleges and universities have a four-decade proven track record in deploying, managing, operating, and continually upgrading advanced networks - Colleges and universities today are preparing tomorrow's innovators, workers, and consumers 	Community colleges, Tribal Colleges, and other minority-serving institutions are centers of community cultural life, engines of economic innovation and entrepreneurship, and sources of the next generation of talented employees, employers, leaders and entrepreneurs. Providing leading-edge networks, tools, and connections to higher education research and education accelerates economic growth and job creation in rural and underserved communities.	No evidence but the education system is proven	Indicates how the potential of the information age and knowledge served through colleges and universities can build communities
R. Sayers et	Best Practices in	Focus on	-outlines the drivers for	-not given.	Project in process	Bi-country study indicated

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
al, Researching and Benchmarking Best Practice in Library Staff Development : A Joint Australia – United Kingdom Study, 2008	University Library Developments	organization performance and enhanced staff developments	benchmarking in library staff development and discusses why applied research of this kind is of potentially such great value to university and other libraries in the context of current issues impacting staff development. - benchmarking may be defined as an ongoing structured process to evaluate the functions, work processes and services of other organisations (not always libraries) recognised for their leadership and innovation This process of evaluation is undertaken for the purpose of organisational comparison and improvement	However, the major influences on staff development programs included: - Increasing scope and volume of electronic publishing, with required staff skills and knowledge; - Increasing involvement of university library staff in teaching information literacy; - Changing organisational demographics (ageing workforces), and actual or impending retirements of staff and development of new leadership and management capability; and, - The imperative for regionally isolated libraries to develop capability within their existing workforce	and no evidence yet	some issues: -cultural differences -different stage of development -geographical separation -diverse agendas. -Study is still in progress and a learning tool
S. Rosenfeld, Trans-	Multi-country College network-	To share best practice and	-Learning, innovation and	Not known	Appears to be viable college network for	Themes for network: • Industrial

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
Atlantic Technology Training Alliance: Looking Back Looking Forward, 2009	USA, Denmark, Finland, Ireland, Germany, Spain, South Africa	knowledge	<p>shared knowledge</p> <ul style="list-style-type: none"> -Faculty & student exchanges -Comparative research projects -International technical assistance teams -Joint educational R&D -Mutual understanding of cultures and economies with: joint projects, faculty exchanges, entrepreneurial skills -Cluster & sector approaches -Expanding internships/externships -Building on creativity -Establishing learning & innovation networks including international learning and innovation networks 		knowledge sharing	<p>modernization/SMEs</p> <ul style="list-style-type: none"> • Inter-firm collaboration/training networks • Entrepreneurial education • Web-based learning/IT education • Responses to industry clusters • Developing creativity
Dr. P. Fahy et al, Alberta-North's Northern Communities Research Project, 2010	Facilities, learning technologies and support services to over 87 AB community learning sites	Coordinated local community learning in northern remote communities	<ul style="list-style-type: none"> -Community surveys and input from students -Literature review <p>Overcome barriers such as: lack of funding, lack of transport, childcare, location of program, fear</p>	Not known -AE&T (2005) completions for non-Aboriginals enrolled in a program are 14% higher than Aboriginals.	Not known. Research questions include: What program models effectively support Aboriginal participation in adult education? • What are best practices for attracting, preparing, and retaining Aboriginal	Literature review themes: Necessity of understanding and incorporating -Aboriginal culture, values, and attitudes toward learning. - Necessity to address the current funding structures and accessibility. - There is a return on investment in Aboriginal education that needs to

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
					<p>students?</p> <ul style="list-style-type: none"> • What are the implications of our research for institutions and Alberta-North? • What is the effect of family, community, and advisors/counselors on Aboriginal participation? • What are the implications for first generation students in northern communities? • Are mentorship/role-model programs effective in helping to attract, prepare and retain Aboriginal and low-literacy students? 	<p>be better recognized.</p> <ul style="list-style-type: none"> - First-generation students may be under-prepared for the postsecondary experience, and so need strong institutional, community, and family supports.
<p>Rena Shimoni et al, Successful Practices in Supporting Students in Distributed Learning, 2010</p>	<p>The project provides the post-secondary system with a set of tools and strategies needed for the successful implementation and expansion of student services to support alternative</p>	<p>College best practices learnings in Alberta</p>	<p>Key best practices include: -admission and registration is well organized - Students can access comprehensive initial assessment, academic advising, and orientation -financial and services</p>	<p>Not available</p>	<p>Based on a survey of 950 college students, over 40 interviews, 9 organizations and GOA</p>	<p>Best practices are not widespread. Student needs vary. Instructors are the face of the college. Policies on distributed learning are scarce.</p>

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
	delivery learners		<p>information is on the website</p> <ul style="list-style-type: none"> -students can access adequate technology supports -students can access services for writing -students can access bookstore services -students can access library services -students can access career counseling -students can access personal counselling - diverse students can access adequate supports 			
B. Rutley, Centre for research and Innovation, 2010	Regional innovation model	Develop an innovation model within the regional college system with economic partners	<ul style="list-style-type: none"> -Hire a full time director reporting to the college system -Use internal staff as resource and third party experts- mixed model -Focus on applied research innovation services, and projects Partnerships with many 	Received \$3.5 m from ARDF on a three year grant	Have completed a number of industry projects	High dependence on grant funding
RTS, A Compendium of Clusters in Less Populated Places, 2009	How clusters can build a rural region's economy	Various but business driven projects to build a cluster	<ul style="list-style-type: none"> -Entrepreneurial projects -Supports from agencies and government -College in various roles Market driven models 	Not known	Case study evidence provides many examples from agri-foods, wood, technology, creative economy, tourism, energy, manufacturing, textiles, transport	Case study examples indicate various models of business developments

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
EU, Creativity and Innovation, Best Practices from EU Programmes, 2009	Projects which have improved innovation in the education system	Variety of projects in 5 countries by university, college, social agencies and focused on SMEs and entrepreneurship	-Many different projects were attempted for innovations in: -Education and training -Culture -Youth -Citizenship -Enterprise -Regional cuisine -Knowledge-based entrepreneurship	Not known	Case studies (35) provide a variety of specific projects such as entrepreneurship for young adults, mobile learning into mainstream learning, training SMEs on intellectual property,	Example project- This Leonardo project, e-Craft Idea Tutor, sets out to transform traditional ways of working with an innovative training concept. It aims to train craftsmen to be aware of the potential market, not just in their own area or country, but across Europe. It promotes a creative approach to all aspects of the business, helps to develop new products and new ways of producing them, including the use of collaboration with other businesses.
American Youth Policy Forum, Challenges, Assets and Innovations: Considerations for Secondary Education in Rural Communities, 2010	Rural schools which are smaller and diverse, common across many rural areas is the shift in local economies as traditional industries have disappeared and larger employers have moved out of communities.	National comments	-Funding -Use partnerships -Technology the innovation heart -Unique teacher considerations -Transportation issue -Innovative rural models	Not known - Rural schools often realize the "brain drain" of young people who are educated in local systems and then leave the community to pursue further education or broader career options.	Based on observations	Rural schools operate in a vast range of geographic, cultural, and economic settings across different Regions. Common across rural education systems are limited resources, in terms of funding and the ability to recruit and retain strong teachers and leaders
Association of Canadian Community	Role of community colleges in remote and rural regions	Realities of rural Canada necessarily	-Advanced skill building -Support services to students	Not known - Canada has 150 colleges in 1,000	Canada must balance its investments more	Colleges are developing a new role in the areas of innovation, applied

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
Colleges, Colleges, Institutes and Communities Partners in Rural Sustainability March 2010		create differences in institutional focus and organizational challenge. Rural-based colleges are often the only post-secondary institution in the region and play a key role in a strong rural revitalization strategy in local and regional economic development	-Link to innovation -Need college infrastructure -Engage First Nations and Inuit learners -Focus on applied research, product development and commercialization	communities.	equitably between discovery research and college-industry partnerships in applied research. Colleges encourage business formation and sustainability by growing the local talent pool, by re-skilling displaced employees, by offering customized education, and by providing applied research and development support to local businesses.	research and business services. The strong links to community mean a new for broader engagement.
Center for Rural Innovation Harper Adams College – website http://www.nationalrural.org	Support rural and regional innovations	College centre model	-Business management -Renewable energy -Community, health, social -Livestock -Crops & grassland -equine	Not known	The project was set up with funding from the Higher Education Funding Council for England, as one of 22 Centres for Knowledge Exchange activity in the country. NationalRural represented a collaboration of <u>14 universities and colleges</u> with influence on many other universities and colleges with rural interests and expertise.	Provides a knowledge exchange service with 2,000 projects and active use of the web

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
Related College Research						
Prof. Steve Burdon, Organisation al and Management Best Practice for Outsourcing Services Through Alliance Contracts, 2004	How the use of alliance contracts in out sourcing is beneficial and assists in innovations	-provides AU review of competing. The question that each Board and CEO needs to ask is: "Do I have the skills to increase productivity levels faster and more efficiently than my competitors?" With average productivity at 3.6% overall, this is a daunting task for all business functions.	-Review of outsourcing trend -Indicates 13 key benefits and cost savings -Flexibility for change, innovations, core competency focus and transformational change -Case study examples as Honda indicates they focus on engines and outsource balance -Can use a strategic alliance contract process, a strategic alliance board -Assess cost savings, then build trust and flexibility, then create a culture of joint partnering, then shared strategic management and entrepreneurship Provides access to best practice, innovation and transformational change, innovation means different things	Appears positive Reasons for taking this path are to: facilitate innovation, improve collaboration on strategic planning and optimising skill sharing, resulting in better value for money. The facilitators to this objective are to reduce the client/server relationship, establish shared risks and rewards, tie each organisation into a shared vision, and improve communication	Appears positive- Alliance/Performance based contracts are growing as a percentage of total outsourcing contracts. The link between contract duration and degree of management tasks outsourced is significant. As the relationship moves up the scale from in-house to joint venture/alliance, the duration of contracts tends to lengthen from 3 to 5 years.	Given the trend to global competitiveness, skill building and the need to access more knowledge, shows the alliance method works. Shell's strategic alliance outsourcing contract, which in 10 years has moved them from lower quartile to second best out of 67 refineries in the world (Solomon index.) Organizations need to assess their strategic core and essential services and determine the 'other elements'.
Heikki Kotilainen, Best practices in Innovation	International Survey of 8 countries models and results in the application of	-national and regional A balance is needed between the different policy	-regional and clusters need to be supported -need individual training on innovations -proactive mentoring	Reviews national systems and indicates best models as Finnish	BP includes: -flexibility -be ready to change if needed -link decision making	Indicates a system approach which can be used in a region or nationally to improve

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
Policies, 2005	innovation policy and practices	components and criteria in order to safeguard the mechanism of innovation: <ul style="list-style-type: none"> • education • academic entrepreneurship • knowledge creation • skills' base • innovation management • financial possibilities 	should be used with SMEs <ul style="list-style-type: none"> -service sector innovations differ and need multidiscipline approaches -keep applied research close to industry even physically located -networking is very important as is flexibility and dynamism and attitudes of researchers 		to implementing people <ul style="list-style-type: none"> -don't wait -don't allocate all resources- may be needed elsewhere -create clusters, critical mass, creativity labs, link clusters across regions, use e-business and industry-driven research systems 	
Siemens, International Employee Development Year, 2008	Indicates need to have global minded skilled people	Global program <ul style="list-style-type: none"> -includes technical and specialized topics 	-International orientation <ul style="list-style-type: none"> -Communicate in common language- English -Highly skilled -Capable of building solid networks -Willing to document and share knowledge -Ready for international work 	Not known	Not known	Focus includes: <ul style="list-style-type: none"> -basic language -team management system -inter cultural training -communication skills -quality management -business studies
W. Boland et al, Public-Private Partnerships for the Management of National, Regional and International Innovation	Case study of pulse crops in regional system and innovations	Uses social network analysis, case study and vulnerability analysis to examine 4 functioning and inter-related regional and global pulse crop	-P3 innovation partnerships. Changes in governance and innovation management has helped the development and use of the public –private partnership (P3).A P3 can be defined as an organizational structure	Not known but pulse industry has grown dramatically	Reviews four networks- export, global, developing world and EU models.	P3 process and models appears to offer broad reach and impact to industry developments based on research linkages and suppliers

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
Systems: A Network Analysis of Knowledge Translation Systems, 2008		R&D networks.	that facilitates collaboration among partners from different sectors-public, private and voluntary. A P3 signifies the" sharing of risk, reward, return and authority.			
Saskatchewan Chamber, Community Growth Toolkit, 2010	Community growth toolkit for engaging citizens in community growth	Focus, plan and do community based projects	-Get organized -Review data -Open communication -Work together -Tools -How to get success	Not known	Not known -What is important is determining what the term community" means to you. -Does the term community refer to a specific city or town, or does community refer to a specific area/suburb within a larger city centre? In terms of your target area, you could also be referring to a specific region or to a broader group of communities that are working together to achieve similar economic growth strategies	Provides a community development model and process with checklists
R. Mahaffey, Investing in Innovation: A Rural School Technical Assistance Initiative,	Competitive USA grant program for innovative projects	Three lines of action: -development grants -validation grants -scale up grants	For rural regions: -Meet low resource high needs -Networks and web-based outreach -Experience and capacity	\$650m by 2010 part of \$9.7b program Focus on a 11 remote rural regions of USA with need	. Grants need higher levels of evidence in a gating process	Help move organizations from compliance focus to engine of innovation and education reform

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
2010			<ul style="list-style-type: none"> -Face to face cluster meetings -Build local capacity -Identify innovations aligned with real needs -Refine home grown innovations 			
Imperial College entrepreneurship Website http://www3.imperial.ac.uk/entrepreneurship	New business startups	<ul style="list-style-type: none"> -website -workshops -information -counseling 	<ul style="list-style-type: none"> - use of the Hub <p>The Hub translates new insights developed by the academic community into practical tools and guidelines for entrepreneurs and managers active in the areas of innovation, entrepreneurship and design (IE&D)</p>	<ul style="list-style-type: none"> -seems positive, as several businesses assisted by the Innovation company have raised \$m for start-ups. 	Focus on students, entrepreneurs and business	Provides a best practice Hub of knowledge for business. Has an Innovation company to help in tech transfer and related matters
Innovation Unit, UK Website http://www.innovationunit.org/education-experience/project-archive/federations-in-practice.html	Local Organization improvement	<ul style="list-style-type: none"> -website -case studies -tools such as Delta 6- for planning; To Be- for identifying how to change, Looking to Learn- for seeking out better ways for tasks, and a number of other tools 	<ul style="list-style-type: none"> -website -projects -partnerships - Innovation Labs designed to change the culture and performance of their organisation, build the capability for innovation across the organisation, draw innovations into the organisations from all around the world and spin out innovations commercially 	<ul style="list-style-type: none"> Seems positive - Innovation Unit has seven years experience of enabling innovation in the public services. We have made lots of mistakes and have learned the hard way about making innovation happen on the ground. We work with Local Authorities, regional government and foreign governments to help them 		Is a way to assist in change process and in innovations

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
				overcome the barriers to innovation		
Rural Community College Alliance, USA Website http://www.ruralccalliance.org	National knowledge sharing	National, regional and local ideas	-website and links -conferences -joint projects -alliance -networking	Not known	- The Rural Community College Alliance is a network and advocacy group that helps build the capacity of member community colleges to improve the educational and economic prospects for rural America. The Alliance seeks to reduce rural isolation and share effective solutions to problems facing distressed rural communities	Association for shared ideas for rural colleges
American Association of Community Colleges Website http://www.ruralccalliance.org	National knowledge sharing	National, regional and local ideas	-website and links to many related sites -research papers -journal of best practice and other ideas -networking -conferences	Strong and continued membership	Provides a number of research and project reports and future oriented issues facing the system and the need for more students	Founded in 1920, the American Association of Community Colleges (AACC) has, become the leading proponent and national "voice for community colleges." The association is to function as a forum for the nation's two-year colleges.
League for Innovation Website http://www.league.org	National innovations	National and regional and linked to community colleges	-website -projects -alliances -networks -new project such as project SAIL- for specialized industry	Not known	Provides a set of links to resources such as open textbooks, networks and information, several innovation reports.	Appears to be a way to provide new models for innovations. Significant Discussions report 2010 gives curriculum ideas, worksheets, checklists.

Jurisdiction Experience	Context of Practice	Regional Strategy or Program	Strategic Lines of Action	Cost and or Effectiveness	Evidence of Impact	Comments
			courses nationally			
LOI, Nature of Innovation in Community Colleges, 2010	Review of international innovations for college system	How colleges assist and foster innovation in the system	<ul style="list-style-type: none"> - almost one-quarter (22.5%) of the innovations were in Course/Program Development - Faculty and Staff Development had 22 innovations (12.7%) - Student Support Services had the third most innovations with 17 (9.8%). -Instruction followed Student Support Services with 16 innovations (9.2%), 	Positive and appears to have made an impact in change process and idea sharing	the League for Innovation in the Community College celebrated its 40th anniversary as one of the oldest and most significant organizations for college. Created in 1968 when community colleges were being established at the rate of one per week, the League became a beacon for forward looking ideas that would influence the community college movement over the next four decades	Shows how the college system innovates in specific areas. Notes hoe the role of teams are very important to creating and developing new ideas.
Berea Community College- Kentucky http://www.berea.edu/epg/default.asp	Support Economic Development through social entrepreneurship	Improve the general approach to business formation in poor rural communities in Appalachia	Train senior students to become Entrepreneurship for the Public Good “fellows” They go to work on various local development projects	Makes use of low cost student workforce and is cost-effective and supports learning	Is a well recognised and award winning program which assists chronically depressed communities in the Appalachian region. Has also been applied to international projects	Well established ongoing program with broad recognition.

Northern Alberta College Survey Comments

We also employed a short one page survey for the three main northern colleges involved and received 10 responses back with many interesting comments. We included these comments in this report as they are interesting and direct in nature. The appendix has the verbatim comments which are useful to understand.

Summary of Northern College Survey Feedback

The four survey questions included:

- Top college opportunities in your northern Alberta region are?;
- The barriers in developing them are?;
- I suggest we also focus on certain innovative college practices;
- Any other comments?

The main themes of comments received back in this survey included:

- Resources, trade, and technology (industry and ICT) are important opportunities including business training, continuing education, building trade centers and business products;
- Use of distance learning and continuing education is needed;
- Build both community and business relationships for impact;
- Barriers include funding, space, credit vs. non-credit courses, competition among providers for students and a need to overcome funding challenges;
- Need to focus on student outcomes in an integrated manner among providers;
- Reduce process waste and partner more.

More detail is noted in the appendix but the survey comments give a view of much potential if things are organized to overcome and address the local barriers. Will the region and community potential be realized? How can it be catalyzed?

The next section provides a summary of the main tools and new ideas identified in the research which can be applied to Alberta resource regions and colleges.

Conclusions on Tools and New Ideas

Based on the research and college experiences, the following tools are suggested as ways to stimulate ideas and new ways of innovating in the rural and remote college environment. These tools can be used at the organization level or at a business unit level and are mainly planning tools. Two types are discussed below- internal tools and external tools. These tools are also summarized in a companion “toolkit” report to this report.

These tools discussed below can be used for creating new ideas and new ways of thinking for implementation at the college and region level. Typically the process of using a tool will involve:

- Awareness meeting for discussion of the local situation and application of a tool which may help clarify the desired outcome. It is always better to focus on the longer term “outcome”, rather than on the shorter term “activity”;
- Agreement meeting or meetings- on what is needed and how to get a commitment to action;
- Empower a “champion” to help lead the idea;
- Any related detailed supporting research and consultation as needed;
- Development of a strategy and business plan of action;
- Buy-in and development of marketing and communications materials;
- Funding the agreed plans;
- Implementation meetings and projects as needed with all of the key stakeholders.

Internal Tools

Four organization “internal tools” which have been reviewed can be used to help make a change. The tools are:

- SWOT (strength, weakness, opportunity, threat) matrix- focus for strategic planning;
- Match Industry Needs with R&D - example U of A oil sands model;
- Quebec matrix for assessing a focus;
- Lean thinking to reduce waste in processes.

SWOT Matrix

The SWOT tool is a common tool which many organizations use to critically examine their organization in the face of competition and ways to improve key internal assets. A matrix as noted below is a common way to use the tool.

To use this tool, one needs to employ critical and open thinking on what is the current situation and what can be changed in a time period of say 1-3 years. The bigger the change, the longer the time to implement and the SWOT framework helps to indicate where the change is needed. How to change needs to be developed in a strategy and annual business plan format.

1. College SWOT Framework-

for strategic thinking

<p>Strengths</p> <ul style="list-style-type: none"> • College presence in communities • Dedicated and passionate staff • Brand recognition • Supernet potential • Proven expertise/ models • Access to industry • Strongest regional economy 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Industry practices- lean, productivity, HR, tech • Communication models • Highly dependent on core funding • Leadership and staff aging • Program focus meeting industry need • Links to key stakeholders- biz, youth • Operations may reflect poor strategic approach
<p>Opportunities (1-3 Yr)</p> <ul style="list-style-type: none"> • Supernet and website for much broader social outreach • Regional innovation network • Applied research projects • Involve youth and community more • New collaborations for social change; re-inventing is possible • Create sustainable funding base from biz- applied research, co-ops, capital plans, new ventures • Global alliances and delivery 	<p>Threats</p> <ul style="list-style-type: none"> • No change means forgone potential • Leadership, management gaps vrs industry/ student need • Lack of growth in changing world • Competitive education marketplace • Mission duplication with others? • Regional economic development gaps

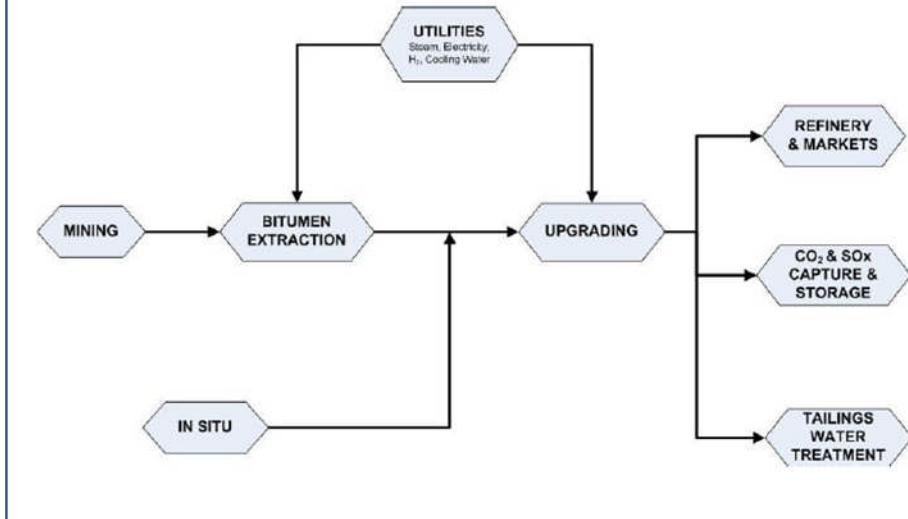
An independent qualified facilitator can greatly help use this tool in a review process and develop new ways of seeing the potential road map for change. The facilitator can help bring in new information, encourage critical thinking and advance new ideas which are not realized or maybe missed. This information can then be used in a business and operational plan over time to implement a needed change.

Match Industry Needs with R&D- University of Alberta Example (courtesy of Dr. D. Lynch)

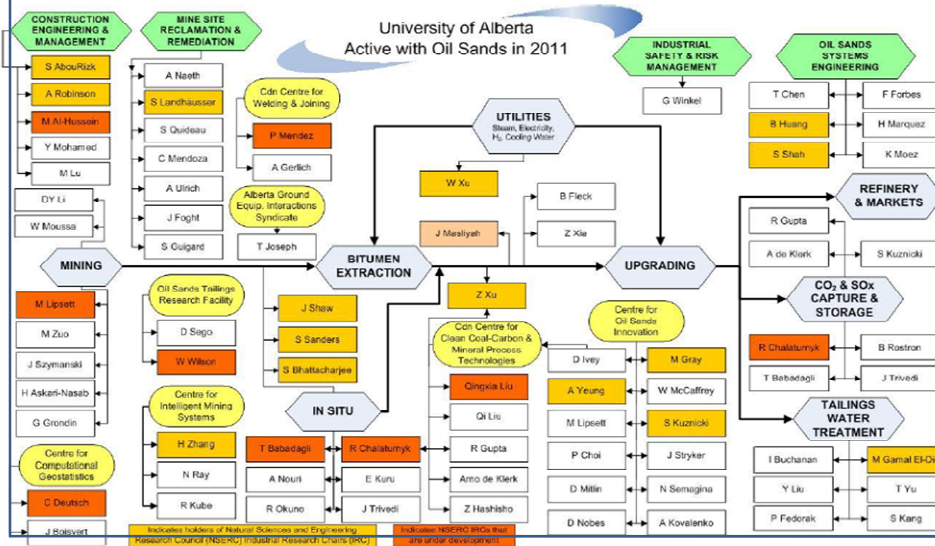
The University of Alberta engineering Dean reviewed the oil sands development under the lens of key problems. The main problem areas were viewed in a process flow diagram as a business owner would think through oil sands developments.

The initial diagram was viewed in 1995 with 8 key hubs of research focus against the business issue to be resolved. The next diagram is from 2011, and to date about 1,100 research positions have been staffed against the 8 hubs. This tool helps to identify and explain how the University of Alberta Engineering Faculty followed the oil sands applied research problem solving against its staffing.

2. Example-U of A Model- to Respond to/ Support the Oil Sands




U of A Model- 2011



Quebec College Matrix

The matrix tool below is a way to highlight desired niche versus key criteria such as business and community focus, global interests, and student needs.

 **3. QU Cegep Focus Matrix–for region response**

	Sector					
	College Program	Educational Environment	College Administration	Regional Development	Opening to the World	Research
Developing or improving the quality of student services						
Improving the college's image or visibility						
Improving relations and maintaining or developing partnerships						
Developing or improving the training offer						
College management or optimization of resources						
Regional development and improving the services provided to the community						
Improving academic success and diploma acquisition						
Managing human resources and the work environment						
Developing research and transfer of knowledge						
Recruiting students						
Improving access to education						
Improving the job placement rate and internship offer						
Improving student or teacher mobility						
Other						

The tool above is a way to check where the college or unit can assess its performance or gap relative to the community, student and business needs.

Lean Thinking (Source: James Womack, Lean Thinking)

Lean thinking is a way to reduce waste and find process improvements. Lean thinking is a well-established process used in service and manufacturing businesses to reduce 7 sources of waste, including process waste. This model has been a continued focus since about 1996. Again an independent advisor may be needed to help apply the tools of lean thinking including 5-S, value stream mapping and identifying waste. Each tool has a specific use to help reduce waste.

Lean Approach

- Improve quality- using customer specs
- Eliminate waste- 7 types
- Reduce lead time- cycle times, processes
- Reduce total costs- variable and fixed
- Use value stream mapping- identify customer value and waste- quickly
- Start with small projects

4. The 5 Principles of Lean Thinking (Reduce process waste)



Seven Forms of Waste



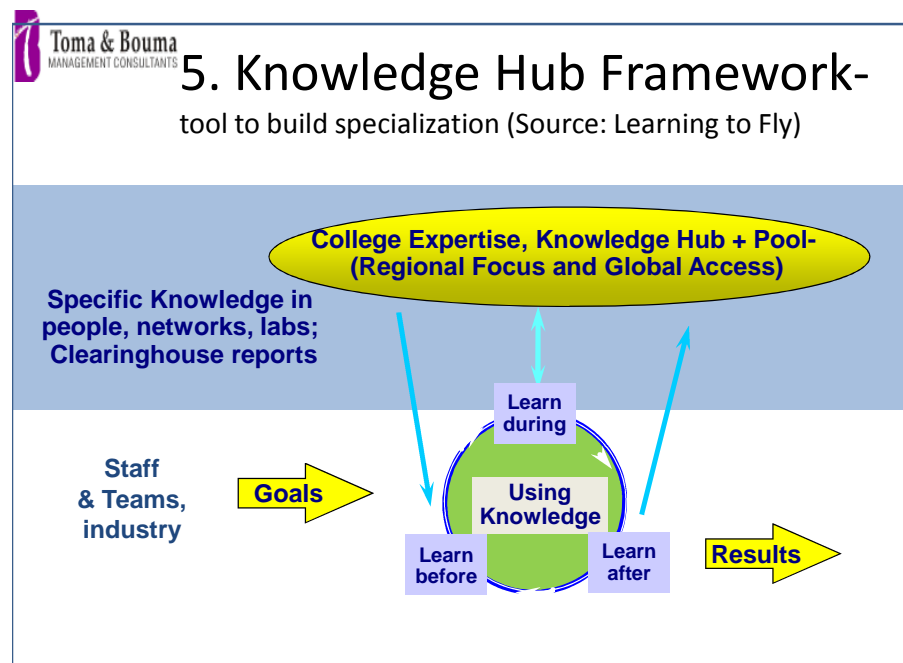
External Tools

Several “external tools” have been reviewed and can be used to help make a change. The tools are:

- Knowledge hub;
- Peer to peer and stakeholder collaboration;
- Economic development and mind maps;
- Applied research and regional innovation networks;
- Clusters and regional innovation networks.

Knowledge Hub and Peer to Peer Knowledge Sharing

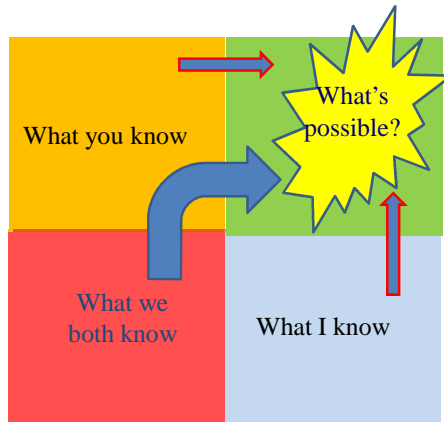
The knowledge hub below is a way to help understand the many linkages a college can have to the community, larger society, and businesses because of its reputation, internal knowledge, and labs which can be accessed. Given the growth in the use of the internet and global access to knowledge hubs and experts, this is a strong way to develop and deliver services for distance delivery.



Peer to peer help is one way to assist in transferring ideas and practices, even among colleges and staff. Further collaborations among community, business, and colleges can greatly increase uptake of new ideas.

Commonly, colleges will provide leadership to a region in this way. It is common to also include all stakeholders in an issue to help define a shared vision and ways to overcome common barriers or constraints.

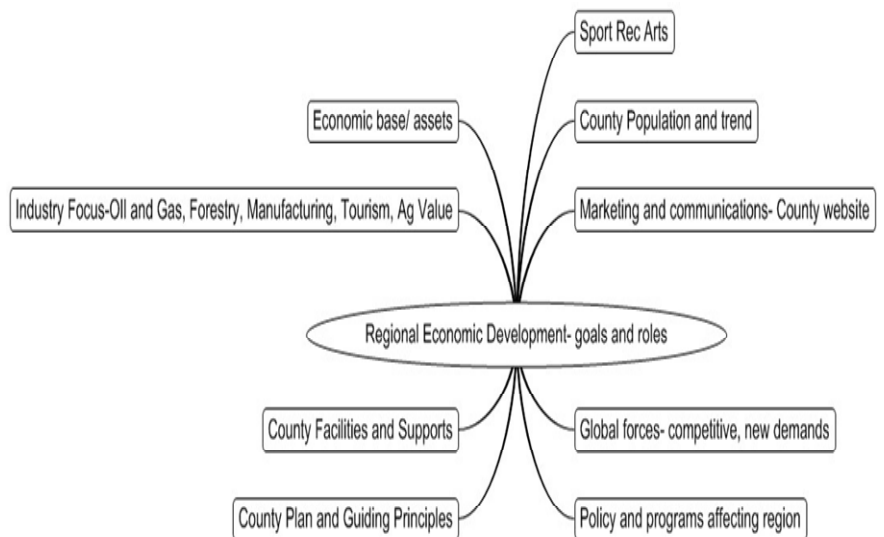
6. Peer to Peer Help Collaborating with stakeholders for a Shared Vision



Economic Development Thinking

Economic development is a common issue which many communities and regions have to face up to in their growth or retention plans. The mind map helps generate ways to proceed.

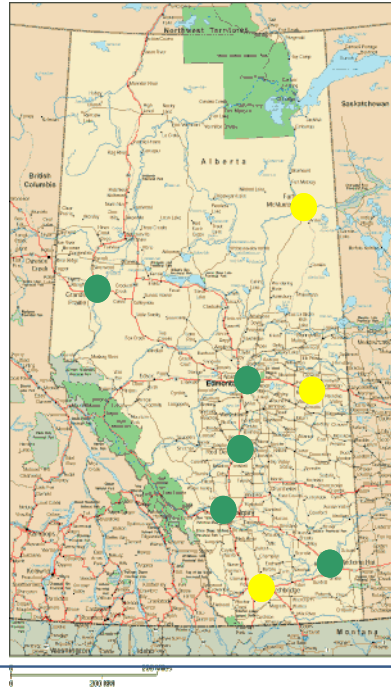
7. Mind Map



Economic development in a region is important as a role for colleges and many aspects can be considered in the economic development space. Alberta is now moving to a new system of regional innovation networks (RINs) as a way to improve business linkages for product growth.

8. AB RIN System new plan- 2011+

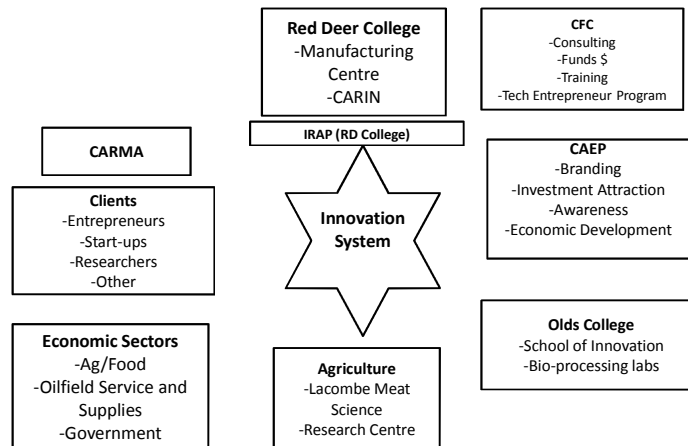
5 sites now=green
3 planned= yellow



Applied research is going to be organized through regional innovation networks (RINs) and Alberta is planning to implement several new RINs to help businesses create products.

Regional System Model

Innovation System- Red Deer Region



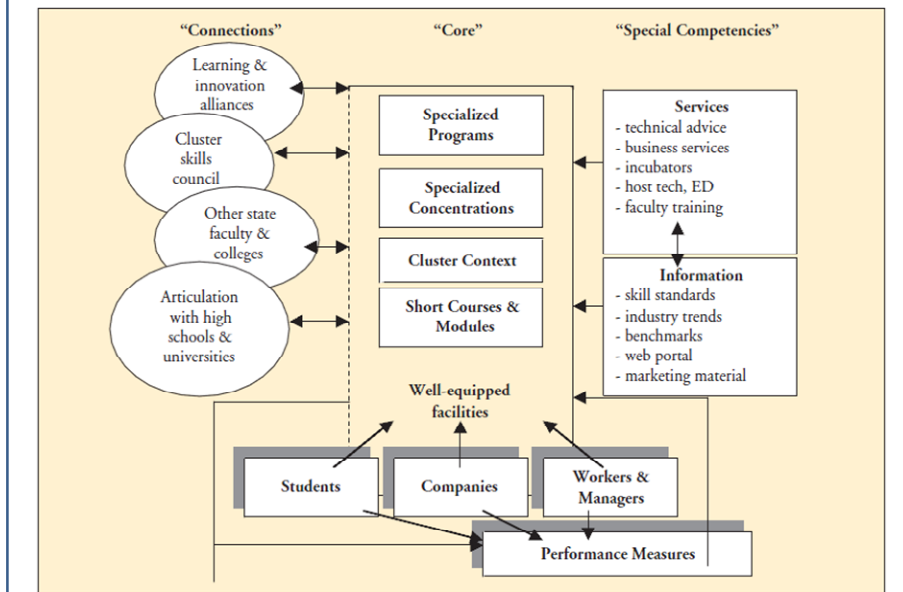
Industry clusters and networks are ways the region can develop. Much literature exists on this area and colleges typically will fit within this framework and cluster development is a process which requires expert facilitation for success and is occurring in Alberta and elsewhere.

9. College Roles Tool

- Education is a core role- other roles?
- Leadership, “Sounding Board”
- Economic development, entrepreneurship
- Regional supports- research, innovation
- Tech transfer/ adaptation in ICT/social networks
- Workforce Development- key

10. Target Clusters- S. Rosenfeld

CLUSTER CENTER DIAGRAM



11. Target Networks & Clusters-

S. Rosenfeld

Table 4
CHARACTERISTICS OF NETWORKS AND CLUSTERS

	<u>Hard networks</u>	<u>Soft networks</u>	<u>Clusters</u>
"Membership"	Closed	Open, membership based	None required
Relationships	Collaborative	Cooperative	Cooperative and competitive
Basis for agreements	Contractual	Majority determination	Social norms and reciprocity
Value added	Allows firm to focus on core competencies	Aggregates & organizes demand for services	External economies
Major outcomes	Increased profits and sales	Shared resources, lower costs, benchmarking	Access to suppliers, services, labor markets
Basis of external economies	Shared functions and resources	Membership	Location/proximity
Shared goals	Business outcomes	Collective vision	None

Next Steps

Each tool can be used to help assess a situation, generate new ideas and develop ways to create economic development in a remote resource-based region. It is important to take action as possible and if needed, obtain outside help to catalyze others.

Good luck in creating the future.

Project Implementation-

Overcome the "Knowing –Doing Gap" (Source: Pfeffer, Sutton)

12. Jump the "Knowing-Doing Gap"

- We know what to do but....
- Do we decide by memory, not with data and judgment?
- Do we forget to follow up?
- Actions speak louder than words
- "Man who says, "It cannot be done, should not interrupt man who is doing it"
- Talking a lot does not mean doing a lot
- Simple answers are better than complex ones
- Does knowledge turn into action?

Project Toolkit-

“Plan it Do it”

13. Next Steps

- Choose the correct tool/ idea/model for regional use by a college- link to strategic plan and provincial plans
- Empower champions to lead- with assistance
- Awareness meetings-internal to test ideas
- Conduct research as needed
- Check understanding with stakeholders
- Implementation meetings (several for involvement) towards an outcome (shared vision)- can take time
- Build into annual business plans
- Monitor and measure-with assistance

Appendix- Survey Comments

Verbatim Comments:

A brief e-survey form was emailed in May to the three northern Colleges for input from staff and 10 responses were received. In spite of a low response rate the content is quite good (target list was about 30 names).

1. *“The top college opportunities in your northern Alberta region are:”*

- Trades and technology;
- Resource sectors, large employer for skilled and semi-skilled;
- May need incentives to attract people;
- Business-clerical to executive / Research and Development;
- Service sector;
- Since we serve an oil producing community, the increase in oil process means increased need for work force in all fields related to the oil industry from trades to administration;
- The increased reliability and availability of telecommunications medium and tools can allow us to extend our educational services and distributed learning to new areas;
- The good level of Faculty and Instructors that we attracted in the recent years provide a golden opportunity to offer more educational services;
- Academic upgrading and high school completion for adults;
- Training for jobs through apprenticeship models and other cooperatives with business and industry;
- General education to enhance citizenship and the quality of life;
- Continuing Education [CE] opportunities for working adults in professional certificates, professional development related to current work and second career, or advancement exploration;
- Certificate of diploma-level career-oriented programming especially if offered in alternate delivery formats including blended delivery mixes like web and face-to-face seminars that could be done by video, conference call, or online via Skype;
- Programming would be received well if there were laddering options such as certificate-to-diploma-to –degree;
- Trades and technology professional programming including engineering, health, and environmental technology diplomas;

- These would be really successful if they had corresponding prep programming to help aboriginal, ESL, remote-transfer, and other non-traditional student’s access with more academic strengths and confidence;
- Mining and related programming, and continuing education opportunities;
- Partnerships with universities for degree completion;
- Degree granting status;
- Developing a regional trade centre- or multiple centres in our service region;
- Continue to build business/community relationships;
- Involve the stakeholders more, and build the relationships;
- Fairview is a change process but Harley, trades, beekeeping is possible and strong;
- Many students are university transfers, hard to engage people;
- People respond well to community events;
- Can do more in distance learning.

2. *“The barriers in developing them are:”*

- Funding;
- Space;
- Need a good strategic plan that's flexible for changes with the economy;
- Need to be student friendly;
- General lack of concern for completing high school within aboriginal families (and others);
- Training requires greater participation from industry;
- Fear of young people moving away from the community once they are educated;
- **Looking at Non-credit versus credit recognition/status or value** within the Ministry could help. Colleges operate much of the above programming in CE, and that is not a funded operation the same way that academic programming is. If Colleges received kudos/recognition for working in CE & its enrolments (typically larger than participation rates in academic programming); funding for CE development or for working adults to take such programming (including by blended or online delivery); and moved to develop adult education quality standards for CE instruction (including alternative delivery), it would be a real message that this programming supports Campus AB and the provincial economy in developing human capacity;
- **Lack of access to funding for some learners in alternate delivery scenarios** – some aboriginal funders for example will not fund a band student for programming that is not delivered face-to-face. They may make the learner pay up front and then reimburse their registration/tuition/book costs etc. Upfront costing is a significant barrier for those largely rural learners;
- This is linked to a lack of understanding of the quality, engagement potential, and tracking abilities of the platforms/programs. People in our province, especially in rural and aboriginal communities, may not know that other provinces have a long history of success in alternative delivery to remote and aboriginal populations – even in professional programs like a Bachelor of Nursing degree. We are building this from the ground up via eCampus.
- No provincially-recognized (Ministry) **adult high school certificate for collegiate application**. The Provincial Academic Upgrading Chairs [PAUC] are working on a provincial collegiate model; this certificate could be so critical in getting more people into those targeted professional/career programs that ladder upward - even perhaps into undergraduate degrees. There needs to be a seamless flow between system “developmental providers”. That map would help with institutional mobility for learners, develop shared understandings for PLAR (program and course outcomes to map), be a communication tool for K-12 to colleges for drop-outs, counsellors working with high risk kids etc;
- **Competition among providers** is still an issue in Campus AB. Regional stewardship based on geographical boundaries helps but collaboration to better exploit resources like access to expensive physical plants & personnel & administrative services would support programming. No one wins especially in CE if multiple organizations are competing for a closed-geographical market;
- Expansion of eCampus model needs to look seriously at **inter-organizational competition at the course level**. How many versions of basic communication courses are really needed? We need to stop promoting a dilution of the enrolment across multiple entries in the same discipline at the same level of course outcomes;
- **Mapping program and course outcomes** across the entire system would help communication between institutions and the public. It could truly expand PLAR. Starting with grade 12-level courses, career certificate and postsecondary diploma level offerings would be a fantastic start;

-Promote the integration of at least **ONE alternative delivery course (core course)** in a series of the most common certificate and diploma programs in the system. Ideally this offering would only be accessible online. This truly validates that AB is a future-thinking province; our grads know how to function in a knowledge/information economy; our grads are prepared to access technologies to be lifelong learners. eCampus could be the platform for delivery of multiple sections of those “core credential” courses;

-Our learners are technology users even in the remote areas of the province; the next generation in K-12 senior level courses are even more technology savvy. The barrier to this collaboration and change will likely sit in FLEs, dollars with the Deans;

-Another barrier will be the resistance of some faculty – loss of academic freedom, quality issues (program and course outcome mapping may address that so everyone knows what is being delivered);

-Small institutions need an **incentive to participate and promote programming** offered by other larger colleges; can there be a credit split even if there is no dollar shared between a lead and a partnering institution? eCampus is a marvellous opportunity that still is nowhere near its full potential, and everyone needs a reason to participate especially if they are putting a core course online as its sole means of delivery;

-Colleges need to **communicate information easily and clearly** – especially as it relates to non-traditional course and program offerings, inter-provincial and intra-provincial or “twirling” or multi-simultaneously registered students, and CE students.

1. There is untapped wealth for the Ministry in CE data if it were collected with the same rigour as academic data. The CE data needs to be core data in collegiate information systems, reports etc. That data can be mined to look for opportunities to support better learning deliveries for a broader range of Albertans, identify emergent “learning” populations in AB, and review current and potential program needs.
2. It would be helpful for the provincial institutions to move beyond common registration to **one common information platform** that is tested and Canadian. If these could allow financial, registration and HR info to be seamlessly worked internally and to feed typical Ministerial reports then clarity can be enhanced. These software platforms are expensive for smaller institutions that cannot afford them without support. Even if northern and rural colleges could get help to get a common system like Banner or People Soft it would be helpful.

- Some funding challenges but they will be resolved;

- Some funding issues and some issues around instructor qualifications; but, again, we are working on these with the universities and we are confident solutions will be found;

- Workload of College staff and contractual agreements can sometimes be a challenge;

- Resistance to change;

- Reduction in budget;

-Due to the remoteness of our location, lack of right resources in our community and limited support and services we expect;

- Human resources- scarcity of faculty, industry offers significantly higher wages;

- Capital costs – low level of technology;

-Low communication among professionals in the same field;

-Need to use more technology for distance delivery, and deliver locally as much as possible;

- May need to consolidate centres and sites;
- Develop more just in time courses for busy people who only can learn at night etc.- due to work, need cohort delivery for adults who work;
- We have a mobile population and many “basement dwellers” who do not get engaged;
- Need flexible delivery, more online delivery;
- Northern Lakes- harder to do applied research here, is a different model.

3. *“I suggest we also focus on certain innovative college practices.”*

- Work with large companies;
- Work with bands, towns, municipalities;
- Plan for the space before it is needed;
- Cooperative education practices with industry and business – applied credit for diplomas and certificates;
- Formalization of traditional learning from an aboriginal perspective. Giving credit and value to, and making better use of traditional knowledge;
- Integrated developmental and career-oriented access models like **Syncrude Aboriginal Trades Preparation program** at Keyano College. There is a new run starting for fall 2011. It has proven to be a really amazing program that collaborators Syncrude Canada, AEI, Rupertland’s Institute, First Nations and Keyano have watched enrich lives and secure talent development for youth in aboriginal communities;
- NEW College and Career Prep Packs** – streaming and promoting courses to upgrading adults based on their career interest. For example, the grade 11-level adult who lacks high school courses for a career program enters upgrading that is a tailored program. The student’s path is always referred to as Preparation for Health Careers or Preparation for Business Careers for example and not grade 11 upgrading. In addition to the standard math or English language or science classes, the students get opportunities to connect with receiving departments, research careers, and master student success skills;
- We are trying to create “Velcro fingers” in academic upgrading to hand the learner off to a future career program. The pride at being in a Career prep program and connecting with a professional program area helps motivate adults, improve retention and get upgrading students to be good applicants into their chosen career certificate;
- Mapping all program and course outcomes** – even in CE non-credit credentials. This is NEW but will really help us move towards greater accessibility for PLAR for example;
- Establishing dual credit with universities;
- Partnering between colleges to provide learner access;
- Partnering more with industry and other colleges to provide industry specific programming, and more just in time programming;
- Increased use of technology in the classroom;
- Focus on student driven operation rather than curriculum driven focus;
- Increase reliance on social media and collaborative technical tools;
- Organizational change to transition to multiple delivery models;
- Implement applied research to address community issues;
- Online collaboration;
- Need more niche courses;
- Reduce the bureaucracy and process issues;
- Approval times for courses take too long and may need more informal models;
- Are getting more out of country people and need to change the entry process;
- Need more local delivery and provide a presence;
- Partner more to be more effective;

- Try distance delivery to camps as people have free time and want to increase their skills and knowledge;
- Increase training for aboriginal workforce, power engineering, industrial training models with industry, local training, use local shops for training and upgrading skills when they can be made available;
- Need to increase our role with NSERC, more applied research, help change the culture;
- Student body is not active so it is a barrier sometimes to engagement.

4. *“Any other ideas or comments?”*

- Part of the planning might be to offer foundational training programs that would help enable students (local students who are not of high school age) to prepare for trades training;
- Fort McMurray is comprised of a diverse range of individuals working in a variety of fields. The community is comprised of labourers, engineers, scientists, service sector workers, and executives; this poses numerous challenges in terms of education and innovation.

E&OE.