

2010 INSTITUTIONAL RESEARCH PLAN (IRP) SUBMISSION

I. INSTITUTIONAL RESEARCH PLAN DEVELOPMENT: CONTEXT

A. Approved Mandate Statement

Founded in 1970, Athabasca University is a public, board-governed, open and distance education university, operating as a Comprehensive Academic and Research Institution under the authority of the *Alberta Post-secondary Learning Act*, which serves students throughout Alberta, across Canada and around the world. Working as a partner within Campus Alberta, Athabasca University is committed to collaborating with other key stakeholders to ensure a seamless and responsive advanced education system that provides high-quality learning opportunities in support of lifelong learning.

The University offers a range of courses and programs leading to graduate and undergraduate degrees, certificates and diplomas in the Humanities, the Social Sciences, the Sciences, Technology, Business, and the Health Disciplines.

As an Open University, Athabasca University seeks to remove barriers to undergraduate and graduate education. It offers flexible enrolment opportunities for learners regardless of age, gender, culture, income, disability, career and family obligations, geographic location, or educational background. As a distance education university, Athabasca University provides flexibility for lifelong learners who cannot or choose not to undertake residential post-secondary education. The University offers learners the opportunity to interact with students across Canada and around the world through programs in established as well as emerging areas, as it seeks to meet the needs of career professionals, develop research expertise, and create knowledge that fosters a global outlook among its graduates.

Athabasca University provides high-quality, interactive learning environments that include a variety of on-line and other media technologies for individualized and cohort learning. The University's library and tutorial services and extensive student support services that facilitate access and increase learner success are integral aspects of a quality open and distance education system. Similarly, its course designs and technology applications are based on current research in open and distance education, pedagogical advances in lifelong learning, and contemporary developments in online learning technologies. The University actively pursues technological innovations that can enhance its teaching, research and administrative functions.

The University provides undergraduate degree completion opportunities for university transfer students and college diploma graduates through credit coordination, credit transfer, and prior learning assessment and associated forms of learning accreditation. It supports collaborations such as its degree completion agreements with colleges and partnership with Alberta North. These collaborations, together with its participation in initiatives like the Canadian Virtual University, reflect Athabasca University's longstanding commitment to adult and lifelong learners, to Aboriginal communities, to learners in remote, rural and northern areas, to underserved urban populations, and to students in other universities' programs who seek courses to accelerate degree completion. The University also acquires and maintains accreditation in other Canadian provinces and in appropriate international jurisdictions.

Athabasca University pursues and demonstrates excellence in research and scholarship, viewing research as central to the creation and mobilization of knowledge, the enhancement of its programs, the education of its students, the betterment of its community, and the development of its faculty and future scholars. Besides its international reputation for research in all aspects of open and distance education and learning technologies innovation, the University is also developing notable strength in interdisciplinary research in several areas such as Canadian studies, globalization and cultural studies, Indigenous education, space and environmental sciences, project management, and nursing and health management. Aspects of technological change are integral to many of these theme areas. By supporting and conducting research activity in all program areas Athabasca University makes significant contributions to cultural, scientific, and professional development in Alberta and beyond.

Athabasca University's academic, professional and support staff engage in professional service within the education system at local, provincial, national and international levels. The University encourages its members to serve a wide range of communities through activities such as volunteerism, community based research, involvement in local community organizations and participation in virtual learning communities.

Approved by Athabasca University Governing Council, Executive Committee,
September 25, 2009

B. Alberta Policy Environment

Athabasca University's research initiatives are outlined in its research plan:

- to support disciplinary research both for its own sake and as a resource for the development and revision of Athabasca University courses,
- Athabasca University encourages research activity that crosses the borders of conventional fields; interdisciplinary research helps to enlarge research contexts and paradigms, to generate new ways of thinking, to develop staff professionally, and to foster collegiality.
- Inquiry into mission-critical subject matter – i.e., the pedagogical, cognitive, technological and student support aspects of distance learning, open access and new learning technologies – is central to the fundamental purpose of Athabasca University and will remain central to its research effort.

Within that context there is a strong alignment with GOA and AET priorities as they relate to the transformation to a knowledge economy, the acceptance of new technologies, the development of e-citizenry and a digital workforce, and the role of technology in all aspects of work and learning.

This policy scan is structured around the four Government of Alberta goals provided at the beginning of the *Research and Innovation Priorities for IRP Development* document, highlighting other GOA plans, papers, and publications as appropriate;

1. Economic Diversification and Competitiveness,
2. Environmental Stewardship,
3. Social Well-Being and Health, and
4. Talent and Skills.

Goal #1: Economic Diversification and Competitiveness

The core components of this Goal provide the focus for much of Athabasca University's ongoing and planned research, and are also central to 2010's *Bill 1: Alberta's Competitiveness Act*. Indeed, one of the University's mandated research priorities directly addresses *Bill 1's* objective to "develop strategies and initiatives to encourage innovation and to develop and adopt technology" through research endeavours in technology adoption and adaptation, knowledge acquisition and dissemination, business and workplace innovation, and a variety of related areas. In this regard, the University's research program both supports and is supported by the first Strategic Priority laid out in the 2010-13 AET *Business Plan*, ("Alberta Innovates"), which facilitates economic diversification by funding R&D ventures in areas of competitive strength; and the Plan's Goal 3, which speaks to research and commercialization in technology innovation sectors. AU's existing and growing partnerships with R&D companies in ICT, knowledge-based, e-learning, and other fields with solid growth prospects will continue to foster an increasingly competitive, knowledge-based economy in the coming years.

These same themes undergird two of AU's research institutes, the Technology-Enhanced Knowledge Research Institute (TEKRI) and the Project Management Research Institute (PMRI) – as well as the Alberta Innovates Technology Futures (AI-TF) Corporation. The AI-TF is mandated to foster the discovery of new knowledge for commercializable technology – TEKRI's foci complement this, supporting business innovation, leadership, entrepreneurship, changes in corporate culture, and investment along the value chain – activities that also form part of the research of PMRI and their colleagues in the Faculty of Business.

As described in *Alberta Innovates: Research and Innovation Priorities*, the AI-TF's support of strategic research through core funding will support SMEs in many other AU research fields covered by the four Corporations and the other GOA Goals ranging from creating a culture of sustainability to increasing health outcomes and increasing ICT applications and adoption. Further, the University is increasing its research focus and expertise in all of the target areas the document lists for the pending provincial ICT Strategy; geomatics, wireless, informatics, collaboration tools, infrastructure, imaging, digital media, and process optimization; discussions with both industry and Government are underway to explore growth in these and related sectors in alignment with AET goals and other GOA programs such as *Alberta's Action Plan for Bringing Technology to Market* and *Securing Tomorrow's Prosperity*. As those strategic documents make clear, if Alberta is to lead the knowledge economy, it needs a research framework that promotes not only the creation of new technologies and applications across all sectors of the economy, but also a much greater understanding, knowledge transfer, and implementation of those innovations. AU is already engaged in strategic research in support of those priorities, and looks forward to partnering with Government and the private sector to expand its efforts across the innovation spectrum.

Goal #2: Environmental Stewardship

The GOA's second Goal is supported through research undertaken by two Alberta Innovates Corporations; Bio Solutions, and Energy and Environment Solutions. Athabasca faculty engage in research activities in a variety of natural and social science disciplines that support AI and GOA priorities such as the work of the Athabasca River Basin Research Institute (ARBRI). Research being conducted under the ARBRI umbrella includes the changing ice flows on the Athabasca River, the social impact and processes of the resource-based towns and cities along the basin, the history of the region, and programs for environmentally and economically sustainable communities. The Centre for World Indigenous Knowledge and Research (CWIKR) studies local and international Indigenous ways of knowing, describing, understanding, and adapting to the natural environment; between them, CWIKR and ARBRI have developed strong relationships with

Alberta's Northern Aboriginal and Métis peoples that provide a solid foundation for current and ongoing research, academic, and other programs.

Another provincial government priority that is a strategic fit with Athabasca's research programs is highlighted in the *Alberta Provincial Energy Strategy* and the *Climate Change Strategy* – under which Albertans will have the information and knowledge to mitigate and adapt to climate change. AU faculty in Communications, ICT, Business, Sociology, and Distance Education engage in basic research related to the acquisition, dissemination, and application of knowledge with a range of environmental, social, and economic applications. University faculty and their colleagues in other institutions are well placed to support of GOA objectives to change public and corporate knowledge, attitudes and behaviours, by maximizing the potential of the digital environment to strengthen and foster the natural world.

Goal #3: Social Well-Being and Health

The *2010-13 GOA Strategic Business Plan's* third Goal is that Alberta will have a strong public health foundation including health promotion, disease prevention, assessment, and monitoring. The Alberta Innovates: Health Solutions Corporation provides the provincial research focus through its support of research and innovation “to improve the health and well-being of Albertans”, including the health-related social and economic benefits of increased well-being. The fit with Athabasca University faculty and graduate student research in improving health and well-being is high in a number of fields. These include Nursing and Health Studies-CIHR and other funded projects into health issues like health care worker adaptation and the role of physical activity in cancer recovery; Computing Science research into the use of mobile devices in health environments and personalized and adaptive information provision for both front-line staff and patients; Economic and Sociological studies of the impact of rapid economic and population growth on personal and social wellness; and many other areas. While some of these research priorities are addressed in GOA documents like *Alberta's Cultural Policy* and *Aboriginal Policy Framework*, the primary strategic direction is provided by AI-Health Solutions, *Alberta's Health and Research Innovation Strategy*, and a variety of Health and Wellness' guiding documents. That Ministry's *Business Plan 2010-13* includes a number of the Faculty of Health Disciplines' research priorities in nursing, health promotion, and public health, as well as a focus on ICT innovation and adoption throughout the health sector and the province's population as a whole to increase operational efficiencies and improve service and overall health outcomes – all areas impacted by current and planned research in the Faculty of Science and Technology and the Faculty of Humanities and Social Sciences, as well as the Centre for Distance Education.

Athabasca's research strength is in inter-disciplinary initiatives that bring together combinations of hard sciences (often technology), health and human sciences. This presents many synergies with the *Health Research and Innovation Strategy*, which lays out a definition of “health research” premised on the large and growing role of a broad spectrum of research endeavours with health-related applications. AU faculty and graduate students already engage in clinical, health services, and public health research - and their work often has an immediate impact because most of the University's nursing, public health, ICT, and public policy graduate students work full-time in their fields while they study and conduct research – a real advantage to the system, and an excellent test of research potential. While students at residential universities at times struggle to include “real world” experience for their students, at our University this comes with the territory.

The *Strategy* was developed not only to increase alignment and focus, but also to broaden the understanding of what health research includes; increase the translation of health knowledge into action and change; and help the system embrace technological change. Athabasca University is

excited by these new foci and the potential they present because they increase the research priority alignment of the province and the University, and present additional opportunities for funded multi- and inter-disciplinary studies in knowledge transformation and application; the causes and consequences of technological change; adaptivity; public awareness; and sustained behavioural change. These cross-disciplinary ventures will directly support many of the *Strategy's* outcome measures in categories like formal knowledge translation, and the creation of inter-disciplinary teams (in tandem with further contributions such as increasing the number of graduate students and the potential impact on the overall reputation of Alberta health research as a result of AU's internationally-recognized ICT and knowledge transformation researchers increasingly joining their Health colleagues on inter-disciplinary teams).

Goal #4: Talent and Skills

Athabasca University's research strength in distance / online education and life long learning are well known internationally; the University needs to do more to increase awareness of the current and future potential for research and research applications in a variety of related fields with enormous potential for R&D impact. These include some of the areas discussed in the three Goals listed above as well as professional development, knowledge economy skill acquisition, the creation of a digital workforce, the development of e-citizenry, the acceptance of new technologies, and workforce preparedness for change. AET's *Business Plan 2010-13* speaks to the need to foster economic diversification through the provincial research and innovation system; the province's full potential in that regard can best be realized if that research and innovation includes investigations into the broad spectrum of knowledge, creation, adaptation, dissemination, and acquisition including the potential of the latest mobile devices (smart phones, iPads, Android tablets, etc.) and collaborative applications. AU has Canada Research Chairs and an Industrial Chair conducting internationally-recognized, leading research in these and related areas; much more can be done to further this GOA Goal.

Other areas of related AU – GOA commonality include AI-TF's mandated goal of supporting knowledge and skill development throughout the technology sector, the many references in *Securing Tomorrow's Prosperity* and other documents to the need for Alberta's Universities to further the knowledge-based economy; and the *Education Business Plan 2010-13's* goal to support research into the continuous improvement of learning. Athabasca University's research programs already support innovation in these sectors and have the ability to expand considerably in priority areas, thereby providing the opportunity to leverage those investments to maximize Alberta's potential in the new knowledge economy.

Together, the province and AU both recognize that the world economy is changing, and is now firmly based on the production, management and transmission of knowledge rather than on physical products. Knowledge now produces the majority of economic benefits and job creation. We recognize that this economy is strongly inter-disciplinary, involving economists, computer scientists, health professionals, and natural and physical scientists, as well as social scientists, artists, and sociologists. We recognize that the rules and practices that determined success in the industrial economy need to be adapted or changed because knowledge resources like know-how and expertise are now the economic foundation of the global economy. AU, as a world leader in technology-enhanced knowledge research, is committed to working with the province to support this transformation.

C. Environmental Scan

Context

Athabasca University's research goals and strategies are informed by many of the same trends as the other institutions in the CARI sector, such as the health needs of an aging population, the projected shifts in demographics towards an older society and the recession. While those trends are of undeniable importance to AU's research activities, we thought that in light of the fact that that information will be available to AET in other IRP Scans, it would be advisable to focus this section on trends that are of particular import to online universities – that of the knowledge economy and digital world.

The basis for this decision in part reflects the fact that a review of other public online universities readily reveals that, whether they boast a robust research program or are quite narrowly focused, all of their research agendas and graduate program offerings are greatly influenced by those trends that play a unique role for online institutions. Broader research programs with mandates similar to AU's (such as the Open University UK) tend to include the humanities, social sciences, labour/HR, business, natural/environmental sciences, space, health, communication, ICT/security, media, education, the knowledge economy, and online learning. Smaller programs like Norway's NKI are targeted more specifically online communication, online learning, and ICT. But without exception, they all highlight the role of the digital world in their research activities and graduate programs because of its centrality to the environment they operate in - and ensure that it forms a major part of their ongoing research agenda. Other universities clearly engage in research on many of the same issues, but for those of us who "live" online, it is fundamental to our research identity and indivisible from our daily operations. If the Department would like additional information on more general patterns impacting our research please let us know; we would be happy to provide it.

The Primary Economic Trend of our Age: The Shift to a Knowledge-Based Economy

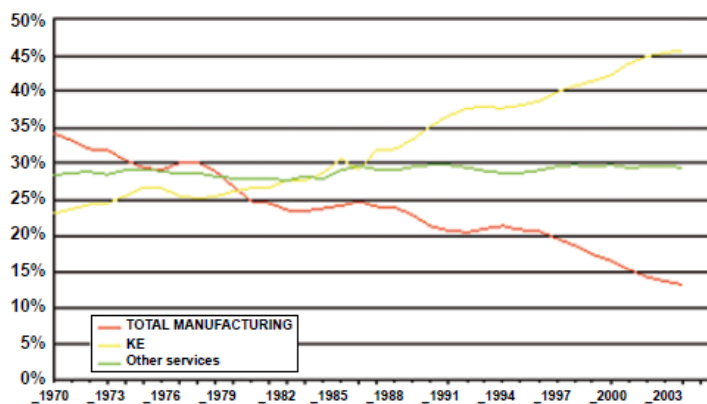
"Technological developments in the 20th century have transformed the majority of wealth-creating work from physically-based to "knowledge-based." The only comparative advantage a company will enjoy will be its process of innovation -- combining market and technology know-how with the creative talents of knowledge workers to solve a constant stream of competitive problems -- and its ability to derive value from information."

Thomas Riley, Executive Director, Commonwealth Centre for Electronic Governance

The implications of the above statement are significant, and range from the need to provide technology-enhanced health care to the revolution in commercial connectivity. We need to be better informed of the statistical and economic implications if we are to fully understand the depth of the change and its impact on the Alberta economy and research agenda.

As stated by the Works Foundation UK in their July 2009 *Knowledge Economy Research Programme* paper, industrialized economies have undergone significant change; half of current jobs are in the knowledge sector, companies spend more on

Figure 1: UK Knowledge Economy (KE) Service Industry Comparative Growth, 1970-2005

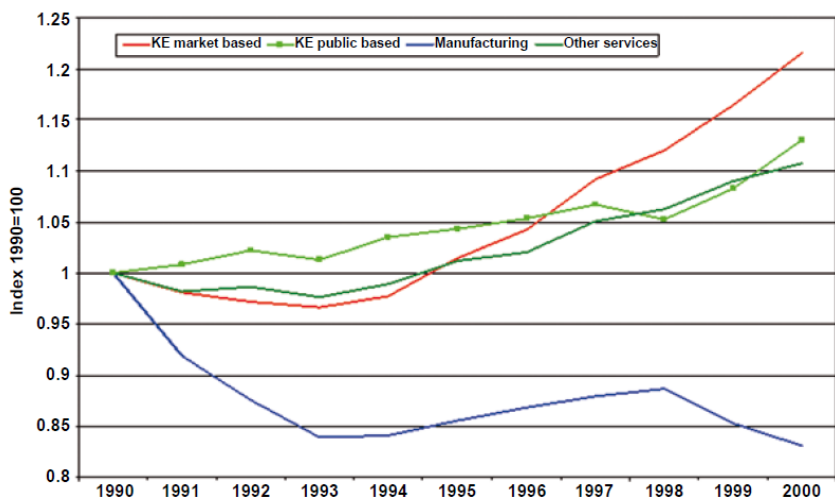


Source: The Work Foundation estimates from EU KLEMS database

“intangible” assets (people, software, design) than on “tangible” resources (buildings, equipment), and the vast majority of the workforce (90%) now presents formal job qualifications, up from 40% in 1970. The change is further illustrated on the graph above from their March 2009 *Knowledge Workers and Knowledge Work* paper (p. 10). In short, ICT is fundamentally changing the face of the economy in much the same way as the industrial revolution did several centuries ago – but this time, the change is happening much faster. The implications for Alberta’s research program are far-reaching, and present a number of opportunities.

(a) The Knowledge Economy - Building Economic Resilience through Knowledge

Figure 2: The Knowledge Economy and 1990s Recession and Recovery



An economy where the primary economic drivers are based on the creation and transmission of knowledge will have far-reaching implications for investment in future growth and the traditional reliance on resources. On page 7 of a UK paper entitled *Innovation, Creativity, and Entrepreneurship in 2020* is a snapshot (left) of how much more economically resilient the British knowledge sector

was during the recession in the early 90’s. Alberta has suffered greatly from several economic downturns; research investments would do well to reflect that reality (<http://www.theworkfoundation.com/assets/docs/publications/>).

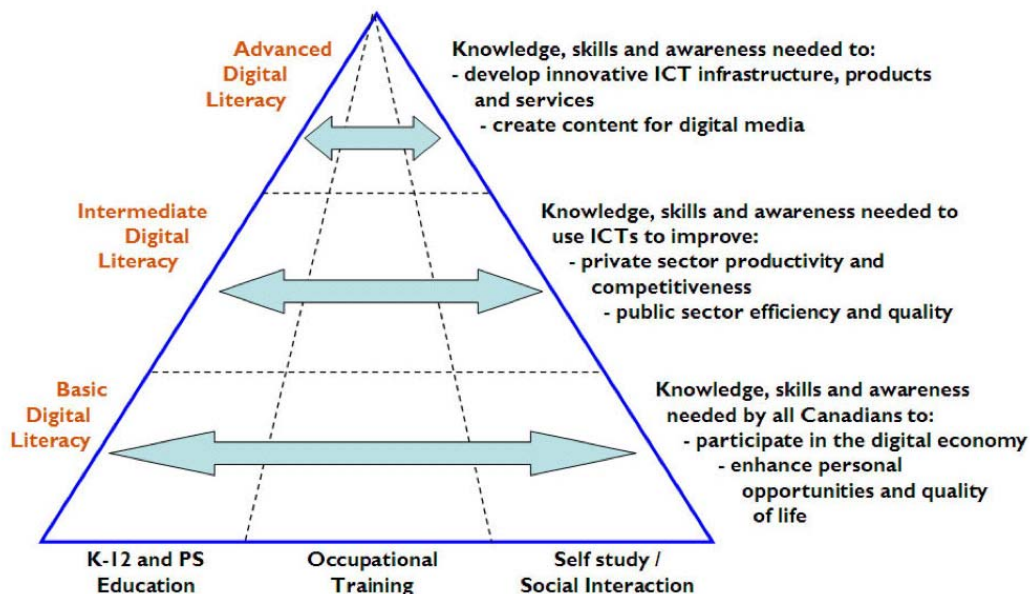
One key element of this change is very beneficial for the research community - economists are increasingly recognizing the role of knowledge in our daily life. Japanese economist Taichi Sakaiya explores these themes in his discussions about what happens when people buy a manufactured item and the impact on the economy. Most of what people pay for is the knowledge embedded in the object - its concept, design, resource extraction system, fabrication, and marketing – rather than the materials themselves (*The Knowledge-Value Revolution or A History of the Future*, 2nd ed; New York: Kodansha International; 1991). This understanding has motivated several Asian governments such as China and Singapore to make the R&D and commercialization of the knowledge economy, including knowledge provision, a cornerstone of their economic strategies. In addition, we need to understand how to create a digital workforce that can work and innovate in the diversified economy of the future as jobs requiring minimal education continue to disappear – or, as Rick Milner highlights in his February 4 National Post article *Ontario's Coming Unemployed Legions*, Alberta will soon be in a similar position to Ontario, which will face 1.1 million unemployed by 2021 (the Alberta equivalent would be 314,000). Futurist Richard Florida echoes the same concepts throughout his work. Other aspects of the new economy with multiple research implications, such as the changing productivity gap, have been highlighted in the work of Dr Leonard Waverman, Dean of the University of Calgary’s Haskayne School of Business. In his 2010 *Connectivity Scorecard*, he highlights the need for e-knowledge dissemination and awareness through his observation that “useful connectivity”, which measures the economic value generated by connectivity, use, tools, and digital literacy skills, accounts for half of the productivity gap between Canada and the United States (<http://www.connectivityscorecard.org/images/uploads/media/TheConnectivityReport2010.pdf>).

The Social and Demographic Side of the Trend: Digital Interconnectivity

“The digital divide used to be conceptualized as... an access issue – with groups divided by the access to ICT. It is now understood that the divide has moved. Having access is not enough... even after controlling for Internet access, socioeconomic status is an important predictor of how the Internet is actually used in daily life.” (Sharpe, Rhonda; *Conceptualizing differences in learners' experiences of e-learning*; Higher Education Academy Learner Difference Synthesis Project Report, July 2010, pg 10). Individual in all segments of Alberta society are affected by the shift to digital, whether or not they have “joined” in the change. The impact is social, fundamentally altering their relationships and who does – and does not – interact with them, and how. The impact is demographic, as younger people shift their relationships and how they maintain and build them in ways that maximize both their e-skills and technology as they draw upon tools that are more accessible to some than others. And the impact is again economic, as many of our financial choices as both consumers and as employees are determined by what we know how to use and how well we know how to use it. In order to increase Alberta’s social opportunities and economic productivity, research needs to be conducted regarding the e-knowledge provision needed to increase the number of Albertans – particularly Indigenous peoples, new immigrants, people in remote communities, and other under-represented groups – with the technical and soft skills needed to participate fully in the digital world. These skills include the ability to think, work, and learn online through both traditional literacy competencies and the processing, collaboration, and media literacy tools that collectively prepare people for technology adoption and integration in their daily social, workplace, and consumer lives.

In particular, we need to better understand technologically-enabled content provision and its role helping people to process and create wikis, blogs, podcasts, 3D simulations, mobile applications, personalized and adaptive environments, etc – the tools that moving us from a face to face, text-

Figure 3: A Digital Literacy Perspective on the Digital Economy Skills



based universe to the reality of the global future. The Media Awareness Network’s 2010 *Digital Literacy in Canada* paper includes the image at left that demonstrates the graduated abilities Canadians need to engage at all levels from literacy to creativity (http://www.media-awareness.ca/english/corporate/media_kit/reports-publications.cfm).

(b) Workplace Trends

Employer attitudes about keeping abreast of ICT platforms and software, and the workforce knowledge and skill currency needed to operate them, are not keeping up. Interaction and inter-firm learning helps employees change, experiment, improve, increase profits, and collaborate – benefiting companies in every sector. However, in addition to the World Economic Forum *Report* data listed above, the federal *Digital Economy Consultation Paper* notes Canadian business' slow ICT adoption rates, underinvestment in ICT (60% of US figures), and the direct impact on productivity (http://de-en.gc.ca/consultation-paper/consultation-paper-6/#c_0, p. 13). As is often the case, the best comparative data of where Alberta is and where it needs to be, is only available at the national level. Below is a series of data that provides national comparators regarding business readiness; in most cases Alberta would not deviate significantly. The information is taken from the Economic Forum and INSEAD's *Global Information Technology Report 2009-2010: ICT for Sustainability* by Soumitra Dutta and Irene Mia (http://www.weforum.org/pdf/GITR10/GITR%202009-2010_Full%20Report%20final.pdf). The *Report* presents a number of potential best practice models that could form the basis of a research enterprise.

Questions (summarized where needed) from Positive Indicator Tables	Canada Rank	Behind
To what extent do businesses in your country absorb new technology ?	21	Korea, Qatar
To what extent are quality specialized training services available?	11	Belgium
To what extent do companies invest in training and employee development?	12	Luxembourg, Denmark
How do companies obtain technology: locally or from other countries ?	20	Slovenia
Do government procurements foster technology innovation?	25	Oman, Tunisia
How much does your government prioritize ICT ?	33	Gambia, Malta
How successfully has government promoted ICT ?	29	Estonia, Brunei
To what extent do businesses and universities collaborate on R&D?	9	Finland
To what extent has ICT improved government service efficiency ?	17	Chile, Portugal
Importance of ICT to the government vision of the future?	26	Jordan, Qatar

Question from a Negative Indicator Table	Canada Rank	Behind
How common is licensing of foreign technology ?	1	No one

Perhaps the most sobering fact from the *Global Information Technology Report* is the foreign technology licensing indicator in the last box; Canada leads the world in using other countries' technology licenses, even when compared with other countries with smaller populations. The fact that Canada adopts more licenses than any other industrialized country demonstrates low ICT creativity. It highlights the need for research into the causes for our performance, together with models to foster creative development.

Another trend is highlighted by the Media Awareness Network and talks about the barriers to SMEs across the economic spectrum (http://www.media-awareness.ca/english/corporate/media_kit/reports-publications.cfm); "compared to large enterprises and public institutions, SMEs have been slow to adopt digital technologies in their internal operations, establish a web presence, and move their

businesses online by developing advanced e-commerce capabilities” (p. 20). This leaves SMEs vulnerable to shifts in the global supply chain, making it harder and harder for them to keep up. Again, this presents an opportunity for much-needed research and best practice policy, practice, and information dissemination (including through both formal and informal learning) models.

(c) Alberta’s ICT Sector: An Emerging Opportunity for R&D

The ICT sector calculates that it accounts for 100,000 jobs in Alberta (<http://albertaict.ca/industry-facts>), but even the GOA’s more conservative estimates in the ICT Profile outline **a robust industry with direct employment of 54,509 and \$10.2 billion** in annual revenues, making it the third largest value-added sector in the province (http://www.alberta-canada.com/images/GOV_4A_Aberta_ICT_Industry_Profile.pdf). Together with its unique ability to facilitate innovation, greening, and problem-solving across private and public spheres, a picture emerges of a sector that serves as a nervous system for the economy as a whole - impacting energy, the environment, health, and education, as described in the GOA ICT Profile referenced above.

Additional information on this sector, which is ripe for extensive commercializable activity through R&D and technology transfer, is provided in the recent AET-commissioned *eScan Final Report* by Lynda Brown-Ganzert and Lars Vedo, “The Alberta sector has the benefit of a widely respected distance education leader in Athabasca University, complemented by alternative delivery strategies employed by Universities of Alberta and Calgary. Infrastructure is well-established, with technical backbone such as SuperNet and collaborative mechanisms via eCampus Alberta” (p. 65). Reliable information about the global knowledge transformation industry is scarce because the business side of digital knowledge provision is so new, but the potential for near-immediate R&D impact is high. One of the better supported statistics gathered as part of our research was that the global self-paced e-learning (individuals studying formally at their own pace at online institutions - one small part of knowledge dissemination commercial activity) market was \$27.1 billion last year, and will be \$49.6 billion by 2014 (<http://www.ambientinsight.com/Reports/eLearning.aspx>). However, the lack of information about this new, growing sector is good news – it means that jurisdictions that move quickly can get in on the ground floor and maximize their investment while the industry is in its early stages.

Knowledge Transformation Sub-Sector – The Potential for Best Practice Research

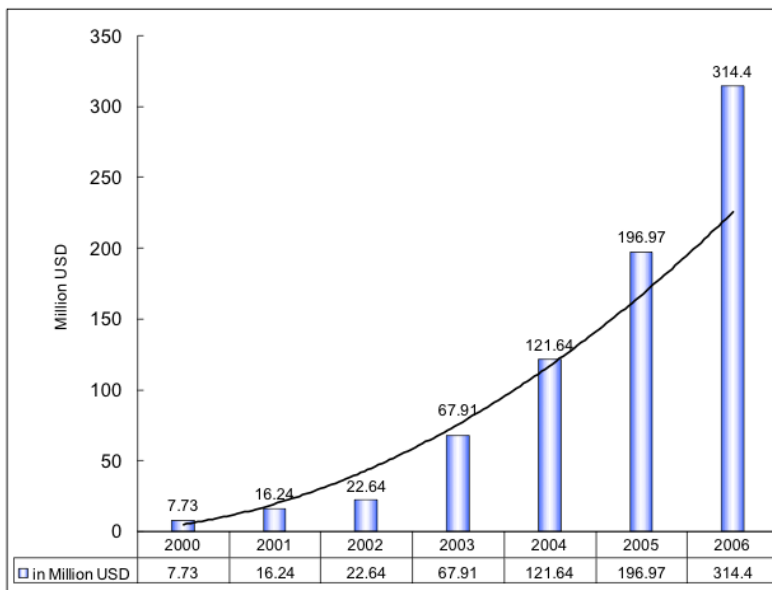
A handful of international jurisdictions have made the advancement of their e-knowledge and e-learning industry a part of government economic strategy (most of those provided have been identified by AU faculty based on their contacts worldwide because the business sector is not well documented as yet). In many ways this creates an ideal situation for Alberta; the province has an unusual glimpse into what is happening in a very young market, providing our R&D community with the opportunity to get in on the ground floor and grow with it; a few examples are provided in the table below.

Taiwan	<ul style="list-style-type: none"> • 13 Ministries partner to support e-learning competitiveness, businesses, technologies, systems, tools, networking, public awareness, and impact on the national and international market through system-wide programs and policies • Focused on developing value-added applications throughout the supply-chain • Integration with researchers, science, technology, and education • Experienced large growth and significant corporate efficiencies (see next page)
Malaysia	<ul style="list-style-type: none"> • Focused on promoting ICT and e-tools in its education sector • The Ministry of Education has supported the development research and infrastructure • Sees e-learning as the key to their ability to achieve developed country status

Finland	<ul style="list-style-type: none"> Created an ICT cluster to lead them into the knowledge economy Invested heavily in knowledge transformation to foster creativity and innovation
India	<ul style="list-style-type: none"> Serves as an outsource provider for many countries' e-learning development needs The offshore industry alone will reach \$603 million by the end of 2012, already up from \$360 million in 2008
Singapore	<ul style="list-style-type: none"> Incubation strategy focused on supporting new e-learning companies Well developed legal and regulatory environment in support of ICT ventures One such example is NTUC LearningHub Private Limited which has trained 800,000 professionals and working adults, and partnered with more than 10,000 companies to identify and provide training needs, helping undergird national economic growth Developed an industry-post-secondary partnership (UniSIM)
Netherlands	<ul style="list-style-type: none"> Concluded that e-learning / ICT investment will form the basis of their new economy The Energy Transition initiative links 6 Ministries and the private sector to incubate innovation front runners that help transition energy production and consumption Sees the knowledge economy as the next step as the resource economy weakens

Half of the world's population is under 20, and they want to learn in a personalized environment that is at least partially delivered online. The just-in-time world of knowledge dissemination matches the goals and expectations of both youth and today's employers, and presents enormous potential for academic inquiry, industry partnerships, and R&D.

Figure 4: The Impact of the Government Initiative on the Taiwan E-learning Industry Market Size



Taiwan presents a strong R&D-based model that has seen large economic returns; the graph at left is already several years old and fails to include the latest profit growth made possible by the government-led e-learning program (launched in 2003; Chang, M., Wang, C.-Y., & Chen, G. D, *National Program for e-Learning in Taiwan*, Educational Technology & Society, 12 (1), 5–17, 2009). Taiwan's initial capacity was similar to that in Alberta today; they then invested in a host of research, public-private partnerships, and

commercialization activities. The lessons learned would be of great interest, particularly when the much broader commercial opportunities for technology-mediated communication, healthcare, and education are factored in.

AU Analysis

Athabasca University is well placed to foster its research priorities. Its strength lie in its commitment to the importance of online virtual environments as integral to the development of a knowledge economy which essentially means the integration and use of technologies to inform

and improve practices and disseminate and create knowledge. This is central to the mission and mandate of the university and hence receives strong support throughout the institution. Global feeds daily bring more information on the recognition of the importance of the digital age, in particular the Internet, to personal communications, information sharing and business operations. Countries are reacting differently but it is essential that we do not lose the opportunity to collaborate with global partners in the development of research that will inform this change.

The following analysis identifies the challenges and opportunities which face AU in the realization of its institutional research plan within the policy and research environments identified above.

Strengths

- AU is recognized as an international leader in this field.
- Recent developments in AU's technology infrastructure will form the basis for future initiatives.
- AU's research network involves established groups of relatively young in career researchers with affiliations to international research groups and partnerships.
- Early involvement in open source, green technology and open access movements helped establish AU's reputation as early adopters within the virtual environment movement.
- A mix of basic and applications oriented researchers who also come from different disciplines (computing science, information systems, business, sociology, health, and communications) and whose research is linked to the use of technologies in improving practices and creating and disseminating knowledge from the research network. Some of these research clusters are led by Research and Industry Chairs.

Weaknesses

- While the University has been very successful in meeting the previous University Plan's objectives and in obtaining external research support, it has had to invest any available resources in infrastructure development and has not been able to fund its research institutes as fully as had been hoped.
- The research support network is minimalist which in turn limits the capacity of AU research groups to network and form partnerships with research groups elsewhere.
- Internal funding for post-doctoral fellows is scarce. International opportunities for research students are likewise less well funded than those from international partners.
- Although graduate students are from AU and internationally, two doctoral programs which would enable the inclusion of more AU graduate students are still in preparation.

Opportunities

- There is increasing awareness of the importance of the digital environment to meeting the needs of governments, the public sector and business and industry both nationally and provincially. Where the link is made the outcome can be beneficial in terms of moving more rapidly into the digital age. For example, recent federal funding for virtual studios will not only benefit newly immigrant architects who need to have their knowledge and skills reevaluated for certification in the Canadian context but will also provide both an incubator and accelerator for research in 3D systems and the translation of simulations research in specialist fields such as medicine and dentistry to its use in other professions.
- Emerging Web 2.0 and social software developments provide new opportunities through possible innovative solutions.
- Canada has a growing interactive industries sector which is second in size after Ontario. There are collaborative opportunities with the e-learning sector in particular.

- Synergies can be realised by building on and/or expanding AU initiatives to include more sector partners.
- As pointed out by CCL, there is no centre for coordinated research on formal and informal e-learning. AU has researchers in the broader fields of knowledge systems and digital technologies innovation as well as in applications in formal and informal learning systems such as health care. Social science researchers examine the digital age and its impact. Together these could form the faculty involved in a centre for such research.

Threats

- A challenge, not unique to AU, is to grow research groups and maintain institutional investments while operational and capital funding investments are depressed.
- Long-term fiscal sustainability of AU's IT system infrastructure in a context of accelerating developments and increasing security challenges continues to be a concern.
- Coordinated planning is essential to ensure AU's institutional research priorities focus on aspects related to the knowledge economy. The almost constant developments in this field mean that without a cluster of research groups skilled to undertake assessment and critique of new possibilities, many good opportunities will be lost.
- Research related to knowledge systems and technologies innovation in the knowledge economy is still not well established elsewhere. Were provincial and national governments to hesitate in recognizing its importance to Alberta and Canada's future, other countries (Singapore, Taiwan, Finland) are poised to take over leadership and provide the funding necessary to launch and stabilize innovation in this area.

II. INSTITUTIONAL RESEARCH PLAN DEVELOPMENT PROCESS:

As part of the consultation process, the VPA and AVPR discussed aspects of the process and possible collaboration with colleagues at the other CARI institutions and met with AET staff in various departments regarding the development of this Plan. Consultations also included meetings with a number of Alberta companies and AU researchers. In addition, the VPA and/or the AVPA and AVPR are meeting with the heads of the Alberta Innovates Corporations. Our goal for this inaugural IRP is to gain a better understanding of the process, together with how the new provincial research strategies, policies, and entities will unfold and evolve over the coming year. We then will be much better placed to build on existing relationships with institutions across Campus Alberta to foster research partnerships and opportunities for the next Plan.

The University is about to write a new Strategic Plan, a process that will also involve the development of new Academic and Research Plans; as a result, the existing AU Research Plan formed the basis for this submission. Internal consultations in preparation for the IRP included meetings with the Deans and the Vice-President Academic. We engaged in a significant amount of background preparation ranging from a review of faculty research plans and AU strategic documents to research plans at other universities in and outside the province. A draft will be circulated through the Deans, Executive group, and Academic Council for information and discussion before final submission.

III. RESEARCH PRIORITIES AND EXPECTED OUTCOMES:

Research Priorities

The identification of research priorities arose from the current University Research Plan (2006-2011) which identifies the general vision and principles underlying University research and the development of strategic initiatives. The next section follows directly from the University Research Plan.

The University is committed to developing a robust and supportive culture that will effectively balance disciplinary and mission-critical research; Athabasca University will cultivate disciplinary research systematically while developing its open and distance education expertise and innovation to the fullest. Interdisciplinary approaches will continue to be encouraged, and partnerships within and outside the academy will be established.

Research Vision and Principles

Athabasca University is a research institution committed to excellence in research and scholarship. Research is integral to the University's purpose and central to its activities. To enable research to thrive, the University must cultivate and maintain a healthy, robust research culture within the institution. This effort will be built upon the following core principles, (which provide the frame of reference for the Research Priorities section):

- Athabasca University will not compromise academic freedom, and will advance it as the foundation of any prospective research undertaking.
- Athabasca University supports disciplinary research both for its own sake and as a resource for the development and revision of Athabasca University courses.
- Athabasca University encourages research activity that crosses the borders of conventional fields; interdisciplinary research helps to enlarge research contexts and paradigms, to generate new ways of thinking, to develop staff professionally, and to foster collegiality.
- Inquiry into mission-critical subject matter – i.e., the pedagogical, cognitive, technological and student support aspects of distance learning, open access and new learning technologies – is central to the fundamental purpose of Athabasca University and will remain a central part of its research endeavours.

Strategic Initiatives

In line with the research goals embedded in the Strategic Plan, the University will foster a growing, healthy research culture (SUP 3.3), increase supports to cultivate student and staff excellence in research and scholarship (SUP 3.1), and develop a clear and viable strategy to seek and allocate funding (SUP 3.7). It will enhance our international profile in research and scholarship on open and distance learning (SUP 3.2) and build research partnerships with appropriate organizations and institutions provincially, nationally and internationally (SUP 3.6). The University will provide the widest possible access to researchers (SUP 3.5) and promote the exploration and dissemination of knowledge for the benefit of society (SUP 3.4). Over the next five years Athabasca University will demonstrate the following key achievements: the development of new centres of excellence and endowed chairs; new collaborative research projects involving provincial, national and international colleagues; a greater emphasis on research reflected in increased numbers of publications and presentations from academic staff and students and greater numbers of grants and awards; and more student involvement in research projects (SUP 3.1.3).

Throughout, the University remains committed to the research priority areas identified in the *University Research Plan (2002-2005)*: Space Science and Astronomy; Environment and Sustainability; Globalization and Cultural Studies; Indigenous Education; Workplace and Community Education; Nursing and Health Management Research; Labour/Canadian Studies; and Open, Distance and eLearning. At the same time, the University recognizes the importance of supporting new and emerging areas of research – i.e., interdisciplinary inquiry; areas of research that have emerged since the 2002-2005 Plan; and changes resulting from new funding initiatives and evolving societal concerns.

While these goals put a clear emphasis on the expansion of research activities, they build on our past record of research accomplishments reflected in our publications and grants records and in particular the work of Athabasca University's funded Canada and industrial Research Chairs, and Tri-Council and externally funded scholars. However, there was also acknowledgement that as we grow in numbers of students we also need to continue to support and accelerate our capacity to do research. These research goals, then, have been identified as helping to establish a more sustainable capacity for research activities.

Besides a general increase in research activity, the University is committed to extending the number of new research chairs and centres of excellence. These are seen as providing leadership in the development of Athabasca University's priority research areas as well as helping to seed interdisciplinary developments in keeping with new provincial and national priorities. The development of scholarly research networks is becoming the norm, and is increasingly central to funding grants allocations. Collaborative research projects are a mechanism that can help enhance the expertise already available at Athabasca University through research involvement with counterparts elsewhere. Of increasing importance is the growth of research capacity among senior undergraduate and graduate students. Through the provision of additional research opportunities, AU's students will be able to both increase their awareness of the role of research in the world, and gain research expertise. This increased capacity building will further their contribution to the development of new knowledge and contribute to society.

In addition to these specific directions, the University is committed to supporting the work of its researchers as part of ongoing effort to further embed research in the culture of the institution. Through its new research proposal and career mentoring program, the University will continue to encourage and assist faculty to develop research development and funding plans that will in turn help identify the supports needed by individual researchers in their research careers. The continuing integration of research into the culture of the institution is a critical and ongoing process that reflects its evolution over the past four decades – and will provide a number of other important benefits: teaching will be informed; faculty, staff and students will develop professionally by contributing to the discovery and dissemination of new knowledge; a formal and dynamic research enterprise will be evident to external stakeholders; the reputation of the University will be enhanced; and the University will establish new relationships in the wider research community.

(Athabasca University Research Plan 2006-2011)

Current Priorities and Expected Outcomes

Over the past five years, the University has moved significantly towards the achievement of these goals through setting up three research institutes (the Technology Enhanced Knowledge Research Institute (TEKRI), the Athabasca River Basin Research Institute (ARBRI) and the Project Management Research Institute (PMRI),(referenced above), the appointment of Research Chairs,

and the development of increased capacity across the institution with greater numbers of academic researchers having received national or international funding within the last five years. Building on that base, the University continues to have a major research interest in expanding the emphasis on e-learning and open and distance education to include its underlying knowledge systems and digital technologies. Envisaged as a network of research clusters, researchers have strong external links to provincial (U. Alberta, U. Calgary, and U. Lethbridge) national (the Universities of Saskatchewan, Simon Fraser, Laval, Dalhousie,) and international researchers (Singapore, Taiwan, Greece, Finland, India, China, UK) who are working on similar topics. The intent is that synergies can be obtained from collaborations among the clusters as well as through their membership in external research teams.

The Technology Enhanced Knowledge Research Institute hosts a network of these clusters that focus either on knowledge systems architecture or digital technology innovation. The former is focused on the development of knowledge architecture such as taxonomies, open architecture/ cloud computing, and the use of data analytics and data visualization in providing real-time data, data schema and visualization essential to the improvement of soft digital technology decision making cycles. The latter includes work on mobile computing, localization and geomatics, personalization and adaptivity, adaptive/responsive designs, and soft techniques such as interactive collaborative tools for knowledge building and team work.

While these are the two main clusters under TEKRI, there are other researchers involved in related work in information systems, applications design and use, and analysis and display. Researchers in the TEKRI group come from all the faculties in the University and as such possess great potential for the increasingly interdisciplinary needs of the provincial and national research agendas. One related cluster is focused on virtual laboratories. This includes work on 3D SPACE, on Second Life applications, on virtual media labs, and federally-funded architecture studios (labs) under the direction of the incoming Architecture Director. Another cluster is examining the possibilities provided by mobile applications in the workplace such as their use in gathering patient data at the bedside, and their utility in aiding in smoking cessation programs. Other researchers focus on the use of mobile technologies in the development of alternative virtual environments for knowledge acquisition and dissemination.

Linked to the research in the TEKRI Research Institute is the work of a research cluster on health promotion that focuses on areas such as aspects of living with chronic illness, the role of nutrition and exercise, and issues surrounding maternal child health. This team has links with colleagues at the University of Alberta, University of Lethbridge, and Dalhousie as well as internationally. This is a growth area for Athabasca University and is related to the planned development of a PhD in Health Disciplines.

Crucial to the sustained development of these initiatives and highlighted in the IAP is the education of graduate students in related areas (DBA, EdD in Distance Education, a planned PhD in Information Systems, and one in Health Disciplines, and graduate programs in Applied Mathematics). Not only will these initiatives help sustain Athabasca University's reputation as one of the foremost research centres in the broad areas of knowledge systems and digital technologies innovation, they will have direct benefits for other Alberta post secondary institutions through providing platforms for quality virtual learning environments for Alberta students and – more broadly - opportunities for the provincial e-Industry to commercialize the R&D findings. Cooperation on the provision of such environments is integral to helping achieve the goals of Campus Alberta.

The Project Management Research Institute brings together local, national and international organizations, practitioners and researchers interested in project management research. Using the benefits of collaborative research to inform its purpose, it exists to advance the state of knowledge and promote knowledge-sharing and community building across the sector, particularly as it relates to change management in projects. Its research is focused on generating and testing new project management concepts to examine the challenges in managing the organization/project boundaries, infrastructure and mega projects, information and high technology projects, and social system reform (e.g., health systems). The knowledge dissemination of project management research to research projects in other areas is a major contribution to the University's research priorities. Graduate students in Business can take courses from PMRI researchers as part of their program and work on project management topics as their capstone research.

The Athabasca River Basin Research Institute is a focus for researchers across the academy. The Institute has adopted a whole systems approach to the river basin with an emphasis on interdisciplinarity. Working with local communities, stakeholder post-secondary institutions and regional organizations, the purpose of the Institute is to create a repository of information from the natural sciences, social sciences, and humanities that provides a richer understanding of life in the basin for community members and researchers. Initial projects include those with Aboriginal learning communities funded by the Rural Alberta Development Fund and involving a Canada Research Chair in Aboriginal Legal Knowledge, research on the aurora borealis led by a Canada Research Chair in space sciences, and the work on community capacity building involving resource based communities funded by the Alberta Rural Development Network. These research activities, initiated in partnership with CCIs such as NorQuest College, as well as with Alberta North, are helping to build capacity and increase knowledge dissemination throughout Campus Alberta. Researchers in the Institute come from Sociology (sustainable rural communities) and Philosophy (ethical decision-making on environmental issues), Workplace and Community Studies, Business (leadership and entrepreneurship), Science (aurora studies, remote data gathering, glaciation and water levels, and mathematical modeling) and Indigenous Studies (legal and traditional knowledge). The involvement of Indigenous researchers is particularly important since over 50% of Alberta's Aboriginal population live in the Northern half of the province. ARBRI will support, and be supported by, the types of new programs that were mentioned in the IAP such as an MSc programs in Applied Mathematics and in Environmental Sciences, and the MA in Environmental Studies.

The University provided initial seed funding for the Institutes and supports the work of individual researchers through small internal grants competitions and matching grants funding. Researchers have been successful in obtaining external funding to support much of their research and the University provides assistance in the development of proposals through the Research Office.

The University Capital Plan supports all institutional research activities through ongoing and planned expansion of physical and ICT infrastructure. The research impact of current capital projects centres on the new virtual media laboratory, supporting a variety of communications, social software, and media initiatives; the federally- and provincially-funded Science Lab expansion, of particular relevance to ARBRI; and the University-wide Open Knowledge Environment – a large ICT infrastructure project funded by both levels of government to advance research effectiveness across all discipline areas have been essential in furthering the research agenda. Planned research initiatives depend on sustaining funding of the IT research infrastructure. This remains fundamental to the development of all the digitally based research endeavours. Together with the academic initiatives laid out in the IAP and University Academic

Plan, recent developments in the Capital and Research planning areas will lay a strong foundation for the development of the new Strategic University Plan.

Alignment with AET goals and priorities

As identified in the section on Alberta's Policy Environment, research foci at Athabasca University relate closely to the AET business plan and the Research and Innovation Priorities identified in the IRP background document.

In particular, there is a close alignment between AU's research foci and expertise and the target areas for the provincial ICT Strategy; analytics and visualisation, geomatics, wireless, informatics, collaboration tools, infrastructure, imaging, digital media, and process optimization. Discussions with both industry and Government are underway to explore growth in these and related sectors in alignment with AET goals and other GOA programs such as *Alberta's Action Plan for Bringing Technology to Market* and *Securing Tomorrow's Prosperity*. They highlight the need for Alberta's Universities to further the knowledge-based economy. If Alberta is to lead the knowledge economy, it needs a research framework that promotes not only the creation of new technologies and applications across all sectors of the economy, but also much greater understanding, knowledge transfer, and implementation of those innovations across all sectors of society. AU is already engaged in strategic research in support of those priorities, and looks forward to partnering with Government and the private sector to expand its efforts across the innovation spectrum.

AET's *Business Plan 2010-13* speaks to the need to foster economic diversification through the provincial research and innovation system; the province's full potential in that regard can best be realized if that research and innovation includes investigations into the broad spectrum of knowledge, creation, adaptation, dissemination, and acquisition including the potential of analytics and visualisation for extracting and displaying useful information; and the latest mobile devices (smart phones, iPads, Android tablets, etc.) and collaborative applications. AU has two Canada Research Chairs and an Industrial Chair conducting leading internationally recognized research in these areas.

The province and AU recognize that the world economy is changing and is now firmly based on the production, management and transmission of knowledge rather than physical products. Knowledge now produces most economic benefits, as well as job creation. We further recognize that the emergent economy is strongly interdisciplinary, involving not only economists, computer scientists, health professionals, and hard scientists, but also social scientists, arts professionals, and sociologists. As a society, we recognize that the rules and practices that determined success in the industrial economy need to be adapted or changed, because knowledge resources such as know-how and expertise are now the economic foundation of the global economy, rather than physical goods. AU, as a world leader in technology enhanced knowledge research, is committed to working with the province to support this transformation.

Areas of Focus – Research Capacity Envelope

As described above, Athabasca has developed a network approach to its research priorities with knowledge systems and digital technologies innovation as two closely related foci. Related topics include research clusters focused on mobile technologies, 3Dspaces and multimedia objects. A second cluster is in the area of health promotions and a third established cluster focuses on project management research approaches to change management. The Athabasca River Basin Research Institute focuses on knowledge dissemination related to all aspects of the basin from

space science to Indigenous legal knowledge to assist local communities in decision making and community development and external researchers through access to facilities and bibliographic databases.

The bullets below are based on AET's strategic priorities as expressed in the IRP planning document, and highlight the work of Athabasca University's researchers in these priority fields, working under the leadership of Canadian, NSERC, Industrial and iCore Research Chairs. Together, they present great potential for ICT commercialization, health care application, public awareness raising, e-learning, and a host of other applications.

- **Geomatics** (remote sensing GIS/GPS): This research focuses on location-based technologies, investigating the application of location-based dynamic grouping algorithms and systems that provide a platform for remote users to work collaboratively and for users to integrate location-based content into product design, development, and delivery.
- **Mobile and location based applications:** These researchers focus on the application of wireless devices for collaboration and knowledge creation, adaptation and dissemination. Research includes the implementation of interoperability standards for mobile-enhanced learning objects, repositories for downloading content in a variety of formats, proxies and style sheets, screen design, models, and user interfaces.
- **Analytics and Informatics** (structure, algorithms, artificial intelligence): These researchers explore innovative paradigms, architectures and implementations of systems for individualized and adaptive applications, intelligent agents, and virtual environments in collaboration with Xerox, Sun Microsystems and other companies. This includes adaptive systems and cognitive profiling, semantic technologies, software language engineering, model-driven engineering, analytics, networks, and service-oriented architectures.
- **Knowledge management and Collaboration Tools:** This research group has developed a social software platform designed to act as social Velcro for formal and informal sharing and communication using technologies similar to popular Web 2.0 sites (social networking, file and photo sharing, micro blogging sites, blogs, and wikis). Research challenges include connecting disparate systems, assuring security, privacy control, and interactive designs.
- **Digital Imaging:** The CRC 's (Space Sciences and Astronomy) world-class geophysical observatory transmits astronomical images around the world, and has been recently awarded CFI funding for a new state-of-the-art geophysical observatory and imaging equipment. AU is a member of the Institute for Space Imaging Science.
- **Digital Media:** This research group operates the largest digital media project in the province, the new Visualization Lab. Thanks to AU's large digitization project, researchers are studying the application of digital media in a wide range of user interface contexts.
- **Process Optimization:** An award-winning world leader in project management research who has led a major international project funded by the Project Management Institute of America. Leads this group. Research applications for the evolving digital economy include organizational change management, team-building and leadership, based on complexity theory.
- **Open Learning Environment -ICT Infrastructure:** This group seeks to maximize AU's potential and make effective use of research for practical implementations both within the University and in collaboration with private sector companies in Alberta. The group leader champions the use of the AU ICT infrastructure for research in its role as Canada's largest online university. AU is the only university with an ICT-based infrastructure project funded through the recent Knowledge Infrastructure Fund; the AU project is supporting cloud and "green" computing.
- **Alternative Knowledge Acquisition Designs:** These researchers are leading a group of faculty and learning designers who are engaging in ongoing research focused on alternative dissemination strategies varying from the use of virtual worlds and simulations to strategies for self-regulated

We see ourselves as being innovative in continuously seeking new and better approaches to enable knowledge acquisition, and motivate learning through leading developments within the digital revolution that will enable the new knowledge economy in Alberta and provide virtual learning environments that meet the needs of contemporary users when and where ever they are, through alternative technologies. This requires a sustainable research portfolio that is focused not only on the improvement of knowledge acquisition but on the architecture which will provide the options for users, and which will also provide opportunities for interactive industries companies to build commercial adaptations and seek further innovative solutions. AU is currently developing a business plan for funding of up to \$15 million over 5 years to the Technology-Enhanced Knowledge Research Institute initiatives.