Athabasca University
CANADA'S OPEN UNIVERSITY

Pre-Budget Consultation Submission Athabasca University – August 2011

*"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

Executive Summary

Athabasca University, Canada's open and online University with over 38,000 students, has engaged in a variety of Government of Canada consultations over the past few years (available upon request). The University further appreciates this opportunity to build on the foundation provided in those documents and AUCC submissions, as well as in recent Government papers on the Digital Economy. This submission focuses on three strategic directions that address large and growing socio-economic issues:

1. The need to develop programs and policies to **follow up on the Digital Economy Consultation**.
2. Setting up **digital infrastructure to facilitate analytics research and development** in response to emergent economic, environmental, and social issues.
3. The potential for **national digital resources** to foster innovation, digital literacy, and STEM HQP.

Canada's Digital Economy Consultation: Next Steps

Technological advances have brought about major social and economic shifts in recent decades that help shape Canada's national economic and social vision and decision-making processes. As stated by the Works Foundation UK in their *Knowledge Economy Research Programme (http://www.theworkfoundation.com/research/keconomy.aspx)*, industrialized economies have undergone significant change; **half of current jobs are in the knowledge sector**; companies spend more on "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 short, ICT is changing the face of the economy in much the same way as the industrial revolution did several centuries ago – and, to put it simply, Canada is not keeping up.

At Athabasca University, we start from the premise that the digital economy is based on knowledge - it is often referred to as the "knowledge economy". This term is often used without consideration of its real significance, which is that **the overwhelming majority of economic activity and value generated no longer depends on physical goods, but rather on knowledge. Knowledge does not enable the digital economy; it IS the digital economy**, as it is based on the creation, development and dissemination of knowledge.

We were encouraged by the Federal Government's announcement for the launch of the public consultation process for the purposes of creating a digital economy strategy for Canada in 2010. Now that the consultation process is complete, it is **imperative that the Government of Canada continue the next steps and implement a federal digital strategy**. For Budget 2012, the government is well-placed to take the steps necessary to develop and resource a digital economy strategy. That will of necessity involve:

- infrastructure
- policies
- programs
- regulatory environment
- intergovernmental partnerships (including those with Aboriginal communities)
- government-industry partnerships (including those with SMEs)
- research and development

All of which are needed to allow Canada to achieve and sustain an international leadership position. We have the results from the consultation – let's use them to move forward.

Analytics: Using New Tools to Solve Tomorrow's Problems

The world today is awash with information, and Canada is no exception. Our public and private bodies have more data than would have been conceivable a few short years ago, but we are only beginning to understand how to harness that resource to **create efficiencies, increase profit margins, improve service, and achieve targets** in supporting under-represented populations. The burgeoning analytics sector is starting to take root and realize its full potential to inform and change our lives—by using the reams of data our ICT systems already collect on a daily basis.

Analytics can provide modeling to better understand environmental impacts and drive land and water use policies and permits; increase health program impacts and reduce health care costs; increase knowledge transfer rates in the formal and informal sectors; change business practices to enable increased customer targeting and satisfaction; and **change business and government practises and decision-making structures in new and powerful ways**. In our own education sector alone, algorithms, modeling, analysis, and data set experimentation can serve to identify and support at-risk students, provide appropriate interventions, increase learning outcomes, personalize the delivery for each individual student, and improve retention and satisfaction—thereby improving work force readiness and the preparation of HQP. However, analytics has a few underlying support needs:

- infrastructure
- targeted pure research and R&D support (Tri-Council, NRC, and other programs)
- pilot and commercialization programs
- privacy, storage, and security systems

With these mechanisms in place, Canada will be well-placed to leverage its existing and future data to increase innovation in the digital age.

A National Digital Resource Strategy: Fostering Innovation

The extent of Canada's innovation gap is well documented. Reminders can be found in the World Economic Forum 2011 Report (http://www.weforum.org/reports): number of patent applications per capita (23rd), companies obtaining technology from other countries (19th), high tech exports (28th), government procurements fostering innovation (25th), corporate spending on R&D (20th), venture capital availability (19th), per minute cell phone cost competitiveness (66th), and broadband cell subscriptions (68th). *Canada's Digital Economy Strategy Consultation* demonstrated that we are behind in STEM PhDs, patents, home-grown products, and many other innovation indicators. The recent stock price adjustments of Canada's flagship innovation-based company, Research in Motion, serve as another unwelcome reminder of the problem that was reinforced in a number of articles about the RIM innovation gap. Strong language is being used across the business and technology sectors: "**We believe that RIM desperately needs innovative products to help revive its business."** (http://community.nasdaq.com/News/2011-05/rim-continues-to-lose-ground-in-smartphones.aspx?storyid=75480#ixzz1Q7mXUMDn). We have a well-educated population and a successful economy—and yet even one of our best is struggling with innovation.

Canada has built a successful economy on our physical resources; however, **if future economic growth is centered on what we know instead of what we have, the question must be—how will we fare**? If we adapt and prepare, Canada is well positioned to rise to the challenge and be just as successful tomorrow as it is today. Improving information provision by filling the gaps in workplace learning, adult learning, digital literacy, online education, and research will broaden Canada's knowledge base.

Knowledge Transfer: Supporting Innovation

While innovations have been implemented to increase workplace and adult learning around the globe, many are founded on elements that are different from—or stronger than—those in place here. This includes regulatory environments, widespread understandings of the need to increase digital literacy and ICT business adoption (especially among SMEs), corporate sector buy-in to the cost benefits of professional and workplace education, nation-wide post-secondary collaborations, and a strong triple helix of university-business-academic partnerships (rather than primarily focusing on research). Together, our **national knowledge transfer system challenges Canada's ability to compete in knowledge transfer for both the workplace and the adult population as a whole**. If those barriers can be overcome, Canada's knowledge transfer rate and ability to innovate and keep up with competitor nations can be improved, enabling us to harness technology-enhanced education to take our place in the knowledge economy of tomorrow. Canada stands to benefit in several capacities:

- **Businesses could use technology-enhanced education to move information** into the workplace and prepare unemployed and under-employed adults for emerging positions through partnering with universities for content, delivery, and accreditation purposes.

- The ICT and education sectors (including K-12, college, and blended learning environments) could benefit by partnering to **create a strong and cohesive online/e-learning business sector** for hardware and software to meet tomorrow's learning needs (for example, by developing and selling e-textbooks, learning resources, content and learning systems, serious games, student support systems, and assessment tools).
- Universities, schools, companies, and the public sector alike could draw from educational resources that **provide the information they need for learning and living online** in Canada.

Digital Resources: Innovation Enablers

Perhaps the greatest potential and challenge for increasing academic, economic, and social knowledge transfer rates is in developing high quality learning resources for use across the formal and informal technology-enhanced learning spectrum. Many are under development right now, some for sale and others for sharing within a given distribution or freely available around the world. Depending on the distribution model, there can be complications and competing objectives among stakeholders; however, because **the hoped-for wins of large scale learning resource creation and sharing could have a transformative impact** across the technology-enhanced learning spectrum for students, employers, and institutions alike, a substantial and growing number of organizations are moving ahead.

Foundations like the Gates Foundation, the UK and US Governments, and states like California and Texas are planning to **create efficiencies in tightening economic times through the development and sharing of digital learning resources** by creating new public and private sectors collaborations. For example, private providers partner with a state or province to create a digital resource that is free to students registered within their jurisdiction and sold externally; or a company partners with a university to create something that is free throughout the world but students pay to print and instructors pay for assessment tools; or a state or province develops e-resources that are customized for its own use and then made freely available to all. Digital resources can include such things as e-textbooks), video, audio, gaming, assessment tools, modules, courses, instructional, and other forms of information provision for formal, informal, and workplace education purposes. The most cost-effective approach (if a sustainable business model is identified) is through Open Educational Resources, which can provide knowledge transfer tools across every province and territory.

Increased Focus on STEM HQP

Many countries around the world are particularly focusing on the **creation of new pathways in Science, Technology, Engineering, and Mathematics (STEM) disciplines** to add another tool to their innovation toolkit that supports a growing and increasingly critical HQP need in the emergent knowledge economy. In the US, NASA has partnered with space scientists and post-secondary providers to offer an online course to students across the country. The online program is designed to build interest in STEM careers by leveraging NASA's reputation, expertise, and facilities in Virginia to attract more prospective students to those disciplines, making courses more engaging and accessible (http://www.usnewsuniversitydirectory.com/articles/nasa-launches-online-stem-education-program_10856.aspx).

Here in Canada we have digital STEM resources, but because they often require more up-front investment both to ensure quality and maintain currency, especially for online provision, they are **less commonly available than other disciplines and usually lack the extras needed to maximize the impact**

of STEM content. While there are degree programs in related areas like Nursing, Health, and Technology, digital STEM resources when they do occur tend to be general in nature. STEM disciplines would benefit from any number of targeted technology-enhanced learning innovations such as

- Well-resourced remote and **virtual labs**
- Technologically-integrated learning **tools**
- Preparedness pathways and supports in **calculus** and other gatekeeper courses
- **Recruitment-focused** resources and programs for K-12 and first year undergraduates
- **Professional programs** to update existing workplace and R&D skills
- **Management programs** for STEM environments (such as ICT)
- Developing specialized instructional **design** expertise required for high quality STEM courses

The barrier to achieving these innovations is the lack of a **vision and support for a national inter-jurisdictional government-university-private sector solution to the STEM HQP problem,** and pathways to address needed cost-effectiveness through cross-Canada partnerships.

Further Dialogue

Key to the strategy outlined throughout this submission is the recognition of the unfolding nature of the digital world and Canada's potential to lead through action. We, at Athabasca University, would welcome the opportunity to review Canada's options with Government, industry, and other partners in furthering the digital agenda.