Technology-enabled results on the Alberta research frontier

INTRODUCTION

This document provides examples of the value added by Alberta's Research and Education Network, CyberaNet, to research in the four areas of strategic importance to Alberta: technology solutions, health solutions, bio solutions, and energy and environment solutions.

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Information and Communications Technology

An engineer at the University of Calgary has devised a touch-screen material that is lighter and more durable than what cell phones currently use. He shares his patent-pending findings with a small team of colleagues located at top universities worldwide.

Cybera operates Alberta's research and education network, which joins all major research institutions in Alberta. This secure, very high bandwidth network is at the heart of Cybera, and keeps Alberta connected and competitive in the international world of research.

Kiribatu Labs is a small, Edmonton-based company with a novel idea for how the insurance industry can better analyze risk. The problem? They need thousands of computers to carry out the number crunching required to verify their formulas.

Playing a leadership role in an Industry Canada initiative, Cybera helped develop a cloud environment that allows small companies like Kiribatu to create and operate thousands of "virtual" computers, to crunch enormous volumes of data. Lessons learned are being applied to an Alberta incubator cloud for entrepreneurs so Alberta businesses can compete in the big data economy.

Alberta is home to well-known space weather researchers, studying phenomena such as the aurora borealis. This is no trivial pursuit. Space weather fluctuations can take down power systems on earth, as a few alarming incidents in the past have proven.

The complex interactions of our grids and space phenomenon require international collaboration and incredibly detailed modeling. A space weather data portal, using cloud technology, has been developed by Cybera and Alberta researchers to allow massive amounts of space data to be stored and shared online. Cybera helps Alberta researchers take leading roles on international projects that attract top young talent to the province.

Life Sciences

A health care aide is driving down a gravel road in a snowstorm to see a housebound patient living on a farm. It feels very isolated. When she arrives, she realizes the patient's needs have changed, dramatically, since last seen by a doctor.

Cybera helped a team of University of Alberta researchers, led by Dr Eleni Stroulia, develop a tablet application, with information stored on a private Alberta cloud, that keeps health care aides connected to a patient's health care team. Quickly look up a chart and execute an up-to-the-minute physician-led decision -- on site. This is how advanced technology is supporting the vision of team-based health care in this province.

When health care workers in the Siksika First Nation noticed a rise in the rates of avoidable diseases – such as tuberculosis and influenza – they wondered if an aging, paper-based immunization record system was partly to blame.

A digital health-record system developed in Alberta, with data security support from Cybera, is now in practice in 15 First Nations communities. It has paved the way for a historic immunization data sharing agreement between Siksika and Alberta Health and Wellness. Technological expertise provided by Cybera is helping to realize the government's commitment to improving the health and well-being of all residents.

Biosciences

Stefan Kienzle is a professor at the University of Lethbridge studying changes in the southern Alberta watershed. To get a full picture, he needs to know everything about the region's climate, terrain features, water quality, and animal migration. This information can take months or years to collect, from all sorts of sources, in all kinds of formats.

Cybera was the co-founder of an initiative, now a stand-alone not-for-profit company called Explorus, that draws data from hundreds of sources into a one-stop-shop, an open-access online portal. It is now the largest source of western Canadian water and environmental data.

Imagine being a climate scientist working in Canada's frigid arctic. Each day you collect ice level samples from 50 different sensors, and enter the results into your smartphone. Instantly, thousands of researchers around the world are able to see the arctic ice coverage as it goes up or down.

An online digital map that collects and shares geo-based information from both researchers and smart sensors has been developed at the University of Calgary, with support from Cybera and Microsoft. The tool has become a strong, flexible resource for research. For example, it is the basis of a popular "citizen science" initiative in Rocky View County, where farmers collect and share their well water information so scientists can detect trends. Technology plays a central role in transparent environmental monitoring.

Energy

Despite what the name suggests, cloud computing does not exist in the ether – there still has to be a computer server somewhere, and that server runs on energy. A lot of it.

An international team, including Cybera, is testing a series of interconnected servers that run on renewable energy. In Alberta, Cybera manages a server that runs on solar power delivered from the roof of the Alastair Ross Technology Centre. The results from this will influence future "green IT", as well as guide protocols for renewable IT systems.

About Cybera:
Alberta's Research and Education Network

Cybera is the not-for-profit agency in Alberta responsible for e-infrastructure – the advanced system of networks and computers that form a very high-speed public backbone in support of research, education and enterprise.

At the core of its operations is CyberaNet, a high-bandwidth network that connects Alberta's post-secondary institutions to the international system of research networks. This network is a testbed for new ideas and services coming from both the research world and the business community. It is also the backbone for a host of emerging shared IT services.

Public sector, not-for-profit and pre-profit organizations are encouraged to take advantage of the network and above-the-network services provided by Cybera:

1) **International research networks.** Cybera is part of a national community of high-speed fibre-optic networks and R&D testbeds linking researchers and educators.

2) **Peering service.** Through direct connections called "direct peering," Cybera's network connects members to sites such as Google, Microsoft and YouTube. The peering service separates this traffic from the members' commercial internet traffic, freeing up bandwidth for new uses.

3) **Internet buying group.** Network traffic from Cybera members is aggregated and passed directly to a commercial Internet Service Provider. The bulk buy allows Alberta public institutions to purchase high-speed internet services more efficiently.

4) **Enterprise in business.** Cybera encourages and cultivates entrepreneurial activity that exploits the potential of internet-related products and services through targeted initiatives and programs.

5) **Shared IT services.** Alberta universities and colleges are collaborating to achieve economies of scale by piloting cloud-based delivery of services such as their Learning Management Systems. Cybera is coordinating these shared IT service initiatives.

6) **Research and pilot projects**. Cybera's expertise is fully integrated into projects on the frontiers of technology involving both the network and above-the-network technology.

7) **Expert unbiased advice.** Cybera's expertise in networking and cloud computing is a source of supplier-neutral advice to support Alberta's public interest. This unbiased role is critical at this time when the internet is becoming as ubiquitous as light and heat.

For more information, contact info@cybera.ca or call 403-210-5333
www.cybera.ca Join us on Twitter (@Cybera), Facebook and LinkedIn