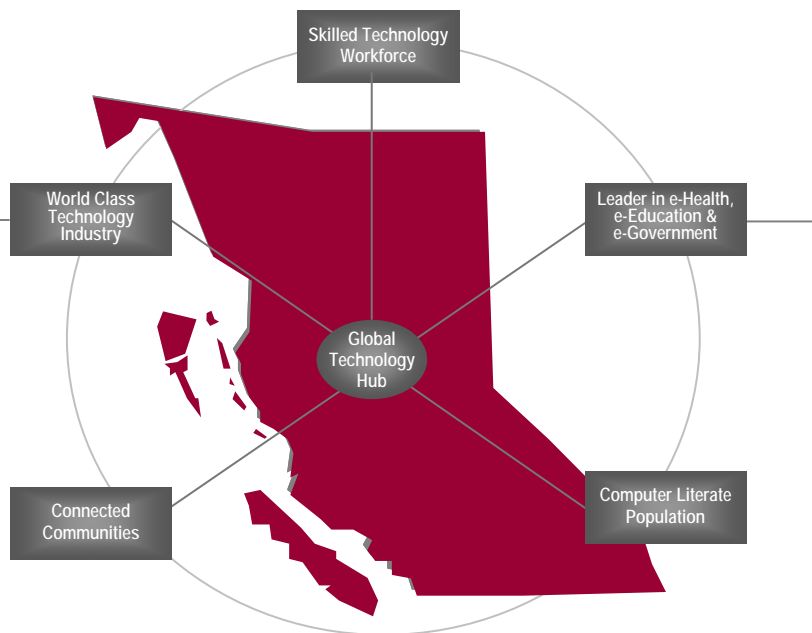


8TH REPORT

MARCH 17, 2006



We believe that with strong cooperation between the provincial government and private enterprise, British Columbia will be one of the world's top ten technology centres

Every effort has been made to consider all information obtained and to be as accurate and consistent as possible in our use and analysis of all research materials. However, errors or omissions may have occurred. Please notify the Premier's Technology Council of any significant inaccuracies by e-mail at:

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Foreword

The Premier's Technology Council (PTC) was created in August 2001 to provide advice to the Premier on technology-related issues. The mission of the Council is to help make British Columbia one of the world's top ten technology centres.

The Honourable Gordon Campbell is Chair of the Council, a position shared with the Co-Chair, Greg Peet, former Vice President and General Manager of the Medical Imaging Group, McKesson Corp. The Council is fortunate to draw its membership from twenty-one other leaders of BC's technology industry and from senior levels of the academic sector.

Over this government's first four-year mandate, the Council produced seven reports containing numerous recommendations, the majority of which the government has supported. These recommendations have acted as a catalyst for growth in the private sector and the adoption of advanced technology solutions in the public sector. Important progress should be applauded:

- Through the initiatives of NetWork BC, the availability of broadband communications has significantly improved with services expected to be provided to all 366 communities by the end of 2006.
- Best technology practices in government procurement have enhanced the delivery of public services.
- Changes to the *Small Business Venture Capital Act* have encouraged capital investment and changes to the *Employment Standards Act* have facilitated job growth and deepened the talent pool.

Growth of the province's technology sector has been impressive. From 2001 to 2004, the BC's technology sector enjoyed revenue growth of 22.5% and GDP expansion of 16%, exceeding the BC industrial aggregate, which grew by 10% during the same period. Notably, these accomplishments occurred despite global trends in technology markets that were not favourable.

This report seeks to build on this record of results with additional recommendations on extending broadband communications, particularly for First Nations; enhancing the provincial government's use of technology, with special attention to security and privacy considerations and wider use of high-tech solutions in educational administration; promoting industry development, through smart taxation policies, world-class educational programs, and targeted initiatives in the power technology and new media sectors; and enhancing innovation and commercialization, by pinpointing key areas for improvement

FOREWORD

and examining how government can help.

This 8th Report of the Premier's Technology Council is the first for the government's renewed mandate. The Council begins this term with a new Co-Chair and five new members but its mandate and role remain the same. We will continue to advise government on how to foster a technology industry that is competitive on a global scale. We will also continue to provide advice on technology policies and practices so that government services are delivered efficiently using best practices. These are the attributes that will earn BC global recognition as one of the world's best centres for technology.

We thank all members of the Premier's Technology Council who volunteered their time, energy, and experience toward achieving the PTC's mission. We would also like to thank the Premier and government officials for their willingness to listen to our ideas and act on our recommendations.

Jim Mutter
President, Premier's Technology Council

Executive Summary

As the Government of British Columbia embarks on its next four year mandate, the PTC issues this 8th Report to identify priority recommendations to ensure that BC will advance its stature as an innovative centre for the private sector technology industry and a leader in high-tech public services. The principal recommendations in this report include:

Infrastructure - Broadband Communications

The PTC's most significant initiative to date has been the "conquering of the digital divide" by providing broadband communications capability to virtually every community in the Province of BC. The Government's progress toward this goal has been laudable. However, the task is not yet complete. The PTC supports continuing the current level of effort so that 100% of the targeted rural communities are included in the broadband network.

In particular, the PTC encourages the Province to collaborate with the federal government on solutions for First Nations communities, which disproportionately lack broadband communications.

Government Services

The PTC continues to examine opportunities to improve public services in health, education, and social services through e-government and technology adoption.

Privacy and Security

The PTC identifies the importance of establishing government policy and technological systems that will achieve two goals: protecting personal privacy and the security of information as well as facilitating the effective implementation of increasingly integrated electronic services. Citizens want to be able to use single log-ins and passwords to access the full array of government services, but they do not want this information inappropriately shared. BC is a leader both in protecting privacy and in delivering services electronically. To maintain this leadership position however, there is a need for an overarching strategy, architecture, and set of standards to manage data and service integration. British Columbians must be confident that the efficient e-government services they enjoy remain private and secure.

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There are three pillars in this architecture:

1. Identity and Access Management – Strategies that allow government systems to seamlessly identify users and their level of access through a single electronic identifier;
2. Security – Investment to protect systems and electronic services from ongoing threats of viruses, attacks, and accidental compromises; and
3. Privacy – Protection of all information through appropriate practices and protocols.

The PTC believes that additional investment of both organizational effort and funding in personal privacy and infrastructure will improve British Columbians' overall satisfaction and confidence in e-government services. Failing to address these challenges will delay advancement of e-government objectives and lead to higher costs in the long-run.

Education

Education would clearly benefit from the adoption of more technology. There is a clear need to implement a broad-based information system, or technological backbone. Such a system will enhance reporting on student performance. It will also reduce the administrative burden on teachers, allowing them to spend more time and effort on what they do best: teaching.

Policies for Technology Leadership

As well as addressing government services, the PTC makes recommendations on how government can encourage growth in the private sector technology industry. BC's supply of capital has increased tremendously in recent years. The Council recognizes that the government has taken many measures that have helped drive this expansion, particularly the recent initiative to expand the *International Financial Activity Act* to include intellectual property on life science patents.

However, more efforts are necessary to stimulate the development of a vibrant and sustainable risk capital market in the province. Strong economic growth in BC continues to drive up demand for capital, and this creates challenges for some companies in the high-tech sector. The PTC recommends that government expand the SR&ED tax program to include all companies in BC, as opposed to just those that are Canadian controlled; raise the individual limit for angel investors; and take further steps to encourage greater foreign capital investment.

Industry Initiatives

In this 8th Report, the PTC focuses on two promising high-tech sectors: power technology and new media. In the spring of 2005, the PTC released a report entitled "A Vision for Growing a World-Class Power Technology Cluster in a Smart, Sustainable British Columbia." In response to that study, the government took a leadership role and immediately established an

EXECUTIVE SUMMARY

Alternative Energy and Power Technology Task Force (AEPTF). This task force is currently developing an implementation plan to grow the sustainable energy cluster in British Columbia. The PTC has endorsed this initiative and urges the government to adopt new recommendations outlined by the task force.

New media is an exciting sector driven by how Internet and digital technology are transforming a variety of technology-related sectors, particularly the entertainment industry. Digital entertainment includes game software, computer animation, and digital effects on the production of videos and film and other web-related applications and content. As a world leader, British Columbia currently houses the largest new media sector in Canada. It has more than 800 companies, 15,000 employees, and \$2 billion in annual revenue. Nonetheless, BC is facing intense competition from other jurisdictions, which are using tax and labour credits to lure key firms.

How can BC ensure that it remains attractive? Currently, there is a critical shortage of middle-management talent in new media. There are only three universities in the world that offer graduate programs in entertainment technology. All of these are in a fledgling stage and market research indicates that eight BC companies would hire all their graduates. There is also the need for a home base and seeding ground for the sector to develop a shared vision, strategy, and competitive intelligence. To overcome these challenges, industry, led by New Media BC is proposing a plan to:

- Establish a world-class *Masters of Digital Media* program for digital entertainment professionals at the Great Northern Way Campus (GNWC) which leverages the collective strengths of BCIT, Emily Carr Institute, SFU, and UBC; and
- Create a “*World Centre for Digital Media*” as a home base for the *Master of Digital Media* program and industry seeding ground also to be located at the GNWC.

The Premier’s Technology Council believes this plan demonstrates true leadership and encourages the government to support and invest in the development of the *Master of Digital Media* program and the *World Centre for Digital Media*. The PTC is pleased to note that government has already demonstrated support for this initiative. It endorsed the project in the 2006 Speech from the Throne and used the 2006 BC budget to announce a \$40.5 million one-time funding contribution for the establishments of the *Master of Digital Media* program and the *World Centre for Digital Media*.

Some of the challenges of the power technology and new media sectors are a microcosm of broader high-tech issues related to innovation and commercialization. The PTC continues its detailed analysis in this area and presents preliminary findings in this report. Specifically, the PTC’s extensive consultations have found that there are six areas that should be targeted for improvement if BC’s high-tech sector is to attain its full innovation and commercialization potential. BC needs to:

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- Attract more senior management executives;
- Enhance sales and product management capabilities;
- Expand the number of highly qualified personnel (HQP);
- Strengthen linkages between academia and industry;
- Strengthen science and technology governance; and
- Improve the availability of early and later stage funding.

The PTC will bring forward a complete set of recommendations to address these issues in its future reports.

Digital Divide – Broadband

The PTC continues to regard broadband as its top priority. As noted in the 7th Report, the government took an important step in closing the digital divide via its partnership agreement with TELUS. This should bring affordable broadband connectivity to all 366 BC communities by the end of 2006.

In addition to delivering the initial broadband connection, the government is attempting to address the issue of the “last mile.” Many places that either now or will soon have broadband access do not have the resources to take full advantage of it. Delivering broadband services from the terminus to homes and other facilities represents too great an expense for these small communities. However, through the First Nations Technology Council and the BC Community Connectivity Cooperative (BC3), the Province recently provided thirty, \$20,000 grants to regional communities to purchase last mile infrastructure. The fact that there were 77 applications for this funding illustrates the strong demand for “last mile” funding in rural and remote communities.

Therefore, the PTC recommends:

8.1 That the government commit further funds to addressing “last mile” issues inherent to the Digital Divide. The funds would add value by preparing communities for the arrival of broadband and by equipping them to benefit from its introduction.

First Nations

In previous reports, the PTC has noted the importance of broadband to First Nations. In particular, broadband holds great potential for improving aboriginal peoples’ access to health, education, and social services as well as boosting their economic development. In its 7th Report the PTC recommended:

7.1 That the provincial government work with the federal government to create a Joint Task Force with the expertise, authority, and resources to provide broadband and related services to First Nations communities in British Columbia wherever reasonably possible. The Task Force must also have First Nations representation.

While discussions on the development of a joint task force are currently under way, no time frame has been determined. However, the commitment both federally and provincially was

DIGITAL DIVIDE

reinforced in November 2005 with the signing of the Transformative Change Accord in Kelowna. It included an agreement to take immediate action to close the digital divide by providing broadband connectivity to all First Nations communities.

The Premier's Technology Council also notes that the provincial government recognized the importance of this issue in the 2006 Speech from the Throne by clearly indicating that steps will be taken to extend broadband access to First Nations. Furthermore the 2005/06 Service Plan of the Ministry of Aboriginal Relations and Reconciliation makes this Ministry, in partnership with the Ministry of Labour and Citizens' Services, accountable for extending broadband Internet access to 100 First Nations communities across BC by the end of 2008.

Although some progress has been made in providing the initial broadband connection to First Nations communities, there are still issues to be resolved. There is some uncertainty about the definition of broadband itself. First Nations believe that broadband should be defined not by its technical capacity but by the programs it can deliver. If it cannot deliver the full range of services then it is not truly broadband. They do not believe, for example, that satellite connectivity is truly broadband and should be the only option where the extreme remoteness of the community makes it the only reasonable alternative.

The last mile issue raised earlier is critical in First Nations communities. To better understand this challenge, the First Nations Technology Council is conducting a survey to determine the average costs of addressing the last mile. Preliminary research suggests that the estimated average cost to link communities to the nearest Internet point-of-presence and to implement a local distribution infrastructure is \$51,000. Related to the last mile issue is the situation where some communities that do not have broadband access are in close proximity to a community that does or soon will have. Investing in an extension of the broadband service to these nearby communities would extend the benefits of broadband further at a relatively small cost.

First Nations are grappling with the paradox that those communities that are most remote and have the most difficulty in receiving broadband are the ones that have the greatest need for the kinds of services it can deliver. It is in these communities that a full range of government services such as health and education are most difficult to access. These are all concerns that the joint task force will explore once it is formed.

Based on the above analysis, the PTC recommends:

- 8.2 That the Joint Task Force be constituted as soon as possible and tasked to develop and resource an action plan to bring broadband to First Nations communities in BC.**
- 8.3 That the Premier and government Ministers continue to support the Transformative Change Accord, urge their federal counterparts to support the connection of broadband to First Nations communities in British Columbia, and enter into a partnership with British Columbia and First Nations in this province to accomplish this task.**

Government Operations

Identity Management and Security

INTRODUCTION

In past reports, the Premier's Technology Council has focused on the need to close the Digital Divide. Recognizing that electronic delivery of health, education, social services and economic development could both improve quality and reduce costs, the PTC investigated the prime obstacles to that delivery. The Council found that the lack of a province-wide broadband service represented the most significant barrier, not only for government's ability to deliver services electronically but also for the ability of citizens in many BC communities to participate in the global online economy.

The Province has made major strides in overcoming these barriers. NetWork BC, through its partnership with TELUS, will ensure that affordable high-speed connections are made available in 366 communities by the end of 2006. Although there is still much to be done, connectivity issues have been addressed to such an extent that the PTC believes government needs to move forward to the next significant barrier to the delivery of e-services – striking the appropriate balance between convenience in accessing comprehensive government services and trust that personal privacy is being protected.

With the use of technology becoming commonplace, citizens' expectations of electronic government services have increased substantially. They want their access to, and interactions with, different government departments to be as easy and as seamless as possible. If, for example, they change their address, they want to be able to do it from one website using a single user id and password, with confidence that personal information stored in the systems will not be inappropriately shared.

Within this challenge, there are three key issues:

- Identity and Access Management – Strategies that allow government systems to seamlessly identify users and their level of access through a single electronic identifier;
- Security – Investment to protect systems and electronic services from ongoing threats of viruses, attacks, and accidental compromises; and
- Privacy – Protection of all information through appropriate practices and protocols.

By addressing these issues, the Province can maintain its position as a leader in e-government and take the next step to integrate services and enable information sharing across ministries.

TRENDS

British Columbia is the most connected province in Canada. Recent figures indicate that 74 percent of households have an Internet connection, 64 percent are high-speed or broadband connections and 89 percent of the population lives in a community where broadband is available. They have high expectations of electronic services, and those offered by the government are no exception.

In view of these realities, the Province is moving more and more services online. BC currently offers more than 300 external and over 200 internal e-services¹ including Mineral Titles Online, Land Registry, Courts Services Online, One Stop Business Registration, Student Information System, and a Health Provider Registry.

As more services become available online, there is growing concern over the security of data shared within the government system and with its service delivery partners, such as the health authorities. This concern applies not only to unauthorized access by external parties, but also to privacy and confidentiality issues within the government itself.

The concern over appropriate use and access will grow as new types of technologies are introduced. One example is mobile phone technologies that signal the user's physical location. Such developments sharpen the debate over privacy because, while the technology offers exciting new benefits, it also creates opportunities for invasion of privacy and misuse of information if not properly managed.

There are other improvements within the technology industry that allow new e-services to be created more easily. In particular, they can better integrate work processes from across a diverse set of organizations. These improvements have dual impacts. Firstly, they lead to a dramatic increase in the volume of services and information that can be moved online. Secondly, they lead to greater integration of information. Public sector e-service initiatives such as the Integrated Land Registry, the Electronic Health Record, and the Student Information System all reflect this trend. Each of these initiatives integrates processes and information on a large scale. This will grow further as governments start to interface across jurisdictions both federally and municipally.

However, if this integration does not take place within an overall strategy involving all government services and information, there may be unintended consequences. One such consequence may be that aggregating data from multiple sources could lead to unanticipated breaches in security or privacy. Another is that proceeding with various, independent government

¹ Office of the CIO, "e-Government Plan", Dec 15, 2004.

projects with no overall plan could lead to the creation of even larger silos or islands of information. These islands of information may need to be further integrated in the future at additional cost.

The need, therefore, is for an overarching strategy, architecture, and set of standards by which to manage service and data integration. This will ensure British Columbians can trust that public services, including those that they access online, will fulfill their expectations for protecting their personal information.

OPPORTUNITIES

BC has the opportunity to maintain its leadership position in e-government and privacy protection by establishing a trusted environment in which service integration and information sharing are safe and secure. The first step toward achieving this is for government to address the three areas identified above: identity management, privacy, and security.

IDENTITY MANAGEMENT

Information must be accessed only by those who are authorized and have a “need to know.” Effective identity management systems are prerequisites to achieving this objective.

The BC Government has already undertaken several identity management programs. The Corporate Authentication Program (CAP) in the Ministry of Labour and Citizens’ Services is a good example. This is a cross-government framework and service solution for authentication for government e-services. The program will work with client ministries to set up, implement, and operate their authentication services over all service delivery channels - online, over the phone, and over the counter as needed. Existing authoritative sources of identity integrate into CAP so there is no need to create completely new business processes. For example, the Corporate Registrar remains the authoritative source for determining the identity of registered corporations in spite of being integrated with new technology systems.

An additional potential benefit of the government’s Corporate Authentication Program is that it could provide the electronic infrastructure for other organizations that have authority over related areas, such as professional designations. Exploring this potential would require review of existing business processes and the development of appropriate new ones. This would ensure that, if new identity management functions are introduced into the Corporate Authentication Program, they are aligned with the program’s core competencies.

While the Corporate Authentication Program is a good first step, government needs to do more to synchronize its identity management program with those currently being developed in the health and education sectors. A variety of authentication approaches will be required to support the

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specific needs of the various business areas, such as the health sector's need for highly portable, strong authentication devices. This requires immediate attention so that public dollars will not be spent on creating incompatible solutions that will have to be integrated into a seamless system at a later date and at a much greater cost.

Administration is by far the largest component of identity management costs, and must be given close attention when expanding identity management to the broader public sector. Processes should not be duplicated, should be appropriately rigorous without being unnecessarily stringent, and should be distributed appropriately to those organizations and people closest to the identified users. Authentication services should not create an ever-expanding central bureaucracy. Instead, they must take advantage of emerging technologies that allow decentralized distribution of authentication and administration across organizational boundaries. Optimal administrative processes will avoid unnecessary costs, and more importantly, reduce the opportunity for inadvertent errors that would compromise the security of government's electronic services.

The scope of the government's work to date has been limited to user authentication. Permissions management is the next level of user authorization to be tackled. Government systems need to be able to identify users and their level of access. This will require unifying permissions management with user authentication systems. While many electronic systems will have to be re-engineered at considerable expense and time, there will be significant long-term administrative cost savings. There are already systems in place that may serve as prototypes in this area.

Furthermore, government systems need to monitor what information users have accessed. Options include unifying the logging and reporting of electronic service activities. This would provide a significant privacy-protection service that could, in all likelihood, be achieved at reasonable cost.

PRIVACY

One outcome of effective identity management is the ability to integrate existing programs into a single-window service offering. These integrated services demonstrate the depth and breadth of the information the government has - information about individuals, families, and businesses and their activities in our society and our economy.

Citizens are naturally concerned about how this information is protected. An open and clear policy of privacy management creates a foundation of trust that encourages people to use more integrated e-services and realize the benefits. Privacy involves more than the physical protection of information. It also includes legislation, policies, and procedures that allow citizens to control their own information. A more complete discussion of how existing privacy laws and regulations protect personal information in an online environment is presented in the privacy section of this report.

SECURITY

There is clear evidence that current government information systems and infrastructure cannot respond effectively to the increasing number of viruses, attacks and attempted or accidental compromises. If these risks are not addressed, governments will continue to put more information and services online that could be susceptible to attacks. Once users have reason to doubt the security of public services, it will be very difficult to regain their trust.

While the serious nature of the security risk is hard to overstate, the BC Government is well positioned to manage it. The current Security Enhancement Project in the Ministry of Labour and Citizens' Services is an effective first step. Most public sector organizations have similar needs for improved security; therefore, there is an opportunity to develop solutions in partnership with a broad set of stakeholders. The NetWork BC project is an example of a successful collective effort among the broader public and private sector, and is one model that could be utilized to address the need for improved security. It would avoid having each public sector organization make investments in unique security solutions that will make any integration of services more expensive and difficult.

BENEFITS

While the immediate challenges posed by privacy and security issues are indeed significant, the long term benefits of resolving them go beyond the obvious and immediate. Addressing them effectively could give BC a huge competitive advantage over other jurisdictions.

When everyone from the private citizen, to the business and public sectors, can trust that the information systems and networks they rely on, the benefits will be immense. Organizations will be better able to focus their resources on improving outcomes. They will be able to work across systems, sharing applications, information and integrating services while maintaining privacy and security. There will be improved interaction between citizens and business in their dealings with government. In particular, technology applications will shorten processing time for individual and business transactions that involves multiple public services. Finally, citizens and business will enjoy integrated services from ministry to ministry and agency to agency.

Better identity and access management and better privacy and security for conducting business online will lead to a more competitive economy and better public services. In order to achieve these goals, the PTC makes the following recommendations:

8.4 That government define an architecture and an implementation/delivery strategy for service integration and information sharing that spans the public service; that recognizes the diversity and mandates of the organizations that participate in delivering public service; and that recognizes the complexities of the service integration and information sharing.

- 8.5 That government ensure a budget and process exist to accommodate the major investments in corporate government infrastructure needed to provide identity management, privacy and security capabilities.
- 8.6 That government expand its notion of identity management to include the broader public sector (i.e., important registries such as client registries, master patient indexes, health care provider registries, student registries, and social service provider registries). The strategy identified in 8.4 also needs to address how the registries will be cooperatively managed (for example, which one will be the authoritative source).
- 8.7 That government ensure public sector investment in better information security technologies is done in a way that provides open connectivity for all users that arrive at any public facility or location. This is especially important as organizations look to extend their current wired networks with wireless capabilities.
- 8.8 That government approach federally sponsored initiatives in an organized fashion. For example, the Ministry of Health and the health authorities are working cooperatively to secure funding from Canada Health Infoway. This will ensure that BC does not build infrastructure to support health solutions in stand-alone silos that increase costs and complexities in integrating these sources into the government's electronic service delivery environment.
- 8.9 That government pursue these issues and recommendations through stakeholders across the broader public and private sector by utilizing a model similar to the NetWork BC project, with the aim of optimizing the amount of investment required and increasing the quality of the result for the entire public sector.

Privacy

INTRODUCTION – PRIVACY BY DESIGN

British Columbia is a recognized leader in privacy and has a foundation for ensuring that appropriate protections are in place. However, meeting the public's expectations means more than just protecting information and stating privacy requirements in legislation and policy. Privacy also involves citizens and their control over the use of their information.

The challenge of providing citizens with convenience while earning their trust is magnified by the nature of privacy itself. Although standards can be defined, privacy as a social concept is not absolute. Because of this, privacy protection is often defined in terms of "reasonableness". Consequently, privacy requirements for the same information may vary from circumstance to circumstance. For example, a name and address on a medical file would require a stronger

privacy protection than a name and address in a phone book. This complicates matters for both the citizen and for the government personnel managing the information. Achieving the right balance requires case-specific assessment because reasonable protection will vary in each circumstance.

THE LESSON OF THE PATRIOT ACT

One lesson learned from researching the impact of the *USA Patriot Act* on British Columbia is that managing the balance between accessing personal information and protecting it is not easy. However, it is achievable when there is commitment to the principles of accountability and the protection of personal privacy. The *Patriot Act* highlighted three key requirements to ensure that the personal information of British Columbians is protected from unauthorized disclosure:

1. A strong legislative and policy foundation upon which to build and communicate a privacy design or strategy;
2. Effective and efficient electronic identity management that enables the authorized sharing of information to enhance service delivery between government, citizens, and business partners; and
3. A reasonable level of security as required by privacy legislation and expected by citizens and businesses.

Major initiatives are underway to assist government in meeting these requirements. Two such initiatives are the Corporate Authentication Project that will provide a common identity management infrastructure; and the Security Enhancement Project that is helping to define and corporately manage e-government's security requirements. There is growing awareness that government's privacy legislation and policies must continue to evolve to govern the collection, storage, use and disclosure of personal information as more public services are delivered electronically.

SOLUTIONS

1. STRONG LEADERSHIP FOR PRIVACY MANAGEMENT

A successful privacy strategy will include privacy as an enabler and a design feature of e-government. Managing privacy is more than keeping personal information confidential or secure – it involves designing a system that properly protects the collection, usage, and disclosure of personal information.

Strong leadership will be key to achieving the balance between trust and convenience. A clear statement should be sent from the senior levels of government to reemphasize that privacy remains a design objective and an integrated part of successful e-services. Organizational commitment is required to develop a business privacy culture so that integrated programs and services include privacy and security as part of the infrastructure. Currently, either a lack of

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agreement on, or a lack of knowledge of, what is required or permitted by privacy legislation is limiting the ability of these integrated programs to reach their full potential.

Given the fundamental objective of integrating information and services, a coordinated approach is necessary. Therefore, a central authority needs to be assigned a leadership role with the authority to:

- Provide/fund corporate infrastructure (e.g., Common Authentication Service, security infrastructure);
- Establish auditing and compliance monitoring (quality improvement) standards; and
- Participate in the design of corporate and ministry specific systems/services.

The Minister of Labour and Citizens' Services is responsible for privacy legislation in BC and, on his behalf, the Chief Information Officer (CIO) is currently responsible for managing this legislation, ensuring appropriate development of information and technology policy and planning, providing reasonable security of the electronic environment, as well as enabling the provincial network that electronically links communities to government. As part of a broader strategy to promote e-government, the Province needs to determine if this is the most appropriate place to vest the authority for managing integrated privacy issues across government. If so, such an authority needs to be clearly designated in order to achieve the balance of convenience and trust. This would be a separate function from the Office of the Information and Privacy Commissioner which is an independent office to enforce privacy legislation.

2. STRATEGIC LEGISLATIVE MANAGEMENT

Privacy management requires a solid legislative foundation. The *Freedom of Information and Protection of Privacy Act* and the *Personal Information Protection Act* regulate government and private sector use of personal information of British Columbians. The *Electronic Transactions Act* also provides legislative support to electronic government and services by enabling electronic signatures to be equivalent to written ones.

Strategic legislative management should ensure that these acts are not only current and service-oriented, but that there is also authority and resources across government to address program and legislative impediments to information and service integration. The provincial government also needs to reflect on and anticipate the impact of technology development on privacy protection.

3. PUBLIC AWARENESS AND EDUCATION

Open discussion with citizens about the objectives of e-services and how information is protected can address misunderstandings, myths, and misrepresentations about privacy protection. This should be accompanied by on-going education and information dissemination reinforcing messaging that e-government services are secure and personal information is properly protected. This transparency will de-mystify privacy risks for the public and alleviate the perception

amongst service providers that privacy is an obstacle to efficient and effective services.

Education is also critical to ensure that public servants and private e-service partners understand the requirements of privacy legislation and are able to meet those responsibilities. Sufficient resource and budgetary provisions are required to provide basic training across government and specialized training where necessary (e.g., contract language, research agreements, Privacy Impact Assessments, etc.).

4. SECURE AND SAFE ELECTRONIC ENVIRONMENT

Safe information management is important to gain public support for e-government. An overarching framework, architecture, and set of standards against which government manages service and data integration will enable British Columbians to trust public services. The Security Enhancement Project is underway to ensure that the appropriate level of security is applied end-to-end within all government systems.

Throughout design, implementation, and production, the environment must be regularly monitored to ensure that it is safe and secure. Privacy support tools, including risk assessment processes, such as Privacy Impact Assessments (PIAs), model contract privacy and security language, self-help audit processes, legislative interpretive materials, procedures and policies, and online training are important to enable compliance. It is also important to have a process which integrates the results of PIAs into the architecture design process so the system constantly adjusts to new situations.

In addition, security and privacy of the environment must include a solid identity management approach. BC will be the first jurisdiction in Canada to implement a cross-government common authentication service that will allow individuals and businesses to use a single electronic identifier to access various e-government services. Identity management involves verifying the user's identity and consenting to the sharing information with that user. Identity management systems pose major privacy issues if not designed properly under the appropriate legislative authority. Possible risks include privacy breaches, identity theft, and a loss of trust in government's e-service infrastructure.

In summary, the PTC recommends:

- 8.10 That government revisit the responsibility structure for privacy management and ensure the authority is appropriately delegated and that there are sufficient resources available for the development, implementation and monitoring of policies and procedures.
- 8.11 That government clearly communicate to the public how it manages privacy and educate public service employees on privacy management in an electronic environment.
- 8.12 That government ensure all ministries deliver on their legislative requirement to conduct privacy impact assessments. These privacy impact assessments must be conducted at the

onset of new e-government initiatives and be reviewed periodically to ensure that the privacy considerations have been addressed in the design and continue to be addressed successfully in production.

- 8.13 That government periodically review privacy and program legislation to ensure that it anticipates technological advances and is not rendered obsolete by them.
- 8.14 That government ensure a secure electronic infrastructure to protect privacy.

Technology and Education

INTRODUCTION

The application of new technology to administrative aspects of the K-12 education system will greatly improve service delivery to students as well as institutional efficiency. Specifically, a province-wide information system or technological backbone supporting the entire education system will provide students and teachers with rapid and accurate information about student achievement. This information will then allow administrators and teachers to amend educational services and meet the needs of learners. Additionally, more cohesive and responsive administrative systems will better enable education policy makers to analyze the success of other innovative and technology-driven learning systems.

COMMON SYSTEMS INITIATIVE – BCESIS

Many current student information systems are unable to keep pace with increasing demands. School and school board management needs, ministry funding and reporting requirements, and pressure for information from parents, students and the public are all significant factors. Trying to meet these demands at the district level is very expensive. The disparate systems in use would mandate new investments by schools and school boards to improve 25 different systems operating in almost 2,000 schools.

To ease this challenge, the Ministry of Education has identified the *British Columbia Enterprise Student Information System* (BCeSIS), a “Common Student Information System” as an ideal solution. Investment in BCeSIS is already paying off as 53 school districts and 72 independent schools are in the process of implementing the new common system. Implementation has begun (64,000 students are now registered in the system) and will continue over the next three to five years.

GOVERNMENT OPERATIONS

This common student information system offers clear advantages for all stakeholders in the education system. The benefits for students and parents are most important. The system will give them online access to current student information twenty four hours a day, seven days a week. This will improve school-parent communications and feedback on student performance. Students and parents will be able to identify strengths and weaknesses sooner, building on the former and correcting the latter.

The common student information system offers additional gains for teachers. It will ease their day-to-day workload, providing them with an integrated holistic system that is accessible from any computer on the Internet. They can share information with other teachers to better help particular students, and print reports from their own computer. They also have online grade books and attendance tracking. All this reduces the administrative burden and at the same time provides better and more accurate information, allowing teachers to devote more time to students.

For administrators and school districts, BCeSIS gives them an improved ability to manage the collection and transfer of student information. Information only needs to be entered once. Accurate and timely reporting of student information can lead to district-wide assessments. Finally, and perhaps most importantly, common standards and processes mean better protection of privacy and student information.

Similarly, for the Ministry of Education, the most obvious benefits are the vastly reduced costs of a shared model and the reduced administrative burden in the schools. Resources will be freed up to be dedicated elsewhere. The benefits for other stakeholders are transferable to the Ministry as well, but on the widest possible scale. BCeSIS can better monitor student achievement information, conduct data-based decision making, and monitor important trends, such as class size. Overall, accountability to stakeholders will increase.

Therefore, the PTC recommends:

8.15 That government ensure the investment in the BCeSIS system to finalise its installation and provide as rapid implementation as possible.

Industry Development

Capital and Investment

The supply of risk capital in the province has grown at an unprecedented rate since the PTC first examined this subject in 2002. Recent analysis shows that venture capital holdings in the province have doubled from \$1.1 B in 2001 to \$2.2 B in 2004. Between 2002 and 2004, BC also led the country in the amount of seed capital available for technology start-up companies.²

While this is by no means a small achievement, more efforts are necessary to stimulate the development of a vibrant and sustainable risk capital market in the province. The strong growth of BC's economy will continue to drive up demand for risk capital, especially from the high growth enterprises in the province's thriving technology sector. The right policy framework is needed to ensure that BC's technology sector has enough funding to flourish.

SCIENTIFIC RESEARCH AND EXPERIMENTAL DEVELOPMENT (SR&ED)

The Scientific Research and Experimental Development (SR&ED) program was introduced to stimulate research and development in Canadian businesses of all sizes. Various studies have shown that industrial research is a key driver of GDP growth. The Organization for Economic Cooperation and Development (OECD) estimates that real GDP per capita rises by 1.2% for a 0.1% increase in business expenditure on research and development per GDP.

As a key government program to promote industrial research and development, SR&ED offers financial support to many companies engaged in R&D activities. About 1,400 BC companies claim SR&ED tax credits every year.³ The federal government SR&ED provides up to a 35% refundable tax credit on any qualifying SR&ED expenditures by Canadian Controlled Private Corporations (CCPCs) and up to a 20% non-refundable tax credit on any qualifying SR&ED expenditures for corporations other than CCPCs. The BC government runs a parallel program that offers up to a 10% refundable tax credit for CCPCs and up to 10% non-refundable tax credit for non-CCPCs.

² James A. Brander, Edward J. Egan, Anthony E. Boardman, "The Equity Capital Program in British Columbia", April 2005.

³ Ference Weicker and Company, "Promoting Research and Innovation in British Columbia", September 2005 (internal circulation).

The availability of refundable tax credits is vital in fostering the development of early stage companies that do not earn a taxable income, especially during an economic downturn. In search of capital, developing companies frequently turn to the public markets or cross border sources when domestic markets do not provide sufficient support. As a result, many viable growth businesses are disadvantaged by losing their Canadian Controlled Private Company (CCPC) status and thereby access to refundable tax credits. Of all SR&ED tax credit claims each year, about 70% result in non-refundable tax credits.⁴ This pool of tax credit carry-forwards provides no value or assistance to companies with immediate need for capital and it is estimated that 50% of the tax credit carry-forwards will never be used.⁵ Accordingly, the PTC recommends:

8.16 That the provincial government expand the SR&ED program to provide the provincial refundable tax credit to all companies in BC.

In its 5th Report, the PTC explored the complexities around the SR&ED program. It notes again the following recommendation:

5.2 That the provincial government initiate an advocacy program with the federal government to:

- **Review and modify the rules within the SR&ED program that restrict tax credits to companies having investment from public companies and/or non-residents. This would ensure that firms that have obtained capital from legitimate sources are not being excluded from other opportunities.**
- **Review and modify restrictions in the program, mandated at a federal level, with respect to differences in the treatment of public (20% tax benefit carry-forward) and private (35% tax credit carry-forward) companies.**

ANGELS

The importance of angel investors for the development of early stage companies has been widely documented. In the United States, there are about 3 million angels investing more than \$50 billion in total every year and funding thirty to forty times as many companies as the venture capital firms.⁶ In BC, it is estimated that about 60% to 80% of arm's length, early stage, and private equity is angel investment.⁷

The angel population in Canada is in the tens or hundreds of thousands and is widely spread across the country, offering a much greater geographical reach than the venture capital community, which is mostly centered in urban areas. In addition to capital, angels bring business advice, network contacts, and market intelligence that most early stage companies lack. Angels

⁴ Investment Capital Branch, "Background SR&ED", August 18, 2004 (internal circulation).

⁵ Investment Capital Branch, "Background SR&ED", August 18, 2004 (internal circulation).

⁶ Canadian Task Force on Early Stage Funding (CTFESF), "Budget Recommendations", Dec 2004.

⁷ James A. Brander, Edward J. Egan, Anthony E. Boardman, "The Equity Capital Program in British Columbia", April 2005.

also often help acquire follow-on financing from the venture capital community. In the US, about 60% of companies financed by venture capitalists were initially financed by individuals. In Canada, however, the proportion is significantly lower at 10%.⁸

Currently, under the *Small Business Venture Capital (SBVC) Act*, the BC government offers a 30% tax credit to individual investors for investment made into eligible small businesses. The direct payback on the 30% tax credit is about 2.8 years and for every dollar of the tax credit, the Province collected \$1.3 in incremental tax revenue over a 5-year period.⁹ For BC companies to maximize the benefits of angel investment, the PTC urges the government to implement its previous recommendation:

5.8 That the provincial government remove or substantially raise the individual annual limit in the provincial *Income Tax Act* for angel investors in eligible small businesses under the *Small Business Venture Capital Act*.

ATTRACTING FOREIGN CAPITAL TO BC

While supply of risk capital in the province has increased considerably in the past three years, the majority of new funds come from individuals. Nationally, in 2004, of the \$1.9 billion new funds raised, 77% originated from individuals, up from 67% of the \$1.7 billion in 2003. In contrast, from 2003 to 2004, investment from pension funds and foreign sources declined by 37% and 12%, respectively.¹⁰ While the Council acknowledges a recent federal government move to eliminate the 30% foreign property limit, other measures are required to encourage foreign capital investment into Canada.

Canada needs to create an environment where capital can move easily across the border. If such an environment does not exist, foreign investors will have to utilize different investment structures that are more costly and complex, which could lead to reduced investment.¹¹ For example, under the *Income Tax Act*, a cross-border merger between a Canadian company and a foreign company not doing business in Canada would result in a deemed share disposition and possibly taxes payable by the acquiring company. This happens despite no share being disposed during or after the merger process (as required by the Securities Law). To avoid this, a foreign company has to create a Canadian corporate affiliate and issue shares to the Canadian shareholders that may be exchanged for shares of the foreign company. This issue has not been resolved, although it was brought up in the federal government's 2000 and 2004 budgets.¹² Therefore, the PTC recommends:

⁸ James A. Brander, Edward J. Egan, Anthony E. Boardman, "The Equity Capital Program in British Columbia", April 2005, p. 8.

⁹ Canadian Task Force on Early Stage Funding, "Budget Recommendations", Dec 2004.

¹⁰ Macdonald and Associates Ltd, "Overview of Venture Capital in Canada 2004", February 9 2005. Slide 5 (recalculated for decrease of new funds from pension and foreign sources).

¹¹ Canadian Task Force on Early Stage Funding (CTFESF), "Budget Recommendations #4", Dec 2004.

¹² Canadian Task Force on Early Stage Funding, "Budget Recommendations #4", Dec 2004.

8.17 That the provincial government work with the federal government to remove any administrative and fiscal constraints that hinder foreign capital investment into BC's companies and venture capital pools.

Another concern that the Council wishes to highlight is the lack of recognition of Limited Liability Corporation (LLC) under the Canada/US Income Tax Convention (the "treaty"). This has become a deterrent for US capital investment in Canada. In the United States, most pension and institutional funds pool their capital into a single fund under an LLC that is registered as a tax exempt entity under the US tax law.¹³ As a flow-through vehicle, an LLC is not required to file a tax return, and incomes of the LLC are taxed in the hands of its shareholders. The Canada Customs and Revenue Agency, however, has taken a position that LLCs are not recognized under the treaty. Therefore, they are subject to Canadian income tax and may be required to file a tax return even if there is no tax payable. This rule becomes a "deal breaker" for most LLCs, since a majority of their corporate articles prohibit them from investing in funds if tax returns are to be filed.¹⁴

A way around this is for LLCs to invest through an offshore holding company, but this process is complex and costly. Considering the significant size of US pension funds and their investment in venture capital, the impact of this red tape on high-tech firms is significant.¹⁵ Worse still, because that investment is unavailable here in Canada, many Canadian companies are forced to move south of the border in order to receive financing from US institutions.

Australia faced a similar problem. In October 2001, its government transformed its rules to recognize international organizations with tax-exempt status. Since then, foreign investment from trusts and pension funds has increased by 18%.¹⁶ Accordingly, the PTC recommends:

8.18 That the provincial government work with the federal government to recognize tax-exempt corporations under the Canada/US Income Tax Convention to encourage foreign capital investment into BC, and Canada in general.

GOVERNMENT UPDATE

Government is to be commended for its recent effort to further spur the province's growing biotech sector. BC has expanded the *International Financial Activity Act* to include refunds of provincial corporate income taxes on income from the commercialization of intellectual property of life science related patents. Effective January 1, 2006, companies are eligible for a refund of up to 75% of corporate income tax paid (to a maximum of \$8 million) per year or taxpayer or associated

¹³ CTFESF, "Budget Recommendation #4," 2004.

¹⁴ CTFESF, "Budget Recommendation #4," 2004.

¹⁵ CTFESF. Pension funds in the United States represent up to 30% of its annual venture capital invested and these funds by value are 15 times larger than their Canadian counterparts.

¹⁶ Investment Capital Branch, "Venture Capital Supply in British Columbia", May 2, 2004.

group of taxpayers. The changes were made to discourage companies from commercializing their patents in an offshore low-tax or no-tax jurisdiction.

Power Technology

The PTC's 7th Report, issued in April 2005, outlined the vision laid out in a document titled "A Vision for Growing a World-Class Power Technology Cluster in a Smart, Sustainable British Columbia." This vision addressed challenges and opportunities in the power technology sector. It highlighted the opportunity for British Columbia to become a world leader in sustainable energy and discussed the tremendous potential of alternative energy sector to support the province's other industries. The report concluded that alternative energy solutions have impressive export prospects and will bring more jobs and more wealth to the province.

In response to the vision document, the government took a leadership role and established an Alternative Energy and Power Technology Task Force. Currently, the task force is developing an implementation plan to help achieve the goals set up in the Vision report. This report is expected in the near future and we anticipate that it will stress leveraging BC's competitive advantage and reputation in sustainability to further grow and benefit the province's power technology sector.

The task force has been focused on developing solutions in the five key subsectors within the alternative energy industry, namely: Remote Power Solutions, Sustainable Urban Practices, Smart Urban Transport, Smart Grid Solution, and Large Scale Clean Green, Power Production.

The implementation report is expected to outline initiatives that will encourage growth across all five sectors through a four-part strategy. This strategy would include:

1. Showing **leadership** through developing and overseeing a long-term plan for the energy system.
2. Helping the industry to coordinate and accelerate **commercialization initiatives** that leverage existing needs in BC.
3. Implementing a **growth strategy** that fosters industry and government collaboration to address world market opportunities.
4. Promoting **innovation** by strengthening work force and technology development.

The PTC endorses this initiative and commends the task force. The Council would also urge the government to continue its leadership role in growing the province's power technology sector. Thus, the PTC recommends:

8.19 That the government support and implement the initiatives outlined by the Alternative Energy and Power Technology Task Force.

New Media

INTRODUCTION

The Internet and digital technology are transforming the entertainment industry at a rapid pace. Known as digital entertainment, digital technologies, such as computer graphics and interactive techniques, are applied to entertainment¹⁷ for the purposes of entertaining, educating, or informing. Digital entertainment includes game software (i.e., console games, Internet games, games for handheld devices), computer animation, and digital effects on the production of videos and film, and other web-related applications and content.

As a result, more and more games, music, movies and television are produced, delivered, and stored through an automated, mobile, and digital process. Digital effects and animation, for example, have become an essential part of successful movie productions. In fact, the 2001 top five global box office hits all featured digital effects.¹⁸ Digital gaming is also gaining significant popularity and has been growing faster than other entertainment sectors, such as movies or music. Half of Japanese families, one third of American families, and one fifth of UK families own a game console at home.¹⁹ In 2004, this global digital entertainment market was valued at US\$23.3 billion, and by 2009 it will reach US\$33.4 billion.²⁰

Industry experts believe that the digital entertainment industry is still in its infancy. Digital technologies will continue to evolve and converge with other sectors, such as advertising and education. Coupled with new distribution channels opened up by the Internet, demand for digital content will continue to rise. It is estimated that all entertainment and media will be in a digital format by 2010.²¹

Clearly, no competitive jurisdiction can ignore the significance of the global digital entertainment industry. No single jurisdiction is currently recognized as the global leader for digital entertainment, and many of them, including Quebec, the United States, Hong Kong, India, and China, are investing heavily to become the "Hollywood" for digital entertainment. Hong Kong, for example, has developed an industry strategy that will invest in infrastructure development, human resources, marketing, and protection of Intellectual Property. Early this year, Quebec, announced the following initiatives:²²

¹⁷ IIAC Working Group on Digital Entertainment, "Information Infrastructure Advisory Committee Working Group on Digital Entertainment", March 11, 2002.

¹⁸ IIAC Working Group on Digital Entertainment, "Information Infrastructure Advisory Committee Working Group on Digital Entertainment", March 11, 2002.

¹⁹ Hong Kong Digital Entertainment Association, Telecoms Info Technology Forum, "Digital Entertainment, Home Networking and Digital Hubs: Driving the Demand for Broadband", March 19, 2002.

²⁰ Hong Kong Digital Entertainment Industry Support Centre [<http://www.hkdea.org/>].

²¹ Kevin Carton, "That's (Digital) Entertainment", PricewaterhouseCoopers.

²² New Media BC (internal submission).

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- 37.5% tax credit for the next 5 years reimbursed on salaries, (est. \$240m over 5 years);
- \$6.3m from Emploi Quebec for job creation in the new media sector;
- \$5.3m from the Ministry of Education for developing new programs related to digital entertainment/video games; and
- \$6m from the Ministry of Development to assist with further business development.

BRITISH COLUMBIA: CENTRE FOR DIGITAL ENTERTAINMENT

BC holds some key competitive advantages in the race to become a world leader in digital entertainment. The province currently houses both the largest new media sector in Canada and the third largest film/TV production centre in North America. The film/TV sector employs about 30,000 workers and generated 194 productions in 2004.²³ The new media industry has more than 800 companies, 15,000 employees and \$2 billion in annual revenue.²⁴ With 156 companies specializing in game development, BC is well-known as the largest game development centre in the world. A recent survey by Fast Company labeled BC as the "Hollywood of the video-game industry."²⁵ In addition, over the past few years, a number of international gaming/entertainment companies have expanded to BC by either buying the local companies or setting up shops in the province. For example, Walt Disney established a development studio for its subsidiary Buena Vista Games, THQ acquired Relic Entertainment, and Vivendi Universal Games purchased Radical Entertainment.

Compared to other jurisdictions, where tax or other financial incentives are often used to lure international companies, BC's talent pool has been a major attraction. In the digital entertainment industry, where success is measured by the ability to produce great entertainment experiences, artistic talent and creativity have become the most the important factors for the industry's competitiveness. Without a doubt, BC is now at a point of reaching a critical mass of top talent and new media companies.

While BC has grown a vibrant new media sector, more needs to be done to ensure its sustainability as the centre for digital entertainment. The industry faces the following key challenges:

- The critical shortage of middle-management talent in the digital entertainment space. Currently around the world, there are only three universities offering graduate programs in entertainment technology: Carnegie Mellon University, University of Southern California, and University of Central Florida. With the industry's rapid growth, demand for these graduates far exceeds supply. The industry's market assessment shows that eight BC companies would hire all graduates from these programs. The problem is exacerbated

²³ BC Film Commission, http://www.bcfilmcommission.com/industry_profile/

²⁴ Premier's Technology Council, 7th Report, April 15th, 2005.

²⁵ Charles Mandel, "Vancouver, Montreal "Well-Positioned" to Attract Global Talent", Vancouver Sun, Nov 15, 2005.

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- with aggressive wage/training subsidies offered in other jurisdictions (i.e., 37.5% wage subsidy in Quebec);
- The retraining of the work force in the film/TV industry to develop the skill sets necessary in the digital entertainment space; and
 - The absence of a home base and seeding ground for the overall sector to:
 - Develop a shared vision, collective planning and strategy, or shared communications strategy among industry, academia, and government;
 - Realize economies of scale through an efficient industry's value chain; and
 - Create competitive intelligence in this area (i.e., trends, needs analysis).

The industry, led by New Media BC, is proposing a plan to establish the infrastructure, strategy, and talent required to increase the province's stature in digital media, especially in the digital entertainment space. Particularly, the plan calls for:

1. Establishing a world-class graduate program for digital entertainment professionals. The *Masters of Digital Media*, which will be run by the Great Northern Way Campus (GNWC), leverages the collective strengths of BCIT, Emily Carr Institute, SFU, and UBC, together with industry partners and leadership from Electronic Arts. The program will produce the new skill sets necessary for fuelling the future growth of the digital entertainment industry; and
2. Creating a *World Centre for Digital Media*, as a home base for the *Masters of Digital Media* program and industry seeding ground located at the GNWC. The *World Centre for Digital Media* will strengthen industry and academic linkages; serve as a training ground for future leaders; foster collaborative efforts within the industry; create a networked infrastructure for data sharing, company tracking and commercialization; and showcase BC's leadership.

By integrating education, research and development, and commercialization programs, the *World Centre for Digital Media* is expected to attract world-class researchers, practitioners, and visionaries from across the globe. To realize its full potential, a partnership among government, industry and academia is required. The proposal has unanimous support from its academic and industry partners. BCIT, Emily Carr, SFU and UBC have agreed on a collaborative effort to jointly deliver the *Masters of Digital Media* program. Industry is committed to curriculum development as well as offering mentoring and internships. It will also provide personnel, facilities and equipment to the *World Centre for Digital Media*.

While the project does not require ongoing government funding for operational purposes, it does require one-time seed funding. Industry has pledged to finance 20% of the total project cost. The federal and provincial governments are each being asked to finance 40%. Commitment from the provincial government is critical to making this project a success. The PTC therefore recommends:

8.20 That government support and invest in the development of the Master of Digital Media program and the World Centre for Digital Media located at the Great Northern Way Campus.

The PTC acknowledges government’s support for this initiative. The 2006 Speech from the Throne contained a clear commitment to the project. In the 2006 BC budget government announced a \$40.5 million one-time funding for the establishments of *Masters of Digital Media* program and *World Centre for Digital Media*. This represents 40% of the total project cost.

Innovation/Commercialization

INTRODUCTION

In its 7th Report, the PTC pledged that it would conduct a detailed analysis of innovation/commercialization in BC. Viewed in the widest possible context, innovation/commercialization covers the overall framework of technology development, transfer and adoption. The following diagram shows key stages in the innovation/commercialization chain, starting from scientific and technological discoveries to a point where innovation is widely-adopted by the marketplace. Although the whole process is cyclical in practice, the diagram shows a linear process for the purpose of illustration.



Source: Sustainable Development Technology Canada, http://www.sdtc.ca/en/about/innovation_chain.htm

A jurisdiction’s capabilities in innovation and commercialization are fundamental to maintaining its competitiveness and standard of living. A highly innovative jurisdiction produces better quality, higher-income jobs. The whole economy, including the traditional resource-based industries, needs innovation and commercialization to stay competitive in the marketplace.

With increasing competition, innovation and commercialization has become a global race. Jurisdictions around the world are looking into ways to improve their innovation/commercialization processes. The PTC believes that British Columbia’s current processes can be enhanced to further realize the economic and social benefit of \$1.6 billion investment in research and development.²⁶

²⁶ Janet Thompson, "Estimates of Canadian Research and Development Expenditures (GERD), Canada, 1992 to 2003, and by

In spring 2005, the PTC conducted a series of consultations with local stakeholders to identify issues that inhibit the growth of innovation or hinder effective commercialization processes in BC. The ultimate objective is to identify government actions that will result in an environment that will:

- Foster creation of new, and growth of existing companies in BC with locally developed or imported technology;
- Facilitate development of new and growth of existing companies in BC with technology from research institutions; and,
- Make BC globally recognized for its innovative capacity and encourage multinational companies to set up businesses in the province.

The PTC has met with 45 stakeholders. Observations from the consultations are presented below and a list of those consulted can be found in Appendix A. As the Appendix demonstrates, the interviewees represent most of the important stages of the innovation cycle. On the private sector side, the Council met with small new companies and larger firms, mature companies, those that have experienced great success, and others that have struggled. The PTC also conferred with representatives from academia, UILOs, government, and the financial community.

OBSERVATIONS FROM THE CONSULTATIONS

Generally interviewees agreed that there are six areas that should be targeted for improvement if BC's technology sector is to attain its full innovation and commercialization potential. Specifically, BC needs to:

1. Attract more senior management executives;
2. Enhance sales and product management capabilities;
3. Expand the number of highly qualified personnel (HQP);
4. Strengthen linkages between academia and industry;
5. Strengthen science and technology governance; and
6. Improve the availability of early and later stage funding.

1. ATTRACT MORE SENIOR MANAGEMENT EXECUTIVES

One of the most pressing issues facing virtually all companies interviewed is the significant challenge in finding and recruiting senior management executives for the following key functions: chief executive officers, senior product development, sales, and marketing and business development executives. Small to medium-sized companies²⁷ in their early stages still comprise a majority of BC's technology sector. Senior executives in these firms are critical to further develop

province 1992 to 2001", Statistics Canada, pg. 59.

²⁷ The 2004 list of 100 BC biggest high-tech companies only noted 60 companies as having more than 100 employees (Business In Vancouver Magazine, Vol 10/2004). The 2003 British Columbia Techmap identified 910 technology companies in the province.

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nascent companies to later stages of growth.

To alleviate the need for these executives, many BC technology companies are taking one of the following steps:

1. Opening an office in the US and setting up the management team there;
2. Hiring a part-time CEO; or
3. Trying to attract top quality CEOs from abroad by paying them more and having them build the management team in BC.

Options one and two have led to what we are calling the “suitcase CEO” syndrome. These executives are usually chosen by the board (often dominated by investors in the company’s early stages) and generally live south of the border with the understanding that they will visit the company regularly. They usually do not form roots in the local community, often build their management team in the US, and do not add to the development of a larger and more diverse technology community in BC. The company’s local management suffers as training for the next generation of leaders does not happen in BC. It is similarly problematic if management decides to move its key functions to the US, leaving the local operation as a branch office that handles lower level business activities. If this practice continues, the growth of BC’s technology industry will be restricted, and a critical mass of technology companies and, more importantly, experienced executives will not develop.

Overall, participants agreed that BC needs to attract senior executives to the province to facilitate growth of the technology sector. With global competition for talent, BC needs a comprehensive package with clear advantages over other jurisdictions. Discussions and studies are currently under way, and the PTC will make specific recommendations in its future reports.

2. ENHANCE SALES AND PRODUCT MANAGEMENT CAPABILITIES

Another common theme for virtually all companies interviewed was the difficulty in developing sales and product management capabilities. Most companies did not have formalized product management until they were relatively large and successful. Many also struggled through multiple VPs of Sales and multiple sales models before finally develop a winning selling strategy. Often these two problems or even one of them in isolation can be fatal for an early stage technology firm.

The source of the sales challenge can often be found with the company founders. The founders of new technology firms rarely come from a sales background nor do they have the experience of selling or managing sales. The nature of the sales executive further complicates the search for the right talent (assuming that anyone who is a candidate for a VP of Sales position is usually pretty good at telling a new entrepreneur what he or she wants to hear).

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Product management is often a problem in new technology companies as well as in most mature companies. Again, the nature of the technology entrepreneurs, and their orientation to technical issues, may contribute to issue. Usually, technology company founders are heavily involved in product development and more often than not believe they understand the customer. A large mature company would never expect a new consumer product to see the light of day without extensive product management work on customer needs, market scoping, and competitive analysis. However, new technology companies regularly make it through multiple rounds of funding without ever having done a real product management exercise.

The PTC will explore these complexities and their public policy dimensions in future reports.

3. EXPAND THE NUMBER OF HIGHLY QUALIFIED PERSONNEL (HQP)

Most stakeholders concur that the province's post-secondary institutions produce a strong talent pool of entry-level, technical expertise. Perhaps surprisingly, almost all companies felt they could get good technical people to meet their technical challenges. However, as previously noted, the province's technology industry is mostly comprised of small-medium sized companies still in their early stages. The PTC believes that the current capacity of the Canadian educational system to produce talent for research and innovation (highly qualified personnel (HQP)) will be inadequate to accommodate the future needs of the province's growing technology sector and the overall knowledge-based economy.

To address this, BC is fostering tremendous growth in the post secondary system. The commitment to create 25,000 new post secondary spaces is the largest expansion of advanced education in British Columbia in 40 years. It should be noted, however, that BC currently lags behind Alberta, Ontario, Quebec and the Canadian average in one particular area; Master's and PhD's enrolment per capita. Alberta and Ontario are pulling ahead with their initiatives to expand graduate spaces over the next three years. Both provinces also provide support to graduate students by administering scholarship programs for Master and PhD students, which are not available in BC.

The PTC applauds the projected expansion as highly qualified personnel are key drivers of the future growth of BC's knowledge-based economy. However, it encourages the government to ensure this expansion generates enough graduate and post graduate opportunities.

4. STRENGTHEN LINKAGES BETWEEN ACADEMIA AND INDUSTRY

BC's post-secondary institutions are the powerhouses of science and technology discoveries. Well-recognized for their outstanding research quality, in 2001, BC's post-secondary institutions attracted \$438 millions in R&D funding.²⁸ The University of British Columbia, for example, is

²⁸ Janet Thompson, "Estimates of Canadian Research and Development Expenditures (GERD), Canada, 1992 to 2003, and

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ranked first when compared to 14 other Canadian universities in terms of numbers of US patents issued per million dollars of research. Simon Fraser University is similarly successful, having launched the most spin-off companies per million dollars of research expenditure of the 15 Canadian universities compared.²⁹ Unquestionably, the province's post-secondary institutions are a critical element of the innovation/commercialization infrastructure.

However, most of the participants the Council met with agreed that technology transfer processes from university to industry can be improved. Many innovative technologies have originated in universities but transfer processes were often cited as being extremely difficult or not worth the effort.

It is evident that successful technology commercialization requires not only strong innovative and receptor capacities, but also linkages between the innovators and market makers. Stronger linkage mechanisms between academia and industry need to be explored. Perhaps a peer review process involving people from industry could help identify ideas and technologies with potential market value. In addition, this process might provide the opportunity for both academia and industry to network, share knowledge, and create higher quality products and services. The University of British Columbia and the University of Victoria have entrepreneur-in-residence programs that connect students (with a potential commercialization project) with an experienced, successful technology entrepreneur to share experience and provide real-world business advice. The objective is to get more marketable technology coming out of universities. More initiatives such as these are required.

One potential mechanism is a joint industry-university technology centre designed to leverage knowledge generated by universities to solve industry problems. Participants in the PTC's consultations noted MITACS (Mathematics of Information Technology and Complex Systems) as a successful example of this collaboration. MITACS initiates and fosters linkages among industrial, governmental, and not-for-profit organizations that require mathematical technologies to deal with problems of strategic importance to Canada. It connects 317 scientists, 455 students, and 145 partner organizations working on 25 ongoing projects and 3 research clusters incorporating an additional 10 projects, involving 36 Canadian universities.

Clearly, there are ways for post-secondary institutions and industry to strengthen linkages by establishing a symbiotic relationship between the two. This is a challenge to the status quo and will require commitment and leadership from all parties to make it happen.

5. STRENGTHEN SCIENCE AND TECHNOLOGY GOVERNANCE

The 2006 Speech from the Throne announced that government will work with the technology industry to develop a comprehensive technology strategy. It also made a number of

by province 1992 to 2001", Statistics Canada, pg. 59.

²⁹ BC Progress Board, "Measuring BC's Performance. Reaching North Star 2010. Third Annual BC Progress Board Benchmarking Report - Volume I", December 18, 2003.

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announcements to support Genome BC, the BC Cancer Society, the BC Foundation for Natural Resources and Engineering Research, and the formation of the digital media centre. Consultations conducted with industry indicate that such strong leadership commitments will be well received.

Overall, the technology community agrees that a provincial strategy that covers a broad topic of research, innovation, and science- and technology-based economic development programs would focus the diverse efforts currently underway. Priorities should be to:

- Build and maintain a strong technology and research infrastructure;
- Ensure adequate research funding to establish and operate world-class research labs;
- Attract and retain star faculty; and
- Provide support to graduate students in the province and retention of those graduates.

The Council notes that government is already working on this strategy. The Province has held numerous discussions regarding a comprehensive framework for BC's research and innovation capacities. This is a good step toward building an innovative economy and the Council urges the government to complete the development of a strategy as soon as possible. The Council will also make further recommendations in its future reports.

6. IMPROVE THE AVAILABILITY OF EARLY AND LATER STAGE FUNDING

While most participants agreed that there is more capital today than there was a decade ago, more early stage and follow-on capital is required to further grow the technology sector. The availability of later stage or follow-on financing is as critical as the early seed funding. Without sufficient follow-on financing, companies will move to where more money is available. The capital and investment section of this report contains a more detailed examination of this subject.

NEXT STEPS

The consultations have provided invaluable “on the ground” input into the PTC's deliberations on innovation and commercialization. The PTC will distill the interview feedback into potential recommendations and test these with the original interviewees. The Council looks forward to refining its preliminary findings and preparing a consolidated set of final recommendations for government's consideration.

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Appendix A. List of Commercialization Consultations

Bill Hunter, President & CEO
Angiotech Pharmaceuticals

Dr. Don Rix, Chairman
MDS Metro and Cantest Ltd.

Dr. Ken Spencer, former CEO & Co-Founder
Creo

David Levi, President & CEO
Hillar Kalmar, Senior VP Investments -
Advanced Manufacturing
Yad Garcha, Senior VP Investments - Life
Sciences
Growthworks Capital Corp.

Greg Smith, Director - Technology Seed
Investments
BDC Technology Corp

Julia Levy, Executive Chairman - Scientific
Advisory Board
QLT

Harry Jaako, Chairman & CEO
Discovery Funds Inc.

Angus Livingstone, Managing Director
UBC UILO

Morgan Sturdy, Chairman
Science World

Don Avison, President
The University Presidents' Council of BC

B. Mario Pinto, VP Research
SFU

Max Blouw, VP Research
UNBC

David Dolphin, VP Research
UBC

Hans Knapp, Partner
Yaletown Venture Partners

Greg Aasen, Vice President & General
Manager
PMC-Sierra

Mike Volker, Director
SFU UILO

Caroline Lewko, Vice President
WIN BC

Eric Jordan, Co-Founder & Chief Strategy
Officer
Pure Edge Solutions

Robin Louis, President
Ventures West Management Inc.

Anthony Holler, CEO
ID Biomedical

APPENDIX A. LIST OF COMMERCIALIZATION CONSULTATIONS

Jim Miller, Chairman & CEO/ Co-Founder
NDI Capital/Inex Pharmaceuticals

David Demers, Founder & CEO
Westport Innovations

Paul Howard, CEO
General Hydrogen

Don Avison, President
The University Presidents' Council of BC

Denis Connor, Executive Chairman of the
Board
Quest Air Technologies Inc.

Dr. Michael Walker, Professor/Co-Founder
UBC/Cardiome Pharma Corp.

Gary Albach, Entrepreneur-in-Residence
UBC

Steven Berman, Independent Consultant

Ross Rose, Director - E-Government Systems
MacDonald Dettwiler

Brent Holliday, Principal
Greenstone Venture Partners

Irfhan Rajani, President & CEO
Apparent Networks

Ardath Paxton Mann, Assistant Deputy
Minister

Dennis Bruchet, Manager - Innovation
Western Economic Diversification Canada

Martin Taylor, VP Research
University of Victoria

Tim Walzak, President & CEO
University of Victoria UILO

Ross Mitchell, Advisory Board
Colligo Networks

Ted Renner, President
Kiora Resources Inc.

Mike Brown, Executive Director & Chairman
of the Board
Chrysalix Energy Management

Doug Pearce, CEO & Chief Investment Officer
Neil Muth, VP Private Placements
BC Investment Management Corp

Gurval Caer, President and CEO
Blast Radius

Appendix B. Summary of Recommendations

This is a list of recommendations made by the PTC in this and all preceding reports. They are numbered in the order in which they appear in the original report.

8th Report

DIGITAL DIVIDE

- 8.1 That the government commit further funds to addressing “last mile” issues inherent to the Digital Divide. The funds would add value by preparing communities for the arrival of broadband and by equipping them to benefit from its introduction.

FIRST NATIONS

- 8.2 That the Joint Task Force be constituted as soon as possible and tasked to develop and resource an action plan to bring broadband to First Nations communities in BC.
- 8.3 That the Premier and government Ministers continue to support the Transformative Change Accord, urge their federal counterparts to support the connection of broadband to First Nations communities in British Columbia, and enter into a partnership with British Columbia and First Nations in this province to accomplish this task.

IDENTITY MANAGEMENT AND SECURITY

- 8.4 That government define an architecture and an implementation/delivery strategy for service integration and information sharing that spans the public service; that recognizes the diversity and mandates of the organizations that participate in delivering public service; and that recognizes the complexities of the service integration and information sharing.
- 8.5 That government ensure a budget and process exist to accommodate the major investments in corporate government infrastructure needed to provide identity management, privacy and security capabilities.
- 8.6 That government expand its notion of identity management to include the broader public sector (i.e., important registries such as client registries, master patient indexes, health care provider

APPENDIX B. SUMMARY OF RECOMMENDATIONS

registries, student registries, and social service provider registries). The strategy identified in 8.4 also needs to address how the registries will be cooperatively managed (for example, which one will be the authoritative source).

- 8.7 That government ensure public sector investment in better information security technologies is done in a way that provides open connectivity for all users that arrive at any public facility or location. This is especially important as organizations look to extend their current wired networks with wireless capabilities.
- 8.8 That government approach federally sponsored initiatives in an organized fashion. For example, the Ministry of Health and the health authorities are

working cooperatively to secure funding from Canada Health Infoway. This will ensure that BC does not build infrastructure to support health solutions in stand-alone silos that increase costs and complexities in integrating these sources into the government's electronic service delivery environment.

- 8.9 That government pursue these issues and recommendations through stakeholders across the broader public and private sector by utilizing a model similar to the NetWork BC project, with the aim of optimizing the amount of investment required and increasing the quality of the result for the entire public sector.

PRIVACY

- 8.10 That government revisit the responsibility structure for privacy management and ensure the authority is appropriately delegated and that there are sufficient resources available for the development, implementation and monitoring of policies and procedures.
- 8.11 That government clearly communicate to the public how it manages privacy and educate public service employees on privacy management in an electronic environment.
- 8.12 That government ensure all ministries deliver on their legislative requirement to conduct privacy impact assessments.

These privacy impact assessments must be conducted at the onset of new e-government initiatives and be reviewed periodically to ensure that the privacy considerations have been addressed in the design and continue to be addressed successfully in production.

- 8.13 That government periodically review privacy and program legislation to ensure that it anticipates technological advances and is not rendered obsolete by them.
- 8.14 That government ensure a secure electronic infrastructure to protect privacy.

TECHNOLOGY AND EDUCATION

- 8.15 That government ensure the investment in the BCeSIS system to finalise its installation and provide as rapid implementation as possible.

CAPITAL AND INVESTMENT

- 8.16 That the provincial government expand the SR&ED program to provide the

provincial refundable tax credit to all companies in BC.

APPENDIX B. SUMMARY OF RECOMMENDATIONS

8.17 That the provincial government work with the federal government to remove any administrative and fiscal constraints that hinder foreign capital investment into BC's companies and venture capital pools.

8.18 That the provincial government work with the federal government to recognize tax-exempt corporations under the Canada/US Income Tax Convention to encourage foreign capital investment into BC, and Canada in general.

POWER TECHNOLOGY

8.19 That the government support and implement the initiatives outlined by the Alternative Energy and Power Technology Task Force.

NEW MEDIA

8.20 That government support and invest in the development of the Master of Digital Media program and the World Centre for Digital Media located at the Great Northern Way Campus.

7th Report

DIGITAL DIVIDE

7.1 That the provincial government work with the federal government to create a Joint Task Force with the expertise, authority and resources to provide broadband and related services to First Nations communities in British Columbia wherever reasonably possible. The Task Force must also have First Nations representation.

E-HEALTH

7.2 Define a provincial strategy and architecture for the Electronic Health Record and commit to its implementation. The PTC recommends that the provincial government:

- Give the highest priority to establishing architecture for the Electronic Health Record, giving consideration to the best industry practice using Internet technology. A defined EHR solution that aggregates existing information in the healthcare system will determine the appropriate standards and interface to ensure that the evolution of systems are properly directed.

- Ensure that the EHR strategy incorporates features to empower patients to better manage their own health and to interact with the health care system electronically.

7.3 Create a business model and data exchange standard to integrate the EHR with private practice physicians' internal Electronic Medical Records (EMR). To do this, the Council recommends:

- That a task force be established to determine a single business model and data exchange standard that will allow electronic information exchange with private practice physicians and their internal EMR

APPENDIX B. SUMMARY OF RECOMMENDATIONS

- while respecting patient privacy rights. Priority should be given to the electronic delivery of information to private practice physicians (for example, to improve chronic disease management), and the collection of private practice physician information should be deferred until a definitive plan is determined.
- That this strategy and business model incorporate a method to encourage private practice physicians to acquire broadband network connections for their offices, principally via demand for the “content” made available from the health authorities EHR.
- 7.4 Establish preferred standards for the regional implementation of clinical systems and give priority to optimizing clinical workflow on an enterprise basis across regions, as distinct from workflow bounded at each facility. To do this the Council recommends:
- That the eHSC and its working committees establish a policy for the preferred architecture for the deployment of clinical systems, as a basis for making future investments and joint procurement purposes.
 - That the health authorities give priority to adopting the preferred architecture and undertake projects to optimize workflow within the next three years.
- 7.5 Continue infrastructure investment. The PTC recommends that the provincial government:
- Complete broadband network services to acute care facilities, expand the network to all government-managed care facilities, and consider a network platform that connects service provider groups within the health authorities.
- Invest to execute on the strategy for a client registry with the ability to uniquely identify each client. This will provide a critical resource for the establishment of the Electronic Health Record. Furthermore, collaboration managed through the eHSC should establish operational methods to add new persons to the client registry and to manage identity records efficiently. The client registry should be considered as a resource for the potential integration of client identity for other social services.
 - Continue to invest in the execution of its implementation plan for the provider registry, in consultation with the College of Physicians.
 - Invest in the continuing development of a detailed architecture and operational plan built on the common “active directory” security access standard. This would be used to develop a comprehensive system access standard that will be interoperable (single sign-on) across regional systems. It would also meet national security and privacy standards. Preference should be given to the harmonization of regulations with the standards primarily adopted by major software systems.
- 7.6 Continue to develop telehealth initiatives. The PTC recommends that:
- The relevant agencies move expeditiously to expand fee codes to cover all billing categories, except where there is a specific medical reason where they should not apply.
 - Under the guidance of the eHSC, there be continuing evaluation of opportunities to implement specific telehealth services that achieve

APPENDIX B. SUMMARY OF RECOMMENDATIONS

positive clinical and economic outcomes.

7.7 Governance and management. The PTC recommends that the leadership of health authorities and Ministry of Health Services collectively:

- Place priority on collaboration to achieve significant progress in the development of the e-health system.
- Ensure that development of the e-health architecture is within the

context of best industry practice, and also establish a process of independent evaluation of the effectiveness of all e-health technology deployed.

- Invest in resources to effectively lead the process of change management of a system required to successfully implement technology that will automate the delivery of healthcare in the province.

IT PROCUREMENT

7.8 That the provincial government continue its procurement reform initiative in cooperation with industry to ensure the most effective process possible. It should consider the issues and the suggested solutions identified at the procurement symposium and further examine those that did not receive due attention.

CAPITAL AND INVESTMENT

7.9 The PTC recommends that government continue its existing programs under the *SBVC Act* and work with federal government to secure federal funding for the program.

HUMAN RESOURCES

7.10 That the provincial government work with industry to develop an accurate inventory of the province's current and projected technology sector skills and then execute on strategies designed to close critical skills gaps that impair growth of designated technology clusters.

7.11 That the provincial government work with industry to develop immigration

policy recommendations to the federal government targeted at attracting the senior management required to grow BC's technology sector.

7.12 That the provincial government work with industry and the federal government to define modifications to the *Income Tax Act* that would improve industry's ability to attract top senior talent to BC's technology sector.

POWER TECHNOLOGY

7.13 The PTC recommends that the government pursue the strategies outlined in the report (*A Vision for Growing a World-Class Power Technology Cluster in a Smart, Sustainable British Columbia*) to advance the power technology industry and secure BC's position as a world leader.

NEW MEDIA

7.14 That the government work with industry to extend the DAVE tax credit to include the new media sector.

7.15 That the government establish a world class, graduate-level program in digital entertainment technology.

6th Report

DIGITAL DIVIDE

- 6.1 The PTC recommends that government:
- Keep up the momentum to extend broadband to the remaining communities as quickly as possible.
 - Work with communities to identify last mile solutions.

INDUSTRY DEVELOPMENT

- 6.2 The PTC recommends that government:
- Recognize and support the important role that regional technology councils play in fostering innovation and small business development within their region.
 - Support the formation of a regional technology council in the Northwest.
 - Provide incentives to encourage growth and development of technology companies in the regions.
 - Market the technology innovations and opportunities for the province as a whole through Leading Edge British Columbia.

E-LEARNING

- 6.3 The PTC supports the PLNet initiative and recommends that its installation and capacity review continue to receive top priority to ensure it has the ability to meet ever-expanding needs.
- 6.4 The PTC recommends that government, through the Ministry of Education, in cooperation with industry and the school districts, support the goals and financing needs of BCed Online, and that the Ministry continue to monitor and promote the expansion of its activities to all school districts in the province.
- 6.5 The PTC recommends that the Ministry of Education:
- Continue research in e-learning for K-12 to include funding for school districts to use IP video and other telecommunications technology delivery systems.
 - Conduct education programs for teachers to provide them with the skills necessary to utilize e-learning technology.
- 6.6 The PTC recommends that the Ministry of Education investigate providing a capability to encourage and assist students to enter high-tech careers. The Australian Skills Hub distance learning program, located on the web at www.itskillshub.com.au, is a good example of a resource that has been very successful.
- 6.7 The PTC recommends that government, through the Ministry of Advanced Education, continue to encourage and support the BCcampus initiative as the leading organization to promote e-learning concepts at the post-secondary

APPENDIX B. SUMMARY OF RECOMMENDATIONS

education level.

- 6.8 The PTC recommends that government, through NetWork BC, in cooperation with other ministries, lead a process whereby a comprehensive and focused team (possibly federal/provincial) work with First Nations to address digital divide issues and government services such as e-learning and e-health.

- 6.9 The PTC recommends that the government work with BC universities, both the federal and provincial governments and large and small business to promote the establishment of an R&D facility to advance the e-learning industry in BC.

E-HEALTH

- 6.10 The PTC recommends that government support the adoption of a fee code structure that allows health care providers to bill for e-health procedures.

- 6.11 The PTC recommends that the government establish a governance structure dedicated to the development and implementation of the EHR. Its structure and accountabilities would involve the following:
- A pre-determined term (24-36 months, for example) be set, and clear, reasonable success criteria developed.
 - A team leader who is a member of the ministry executive reporting to the deputy minister.
 - Positioning so that it is acceptable to the entire community (the health

ministries, health authorities and practitioners).

- A direct link between the success of the team and the success of the EHR implementation.
- A funding model utilizing resources from other bodies such as Canada Health Infoway. The model must allow for central decision making on the common or province-wide EHR infrastructure but also provide continued funding for specific health authority equipment and software.
- An advisory group with members from the ministry, health authorities and practitioners to guide development activities.

CAPITAL AND INVESTMENT

- 6.12 The PTC recommends that government expand the tax credits under the *SBVC Act*. Further, government should change appropriate regulations so that the tax credits exist as a total allocation over multiple years and unused credits can be transferred between programs.

HUMAN RESOURCES

- 6.13 The PTC recommends that government, through Leading Edge British Columbia, undertake special marketing initiatives to assist in recruiting talent for high-tech companies throughout the province.

ALTERNATIVE ENERGY: FUEL CELL

- 6.14 The PTC recommends that government build on the record of success and work with the energy technology sector to complete the "Hydrogen Highway™" prior to the 2010 Olympics and to further develop the sector.

5th Report

CAPITAL AND INVESTMENT

- 5.1 That the provincial government extend the British Columbia SR&ED tax credit program beyond its current expiration date (September 1, 2004) and make it an ongoing program with periodic reviews.
- 5.2 That the provincial government initiate an advocacy program with the federal government to:
- Review and modify the rules within the SR&ED program that restrict tax credits to companies having investment from public companies and/or non-residents. This would ensure that firms that have obtained capital from legitimate sources are not being excluded from other important and appropriate financing sources.
 - Review and modify restrictions in the program, mandated at a federal level, with respect to differences in the treatment of public (20% tax benefit carry forward) and private (35% tax credit carry forward) companies.
- 5.3 That the provincial government develop and implement an equity participation incentive to attract technology companies, senior management, key employees and head offices to British Columbia. The incentive must lower and/or eliminate the provincial tax payable on the exercise or disposition of stock options. The incentive would be applicable to:
- All employees who are residents of BC at the end of the calendar year and file for a BC tax return,
 - All forms of equity compensation such as stock options and restricted stock, and
 - The gain in value between the fair market value on the date of grant and the price on disposition.
- The incentive would provide a tax credit equal to 50% of the provincial tax payable if the option is held for greater than 1 year but less than 2 years and a tax credit equal to the provincial tax payable if the option is held for more than 2 years.
- 5.4 That the provincial government work with the federal government to explore the issue of double taxation by nations whose citizens are working in Canada and ensure that all parties honour both the intention and letter of the appropriate treaties, and that the federal government, when acting upon new tax treaties, pay particular attention to double taxation clauses.
- 5.5 That the provincial government work with the federal government to extend the loss carry-forward provision from the existing 7 year period to 20 years (the newly enacted US limit).
- 5.6 That a thorough review of all regulations and taxation involved with foreign pension and investment fund investment in venture capital and entrepreneurial growth business be undertaken by the province in cooperation with the federal government.
- 5.7 That the provincial government undertake a study to investigate the under-investment of pension funds and other investment portfolios in venture capital, determine the key drivers (particularly educational and training) that would enhance such investment, and work with the venture capital industry and appropriate industry associations to encourage and/or secure further investments by such portfolios in venture capital funds within the province.

APPENDIX B. SUMMARY OF RECOMMENDATIONS

- 5.8 That the provincial government remove the individual annual limit in the provincial *Income Tax Act* for angel investors in eligible small businesses under the *Small Business Venture Capital Act*.
- 5.9 That the provincial government develop programs to focus on attracting and/or building 2 to 3 new, venture capital funds per year, staffed with experienced venture capital players, in British Columbia. The new funds would be required to:
- Be associated with a top tier world class venture capital player that is establishing a new fund in BC,
 - Be a new fund primarily directed at investment in BC which counts among the principals in the new fund individuals with extensive venture capital experience.
- Any new funds must:
- Establish their funds locally: a BC office and general partners in BC,
 - Target its investments in BC companies, and
 - Raise private capital before accessing the BC programs.
- 5.10 That immediate steps be taken to identify an appropriate and targeted campaign for creating greater awareness of British Columbia as a high technology jurisdiction and to make clear the entrepreneurial opportunity that lies within it. The campaign should be designed to be undertaken with existing provincial high technology and biotech players so that it benefits both the companies and the region.
- 5.11 That the provincial government work with the venture capital industry, successful high technology and biotech businesses, and appropriate trade associations to host small group meetings in the key investment centres of New York, London, Boston, Frankfurt and San Francisco.
- 5.12 That the provincial government work with industry and the financial and academic communities to invite the management teams of the top 20 global venture capital and private equity funds to visit the province on fact-finding tours. This should be executed within the year, in an effort to build momentum in the venture community.
- 5.13 That the provincial government work with the universities and institutes to ensure that British Columbia is receiving its fair share of federal funding for innovation, as well as any available industry funding. In addition, the PTC recommends the province work with industry and the academic sector to ensure that BC-based companies, or those having significant satellite plants in the province, are actively investing in innovation in the province.

HUMAN CAPITAL FOR AN INNOVATION ECONOMY

- 5.14 That the provincial government work with industry to develop a means to raise awareness of the opportunities available in an information-based economy and assist citizens to enter technology-related careers.
- 5.15 That the Ministry of Education continue to develop its K-12 e-learning strategy through the BCEd Online initiative to ensure that consistent, province-wide standards and content are developed and maintained.

APPENDIX B. SUMMARY OF RECOMMENDATIONS

- 5.16 That the provincial government fully implement the BCcampus initiative.
- 5.17 That the provincial government revise the definition of a "high technology professional" to provide:
- Enhanced clarity for employees and employers to minimize disputes and costly resolution processes.
 - Greater clarity as to what occupational activities are included as opposed to defining specific occupational titles that limit interpretation.
- Inclusion of all occupational activities related to the full product and service life cycle, including sales and marketing.
 - Clear inclusion of other high technology sectors such as new media, alternative energy (fuel cells), and biotechnology. The definition should also leave room to include new technologies as they emerge.

4th Report

THE PTC PRIORITY RECOMMENDATIONS

- 4.1 Continue to work to implement all previous PTC recommendations with priority consideration of the following by government in the coming year:
- a. Broadband
Provide broadband services to all British Columbia communities. Work with the federal government to accomplish this in the next three years.
 - b. Government Operations - Telehealth
Make telehealth a top priority and continue work to adopt and implement common health information technology infrastructure and standards, and establish an e-Health Task Force.
 - c. Industry Development
 - 1) Venture Capital -
Work to pass the PTC's previously recommended amendments to the *Small Business Venture Capital Act (SBVC Act)*.
 - 2) Promoting British Columbia -
Develop a provincial marketing strategy and take every opportunity possible to promote the province. This includes:
 - a) Marketing and promotion missions led by the Premier
 - b) A marketing and promotion plan developed from government analyses of the five key emerging industry sectors in British Columbia – information technology, life sciences, new media, alternative energy and wireless. The plan would provide for a sustained marketing effort of the province's technology industry and business climate. Among other things, it would include:
 - i. Developing and executing a branding strategy and marketing plan for the British Columbia technology community.
 - ii. Creating an inward-bound information centre for prospective corporate recruits to the province.

APPENDIX B. SUMMARY OF RECOMMENDATIONS

ALTERNATIVE ENERGY

- 4.2 Combine the strengths of the provincial and federal governments, industry and academia to develop and implement an aggressive British Columbia Fuel Cell Strategy that parallels and builds on a similar National Fuel Cells Strategy. Activities in the provincial strategy should include:
- a) Enhanced support for research and development carried out by the private sector and in public institutions (in collaboration with industry).
 - b) Support for market focused demonstration projects in both public and private sector applications. This should include real life situations that validate product reliability and output, “ruggedize” the product, provide quality assurance data, and help manufacturers make the necessary alterations to earn commercial success.
 - c) The British Columbia government becoming an early adopter of fuel cell products. Government departments and crown corporations being real customers raises the profile and supports the development of markets.
 - d) Accelerate the development of

- harmonized codes and standards. Government and industry collaboration is necessary to remove regulatory obstacles to the introduction of fuel cell products and systems.
- e) Incentives that support and reward growth and investment such as:
 - 1) Encourage the early adoption of fuel cell and related products and systems by providing fiscally neutral tax based incentives, such as the income tax payback approaches used in Michigan.
 - 2) Consider programs having an initial cost but longer term substantial savings to the treasury.
 - f) Development of infrastructure which includes building upon investments already made by BC Hydro and others.
 - g) Ensure the availability of a highly skilled, well-trained workforce. This involves conducting industry and government collaboration with secondary and post-secondary institutions to define and implement appropriate education and training at all levels in the post-secondary system.

REWARDING INNOVATORS IN THE PUBLIC SERVICE

- 4.3 Accelerate and reinforce desirable change in the public sector by adopting the Premier’s Awards in all the proposed categories (leadership, service excellence, innovation and partnership), especially the innovation category.

3rd Report

IT PROCUREMENT

- | | |
|--|---|
| <p>3.1 Examine the scope of its current procurement reform initiative to ensure it adequately addresses the unique nature of IT procurement and permits adoption of a benefits-driven procurement model based, above all, on the business objectives rather than the technology requirements of government.</p> <p>3.2 Identify a senior government official to drive both a strategy and implementation process around IT procurement reform. This official will also be responsible for fostering development and adoption of new IT procurement tools and models; facilitating government-wide and industry education; and championing support throughout government.</p> | <p>3.3 Create a joint government and industry task group to address the wide range of issues associated with IT procurement reform, with particular attention to the prioritized list of issues and proposed solutions emanating from the Procurement Symposium as well as the larger list of tactical and strategic issues identified by the PTC during its consultative process.</p> <p>3.4 Continue the momentum. Hold a follow-up IT procurement symposium within 120 days. The joint industry/government event should include a progress report from government outlining its response to the set of recommendations contained within this report, as well as future plans, deliverables, and timelines.</p> |
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E-HEALTH

- 3.5. Establish an e-Health Task Force composed of both government representatives and health care professionals to address the recommendations arising from the e-Health Roundtable. In addition, the mandate of the e-Health Task Force would include:
- | | |
|---|---|
| <ul style="list-style-type: none"> • coordinating and leveraging current e-health initiatives, including clinical and educational telehealth projects; • the implementation of an Electronic Health Record (EHR), in conjunction with other levels of government and across ministries. This standard EHR would be adopted by all Health Authorities, institutions and businesses providing health care services in the province; | <ul style="list-style-type: none"> • address the licensure, liability and billing issues and the resulting changes required to existing policy or legislation to enable health care givers to participate in telehealth; and • conduct a community consultation • process to identify specific telehealth applications that will address critical needs in each community. |
|---|---|

VENTURE CAPITAL

- 3.6. To meet the acute need for seed and early stage venture capital within the province, the PTC strongly recommends that the proposed amendments to the *SBVC Act* be passed by the legislature prior to the beginning of 2003. Failure to do so will discourage and inhibit the facilitation of more early stage capital within British Columbia, and will put us further behind other jurisdictions.

Second Quarter Report

UTILIZING SPAN/BC NETWORKS

- 2.1 Upgrade and extend SPAN/BC so it is capable of delivering advanced broadband network infrastructure to the communities of British Columbia.
- 2.5 Find ways to open up SPAN/BC to allow communities to take advantage of

the government's broadband infrastructure in those communities where the private sector is unlikely to provide high speed Internet access to citizens and businesses.

PRIVATE SERVICE PROVIDERS' NETWORKS

- 2.4 Investigate all potential levers including – but not limited to – aggregating public demand, so that it can prompt service providers to extend and update their current telecommunications network infrastructure.
- 2.6 Reform procurement policy to allow for flexible, creative and competitive procurement models that will stimulate the private sector to upgrade and expand their broadband network infrastructure, as well as encourage the entry of local service

providers, such as community-based networks, into the marketplace. To this end, two or three communities should be identified as pilot sites for further detailed planning, and implementation.

- 2.7 Conduct a Request for Information that solicits vendor and community stakeholder reaction to these recommendations, and taps into the innovative and creative potential for public-private partnerships that exists in the marketplace.

BROADBAND - DEMAND AGGREGATION

- 2.2 Aggregate total public sector demand (including core government, health authorities, schools, etc) where feasible to upgrade and expand SPAN/BC so that it will be capable of providing next-

generation broadband infrastructure to the communities of British Columbia.

- 2.3 Investigate fully the economics as well as the potential benefits or obstacles inherent in aggregating public sector demand.

PUBLIC ACCESS AVAILABILITY

- 2.8 Make sure that there is public access to the Internet in every community in British Columbia.
- 2.11 Develop a complete map-based inventory of all public access sites by community to determine if the levels of public access and location of sites are appropriate for the size and demographics of the population.

- 2.14 Work with the First Nations of British Columbia and the federal government to bring information technology, including public Internet access, to remote First Nations communities in British Columbia.

- 2.15 Determine if the province's 58 sCAT locations and if existing PLNet facilities could be used by the public to access the Internet.

APPENDIX B. SUMMARY OF RECOMMENDATIONS

PUBLIC ACCESS SUSTAINABILITY

- 2.9 Work closely with the federal government to coordinate the allocation of scarce public dollars for public access.
- 2.10 Find ways to sustain existing public access sites in the province and meet the growing public demand by increasing, where necessary (based on demographics and usage patterns), the number of sites, the number of public access terminals, the available bandwidth, and the hours of operation.
- 2.13 Increase staffing levels at public access sites through programs like Youth@BC, through partnering with Industry Canada's CAP Youth program, or through use of the Labour Force Development Agreement with the federal government to train unemployed individuals to work at access sites

IMPROVE AWARENESS ON PUBLIC ACCESS

- 2.12 Improve awareness and visibility of public access.

PROVINCE-WIDE HEALTH IT STANDARD

- 2.16 Continue meetings between the executive of the new Health Authorities and the Ministry of Health Services and Ministry of Health Planning to discuss province-wide health information and information technology standards that will apply to all six Health Authorities as they move to restructure and consolidate.
- 2.17 Ensure each of the Health Authorities appoints a person to be responsible for information management and technology with the task of implementing the appropriate standards in collaboration with the Ministry of Health Services and the other health authorities.
- 2.26 Extend its standards beyond just ministries to its agencies and other government service providers.

Ensure that the designated chief information and technology officers of each authority work with the Ministry of Health Services and Ministry of Health Planning and other appropriate ministries to establish integrated technology standards province-wide. At a minimum these information and technology officers should:

- 2.18 Establish a consolidated provincial strategy for Health Information Management and Information Technology (IM/IT).
- 2.19 Adopt and implement common health information technology infrastructure and standards.
- 2.20 Evaluate and seize opportunities for moving towards shared services where practical and cost-effective.
- 2.22 Identify policy changes needed to support the electronic delivery and management of health services.
- 2.23 Recognize information technology development as a strategic investment.

E-HEALTH AND TELEHEALTH STRATEGY

Ensure that the designated chief information and technology officers of each authority work with the Ministry of Health Services and Ministry of Health Planning and other appropriate ministries to

APPENDIX B. SUMMARY OF RECOMMENDATIONS

establish integrated technology standards province-wide. At a minimum these information and technology officers should:

- 2.21 Develop a provincial strategy to facilitate Telehealth and electronic health record initiatives in consultation with medical and continuing education units of the colleges and universities.
- 2.24 Facilitate the advancement of key e-health and Electronic Health Record initiatives.
- 2.25 Establish a British Columbia e-Health Think Tank composed of e-health visionaries, not senior IT staff, who will examine the applications side of e-health, since it will be compelling applications that drive down costs and improve the delivery of health services to the remote and rural regions of the province.

IT PROCUREMENT

- 2.39 The provincial government should expedite its efforts to rewrite its Policy and Legislative Framework around Procurement Reform so as to result in more streamlined, flexible, and cost-effective processes for both government and the British Columbia supplier community, ensuring fair and open procurement throughout the province. The government should also develop procurement policies and educational programs for both ministries and the supplier community which will provide British Columbia-based technology companies with the tools and skills required to compete more effectively for government contracts.

VENTURE CAPITAL - CHANGES TO *SBVC Act*

Accelerating 'Early Stage' Technology Investment

The provincial government should proceed promptly with the following streamlining amendments to the *SBVC Act* to address the need for early stage capital investment in technology companies:

- 2.27 Expand the tax credit budget legislated under the *SBVC Act* from \$50 million to \$100 million annually.
- 2.28 Introduce an investment model under the *SBVC Act* that does not require the registration of a separate VCC to facilitate investment and tax credits under the programs in order to allow direct investment, cut red tape and reduce program registration costs.
- 2.29 Increase the total amount of capital one business may receive under the program (beyond the current \$3 million) to better reflect the capital needs of many early stage technology companies.
- 2.30 Increase the employee threshold limit for a small business from 75 to at least 150.
- 2.31 Allow approval for common investment regimen, such as multi-tranche investments over multiple years based on attainment of established milestones.

Leveling the Playing Field for Tax Credit Investment in British Columbia

The provincial government should enable small businesses and venture capital managers participating under the *SBVC Act* to raise and invest venture capital, with the assistance of tax credits, under the same conditions that are presently offered to the one Labour Sponsored Venture Capital Corporation (LSVCC) operating in British Columbia and other LSVCCs operating throughout Canada.

APPENDIX B. SUMMARY OF RECOMMENDATIONS

To achieve parity with labour sponsored funds, the task group recommends the following amendments be made to the *SBVC Act*:

- | | |
|---|--|
| 2.32 Allow program investors the option to invest directly from their self-directed retirement savings plans. | 2.35 Provide VCC investors up to 24 months to complete investments. |
| 2.33 Make the tax credit incentives available for program investment within 60 days after the calendar year. | 2.36 Open up the tax credits provided to the sole LSVCC to competition by allowing other venture capital firms to enter the market to create a more dynamic venture capital community. |
| 2.34 Increase program flexibility in program capital investment beyond simple common or preferred shares. | |

RESEARCH AND DEVELOPMENT

- 2.37 The provincial government should take steps to create an e-learning chair at one of BC's universities.

ATTRACTING TALENT TO BRITISH COLUMBIA (RECRUITMENT)

- 2.38 The provincial government should work with the federal government to change immigration rules so that spouses of employees moving to British Columbia can work here automatically.

BRITISH COLUMBIA PROVINCIAL BRANDING

- | | |
|--|---|
| 2.40 Develop a provincial branding and marketing strategy that feature technology and innovation as key drivers supporting British Columbia's image as a place with a sustainable and vibrant economy, including resource and knowledge-based industries, and an unparalleled quality of life. | 2.41 Develop a strong macro-image positioning British Columbia as a desirable technology destination for investors, employees and site selectors. |
| | 2.42 Develop and execute its provincial branding strategy in consultation with the technology community. |

MARKETING BRITISH COLUMBIA

- | | |
|--|---|
| 2.43 Target its technology industry marketing effort at key audiences that include decision makers in technology investment, site selection and highly skilled workers. | 2.45 Focus its marketing strategy to attract highly skilled workers or those individuals that may be predisposed to move to Canada such as expatriate Canadian and British Columbia technology workers and members of communities that are already represented in British Columbia. |
| 2.44 Focus its technology industry marketing strategy initially on four sectors known as areas of strength within the province: biotechnology, wireless, alternative energy and new media. | |

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PUBLIC AWARENESS ON THE BENEFITS OF E-GOVERNMENT

- 1.8 Educate British Columbians about the benefits of being fully connected, including access to relevant Internet-based applications and information, and increasing e-government services.

RESEARCH AND DEVELOPMENT

- 1.1 Double the number of computer science and electrical engineering graduates from British Columbia post-secondary institutions.
- 1.2 Establish 20 British Columbia Research Chairs in the fields of medical, social, environmental, and technological research.

ATTRACTING TALENT TO BRITISH COLUMBIA (RECRUITMENT)

Attract senior professionals to accelerate industry growth by:

- 1.3 Making changes to immigration policy.
- 1.4 Establishing an Info-Office to aid in the recruitment of out of province technology workers and relocation of technology companies to British Columbia.
- 1.5 Implementation of a competitive provincial stock option program for British Columbia workers.
- 1.6 Resolution of cross-boarder security issues with the US.

MARKETING BRITISH COLUMBIA

- 1.7 Establish a domestic and international campaign to promote British Columbia's quality of life, superior infrastructure, education system, technology community and business-friendly environment.

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