

5th REPORT

JANUARY 12, 2004

PREMIER'S TECHNOLOGY COUNCIL



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:

Premiers.TechnologyCouncil@gems8.gov.bc.ca

Premier's Technology Council
795-999 Canada Place
Vancouver, British Columbia V6C 3E1
http://www.gov.bc.ca/prem/popt/technology_council/

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TABLE OF CONTENTS

FOREWORD	I
EXECUTIVE SUMMARY	III
IMPLEMENTATION OF PTC RECOMMENDATIONS - A PROGRESS REPORT	1
BRIDGING THE DIGITAL DIVIDE	1
E-GOVERNMENT	2
INDUSTRY DEVELOPMENT	2
MARKETING	3
PREMIER'S TECHNOLOGY COUNCIL - PRIORITY RECOMMENDATIONS FOR GOVERNMENT SERVICES	4
BROADBAND	4
E-HEALTH.....	4
CAPITAL AND INVESTMENT	5
INTRODUCTION	5
BACKGROUND	6
CONCLUSIONS	8
RECOMMENDATIONS	9
HUMAN CAPITAL FOR AN INNOVATION ECONOMY	14
INTRODUCTION	14
THE INNOVATION ECONOMY AND THE CASE FOR EDUCATION	15
E-LEARNING.....	16
EMPLOYMENT STANDARDS ACT CHANGES	19
ALTERNATIVE ENERGY: FUEL CELL INDUSTRY STRATEGY - A STATUS REPORT	21
INTRODUCTION	21
ACTION POINTS	22
EMERGING TECHNOLOGIES	23
INTRODUCTION	23
IMPORTANCE OF EMERGING TECHNOLOGIES	23
GOAL.....	24
INITIAL RESEARCH AND EARLY STAGE FINDINGS	25
ACTION POINTS	26
CONCLUDING REMARKS AND NEXT STEPS	27
APPENDIX A. DIGITAL DIVIDE – GAP ANALYSIS (UPDATED TABLE)	29
APPENDIX B. THE REALITIES OF THE NEW ECONOMY	43
APPENDIX C. BCCAMPUS: GOALS AND OBJECTIVES	45
APPENDIX D. MASTER LIST OF EMERGING TECHNOLOGIES	47
APPENDIX E. SUMMARY OF RECOMMENDATIONS	61
APPENDIX F. PTC MEMBERS, STAFF & ACKNOWLEDGEMENTS	72

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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 10 technology centres. The Honourable Gordon Campbell is Chair of the Council, a position shared with the Co-Chair, Paul Lee, Executive Vice President and Chief Operating Officer, Worldwide Studios, Electronic Arts.

The Council is fortunate to draw its membership from leaders of BC's technology industry and from senior levels of the academic community. These dedicated people are chosen for their leadership, commitment and firm belief in the future of British Columbia. PTC members spearhead initiatives in key areas of interest, creating teams and drawing upon expertise as required. The results of their research and consultations form the basis of the Council's reports, which are issued on a semi-annual basis.

British Columbia is a recognized leader in e-government and several of its technology sectors have world-renowned strengths. The Province is also becoming recognized as a leader in the development of technology that assist the resource sectors in staying competitive and accessing new market opportunities. However, the province faces tough competition both within Canada and abroad where most jurisdictions are turning to technology for their economic future. The work of the PTC is thus to maintain the lead in the areas where we excel, and to develop the lead in those areas where we have strengths on which to build.

In working to realize the Council's goals, it is gratifying to note the support of British Columbians for the technology initiatives that are needed to make the province a world-class technology centre. In a recent survey conducted for the Innovation and Science Council of BC, an impressive 91% of the population said they consider science and technology to be important to the future growth and development of the people, industries and economy of this province.

Transforming British Columbia into a global technology hub is a collaborative endeavour. Government, the technology industry, academia and the citizens of British Columbia all have roles to play and it is through a collective effort that this goal will be achieved. The Council gratefully acknowledges the continuing efforts of its members as well as the generous assistance and counsel it has received from so many people in so many quarters.

Jim Mutter, President, Premier's Technology Council

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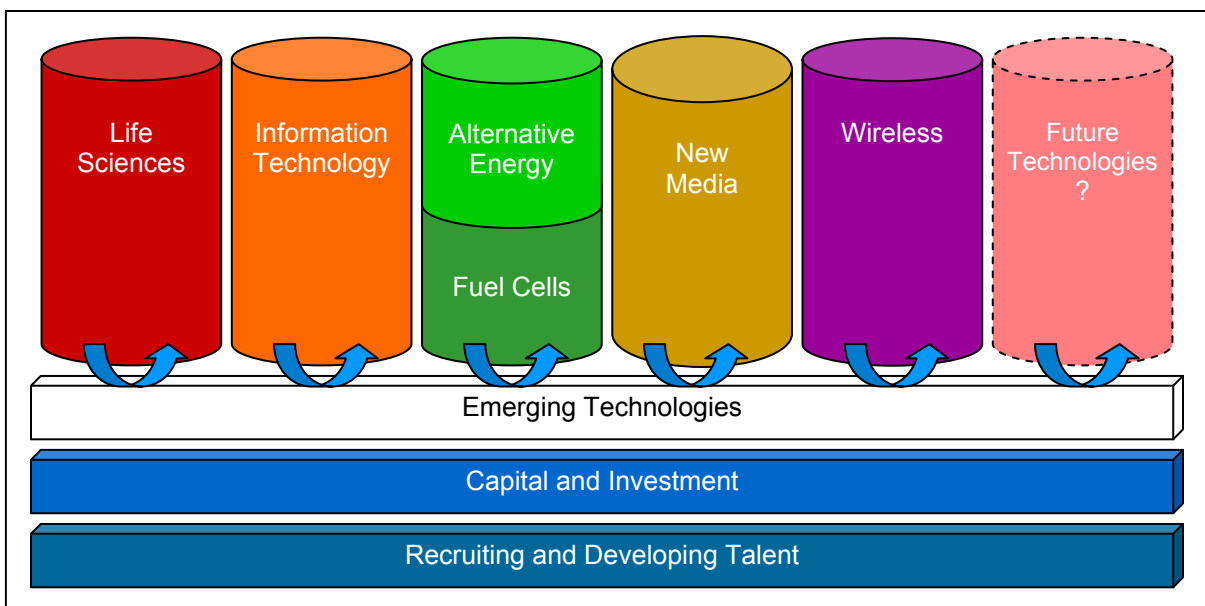
EXECUTIVE SUMMARY

The Premier's Technology Council: Building a Bridge to the Future

The idea of the “new economy” is no longer new. Jurisdictions around the world are developing strategies to harness the power of technology for their future economic prosperity. British Columbia's government has undertaken a bold commitment to make our province one of the world's top ten technology centres. In the face of intense competition, can BC compete and lead?

The Premier's Technology Council is firmly convinced that the answer is “yes.” To be sure, the provincial government has made important strides in implementing recommendations from the four previous PTC reports. But much work remains to be done by all stakeholders. Our venture capital pools are too shallow and narrow to effectively support development of our high-tech industry. Our human capital is only slowly adjusting to the high-tech reality, with many, particularly students unaware of its demands. And our international image remains one of natural splendour, rather than dynamism and innovation. British Columbia needs to make known the positive changes it has made and it needs to tell the international community that these changes are making a big difference.

The PTC believes that for BC to become a recognized technology leader, it will need to be a global leader in at least one key sector of the technology industry. While the Information Technology sector is currently the largest technology sector in the province, other potential candidates for recognized global leadership are: Life Sciences, Alternative Energy (fuel cells), New Media, and Wireless. We also include emerging or future technologies as exciting prospects for discovery. Underlying all these sectors are two factors that shape their success: financial capital and human capital. These factors are central to this report and its recommendations.



EXECUTIVE SUMMARY

The goal of the PTC is to build a bridge to BC's high-tech future. Working with stakeholders in all sectors - business, industry groups, community groups, government, and academia - we have developed concrete, actionable recommendations to realize the province's high-tech vision.

The first section of this report outlines "missions accomplished." These are the areas where government has acted on our recommendations. The PTC is heartened that the majority of recommendations in its previous reports have either been implemented or are being addressed. In particular, considerable progress has been made in extending broadband throughout the province, which is the foundation for our high-technology future and in ensuring that we mitigate the digital divide in British Columbia. The Alternate Service Delivery (ASD) secretariat will soon unveil a Digital Divide strategy. We reiterate our strong belief that no one in the province should be left behind, and that broadband must be extended to every community within the next 18 months.

Changes to the *Small Business Venture Capital Act* made by government have helped to spur investment. Legislation passed in Spring 2003 streamlined the process by permitting a direct investment model for investors. This has resulted in more than 125 small businesses being registered under the program, a number of which are outside the Lower Mainland.

These accomplishments certainly help, but more still needs to be done. In the first two chapters of the report, the PTC examines strategies for developing British Columbia's capital and investment climate and human capital. These are both fundamental to the PTC's four areas of concern: Digital Divide, E-Government, Industry Development, and Marketing. In the last two parts of the report, we zero in on the fuel cell sector as a particular "success story" for high-tech in British Columbia, and, looking to the future, outline our "emerging technologies" project, which we believe will help the province remain competitive.

A favourable climate for business and investment is essential for innovative firms. To address the need, the PTC urges the provincial government to act in three areas: venture capital, senior technology management, and marketing and branding.

On venture capital, the PTC has encountered a sense of frustration that inadequate funds are impeding the most dynamic innovative businesses. To be sure, we are not recommending the dated and discredited model of the government "picking winners." But the Council does believe that changes are needed to remove artificial restrictions on angel investment and to foster development of a market driven venture capital industry. Angel investment can be spurred by removing the individual tax credit limit in the provincial *Income Tax Act*. By eliminating these restrictions active angel investors will not be limited and more companies will benefit from increased investment opportunities. We also suggest that the provincial government work with the financial community to create market-based mechanisms to attract two to three new proven venture capital funds per year to British Columbia; that is, establish a "fund of funds" to accelerate the increase in supply of proven and connected venture capital funds in the Province.

The PTC also found that the province remaining competitive is a concern for entrepreneurial enterprise. The Council has focused on ways to incent innovative businesses to take root in British Columbia and flourish. Examples include: extension of the highly successful Scientific Research and Experimental Development (SR&ED) program beyond September 1, 2004; establishment of an employee equity participation incentive; and elimination of double taxation by nations whose citizens are working in Canada. Co-operation with the

EXECUTIVE SUMMARY

federal government to ensure the competitiveness of taxation must be a major component of this strategy.

The provincial government has a significant role to play in working with the technology community to help put British Columbia “on the map” among the international high-tech and venture capital community. A targeted campaign in partnership with the private sector aimed at encouraging high-tech investors and senior management to come to BC is needed. The PTC applauds the Premier’s recent visits to technology centres in the US and encourages continued high-profile promotion and follow-up to solidify relationships. The government should also consider inviting leaders from the global venture capital community to visit the province to learn first hand about what we offer and to network with the leaders in the local technology community. We applaud the establishment of the Leading Edge initiative and hope that it will play a leading role in this regard.

Highly developed human capital and appropriate government involvement must complement a favorable business and investment environment. The federal government’s Innovation Strategy estimates that by 2004 over 70 percent of all new jobs in Canada will require some form of post-secondary education; in contrast, only 6% of new jobs will demand education below the high school level. Yet a recent study by the Conference Board of Canada reports that Canada produces fewer university graduates in sciences, math, computing, and engineering than other leading members of the Organization for Economic Co-operation and Development (OECD) - the richest nations in the world. This is a troubling picture for Canada’s future prosperity.

The PTC makes recommendations in two areas: the innovation economy and the case for education, and e-learning.

In the first area, it is clear that there is a lack of awareness among the current generation of students about the opportunities in, and educational requirements of, the high technology sector. We recommend that an awareness campaign be launched. In e-learning, the Council underscores the importance in extending broadband to all communities. We are confident that leveraging the power of the Internet through initiatives such as BC Ed Online and BCcampus can help improve the educational attainment of rural and remote communities, which have traditionally been below the provincial average.

Once learners emerge from the educational system into the world of work, regulation of the employment environment that is sensitive to the demands of the high-tech sector is an important element is securing jobs and attracting new ones. The Council is gratified to see that the government has recently amended the *Employment Standards Act*, broadening the definition of high technology professional to ensure that employees in biotechnology and robotics are eligible under this regulation. These changes reflect the Council’s recommendations and were developed in cooperation with representatives of BC’s high-tech sector.

In the last two parts of the report, the PTC discusses fuel cells and emerging technologies. BC’s fuel cell sector has gained international renown. The PTC feels that a high-profile goal must be the core thrust of the sector going forward. Building a hydrogen highway to Whistler for showcasing at the 2010 Olympics would focus efforts on an objective that would spur growth across the industry.

Emerging technologies are specific technologies or technology areas that are either new to the world or currently exist and have new applications. The PTC is conducting an analysis of

EXECUTIVE SUMMARY

these emerging technologies, aiming to highlight those which could significantly benefit the province. Because emerging technologies are on the cutting edge of innovation, early identification and exploitation of them will help make British Columbia one of the world's top technology centres.

IMPLEMENTATION OF PTC RECOMMENDATIONS - A PROGRESS REPORT

In the four previous reports issued since its establishment, the Council has made a total of 62 recommendations. Forty percent of these have been addressed, while almost another 50% are in various stages of implementation. The Council would like to publicly recognize the extensive and bold initiatives that government has undertaken to implement or address most of the PTC's recommendations.

Bridging the Digital Divide

The Council originally anticipated that by the end of 2003, broadband service would be available to 80% of the province's population, living in 150 of the 361 communities in BC. (A community was defined as any location in the province with a place name and either a public school, library or health care facility.) The remaining 20% of the population scattered in over 200 communities represented the Digital Divide - those without broadband and therefore without access to the many basic programs and services it enables, such as e-learning, e-health and e-government.

The Council is pleased to report that this initial estimate has been surpassed and 193 communities representing 89% of the province's population now have broadband service. Much has been done by both government and industry to reach this point, yet almost half the number of BC communities still remains on the wrong side of the Digital Divide. Efforts to reach the goal of providing broadband access to each and every BC community must continue unabated. Attached as Appendix A is an updated version of the Gap Analysis Table that graphically indicates those communities that have access and those that still remain to be connected.

A Digital Divide strategy, created by the Alternative Service Delivery (ASD) Secretariat, has been approved by government. The strategy includes two major streams of activity:

- A short-term tactical stream of activity to connect 30 - 50 communities by opening points of presence (POP) on the existing government SPAN/BC network. These sites will be selected based on such criteria as Provincial Learning Network (PLNet) status, community demand, identification as a First Nations community, demand for e-health services, and so forth.
- A longer-term plan based on aggregating broader public sector demand and taking this to the market. The ASD Secretariat is also working closely with the Federal Government to leverage funding opportunities.

E-Government

IT procurement and e-health have been the Council's focal point within the area of government operations. Government has responded quickly and aggressively to the Council's recommendations.

IT PROCUREMENT

The Council's investigations revealed that responsibilities for IT governance were dispersed across government with no apparent central authority. Government responded through a major reorganization. The CIO responsibilities have been transferred to the Ministry of Management Services, which has assumed responsibility for all IT governance and operations functions, as well as procurement, alternative service delivery, e-government, etc.

Based on the Council's recommendations, government has also recognized that its commodity-based procurement processes were not taking advantage of creative IT solutions. Endorsed by the PTC and supported by the vendor community, the ASD Secretariat has launched the Joint Solution Procurement (JSP) process. Outsourcing of the government's Medical Services Plan (MSP) and Revenue Management Functions are the first two projects to be addressed using the JSP model. This revised approach structures the procurement process to increase flexibility and to promote collaboration. The feedback from stakeholders has been positive.

E-HEALTH (TELEHEALTH)

Government has made progress on some of the Council's recommendations in the area of e-health, particularly on structure and organization. CIOs have been appointed in each of the new health authorities. A CIO Council has been established to provide a forum for collaboration. The British Columbia Health Information Standards Council now identifies, reviews and recommends standards for the sharing of health information. A consolidated, five-year provincial strategy for Health Information Management and Information Technology (IM/IT) has been produced. In addition, an electronic health record (EHR) framework has been created. These are all important first steps in the provision of e-health services.

Industry Development

Government has implemented several important recommendations aimed at stimulating the development of the technology industry in BC. The province's universities are doubling spaces for computer science and computer and electrical engineering graduates. A Leading Edge Endowment Fund has been created in response to the Council's recommendation that research chairs be established at provincial universities.

IMPLEMENTATION OF PTC RECOMMENDATIONS

The provincial and federal governments have together addressed cross-border security issues, and changes to immigration rules have been made to allow spouses of employees to move to British Columbia to work.

More needs to be done. Changes must be made not only in the approach to training new, skilled knowledge workers, but in attracting skilled workers and experienced executives from abroad, and in retaining them.

To date, one of the successes has been in the area of capital and investment. In the 2003 Spring session of the Legislature, the provincial government acted on the Council's recommendations for procedural changes to the *Small Business Venture Capital (SBVC) Act*. In just over four months, more than 125 small businesses (93 engaged in the technology sector) registered as EBCs under the program, and are now raising up to \$116M in capital. The location of these businesses goes beyond the Lower Mainland and Vancouver Island to include communities such as Dawson Creek, Fernie, 100 Mile House and Kamloops. The changes have not only cut red tape and costs for innovative businesses accessing capital under the programs, but they have also helped to "bridge the gap" for venture capital financing outside the Lower Mainland.

Marketing

The Council feels strongly that to achieve the goal of making British Columbia one of the world's top technology centres, every opportunity must be made to promote the province. Accordingly, it has made several recommendations in the areas of marketing and branding, some of which include:

- 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
- Develop a strong macro-image positioning British Columbia as a desirable technology destination for investors, employees and site selectors
- Develop and execute its provincial branding strategy in consultation with the technology community
- Marketing and promotion missions led by the Premier
 - 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.

Government has created a marketing agency called *Leading Edge BC*. This is a partnership between government and the technology community to market the province's technology industry and undertake initiatives to attract investment to the province. The Council welcomes this step forward.

PREMIER'S TECHNOLOGY COUNCIL - PRIORITY RECOMMENDATIONS FOR GOVERNMENT SERVICES

As it did in its last report, the Premier's Technology Council re-emphasizes two key areas for priority consideration by government:

Broadband

The Premier's Technology Council places a high priority on the provision of broadband services to all communities in British Columbia and the ability of all communities to have public access to the Internet should they wish it.

The Council urges government to accelerate its efforts in this area and work with the Federal Government to bridge the digital divide in the next 18 months.

e-Health

The Council reiterates the importance it attaches to e-health and urges government to accelerate progress by:

- Adopting and implementing common health information technology standards.
- Addressing sustainability of current e-health initiatives, including clinical and educational telehealth projects.
- Implementing 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 BC.
- Addressing the licensure, liability and billing issues, and the resulting changes required to existing policy or legislation to enable healthcare workers to participate in telehealth. The billing issue can be addressed by creating specific fee codes to allow physicians to bill for telehealth procedures.

CAPITAL AND INVESTMENT

Introduction

This report contains a number of recommendations designed to improve the investment climate in British Columbia. The Premier's Technology Council is indebted to many in the high-tech community for their contributions, in particular, the British Columbia Technology Industries Association (BCTIA). In October 2003, the Premier hosted and the PTC moderated a Venture Capital Forum organized by the Ministry of Competition, Science and Enterprise. The forum brought together experts from across the community for a dialogue on the differing ideas being championed by various groups.

Over the last two years, the provincial government has implemented a number of measures, listed below, that were directly or indirectly related to capital and investment. Some of these, the latter two in particular, were in response to recommendations made by the Council to improve the environment for growth-oriented high technology business. The PTC's recommendations were consistent with those offered by the BCTIA and the British Columbia Biotechnology Alliance (BC Biotech) and their memberships. The government's measures include:

- Reduction of personal taxation rates to bring them in line with the US and other developed high technology economies (permits the attraction and retention of individuals at comparative costs with other high-tech jurisdictions).
- Reduction of capital gains to bring them in line with other high technology jurisdictions.
- Changes in the *Small Business Venture Capital (SBVC) Act* (enacted in March 2003) to improve access to resources and streamline the regulatory burden associated with registration.
- Creating competition in labour-sponsored venture funds.

Several aspects were considered in undertaking this review of venture funding:

- Availability of funding for a new venture from the development of an idea into an innovation right through to a sustainable, profitable business enterprise.
- Incentives required to attract and to retain new talent (e.g. salaries, employee ownership incentives, etc.).
- Human resources available to deploy and to utilize the available financial resources.

In this review of the resources available to support growth-oriented entrepreneurial enterprise, the Council concluded that a significant increase in the overall level of investment capital will be required if BC is to remain a competitive jurisdiction for these innovative businesses.

Background

Many conferences, industry task forces and meetings about venture finance have been convened in BC over the past few years with varied outcomes, and several distinct “camps” have developed around the subject.

Four issues predominate:

- Sufficiency of resources available to the entrepreneurial community and growth business from limited capital available to the venture capital industry.
- Labour-sponsored funds compared to regular venture capital funds.
- Role of “angels” in the marketplace.
- Role of government in supporting entrepreneurial enterprise.

RESOURCES

Some Vancouver venture capitalists argue that there is adequate capital for emerging opportunities, and that the scale of capital available per deal appears to fit the needs of the businesses. They maintain that a certain “equilibrium” has been achieved in the local private equity market, that deals are being financed, and that entrepreneurial businesses appear to be moving forward.

This conclusion misses three key points. First, businesses may have narrowed their ambitions to meet a smaller capital pool compared to other high-tech markets. Second, sufficient private equity may not be available at all stages to ensure the growth of promising enterprises. And third, there is, of course, no data about the businesses that are not financed - by definition they cannot be measured.¹

Additionally, there is evidence that entrepreneurs appear to be more than normally frustrated with the private equity community in Vancouver.² It is also not clear, given the amount of venture capital available, that growth enterprises or entrepreneurs from outside the region who wish to pursue business opportunities would naturally choose British Columbia. For BC’s technology industry to grow faster, more venture capital funding is required.

¹ A study of the financing of Biotech firms in BC, undertaken by the Maury Young Centre of the Sauder Business School at UBC, points out that with regard to Biotech firms in BC, financing has been available, that our biotech firms are witnessing smaller rounds of financing than their counterparts in the US, and that the firms went to IPO markets at an earlier stage of development than their American counterparts in search of financing. This now makes them vulnerable as the public markets have raised the bar on financing for entrepreneurial businesses given that our BC businesses are not as well developed in their products and technology.

² Multiple surveys, including a recent one by the BCTIA, have suggested this lack of capital. This is backed by interviews with local growth entrepreneurs and other surveys that have been previously undertaken.

LABOUR-SPONSORED FUNDS AND THE NEED FOR A LEVEL PLAYING FIELD

Labour-sponsored funds, with their cost of capital reduced through tax credits, may be able to undercut regular venture capital funds and cause some dysfunction in the marketplace. In addition, the rate of return from these funds is, on average, not promising. Related to this issue is whether retail investors should be taking the risk posed by the investment in single, small pools of venture capital investment (i.e. the investment in 20-25 growth businesses).

However, labour-sponsored funds have filled a gap in the amount of venture capital available in British Columbia and the rest of Canada. By wooing retail investors, these funds have ensured a reasonable availability of venture capital, in contrast to the comparative lack of investment by pension and other investment portfolios.

Currently, there is under-investment in venture capital pools by the traditional sources of funding found in developed economies. Retirement funds, insurance portfolios, and other long-term investment funds usually constitute the primary source of venture capital in the G7 countries. In Canada, retirement funds, in particular, have not followed the trend to put at least 10% of their investment pool in “at risk” financing areas, with a large portion of this dedicated to private equity pools. (This 10% rule was first permitted in the US under the *Employee Retirement Income Security Act* (ERISA) which permitted retirement funds to invest “at risk” in order to ensure that they were realizing their full long-run return potential). The resulting gap in venture capital funding has been partially filled through other mechanisms, particularly the creation of labour-sponsored funds.

Labour-sponsored funds should not be a long-run solution to sustaining the pool of venture capital. There should be little reason to put tax incentives in place to ensure a sufficient pool of capital if the returns are reasonable from venture capital activity in the region, and if capital flows freely in from the “normal sources.” In the interim, however, labour-sponsored fund managers need to be able to make reasonable decisions regarding their investments and to work to ensure the inflow of capital from other sources.

“ANGELS”

“Angels” play an important role in both mentoring and providing early stage companies with much needed capital. An investment by an “angel investor” can also assist early stage companies to attract additional capital as often these “angel investors” have a track record or expertise that is invaluable to assist management in building the company. Often angels are the only investors in the formation or seed of a company as most venture capital comes in later rounds. The current “angel investor” community is comprised of a relatively small number of investors compared to the number of early stage companies that require capital. Measures are needed to encourage these “angel investors” to invest in a greater number of companies and through their investments share their knowledge and experience in addition to their financial resources. The current individual investment cap is too low and often limits or delays angel participation. Removing the limit in the provincial *Income Tax Act* will accelerate seed funding to early stage companies and lead to the creation of more new companies, more jobs and an expanded tax base.

ROLE OF GOVERNMENT

The government's key role is to ensure the presence of adequate infrastructure to support growth business, to manage the government in such a way that a list of minimal rules and regulations are efficiently administered for all parties, and to ensure a competitive business environment that both sustains societal needs and maintains the jurisdiction as a competitive region. Additionally, government may provide limited capital, particularly in stages of development where capital may be unavailable or difficult to access without exorbitant cost.

Conclusions

There is progress in making British Columbia a more competitive home for growth-oriented entrepreneurial enterprise. However, more is required if British Columbia is to be one of the top technology centres in the world. Some of the issues confronting the province are:

- ***Amount of Funding.*** The amount of venture funding in the province must triple in the next three years from the current \$1.1 billion. This includes funding for all stages of entrepreneurial business development, from innovation funding to mezzanine funding for near fully developed enterprises. This will require not only developing increased amounts of indigenous venture and other forms of capital (including angel investment), but also attracting additional capital from funds outside the province.
- ***Appropriate Funding of Venture Capital.*** The Council believes that a larger pool of venture capital can be realized through the acceleration of funding to venture capital from "traditional sources." In essence, there must be a full maturation of the market for the funding of venture capital in British Columbia and Canada. Increased funding from various investment portfolios, including retirement and insurance, must be realized. The industry must also evolve to become market driven and less tax "incented".
- ***Breadth of Capabilities.*** There are three issues which impede technology sector growth:
 - The number of venture capitalists in British Columbia is low. There are a number of highly capable executives and firms, but not the critical mass of seasoned veterans that is required to meet the goals that the Council has set.
 - British Columbia does not have the breadth of specialist venture capital capabilities required. In regions with fully developed venture capital markets, there are both venture capital generalists and specialists - concentrating on one or more industrial sectors (e.g. biotech, bioinstrumentation, etc.). The more specialized funds offer additional capabilities to new or developing ventures and serve to coordinate and to further develop industry clusters, or companies, that create an industry "value chain."
 - The province does not have enough broad-based growth-management executives who understand the challenges of developing an entrepreneurial business and coordinating activities with various stakeholders, particularly financiers.

- **Visibility of Opportunities:** British Columbia does not have an international business image as a centre for innovation and entrepreneurship. Discussions with major venture capital funds outside of Canada indicate that the province is perceived principally as a recreation destination. Messages need to be specifically designed to attract capital both into entrepreneurial enterprise and venture capital funds.
- **Coordinated Action:** There must be better mutual understanding between industry, government, advocacy groups (e.g. industry associations), and the financial sector, of the need to work together in order to fundamentally increase the depth and breadth of the venture financing pool in BC. A large expansion in the risk capital pool will only be realized through a collective effort that puts aside short-term self-interest.

Recommendations

The recommendations have been grouped into those which are primarily the responsibility of government and those which the provincial government and others (finance sector, industry and educational institutions) must play a role in realizing.

The Council believes that it is important for government at all levels to maintain a competitive business environment and for that to be recognized. The Council believes that by implementing these 13 recommendations, government, industry, academia and other stakeholders can add significant momentum to BC's high technology sector.

(i) GOVERNMENT

SR&ED Tax Credits: The Scientific Research and Experimental Development (SR&ED) program and the related investment tax credits are an important source of capital for innovation development in early stage technology businesses. The PTC recommends:

- 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.

Employee Equity Participation Incentive: For BC to be recognized as a competitive business climate, it must lead in at least one area. One area where BC can lead is in employee equity participation. We believe that there should be no real cost to the government and in fact could generate additional revenues as it causes senior people to

want to locate in BC, often forcing companies and jobs to locate here as well. The PTC recommends:

5.3 That the provincial government develop and implement an employee 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.

Double Taxation For Foreign Workers: Double taxation of those who are nationals of other countries, especially of the US, is a concern. There may, in effect, be double taxation imposed on some of the income earned (salary and options) by individuals who have worked and lived in Canada but who must file taxes with their country of citizenship (or for purposes of maintaining residency permits such as the US “Green Card”). Such double taxation would reduce BC’s ability to attract and retain top talent and become a leading high-tech jurisdiction.

In the case of the US, this double taxation takes the form of something referred to as “Alternative Minimum Tax” which is imposed on high-income earners even though they may have previously paid the computed taxes to Canada. While such double taxation appears to be prohibited by the US-Canada tax treaty, the US Government is taking measures to collect the tax. This has the effect of penalizing individuals who choose to pursue a career, even for a finite period, in Canada. The PTC recommends:

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.

Comparative Corporate Tax Treatment: It is important that British Columbia and Canada have a tax treatment for corporations that is competitive with other high technology jurisdictions. At this time, the provisions for corporate loss carry-forwards in BC and Canada are neither competitive nor reflective of the long development cycles in some sectors of technology, including biotechnology. Recent changes in the US tax law have made Canada even less competitive. The PTC recommends:

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).

CAPITAL AND INVESTMENT

- 5.6 That to encourage more foreign investment, 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.**

A comparative analysis of how other G7 countries handle such cross-border investments by large-scale investment portfolios should be undertaken to pinpoint regulations, taxes or administrative practices which inhibit such cross-border investment. For instance, Canada may be requiring investors to create complicated vehicles for investment, or to file multiple administrative forms. In particular, Canada should not try to realize the benefits of “quadruple” taxation (i.e. governments sometimes try to realize taxes by those who are gainfully employed by corporations through taxation on corporate profits, taxation of corporate purchases, and taxation of foreign capital suppliers on their returns) at the expense of eliminating certain taxes on foreign investors. There is also a need to understand how to streamline and simplify the process of cross-border investment.

(ii) GOVERNMENT AND FINANCE SECTOR

To help accelerate the funding of venture capital from various investment portfolios, the PTC recommends:

- 5.7 That the provincial government undertake a study to investigate the under-investment by 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.**

To increase the amount of early stage capital that is invested in early stage companies, the PTC recommends:

- 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*.**

In order to accelerate the creation of a world class, market driven venture capital industry in British Columbia, the PTC recommends:

- 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

CAPITAL AND INVESTMENT

- Raise private capital before accessing the BC programs.

These new funds are more likely to be formed if there is ready capital available to support their formation. We strongly suggest the establishment of a capital pool or pools to accelerate the formation of market-based venture capital funds. Examples of possible funding mechanisms for ensuring the formation of new venture capital funds include the establishment of:

- **Matching Fund of Funds**
 - Run by experienced and qualified management.
 - Initial capital provided would receive a market rate of return based on sound investment principles.
 - Targeted at institutional investors who are currently not targeting venture capital as an asset class (generally because they are too small or lack expertise).
 - No matching unless the qualified new venture fund has first raised private institutional capital.
 - Qualified new venture funds would be able to match 1:1 against the funds they raise.
- **Loan Program - Similar to the successful Small Business Investment Corporation (SBIC) Program in the US**
 - Guarantee assists qualified new venture funds to raise additional venture capital.
 - Qualified new venture funds would be able to raise up to 3 times the amount of the private institutional capital raised.

No matter what the circumstance, we recommend the formation of capital pools which would be allocated to new forming funds on a fully commercial basis with the expectation of a return on capital invested. Any involvement of government funding would be to seed the formation of further commercially viable capital pools. This would continue the movement of risk capital formation away from government “incented” risk capital to commercial risk capital.

(iii) GOVERNMENT AND INDUSTRY

In order to attract world class venture capital firms to invest in British Columbia, the PTC recommends:

- 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. In the end, the campaign should be a partnership between government and industry, not an initiative solely driven or financed by the government.

CAPITAL AND INVESTMENT

- 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.** These meetings should be undertaken to inform the management of funds and investment banks of the entrepreneurial business opportunities that exist in British Columbia and the opportunity for further investment (based largely on even further increases in innovation funding). These meetings can be scheduled using local industry network connections.
- 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.** These tours should include networking opportunities with key figures in the British Columbia finance and high-tech industries. Such “person to person” visits help to establish relationships and build an image of the province that broad-based advertising alone cannot achieve.

(IV) GOVERNMENT AND EDUCATIONAL INSTITUTIONS

Government and educational institutions need to ensure that adequate funding is available for the initial pursuit of innovations. In addition, educational institutions need to appreciate their role in promoting and disseminating innovations as well as providing appropriate entrepreneurship and venture capital education. In these latter two areas, the PTC will pursue independent discussions with the appropriate universities, colleges and their associations. The PTC recommends:

- 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

Introduction

From its inception, the Premier's Technology Council has recognized that to become one of the world's leading technology centres, a supply of highly skilled and motivated knowledge workers is essential.

According to world-renowned management expert Peter Drucker, today only 20% of work forces are manual workers and of the remainder, nearly half are knowledge workers.³ Human capital has become the source of competitive advantage, and the keys for success in the new economy are companies' ability to obtain, train and retain knowledge workers.⁴ Businesses have learned that their employees are an investment and that they need continuous training to remain productive. The implication is clear that it is no longer possible for people to spend their entire working lives on an assembly line, a fishing boat, or in the forest. People will have to respond rapidly to shifting demand and be prepared for life-long learning. Not only should educational opportunities be provided to facilitate this, but there must be greater awareness that flexibility and adaptability are critical to survival and success in the new economy (see Appendix B for business leaders' comments on the need for education).

Globalization and knowledge-based industries hold the key for the future prosperity of British Columbia. In 2002, 80% of British Columbians were already employed in service-producing sectors, such as travel and tourism, communications, healthcare, education, financial, entertainment and information technology.⁵ Innovation and knowledge-based technology will be the platform for many of the best jobs in the future and will define British Columbia's competitiveness in the global marketplace.

Education in these disciplines will offer the recipient the advantage to capture those jobs. Already other jurisdictions have focused on this trend and jobs have moved from North America to places such as Singapore, India and Israel.⁶ While these jobs are not expected to return to North America soon, if at all, continued innovation will help ensure that British Columbia is on the forefront of the knowledge economy and establish the province as a world leader. A better-educated workforce will sustain such innovation and help to increase productivity, a key factor in building and maintaining our competitiveness.

In its First Quarterly Report (November 22, 2001), the Council stated that academia, government and industry needed to work together on several key goals:

³ Peter Drucker. *"Putting More Now Into Knowledge."* Forbes Magazine, May 15, 2000

⁴ Ching-chih Chen. *"Millennium eLearning: The Next Killer Application."* Graduate School of Library and Information Science, Simmons College

⁵ BC Statistics. *"A Guide to BC Economy and the Labour Market."* <http://www.guidetobceconomy.org>, April 17, 2001

⁶ Pete Engardio, Aaron Berstein, Manjeet Kripalani, Frederik Balfour, Brian Gow, and Jay Greene. "Is Your Job Next?" Business Week: February 3, 2003.

- Creating an education environment that fosters the production of superior talent and knowledge, and reaching out to young people from an early age to raise awareness of the opportunities in high-tech careers.
- Developing a training environment that supports and promotes life-long learning and permits every individual to identify and pursue a career path in high technology.
- Fostering a climate of personal opportunity that promotes the retention of talent produced within the province and country.

The Innovation Economy and the Case for Education

Developing the talent industry needs begins in our education system, both K-12 and post-secondary. Over the past year, the PTC consulted widely throughout the K-12 and post-secondary systems, and with government, industry and other stakeholders. The Council discovered that the case for education still needs to be made. Youth in British Columbia are not receiving the important message that economic evolution is occurring and that resource-dependent economies are being overtaken by those based on information and knowledge. Too few are opting for technical training and education or pursuing technology-related careers.

One of the conclusions derived from these consultations is the need to increase public and student awareness of the impact of the knowledge economy, and to better prepare BC's population for the opportunities it offers. Job seekers and youth are experiencing difficulty accessing current information on career trends and the labour market. Thus, they lack the tools to help them make informed career choices. Going forward, the majority of new jobs will be knowledge-based and it is vital that people understand how to prepare themselves for this future.

Australia faces many of the same challenges as British Columbia, as its economy is also largely resource based. To help refocus its population on the opportunities of the future, the Australian government developed an industry-operated Internet portal called the "IT Skills Hub". The hub was created to address the education and training needs of Australian employers, educators, professionals and students in the Information and Communication Technology (ICT) sector. It has five strategic objectives:

- **Industry Attractiveness** - making ICT a top aspirational career choice
- **Skills Supply** - creating the ICT skills pool for the future
- **Workforce Development** - realizing the potential of ICT skills to improve productivity, innovation and business performance
- **Intelligence** - anticipating and communicating future ICT skills needs
- **Life Skills** - improving quality of life through ICT skills

RECOMMENDATION

The PTC recommends:

- 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.**

E-Learning

In its First Quarterly Report, the PTC stated that “e-learning can bring the classroom to the student. Distance should not be a barrier to accessing any educational programs. K-12 students, college or university students, companies retraining workers, or lifelong learners seeking new skills, can all be aided through distance learning on-line.”

In the same report, the PTC recommended that the province continue to seek ways to increase the capacity of universities to produce additional technology graduates in other fields. E-learning is one way in which the capacity can be increased.

E-learning is much more than the correspondence school of the information age; it challenges us to re-examine the way we learn and offers tremendous opportunities for growth and development. This report contains recommendations based on preliminary consultations and research. An upcoming E-learning Roundtable sponsored by the PTC will generate detailed recommendations on this important topic.

E-learning (or electronic learning) means providing education through a variety of applications and processes that can be Web-based, computer-based, or in virtual classrooms. It includes the delivery of content via Internet, intranet/extranet (LAN/WAN), audio- and videotape, videoconferencing, satellite broadcast, interactive TV, CD-ROM, and more. In practical terms, e-learning can be thought of as using technology to deliver the right information and skills to the right people at the right time at acceptable standards and quality.

In the new economy, both the education system (K-12 and post-secondary) and industry play important roles. The education system provides the skills generally needed to obtain the first job. It later provides special or upgrade skills and graduate education as well as the training needed to transition between careers. On its part, industry takes school system graduates and trains them to function effectively in the corporate environment. To survive and thrive in the rapidly changing and evolving high-tech world, companies must also continually upgrade employee skills. Change is occurring so rapidly and corporate education is growing so dramatically that Jim Botkin and Stan Davis, in the “Monster under the Bed,” state:

“If you are not being educated in your job today, you may be out of a job tomorrow... Employee education is not growing 100 percent faster than academia, but 100 times - or 10,000 percent - faster...Over the next few decades the private sector will eclipse the public sector and become the major institution responsible for learning.”

BROADBAND IS THE KEY

E-learning is reliant on a technology platform. Implementing a broadband infrastructure that connects all communities in BC will allow people in the province's remote or rural communities to cross the Digital Divide and to have access to vital services such as e-learning.

In a province the size of British Columbia with its small population so widely dispersed, school proximity and course availability are challenges, particularly in rural areas. The results of the 2002 Foundation Skills Assessment showed that academic performance is considerably lower in rural/remote areas of the province. The seven highest ranked school districts are located in Vancouver and Victoria, where more than 80% of Grade 10 students meet provincial standards for reading. Meanwhile, barely half of students in the lowest 10 ranked districts are reading at an acceptable level. These districts are located in the North, Interior and on Vancouver Island.⁷

In September 2002, the Minister of Education formed a Task Force on Rural Education to recommend strategies to ensure access to quality education for all students living in rural and remote communities of British Columbia. The Task Force advised, among other things, that the government increase learning options for rural students and educators through technological solutions. The PTC sees e-learning as an important part of delivering a range of quality educational programs, not only for rural and remote areas of the province, but to all British Columbia communities.

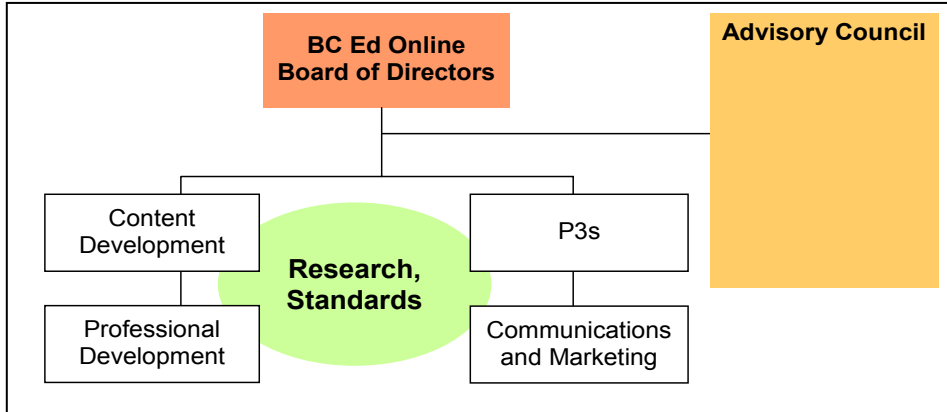
PUBLIC SCHOOLS (K-12)

The Ministry of Education recognizes the potential that e-learning offers. Content development is one of its primary objectives. In February 2003, education leaders in the province met to create a vision for online learning, reflecting where the province needs to be in five years. These leaders agreed that within this period, "Students in BC will have access to the highest quality online learning opportunities which will enable them to achieve their educational goals." To realize this vision, the leaders felt that school districts and key partners must organize, show leadership, share with each other and pool resources for efficiencies.

To this end BC Ed Online was created - an umbrella organization led by school districts with involvement from district administrators, teachers and their specialist organizations, independent schools, the private sector, post-secondary institutions, and government. This organization will provide leadership, advocacy, online content development and teacher professional development, as well as offer an access point for the private sector, research opportunities, and partnerships with post-secondary institutions and faculties of education.

The major committees of the organization are: Content Development (coordinating the development of high quality e-courses, fully aligned with the British Columbia curriculum), Professional Development, P3s, and Communications and Marketing. A Research and Standards committee will have cross-committee responsibilities.

⁷ Paul Wilcocks. "Education System Cheating Rural Kids." October 21, 2002.
<http://www.creativeresistance.ca/awareness01/2002-nov07-education-system-cheating-rural-kids-paul-willocks.htm>



Recommendation

The PTC recommends:

- 5.15 That the Ministry of Education continue to develop its K-12 e-learning strategy through the BC Ed Online initiative to ensure that consistent, province-wide standards and content are developed and maintained.

ADVANCED EDUCATION AND E-LEARNING

To address e-learning, the Ministry of Advanced Education has designed and is in process of implementing BCcampus, the provincial online and distance learning capability. BCcampus is a collaboration of post-secondary institutions in British Columbia providing an online central access point to post-secondary online and distance learning courses, programs and resources. It is envisioned that, once fully implemented, BCcampus will facilitate a seamless path from application to graduation, for distance learners in British Columbia. In addition to providing access to online and distance education courses and programs available throughout the British Columbia public post-secondary system, BCcampus will provide support services and other resources for learners, faculty and course developers, staff and administrators. A more detailed description of BCcampus is contained in Appendix C.

Recommendation

The PTC recommends:

- 5.16 That the provincial government fully implement the BCcampus initiative.

ACTION POINTS

To ensure a more thorough examination of this important subject, the Council will sponsor an E-Learning Roundtable in February 2004, with the goal of identifying a more comprehensive set of recommendations to create an e-learning environment in British Columbia. The Roundtable will be comprised of experts from government, the academic

community, and industry. The Council plans to report on the outcomes of the Roundtable in the 6th Report in early 2004.

Employment Standards Act Changes

The *Employment Standards Act* (ESA) sets out the minimum standards that apply in most workplaces in British Columbia. The Act contains such provisions as the province's minimum wage, overtime, vacation, and statutory holidays. Among other goals, the Act aims to:

- Ensure that employees in British Columbia receive at least basic standards of compensation and conditions of employment.
- Promote the fair treatment of employees and employers.
- Encourage open communication between employers and employees.
- Provide fair and efficient procedures for resolving disputes over the application and interpretation of this Act.
- Foster the development of a productive and efficient labour force that can contribute fully to the prosperity of British Columbia.
- Contribute in assisting employees to meet work and family responsibilities.

The Act dates from a period when the province's industry was largely resource-based and the provisions reflected the type of work most common in those traditional forms of industry. Advances in technology and the growth of high technology industry, however, have changed the workplace for many. A combination of the nature of the work and the dynamism of the industry resulted in a new kind of workplace, including one in which workers desire greater flexibility and receive new forms of compensation for their efforts.

In recognition of the nature of the industry and the flexibility it needed to compete in a rapidly changing environment, special Employment Standards rules for the high technology sector were created. For the most part, "high technology professionals" are exempt from the parts of the *Employment Standards Act* dealing with hours of work, overtime and statutory holidays. Examples of some of the requirements of the *Employment Standards Act* which do not apply to "high technology professionals" include:

- Employees are not to work more than five consecutive hours without a 30-minute meal break.
- Split shifts must be completed within 12 hours.
- Minimum daily pay.
- Employees must have 32 consecutive hours free from work each week.
- Overtime pay.
- Employees are entitled to either a paid holiday or extra pay when they work on a statutory holiday.

The high technology industry is still relatively young. As helpful as these changes have been, it has become apparent that more changes are necessary to maintain competitiveness. For example, there is a need to:

- Clarify the regulations related to the Act. Lack of understanding leads to increased overhead costs for employers - e.g. spending time to obtain an interpretation from

either the Employment Standards Branch (ESB) or a lawyer. There is similar uncertainty for employees.

- Eliminate the reference to occupational titles as this limits interpretation and will not stand the test of time. The regulations should be generic enough to clearly cover high technology occupational activities as opposed to defining jobs that may disappear with technology advances, and they should not require continual revision.
- Capture all occupational endeavours that rightly fit the intent of the Act.
- Clarify the Act to make it more easily understood by employers and employees alike.

Changes to the *Employment Standards Act* regulations would provide significant benefits to the high technology industry in BC by providing greater clarity for all concerned. A broader application of the exemption for high-tech professionals would ensure that employees in such areas as multi-media, graphic animation, biotechnology and the fuel cell industry are clearly included, as well as traditional IT and other high-tech employees. Finally, as existing companies evolve and new ones emerge, there would be less concern as to whether a new category of job is exempt or eligible.

RECOMMENDATION

The PTC recommends:

- 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.**

Editorial Note: The PTC has been working with the government for some time on these issues. In the Fall 2003 sitting of the Legislature, legislation was enacted that implemented most of this recommendation.

ALTERNATIVE ENERGY: FUEL CELL INDUSTRY STRATEGY - A STATUS REPORT

Introduction

In its 4th Report, the Council stated that “British Columbia is a recognized world leader in fuel cells and related technologies. Maintaining this leadership will provide significant economic, social and environmental benefits to the province. The people and the economy of British Columbia can capitalize on past and present government investments in this technology by taking a pro-active approach to industry development.”

The Report further stated, “If the province is to maintain its leading position, industry, government and academia must partner to develop and implement an aggressive provincial fuel cell strategy. This strategy will build on a strong history of government/industry collaboration and leverage our present strengths.” Indeed, the provincial government has identified the sector for priority development.

The Report then outlined a seven-point strategy that included:

- Enhanced support for research and development.
- Support for market focused demonstration projects.
- Early adoption of fuel cell products by the BC government.
- Accelerated development of harmonized codes and standards.
- Incentives to support and reward growth and investment.
- Development of infrastructure.
- Availability of a highly skilled, well-trained workforce.

An intense collaborative effort is currently underway to transform this strategy into an implementation plan. Industry has determined that the most effective way to advance the sector is to focus on a simple clear goal. That would serve to galvanize and focus effort while at the same time spurring development of a host of supporting activities.

The goal that has been selected is to build a **hydrogen highway to Whistler** in time for the 2010 winter Olympics. Reaching the goal will not only provide a world stage to showcase British Columbia achievement and capability, it will also address a number of other critical sector development areas and concerns such as:

- social, economic and environmental sustainability.
- world-class research and inter-institutional collaboration among the academic, industrial, and public sectors.
- a supportive environment including good public policy, sound regulatory regimes and a flexible financial market.
- collaborative partnerships to create linkages with Alberta, Manitoba, Washington, Oregon and California.
- turnkey alternative energy solutions that can be marketed and sold worldwide.

Action Points

There has been wide consultation to develop an innovative plan that contains bold ideas but is, at the same time, realistic and achievable. It is anticipated that the industry will complete the final plan for release in early 2004.

EMERGING TECHNOLOGIES

Introduction

New technologies present opportunities for British Columbia companies to develop new products and markets. Working in partnership with the Innovation and Science Council of BC on the Emerging Technologies Research Project, the Council's goal is to identify emerging technologies that are likely to positively impact the provincial economy, and to identify government policies and actions that will best enable their successful development.

For the purposes of the report, the term 'emerging technology' is defined as a specific technology or technology area that is either new-to-the-world, or an existing technology or technology area that has new applications. In either case, the technology must have the potential to significantly impact the provincial economy in a positive way.

The project is currently tracking 161 emerging technologies (see Appendix D). These technologies range from quantum computing to proteomics and from asynchronous computer chips to microbial fuel cells. Based on preliminary findings, 21 technologies have been identified as representing potentially significant opportunities. This number will be further reduced through additional research to identify the most promising emerging technologies where there is an expectation that British Columbia may be able to take a leadership position.

Importance of Emerging Technologies

Emerging technologies are key drivers for future prosperity because they help provide the foundation for innovation. An innovative economy is one that continually takes advantage of new technologies, ideas, trends and market opportunities to build successful companies and industries and meet consumer demands. Innovation is the process through which new economic and social benefits are extracted from knowledge.⁸

Emerging technologies represent the leading edge of innovation. As such, it is important that the province attempt to gauge the impact of specific future technologies with the intent of helping to foster basic research, idea development, capital formation, concept and product prototyping, business development and product commercialization. There are many currently emerging technologies that have received widespread interest from the BC research community, investors and the business sector. These include PEM (proton exchange membrane) fuel cells, 3-G and 802.11 wireless, genomics and new media. Significant industry clusters already exist in these and other technology areas and they are expected to continue to have a positive impact on the growth and diversification of the provincial economy. Nevertheless, there are other emerging

⁸ Industry Canada. *Achieving Excellence: Investing in People, Knowledge and Opportunity*. (Ottawa, Industry Canada, 2002) p. 4.

EMERGING TECHNOLOGIES

technologies that will not only have a significant impact on current industries but will also provide the opportunity for British Columbia companies to take national and global leadership positions.

Some emerging technologies will enable the development of other new technologies. In this sense, some are enabling technologies that allow others to be more fully exploited. Many new technologies are also disruptive to existing markets and current business methods, meaning that while an emerging technology may represent significant opportunities for some firms or industries, it may represent a significant threat to others.

Goal

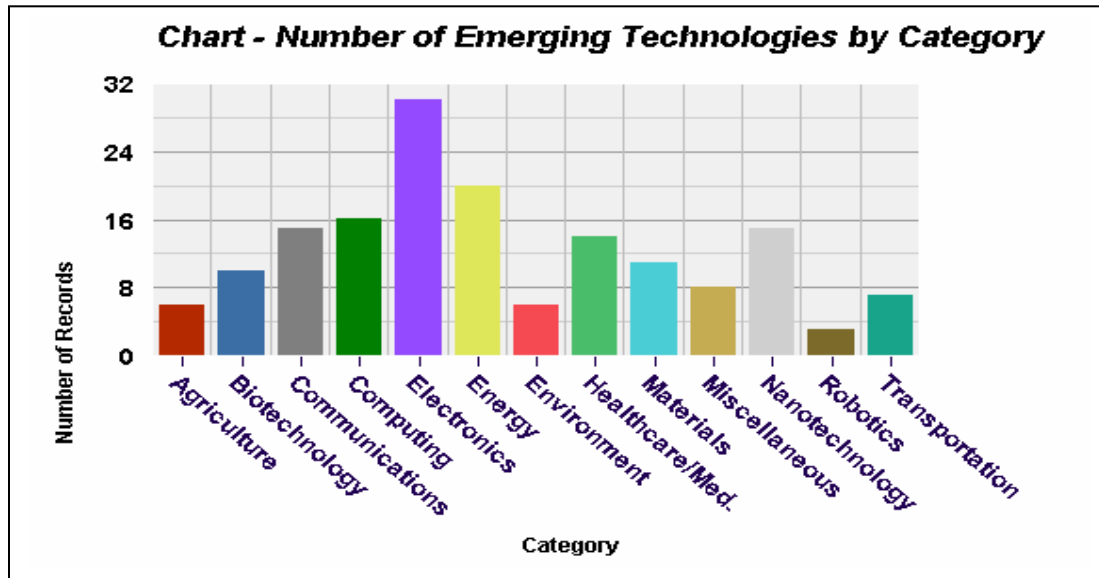
The goal of the Emerging Technologies Research Project is to identify technologies that meet the following general criteria:

- The technology is likely to have a significant impact on the future of the BC economy with both near-term and long-term social and economic benefits.
- The technology is one in which BC companies and industries can take a leadership role on a national and global scale through development and commercialization.
- The technology leverages the province's competitive advantages; whether those advantages are intrinsic to BC, such as plentiful water, or developed by BC companies, such as inexpensive hydroelectric power.

Emerging technologies and their impact on the economy are driven by a combination of academic and corporate research, entrepreneurship, venture capital, market developments, and government support. The road from technology discovery to commercialization is complex, challenging, and fraught with uncertainty; nonetheless, through close cooperation of government, academia and industry, significant obstacles can be overcome to foster the development of world-class high-tech industries in British Columbia.

Initial Research and Early Stage Findings

Through a comprehensive global search, 161 emerging technologies were identified. The following exhibit shows the number being tracked by industry.



In addition to industry categories, each emerging technology is being analyzed based on the following criteria:

- Primary Industries Affected: Companies in industries that create new technologies.
- Secondary Industries Affected: Companies in industries that may apply an emerging technology in some way within their day-to-day business activities.
- Estimated Commercialization Timeframe: An approximate date when the emerging technology is expected to have significant market opportunity.
- Market Opportunity by 2010: The amount of potential market demand by 2010 whether or not the commercialization timeframe has been met.
- Research Activity: Significant publicly funded research related to the technology which is currently underway in British Columbia's research universities, institutions and/or companies.
- Commercial Activity: Companies in British Columbia currently active with the technology either through research, product prototyping or commercialization.
- Potential Convergence Technologies: Other technology areas where a particular technology may have significant impact on their development and commercialization.
- Leverages British Columbia's Competitive Advantages: This indicates whether the province currently has intrinsic or developed competitive advantages that can be leveraged to help develop the technology or its markets.

EMERGING TECHNOLOGIES

Based on a “first pass” analysis by the research team, the following emerging technology areas have been identified out of the 161 areas being tracked, as potentially representing significant opportunities for British Columbia.

- Bioinformatics
- Biomass Fuels
- Functional/Therapeutic Foods and Nutraceuticals
- Gene Therapy
- Genetically modified plants and animals to produce medicine, chemicals, fuels, and other goods
- Hybrid Vehicle Technology
- Intelligent Transportation Systems (ITS)
- Knowledge Management / Knowledge Discovery
- Magnetic Refrigeration
- Micro Fuel Cells
- Natural Language Processing
- Photodynamic Therapy
- Precision/Remote Automated Farming
- Proteomics
- Quantum Computing
- Solid State Lights
- Stem Cell Therapy
- Telemedicine
- Transgenic Organs
- Virtual Reality
- Water Treatment and Processing

Action Points

The final stage of this project will be to conduct the analysis needed to reduce the above list by approximately one half. The PTC will then identify issues and make recommendations on how government can support these technologies and their industries in order to help ensure successful future economic development. Research findings will be published in the PTC's 6th Report in 2004.

CONCLUDING REMARKS AND NEXT STEPS

BC's high-tech strategy is on the right track. The PTC appreciatively acknowledges the government's strong response to its past recommendations and hopes that this report enjoys a similar response.

While we are confident that the goal of making the province a top ten technology jurisdiction can be achieved, it is not assured. Without concerted action to address issues related to attracting venture capital, maintaining competitive taxation, and training, recruiting, and properly regulating top talent, BC's high-tech future could become sidetracked.

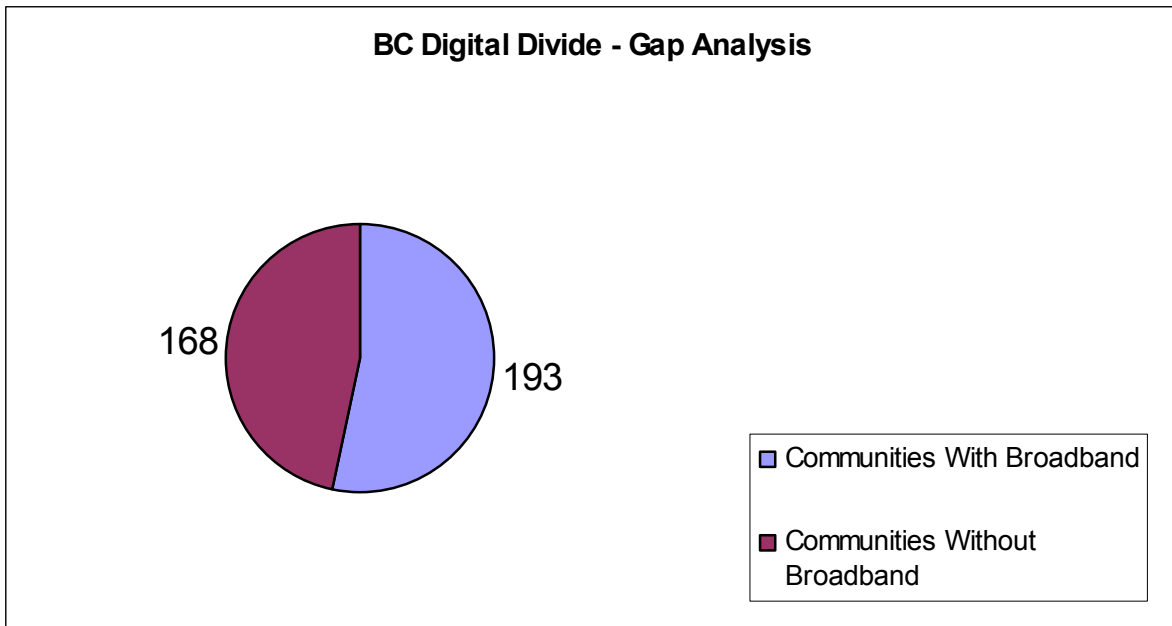
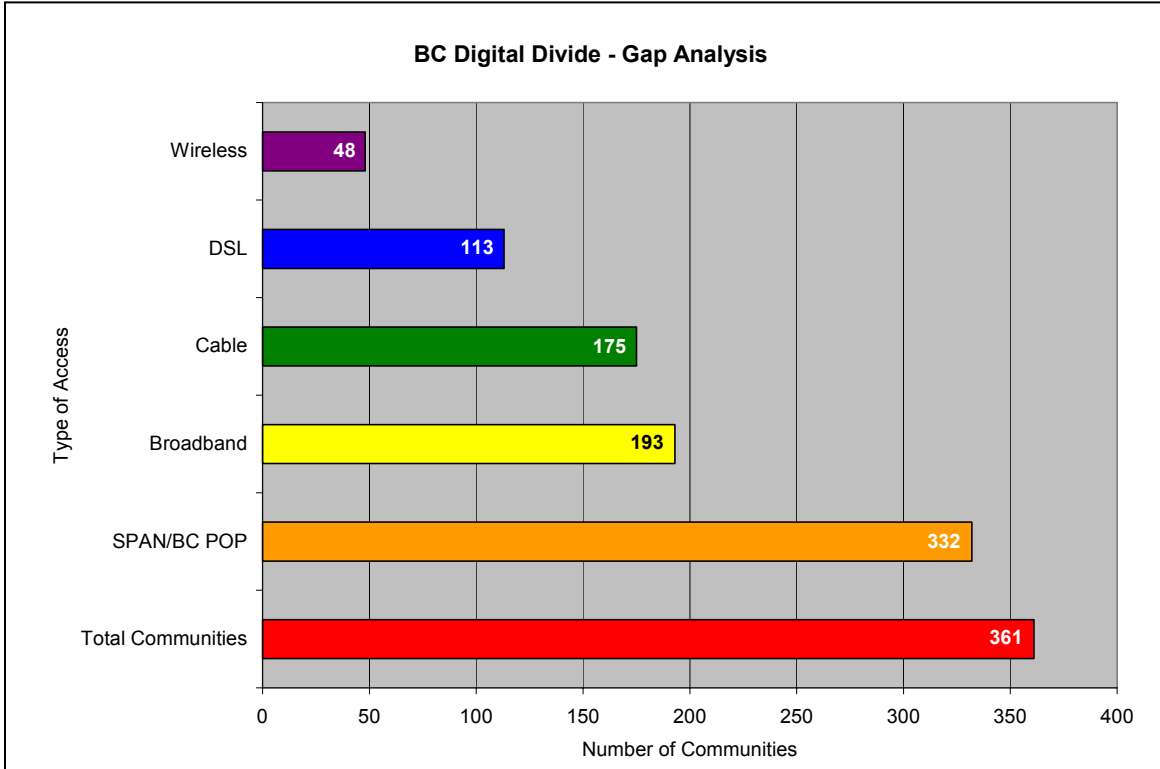
In this report the PTC has offered 17 recommendations and urges their prompt implementation.

The PTC will be doing its part in realizing the province's high-tech vision. The Council will sponsor an E-Learning Roundtable in February 2004, with the goal of identifying a more comprehensive set of recommendations to create a positive e-learning environment in British Columbia. The Roundtable will be comprised of experts from government, the academic community, and industry. The Council plans to report on the outcomes of the Roundtable in the 6th Report in early 2004. The PTC will also deepen its work on e-health, capital and investment, and conduct another round of regional consultations.

As part of our collaborative approach, we warmly welcome feedback on the recommendations of this report, and look forward to strengthening our relationships with all stakeholders as we forge ahead with our agenda.

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APPENDIX A. DIGITAL DIVIDE – GAP ANALYSIS (UPDATED TABLE)



APPENDIX A. DIGITAL DIVIDE – GAP ANALYSIS

Introduction

The data in this table and the preceding charts are an update of the work in Appendix C of the PTC’s Second Quarterly Report, dated April 2, 2002. The table has been assembled from data provided by telecommunications companies and other providers in British Columbia. If there are any errors or omissions, please contact us at Premiers.TechnologyCouncil@gems8.gov.bc.ca.

The PTC defines community as any location in British Columbia with a place name and either a public school, library or health care facility. This table shows broadband (1.5 Mbps) service availability in the province’s 361 communities.

Explanations of the column labels follow the table. The elements in each cell of the table represent either a “yes” (1) or “no” (0). At the bottom of each column, the totals represent the number of communities with the respective service (yes).

DIGITAL DIVIDE - GAP ANALYSIS

Community	Population	DSL	Cable	Wireless	SPAN/BC or PLNet in community	Lacking Broadband
100 Mile House	1739	1	1	1	1	0
108 Mile Ranch	2441	1	1	0	1	0
150 Mile House	1142	0	0	0	1	1
70 Mile House	311	0	0	0	1	1
Adams Lake	141	0	0	0	0	1
Agassiz	INCL	1	1	0	1	0
Ahousat	51	0	0	0	1	1
Aldergrove	INCL	1	1	0	1	0
Alert Bay	1295	0	0	0	1	1
Alexis Creek	162	0	0	0	1	1
Anahim Lake	163	0	0	0	1	1
Anmore	1344	1	1	0	1	0
Armstrong	4256	1	1	0	1	0
Ashcroft	1788	0	1	0	1	0
Atlin	300	0	0	0	1	1
Baldonnel	644	0	0	0	1	1
Bamfield	245	0	0	0	1	1
Barriere	767	0	0	0	1	1

APPENDIX A. DIGITAL DIVIDE – GAP ANALYSIS

Community	Population	DSL	Cable	Wireless	SPAN/BC or PLNet in community	Lacking Broadband
Bear Lake	227	0	0	0	1	1
Beaverdell	206	0	0	0	1	1
Belcarra	682	1	1	0	0	0
Bella Bella	254	0	0	0	1	1
Bella Coola	167	0	0	0	1	1
Big Lake Ranch	337	0	0	0	1	1
Black Creek	933	0	0	0	1	1
Blue River	278	0	0	0	1	1
Boston Bar	233	0	0	0	1	1
Bowen Island	2957	1	1	0	1	0
Bowser	1307	0	1	0	1	0
Brackendale	1073	0	1	0	1	0
Brentwood Bay	INCL	1	1	0	1	0
Bridge Lake	298	0	0	0	1	1
Buick Creek	58	0	0	0	1	1
Burnaby	193954	1	1	0	1	0
Burns Lake	2623	1	1	1	1	0
Burton	167	0	0	0	1	1
Cache Creek	1056	0	1	0	1	0
Campbell River	31294	1	1	0	1	0
Canal Flats	709	0	1	0	1	0
Canoe	779	0	1	0	1	0
Cape Mudge	181	0	0	0	0	1
Cassidy	978	0	1	0	1	0
Castlegar	8677	1	1	0	1	0
Cawston	1013	0	0	0	1	1
Cedar	4440	1	1	0	1	0
Celista	461	0	0	0	1	1
Central Saanich (DM)	15348	1	1	0	1	0
Charlie Lake	1727	0	1	1	1	0
Chase	2460	0	1	0	1	0
Chemainus	INCL	1	1	0	1	0
Chetwynd	2591	0	0	1	1	0
Chilanko Forks	65	0	0	0	0	1

APPENDIX A. DIGITAL DIVIDE – GAP ANALYSIS

Community	Population	DSL	Cable	Wireless	SPAN/BC or PLNet in community	Lacking Broadband
Chilliwack	62927	1	1	0	1	0
Christina Lake	1035	0	1	0	1	0
Clearbrook	INCL	1	0	0	1	0
Clearview	129	0	0	0	1	1
Clearwater	1015	0	0	0	1	1
Clinton	621	0	0	0	1	1
Coal Harbour	215	0	0	0	1	1
Cobble Hill	1753	1	1	0	1	0
Coldstream	9106	1	1	0	1	0
Colwood	13745	1	1	0	1	0
Comox	1172	1	1	0	1	0
Coombs	1372	0	1	0	1	0
Coquitlam	112890	1	1	0	1	0
Courtenay	32648	1	1	0	1	0
Cranbrook	18528	1	1	1	1	0
Crawford Bay	328	0	0	0	1	1
Crescent Valley	675	0	1	0	1	0
Creston	4795	1	1	0	1	0
Crofton	723	0	1	0	1	0
Cultus Lake	1256	0	1	0	1	0
Cumberland	2618	0	1	0	1	0
Danskin	219	0	0	0	0	1
D'Arcy	153	0	0	0	1	1
Dawson Creek	10754	1	1	1	1	0
Dease Lake	318	0	0	0	1	1
Delta	96950	1	1	0	1	0
Denman Island	1048	0	0	0	1	1
Deroche	149	0	0	0	1	1
Dewdney	INCL	0	1	0	1	0
Dog Creek	1739	0	0	0	1	1
Douglas Lake	171	0	0	0	0	1
Duncan	22101	1	1	1	1	0
Dunster	424	0	0	0	1	1
Edgewater	369	0	1	0	1	0

APPENDIX A. DIGITAL DIVIDE – GAP ANALYSIS

Community	Population	DSL	Cable	Wireless	SPAN/BC or PLNet in community	Lacking Broadband
Edgewood	160	0	0	0	1	1
Elkford	2589	1	0	0	1	0
Enderby	2818	0	1	0	1	0
Erickson	934	0	1	0	1	0
Errington	2122	0	1	0	1	0
Esquimalt	16127	1	1	0	1	0
Falkland	747	0	1	0	1	0
Farmington	445	0	0	0	1	1
Fauquier	219	0	0	0	1	1
Fernie	4997	1	1	0	1	0
Field	449	0	0	0	1	1
Forest Grove	371	0	0	0	1	1
Fort Babine	215	0	0	0	0	1
Fort Fraser	308	0	0	0	1	1
Fort Nelson	4188	1	0	0	1	0
Fort St. James	2381	1	0	1	1	0
Fort St. John	16034	1	1	1	1	0
Fort Ware	215	0	0	0	0	1
Francois Lake	284	0	0	0	1	1
Fraser Lake	1268	0	1	1	1	0
Fruitvale	3773	0	1	0	1	0
Fulford Harbour	9349	1	0	0	1	0
Gabriola Island	3522	0	1	0	1	0
Galiano Island	1071	0	0	0	1	1
Ganges	INCL	1	0	0	1	0
Garibaldi Highlands	1302	0	1	0	1	0
Genelle	823	0	1	0	1	0
Gibsons	6791	1	1	0	1	0
Gilford Island	35	0	0	0	1	1
Gitwinksihlkw	212	0	0	0	1	1
Gold Bridge	223	0	0	0	1	1
Gold River	1359	0	1	0	1	0
Golden	4020	1	1	1	1	0
Good Hope Lake	75	0	0	0	0	1

APPENDIX A. DIGITAL DIVIDE – GAP ANALYSIS

Community	Population	DSL	Cable	Wireless	SPAN/BC or PLNet in community	Lacking Broadband
Grand Forks	4189	1	1	1	1	0
Granisle	353	0	0	0	1	1
Grasmere	184	0	0	0	1	1
Grassy Plains	218	0	0	0	1	1
Greenwood	666	0	1	0	1	0
Grindrod	1419	0	1	0	1	0
Groundbirch	440	0	0	0	1	1
Hagensborg	279	0	0	0	1	1
Halfmoon Bay	358	0	1	0	1	0
Hanceville	112	0	0	0	0	1
Harrison Hot Springs	1343	0	1	0	1	0
Hartley Bay	181	0	0	0	1	1
Hazelton	345	0	0	1	1	1
Hedley	272	0	0	0	1	1
Heffley Creek	535	0	0	0	1	1
Highlands	1674	0	1	0	1	0
Hixon	264	0	0	0	1	1
Holberg	39	0	0	0	1	1
Honeymoon Bay	629	0	1	0	1	0
Hope	6184	1	0	0	1	0
Hornby Island	966	0	0	0	1	1
Horsefly	238	0	0	0	1	1
Houston	3577	1	0	1	1	0
Hudson's Hope	1039	0	0	1	1	1
Invermere	2858	1	1	0	1	0
loco	807	0	0	0	1	1
Iskut	88	0	0	0	0	1
Jaffray	498	0	0	0	1	1
Kaleden	1269	0	1	0	1	0
Kamloops	77281	1	1	1	1	0
Kaslo	1032	0	0	0	1	1
Kelowna	108330	1	1	0	1	0
Kent	4926	0	1	0	1	0
Keremeos	1197	0	0	1	1	0

APPENDIX A. DIGITAL DIVIDE – GAP ANALYSIS

Community	Population	DSL	Cable	Wireless	SPAN/BC or PLNet in community	Lacking Broadband
Kettle Valley	98	0	0	0	1	1
Kimberley	6484	1	1	1	1	0
Kincolith	339	0	0	0	1	1
Kingcome Inlet	95	0	0	0	0	1
Kispiox	651	0	0	0	0	1
Kitamaat Village	283	0	0	0	0	1
Kitimaat	10285	1	1	0	1	0
Kitkatla	421	0	0	0	1	1
Kitwancool	93	0	0	0	0	1
Kitwanga	475	0	0	0	1	1
Klemtu	295	0	0	0	0	1
Kuper Island	302	0	0	0	0	1
Kyuquot	160	0	0	0	1	1
Lac La Hache	396	0	0	0	1	1
Ladysmith	7612	1	1	0	1	0
Lake Country	9267	0	1	0	1	0
Lake Cowichan	2857	0	1	0	1	0
Langford	18840	0	1	0	1	0
Langley (DM)	86896	1	1	0	1	0
Langley City	23643	1	1	0	1	0
Lantzville	3643	1	1	0	1	0
Lasqueti Island	367	0	0	0	1	1
Lax Kw'alaams	675	0	0	0	1	1
Laxgalts'ap (Greenville)	467	0	0	0	1	1
Lazo	795	0	1	0	1	0
Likely	439	0	0	0	1	1
Lillooet	2741	0	1	1	1	0
Lions Bay	1379	1	1	0	1	0
Lister	84	0	0	0	1	1
Little Fort		0	0	0	1	1
Logan Lake	2185	1	0	1	1	0
Lower Nicola	859	0	0	0	1	1
Lower Post	28	0	0	0	1	1
Lumby	1618	0	1	1	1	0

APPENDIX A. DIGITAL DIVIDE – GAP ANALYSIS

Community	Population	DSL	Cable	Wireless	SPAN/BC or PLNet in community	Lacking Broadband
Lund	265	0	0	0	1	1
Lytton	319	0	0	0	1	1
Mackenzie	5206	1	1	0	1	0
Madeira Park	540	0	1	0	1	0
Malakwa	649	0	0	0	1	1
Mansons Landing	134	0	0	0	1	1
Maple Ridge	63169	1	1	1	1	0
Marysville	1291	0	1	0	1	0
Masset	926	0	0	0	1	1
Matsqui	129475	1	1	1	1	0
Mayne Island	880	0	0	0	1	1
McBride	711	0	0	0	1	1
McLeese Lake	261	0	0	0	1	1
McLeod Lake	69	0	0	0	1	1
Meadow Creek	318	0	0	0	1	1
Merritt	7147	1	1	1	1	0
Merville	2069	0	1	0	0	0
Metchosin	4857	1	1	0	1	0
Midway	638	0	1	0	1	0
Mill Bay	1974	0	1	0	1	0
Mission	31272	1	1	0	1	0
Moberly Lake	238	0	0	0	1	1
Montney	551	0	0	0	0	1
Montrose	1153	0	1	0	1	0
Moricetown	159	0	0	0	0	1
Mount Currie	1054	0	0	0	0	1
Mount Lehman	INCL	1	0	0	1	0
Nakusp	1698	0	0	0	1	1
Nanaimo	77845	1	1	1	1	0
Nanoose Bay	4723	0	1	0	1	0
Naramata	1791	0	1	0	1	0
Nelson	9715	1	1	0	1	0
Nemaiah Valley	46	0	0	0	1	1
New Aiyansh	716	0	0	0	1	1

APPENDIX A. DIGITAL DIVIDE – GAP ANALYSIS

Community	Population	DSL	Cable	Wireless	SPAN/BC or PLNet in community	Lacking Broadband
New Denver	538	0	0	0	1	1
New Hazelton	750	0	0	0	1	1
New Westminster	54656	1	1	0	1	0
North Bend	150	0	0	0	1	1
North Cowichan	26148	0	1	0	1	0
North Saanich (DM)	10436	1	1	0	1	0
North Vancouver (C)	44303	1	1	0	1	0
North Vancouver (DM)	82310	1	1	0	1	0
Oak Bay	17798	1	1	0	1	0
Okanagan Centre	1094	0	1	0	1	0
Okanagan Falls	1971	0	1	0	1	0
Oliver	4626	1	1	1	1	0
Osoyoos	4295	1	1	1	1	0
Oweekeno	96	0	0	0	1	1
Oyama	INCL	0	1	0	1	0
Parksville	21057	1	1	1	1	0
Parson	251	0	0	0	1	1
Pavillion	109	0	0	0	1	1
Peachland	4654	1	1	0	1	0
Pemberton	1637	1	1	0	1	0
Pender Island	1776	0	1	0	1	0
Penticton	34686	1	1	0	1	0
Pinantan Lake	868	0	0	0	1	1
Pitt Meadows	14670	1	1	0	1	0
Port Alberni	20309	1	1	0	1	0
Port Alice	1126	0	1	0	1	0
Port Clements	516	0	0	0	1	1
Port Coquitlam	51257	1	1	0	1	0
Port Edward	659	0	0	0	1	1
Port Hardy	4608	1	1	0	1	0
Port McNeill	2821	1	1	1	1	0
Port Moody	23816	1	1	0	1	0
Port Renfrew	161	0	0	0	1	1
Pouce Coupe	833	0	1	1	1	0

APPENDIX A. DIGITAL DIVIDE – GAP ANALYSIS

Community	Population	DSL	Cable	Wireless	SPAN/BC or PLNet in community	Lacking Broadband
Powell River	13232	1	1	1	1	0
Prespatou	260	0	0	0	1	1
Prince George	72406	1	1	1	1	0
Prince Rupert	14643	1	0	1	1	0
Princeton	2694	0	1	0	1	0
Qualicum Beach	6921	1	1	0	1	0
Quathiaski Cove	2344	0	0	0	1	1
Quatsino	85	0	0	0	1	1
Queen Charlotte City	119	0	0	0	1	1
Quesnel	13727	1	1	1	1	0
Radium Hot Springs	583	0	1	0	1	0
Read Island	65	0	0	0	1	1
Revelstoke	7500	1	1	0	1	0
Richmond	16435	1	1	0	1	0
Riske Creek	128	0	0	0	1	1
Rivers Inlet	42	0	0	0	1	1
Roberts Creek	3080	0	1	0	1	0
Robson	1654	0	1	0	1	0
Rock Creek	324	0	0	0	1	1
Rolla	125	0	0	0	1	1
Rossland	3646	1	1	0	1	0
Royston	1699	0	1	0	1	0
Saanich	103654	1	1	0	1	0
Saanichton	INCL	1	1	0	1	0
Salmo	1120	0	0	0	1	1
Salmon Arm	15210	1	1	1	1	0
Sandspit	435	0	0	0	1	1
Sardis	INCL	1	1	0	1	0
Saturna Island	319	0	0	1	1	0
Savona	804	0	0	0	1	1
Sayward	379	0	0	0	1	1
Sechelt	7775	1	1	0	1	0
Sechelt Ind Gov Dist	831	0	1	0	0	0
Shalalth	113	0	0	0	1	1

APPENDIX A. DIGITAL DIVIDE – GAP ANALYSIS

Community	Population	DSL	Cable	Wireless	SPAN/BC or PLNet in community	Lacking Broadband
Shawnigan Lake	4608	0	1	0	1	0
Sicamous	2720	0	1	0	1	0
Sidney	10929	1	1	0	1	0
Silverton	222	0	0	0	0	1
Skidegate	181	0	0	0	1	1
Skookumchuck (Skatin)	66	0	0	0	0	1
Slocan	336	0	0	0	1	1
Smithers	5414	1	0	1	1	0
Sointula	795	0	0	0	1	1
Sooke	9402	1	1	0	1	0
Sorrento	1197	0	0	0	1	1
South Hazelton	499	0	0	0	1	1
South Slocan	675	0	1	0	1	0
Spallumcheen	5134	0	1	0	0	0
Sparwood	3812	1	0	0	1	0
Spences Bridge	460	0	0	0	1	1
Squamish	14247	1	1	0	1	0
Stewart	661	0	0	0	1	1
Summerland	10713	1	1	1	1	0
Surrey	347825	1	1	0	1	0
Tachie	450	0	0	0	0	1
Tahsis	600	0	1	0	1	0
Tahsis River	INCL	0	0	0	1	1
Takla Landing	40	0	0	0	0	1
Tappen	788	0	0	0	1	1
Tatla Lake	147	0	0	0	1	1
Taylor	1143	0	1	1	1	0
Telegraph Creek	88	0	0	0	1	1
Telkwa	1417	0	0	0	1	1
Terrace	12109	1	1	1	1	0
Thetis Lake	349	0	1	0	1	0
Tofino	1466	0	0	0	1	1
Topley	116	0	0	0	1	1
Trail	9119	1	1	1	1	0

APPENDIX A. DIGITAL DIVIDE – GAP ANALYSIS

Community	Population	DSL	Cable	Wireless	SPAN/BC or PLNet in community	Lacking Broadband
Tsawwassen	474	1	1	0	0	0
Tulameen	223	0	0	0	1	1
Tumbler Ridge	1851	0	0	1	1	0
Ucluelet	1559	0	0	0	1	1
Union Bay	1167	0	1	0	1	0
Upper Halfway	412	0	0	0	1	1
Upper Pine	na	0	0	0	1	1
Valemount	1195	0	0	1	1	0
Vananda	INCL	0	0	0	1	1
Vancouver (C)	545671	1	1	0	1	0
Vanderhoof	4390	1	1	1	1	0
Vavenby	518	0	0	0	1	1
Vernon	39995	1	1	1	1	0
Victoria (C)	74125	1	1	1	1	0
View Royal	7271	1	1	0	1	0
Waglisla	128	0	0	0	0	1
Warfield	1739	0	1	0	1	0
Wasa	259	0	1	0	1	0
Wells	235	0	0	0	1	1
West Vancouver	41421	1	1	1	1	0
Westbank	15700	1	1	0	1	0
Westwold	362	0	0	0	1	1
Whistler	8896	1	1	0	1	0
White Rock	66157	1	1	0	1	0
Williams Lake	12997	1	1	1	1	0
Willow River	197	0	0	0	1	1
Wilson Creek	904	0	0	0	1	1
Windermere	1060	0	1	0	1	0
Winfield	INCL	1	1	0	1	0
Winlaw	273	0	0	0	1	1
Wonowon	391	0	0	0	1	1
Woss	349	0	0	0	1	1
Wynndel	591	0	0	0	1	1
Yahk	168	0	1	0	1	0

APPENDIX A. DIGITAL DIVIDE – GAP ANALYSIS

Community	Population	DSL	Cable	Wireless	SPAN/BC or PLNet in community	Lacking Broadband
Yale	171	0	0	0	1	1
Youbou	955	0	1	0	1	0
Zeballos	224	0	0	0	1	1
TOTALS: 361	3553208	113	175	48	332	168

Column Label Descriptions

COMMUNITY

- The community names and the population figures shown follow standard geographic classifications (SGC) and population definitions. For example:
 - Vancouver (C) is the ‘City of Vancouver’ (e.g. not including surrounding municipalities such as Burnaby, Surrey, etc.).
 - Some place names are duplicated (e.g. North Vancouver), where there is both a city (C) and a District Municipality (DM).
 - Some smaller communities are contained within larger municipalities (e.g. Saanichton is located within the Central Saanich DM boundary). Other examples would be Yarrow, located within Chilliwack, and Ladner, located within Delta.
- For communities contained within another municipality, the extent of broadband service has not yet been determined and does not yet appear in the table.

POPULATION

- The population figures shown were drawn from data provided by BC Stats and Statistics Canada. These are readily available for all incorporated municipalities (2001 Census of Canada), which taken together, account for over 90% of total population of British Columbia. Determination of population for the remaining (unincorporated) communities is less easily obtained. Where available, this population was derived from Dissemination Area totals from the 2001 census, which implies both the area and population maybe greater than the indicated community. Designated Places, which by definition are not incorporated municipalities but have been defined using local knowledge of the area and the contained population was also identified based on the 2001 Census. In some cases, where data was not available, cells were left blank, which is NOT to be viewed as meaning zero population. To help clarify this anomaly, the table indicates places where the population count has been included within another larger municipality with ‘INCL’.

APPENDIX A. DIGITAL DIVIDE – GAP ANALYSIS

DSL

- A '1', indicates the availability of DSL service.

CABLE

- A '1' indicates the availability of cable broadband service.

WIRELESS

- A '1' indicates the availability of wireless service.

SPAN/BC OR PLNET IN COMMUNITY

- A '1' in this column indicates that the community already has a school attached to the Provincial Learning Network, and therefore also to SPAN/BC. Although considered school sites for the purposes of this gap analysis, federally supported schools on Native Reserves are not presently connected to the PLNet. These locations are nonetheless valid candidates for communications POPs for broadband deployment.

LACKING BROADBAND

A '1' in this column indicates that the community currently has no broadband service. The communities listed in this column represent the Digital Divide in British Columbia.

APPENDIX B. THE REALITIES OF THE NEW ECONOMY

“ There is a direct link between education and income. People who have a better education have better jobs and get better pay. Countries that have better education systems have stronger economies and are tougher competitors in the worldwide marketplace.”

Louis Y. Gerstner, Jr. Chairman and CEO IBM

“ Those armed with the highest levels of knowledge and skills are in an advantageous position in the current economic climate. We are currently in a seller’s market - the skilled employed have the bargaining chips because of very low unemployment levels, especially for highly sought skills such as computer programming.”

Canaccord Capital, E-learning

“ The new economy puts a premium on intellectual capital. However, the life of knowledge and human skills today is shorter than ever, increasing the pressure to remain at the forefront of education and training throughout a career. In the midst of globalization and technological revolution, four-year degrees are just the beginning of a forty-year continuing education. Life-long learning may be considered a buzzword today, but it is quickly becoming an imperative.”

WR HAMBRECHT + Co

“ In your career, knowledge is like milk. It has a shelf life stamped right on the carton. The shelf life of a degree in engineering is about 3 years. If you’re not replacing everything you know by then, your career is going to turn sour fast.”

Louis Ross, Ford Motor Co., CTO to a group of engineering students

“ Education is the next industrial era institution to go through a complete overhaul, starting in earnest in 2000. The driving force here is not so much concern with enlightening young minds as economics. In an information age, the age of the knowledge worker, nothing matters as much as the workers brain.”

Peter Schwartz, Wired Magazine, The Long Boom

“ And as human capital becomes the chief source of economic value, education and training become lifelong endeavors for the vast majority of workers.”

Peter J. Stokes

APPENDIX B. THE REALITIES OF THE NEW ECONOMY

- “ Approximately 50% of IT Company executives cited the lack of skilled workers as the most significant barrier to growth during the next year.*
- “ Approximately 70% of IT companies said that “few” or “some” applications for IT jobs have the skills the companies are seeking.*

Information Technology Association of America (ITAA)

- “ Motorola calculates that every \$1 it spends on corporate learning translates into \$30 in productivity gains within three years.*
- “ Skilled labor is expected to represent 85% of all jobs in 2005, up from 20% in 1950.*
- “ Currently, it’s been estimated that 50% of employees’ skills become outdated within 3 to 5 years.*
- “ Seventy percent of CEOs cite finding and retaining skilled employees as a serious problem.*

Merrill Lynch “Fast Facts”⁹

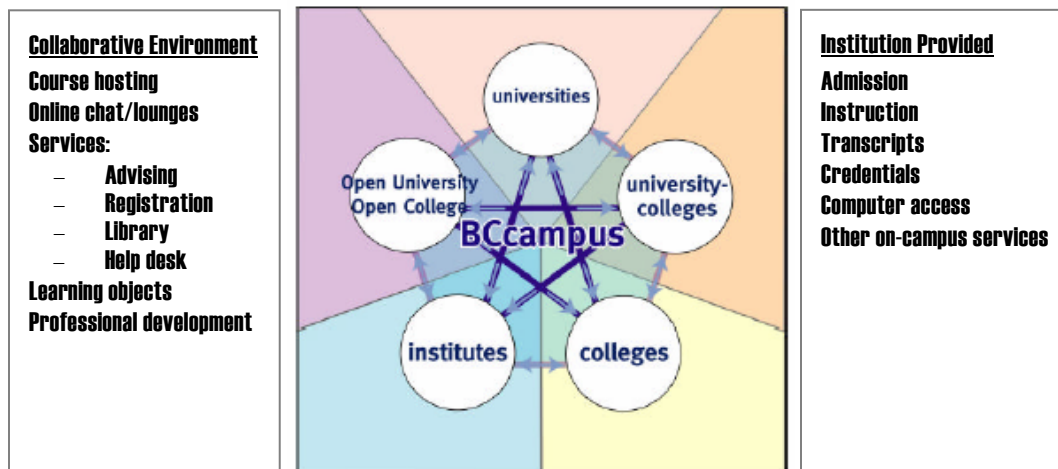
⁹ Michael Moe and Henry Blodget. "The Knowledge Web. Part 4: Corporate E-Learning - Feeding Hungry Minds." Merrill Lynch, May 23, 2000.

APPENDIX C. BCCAMPUS: GOALS AND OBJECTIVES

PROVINCIAL ONLINE AND DISTANCE LEARNING FACILITY (BCCAMPUS)

WHAT IS IT?

BCcampus is a collaboration of post-secondary institutions in British Columbia providing an online central access point to post-secondary distance learning resources and support services for learners, faculty and course developers, staff and administrators. It will facilitate a seamless path from application to graduation for distance learners in British Columbia.



HOW DOES IT BENEFIT LEARNERS?

BCcampus is a portal (or website) that provides a **single point of online access** for learners and potential learners. It provides seamless access to post-secondary courses, programs as well as online career counseling and educational advising services.

Through BCCampus, learners will be able to:

- access information on **all distance education courses and programs** available throughout the British Columbia public post-secondary system;
- access **all student support services tasks online**, including applying for admission, selecting and registering for courses online and tracking personal academic history as well as extended hour (24 hours, seven days a week) helpdesk services for on-line students;
- **transfer** courses **easily** from one institution to another,
- **enhance their choices** through access to a broad range of programs, courses, schedules and delivery formats. Students will be able to choose learning that fits their individual needs;
- have the option of completing their programs of study entirely online and **receiving their credentials online**; and,
- access **interactive student resource and “chat”** areas to enhance networking, information sharing and peer support.

BCcampus will also allow learners to progress from pre-program selection to program completion and finally to employment information. The portal will provide links to online employment opportunity listings for program graduates seeking employment. It will also provide learners with links to information and access to options for post credential learning and upgrading.

HOW DOES IT BENEFIT BRITISH COLUMBIA'S PUBLIC POST-SECONDARY SYSTEM?

BCcampus will contribute to a more coherent and integrated public post-secondary system in a number of ways by:

- Providing a **focus for distance learning activity** in the public post-secondary system in British Columbia;
- Offering opportunities **to reduce duplication and redundancy** and perhaps achieve economies of scale;
- Encouraging faculty to share **ideas and best practices** through online conferences. These online conferences could also develop mechanisms for peer review of research and proposals;
- Promoting the development of **high quality** curriculum through access to shared databases of learning resources that faculty and developers may use in the development of new courses;
- Facilitating **collaboration in course development and delivery** through “virtual” development teams of faculty working on joint projects online; and
- Allowing institutions to **share information** to manage enrollment and better deploy resources.

Finally, BCcampus will develop an easily identifiable “BC Brand” for this province’s excellent distance and online courses and programs and will competitively position British Columbia in the global e-learning marketplace.

Visit BCcampus at www.bccampus.ca to see the services currently available. New programs and services are added frequently. Full implementation of the site is expected to be completed in the next two years.

APPENDIX D. MASTER LIST OF EMERGING TECHNOLOGIES

The Emerging Technologies Research Project is currently tracking 161 emerging technologies and technology areas to determine those where British Columbia might take a leadership position. This appendix lists the emerging technologies, provides a brief description of each and identifies the industry category each is in.

The purpose of this research project is to identify those technologies that have the greatest potential to provide economic and social benefits to British Columbia. Though many of these technologies are expected to substantially impact the global economy, or portions thereof, the vast majority will likely not highly impact the British Columbia economy in terms of research, business development, or commercialization opportunities.

For a description of the Emerging Technologies Research Project, please refer to the body of this report.

Category	Emerging Technology	Brief Description
Agriculture	Aquaculture	Aquaculture is an emerging technology field that deals with genetics, health, and feed that impact the cultivation of fish, shellfish, and aquatic plants.
Agriculture	Artificial Food	Artificial foods are foods synthesized directly from raw materials instead of being harvested from plants and animals.
Agriculture	Functional/Therapeutic Foods/Nutraceuticals	Nutraceuticals and functional foods provide health benefits such as reducing the risk of chronic diseases in addition to their basic nutritional value.
Agriculture	Genetically Modified Crops	Plants genetically modified to improve their resistance to drought, pesticides, pests, as well as to improve other traits such as nutritional value.
Agriculture	Organic Farming	Organic farming is a technology area that focuses on ways of using biodegradable materials and symbiotic plants and animals to maintain soil fertility and provide pest control.
Agriculture	Precision/Remote Automated Farming	Precision farming is the convergence of geographic information systems, automated machines, remote sensing devices, mobile computing, and telecommunications to care for livestock and manage farms.
Biotechnology	Genetically modified plants and animals to produce medicine, chemicals, fuels, and other goods.	Bacteria, plants, and animals are genetically modified to produce a specific chemical more cheaply and quickly than with traditional chemical methods.

APPENDIX D. MASTER LIST OF EMERGING TECHNOLOGIES

Category	Emerging Technology	Brief Description
Biotechnology	Proteomics	Proteomics is a technology area that catalogues all human proteins and works to understand their interactions with each other, leading to new diagnostic tests and avenues for the treatment of disease.
Biotechnology	Protein Arrays	Protein arrays allow proteins to be cheaply and quickly identified, characterized, and screened.
Biotechnology	Bioinformatics	Bioinformatics is the application of computers to store and manage genomics, proteomics, and other biological information, allowing researchers to find useful relationships in a complex set of data.
Biotechnology	Neuroinformatics	Neuroinformatics consists of the tools and databases to allow neuroscientists to manipulate, store, and share data.
Biotechnology	Glycomics	Glycomics is an emerging technology area that analyzes carbohydrate and sugar structures to better understand molecular sequencing and cell communication, which can lead to new diagnostic tests and treatments for diseases.
Biotechnology	Computer models of living cells	A computer model of living cells would allow the effects of drugs on the body to be simulated, predicting efficacy and side effects. This ability to simulate the effects of drugs will reduce the cost of discovering and testing new drugs, since unsuitable drug candidates can be eliminated sooner.
Biotechnology	Biosensors	Biosensors use a biologically-based or derived sensor to detect specific chemicals or pathogens cheaply, accurately, and quickly.
Biotechnology	Biomimicry or Biomimetics	Biomimicry is the technique of copying features or processes from natural examples to produce new or more efficient products.
Biotechnology	Biological catalysts to replace chemical reactors	Enzymes are biological catalysts that allow chemical reactions to take place at lower temperatures and higher rates, as opposed to the high temperatures and pressures required by some chemical reactions currently used.
Communications	Zigbee	Zigbee is a reliable, low-cost, secure wireless networking standard that supports low data rates and low power consumption, making it ideal for security and building automation applications.
Communications	XM Satellite Radio	Satellite-based radio can provide CD quality audio entertainment coast-to-coast. Like satellite TV, it carries more channels than the typical local market.
Communications	Wireless Web	The wireless web is a network that allows people to access the Internet from cell phones, handheld computers, and other portable devices.

APPENDIX D. MASTER LIST OF EMERGING TECHNOLOGIES

Category	Emerging Technology	Brief Description
Communications	Voice over IP (VoIP)	Voice over IP is the two-way transmission of voice traffic over a packet-switched IP (Internet Protocol) network. VoIP is more bandwidth efficient than ordinary telephones, allowing more telephone conversations to be sent over the same line. VoIP allows a single network to carry both data and voice traffic, allowing communications providers to lower costs and offer additional services.
Communications	Ultra Wide Band	Ultra Wideband uses very short radio pulses to offer very high bandwidths, very low power consumption, and no interference with other equipment using the same spectrum. It also has location tracking and radar capabilities.
Communications	Tele-immersion	Tele-immersion is a communications medium that creates the illusion that the user is in the same room as other people and allows them to manipulate virtual objects together, even though the participants are in different locations.
Communications	Semantic Web	The semantic web is a set of standards and formal language that gives content on the Web meaning that is machine-readable. This results in improved searches and should allow for increased automation and software agents.
Communications	Quantum Teleportation	Quantum teleportation is the transfer of quantum information from one particle to another, theoretically transporting it from one location to another without traveling through the distance in between.
Communications	M-Commerce	M-commerce encompasses the technologies and software that allow goods and services to be purchased and sold through portable wireless devices such as mobile phones and PDAs.
Communications	Location Based Services	Location based services use location-finding technologies to offer specific services and information based on the current location of the wireless device's user.
Communications	Internet 2	Internet 2 technologies consist of high-speed applications such as video conferencing over the high speed infrastructure being built between government and research institutions.
Communications	Free Space Optics	Free space optics uses beams of light to transmit information without cables.
Communications	Bluetooth	Bluetooth is a wireless standard that delivers short-range radio communication between electronic devices, allowing disparate devices to communicate with each other.
Communications	4G	This is the next generation of packet data cellular networks capable of higher data rates and is "always on, always connected".
Computing	Extreme UV (EUV) Lithography	Extreme UV lithography uses very small wavelengths of light to etch transistors in silicon, allowing for higher computing speeds and lower power consumption.

APPENDIX D. MASTER LIST OF EMERGING TECHNOLOGIES

Category	Emerging Technology	Brief Description
Computing	Virtual Reality	Virtual reality consists of systems that enable one or more users to move and react in an immersive computer-simulated environment.
Computing	Natural Language processing	Natural language and gesture processing allows computers to correctly interpret the meaning of speech and gestures, extracting meaning from context.
Computing	Swarm and Biological Computing	Swarm and biological computing consists of computers operating like a swarm of insects, tackling a number of simple operations in coordination to produce a solution to a complex problem.
Computing	Speech Synthesis	Speech synthesis will allow computer generated voices to produce pleasing, expressive voices to respond to users with correct intonation and pronunciation.
Computing	Speech Recognition	Speech recognition will allow computers to accurately interpret a user's voice commands with a large vocabulary without special training, allowing for variations in accent.
Computing	Grid and Massive Parallel Computing	Grid computing transforms computing power into a utility service that is available on demand. Program instructions are divided among multiple computers in a network, allowing computations to be performed by computers at other locations that are not necessarily owned by the user.
Computing	Genetic Programming	Genetic programming uses the principles of evolution to find optimum solutions to problems, with the best individual after several generations taken as the best solution to the problem.
Computing	DNA Computing	DNA can store vast quantities of information in its sequence of four bases, and natural enzymes can manipulate this information in a parallel manner. It has been used to solve the Hamiltonian path problem, also known as the traveling salesman problem, which has applications for network and supply chain management.
Computing	Knowledge Management / Knowledge Discovery	Knowledge management and knowledge discovery encompass the technologies that derive useful knowledge from a large quantity of raw information. This includes data mining and novel visualization techniques.
Computing	Computer Immune Systems	Computer immune systems identify processes as "self" and "non-self", allowing them to detect computer virii and worms without relying on exact descriptions. This capability would allow new virii and worms to be detected and blocked without regular updates to antivirus software.
Computing	Biometrics	Biometrics are automated methods of recognizing a person based on a physiological or behavioral characteristic such as face, fingerprint, or voice recognition.

APPENDIX D. MASTER LIST OF EMERGING TECHNOLOGIES

Category	Emerging Technology	Brief Description
Computing	Autonomic Computing	Autonomic computing is a computer and network management technology that automatically allocates tasks to different system components. It can restart components that stop or crash without disrupting the user. This would reduce the maintenance costs of expanding databases and servers.
Computing	Augmented Reality	Augmented reality is a computer display that adds virtual information to a user's sensory perception. An example is a see-through device that overlays graphics and text over a user's view of his or her surroundings.
Computing	Artificial Intelligence	Artificial intelligence is the embodiment of thought and intelligent behavior in machines.
Computing	Wireless Local Loop	Wireless local loop is a technology that allows high speed wireless access between a subscriber's building and the public telephone network without the need for copper wires and fibre optic cables.
Computing	Quantum Cryptography/Encryption	Quantum cryptography uses quantum entanglement to transmit secure encryption keys and detect the presence of any eavesdroppers in the communications channel.
Computing	Quantum Computing	Quantum computing uses the principles of quantum mechanics to produce non-binary results. Whereas traditional computers increase power linearly with each additional bit, each additional quantum bit used by a quantum computer increases the computer's power exponentially, allowing moderately-sized quantum computers to solve problems more quickly than very large traditional computers.
Electronics	Cognitronics	Cognitronics is a direct interface between the human brain and devices such as computers, sensors, and prosthetics.
Electronics	Head-mounted Displays	Displays mounted on helmets, visors, and glasses that display computer-generated information.
Electronics	OLED (Organic Light Emitting Diodes)	OLEDs consist of polymers that emit light when electrically charged. Unlike traditional LCDs, a backlight is unnecessary, saving weight and electrical power.
Electronics	Optical Computers	Optical computers use beams of light and photons in place of electricity and electrons to transmit and manipulate information. As microprocessors shrink, they will approach a quantum mechanical limitation for electrons that photons are not subject to.
Electronics	Optical Interconnects	Optical interconnects transmit information from one device to another within a computer using pulses of light instead of electricity.
Electronics	Organic Semiconductors	More flexible and potentially much cheaper than silicon, organic semiconductors can be printed on plastic, allowing sensors, memories, and displays to bend like paper.

APPENDIX D. MASTER LIST OF EMERGING TECHNOLOGIES

Category	Emerging Technology	Brief Description
Electronics	Ovonic Unified Memory (OUM)	Ovonic unified memory uses the same material as rewritable CDs and DVDs to store information by changing the phase and properties of this material. This allows for memory storage that persists even in the absence of electrical power, but is cheaper than Flash RAM.
Electronics	Parallel Chips	Parallel chips are processors composed of many simple processors working in parallel at the chip level, on the same piece of silicon.
Electronics	Plasma and Liquid Crystal Display	Plasma and Liquid Crystal Displays are thin monitors that presently vary in size from 34" to 61".
Electronics	Power suit	Power suits are computer controlled, strength enhancing suits that detect and amplify muscle movements.
Electronics	Radio Frequency Identification (RFID)	RFID tags are small microchips that listen for a radio query and respond by transmitting their unique ID code. Most RFID tags have no batteries and use the power from the initial radio signal to transmit their response.
Electronics	Solid State Lights	Solid state lights are Light Emitting Diodes (LEDs) with long life, low energy consumption, and high intensity. They can control both color and intensity at the same time.
Electronics	Spintronics	Electronics that use the spin of electrons to store and manipulate information instead of moving electric charges. This should result in lower power consumption and higher speeds, as electron spins are easier to move than the whole electron.
Electronics	Three-Dimensional Microchips	Microchips have traditionally been produced as a single layer, with the semiconducting parts of the circuits confined to a single plane. Three-dimensional microchips have multiple layers, with the semiconducting parts of circuits extending vertically as well as horizontally.
Electronics	Wearable Computer Devices	Wearable Computer devices are computers small enough to be worn much like eyeglasses, wrist watches and clothes.
Electronics	157-nm Flourine Lithography	157-nm flourine lithography uses light from a flourine source with a wavelength of 157-nm to etch smaller transistors in silicon, allowing for higher speeds and lower power consumption.
Electronics	Adaptive Optics	Adaptive optics consist of mirrors that deform rapidly by small amounts in response to commands from a sensor to adjust for distortions, such as those introduced by the atmosphere.
Electronics	Asynchronous Chips	Traditional chips are synchronous and operate with a clock. Asynchronous chips do not use a clock, and their transistors can switch independently of one another and operate at their own speed instead of at the speed of the slowest component. Unused portions of the chip can be shut down, reducing power consumption.

APPENDIX D. MASTER LIST OF EMERGING TECHNOLOGIES

Category	Emerging Technology	Brief Description
Electronics	Chip Cooling Techniques	Chip cooling techniques reduce the heat produced by smaller, denser chips or dissipate them more effectively. Chip cooling is becoming an issue as the heat power density of computer chips approaches those of a nuclear reactor.
Electronics	Directed Sound Generators	Directed sound generators are devices that can project ultrasonic waves to cause a surface to vibrate at lower frequencies and at lower volumes, allowing speech and other sounds to be directed at one person only.
Electronics	Electron Projection Lithography (EPL)	Electrons are projected in a beam to etch smaller transistors in silicon, allowing for higher speeds and lower power consumption.
Electronics	Electronic Paper	E-paper is a portable, reusable, and flexible storage and display medium that looks like paper but can be repeatedly written on by electronic means thousands or millions of times.
Electronics	EMR Hard Disk Drives	By using extraordinary magnetoresistance (EMR), much higher data densities can be achieved in hard drives, allowing for higher capacity drives that are physically smaller.
Electronics	Ferroelectric RAM (FRAM)	Ferroelectric RAM cells use a capacitor to store information. The capacitor has a permanent electric dipole from its insulator. Data is either 1 or 0, depending on whether the dipole in the insulator points up or down.
Electronics	FinFET	The FinFET is a 3D structured transistor that achieves faster operation and less power consumption than existing transistors.
Electronics	Gallium Nitride Transistors	Transistors fabricated from gallium nitride instead of silicon are capable of operating at much higher power levels and frequencies than any other semiconductors known today. They are also capable of operating at higher temperatures than silicon, reducing the need for cooling mechanisms.
Electronics	Low Capacitance Films	Low capacitance films used in manufacturing microprocessors will allow signals to propagate faster, resulting in a higher speed processor.
Electronics	Magnetoresistive RAM (MRAM)	MRAMs store information in the orientation of magnetic domains. This memory will consume less electricity than current flash RAMs and capture data faster.
Electronics	Non-volatile Random Access Memory (NRAM)	NRAM memory chips use an array of single-walled carbon nanotubes to store digital data without requiring electrical power to maintain the data.
Energy	Water Current Energy Generation	Water current energy generation makes use of tidal currents and other forms of water current (rivers, creeks, etc) to generate power without the size, cost and environmental damage associated with traditional hydroelectric generation facilities.

APPENDIX D. MASTER LIST OF EMERGING TECHNOLOGIES

Category	Emerging Technology	Brief Description
Energy	Sonofusion	Sonofusion uses the high temperatures and pressures produced by collapsing bubbles in a liquid to initiate a series of short fusion reactions.
Energy	Solid Oxide Fuel Cells	Fuel cells are electrochemical devices that combine hydrogen with oxygen to produce electricity, heat, and water. The solid oxide fuel cell (SOFC) uses a hard ceramic electrolyte instead of a liquid and operates at temperatures up to 1000 degrees Celsius.
Energy	Solar Power	Efficient photovoltaic cells that will capture and store large quantities of solar energy in a cost-effective manner.
Energy	Quantum Nucleonics	Quantum nucleonics is a method of extracting energy from atomic nuclei without using either fission or fusion.
Energy	PEM Fuel Cells	PEM fuel cells harness the electrochemical reaction of oxygen and hydrogen using a proton exchange membrane (PEM) to produce electricity.
Energy	Nuclear Fusion	Harnessing the nuclear fusion of light nuclei such as hydrogen isotopes to produce energy.
Energy	Next-generation nuclear power plant: Water cooled nuclear reactor	This next-generation nuclear reactor design encloses the entire coolant system inside a damage-resistant pressure vessel. This design is smaller and simpler than traditional water cooled reactors.
Energy	Next-generation nuclear power plant: Gas cooled nuclear reactor	This next generation nuclear reactor uses self-contained, pebble-sized fuel elements that are inherently safer than a traditional nuclear reactor. This system operates at a higher efficiency level than traditional reactors and operates using smaller modules which can be added as necessary.
Energy	Next generation nuclear power: fast spectrum nuclear reactor	Fast-spectrum reactors make new fuel and destroy long-lived wastes from traditional reactors. They deliver much more energy from uranium and reduce the amount of waste that needs to be disposed.
Energy	Microbial Fuel Cells	Microbial fuel cells use microbes such as bacteria and yeast to produce hydrogen from glucose to power the fuel cell.
Energy	Micro Fuel Cells	Micro fuel cells are small fuel cells used to power portable devices such as cell phones and laptops.
Energy	Methane hydrate crystal mining	Methane hydrate crystal mining consists of the technologies required for the commercial retrieval of the rich deposits of frozen natural gas crystals on the ocean floor.
Energy	Lithium Polymer Batteries	Lithium polymer batteries have high energy densities and can be shaped or molded as necessary for different applications.

APPENDIX D. MASTER LIST OF EMERGING TECHNOLOGIES

Category	Emerging Technology	Brief Description
Energy	Hydrogen-on-Demand	Hydrogen-on-Demand technology stores hydrogen using borax. It is safer and cheaper than conventional hydrogen storage, which uses either high pressure hydrogen tanks or liquid hydrogen.
Energy	Geothermal Power	Geothermal power production operates by extracting steam from the Earth's crust to power turbines. Extra water can be injected to replenish subterranean reservoirs.
Energy	Gas to Liquid Conversion	Gas to liquid conversion technology is a chemical engineering process that transforms hydrocarbon compounds from gases to liquids.
Energy	Flywheel Batteries	Flywheel batteries store energy in a rotating mass in a vacuum. They can accept and deliver large amounts of energy in a very short time and charge and discharge energy without degrading.
Energy	Biomass Fuels	Biomass fuels are extracted from biomass resources such as sawdust and landfills.
Energy	Downwind Windmills	These have blades downwind of the turbine and tower, allowing lighter and cheaper blades to be used. Traditional windmills have blades positioned upwind to avoid turbulence, and these blades and must be made stiffer to avoid touching the tower.
Environment	Water Treatment And Processing	Water treatment and processing is a technology area that deals with the treatment and purification of water for human consumption or the removal of pollutants from industrial discharges.
Environment	Recyclable Electric/Electronic products	Electric appliances and electronic products have more recyclable components and less toxic or hazardous materials.
Environment	Thermal Depolymerization - Pressure cooking of waste	Thermal depolymerization breaks carbon chains in plastics and other carbon-based substances, producing oil and other chemicals from waste.
Environment	Green Integrated Technology (GrinTech)	Green Integrated Technology is the convergence of a variety of technologies such as advanced sensors, new materials, computer systems, energy systems, and manufacturing technologies to eliminate waste and make products more recyclable.
Environment	Carbon Dioxide Sequestration	Carbon dioxide sequestration consists of the different technologies that remove carbon dioxide from the air without using photosynthesis.
Environment	Automobile Air Filters	Automobile air filters capture air from outside the vehicle and remove the hydrocarbons and nitrogen oxides by burning them in the engine and catalytic converter.
Healthcare/Medicine	Phage Therapy	Phage therapy uses virii that infect only a specific type of bacteria to replace antibiotics as treatments for bacterial diseases.

APPENDIX D. MASTER LIST OF EMERGING TECHNOLOGIES

Category	Emerging Technology	Brief Description
Healthcare/Medicine	Wavefront Analysis	Wavefront analysis allows a 3D map of changes to a patient's cornea to be generated prior to laser eye surgery. This map is positioned over the eye, allowing more accurate and effective laser eye surgeries to be performed.
Healthcare/Medicine	Transgenic Organs	Transgenic organs increase the supply of organs for transplant. These organs are taken from animals genetically modified with human genes to reduce the transplant rejection reaction.
Healthcare/Medicine	Telemedicine	Telemedicine is the use of electronic communication and information technologies to provide or support clinical care at a distance.
Healthcare/Medicine	Stem Cell Therapy	Stem cell therapy is the technology field associated with the isolation, cultivation, and transplantation of stem cells to cure degenerative diseases such as Alzheimer's and diabetes.
Healthcare/Medicine	Signal-Responsive Missile Drugs	Signal-responsive missile drugs are drugs with packaging that only release their active ingredients in the presence of cellular signals produced by diseased cells.
Healthcare/Medicine	Rupture Event Scanning	Rupture event scanning is a novel diagnostic technique using the piezoelectric effect of quartz crystals that can detect the presence or absence of a particular microbe or protein.
Healthcare/Medicine	Photodynamic Therapy	Photodynamic therapy uses drugs that are activated by the presence of a specific wavelength of light. This allows treatment to be targeted to specific areas of the body without affecting other parts.
Healthcare/Medicine	Photobiomodulation	Photobiomodulation is the use of light in the far-red to near-infrared wavelengths to help wounds heal more quickly and stimulate growth.
Healthcare/Medicine	Implantable Sensors	Implantable sensors in the body retain their sensitivity, specificity, stability, and response time for long durations and do not provoke reactions from the immune system.
Healthcare/Medicine	Gene Therapy	Gene therapy treats disease by either modifying genes or correcting abnormal genes.
Healthcare/Medicine	Conjugated Monoclonal Antibodies	Monoclonal antibodies are proteins made by the immune system to bind to a specific invader and identify them for destruction by immune cells. Combining them with radioisotopes or toxins would allow them to directly kill the cells they target.
Healthcare/Medicine	Combination Treatments	Combination treatments consist of combinations between drugs, medical devices, and information technology such as implantable drug pumps and drug coated stents.
Healthcare/Medicine	Artificial Organs	Artificial organs refer to the technologies required to build human organs and tissues from scratch. This technology includes the ability to supply the new organs with essential nutrients.

APPENDIX D. MASTER LIST OF EMERGING TECHNOLOGIES

Category	Emerging Technology	Brief Description
Healthcare/Medicine	Angiogenesis Therapy	Angiogenesis therapy seeks to control the growth of blood vessels in the body. By either stimulating or inhibiting blood vessel growth, different conditions including cancer and heart disease can be treated.
Materials	Metal Powder Injection Molding	Metal powder injection molding is a manufacturing process for fine parts that reduces the machining required for complex components, especially with materials that are difficult to machine with conventional methods.
Materials	i-Textiles or e-Textiles	i-Textiles are the technologies that allow electronic circuits and sensors to be built into fabrics. These fabrics look and feel normal, are easy to care for, and can be woven easily.
Materials	Plasma Spray	Plasma Spraying is an extremely versatile thermal coating process. Complex alloys, elemental materials, composites and ceramics can often be produced with this technique for use in material fabrication.
Materials	Shape Memory Polymers (SMP)	Shape memory polymers are special plastic materials able to change their shape in response to temperature. They can be deformed and then restore themselves to their original shape by applying heat. They are more deformable than shape memory alloys, which have similar properties.
Materials	Reverse-Selective Membranes	Reverse-selective membranes are filter materials that are permeable to large molecules but block small molecules.
Materials	Biodegradable Plastics	Biodegradable plastics are plastics and polymers that decompose at high temperatures in the presence of water. These plastics can be composted and will degrade in landfills.
Materials	Fine Grain Metals	Fine grain metals are composed of tiny microscopic grains that vary in size. The strength, toughness, and corrosion resistance of metals are improved by decreasing the grain size.
Materials	High Temperature Superconducting Materials	High temperature superconducting materials allow electrical conduction without losses at higher temperatures. Conventional superconductors require liquid helium cooling, while current high temperature superconductors require liquid nitrogen.
Materials	Magnetorheological (MR) Fluids	MR fluids solidify within milliseconds in the presence of a magnetic field. When the magnetic field is removed, they return to their original state.
Materials	Negative Index Materials	Negative index materials bend certain EM waves in the opposite direction of other materials. These can lead to smaller, cheaper antennas and optical devices.

APPENDIX D. MASTER LIST OF EMERGING TECHNOLOGIES

Category	Emerging Technology	Brief Description
Materials	Photonic Crystals	Photonic crystals are microscopically structured materials that perfectly reflect photons at specific wavelengths. Photonic crystals can be used to produce more compact optical components such as splitters, couplers, and filters.
Miscellaneous	Atomic Mirrors	A device that reflects impinging atoms similar to the way a regular optical mirror reflects an incoming light beam.
Miscellaneous	Combinatorial Chemistry	Combinatorial chemistry is the technique of using a large library of chemicals to efficiently screen for desirable interactions with new chemical receptors as they are discovered.
Miscellaneous	Earthquake Warning System	Earthquake warning systems detect the approach of earthquakes a few seconds before the damaging portion of the quake arrives, allowing computer controls to shut down gas and water pipelines beforehand to reduce damage.
Miscellaneous	Electronic Voting	Electronic voting permits votes to be cast electronically while providing mechanisms for accountability and reliability.
Miscellaneous	Microfluidics	Microfluidics deals with devices that manipulate tiny amounts of liquids. They pump solutions through narrow channels, controlling the flows with small valves and electric fields.
Miscellaneous	Microelectromechanical Systems (MEMS)	MEMS are devices that have microscopic moving parts made using computer chip manufacturing techniques.
Miscellaneous	Magnetic Refrigeration	Magnetic refrigeration is an energy efficient cooling mechanism that replaces compressors with large magnets. It is more energy efficient than traditional refrigeration, and may make the production of liquid hydrogen economically feasible.
Nanotechnology	Artificial Muscle	Artificial muscles are materials that work by contracting and expanding like human muscles in the presence or absence of electric fields, but at many times the strength.
Nanotechnology	Carbon Nanotubes	Carbon nanotubes are tiny tubular structures composed of one or more layers of carbon atoms. Single walled carbon nanotubes are 100 times as strong as steel, but much lighter. They can act as superconductors and have electrical properties similar to silicon that allows them to be used in logic circuits.
Nanotechnology	Catalysts	Nanotechnology catalysts are nanometer scale particles that facilitate chemical reactions without being consumed by the reactions themselves.
Nanotechnology	Contrast agents for imaging	New contrast agents enhance the performance of imaging devices, allowing problems to be detected at earlier, more treatable stages.

APPENDIX D. MASTER LIST OF EMERGING TECHNOLOGIES

Category	Emerging Technology	Brief Description
Nanotechnology	Data Storage	Nanotechnology data storage are nanometer scale particles that hold data that can be read and written. Disk drives with nanoscale layering attain highly dense data storage.
Nanotechnology	Drug Delivery	Nanotechnology drug delivery technologies are small structures enclosing drugs that allow them to be ingested through the stomach and reduce side effects by releasing the drugs only at the target site.
Nanotechnology	Superior Implants	Nanometer scale modifications to implant surfaces to improve implant durability and biocompatibility.
Nanotechnology	Imprint Lithography	With imprint lithography, patterns are copied many times by pushing a mold into a blank silicon wafer. The mold is produced with an electron beam or other next generation lithography technique.
Nanotechnology	Molecular Motors	Molecular motors and devices can manipulate molecules one at a time. They convert chemical energy into mechanical work to perform tasks such as molecular assembly, fine sifting, low-energy-consumption computing and semiconductor quality control.
Nanotechnology	Nanoelectronics	Nanoelectronics are nanometer scale electronic components such as transistors, diodes, relays, and logic gates from organic molecules, carbon nanotubes, and semiconductor nanowires.
Nanotechnology	Quantum Dots	Quantum dots are semiconductor nanocrystals. They absorb photons of all energies above the threshold of the band gap and emit light at a wavelength that depends on the dot's size.
Nanotechnology	Scanning Probes	Scanning probes are nanotechnology tools that permit users to visualize and manipulate items at the nanoscale and to detect single molecules. They can also be used to push individual atoms and molecules into position to assemble nanometer-scale structures.
Nanotechnology	Self-Assembling Materials	Self-assembling materials are materials that assemble themselves into small nanostructures from raw components in a controlled environment.
Nanotechnology	Materials Enhancement	Nanotechnology materials enhancement technologies consist of nanocrystalline particles that are incorporated into other materials to provide new characteristics, such as to produce tougher ceramics and transparent sun blocks to block infrared and UV.
Nanotechnology	Soft Lithography	Soft lithography can make large numbers of small structures in soft materials. It is much cheaper than conventional lithography and works on curved as well as flat surfaces.
Robotics	Multi-legged Robots	Multi-legged robots can navigate rough terrain where wheeled robots cannot, and are more stable than two-legged robots.

APPENDIX D. MASTER LIST OF EMERGING TECHNOLOGIES

Category	Emerging Technology	Brief Description
Robotics	Two-legged Locomotion	Two legged locomotion is the ability for robots to stand and walk on two feet without losing balance.
Robotics	Machine Vision	Machine vision is real-time 3D sensing for computers and machines.
Transportation	Homogenous-Charge Compression-Ignition (HCCI) Engine	This is a type of engine that produces low combustion temperatures, meaning that the engine produces only small quantities of nitrogen oxides and soot, and operates at a higher fuel efficiency than gasoline engines.
Transportation	Telematics	Telematics is the convergence of GPS, voice recognition, and wireless technologies to provide safety, entertainment, and navigation services to cars and other motor vehicles.
Transportation	Supercavitating Propulsion	Supercavitation propulsion forms a single bubble that surrounds an underwater object or vessel almost completely. This minimizes contact between the vessel's surface and water and drastically reduces drag, allowing it to travel at much higher speeds.
Transportation	Personalized Public Transportation	Personalized public transportation is a technology field that aims to control individual cars remotely, coordinating and optimizing traffic through the road system.
Transportation	Intelligent Transportation Systems (ITS)	ITS is the integration of a broad range of communications, information, control, and electronics technologies into vehicles and transportation infrastructure. These technologies help monitor and manage traffic flow, reduce congestion, and provide alternate routes to travelers.
Transportation	Hybrid Vehicle Technology	Hybrid vehicle technologies are the electrical, mechanical, and computer components required to produce hybrid vehicles. Hybrid vehicles use a combination of an internal combustion engine and electric motors to improve fuel efficiency and reduce emissions without sacrificing the vehicles' range.
Transportation	Fuel efficient supersonic jet engines	A fuel efficient jet engine capable of producing enough thrust to allow supersonic flight that also minimizes takeoff emissions and noise levels.

APPENDIX E. SUMMARY OF RECOMMENDATIONS

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

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

APPENDIX E. SUMMARY OF RECOMMENDATIONS

- 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.
- 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

- | | | |
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| 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. | • Enhanced clarity for employees and employers to minimize disputes and costly resolution processes. |
| 5.15 | That the Ministry of Education continue to develop its K-12 e-learning strategy through the BC Ed Online initiative to ensure that consistent, province-wide standards and content are developed and maintained. | • Greater clarity as to what occupational activities are included as opposed to defining specific occupational titles that limit interpretation. |
| 5.16 | That the provincial government fully implement the BCcampus initiative. | • Inclusion of all occupational activities related to the full product and service life cycle, including sales and marketing. |
| 5.17 | That the provincial government revise the definition of a "high technology professional" to provide: | • 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).

APPENDIX E. SUMMARY OF RECOMMENDATIONS

- 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 province's technology industry and business climate. Among other things, it would include:
 - 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
 - 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.

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.

APPENDIX E. SUMMARY OF RECOMMENDATIONS

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| f) Development of infrastructure which includes building upon investments already made by BC Hydro and others. | government collaboration with secondary and post-secondary institutions to define and implement |
| g) Ensure the availability of a highly skilled, well-trained workforce. This involves conducting industry and | 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

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| 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. | 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. |
| 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. | 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. |

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:
- 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;
 - 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

APPENDIX E. SUMMARY OF RECOMMENDATIONS

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.

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. 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.
- 2.17 Ensure each of the Health Authorities appoints a person to be
- 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 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,

APPENDIX E. SUMMARY OF RECOMMENDATIONS

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:

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| 2.27 | Expand the tax credit budget legislated under the SBVC Act from \$50 million to \$100 million annually. | the program (beyond the current \$3 million) to better reflect the capital needs of many early stage technology companies. |
| 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. | 2.30 Increase the employee threshold limit for a small business from 75 to at least 150. |
| 2.29 | Increase the total amount of capital one business may receive under | 2.31 Allow approval for common investment regimen, such as multi-tranche investments over multiple years based on attainment of established milestones. |

Levelling 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.

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

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| 2.32 | Allow program investors the option to invest directly from their self-directed retirement savings plans. | 2.33 | Make the tax credit incentives available for program investment |
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APPENDIX E. SUMMARY OF RECOMMENDATIONS

- within 60 days after the calendar year.
- 2.34 Increase program flexibility in program capital investment beyond simple common or preferred shares.
- 2.35 Provide VCC investors up to 24 months to complete investments.
- 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.

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.
- 2.44 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.
- 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.

First Quarter Report

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

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| 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. |
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ATTRACTING TALENT TO BRITISH COLUMBIA (RECRUITMENT)

Attract senior professionals to accelerate industry growth by:

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| 1.3 Making changes to immigration policy. | 1.5 Implementation of a competitive provincial stock option program for British Columbia workers. |
| 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. | 1.6 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.

APPENDIX F. PTC MEMBERS, STAFF & ACKNOWLEDGEMENTS

PTC Members

Chair:

Honourable Gordon Campbell
Premier
Office of the Premier

Co-Chair:

Paul Lee
Executive Vice President and Worldwide Studios
Chief Operating Officer
Electronic Arts Inc.

Members:

Reg Bird
Chairman
TR Labs and SaskTel

Dr. Victor Ling
Vice President, Research
BC Cancer Agency

Shannon L. Byrne
President & Chief Executive Officer
Paradata Systems Inc.

Douglas Manning
Chief Executive Officer & President
Bridges.com

Michael Calyniuk
Lead Partner, Technology
PricewaterhouseCoopers

Ian McBeath
President & Chief Executive Officer
Inflazyme Pharmaceuticals Inc.

Dr. Denis Connor
Executive Chairman of the Board
QuestAir Technologies Inc.

Dr. Daniel Muzyka
Dean, Faculty of Commerce and
Business Administration
University of British Columbia

Norm Francis
Chair
Pivotal Corporation

Darcy O'Grady
Corporate VP Leadership Development &
Succession
Creo Inc.

George Hunter
Executive Director
BC Technology Industries Association

Dr. Donald Rix, MD
Chair
MDS Metro and Cantest Ltd.

Greg Kerfoot
Owner/President
Whitecaps F.C.

Dr. Gerri Sinclair
General Manager
Microsoft Network Canada

William Koty
Director, Division of Applied Technology,
Continuing Studies
University of British Columbia

David Sutcliffe
Chairman & Chief Executive Officer
Sierra Wireless Inc.

President, Jim Mutter

PTC Staff

Len Juteau, Director of Operations
Derrick Chee, Analyst
Artyayu (Tia) Tjandisaka, Analyst
Pratibha Sharma, Office Assistant/Analyst

Acknowledgements

The Premier's Technology Council gratefully acknowledges the assistance it has received from many quarters in preparing this report.

GENERAL

Ministry of Management Services

Kirsten Tisdale
A/Assistant Deputy Minister
ASD Secretariat

Maria Fuccenecco
Analyst
Telecommunications Branch

Jerri Wilkins
Manager, Information Services
Common IT Services

Sarah Lawrence
Coordinator, Finance and Administration

Ministry of Competition, Science and Enterprise

Todd Tessier
Portfolio Manager
Investment Capital Branch

Ken Rekrutiak
Kerek Services Inc

Margaret Nevin
MN Communications Inc.

E-HEALTH

The Premier's Technology Council would like to express its gratitude to those who have participated in discussions and consultations on e-health.

Dr. Kendall Ho
Associate Dean and Director
Continuing Medical Education
Faculty of Medicine
University of British Columbia

Dr. Hal Siden
Medical Director, Telehealth
Children's and Women's Health Centre
of BC

Provincial Health Services Authority

David Babiuk
Provincial Director

Valerie Ashworth
Telehealth Coordinator

E-LEARNING

The Premier's Technology Council would like to express its gratitude to those who have participated in discussions and consultations on e-learning.

Ministry of Advanced Education

Gerry Armstrong
Deputy Minister

Jim Soles
Assistant Deputy Minister
Post Secondary Education Division

Arlene Paton
Director
Public Institutions Branch

Ministry of Education

Emery Dossall
Deputy Minister

Tanya Twynstra
Distance Education and Corporate
Support

Bobbi Plecas
Lead Director
Standards Department

Royal Roads University

Dr. Richard Skinner
President & Vice Chancellor

Peter Norman
Associate Faculty and LDR Project
Leader

SIDES (South Island Distance Education School)

John Pringle
Principal

Sheila Shanahan
Vice Principal

Science World

Dr. Ken Spencer
Chairman

Bryan Tisdall
President and CEO

Etraffic Solutions Inc

Wayne Poncia
Director

Robin Gardiner Poncia
Director

APPENDIX F. PTC MEMBERS, STAFF & ACKNOWLEDGEMENTS

Don Avison
President
The University Presidents' Council of
British Columbia

Dr. Kathryn Barker
President and CEO
QualitE-Learning Inc.

Josh Blair
Vice President, Learning Services
Telus

Scott Campbell
Interim Deputy Minister
Ministry of Management Services

Harry K Davis
H. K. Davis & Associates Ltd.

Fran Hunt-Jinnouchi
Adult Centre Director
Saanich Indian School Board

Shahid Hussain
President
New Media Innovation Centre (NewMIC)

Ramona Materi
President
Ingenia

Mike McKay
Superintendent of Schools
Saanich Schools
School District 63

Tanya Northcott
President & CEO
Odyssey Learning Systems Inc.

Glen Scobie
Industry Development Advisor
Ministry of Competition, Science and
Enterprise

Bruce Stewart
President
The Stewart Group

David Strong
Chairman and CEO
LearningWise Inc.

ALTERNATIVE ENERGY

Ron Britton
President & CEO
Fuel Cells Canada

Michael Brown
Chair
Chrysalix

Steve Brydon
Senior Advisor
Electricity Policy
Ministry of Energy, Mines

Stephen Kukucha
Senior Advisor, External Affairs
Ballard Power Systems Inc.

Michael MacDonald
Senior Vice President, Technology
Methanex Corporation

Firoz Rasul
Chairman of the Board
Ballard Power Systems Inc.

Bruce Sampson
Vice President, Sustainability
BC Hydro

Wal Van Lierop
President and CEO
Chrysalix

EMERGING TECHNOLOGIES RESEARCH PROJECT

Chris Dennis
Health Industry Consultant

Geoffrey Hansen
President
Rocket Builders

Michael DeSandoli
Director, E-Business and Sales
Operations
Creo Inc.

Brendon Wilson
UBC MBA Intern Researcher

Innovation and Science Council of British Columbia

Aaron Cruikshank
Research Analyst

Arnel Lim
UBC Co-op Student Researcher

Veneranda Dettmers
Research Analyst

Aileen McManamon
Executive Director
Canadian Institute for Market Intelligence (CIMI)