

Leadership



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Leveraging Information Technologies To Transform and Sustain British Columbia's Health Care Sector

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Executive Summary

Much has been written about the promise of health IT to derive operational efficiency for our health systems, to increase patient safety, to ease the work life of health practitioners and even to transform the way health care is delivered. However, these promises have been elusive - with cost-overruns and lagging rates of adoption common across Canada. Health IT has become politically charged and citizens are skeptical and wonder why it needs to cost so much. Many health care managers are putting off the necessary investments in technology, faced with competing budget priorities of immediate health care needs in our emergency rooms, surgical suites and clinics, or dealing with investments that have real, but far-off return.

This paper provides a forward-thinking perspective on the role information technology could play in British Columbia's (BC) health care system by 2020 and the impact it could have on BC's economic development in relation to Outlook 2020, an initiative of The Business Council of British Columbia.

Based on international and domestic evidence, this paper re-affirms the promise that health IT is important for health system transformation and better patient outcomes. It consolidates the current state of the science to create new momentum. Recommendations are put forward on how to restart a positive conversation about ways to all stakeholders can come together to achieve the ultimate goal of using health information technology (IT) to help create a sustainable health care system and an economic engine for BC and for Canada.

Section 1: Introduction

The factors driving change of our health care system are undeniable and mounting: cost pressures from changing demographics; shortages in health human resources; growing costs of managing chronic diseases; demand for new medical technologies; and new infectious diseases that spread around the globe

in hours. To sustain our health care system in the face of these challenges, we must embrace the information technologies that other sectors of the economy and public service have successfully adopted to enhance efficiency and improve service.

Section 2: Where We Are Today

According to the BC Physician Information Technology Office, 40% of family/specialist practices in BC have adopted electronic medical records (EMR). As Canada Health Infoway acknowledges, low adoption rates are a serious risk to any eHealth vision. The family practices of other countries have succeeded in achieving high adoption rates, supported the premise that IT can help to modernize health care. New Zealand (92%), Australia (91%), and the UK (89%) have a high percentage of physicians using advanced health IT. Key factors that drive IT adoption may differ across these countries, but largely include: strong support of medical associations, leadership from key clinicians, national IT strategy & unifying body, standards setting and vendor certification, change management support, mandatory electronic billing and government investment in IT capacity. The experience of other countries offers a strong basis for BC to exploit similar strategies and accelerate physician adoption of EMR's.

Section 3: Towards 2020

By 2020, the targeted delivery of specifically designed interventions using health IT for a range of diseases will be commonplace in medicine. So too will be the rapid transmission of patient records and related data through connected and increasingly mobile tools. In addition, there will be a significant volume of information and health promotion tools available to British Columbians delivered through internet-based consumer health solutions.

Health IT could have a positive effect on the quality, operational efficiency and sustainability of a health care system spanning single physician practices to

integrated, province-wide health care delivery. A technology enabled health care system improves safety, allows coordination of chronic and acute care across numerous medical care providers, allows faster and more precise measurement of performance, improves disease prevention and enables consumers to take a more active, and well informed role of their own health care.

The transformational capacity of health information technology will be realized when stakeholders support its development for advancing health care delivery and driving economic innovation. Moreover, sustained investment in health IT will result in the creation of a robust health technology cluster. This will be a vibrant economic hub, commercializing the innovations of BC and Canadian scientists and entrepreneurs, assisting the province in reaching its eHealth goals and producing technology solutions for export. Establishing a health IT cluster of excellence will help strengthen BC's economy as well as help to improve the health of its citizens. BC must act immediately and simultaneously on a number of fronts to seize the advantages our economy, and build on the strengths of our businesses and citizens to become global health care information innovators.

Section 4: The Path Forward: Recommendations

Governments, health care organizations and health care practitioners will have to continue to make health information a priority. This can be done through infrastructure support, capital and operational funding, restructuring, significantly expanding training and education programs, and fostering and promoting innovative change. Private sector firms need to recognize the opportunities and mobilize their entrepreneurial energy to help grow a health IT cluster. Health care professionals will have to embrace their role as leaders in the process of health care innovation adoption, facilitated through technological advancements. The following is a summary of the key recommendations in this white paper:

- A. Create a Health IT Cluster of Excellence**
- B. Protect eHealth as a Government Funding Priority**
- C. Develop a Human Resource Strategy**
- D. Promote Partnership Opportunities Across Health Sector Stakeholders**
- E. Ensure System Accountability**

Introduction

This paper provides a forward-thinking perspective on the role information technology could play in British Columbia's (BC) health care system by 2020 and the impact it could have on BC's economic development in relation to Outlook 2020, an initiative of The Business Council of British Columbia¹. This paper recognizes the important place information technology must occupy in a modern health care system as the key facilitator of synergistic health care delivery and systems operation. While we, as a province, have taken some important exploratory steps, there are still fundamental choices and actions we must take together if we are to protect health care services for our citizens and take advantage of the opportunity we have for BC to become a Canadian and global leader in the area of health information technology innovation.

Let us be clear at the outset. There is no choice but to move forward to adopt the technologies that power and connect our society with our health care system - no matter how challenging this transformational change may be. The factors driving change are undeniable and mounting: cost pressures from changing demographics; shortages in health human resources; growing costs of managing chronic diseases; demand for new medical technologies; and new infectious diseases that spread around the globe in hours. To sustain our health care system in the face of these challenges, we must embrace the technologies that other sectors of the economy and public service have successfully used to enhance efficiency and improve service.¹

However, our vision is much broader than just preparing BC's health care system to meet these critical challenges. We have an opportunity right now to seize the advantages our economy, our businesses and our citizens offer to become global health information innovators. To do this, we must act immediately and

¹ Early data is emerging in Europe validating socio-economic benefits at the point of care in terms of quality and efficiency of care as a result of better informed decisions. Financial gains may also be realized through the ability to reduce paper-based processes. Dobrev, A, Stroetmann, K, Jones, T. Preliminary study results of EHR IMPACT. i2010 Sub Group on eHealth, Brussels, 09 July 2009. http://www.ehr-impact.eu/downloads/documents/i2010_EHRI_study_summary_draft.pdf

simultaneously on a number of fronts. Governments, health care organizations and health care practitioners will have to continue to make health information a priority through infrastructure support, capital and operational funding, restructuring and significantly expanding training and education programs, and fostering and promoting innovative change no matter how it is manifested. Health care professionals will have to embrace their role as leaders in the process of health care innovation and adoption, facilitated through technological advancements. BC citizens, like all Canadians, recognize that in order to create a health care system that offers timely access and cutting edge treatments, health care cannot continue to be practiced the way it has been in the past ². Private sector firms need to recognize the opportunities and mobilize their entrepreneurial energy to help grow a health IT cluster.

We have a narrow window of opportunity to create both long-term financial sustainability in our health care system and an economic competitive advantage for BC through the use of health care technology. To do so requires a shift in understanding of how to link innovation and economic development to fundamental changes in the way we practice and deliver health care. And it will require leadership and commitment from health care providers, from business and from our governments.

This paper consolidates many aspects of the existing literature and is an attempt to create new momentum with recommendations as to how to restart a positive conversation with the ultimate goal of using health IT to help create a sustainable health care system and an economic engine for BC and Canada.

The Need to Get There

Seniors account for one-in-seven British Columbians. By 2030, they will account for one-in-four. The good news is that BC supports one of the healthiest populations with a life expectancy of 81 years - higher than the Canadian average and higher than almost all western nations. The problem is that no matter how healthy we are as we age, the demand for health services inevitably

increases. British Columbians in their 50s use an average of \$2,100 in health care each year; in their 70s, the amount more than doubles to \$5,700 and in their 90s, it reaches on average \$22,000 in health services.

Demographic shifts would be enough of a challenge on their own. Add to this, a stubbornly persistent shortage of qualified health care providers, not only physicians and nurses but researchers, scientists and others. Geographical distances - both vertical and horizontal in BC - only exacerbate the problems associated with timely delivery in remote and under-serviced areas.

55 per cent of Canadians are tracking their medical history on paper, and one out of four people track their history by memory, or not at all. Moreover, 93 per cent of Canadians believe that medical errors can be prevented by tracking health records electronically.

-November 2008 Ipsos Reid survey

Exacerbating this are the dramatic increases in the prevalence and incidence of chronic diseases like diabetes and asthma, emerging threats to public health such as SARS and H1N1, the need to provide equitable services to citizens in rural or urban communities irrespective of the location of care, and the recognition that care is silo-based and fragmented resulting in treatment delays and unnecessary duplication of tests and investigations.

The pressure is evident. Between 2000 and 2009, health expenditures in BC increased from \$8.6 billion to \$13.4 billion (65%) - roughly \$1.52 million every hour. Health is the largest expenditure in this year's BC budget at 43.3 cents of every operating dollar. Over the next three years, in a time of intense restraint in other public budgets, health care will receive the largest share of funding increases in government spending. The large majority of these dollars do not go to investments in new technologies. They go to pay the wages and salaries of our health professionals and related health staff.

The slow pace of adoption of health care information technology in Canada today is likely to force different approaches to achieve a connected health care system. Provincial governments across Canada are looking to leave their “prime-the-pump” recession fighting budgets behind and face-up to hard choices to rein in budget deficits. BC is no exception. Although governments may declare health care a priority, investment in technologies in a period of severe public sector retrenchment will be difficult. Nevertheless, these investments are critical to drive overall efficiency and slow the rate of growth in health care expenditures.

Role of New Technologies

Today, thousands, if not tens of thousands of British Columbians are at work developing, commercializing, adopting, using and applying new technologies, new tools, new approaches, and new analyses to improve our overall health. British Columbians, like many people around the world of all ages and health status are regularly going on-line to learn about treatment options and to find new ways to better manage their own health and well-being³. They expect their health care providers and health system operations to be equally engaged with technology, so that their health care experience is as seamless as possible.

Right now, Canada, and by inference BC, is lagging other countries in managing a “high performing health system”. The Conference Board of Canada reports that Canada continues to be a “D” performer on innovation, according to their 2009-2010 report card². Within our health care institutions, practitioners and health care services are not aligned to flow seamlessly, creating serious system inefficiencies, forcing health care practitioners to spend time on administration rather than front line patient care. Patients are sometimes put at unnecessary risk through inadvertent medical errors due to the inefficiencies of working with

² <http://www.conferenceboard.ca/>

paper records that do not move with the patient to each health professional who needs the records to make informed decisions. While the technology tools exist to address these challenges, adoption across the country has been slow, largely due to the perceived cost and uncertainty around system implementation. In addition to installing software & hardware, successful implementation requires redesign of service delivery, staff training and change management. It is the human dimension of change that can be the most challenging barrier towards adoption of health IT.

Significant opportunities exist to strengthen the innovation culture and to transform health technology from a “cost driver” to a stimulus of economic development. Creating, diffusing and transforming the knowledge that will be generated by our adoption of information and communication technology holds the potential to strengthen the BC economy, by lowering health care costs while maintaining quality. But BC must improve on the degree of collaboration between university and private sector research, develop and support venture capital to support commercialization of new innovations (or alternatively finance innovation by being earlier adopters and customers of this technology themselves), and turn out a highly skilled workforce that can capitalize on the intellectual property that a high performing health system generates.

By supporting investments in innovation in health IT - and focusing on the questions of adoption of this technology - the opportunity exists to reap tremendous benefit for our health system and to create a world-leader in the growing field of health care technology. The right mix of strategies and policies in British Columbia can position the province as a world-leader in the growing field of health care technology, while ensuring that BC patients have access to seamless and effective medical care. The potential benefits to our economy and our citizens are enormous.

Where We Are Today

eHealth in Canada

The term "health infostructure" refers to the development and adoption of modern systems of information and communications technologies (ICTs) in the Canadian health care system. Such an infostructure will allow the people of Canada (the general public, patients and caregivers, as well as health care providers, health managers, health policymakers and health researchers) to communicate with each other and assist them to make informed decisions about their own health, the health of others, and Canada's health system³.

According to Canada Health Infoway, about 2,000 health care transactions happen every minute in Canada. Many are quite complex and all involve documentation and information flow. The information recorded or transmitted contains everything from the mundane to the life-critical. Until just a few years ago, the vast majority of these hundreds of millions of health care-related transactions involved handwritten records. Critical information was filed in doctors' offices and clinics, and in BC's hospitals. This is starting to change, but that change is happening too slowly.

Unfortunately, the health infostructure to support this transformation in Canada is lagging. Despite evidence that improvements in productivity can be linked to investments in information technology,⁴ the amount spent by Canadian hospitals on information and communications technology in 2005 constituted only 1.5 per cent of their operating budgets. That percentage stands in contrast to countries

³ Health Canada. www.hc-sc.gc.ca

⁴ Arsenault, and Sharpe. An Analysis of the Causes of Weak Labour Productivity Growth in Canada since 2000, Calculations based on the Canadian Productivity Accounts from Statistics Canada, Cansim Table 383-0021. *International Productivity Monitor*, 16, 2006

including Italy, Sweden, and the UK who allocate in excess of 5 per cent of hospital budgets to information and communications technologies (ICT).⁵

Vision is not the issue, nor is access to technology a significant barrier. In fact, the technology of digitizing, storing and maintaining health information in ways that can be used by many applications and users (the interoperability aspect) is quite mature.

Barriers to adoption of health IT are well documented in recent research:

- There is inadequate or no reimbursement for clinicians to adopt health IT ⁴⁻⁹.
- Many improvements in quality and patient safety accrue to the payers of health care services and not to the providers; yet providers are required to invest in the implementation of EHR ^{10, 11}.
- Fee-for-service reimbursement models give little incentive to health care providers to adopt EHR and therefore efficient organizations may get penalized by health IT efficiency improvements ^{10, 12}.
- The lack of compelling business cases by providers for adoption of health IT ^{5, 10, 11, 13, 14} coupled with the high cost of implementation ^{5, 15}.

These barriers pose similar challenges to health IT innovation in B.C. and across Canada. One of the biggest challenges in BC continues to be information system adoption into physicians' offices. It is here where the majority of primary health care is delivered, where the most basic health records are initiated and kept, and where there has been a very slow adoption of electronic medical records (EMRs) and information technology. According to the 2007 National Physician Survey, 26.2% of physicians reported using a combination of EMRs and paper

⁵ See Prada and Santaguida, Conference Board, 2007, p. 30, Chart 16

records while only 9.8% of physicians reported using EMRs instead of paper charts. The Physician Information Technology Office (PITO) in British Columbia, created by Ministry of Health Services and the British Columbia Medical Association, is accelerating the adoption of EMRs through innovative approaches designed to encourage the adoption of common systems in the geographic areas in which care is provided. *In order to achieve the 2020 vision of a technology enabled health care system, all physicians need to be using integrated, accessible and robust electronic medical records technology.*

British Columbia -Measured Progress

In November 2005, British Columbia released its eHealth Strategic Framework. It was a timely response to pressing challenges and an important signal that technology is a necessity for a modern, financially sustainable health care system. The “Framework” laid out a long-term vision for implementing eHealth, identifying 22 projects in nine areas - hospital care, home and community care, public health, laboratories, pharmacies, diagnostic imaging, telehealth and record standards, and other foundational projects - which together would produce an integrated, electronic record of a patient's journey through the health care system.⁶ Significant funding was committed, including an initial \$150 million with a further \$30m commitment from BC, supplemented by a conditional \$120 million from Canada Health Infoway.

In 2008, British Columbia's Ministry of Health Services recognized that there wasn't sufficient coordination across its health sector organizations to allow fundamental transformation of health care delivery and improved health outcomes for its citizens. In the fall of 2009, BC Ministry of Health Services released its Health Sector Information Management/ Information Technology Strategy that was developed by the BC eHealth Strategy Council. Its purpose was “to ensure the alignment of IM/IT initiatives and investment with BC's overall health sector strategies and priorities”. The strategy has five areas of focus.

⁶ See eHealth Overview published by the Ministry of Health Services, at www.health.gov.bc.ca/ehealth/index.html

1. Chronic disease prevention and management across multiple service lines and care providers.
2. Improvement of care delivery to enable health system sustainability.
3. Government priorities that include citizen access, citizen-centred service, public_health (IT to manage communicable disease) and other priorities.
4. Sustaining IM/IT Assets: Existing and new IT enablers need ongoing financing to remain functional.
5. Enabling competencies such as leadership, information access and privacy, architecture and standards, process redesign and change management, technology procurement among other competencies need to be developed.

The direction set by the BC Ministry of Health Services IM/IT strategy is encouraging, and it aligns with the strategies set out in other provinces. It supports the view that the BC government should provide sustained funding across a spectrum of activities to ensure health IT supports a transformation of the healthcare system. All other provinces have implemented broadly similar strategies and all are struggling to make progress. According to Infoway, BC ranks third in progress in delivering on the six key deliverables required for implementing an electronic health record (EHR).⁷ Although the province has not provided a detailed accounting, a number of the three year target deliverables for each eHealth project in the 2005 eHealth Framework seemed to have not been achieved. Many projects that were considered 95 to 100 percent “complete”, had either underperformed adoption targets (use by providers) or were not being used. As Infoway acknowledges, low adoption rates are a serious risk to any eHealth vision. According to the BC Physician Information Technology Office, 40% of family/specialist practices in BC have adopted electronic medical

⁷ See Canada Health Infoway, March 31, 2009.

records (EMR)⁸. This is in contrast to Alberta where 60% of primary care physicians in Alberta have implemented EMR and may provide lessons for adoption of IT for BC clinicians. Practices in Alberta that adopted EMR have greatly reduced the amount of time their staff spends handling questions from patients regarding scheduled appointments, test results and plans for further management¹⁶.

Looking to the future, system and environment changes could pose challenges to health technology adoption unless they are acknowledged and overcome. The presence of multiple vendor solutions in the six Regional Health Authorities (RHAs), integration/interoperability hurdles for these records and others, the slow pace of provider (especially primary care) adoption and chronic budget pressures at the RHAs, all continue as barriers to progress. The forecasted slowing of the domestic economy will likely decelerate or even halt capital spending on IT in the foreseeable future as RHAs focus on financial and clinical gains rather than on technological functionality. While understandable, this short-term view will have negative consequences as fundamental building blocks will not be established now to create the technological infrastructure for the future.

Other countries are succeeding and proving that using IT to help modernize health care is possible. The percent of practices per country that reported having at least 9 of 14 advanced clinical IT functions⁹ are: New Zealand (92%), Australia (91%), UK (89%), Italy (66%), Netherlands (54%), Sweden (49%), Germany (36%), USA (26%), Norway (19%), France (15%) and in last place Canada (14%)¹⁷. UK, New Zealand, and Australia have a high percentage of physicians

⁸ <http://pito.bc.ca.s69888.gridserver.com/cms/news/10/07/pito-establishing-new-programs-support-specialists-and-gps>

⁹ Count of 14 functions includes: electronic medical record; electronic prescribing and ordering of tests; electronic access test results, Rx alerts, clinical notes; computerized system for tracking lab tests, guidelines, alerts to provide patients with test results, preventive/follow-up care reminders; and computerized list of patients by diagnosis, medications, due for tests or preventive care.

using advanced functionality for a variety of reasons that may differ across these countries such as: strong support of medical associations, leadership from key clinicians, national IT strategy and unifying body, standards setting and vendor certification, change management support, mandatory electronic billing and government investment in IT capacity¹⁸. These key drivers for success provide the road-map for BC and for Canada. But action must be taken now in order to have a competitive advantage in a knowledge-based economy that these other jurisdictions will have because of the investments they continue to make.

Leveraging British Columbia's Unique Strengths

BC has a unique variety of strengths that can support an acceleration of eHealth adoption and the development of a health IT cluster in the provincial economy. This includes a strong health system, with leading health outcomes and foundational elements of eHealth already in place, a growing supply of health professionals, and a healthy advanced technology sector.

BC has been recognized for having a strong health care system, with some of the best health outcomes in the world. The province has the lowest overall rates of death due to cancer, which the Canadian Cancer Society attributes to exceptional medical care, effective screening programs, as well as an overall healthier population.¹⁰ BC has lower physical inactivity rates (46.3 per cent versus the 51 per cent national average); the lowest smoking rate (17.8 per cent versus national average of 21.9 per cent) and obesity rates (29.7 per cent versus 32.4 per cent national average).¹¹ Overall, BC residents have the longest average life expectancy in Canada. Based on calculations of life expectancy at birth, British Columbians are experiencing greater longevity, living to an average age of 81.1 years in 2008 compared to 78 years in 1991.¹² The

¹⁰ 2010 Canadian Cancer Statistics report

¹¹ *ibid*

¹² 2008 BC Vital Statistics Annual Report

Conference Board of Canada ranked BC's health system as the top performing health system in Canada.¹³

The success of provincial bodies like the BC Cancer Agency has contributed to this superior ranking. So has the early adoption of some elements of eHealth in BC's health system. Notably, BC's PharmaNet system which has been in place since 1995 to link community pharmacies, outpatient hospital dispensaries and emergency rooms to a common data-sharing network for prescriptions. Not only has the implementation of this system enabled policy makers to put into place the necessary controls to protect the privacy of personal information, it has increased the public's comfort level with the idea of the electronic storage of health information and the benefits of such a system. Electronic delivery of laboratory information systems has also been in use for the past decade among the private laboratory providers in BC, with a provincial system now being implemented by the government. The Provincial Laboratory Information System (PLIS) is being designed to support laboratory test result sharing, which can provide medical test information to care providers across the Province at the point-of-care. This innovation will form a core clinical component of the provincial Electronic Health Record of the future. These are robust systems that we can build upon and learn from as we move towards a more fully integrated eHealth system.

The supply of health human resources in BC has also steadily increased over the past decade as a result of a number of focused initiatives by the BC Government. Notably, the government has doubled the number of medical school spaces and nursing education spaces in BC. Today, we are seeing the benefits of these long term initiatives as the cohorts of these new programs begin to graduate and enter into the health system as front-line health practitioners. In 2010, the number of nurses in BC totaled more than 49,900 -

¹³ The Conference Board of Canada, News release 06-48, February 2006.

up 37 per cent since 2001.¹⁴ Between 2008-9, BC saw a net increase of 333 physicians registered to practice in the province - the largest year over year increase ever recorded by the College of Physicians and Surgeons.¹⁵ Many of these physicians are new graduates who may be more comfortable using technology in their practice, and may increasingly come to expect it. A 2006, US study of students' and residents' perceptions regarding technology in medical training found that 96% agreed with the statement, "Technology skills are important in medical training," and 81% agreed that "Teaching about technology skills should be part of my medical curriculum."¹⁶

The strength of the advanced technology industry in BC and its potential for significant growth provides a unique advantage for BC. According to the BC Technology Industry Association (BCTIA), "BC has all the characteristics required to become a technology powerhouse."¹⁷ While the technology sector generated only 5.9% of BC's GDP in 2007, it consistently outgrew the rest of the economy over the previous 5 years.¹⁸ It may be relatively small, but that 5.9% translated into \$18.1 billion in revenues, employing 81,140 people with a total payroll over more than \$4 billion - more people than the mining, forestry and oil and gas exploration industries combined.¹⁹ The growth of knowledge-based industries provides a significant and necessary opportunity for BC to further diversify its economy, to reduce its reliance on natural resource based industries. The BCTIA identified five clusters of strength emerging in BC's technology sector: Biotechnology, Digital Media, Clean Energy, Wireless Telecommunications and Information Communications Technology (ICT).²⁰ The ICT component is responsible for three quarters of revenues and more than 90% of the exports for

¹⁴ News Release, BC Government, "BC Celebrates National Nursing Week", May 11, 2010

¹⁵ College of Physicians and Surgeons of B.C., 2009/10 Annual Report

¹⁶ "Students' and Residents' Perceptions Regarding Technology in Medical Training" Study by Gregory W. Briscoe, M.D., Lisa G. Fore Arcand, Ed.D., Terence Lin, M.D., Joel Johnson, M.D., Anmol Rai, M.D., Kevin Kollins, B.A., June 14, 2006, <http://ap.psychiatryonline.org>

¹⁷ BCTIA and BC Business Council, "BC's Advanced Technology Sector: Reaching for the Next Level," March 31, 2009, p. 12.

¹⁸ Ibid, p. 1.

¹⁹ Ibid, p. 4.

²⁰ Ibid, p. 3.

the entire industry in BC. Wireless communications generate a total economic value of some \$39 billion for the Canadian economy.²¹ There is opportunity for a sixth cluster to emerge, focused more specifically on health IT. As the BCTIA points out, demographic changes will increase demands on our health system, thereby intensifying the need for innovative health care solutions, which will offer growth opportunities for BC's technology sector.²² In developing a health IT cluster, industry could draw upon other areas of strength within the BC health industry such as its successful biotech industry, world-class health research performed by Genome BC, BC Cancer Research Foundation, and Michael Smyth Foundation and health informatics at the University of Victoria's School of Health Information Science. BC has the potential to meet the future demands of the health system while at the same time creating a health IT cluster within the BC economy and generating new wealth.

Irrespective of these successes, the greatest challenges facing BC are yet to come as baby boomers, which currently comprise as much as 40% of the workforce²³, start to reach retirement age and rely more on the health system. Health IT can help BC's strong health system manage future demands by creating efficiencies, improving access to medical care, engaging citizens in the management of their own health, and enabling better management or prevention of chronic conditions that consume such a substantial proportion of health resources. BC has an opportunity to leverage its strengths to become a leader in health IT development and adoption.

²¹ Ovum, "The Benefit of the Wireless Telecommunications Industry to the Canadian Economy", prepared for the Canadian Wireless Telecommunications Association, April 2010, p.1.

²² BCTIA and BC Business Council, p. 6.

²³ Percentage of 'mature workers' – those 45 and older – in BC is 40%. Source: Mature Workers in BC and Alberta: Understanding the Issues and Opportunities, published by the Government of Alberta, August 2008.

The Future is Almost Here

There's no question the pace of technological change has accelerated over the last decade. Technological change will happen in the health sector whether or not we - or 'the system' - are ready for it. In fact, it is already taking place. The question is whether BC will lead, follow or simply get left behind. Will the system itself benefit from the operational improvements technology can enable, or will we see technology-savvy health consumers become frustrated with a health system that continues to rely on antiquated business practices?

We need only to look at what's happening around the world for examples of how the use of technology - some of which is commonplace in other aspects of our lives - is already making a significant difference to improve both the efficiency of health care as well as patient satisfaction with the system.

The UK National Health Service uses SMS to remind patients of appointments. As a result, missed appointments have been reduced by 33%, translating into savings of £250 million annually.

New Zealand has fostered a primary care based health care system, and has enabled messaging standards that allow general practitioners to communicate directly via their electronic medical records to hospital admissions, discharges and transfer systems. They refer patients to specialists electronically along with all information required directly out of the electronic medical record.

Ontario research into the use of Blackberry devices in the hospital setting showed marked improvement in communications and productivity over the usual pager and call back system, which doesn't allow clinicians to prioritize calls and requests.

In Canada, students and residents at the Northern Ontario School of Medicine often train at rural clinics. Using mobile phones, hosted MS Exchange servers and mobile access to healthcare applications, learners communicate better and can transmit data directly from the field. In BC, telethoracic medicine is

providing patients with greater access to specialist doctors, particularly in rural areas. Using secure video conferencing, patients in remote regions can receive assessments from one of ten thoracic surgeons practicing in four centres of excellence. The Kelowna Centre of Excellence alone has served more than 5,400 patients through 953 clinic locations around the province, saving nearly 6 million travel kilometers for patients and physicians. Telehealth services are currently available throughout the province.

If there is any doubt about the demand for technology and its application in health, we need only look to what is happening in the wireless market. By the end of 2009, Canadian wireless phone subscribers numbered 22.8 million - see Figure 1. 75% of Canadian households now have access to a wireless phone.²⁴

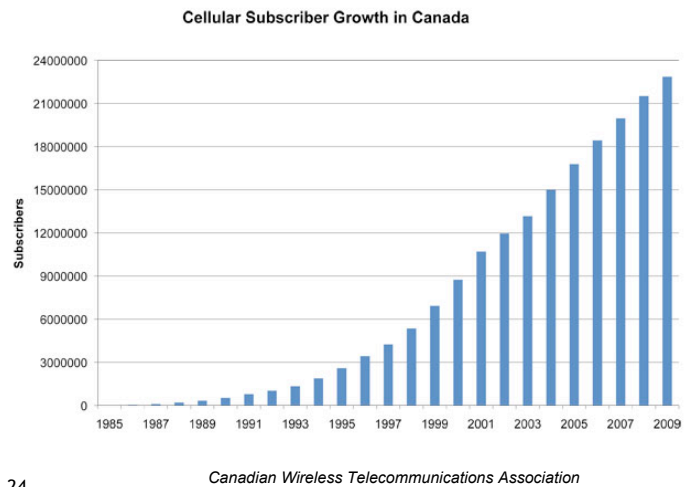


Figure 1

There has been a veritable explosion in the use of smartphones by consumers and, by extension, the availability of applications (or “apps”) available to download. As of February 2010, entrepreneurs have created 5,805 health, medical, and fitness applications now posted within the Apple AppStore²⁵. Of these, 73 percent were intended for use by consumer or patient end-users while

²⁴ Canadian Wireless Telecommunications Association, www.cwta.ca

²⁵ California Healthcare Foundation
<http://www.chcf.org/~media/Files/PDF/H/HowSmartphonesChangingHealthCare.pdf>

27 percent were targeted to health care professionals.²⁶ With access to technology becoming more prevalent and convenient through smart phones and advanced networks, there is increasing potential to engage consumers to actively manage their own health, but also to interact directly with the health system. This can expand the concept of “self-service” in the health system to reduce the amount of low-value work being performed by high-cost health service providers, thereby promoting the highest and best use of our scarce health professionals.

Clinicians who cannot be tied to their desks to do their work will benefit from compact, mobile devices that allow them to access clinical workflow, find best practice evidence, view patient records, use diagnostic tool, and view laboratory results the instant they are available. Medical devices will become increasingly compact and be used at point of care with the ability to transmit information readily to support efficiency and effectiveness of health professional practice.

²⁶ Jane Sarasohn-Kahn, “How Smartphones Are Changing Health Care for Consumers and Providers” California HealthCare Foundation, April 2010, p. 3.

Towards 2020

2020 - The eHealth Vision

By 2020, the targeted delivery of specifically designed interventions using health IT for a range of health services could be commonplace in BC healthcare. So too could the rapid transmission of patient records and related data through connected and increasingly mobile tools. The capture and use of such data by researchers, with appropriate privacy protections, will help us tailor health services to the needs of patients and their families. Citizens of British Columbia will have the ability to access vast volumes of information through new internet-based consumer health solutions.

2020 - High Performance Health System

Figure 2 is a diagram of the 2020 model for IT enabled health care ^{7, 19, 20}. All patient data will be aggregated into their EHR for access to applications. Data mining and data-navigation techniques can be used to identify care gaps, risks, trends and patterns in seconds rather than months or years. The use of embedded algorithms can flag health professionals of a person's risk and priority health care needs. Re-design of processes can occur pro-actively for groups of patients, rather than what is done now. We start with very little information, make decisions the best way we can and then re-design care retroactively, when the current systems are not working.

Figure 2 is composed of four layers: data creation, secure data exchange, standardized data formats and applications. The data creation layer at the bottom of the figure includes data captured by citizens, clinicians, pharmacists, laboratories, imaging equipment and other health care workers used to populate a citizen's electronic health record (EHR). In addition, genomic information, environmental factors and family history could also be available for electronic capture. The second layer ensures secure exchange of a citizen's health information and enforces the rules of who can access a patient's EHR to

change, add or read its information. Data from the sources shown in the data creation layer will be integrated to populate a citizen’s EHR. This will create one record for one patient. The third layer shows that the EHR uses a standard data format. The third layer also contains the evidence base and clinical guidelines for easy access as well as computer-based medical knowledge²⁰. The fourth layer has a number of applications and information technology based tools that combine data from the EHR with the evidence-base/guidelines to assist health care professionals. The IT applications that will help transform health care shown in Figure 2 are described below:

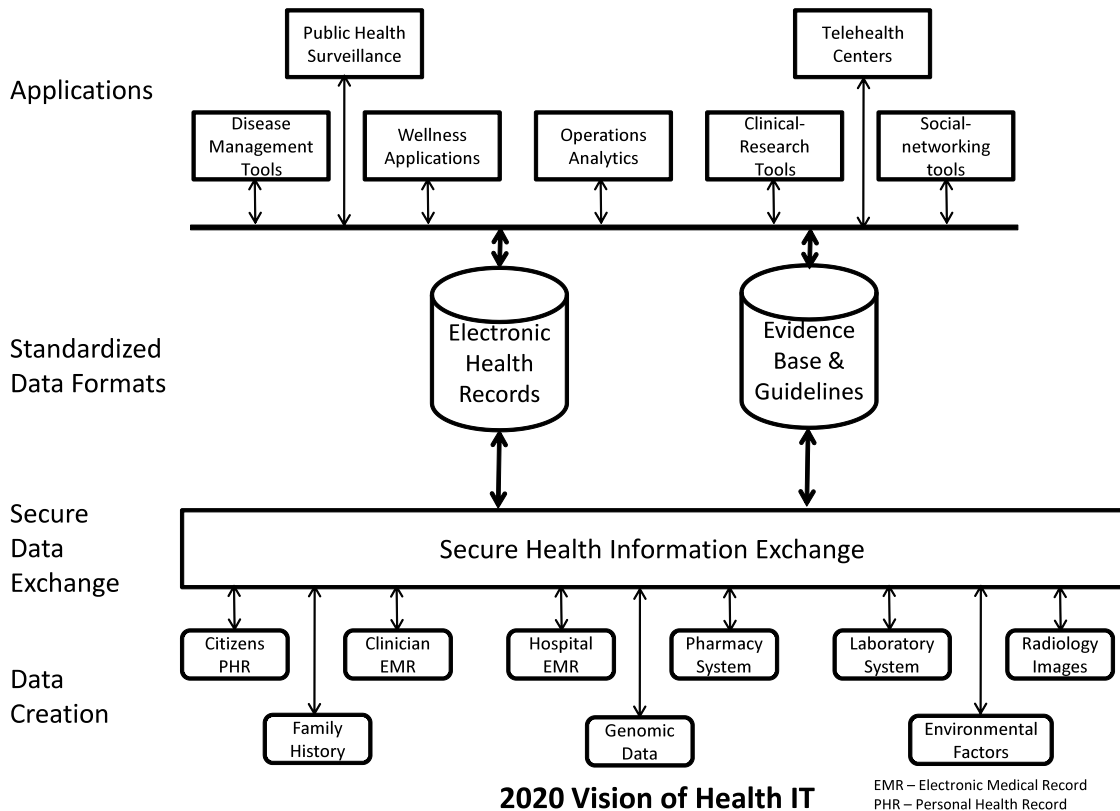


Figure 2 2020 Vision of Health IT

Health Care Management Tools

Health professional counseling and advice can be customized to the individual's needs based on the information in their EHR¹⁹. A clinician can view a patient's health information from numerous sources including a hospital stay or specialist information integrated into one health record allowing him or her to make better informed decisions. There is clear evidence of improved practitioner performance when information technologies are used in practice, including computer assisted diagnosis, computerized reminders for preventive care, disease management systems, and computerized drug dosing and prescribing²¹. Moreover, an EHR shared by health care providers that are integrated across multiple lines of service are better able to design safe, effective, efficient care processes for patients²². Health IT could support new ways of delivering health services that would otherwise be impossible using paper-based systems. For example, health IT can be used to identify patients across a large volume of records that experienced adverse drug events, examine the cause of the adverse event and then create risk awareness programs to ensure future adverse events are avoided in future^{23, 24}.

Similarly, management of chronic disease can be enhanced by customized care plans that encompass multiple lines of care. Collaborative chronic disease tracking by patients and their physicians could allow for earlier detection of disease exacerbations and early intervention to minimize deterioration that so frequently results in the need for hospitalization. Health IT for chronic care could track outcomes versus type of treatment customized to each patient and allow more informed modification of treatment approaches^{9, 25, 26}. According to Bu et al., IT-enabled diabetes management has the potential to improve care processes, delay diabetes complications, and save health care dollars²⁷. The majority of health IT based chronic disease management systems reviewed by Dorr et al. showed positive impacts on chronic illness care²⁸.

Public Health Surveillance

Automated reports of infectious disease transmission could reduce the paperwork burden of public health surveillance and reporting further strengthened by the use of analytical tools to identify community based trends more readily²⁹. Aggregating anonymous data of disease transmission could help save lives by hastening the identification and tracking of outbreaks to support early intervention²³.

Wellness Applications

Health IT can support the transition from institution-centered to patient-centered applications with a focus on health promotion, disease prevention, maintenance and improvement of health status of any individual^{13, 30}. Health IT could help citizens and or their clinicians create wellness programs focused on reducing risk factors and enhancing well being. Effective prevention has been shown to increase the lifespan of individuals as well as lower the demands on health care services through the lifespan³¹. Health risk assessments could be commonplace for citizens who can then be guided by a health plan tailored specifically to them. Many employers today understand the value of healthy employees to their bottom line and are providing wellness programs based on EHRs for their employees^{7, 11}. Adolescents using personal digital assistants were influenced to increase exercise and milk intake³². Web-based applications also have the potential to increase disease knowledge, education and social support³⁰.

Operations Analytics

Today, numerous industries use the analysis of extensive data aggregated across thousands of transactions to improve performance and quality including consumer and industrial products, telecommunications, financial services, pharmaceuticals, transportation, hospitality, entertainment, e-commerce, and retail^{33, 34}. Healthcare is conspicuously absent from that list of industries. Analysis of the daily operational behaviour of hospitals and other health care

facilities could be used to reduce inefficiencies and costs by more effective management of facilities, equipment and the workforce^{33, 35}.

Health IT can also help determine which payment systems are effective by comparing the impact of different payment schemes conducted as pilot studies³⁶. Health IT supports better decisions on how to design new health services, and how to deliver care more effectively. It does that by providing strong and clear evidence for gaps in health care and overlap of health care that is redundant. By 2020, a payment system that rewards improved patient outcomes could be in place because of the information health IT has gathered³⁷. Health IT can be used to coordinate patient care and health care providers that are integrated across multiple lines of service that are better able to design safe, effective, efficient care processes for patients²².

Clinical Research Tools

The following clinical data could be easily aggregated across the population of BC: vital signs, diagnostic images, laboratory values, medications, disease status, interventions, and patient demographics. In addition, genomic information, environmental factors and family history could also be accessed electronically. The electronic aggregation and analysis of detailed health data could significantly increase knowledge dissemination and generate new evidence to support improved quality health care services. Patient level data is currently collected “by hand” using paper based records. Electronic data access may accelerate research identifying patterns in treatment outcomes, environmental, lifestyle, dietary and or genetic factors on smaller and smaller subsets of citizens that share the same characteristics³⁴. This evidence could allow clinicians to apply the most appropriate therapy customized to each individual^{20, 38, 39}.

Scientific understanding of human biology is growing exponentially, especially the understanding of genetics aided by computer intensive research known as bioinformatics. Health IT can optimize the health care system through the use of

information provided by an individual's genome and could have an enormous positive impact on the detection and treatment of disease ^{20, 38, 39}.

Today, health care systems do not have adequate "feedback loops" that aggregate data on the effectiveness of different diagnostic & treatment processes. A lot more can be learned about the impact of many health care services on patient outcomes or on the health of populations as a whole ³⁶. Health IT is the essential foundation for broader efforts to restructure the health care system ³⁷. By 2020, measure-sets to capture data on patient outcomes, care processes and resources used could be standardized, automatically captured and aggregated in a consistent way that allows effective comparison in a timely way ³⁷. Hence clinicians & administrators could have a wealth of information to compare alternatives enhancing decision making and the quality and depth of evidence-based knowledge ³⁷.

Social Networking

Social networks aided by information technology can also aid individuals' management of chronic disease. Motivation for health behavior-change can be increased through access to the success stories found in an individual's social network ^{40, 41}. No one is a greater expert at experiencing a disease than the patient themselves.

Telehealth Centers

Application of telecommunications to health care could continue to grow with such applications as remote monitoring, consultations, and remote real-time clinical interactions especially for distant underserved regions.

Achieving Operational Efficiencies

The operational efficiencies that come from basing systems on the efficient flow of information will hopefully provide the "early" wins for decreasing system costs and improving delivery. For example, a supply chain management

framework is based on the efficient capture and movement of information. Some of that information can be captured from medical records (e.g. when a prescription is filled it triggers an action to re-stock the inventory). The savings that can be achieved by automating operations could be substantial. A 2001 Ontario Hospital Association Task Force study estimated the potential value of SCM improvements in the Ontario hospital sector at more than \$300 million.²⁷ Even greater savings and efficiencies will be found in other “back-office” operations of a health care institution, allowing for more resources to be dedicated to front-line care.

But it is not just back-office operations in a hospital where efficiencies can be realized. A recent survey of nurses in the U.K., commissioned by GS1 UK and the Nursing Times suggests that nurses spend up to two hours of every shift searching for missing medical equipment. In the U.K. that adds up to 40 hours a month and £900m of NHS wages a year spent hunting for missing pumps, thermometers or the keys to the drug cupboard.²⁸ Imagine a scenario where all that equipment was outfitted with an RFID tag that was linked to a hand-held PDA attached the belt of every nurse or nurses assistant in a hospital. Equipment wouldn't get lost or run out because it would be tracked at all times. As one of the survey respondents noted, “Nurses should be free to nurse, so it is crucial that employers look into this research.”

The conclusion is clear: The application of information technology has the potential to realize huge operational savings. It is the only way our health care system can be sustainable.

2020 - Empowered BC Citizens

Today, the popularity among the public for using the internet to obtain health related information continues to grow at the expense of traditional forms of

²⁷ Task Force Report on Supply Chain Management, "Improving Supply Chain Management for Better Health Care," A Joint Initiative of the Ontario Hospital Association and Efficient Healthcare Consumer Response, November 2001.

²⁸ <http://www.ultimatenurse.com/forum/f142/missing-equipment-wastes-nursing-time-35655/>

information that are decreasing in popularity: health professionals, TV/radio/print media, and pharmacies³. It is clear through a number of surveys that citizens want more active participation and autonomy in their health care⁴²⁻⁴⁴. The central hub that is the repository of health information to provide citizens with more control of their health care is the Personal Health Record (PHR).

Many consumers had high levels of satisfaction with early versions of PHRs with easy access to their test results, medications and better communication with their clinician being very popular functions^{5, 42, 45}. Communication barriers between patients and clinicians can be lowered when they collaboratively track disease¹³. The information provided from a PHR to a patient and their clinician allowed better management of patients' medication dosing as well as more involvement of patients with decisions regarding their medications^{44, 46-48}. By 2020, a citizen's PHR could be fully interoperable with the health records of their family practitioner, health specialists, health insurer, hospitals, laboratories, pharmaceutical provider (prescriptions and over-the-counter).

Creating a Health IT Cluster in BC

Lucas et al. describe the factors that contributed to the emergence and growth of eight regional IT information technology clusters across Canada⁴⁹. They report the following factors critical for cluster formation:

- entrepreneurs that build on an existing base of institutional assets;
- existence of at least one large anchor organization that provided initial talent pool and capacity for market growth as well as spinning off other companies;
- development of talent through university/college training programs & on the job industry experience;
- public and private research institutions and government centres of excellence programs;

- ability to create channels to local & global markets;
- financing by networks of angel and venture capital investors as well as government programs;
- local networking provided by regional associations.

Anchor organizations varied by type that included large private firms (e.g. Vancouver), public regulated utility (e.g. New Brunswick) and universities (Quebec & Waterloo). Vancouver possesses many of these elements in its wireless IT cluster that may be reusable for the formation of a health IT cluster. Lucas et al. studied 121 firms in Vancouver most of whose revenues came from export to Europe and USA and they employ a highly skilled labour force across many different IT segments. Many of Vancouver's firms belong to WINBC whose mission is to facilitate collaboration, create awareness of the 250 firms in BC's wireless sector and enhance innovation by exposure to technical developments and market drivers²⁹

According to Lucas et al. government plays a critical role in creating the conditions for cluster emergence:

“Cluster policies work most effectively where they succeed in aligning initiatives across senior levels of government with the current capabilities and future potential of local concentrations of firms.”⁴⁹

²⁹ www.winbc.org

Example of a Health IT Cluster

As an example, New Zealand has created a Health IT Cluster³⁰ which is an alliance of organizations interested in health IT, comprising software and solution developers, consultants, health policy makers, health funders, infrastructure companies, healthcare providers, and academic institutions - who have agreed to work collaboratively. Their vision is to become a centre of excellence for health technology. Their mission is to collaborate to position New Zealand as a world leader in the supply and use of innovative health technology. The Cluster undertakes advanced technical research for the healthcare sector, and provides world-class integrated health information solutions to healthcare customers worldwide. The key goals of the cluster are to: help members grow their business capability, foster collaboration, catalyze innovation and investment in health technology and be financially sustainable.

Government Procurement Policy

New government procurement policy has the potential for stimulating innovation of health IT. The National Health System of the UK is a great example of how the public sector can help take on some of the challenges for the private sector. Collaborative commercial agencies were created to work with Strategic Health Authorities (SHAs), in order to develop an expertise and establish health industry best practices in procurement practices. Since April 2009, each SHA has had the legal duty to promote innovation and continuous improvement in the commissioning and provision of health care³¹.

NHS has recognized that there is a link between procurement practices and whether innovation thrives or dies. The impact and value of these structures and commitments have not yet been determined, but they would certainly be a

³⁰ <http://www.healthit.org.nz/>

³¹ <http://www.nwcca.nhs.uk/innovation/>

welcome step in the right direction for creating a more collaborative relationship with the private sector in Canada.

What We Need to Consider Along the Way

The Human Dimension of Change

In order for information to move efficiently with the patient through the health care system, processes need to be reviewed, refined and remodeled in order to be successful. Successful adoption of health information technology systems depends on the engagement of clinicians and other health care professionals before the design is complete and before implementation begins.

In a traditional provider-centric model of care, the system is optimized to facilitate access to information for the health care provider (physician, nurse, ancillary provider). New models of care will continue to support providers but will also facilitate patient access to information. The ideal system will be one that will serve both the provider and the patient. This will result in significant changes to processes that support care delivery. Investment in health care information technology alone without a long-term strategy that includes human resource planning, policy reform and process redesign is unlikely to achieve improvements in productivity and efficiency leading to health care system transformation. Health IT implementation needs to be carefully planned with the early engagement of key stakeholders because of the large changes that will occur. The roll out of health IT in large organizations needs to be done systematically in an incremental way so that the organization learns what is and is not working so that adjustments can be made to the implementation⁵⁰. Financial drivers are needed to ensure that key stakeholders are fully committed to the success of the implementation.

The use of pervasive consumer tools in conjunction with health information technology can leverage existing behaviors. For example, as mobile phone technology becomes more pervasive, the use of simple text messaging for appointment notifications or medication reminders has the potential to improve patient satisfaction, the effectiveness of a course of treatment and the overall efficiency of the health care system. Whether or not users adopt health information technology will depend on the usability of the applications as well as the implementation processes designed to accommodate user needs. Ongoing support and education will need to be funded and sustained in order to maintain and enhance the skills of users through periods of transformational change.

Maintaining Public Support and Confidence

As we enter a phase of higher engagement and increased use of technology by clinicians, administrators and patients/consumers, we need to ensure we continue to build public trust and support for health IT investment from both a policy perspective as well as a financial one. To do this successfully, we must address fundamental issues such as the privacy of health information, strong governance, and the transparency of health IT spending, decision-making and accountability.

The new wellness delivery channel for ubiquitous care will be the smartphone, and it will happen sooner than you think.

-John Mattison, M.D., Kaiser Permanente

(from Jane Sarasohn-Kahn, "How Smartphones Are Changing Health Care for Consumers and Providers" California HealthCare Foundation, April 2010, p. 2.)

Privacy and security of personal health information is essential for most people when they think about electronic health records. As mentioned, the BC government has the advantage of having addressed many of the issues around access and consent when it implemented the PharmaNet system in the 1990's. However, these issues will require further examination and discussion as the use

of EMRs becomes more prevalent throughout the system and among health providers. Especially as consumers begin to adopt personal health records, and as we begin to make information contained in clinical systems, such as prescriptions or lab results, available to consumers through their PHRs. On the technical side, there has been a significant amount of work led by Canada Health Infoway to develop technical standards for a health information access layer (HIAL) that can enable interoperability while ensuring security of information.

In terms of public trust, there's no question that incidences of impropriety, such as the eHealth Ontario spending controversy, have shaken the public's confidence in the value and governance of IT investments being made in the health sector. Questions surrounding governance issues, and concerns over whether these large scale investments will stand the test of time has the potential to significantly stall future investments. However, to do so would only serve to delay the cost savings, productivity and efficiency gains, clinical improvements and patient benefits that enhanced use of IT in health care will bring. We know from all other aspects of life, that demand for technology continues to grow, and in industries where there is competition for customers, investments are made in a timely, yet responsible way. Most point to the banking sector as a comparable industry due to the importance of privacy and security of banking systems and information.

There's an opportunity for politicians and policy makers to proactively engage the public and communicate the benefits of investments in health IT, individually and system wide, in a non-technical manner. Government should be transparent about their budget allocation, their technology road map, progress to date, as well as the governance structure and procurement process that will be used to decide which systems and new technologies they will adopt. Policy makers can make it clear that the strategies they are posting are living documents that will be updated annually to reflect programs implemented, experience and information gained, and changes within the market and

government environment. The increase in availability of information will enhance transparency and add to the public's sense of trust about the investments being made and the value of those investments.

2020 - The Economic Benefits

Health IT has the potential to discover situations where higher spending does not necessarily buy better care. Health IT could be the key to start identifying and paying for quality and reducing payments for less effective treatments. An economic model developed by Hillestad et al. estimated that health IT could lead to savings of \$81B a year annually in the US by improving efficiency and safety⁹. These savings could double using health IT to enable management of chronic disease. In addition, state of the art supply chain management processes could effectively lower the costs of health care operations.

Research indicates that prevention strategies could improve the health and longevity of citizens at a low cost³¹. A web-based nutrition program sponsored by an employer was able to reduce, on average, health care costs of US\$827 per year per person among study participants with high risk of cardiovascular disease⁵¹. Increased wellness means citizens are able to function more effectively in society, live a longer life and contribute to its economic growth while at the same time being less of a burden on the province's health care system. Prevention strategies that are enabled with the use of health IT show significant promise.

BC could develop an electronic health information technology cluster. This would create a vibrant economic hub, commercializing the innovations of BC and Canadian scientists and entrepreneurs, and assisting the province in reaching our eHealth goals. BC could be established as a health IT cluster of excellence capable of taking advantage of global health opportunities.

Not only is this vision possible, it is absolutely imperative that we try to make it a reality. However, the truly transformational capacity of health information technology will only be realized when health authority leaders, political leaders,

government officials , health providers, entrepreneurs, and patients collectively understand its advantage in supporting health care delivery and driving economic innovation.

The Path Forward: Recommendations

Expanding the scope of health information technology in British Columbia needs to be a high priority for decision makers if BC is going to have a financially sustainable health care system. The growing importance of citizen oriented solutions such as personal health records, patient portals, secure messaging, remote monitoring technologies, and telehealth will necessitate the completion of the infrastructure building blocks to increase the overall capability to meet increasing health care needs.

The road forward is not easy and it will not be quick. It must pay attention to complex human, operational and clinical dimensions. It faces significant risk in provider and patient adoption and from any slow down in IT investment. It requires investment with a multi-year return on that investment at a time when resources are constrained. But if BC wants to continue to provide outstanding health care to its citizens and position itself to lead health care innovation, then we have no choice but to aggressively embrace the opportunities presented through a comprehensive adoption of health information technology. The symbiotic opportunity that this pursuit presents to BC, however, is the opportunity to foster a robust health IT cluster of firms in BC, ready to export solutions to the world.

The following recommendations are offered in an attempt to keep us moving on the necessary course of adopting information and communications technologies, to help BC build towards an environment of innovation and leadership and to keep in mind the truly transformational opportunities involved every step of the way.

A. Create a Health IT Cluster of Excellence

1. *Devise a strategy to create the conditions for the emergence of a health IT cluster.*
 - *Identify existing assets in the cluster.*

- *Devise initiatives to harness & mobilize those assets.*
 - *Create policy to sustain entrepreneurial drive.*
 - *Create programs that support expansion of the innovative capacity of firms.*
 - *Promote rapid diffusion of technologies.*
 - *Create networks to foster interaction among small and medium sized enterprises.*
2. *Develop a procurement system for health information technology that is transparent and publicly accountable, but that also encourages discovery and innovation in the private sector.*
 3. Establish a provincial Centre of Excellence in eHealth that brings together business, academic and technology leaders to drive health information technology innovation and adoption. Focus on supporting small innovative IT projects to build innovation into the system and by doing so build momentum.

B. Protect eHealth as a Government Funding Priority

4. *In the face of serious and pressing provincial budget pressures, protect eHealth as a government funding priority.*
 - Health information technology funding, both operating and capital should be provided as “protected funding” to prevent it from blending into that required for daily clinical operations.
 - Ensure that there is long-term investment in eHealth that is linked to a system level strategy that improves efficiency and productivity. The development of information systems is a complex, multi-year process that requires system integration to accelerate innovation.
5. *Aggressively drive BC to be the first province to reach the goal of full use of an operational EHR.*
 - Ensure BC has a health care technology adoption strategy that is achieving ALL its stated objectives in the timeframe indicated.
 - Create tangible incentives to drive adoption of new technologies.
 - Engage all stakeholders to work together with the senior leadership of the BC government, health care provider groups, health care institutions and the information technology vendor community to ensure implementation deadlines are being met.
 - Expand British Columbia’s Physician Information Technology Office (PITO) role to help BC be a world class leader of next generation EMR

- systems. Data consultants with clinical knowledge should be provided that periodically visit primary care physicians to talk about their EMR and demonstrate its possibilities, and using the data for quality monitoring. The consultant can re-assure clinicians “You are not on your own - help is readily available.”¹⁶ By being in touch with front-line clinicians, the clinically savvy data consultants would be in a leadership position to drive enhancements into next generation EMR systems. Next generation EMR systems may include decision support tools, health risk assessments, incorporating genetic data into diagnostic and treatment decisions, and faster searches of the evidence base etc.
 - Support BC industry to comply with established EHR standards especially as they relate to interoperability. This will allow connectivity of the individual EMRs that practices adopt to allow a “one-patient one-record” solution across different specialists, hospitals, labs etc. that a patient uses. These EHR systems would also allow patients access to their medical information and to enter patient reported outcomes allowing them to be more involved and informed of their own care.
6. Create legislative, regulatory and governance frameworks that allow for the free-flow of personal health information between points in the health care system (not limited by artificial boundaries created by hospitals or regional health authorities), while ensuring the protection of personal privacy.
- Harmonize health information regulatory systems across all provincial jurisdictions in Canada to support the transferability built into the Canada Health Act. While this is an ambitious goal, a short-term solution could see the alignment of key BC regulatory frameworks with a national consensus.
 - Establish appropriate intellectual property protection, including breaking down barriers to multi-institutional R&D networks and alliances essential to creating, transforming and using knowledge. The government should look to international jurisdictions that have done this successfully as potential models. The emerging trend is open-source, where there is tremendous flexibility and inter-operability, and many talented people able to work together to build the system.

C. Develop a Human Resource Strategy

7. *Ensure that we have the human resources here in BC to lead and administer our health sector information infrastructure and to provide leadership to the world.*
- Develop new innovative programs that cross-pollinate business, clinically astute systems analysis, health informatics, human factors engineering⁵², computer science and health concepts to achieve real education for health IT workforce that will be badly needed.

- Work with provider organizations to develop a province-wide training program targeted at existing health system professionals to communicate and promote the critical importance of innovation in a health care setting.
- Develop and immediately implement a public and private sector retention strategy to protect and retain the best and the brightest health technology and health care informatics experts in BC. The strategy should include standard compensation and tax measures, as well as funding for focused research chairs at BC's expanding university and community college system.
- Create incentives to attract professionals that want to be trained to provide process redesign and change management services to clinical and acute care environments. These are skills available in other industries but require customization to healthcare's unique situation and with emphasis towards patient safety. In many cases, technology exists or can be easily adapted. It is the human dimension of change that can be the most challenging barrier towards adoption of health IT.

D. Promote Partnership Opportunities Across Health Sector Stakeholders

8. *Promote more collaboration between universities and BC businesses in order to boost the commercialization of knowledge and innovation from eHealth adoption*
 - Actively develop and promote private-public partnerships between BC academic institutions and BC businesses in order to stay competitive with other provinces who are striving to develop health informatics expertise. Begin by building on existing strengths such as the UBC "Office for eHealth Strategy" and the University of Victoria's Health Information Science Department. All of these existing initiatives could partner with BC health technology companies to focus on innovation.
9. *Identify opportunities to partner with BC businesses, including venture capitalists, to invest and actively participate in the development of health information technologies*
10. *Encourage all BC business and other institutions to become engaged to better manage the health of their employees by linking to eHealth as it develops.*
 - Funding patient portals and tools such as Personal Health Records (PHRs) for employees with chronic health conditions could help employees to better manage their own medical conditions and chronic diseases and prepare to leverage new information and services from the public health system as they become available to patients.

11. *Encourage British Columbians to rapidly adopt and leverage eHealth services and information.*

- Individually managed personal health records will be increasingly connected to a wider range of services and health care providers and allow a shift of a portion of the responsibility to the individual. This can be advanced by expanded telehealth services and health portals for British Columbians who manage their chronic conditions. Some work is underway in diabetes management and other areas but this should be accelerated.

E. Ensure System Accountability

12. *Create valid indicators and consistent definitions aligned with international standards that will allow us to measure the innovation performance in the BC health system, including progress in achieving the stated information technology goals.*

- Develop publicly accessible indicators and the appropriate data collection infrastructure that will ensure that health systems are suitably understood, supported, measured, and managed from an innovation perspective. A sustainable system will be one that is able to transparently present data in real-time that can be used to benchmark performance and display progress or lack thereof. The ability to measure and report will be necessary to determine the social and economic value of health care information technology to the province of British Columbia.

Conclusion

The greatest thing any government can do to encourage innovation and transformation is to lead. In the global market for health care IT products and services, BC has an opportunity to become a world innovator. The BC Government must lead by example. It needs to lead by being an early adopter and consumer for innovations that are created in BC. It needs to lead through policies that break down barriers to change and innovation. It needs to lead by employing people in leadership positions that have a mandate to “think outside the box”. It needs to lead by setting the bar for other Canadian provinces and the rest of the world.

This leadership needs to begin now if we are to create a long-term, financially sustainable health care system for BC citizens and a competitive advantage in health information technology for our province.

Appendix: Health Information Technology Definitions

For the purposes of this document a number of commonly use health information technologies are reviewed to describe the current and future state that can be expected.

Electronic Medical Records (EMRs)

The 2007 National Physician Survey reported that 26.2% of physicians use a combination of Electronic Medical Records and paper records while only 9.8% of physicians reported using EMRs instead of paper charts. Electronic Medical Records have achieved high levels of adoption in countries such as Denmark, New Zealand, UK and the Netherlands. The average time frame to reach a critical mass of users in countries that have provided an incentive for adoption is 5-7 years.

Approximately 36 commercial EMR systems are marketed to physicians in Canada.³² Formal funding programs to support adoption of EMRs by physicians are available in Ontario (OntarioMD), British Columbia (PITO) and Alberta (POSP). A provincial funding program for EMRs is not available in the province of Quebec. Other provinces including Saskatchewan, Newfoundland and Manitoba are in the early stages of adoption.

A high level of EMR adoption is expected by 2020 with the majority of primary care physicians and specialists using EMR systems to provide care to patients. The EMR market in Canada is dominated by about 15 vendors, none of whom has a dominant market share. It is difficult to accurately determine the number of EMR users in Canada as many early adopters may have purchased systems directly from vendors. This information is not included with purchase data available through provincial funding programs.

³² CanadianEMR data - February 2009 www.canadianemr.ca

Electronic Health Records

EHR solutions are large regional or provincial systems that link multiple clinical systems using nationally determined standards and in doing so, allow the sharing of lab results, immunization data, medication information, and diagnostic and medical reports amongst providers. Canada Health Infoway has developed the vision of a network of interoperable EHR solutions across Canada, linking clinics, hospitals, pharmacies, and other points of care to improve access to health care services for Canadians to enhance the quality of care and to make the health care system more efficient. British Columbia, Alberta, Ontario, and Quebec all have EHR projects underway with differing levels of maturity.

In 2020, widespread adoption of EHRs will not be limited by technology; limitations will be based on policies and rules governing the acceptable use of information while protecting privacy and confidentiality. EHR success will depend on the ability to appropriately share and protect the confidentiality of personal health information through comprehensive, transparent legislation.

Personal Health Records

Personal Health Records (PHRs) are a relatively new technology in the eHealth landscape. In early 2009, Canada Health Infoway announced a new certification service for vendors of consumer health solutions platforms³³ to ensure that consumer health solutions comply with Infoway's privacy, security, interoperability and management standards. These certification standards are also intended to provide vendors with an opportunity to demonstrate compliance with pan-Canadian standards.

PHRs have received attention in the media due to the presence of multinational companies such as Microsoft and Google that have announced personal health record solutions. All of these tools are targeted at empowering the citizen to better manage their own health. They will ultimately allow citizens to create

³³ Infoway launches new certification service for health information technology vendors. February 12, 2009 <http://www.infoway-inforoute.ca/lang-en/about-infoway/news/news-releases/396>

and maintain a personal lifelong record that contains all of the information that is important to them and necessary for their care or the care of a family member.

While PHRs are currently a standalone solution, the current investment being made to facilitate adoption of electronic medical records by primary care physicians and specialists in the province of British Columbia indicates a future in which all health care providers will function in an electronically connected practice. A strategic provincial focus on the citizen taking greater responsibility for their own care particularly with respect to the management of chronic disease sets the stage for the accelerated adoption of personal health records, particularly if they enable a connection to a primary care provider or hospital.

Telehealth Solutions

The value of telehealth solutions has been widely demonstrated through the development of the Ontario and Alberta provincial networks. The Ontario Telemedicine Network (OTN) is an independent, not-for-profit organization that is funded by the Government of Ontario. It is the most comprehensive service of its kind in Canada and is used by over 2,000 health care professionals to deliver care and health related services using telecommunications technologies. In 2007, over 32,000 clinical consultations in Ontario were conducted using telemedicine. Alberta Telehealth is a large and well-integrated telehealth network funded through Alberta Health and Wellness, regional health authorities and boards, Health Canada First Nations and Inuit Health Branch (FNIHB) and Canada Health Infoway. The goal of this system is to enable clinicians to screen patients at a distance and ensure that all possible diagnostic work is done locally and reviewed before subjecting a patient to the time, expense, and possible discomfort of travel to receive services.³⁴

In 2020, it is expected that a significant portion of care could be provided using a range of telehealth tools including mobile devices. To reach this goal, barriers to the provision of care between provincial jurisdictions need to be removed. To facilitate its adoption, changes have to be made to remuneration schedules

³⁴ Alberta Telehealth Business Plan 2006-2009 - <http://www.albertatelehealth.com/>

in such a way that there is an incentive for providers to use telehealth tools versus more traditional methods.

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