SECTOR ANALYSIS

DIGITAL HEALTH IN CANADA

EXPLORATORY ANALYSIS OF CANADA’S DOMESTIC HEALTH ICT SECTOR

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ACKNOWLEDGEMENTS

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Canada’s health ICT companies have been instrumental in supporting the development of digital health solutions. As demand and adoption of these solutions have grown, so have associated benefits, as evidenced by dozens of reports on the measurement of access to care, productivity, and quality of care outcomes. In addition, there have been dividends in areas such as job creation, economic gains and investment in innovation through research and development.

To date, there have been only a handful of studies that have explored specific aspects of economic contribution. Through these reports we have learned:

- Between 2014 and 2019 the combination of growth and replacement demand will generate hiring requirements ranging from approximately 6,200 to 12,200 persons in the health informatics and health information management sector. More than 70% of these hiring requirements will be in information technology and health information management.¹

- Canadians say that, if they had access to digital health tools, they could have avoided nearly 47 million in-person visits to health care providers, taken 18.8 million fewer hours off work (representing a $400 million annual gain in GDP) and had 51 million extra hours to spend on non-paid activities like education, volunteer work and leisure.²

- The 2010 federal government grant of $500 million to Canada Health Infoway was estimated to create approximately 10,700 person-years of employment and add about $1.48 to overall GDP for every $1 invested.³

These findings were intriguing and suggested that a larger scale exploration of other aspects of the impact of health ICT investments on the economy was needed. 

Digital Health in Canada: Exploratory Analysis of Canada’s Domestic Health ICT Sector is a preliminary effort to bridge this gap.

As a first step, this report focuses on domestic companies only, which is comprised primarily of small and medium-sized health ICT companies. Our estimates suggest that domestic players discussed in this report make up approximately half of all companies operating in the health ICT industry in Canada. It is not intended to be a comprehensive review of the global health ICT market, and it does not include large, multi-national corporations operating in Canada, public sector organizations and health care providers.

What ICTC has found through this report is that the Canadian domestic health ICT sector is strong and growing in all critical measures of economic stimulus including exports, employment and innovation. And importantly, this report sets the stage for further investigation to explore the economic impacts of digital health investments generated by all partners involved in Canada’s health ICT sector, including Canadian companies and those with a global presence.
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ACRONYMS

HR Human Resource
ICT Information and Communications Technology
ICTC Information and Communications Technology Council
IT Information Technology
R&D Research and Development
UI User Interface
1. INTRODUCTION

The Information and Communications Technology Council (ICTC) is pleased to present its new sector analysis study, Digital Health in Canada: Exploratory Analysis of Canada’s Domestic Health ICT Sector. Innovations in Information and Communications Technologies (ICTs) have become drivers of economic productivity and growth. Not only have these enabling technologies changed the way Canadians live their daily lives, but also the way Canadians experience healthcare. The adoption of health ICT has also led to economic opportunities, including the creation of employment, improved productivity, cost reductions, revenue generation, as well as improved collaboration and innovation.

To our knowledge, there have been few or no previous efforts to define or assess the nature and impact of the health ICT sector in Canada. In this exploratory analysis, we have consulted multiple data sources and subject matter experts to both define Canada’s domestic health ICT sector and understand its impact. To do so, we defined “Canada’s Domestic Health ICT Sector” as Canadian for-profit companies conducting business in the health ICT sector, but did not include multinational companies operating in Canada but headquartered elsewhere.

Despite the challenges we encountered in defining this relatively new sector\(^4\), the findings in this study illustrate that there are notable economic contributions from the domestic health ICT sector to the overall Canadian economy and indicate that further research and effort are needed to better define this important sector and continue to understand its impact on the overall Canadian economy.

OBJECTIVES

The purpose of this study is to provide a profile of Canada’s current domestic health ICT sector, understand its impact on the national economy as well as its future outlook. This study, albeit exploratory in nature, contributes new knowledge to the following aspects of Canada’s domestic health ICT sector:

- the direct and indirect employment levels and trends
- the educational and earning profiles of the workforce
- the profile of companies with respect to size, revenue, and growth
- innovation and outlook (e.g., patents, business expansion, R&D expenditure) of companies
- the economics of domestic health ICT in Canada: contribution to GDP, share of the overall ICT sector, export trends

\(^4\) Please see Analytical Framework for more details
The highlights of the study *Digital Health in Canada: Exploratory Analysis of Canada’s Domestic Health ICT Sector* are presented below.

**Current profile and future outlook of the domestic health ICT sector in Canada**

- **Well educated workforce**: Three-quarters (75 per cent) of health ICT employees have post-secondary education with 52 per cent holding a bachelor’s degree or higher. In contrast, 61 per cent of the overall Canadian workforce have post-secondary education with 28 per cent holding a bachelor’s degree or higher.

- **Strong exporters**: More than half (54 per cent) of the domestic health ICT companies export their health ICT products and services. Nearly two-thirds (64 per cent) of their revenue is generated domestically, while 24 per cent is from the United States and 12 per cent from the rest of the world.

- **Employment growth**: Most domestic health ICT employers (82 per cent) expect employment to increase in their companies over the next 12 months.

- **Innovative**: The domestic health ICT sector expects to see some growth in Research and Development (R&D) with 44% of the health ICT companies indicating that their expenditure in R&D will increase over the next three years while 35 per cent expect no change. However, the remaining 21 per cent are unsure about their R&D course of action.

- **Facing challenges**: The lack of desire within the healthcare sector to implement new systems is a challenge to growth indicated by more than half (59 per cent) of domestic health ICT companies. The lack of capital investment (49 percent) and the lack of support from the federal government (44 per cent) are also identified as challenges faced by companies.

**Domestic Health ICT sector economic projections**

- Canada’s domestic health ICT sector generates an estimated $3.4 billion in revenues annually, and makes an estimated $1.5 billion contribution to Canada’s GDP.

- Average annual growth in Canada’s domestic health ICT sector since 2011 is estimated at 19 per cent.

- Canada’s domestic health ICT sector R&D expenditure is estimated at $210 million annually.

- An estimated 47,400 professionals are currently employed in and by Canada’s domestic health ICT sector with more than 32,000 new jobs expected to be created between now and 2020.

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5 Based on findings from survey of health ICT companies
6 Survey was conducted between November 2014 to March 2015
7 Projections and estimates presented are based on forecasting and modelling conducted by ICTC using survey and secondary data
2. ANALYTICAL FRAMEWORK

To understand the domestic health ICT sector sufficiently, a mixed methods approach combining the following qualitative and quantitative techniques was employed:

- a review of the existing literature
- an environmental scan, including review of company websites and publications from COACH: Canada’s Health Informatics Association
- consultations with key stakeholders and subject matter experts
- a review and analysis of available secondary data from sources such as Industry Canada and Statistics Canada
- in-depth information from 79 Canadian domestic health ICT companies, gathered using a detailed survey in both official languages

The use of multiple sources was valuable as it allows triangulation of various sources to cross-validate findings and patterns that emerged in the following phases:

- Inception
  - Finalization of the Framework
  - Finalization of data gathering instruments and guides

- Field
  - Pilot testing of instruments and guides
  - Collection of quantitative data
  - Collection of qualitative data

- Finalization
  - Analysis of data and other evidence
  - Synthesis of findings
  - Preparation of the final knowledge product

DEFINING CANADA’S DOMESTIC HEALTH ICT SECTOR

An assessment of Canada’s domestic health ICT ecosystem is challenging, as very limited research classifying the for-profit sector has been done to date. Our attempts to gain a better understanding of this relatively new sector included consulting multiple sources (listed below) to arrive at a comprehensive listing of Canadian health ICT companies.

- Export Development Canada (EDC)
- Information Technology Association of Canada (ITAC)
- Industry Canada
- Key stakeholders and subject matter experts

Through consultation with the above sources we arrived at an estimate of approximately 700 companies that currently make up the domestic health ICT sector in Canada. The limited overlap we found among these sources suggests that the health ICT sector is not very well defined or understood as yet.

This report provides a first look at the domestic health ICT sector in Canada, a sector that has not been previously studied. Many of the large international firms with a substantial presence in Canada’s healthcare landscape, such as IBM, Cerner and Meditech, have been excluded from this analysis due to the difficulty of obtaining accurate information for this study that applied specifically to Canada. In interpreting the findings, it is important to note that the contributions of these multinationals would lead to higher projections on the workforce profile and economic contribution data presented in this report. Also out of scope are public sector organizations and health care providers.

The findings presented in this report illustrate that there are notable economic contributions from the domestic health ICT sector to the overall Canadian economy, indicating that further research and effort are needed to better define and continue to understand the impact this important sector has on the overall economy.

SURVEY DATA COLLECTION

Between November 2014 and March 2015, ICTC conducted an in-depth survey of health ICT companies to better understand their workforce profile, economic contribution and future outlook, 79 companies responded. The survey consisted of approximately 35 questions and took 10 minutes to complete. The survey was in field in two waves.

WAVE 1
Combining health ICT company names from EDC and ITAC listings, a total of 242 Canadian health ICT companies were targeted in wave 1. The survey questionnaire was sent via email blasts and social media (e.g. LinkedIn, Twitter, and Facebook) to all 242 companies. In addition, the survey was also shared with ICTC’s wider network to get possible responses from health ICT companies not on these listings. These companies were sent email and telephone reminders in an attempt to increase the response rate. A total of 37 usable responses were gathered in wave 1.

WAVE 2
Industry Canada maintains a directory of health ICT companies in Canada that lists 426 companies currently and these companies were targeted in wave 2. All 426 companies were contacted by email and/or telephone, and were sent email and telephone reminders in an attempt to increase the response rate. A total of 38 usable responses were gathered in wave 2.
IN ADDITION
As survey responses under-represented larger firms, a wealth of information on four large health ICT companies was gathered through a review of publically available information. This information complements the primary data gathered through the multiple waves of the survey and provides some assurance that the research findings are an accurate reflection of Canada’s domestic health ICT sector.

ASSUMPTIONS AND CONSIDERATIONS

Data gathered from the industry consultation, as well as latest available GDP and revenue data produced by Statistics Canada and historic trends in inflation rates are taken into account to measure the economic impacts presented in this report. The impact analysis aggregates the collected data with weights by company size applied. The final estimates are reported in 2015 dollars.

The methodology detailed above forms the core analytical framework to address the key research questions:

<table>
<thead>
<tr>
<th>Analytical framework</th>
<th>Research questions</th>
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<th>Key informant / SME interviews</th>
<th>Secondary data</th>
<th>Literature review</th>
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<tr>
<td></td>
<td>The direct and indirect employment levels and trends</td>
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<td>The educational and earning profiles of the workforce</td>
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<td>Innovation and outlook (e.g. patents, business expansion, R&amp;D expenditure) of companies</td>
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<td>The economics of health ICT: contribution to GDP, share of the overall ICT sector, export volume and share</td>
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3. WORKFORCE PROFILE AND IMPACT

The adoption of ICTs in healthcare in Canada and internationally has resulted in a significant number of jobs being created in Canada’s domestic health ICT sector. Our survey findings indicate that the domestic health ICT sector labour market includes technical and non-technical positions in micro start-up companies, in growing small and medium companies (SMEs), and in large corporations.

HEALTH ICT WORKFORCE PROFILE CURRENT STATE – SURVEY FINDINGS

Despite the fact that large multinational companies were excluded from this study, the domestic ICT sector consists of many small companies. Based on survey responses, we estimate that two-fifths (61 per cent) of Canada’s domestic health ICT companies are micro with fewer than 10 employees; 29 per cent of the companies have between 10 and 49 employees; six per cent of the domestic health ICT companies have between 50 and 100 employees, while four per cent have more than 100 employees. Canada’s overall ICT sector consists of more micro companies (85 per cent), but fewer small companies with 10 and 49 employees (12 per cent). Given that international firms with large presence in Canada’s health ICT sector have been excluded from this analysis, these estimates should be considered as preliminary insight into Canada’s domestic health ICT sector company size.

Companies by employee size in Health ICT sector

<table>
<thead>
<tr>
<th>Company size</th>
<th>Health ICT*</th>
<th>ICT</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 10</td>
<td>61%</td>
<td>85%</td>
</tr>
<tr>
<td>10 to 49</td>
<td>29%</td>
<td>12%</td>
</tr>
<tr>
<td>50 to 100</td>
<td>6%</td>
<td>2%</td>
</tr>
<tr>
<td>100+</td>
<td>4%</td>
<td>2%</td>
</tr>
</tbody>
</table>

*Based on survey responses
Source: ICTC, 2015

The workforce in Canada’s domestic health ICT sector can be divided into technical and non-technical roles. Technical positions range from software engineers to programmers to testers to user interface (UI) designers. Non-technical roles range from marketing, sales, management, human resources, and administrative support. Survey responses indicate that three in every five jobs are technical roles in Canada’s domestic health ICT sector, and the other two in five are non-technical roles. Canada’s domestic health ICT sector – particularly in technical positions – is highly skilled, requiring a higher level of education than the overall Canadian workforce. Seventy-five per cent of the technical workforce in Canada’s domestic health ICT sector has post-secondary education, with 52 per cent...
holding a bachelor’s degree or higher. In contrast, 61 per cent of the overall Canadian workforce has post-secondary education, with 28 per cent holding a bachelor’s degree or higher.

**Educational attainment in Health ICT**

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Canada</th>
<th>Health ICT Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post secondary education</td>
<td>61%</td>
<td>75%</td>
</tr>
<tr>
<td>Bachelor’s degree or higher</td>
<td>28%</td>
<td>52%</td>
</tr>
</tbody>
</table>

Source: ICTC, 2015

Employees in Canada’s domestic health ICT sector earn on average $73,000 per annum, compared to national average earnings of $52,000. The highest earners in the sector are technical professionals, who on average earn $81,000 per annum. Non-technical professionals in Canada’s domestic health ICT sector earn $58,000 on average.

**Average earnings (per annum)**

<table>
<thead>
<tr>
<th>Category</th>
<th>Earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health ICT technical jobs</td>
<td>$81,000</td>
</tr>
<tr>
<td>Health ICT non technical jobs</td>
<td>$58,000</td>
</tr>
<tr>
<td>Health ICT sector</td>
<td>$73,000</td>
</tr>
<tr>
<td>Canada</td>
<td>$52,000</td>
</tr>
</tbody>
</table>

Source: ICTC, 2015
HEALTH ICT WORKFORCE PROFILE FUTURE OUTLOOK – SURVEY FINDINGS

Canada’s domestic health ICT companies responding to the survey indicated that employment in this sector will continue to increase, as five in six respondents (82 per cent) expect health ICT employment to increase in their companies in the next year, compared to no expected change in 10 per cent of companies.

**Anticipated hiring in Health ICT companies**

- **Increase 82%**
- **No change 10%**
- **Decrease 3%**
- **Don’t know / unsure 5%**

Source: ICTC, 2015

HEALTH ICT WORKFORCE ESTIMATION – ICTC MODELLING

ICTC modelling based on the survey findings and secondary data sources indicates that an estimated 47,400 professionals are currently employed in and by Canada’s domestic health ICT sector. Of them, 19,800 are employed in direct jobs (those employed by the domestic health ICT companies) and 18,100 are employed in indirect jobs (those employed by suppliers to domestic health ICT companies). An additional 9,500 induced jobs (when directly and indirectly generated incomes are spent in the broader economy) have also been created. Five of every six (83 per cent) direct jobs are full-time positions, while the other (17 per cent) are part-time or contract positions. Our estimations suggest that more than 32,000 new jobs are expected to be created in and by Canada’s domestic health ICT sector between now and 2020. The total domestic health ICT sector employment in Canada is estimated to exceed 79,000 by 2020. These labour market estimates are aligned with a recent estimate of the current employment of only health informatics (HI) and health information management (HIM) professionals in both the public and private sector at approximately 39,900 persons with a projected growth of 6,200 to 12,200 over the next five years.

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Health ICT current workforce estimation

<table>
<thead>
<tr>
<th>Direct</th>
<th>Indirect</th>
<th>Induced</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>19,800</td>
<td>18,100</td>
<td>9,500</td>
<td>47,400</td>
</tr>
</tbody>
</table>

Source: ICTC, 2015

Health ICT workforce projection

Workforce Estimation

<table>
<thead>
<tr>
<th>Present (2015)</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>47,400</td>
<td>79,000</td>
</tr>
</tbody>
</table>

Source: ICTC, 2015
4. ECONOMIC IMPACT

DOMESTIC HEALTH ICT ECONOMIC IMPACT: CURRENT STATE – SURVEY FINDINGS

Survey results show that Canada’s domestic health ICT sector has both a domestic and an international focus, as 54 per cent of survey respondents export their health ICT products and services. An estimated 64 per cent of the revenues generated by Canada’s domestic health ICT sector are domestically sourced; however nearly one-quarter (24 per cent) of revenues are from the United States and the remaining 12 per cent of revenues are generated from the rest of the world.

![Health ICT companies by clientele](chart1)

![Revenue sources for Canada’s Domestic Health ICT companies](chart2)

Source: ICTC, 2015
HEALTH ICT ECONOMIC IMPACT: FUTURE OUTLOOK – SURVEY FINDINGS

In spite of growth in recent years, survey responses indicate that Canada’s domestic health ICT companies face some challenges. The lack of desire within the healthcare sector to implement new systems is a challenge to growth indicated by more than half (59 per cent) of survey respondents. Nearly half of survey respondents also indicate that the lack of capital/investment (49 per cent) is a challenge. Lack of support from the federal government (47 per cent) and provincial/territorial governments (39 per cent) were also commonly referenced challenges to the growth of the domestic health ICT sector.

Survey question: What are some of the growth challenges your company is facing? (Please select all that apply).

Source: ICTC, 2015

HEALTH ICT WORKFORCE ESTIMATION – ICTC MODELLING

ICTC modelling, using survey and Statistics Canada data, estimated that Canada’s domestic health ICT sector generates approximately $3.4 billion in revenues annually, and makes a $1.5 billion contribution to the national GDP. The estimated average annual growth in Canada’s domestic health ICT sector has been 19 per cent since 2011, outgrowing most economic sectors in Canada. In this period, the overall Canadian economy grew by less than three per cent.

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9 Revenue to GDP ratio for the overall ICT sector in Canada is applied to estimate GDP contribution by Canada’s health ICT sector.
5. INNOVATION

HEALTH ICT INNOVATION: CURRENT STATE – SURVEY FINDINGS

Survey results indicate that Canada’s domestic health ICT sector is providing innovative tools and approaches to healthcare. About two in five (43 per cent) health ICT companies surveyed indicate that they hold their own patents and those that hold patents get approval on average, for more than one patent every two years. The majority (76 per cent) of the domestic health ICT companies that innovate through investing in research and development do so in Canada. An additional eight per cent do so in the U.S. in collaboration with American partners and/or counterparts, while 16 per cent of the domestic health ICT companies do not invest in research and development.

Source: ICTC, 2015
HEALTH ICT INNOVATION: FUTURE OUTLOOK – SURVEY FINDINGS

Survey results indicate that Canada’s domestic health ICT companies see value in investing in research and development (R&D) in the future. About two in five (in 44 per cent) companies surveyed indicate R&D expenditure is set to increase over the next three years, 35 per cent of the companies indicate R&D will remain unchanged, and the remaining 21 per cent are still unsure of their R&D course of action.

R&D strategy in domestic health ICT companies – next three years

Source: ICTC, 2015

HEALTH ICT INNOVATION ESTIMATION – ICTC MODELLING

ICTC modelling based on survey findings and secondary data suggests that Canada’s domestic health ICT sector R&D expenditures total $210 million annually.
6. ROADMAP FOR THE FUTURE

Canada's domestic health ICT sector has a lot to look forward to in 2015 and beyond. The strong growth this sector enjoyed in recent years is a robust building block, and ICTC expects Canada's domestic health ICT sector to experience growth in 2015. When health ICT companies were surveyed on how growth in revenue, innovation and productivity for their company could be supported, more than half felt that policies to support research, innovation and outreach would be helpful. Over half (54%) of respondents also feel that federal government funding of digital health technologies would be beneficial. In addition, improved stakeholder collaboration and partnership models, and updated skills policies to avoid labour and skills shortage/mismatch were also considered beneficial.

<table>
<thead>
<tr>
<th>Actions to support growth in Canada's domestic health ICT sector</th>
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<tbody>
<tr>
<td>Policy support for research, innovation, and outreach</td>
</tr>
<tr>
<td>The federal government’s increased funding of digital health technologies</td>
</tr>
<tr>
<td>Funding/incentives/subsidies provided by other stakeholders</td>
</tr>
<tr>
<td>Improved stakeholder collaboration and partnership models</td>
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<tr>
<td>Updated skills policies to avoid labour and skills shortage/mismatch</td>
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</tbody>
</table>

Source: ICTC, 2015
7. CONCLUSIONS

ICTC is pleased to have undertaken this exploratory study of Canada’s domestic health ICT sector (Digital Health in Canada: Exploratory Analysis of Canada’s Domestic Health ICT Sector). Although this study has been narrow in its scope of defining the “domestic health ICT sector” to focus solely on Canada based for-profit companies conducting business in the health ICT sector, we have uncovered important findings for future investigations. This exploratory analysis using multiple sources of data has provided evidence that the domestic health ICT sector has an impact on the overall Canadian economy including the creation of employment, generation of revenue and innovation. We hope that the findings from this study have brought to light the lack of previous work in defining and understanding Canada’s domestic health ICT sector. We also hope that this study underscores the need for further research to better define this important sector and continue to understand its impact on the overall Canadian economy.
The Information and Communications Technology Council (ICTC) is a leading not-for-profit national centre of expertise conducting research, policy development, and creating talent solutions for the digital economy.

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