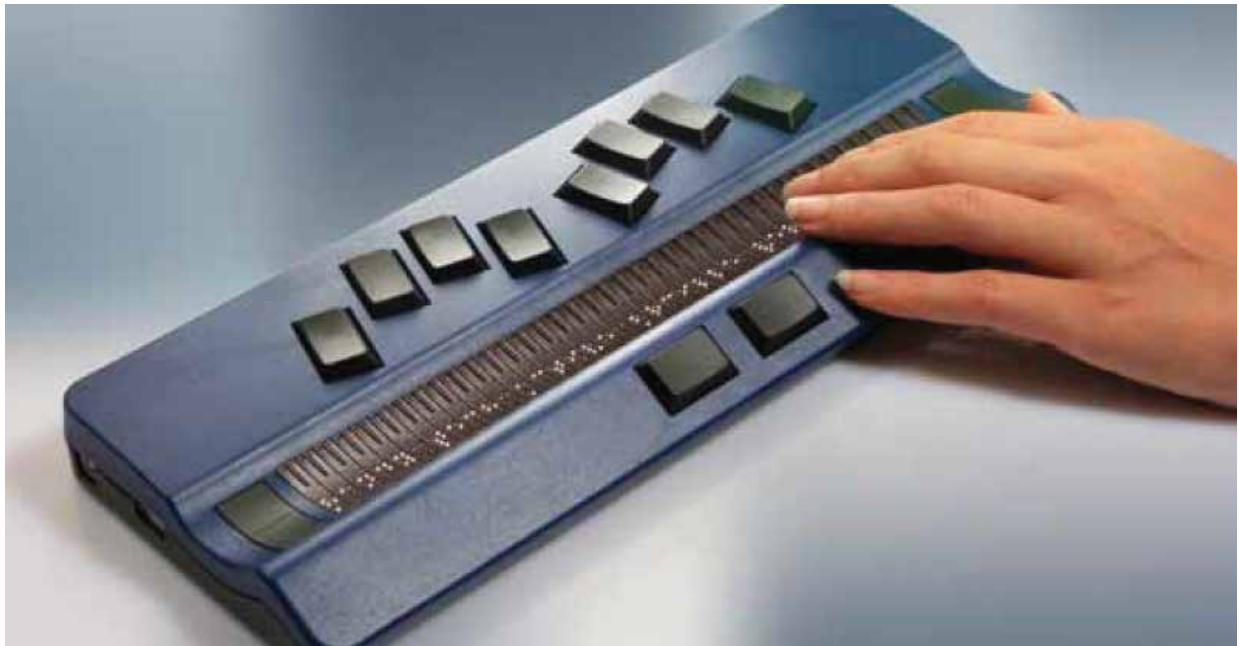

Supplementary Report
A Needs Report on
Accessible Technology



**A Discussion on Accessible, Assistive Devices
in Canada's Vision Loss Community**

A Report by the Canadian Council of the Blind (Keith D. Gordon, Ph.D.)
Submitted to the Accessible Technology Program, Department of Innovation,
Science and Economic Development

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Author Biography

Dr. Keith D. Gordon is past Vice President of Research of the Canadian National Institute for the Blind (CNIB) in Toronto, where he worked from 2007 to 2017, directing all research activities of the organization. Prior to that, he spent more than 30 years in the ophthalmic industry, where he was responsible for a wide range of research and scientific activities.

Dr. Gordon is currently the Research Director of Blind and Low Vision New Zealand (BLVNZ), where he has helped develop and direct a number of research projects, most notably a study on the prevalence of visual impairment in New Zealand and a study of the needs of BLVNZ members across a wide range of activities.

Dr. Gordon's primary research interests lie in the area of ophthalmic epidemiology; the prevention of vision loss; and Charles Bonnet syndrome, the experience of visual hallucinations by many people who undergo vision loss. He is committed to increasing awareness, in both the medical community and the general public, of this fairly common, but little known, condition.

Dr. Gordon has been a board member of, and worked with, a number of national and international organizations associated with vision. He is currently a board member of BALANCE for Blind Adults and Chair of the Board of the international organization Retina Action.

His academic qualifications include a M.Sc. in Epidemiology, a Ph.D. in Bio-organic Chemistry, and an MBA. He is an adjunct professor in the Department of Ophthalmology and Vision Sciences at the University of Toronto and an Honorary Teaching Fellow in the School of Optometry and Vision Science at the University of Auckland in Auckland, New Zealand.

Introduction

This report is meant to provide additional background material to supplement the Canadian Council of the Blind's (CCB's) *A Needs Report on Accessible Technology*.

The report is not meant to be a complete review of the full range of areas where accessible devices can positively impact the lives of people who are blind or visually impaired. It has rather focused on reviewing recent data and outlining the scope of a few areas where accessible technology has the potential to change the lives of those affected by vision loss.

Specifically, this report will address the following Requirements of the Statement of Work:

1. Comparison of *Canadian Survey on Disability (CSD) 2017* to Demographic Findings from the CCB
2. Comparison of Findings from the *CSD 2012* to the New *CSD 2017*
3. Comparison of Findings from the *CSD 2017* as Pertaining to the Accessible Technology Program (ATP)
4. Other Findings in Terms of Gaps in Support Related to Engaging in the Digital Economy

Overview

This supplementary report to the Canadian Council of the Blind's (CCB's) original *A Needs Report on Accessible Technology: Summary Report* dated April 9, 2019 recommends broadening the scope of the Accessible Technology Program (ATP) and ensuring its ongoing continuation by establishing it as a permanent program. We recommend broadening the discussion on accessible and assistive devices in Canada's vision loss community, and this can best be done by helping the ATP to evolve within its position of leadership to allow the program to better meet the needs of Canadians with disabilities—specifically, those living with blindness and vision loss.

The importance of the ATP to people with disabilities may have been underestimated. The program's positive impact on the technology sector is having a life-changing outcome on people with disabilities, particularly those with seeing disabilities. For those living with vision loss, there is no more important program. The ATP touches people with disabilities of every age and in every facet of their lives. The program's potential to positively affect their future and their quality of life has no bounds. To quote Louise Gillis, National President of the CCB: "The ATP provides hope for all of us who live with blindness, but most importantly for those of us who have been left behind."

There is an unprecedented crisis in the delivery of vision care and rehabilitation in Canada. Given our aging population, the prevalence of age-related eye disease is set to skyrocket. Vision health policies implemented by provincial and federal governments should be reevaluated to determine whether or not they are still adequate to meet the needs of the growing number of people living with vision loss. In our opinion, they are not.

The financial costs associated with vision loss are the highest direct health costs of any disease category in Canada—more than diabetes, cancer, mental disorders, respiratory diseases, arthritis, or cardiovascular disease.¹ We also know that more Canadians have age-related macular degeneration (AMD)—the leading cause of vision loss among Canadians—than have breast cancer, prostate cancer, Alzheimer's disease, and Parkinson's disease combined.² Studies show that vision loss triples the incidence of depression and quadruples the incidence of hip fractures associated with falls that drive people to emergency care. Taking into account higher absenteeism, lower employment rates, decreased earning potential, premature retirement, depression, and premature death, one estimate suggests that the annual cost of vision loss in Canada could rise to as much as \$30 billion by 2032.³

1 CNIB and Canadian Ophthalmological Society. "The Cost of Vision Loss in Canada: Summary Report." 2009.

2 CNIB. "AMD Fact Sheet."

3 The National Coalition for Vision Health. "Vision Loss in Canada 2011." 2010.
http://www.cos-sco.ca/wp-content/uploads/2012/09/VisionLossinCanada_e.pdf.

An estimated 1.5 million Canadians are living with vision loss, while an additional 5.59 million (1 in 7) have diseases that put them at significant risk of losing their vision. Moreover, vision loss is the most feared disability among Canadians.⁴ By 2023, the number of people living with vision loss is projected to double.

There is an incredibly high rate of unemployment in the blind and vision loss community, whose members continue to experience many barriers to employment and lack of access to the precursors necessary for full participation in the Canadian digital economy. These everyday barriers are complex and create vicious cycles of exclusion, preventing members of the community from reaching their full potential. At best, people living with vision loss have access to specialized technology that is costly, fragmented, lacks associated training and support, and does not interoperate with systems needed to participate fully in employment and education. This situation has negative consequences for the Canadian economy as the prevalence of vision loss within the working-age population increases.

The ATP is an essential component in addressing this problem. The *Releasing Constraints*⁵ report developed by the Martin Prosperity Institute and its partners shows the incontrovertible links between accessible education and employment and improvements in the economy. Despite being, on the whole, fiscally-conservative in their outlook, the economists participating as partners in this research report were compelled to conclude that accessibility is the single most promising investment a government could make in order to boost the economy.

The ATP plays a pivotal role in realizing this economic potential; however, while the program may continue focusing on the production of new devices as products to be purchased by consumers with vision loss, the program must take a systems approach. Lack of access to devices is not the primary barrier to employment, nor is it the reason for loss of employment. The primary barriers to employment are: (1) a reliance upon devices that lack interoperability with employment systems; (2) a lack of training; and (3) the rising cost of specialized equipment that will not benefit from economies of scale. Accessibility must become integrated into the technologies that everyone relies upon. This must be done proactively, from the emergence of the new technologies and associated practices. It is close to impossible to retrofit digital systems once they have been widely adopted.

4 Vision Critical. "Canadian Council of the Blind Summary Report." June 2011. http://ccbnational.net/docs/CCB_Report_of_Findings.pdf.

5 Martin Prosperity Institute. "Releasing Constraints: Projecting the Economic Impacts of Increased Accessibility in Ontario." 2010. <http://martinprosperity.org/wp-content/uploads/2010/06/Releasing-Constraints-Economic-Impacts-of-Increased-Accessibility-in-Ontario-1.pdf>.

Ensuring that the technologies deployed within the work environment are accessible to everyone (thereby eliminating the need for segregated assistive technologies) would benefit all employees and would lead to greater productivity. Inclusively-designed technologies would reduce the time needed for training, reduce bugs and maintenance, and improve the longevity and interoperability of the systems.

For example, a screen reader (one of the most sophisticated assistive technologies) that does not interoperate with the other systems in the workplace acts as an impediment to job performance. The fact that an employee has a screen reader leads to the assumption that their needs have been accommodated. The larger the investment in the screen reader, the more is expected of the employee with the screen reader. At the same time, the employee will be expected to keep up to date and to contribute. This will be extremely difficult, if not impossible, if new workplace technologies are not accessible and interoperable. Most employee-facing technologies are not directly accessible, nor are they interoperable with assistive technologies. This undermines any accessible employment programs and damages attitudes toward equitable employment. Unless systemic barriers are addressed, recruiting and hiring additional employees with disabilities will only set these employees up for failure.

A major challenge faced by blind and visually-impaired Canadians today is the substantial number of barriers to employment. There is an incredibly high rate of unemployment in the blind and vision loss community, and for the lucky few who are employed, everyday barriers in accessibility and technology prevent them from reaching their full potential. Some solutions are quite simple, such as getting employers and innovators to adapt accessibility into their processes from the outset.

Just consider what a difference it would make if you didn't need expensive technology to access online job application forms. Then picture what a difference it would make if you didn't have to convince hiring managers that any potential pre-conceived notions of disability and blindness are not true—that you are in fact ready, willing, and able to work. Finally, if you persisted and attained employment, consider what a difference it would make to your ability to function in the workplace if many of the existing barriers, such as inaccessible technology, no longer existed.

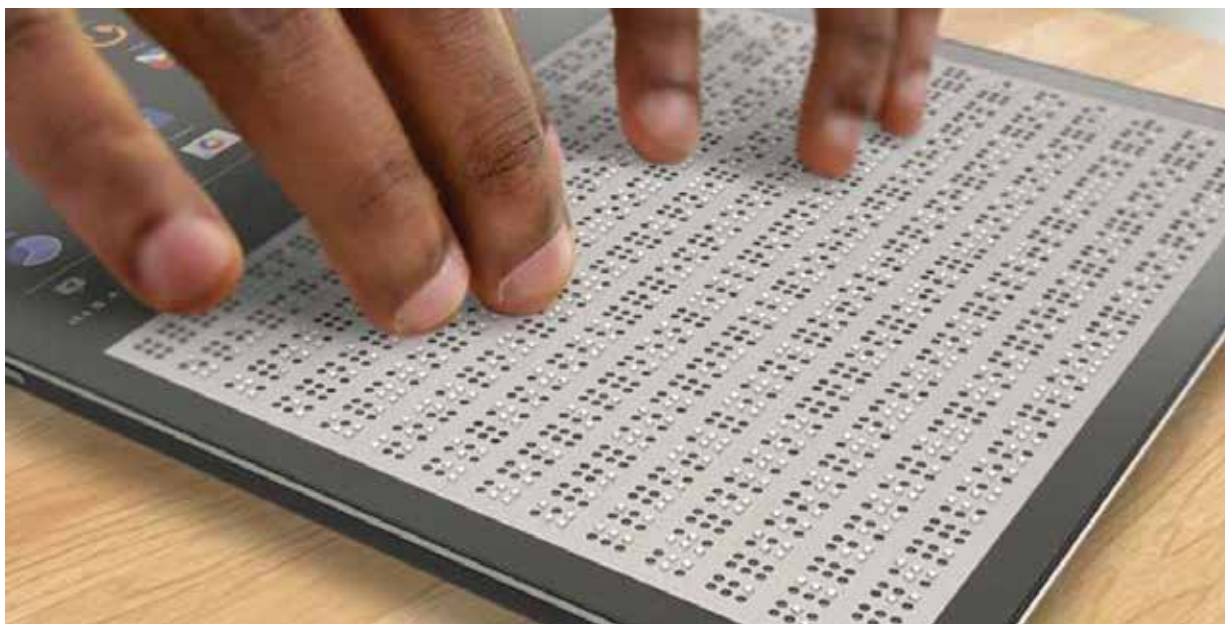
The ATP is essential to almost all commitments the government has made to equity. It is also essential to fulfilling any commitments to greater prosperity and economic sustainability for the country as a whole. However, the ATP is not sufficient in its current form. A focus on producing separate technologies to be purchased by employees with disabilities, or by employers on their behalf, should be revisited and reframed as per enclosed recommendations to better achieve the aspirations of the program.

This report has developed a full set of recommendations based on an analysis of data from the *Canadian Surveys on Disability 2012 and 2017* and the CCB's 2019 study as well as other research. A list of recommendations follows this overview.

Overall, it is our recommendation that the ATP adopt a broader and more long-term approach to ensuring that the technologies relied upon to participate in employment are accessible to all workers and potential workers. This strategy would prevent the program's outcomes from being fragmented, short-term, and in some cases counterproductive, and would allow the program to achieve its goal of increasing employment rates and keeping the increasing number of individuals with vision loss in the workforce.

The program also requires a larger investment to accompany the broader scope. Additional investments in the ATP would garner significant return. As modelled by the *Releasing Constraints* report, this investment would have a proportionately larger return—more than any other investment government could make in economic prosperity measures.

These approaches will not only benefit Canadians with blindness and vision loss, but all people with disabilities, all Canadians, and the Canadian economy. No longer should those in the seeing disability community—or anyone living with a disability, for that matter—have to rely on a charity for the support to achieve a standard of quality of life assumed by many in the sighted world.



Recommendations

Detailed Recommendations on How the Accessible Technology Program (ATP) Can Best Evolve to Meet the Needs of Canadians with Disabilities, Specifically Those Within the Vision Loss Community

A. Increasing the Scope of the ATP and Providing Additional Investment

Recommendation 1:

The ATP program should be established as a permanent program. The need for proactive intervention to ensure that emerging technologies are accessible to people with disabilities does not end. Technology is advancing exponentially. The incidence of vision loss is also increasing. The ATP is essential to support Canada's human right commitments, but also the economic welfare of Canada.

Recommendation 2:

Invest in forecasting efforts and research to determine technology trends and proactively intervene to ensure that emerging technologies and their associated practices are built accessibly from the start and that the needs of people with disabilities are included in the emerging designs.

Recommendation 3:

That the ATP be expanded in scope, recognizing that the program has the potential to play an important leadership role in cross-departmental government collaboration and meeting Canada's accessibility commitments. The ATP can assist and inform CASDO standards as they relate to technology.

Recommendation 4:

Consider only funding initiatives that enable current accessible technology to be more affordable, since cost is a major barrier to many people with a seeing disability.

Recommendation 5:

Recognizing that socio-economic barriers and cost are major factors, that the ATP advocate for the creation of a complimentary national assistive device program, dedicated to ensuring the availability of accessible and assistive technology and access to the digital economy for low-income, economically-stressed people with disabilities. This program could, for example, encourage/enable vision care professionals (i.e. optometrists, ophthalmologists, and vision rehabilitation, education, and training organizations) to prescribe accessible and assistive technologies to people with disabilities as deemed necessary, in consideration of the enormous cost barriers that assistive technologies can pose for people with disabilities, specifically those with vision loss. This measure could act as a practical method for disseminating the innovative technologies supported by the ATP and others, allowing them to reach the highest number of Canadians who are living with blindness and vision loss and have a positive impact on their quality of life.

B. Specific Program Adjustments

Recommendation 6:

That the ATP take a systems approach to accessible technologies and address the true primary barriers to employment: lack of interoperability with employment systems, lack of training, and the rising cost of specialized equipment that will not benefit from economies of scale. The ATP should help to ensure that mainstream technology is accessible. People with disabilities should not be compelled to use segregated or specialized technologies.

Recommendation 7:

That the ATP adopt a broader and more long-term approach to ensure that the technologies relied upon to participate in employment are accessible to all workers and potential workers.

Recommendation 8:

Link the ATP to Bill C-81, the Accessible Canada Act, and its associated standards efforts.

Recommendation 9:

That the ATP require potential funding recipients to indicate that their proposals, while being accessible and assistive, also include a training program/strategy relevant to those with seeing disabilities.

Recommendation 10:

That the ATP recognize in its mandate that people with seeing disabilities are more likely to require assistive, accessible technologies, including training support, than others within the disability community, and work with governments and educational institutions to develop dedicated accessible and assistive training programs designed to facilitate employment for people with seeing disabilities.

Recommendation 11:

That the ATP advocate for and proactively support, in and out of government, inclusive design in the adoption, procurement, and deployment of new technologies. That the ATP ensure that the content produced by technologies are “born accessible,” meaning they integrate the functions needed by individuals with vision loss (and other disabilities) from the very start. That support is given to accessible authoring/development tools that produce accessible content/tools/interfaces by default.

Recommendation 12:

Ensure that the technologies deployed within the work environment are accessible to everyone, without the need for segregated assistive technologies.

Recommendation 13:

Develop planning, evaluation, and monitoring tools, as well as procurement instruments, that support the integration of inclusive design in the public and private sector in Canada.

C. Inter-Governmental Collaboration and Partnerships

Recommendation 14:

That the ATP encourage and engage in regular cross-departmental collaboration, sharing of information, and sharing of best practices in order to sustain a well-connected ecosystem of support within government for Canadians with seeing disabilities. Suggested participants include, but are not limited to: Employment and Social Development Canada (ESDC), Office for Disability Issues; Employment and Social Development Canada (ESDC), Skills and Employment Branch; Treasury Board of Canada Secretariat (TBS), Office of the Deputy Minister of Public Service Accessibility; Public Services and Procurement Canada (PSPC), Acquisitions Branch, Services and Technology Acquisition Management Sector; as well as the Accessible Procurement Resource Centre and Shared Services Canada: Accessibility, Accommodations and Adaptive Computer Technology Program.

Recommendation 15:

That the ATP, in cross-departmental cooperation with the departments identified in the above Recommendation 14, advocate for the Government of Canada, an essential partner, in consultation with the seeing disability community and its stakeholders, to develop and implement a national vision health plan, as recommended by the Canadian Association of Optometrists, the Canadian Council of the Blind, the Canadian National Institute for the Blind, and Fighting Blindness Canada in their 2017 document, *The Federal Role in Eye Health and Vision Care*,⁶ with the goal of providing the best possible outcomes and quality of care and rehabilitation for Canadians who are blind and partially-sighted.

Recommendation 16:

Partner with the Canadian Digital Academy and other recognized entities to identify and integrate, where relevant, accessible and inclusively-designed practices within government.

⁶ Canadian Association of Optometrists, Canadian Council of the Blind, CNIB, and the Foundation Fighting Blindness. "The Federal Role in Eye Health and Vision Care." n.d. https://opto.ca/sites/default/files/resources/documents/federal_role_in_vision_care_final_print.pdf.

Recommendation 17:

In collaboration with other departments dealing with disabilities, approach Statistics Canada requesting that they broaden the census to provide more direct and expanded information about people with disabilities, specifically as to assuming a broader approach to demographics (including ages 1-14), employment, technology, and training, amongst others.

Recommendation 18:

Advocate for a pan-Canadian population health study on the prevalence and causation of vision loss in Canada in order to have solid data on which to base planning for the ATP.

Recommendation 19:

In collaboration with other Departments, undertake a survey of people with seeing disabilities on employment in the vision loss community, which should include, for example, questions on: job search, barriers, accessibility, inclusion, the use of assistive technology, devices, entering the digital economy, employment standards, education and training, equal opportunity, workplace bias, and more.

Recommendation 20:

That the ATP work in cooperation with the Minister(s) responsible* for the implementation of one of the Liberal Party of Canada's 2019 federal election platform commitments: More Accessible Workplaces and Schools through a new \$40 million per year national workplace accessibility fund (page 13 of the Liberal Platform).⁷ The ATP must be part of the implementation of this commitment, given the common objective of connecting disabled Canadians to the workforce and the digital economy.

**At the time of writing, the Prime Minister has yet to announce his Cabinet for the 43rd Parliament. It is the hope of stakeholders representing the vision loss community that the recent practice of appointing a Minister of Accessibility be continued.*

Recommendation 21:

That the ATP Technical Advisory Committee establish an advisory council to the ATP, which would consist of people with a seeing disability who are experts in the field of technology.

⁷ Liberal Party of Canada. "Forward: A Real Plan for the Middle Class." 2019. <https://2019.liberal.ca/wp-content/uploads/sites/292/2019/09/Forward-A-real-plan-for-the-middle-class.pdf>.

Recommendation 22:

Enlist the CCB's Get Together with Technology (GTT) Program as an outside stakeholder to conduct assessments of innovative assistive and adaptive digital devices and technologies on behalf of the blind and low-vision community. The GTT Program has the ability, through its national membership, to assess hardware and software solutions, providing feedback on feasibility and potential improvements to ATP investments dedicated to helping Canadians with disabilities overcome workplace barriers in the way of not just employment but gainful and meaningful employment.

Recommendation 23:

Work with employers and technology companies to understand how technology could make the workplace more accessible while seeking the development of an accessible workstation, which could be a standard for all employees and not just those with a seeing disability.

Recommendation 24:

Work with people with seeing disabilities to establish their real needs. Very often, people with seeing disabilities don't know what could be available until they meet with device or software developers who can open up the technological world for them. Only fund the development of technology that employs people who are blind or visually-impaired as part of the development team, as their knowledge would be very useful to the ATP.

Recommendation 25:

Consult organizations such as the International Federation on Ageing (IFA) in the development of new technology. The *Canadian Survey on Disability 2017* clearly identifies the growing number of aging people with a seeing disability. New technologies need to take into account that many older people may not be as savvy with respect to the use of technology.

Recommendation 26:

Consider international collaboration with blindness organizations and vision rehabilitation organizations. Employees within these organizations have an outstanding knowledge of current technology and technology needs that will help their members or clients.

Executive Summary

This report is a supplementary report to the Canadian Council of the Blind's *Needs Report on Accessible Technology*⁸ which reported on the needs of Canadians with a seeing disability, focusing primarily on assistive and adaptive technologies. The goals of the current report were to delve into the Statistics Canada *2017 Canadian Survey on Disability*⁹ (CSD 2017) and compare its findings with those of the CCB *Needs Report* as well as the *Canadian Survey on Disability 2012*.¹⁰ In addition, this report was tasked with identifying any gaps that currently exist with respect to the use of assistive technology by people with seeing disabilities and to make recommendations for improvement of the Accessible Technology Program (ATP).

1. Comparison of *Canadian Survey on Disability (CSD) 2017* to Demographic Findings from the CCB

The *CSD 2017*² reported that there were 1.5 million people in Canada over the age of 15 with a seeing disability, 59% of whom were women. This number compares with 56.4% reported in the *CSD 2012*. The slight preponderance of women in the seeing disability community is consistent with epidemiological data for the major eye diseases, which are primarily associated with aging.

The *CSD 2017* reported that people with a seeing disability represented 5.4% of the population over the age of 15 and 9.7% of the older population over the age of 65. The *CSD 2017* also reported that 35% of people with a seeing disability were over the age of 65. This was consistent with 33% reported for this population in the CCB *Needs Report*.¹ In light of the overall aging of the Canadian population, this means that the ATP needs to pay special attention to aging in the development of new assistive technology.

8 Canadian Council of the Blind. "A Needs Report on Accessible Technology. Summary Report." April 9, 2019. [http://ccbnational.net/docs/A_NEEDS_REPORT_\(GCV\)-april_10-HR\[1\].pdf](http://ccbnational.net/docs/A_NEEDS_REPORT_(GCV)-april_10-HR[1].pdf).

9 Morris, Stuart, Gail Fawcett, Laurent Brisebois, and Jeffrey Hughes. "Canadian Survey on Disability – Reports A Demographic, Employment and Income Profile of Canadians with Disabilities Aged 15 Years and over, 2017." Statistics Canada. <https://www150.statcan.gc.ca/n1/pub/89-654-x/89-654-x2018002-eng.htm>.

10 Bizier, Christine, Ricardo Contreras, and Alyssa Walpole. "Canadian Survey on Disability, 2012 Seeing Disabilities among Canadians Aged 15 Years and Older, 2012." Statistics Canada, February 29, 2016. <https://www150.statcan.gc.ca/n1/pub/89-654-x/89-654-x2016001-eng.htm>.

2. Comparison of Findings from the *CSD 2012* to the New *CSD 2017*

a. The Number of People with a Seeing Disability

The *CSD 2017* cautions against a direct comparison of data from the *CSD 2017* to the *CSD 2012*. The reason for this is that the methodology involved with *CSD 2017* is entirely different from *CSD 2012*. This being said, the *CSD 2017* reported that there were 1.5 million people with a seeing disability in Canada, representing 5.4% of the population. These numbers compare with 756,000 people with a seeing disability or 2.8% of the population reported in the *CSD 2012*. In the absence of any full scale population health study on blindness in Canada, the 1.5 million number for people with a seeing disability should form the basis for planning in the near future.

The *CSD 2017* reported that most people with a seeing disability also had another co-occurring disability. Almost all disabilities were less prevalent in the 2017 survey compared with the 2012 survey. This decrease may just be due to a change in methodology in the 2017 survey.

b. Employment by the Numbers

The *CSD 2017* reported the percentage of people of working age (15–64) who were not employed was 44.7%. This compares with 62.4% of people with a seeing disability aged 15–64 who were not employed as reported by *CSD 2012*. The *CCB Needs Report* found that 63% of the population studied were not employed in 2018. The non-employment rate for people with any disability showed a substantial drop from 53% in *CSD 2012* to 39.6% in *CSD 2017*. In 2017, 38.6% of the total Canadian population was not employed.¹¹

Clearly, there is a large difference between the number of people with a seeing disability who are not employed and the number of people not employed among the population of people with any disability or the total population.

¹¹ Statistics Canada. “Labour Force Characteristics, Monthly, Seasonally Adjusted and Trend-Cycle, Last 5 Months.” <https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=1410028701>.

c. Barriers to Employment Due to Accessibility Issues

i. Lack of Availability of Accessible Technology

Various studies reported here linked lack of availability of accessible technology as being a barrier to gaining and advancing unemployment. The *CSD 2012* reported that among adults with a seeing disability who were employed, or had been recently employed, 15.5% reported having a need for a modified workstation. Of these, 60.6% said that their requests for modification were unmet. Clearly there is a need for a universally accessible workstation that would not require special modification by employers.

The *CSD 2012* also reported that 19% of people with a seeing disability not in the labour force reported accessibility issues as being a major discouragement for their seeking work.

A recent study conducted by CNIB¹² also reported that 58% of Canadians considered workplace inaccessibility to be a barrier to employment. This study also reported that 48% of people with seeing disabilities who were surveyed cited technology barriers as a reason for their not getting promoted to management positions and further identified the use of newer and mainstream assistive devices and software as being more likely to be associated with transition into management positions. Finally, the *CCB Needs Report* reported that 55% of people with a seeing disability who were not employed faced barriers to employment due to lack of access to assistive technology, while 43% faced barriers due to lack of web accessibility.

ii. Lack of Training as a Barrier to Employment

The *CSD 2012*, *CCB Needs*, and CNIB studies all identified lack of training as a barrier to employment, with the *CSD 2012* and *CCB* studies both identifying lack of training on accessible technology as being an issue for many people with seeing disabilities. It is important that all new technologies include extensive training for people with a seeing disability.

The *CCB* study reported that only 35% of respondents said that they had adequate training in the use of accessible devices, with 30% having no training at all. 31% of respondents said that they would rate themselves as beginners in the use of accessible devices specifically related to employment.

12 CNIB. "International Levels of Employment Study." November, 2018. <https://cnib.ca/en/news/survey-shows-blind-people-significantly-underemployed-around-world?region=on>.

iii. Transportation as a Barrier to Employment

The *CSD 2012* reported that 27% of people not in the labour market said that lack of local jobs was a barrier to their gaining employment. Affordable wayfinding technology coupled with training in its use will make a big difference to people being able to commute to work.

d. Education Attainment of People with Seeing Disabilities

The *CSD 2017* reported that 21.7% of adults aged 15–64 with a seeing disability had not graduated high school compared with 14.1% of adults with any disability. The *CSD 2012* reported lower levels of education attainment with 23.3% of people with a seeing disability not having graduated from high school compared to 13.1% for people without a disability. The CCB study reported higher levels of education attainment than the *CSD 2012* and *CSD 2017* studies. It is highly likely that a major reason for this difference between people with a seeing disability and those without a disability is the lack of availability of accessible learning materials, although this link has not been studied.

Both the *CSD 2017* and *CSD 2012* asked people a number of questions related to the impact of their disability on their educational experience. People reported a long list of aspects of their education that were affected by their disability. For all factors reported, the percentage of people reporting was lower in 2017 compared with the same factor in 2012.

3. Comparison of Findings from the *CSD 2017* as Pertaining to the Accessible Technology Program (ATP)

The *CSD 2017* study reported that 84% of people with a seeing disability use one or more aids or assistive devices.¹³ The top three devices reported were eye glasses or contact lenses (77%), magnifiers (26%), and large print reading materials (18%), although a large number of other devices were also reported, many of which were not electronic or digital. However, an examination of the complete array of devices used by people with a seeing disability reported in the CCB *Needs* study shows that people with a seeing disability use a wide variety of devices and, like people without a disability, rely heavily on computers and smartphones. More research is needed to dig deeper into the reasons that people use particular devices, what they use them for, and how well they are trained in their use. The *CSD 2017* and CCB *Needs* reports are really just scratching the surface. Devices and technology have transformed the lives of people with seeing disabilities. It is important that we understand their needs and methods in the planning for development of new technologies.

¹³ Statistics Canada. “Canadians with a Seeing Disability, 2017.” 2019.
<https://www150.statcan.gc.ca/n1/en/pub/11-627-m/11-627-m2019071-eng.pdf?st=AC1mtuzG>.

4. Other Findings in Terms of Gaps in Support Related to Engaging in the Digital Economy

The largest gap in terms of people with a seeing disability engaging in the digital economy is the lack of accessibility of many websites and materials available on the internet.

Website and software developers need to learn how to develop a fully accessible website and we all need to learn what constitutes a fully accessible document.

This report identifies areas where accessible technology could play a role in alleviating many of the problems experienced by people with a seeing disability. Some of this can be achieved by:

- Reducing falls and fractures by use of devices that improve mobility and sense physical barriers;
- Facilitating independent living through technologies that enable one to utilize appliances around the house, negotiate one's way indoors and outdoors, and access the internet;
- Facilitating engagement with the community through technologies that allow one to be mobile outdoors, use transport, and use digital technology to connect with others;
- Facilitating ease of everyday living through technologies that help with reading, navigation, and home management;
- Facilitating diabetes management; and
- Reducing the cost of assistive devices, making them accessible to more people as per the development of the Orbit refreshable Braille reader.

This report also presents reviews of currently available accessible devices. In particular:

- A review that presents the full spectrum of currently available devices and categorizes them into three groups: visual enhancement devices, visual substitution devices, and visual replacement devices;¹⁴
- Reviews of mobile technology devices;^{15,16} and
- Technology assisted white cane.¹⁷

14 Elmannai, Wafa, and Khaled Elleithy. "Sensor-Based Assistive Devices for Visually-Impaired People: Current Status, Challenges, and Future Directions." *Sensors* 17, no. 3 (October 2017): 565. <https://doi.org/10.3390/s17030565>.

15 Hakobyan, Lilit, Jo Lumsden, Dymrna O'Sullivan, and Hannah Bartlett. "Mobile Assistive Technologies for the Visually Impaired." *Survey of Ophthalmology* 58, no. 6 (2013): 513–28. <https://doi.org/10.1016/j.survophthal.2012.10.004>.

16 Chanana, Piyush, Rohan Paul, M. Balakrishnan, and Pvm Rao. "Assistive Technology Solutions for Aiding Travel of Pedestrians with Visual Impairment." *Journal of Rehabilitation and Assistive Technologies Engineering* 4 (2017): 1–16. <https://doi.org/10.1177/2055668317725993>.

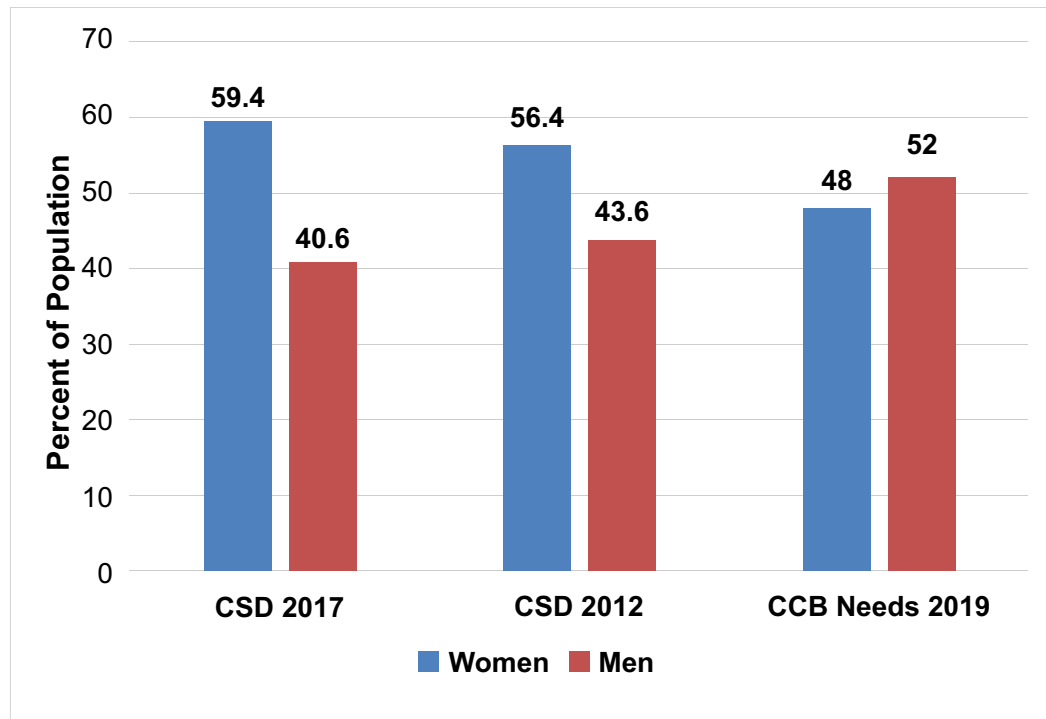
17 Khan, Izaz, Shah Khusro, and Irfan Ullah. "Technology-Assisted White Cane: Evaluation and Future Directions." *PeerJ* 6 (October 2018). <https://doi.org/10.7717/peerj.6058>.



1. Comparison of *Canadian Survey on Disability (CSD) 2017* to Demographic Findings from the CCB

The *2017 Canadian Survey on Disability (CSD 2017)*¹⁸ reported that there were 1.5 million Canadians with a seeing disability, 59.4% of whom were women (Figure 1). The CCB *Needs Report* showed a slightly higher prevalence of men in the sample surveyed. The reason for this difference is unclear. Most major eye diseases causing blindness are slightly more prevalent in women.

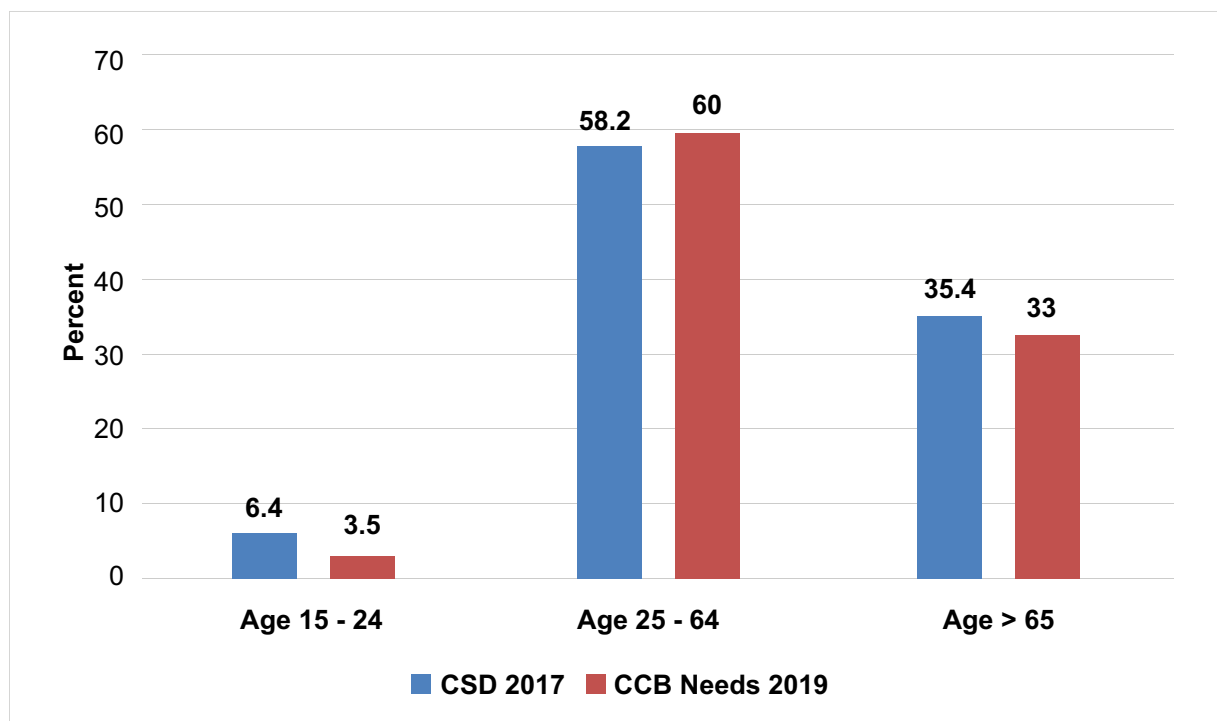
Figure 1. Prevalence of Seeing Disability in Canada by Gender



¹⁸ Statistics Canada. "Canadian Survey on Disability, 2017." November 28, 2018. <https://www150.statcan.gc.ca/n1/daily-quotidien/181128/dq181128a-eng.htm>.

The prevalence of seeing disability in both the *CSD 2017* and the *CCB study* was shown to increase with age (Figure 2) with about one third of the vision loss being in the >65 age group

Figure 2. Percentage of People with a Seeing Disability by Age



The *CSD 2017* study showed that people with a seeing disability represented 5.4% of the population over the age of 15, while the percentage of people over the age of 65 with a seeing disability was almost double this number at 9.7%. The development of new technologies for people with a seeing disability needs to take into account the fact that one third of people with a seeing disability are over the age of 65 and that this percentage is increasing due to the aging of the population in total and the fact that most major eye diseases causing vision loss are diseases associated with aging. The development of new assistive technologies can play a major role in ameliorating the negative consequences that vision loss may bring to people in their later years.

2. Comparison of Findings from the CSD 2012 to the New CSD 2017

a. Blindness and Visual Impairment in Canada

The *CSD 2017* showed that 5.4% of the population aged 15 or older (1.5 million people) had a seeing disability. This represents an extremely large increase in the previously reported number in *CSD 2012*, which was 756,000 people or 2.8% of the population. This large increase can be mainly attributed to the change in methodology used by the *CSD 2017*. In fact, the *CSD 2017* cautions against comparing the *CSD 2017* numbers for people with a seeing disability to those of the *CSD 2012*.

It is difficult to know whether this number is an accurate reflection of the number of people with a seeing disability in Canada. There has been no full-scale population health study on vision loss conducted in Canada. The epidemiological data that does exist has largely been projected from major population health studies conducted in other countries. The results from the various studies are shown in Table 1. What is immediately clear from the great variation in estimates of vision loss in Canada is that there is a serious need for a Canadian population health study in order to improve planning for eye care and for programs such as the ATP.

Table 1. Studies on Prevalence of Visual Impairment in Canada

Study	Age Group	Number of Canadians with Visual Impairment (Thousand)	% of Age Group Studied with Visual Impairment
<i>Canadian Survey on Disability 2017</i>	> 15	1,520	5.4
<i>Canadian Survey on Disability 2012</i>	>15	756	2.8
<i>Prevalence and Determinants of Visual Impairment in Canada: Cross-Sectional Data from the Canadian Longitudinal Study on Aging¹⁹</i>	45–85	1,000	5.7
<i>The Cost of Vision Loss in Canada 2007^{20,21}</i>	Total population	817 ⁱ	2.5
National Coalition for Vision Health 2016 ²²	>40	483	2.6

19 Aljied, Rumaisa, Marie-Josée Aubin, Ralf Buhrmann, Saama Sabeti, and Ellen E. Freeman.

“Prevalence and Determinants of Visual Impairment in Canada: Cross-Sectional Data from the Canadian Longitudinal Study on Aging.” *Canadian Journal of Ophthalmology* 53, no. 3 (2018): 291–97. <https://doi.org/10.1016/j.jcjo.2018.01.027>.

20 Cruess, Alan F., Keith D. Gordon, Lorne Bellan, Scott Mitchell, and M. Lynne Pezzullo. “The Cost of Vision Loss in Canada. 1. Methodology.” *Canadian Journal of Ophthalmology* 46, no. 4 (2011): 310–14. <https://doi.org/10.1016/j.jcjo.2011.07.001>.

21 Cruess, Alan F., Keith D. Gordon, Lorne Bellan, Scott Mitchell, and M. Lynne Pezzullo. “The Cost of Vision Loss in Canada. 2. Results.” *Canadian Journal of Ophthalmology* 46, no. 4 (2011): 315–18. <https://doi.org/10.1016/j.jcjo.2011.06.006>.

22 Buhrmann, Ralf, Jil Beardmore, Amy Bovell, Ralf, William Hodge, Beth Lowcock, and Irene Pan. “Foundations for a Canadian Vision Health Strategy.” The National Coalition for Vision Health, January 2007.

b. Co-occurring Disabilities

The *CSD 2017* reported that most people with a seeing disability were also experiencing at least one additional disability. This is the case for all ages. The co-occurring disabilities experienced by people with a seeing disability by age group are shown in Table 2. This Table also shows the corresponding numbers from *CSD 2012*. In virtually all cases, the percentage of people reporting a disability has decreased from 2012 to 2017.

Table 2. Prevalence of Co-occurring Disability Types Among Canadians with a Seeing Disability Aged 15 Years and Over by Disability Type and Age Group, 2017 and 2012

Co-occurring Disability Type with Seeing	% of 15–24 Year-Olds Studied		% of 25–64 Year-Olds Studied		% of Those 65 Years and Over Studied	
	<i>CSD 2017</i>	<i>CSD 2012</i>	<i>CSD 2017</i>	<i>CSD 2012</i>	<i>CSD 2017</i>	<i>CSD 2012</i>
Developmental	12.7	29.6	6.0	7.3	2.0	2.3
Learning	41.9	51.5	24.4	32.4	13.9	18.8
Memory	23.2	36.3	26.1	31.6	22.7	28.3
Mental Health Related	50.0	49.7	40.5	47.2	17.6	25.2
Physical	42.7	65.9	75.7	83.8	84.9	87.4
Hearing	11.4	15.4	23.2	28.9	47.8	46.1

c. The Cost of Vision Loss in Canada

While the cost of vision loss is not a specific requirement of the statement of work for this report, it is discussed here as the costs reported in these studies give an indication of the magnitude of the financial impact of vision loss to the Canadian economy. It also provides an idea of what unemployed people with a seeing disability cost the economy. For this reason, discussion of the cost of vision loss is inserted here as a preamble to discussions on employment of people with a seeing disability. In a study conducted by CNIB,²³ the total cost of vision loss in Canada was estimated to be \$19.1 billion in 2012. This cost includes direct health costs of \$11 billion, and indirect costs of \$8.1 billion. The total cost represents a 20.8% increase over the total cost of vision loss in 2007, while the direct health costs showed an increase of 28% over the direct health costs in 2007. The indirect costs, which are mostly due to unemployment, showed an increase of 12.5% over the same period.

The CNIB study of 2007 estimated the cost of assistive aids and home modifications at \$305 million. This was largely due to canes and Braille devices. Electronic devices had not been taken up to any significant extent at that time. Since 2007 the number of devices available for people with a seeing disability has mushroomed, so that this value can be expected to be much greater in 2019 and the types of devices would be very different. Unfortunately, this information is not available for Canada.

d. Employment

The ATP has used an unemployment number from the *CSD 2012* as a base number for its overall goals. The *CSD 2012* reports that 47% of working age adults with any disability aged 15–64 were employed in 2011, meaning that 53% were not employed. It is assumed that it is this number that was used by the ATP to set a goal of reducing the number of people not employed from 51% in 2011 to 47% in 2017. The number of people not employed is a reasonable benchmark for assessing the effectiveness of the ATP, however care should be taken not to refer to this number as “unemployment”, as the rate of unemployment constitutes the percentage of people looking for work who are unable to find work. In the case of the disabled and seeing disabled, many people have given up looking for work for a whole host of reasons. The percentage of people not employed is thus a good measure for the ATP to use.

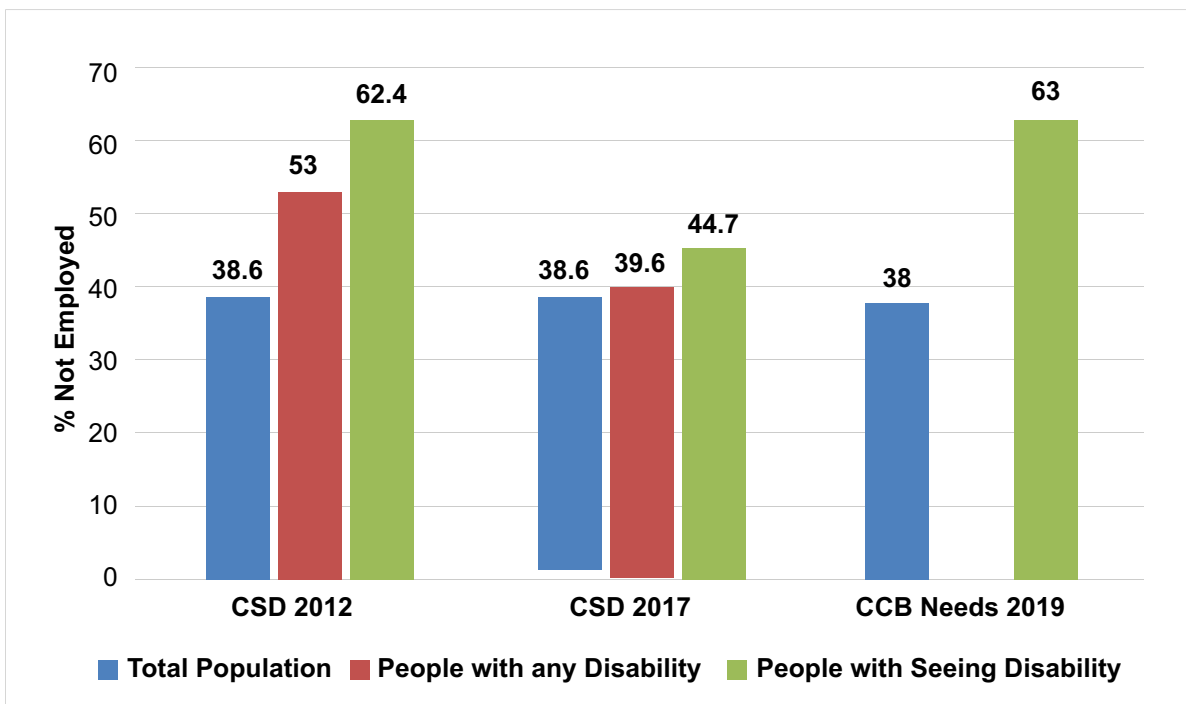
23 CNIB. “The Cost of Vision Loss in Canada 2012.” Quoted in Canadian Association of Optometrists Pre-Budget Submission 2016. January 22, 2016. https://opto.ca/sites/default/files/resources/documents/cao_pre-budget_submission_january_2016_final.pdf.

The *CSD 2017* showed that the percentage of people aged 15–64 with a seeing disability who were not employed in 2017 was 44.7%. This represents a substantial decrease compared to the 62.4% rate of people with a seeing disability who were not employed reported by the *CSD 2012* (Figure 3).

The *CCB Needs Report* found that 63% of the population studied were not employed in 2018. The non-employment rate for people with any disability showed a substantial drop from 53% in *CSD 2012* to 39.6% in *CSD 2017*. A comparison of the rates of non-employed people with a seeing disability with that of the general population and people with any disability is shown in Figure 3.

It should be noted here that the CSD survey methodology from 2012 to 2017 has changed so it is unlikely that the changes shown here represent as large a trend as might be indicated.

Figure 3. Percentage of People Not Employed: People with Seeing Disability, People with Any Disability, and the Total Population



e. Barriers to Employment Due to Accessibility Issues

The *CSD 2012* reported that among adults with a seeing disability who were employed, or had been recently employed, 15.5% reported having a need for a modified workstation. Of these, 60.6% said that their requests for modification were unmet. Clearly there is a need for a universally accessible workstation that would not require special modification by employers.

The *CSD 2012* also reported that 19% of people with a seeing disability not in the labour force reported accessibility issues as being a major discouragement for their seeking work.

The CNIB study reported that 58% of Canadians considered workplace inaccessibility to be a barrier to employment. This study compared this finding with that of Australia where the number was considerably lower at 43%. This study also reported that 48% of people with seeing disabilities who were surveyed cited technology barriers as a reason for their not getting promoted to management positions. It further identified the use of newer and mainstream assistive devices and software (e.g., screen readers, smartphones, custom computers, and artificial vision) as being more likely to be associated with transition into management positions.

The *CCB Needs* study reported that 55% of people with a seeing disability who were not employed faced barriers to employment due to lack of access to assistive technology, while 43% faced barriers due to lack of web accessibility.

i. Barriers Due to Lack of Training in Use of Accessible Devices

The *CSD 2012* and CNIB studies did not specifically address the issue of training in the use of accessible devices, however the *CSD 2012* did report that 27% of people not in the labour force felt that the main reason for this was lack of adequate training though this was not specific to training in the use of accessible devices. The *CCB* study reported that only 35% of respondents said that they had adequate training in the use of accessible devices, with 30% having no training at all. 31% of respondents said that they would rate themselves as beginners in the use of accessible devices specifically related to employment.

ii. Transportation as a Barrier to Employment

The *CSD 2012* reported that 27% of people not in the labour market said that the lack of local jobs was a barrier to their obtaining employment. While no recent Canadian survey has studied the impact of transportation on employment of people who are visually impaired, it is reasonable to predict that new wayfinding technology will make it easier for people to get to work and will therefore have an impact in terms of increasing employment levels.

iii. Other Employment Issues

The *CSD 2012* reported that 55.6% of people with a seeing disability who had been in the labour market felt that employers regarded them as disadvantaged at work. 10–14% believed they were refused a job interview, refused a job, or refused a promotion because of their disability. Anecdotally we know that many employers are unaware that people with a seeing disability supported by the appropriate accessible technology and software are able to do virtually anything a sighted employee can do. Education of employers is essential if full employment opportunities are to be available to all people with a seeing disability.

f. Education Levels of People with a Seeing Disability

There have been a number of surveys conducted in Canada that compared levels of educational attainment of people who are blind or have visual impairment with those of people without a seeing disability (Figure 4). Both the *CSD 2017* and the *CSD 2012* reported that adults with a seeing disability had lower levels of educational attainment than those without a disability.

The *CSD 2017* study reported that 40.8% of people with a disability felt left out of the education system while 37.4% experienced bullying at school or in post-secondary institutions. People with a seeing disability reported a long list of issues that directly or indirectly affected their education attainment (Table 3). In general, the percentage of people reporting these issues was lower than those responding to similar questions in *CSD 2012*.

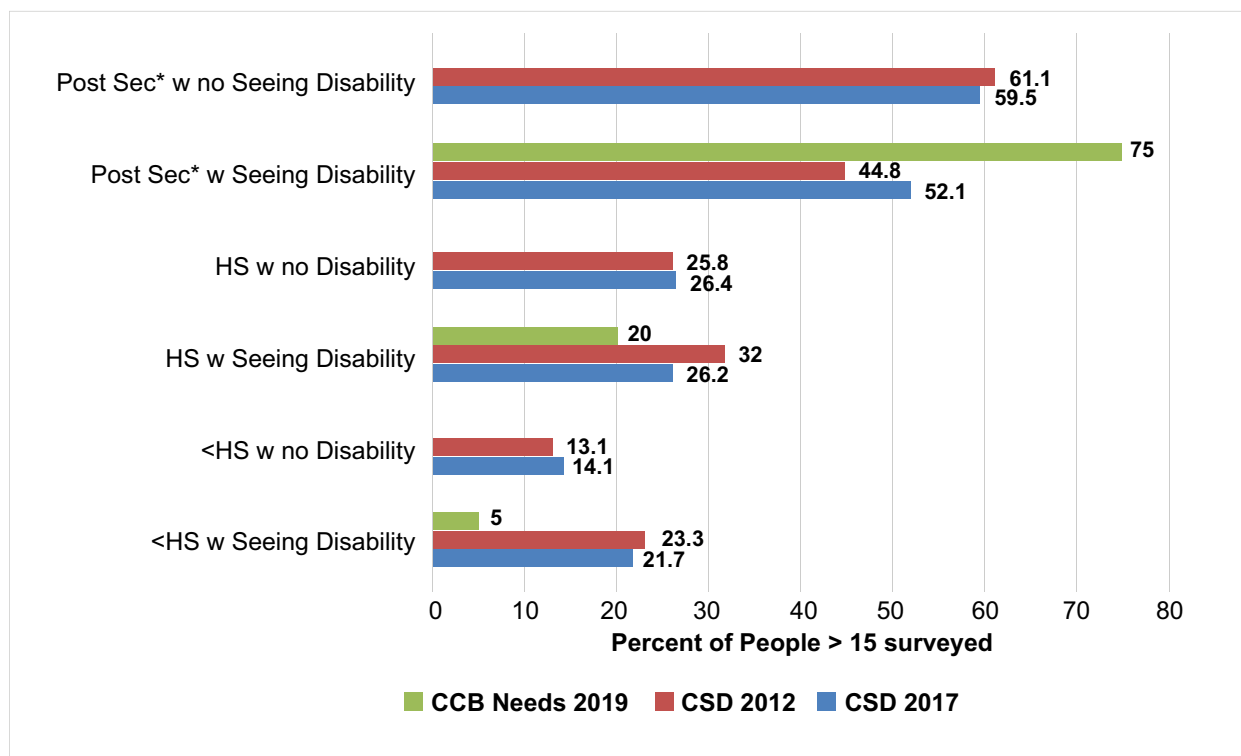
Table 3. Effect of Disability on Educational Experiences of Adults Aged 15 or Over with a Seeing Disability

Because of One or More of Your Conditions, You...	<i>CSD</i> 2017 %	<i>CSD</i> 2012 %
Felt left out	40.8	N/A*
Experienced bullying	37.4	39.5
Choice of courses/career influenced	36.8	67.7
Took fewer courses or subjects	35.8	51.8
Took longer to achieve present level	35.4	43.6
Changed course of studies	29.8	48.1
Returned to school for retraining	29.7	45.8
Took courses by correspondence/online/home study	26.6	N/A*
Were avoided at school	26.5	46.3
Changed schools	26.0	N/A*
Had education interrupted for long periods of time	25.9	43.8
Had additional expenses for schooling	24.6	31.9
Discontinued due to condition	23.7	37.4
Began school later than people your age	18.8	N/A*
Attended special education school/classes	18.0	32.4
Had to leave community to attend school	18.0	N/A*
Discontinued due to lack of assistive devices or support services	7.8	N/A*

* Question not asked

The *CSD 2012* study also showed that a majority (88.0%) of people said that their educational experiences were directly impacted by their disability. The *CCB Needs* study reports much higher levels of education attainment than both the *CSD 2012* and the *CSD 2017* studies. It is not clear what the reason for this discrepancy is.

Figure 4. Highest Level of Education Attainment for People with a Seeing Disability



Post-secondary graduation includes trade certificates, college diplomas, university certificate below bachelor level, as well as university degrees.

People with a seeing disability are highly dependent on assistive technology for acquiring their education. Barriers to acquisition of the same accessible learning materials as their sighted co-students can be many. A few of these are listed below:

- Much of the material available on the internet is not accessible to people with a seeing disability. The assumption is often made that everyone can access anything on the internet;
- The cost of software and accessible technology is often high and may not be affordable by everyone;
- Teachers and professors may have inadequate knowledge of accessible software and materials;
- Lack of availability of Braille books; and
- Lack of availability of Braille notes at the same time as sighted students get their notes.

The net result of these and other barriers is that people with a seeing disability do not attain as high a level of education as their sighted colleagues. This is clearly reflected in the statistics from *CSD 2012* and *CSD 2017*.

3. Comparison of Findings from the *CSD 2017* as Pertaining to the Accessible Technology Program (ATP)

Because of the fast pace of technological innovation, studies older than 5 years must be considered of little use with respect to improving our understanding of assistive device usage. For this reason, the only two studies to be considered here are the *CSD 2017* and the *CCB Needs* study 2019.

The *CSD 2017* study reported that 84% of people with a seeing disability use one or more aids or assistive devices. The top three devices reported were eye glasses or contact lenses (77%), magnifiers (26%), and large print reading materials (18%). The full range of aids identified by respondents is shown in Table 4.

Table 4. Type of Vision-Related Aids Used by Canadians with a Seeing Disability Aged 15 Years and Over (*CSD 2017*)

Type of Vision-Related Aid Used	Percent
Eye glasses or contact lenses	77.4
Magnifiers	25.5
Large print reading materials	17.6
Dark lined paper or dark lined pens	10.2
A device with oversized buttons	6.1
A white cane or identification cane	4.1
Audio or described video for television programs	3.5
Recording equipment or portable note-taking device	2.6
Closed-circuit device	1.4
Braille reading materials or manual Braille	0.5
Another aid or assistive device	7.7

It is recommended that questions more related to current technology be asked when the next CSD is conducted in order to evoke responses that better reflect the higher technology devices currently in use by people with a seeing disability.

The CCB *Needs* study 2019 showed that the assistive technologies most used by respondents in this survey were a white cane (69%); a smartphone (68%) and a screen reader for a computer (PC or Mac) (52%); followed by a talking book player/app (51%); large print (39%); a computer tablet (36%); and GPS systems (34%). The full list of devices identified in the survey is shown in Figure 5. There are clearly differences in responses to devices most commonly used in the *CSD 2017* survey compared with the CCB 2019 survey. This is probably due to the difference in the way the question was asked in each survey.

The CCB *Needs* study 2019 also asked people which assistive technologies they needed to achieve employment or for a successful career. The three most needed products were a smartphone (37%), artificial intelligence (32%), and a screen reader for PC or Mac (27%). A complete list of products used by respondents is shown in Figure 6.

As mentioned previously, the CCB *Needs* study clearly identified the need for training in the use of assistive technology. The study reported that 35% of people had received training in the use of assistive technology, 30% received no training, and 35% received some training. 30% of respondents rated their level of proficiency with employment related assistive technology as beginner level, 45% as intermediate, and 25% as advanced.

Figure 5. Assistive Technologies Currently Used (CCB Needs Study 2019)

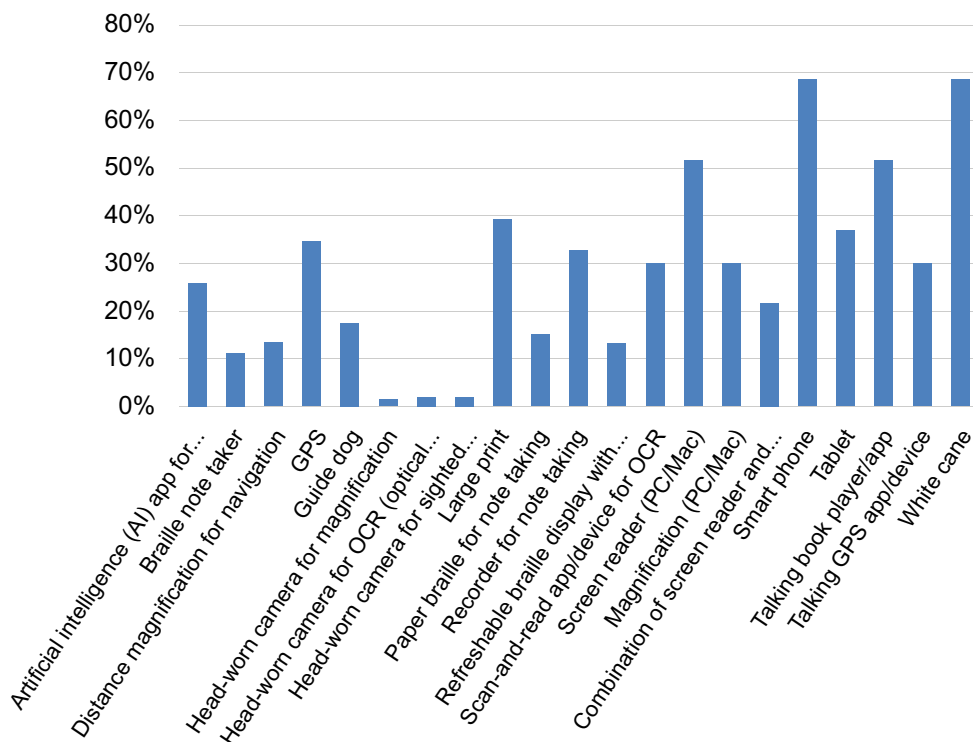
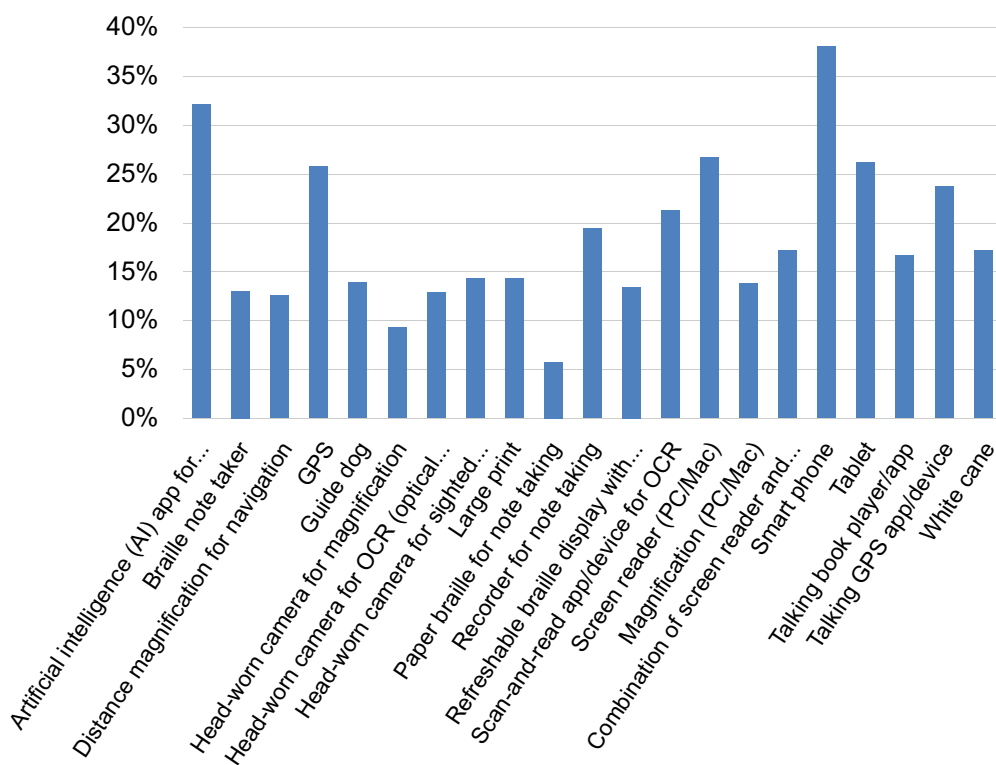


Figure 6. Assistive Technologies Needed to Acquire/Learn for Successful Career or Achieving Employment (CCB Needs Study 2019)



4. Other Findings in Terms of Gaps in Support Related to Engaging in the Digital Economy

The following list identifies some of the gaps that could be filled by new assistive devices, both in terms of new devices as well as new technology that would facilitate full participation in the digital world by people with a seeing disability. This is not meant to be an exhaustive list but rather a list that highlights some of the major needs experienced by people with a seeing disability.

This section also provides a few reviews of currently available assistive devices that are currently addressing some of these needs.

a. The Prevention of Falls and Accidents

Compared to people who are sighted, visually impaired people experience twice the risk of falls²⁴ and four times the risk of serious hip fractures.²⁵ A study on the frequency of falls of people with vision loss²⁶ reported an extremely high risk of experiencing a head level accident or fall among people with vision loss, with 13% of respondents experiencing head-level accidents at least once per month and 7% experiencing falls while walking at least once a month. Devices that facilitate mobility and signal barriers facing people will undoubtedly play a major role in minimizing falls and accidents.

24 Klein, Barbara E.K., Scot E. Moss, Ronald Klein, Kristine E. Lee, and Karen J. Cruickshanks.

“Associations of Visual Function with Physical Outcomes and Limitations 5 Years Later in an Older Population.” *Ophthalmology* 110, no. 4 (2003): 644–50.
[https://doi.org/10.1016/s0161-6420\(02\)01935-8](https://doi.org/10.1016/s0161-6420(02)01935-8).

25 Klein, Barbara E.K., Ronald Klein, Kristine E. Lee, and Karen J. Cruickshanks. “Performance-Based and Self-Assessed Measures of Visual Function as Related to History of Falls, Hip Fractures, and Measured Gait Time.” *Ophthalmology* 105, no. 1 (1998): 160–64.
[https://doi.org/10.1016/s0161-6420\(98\)91911-x](https://doi.org/10.1016/s0161-6420(98)91911-x).

26 Manduchi, Roberto and Sri Kurniawan. “Mobility-Related Accidents Experienced by People with Visual Impairment.” *Insight: Research and Practice in Visual Impairment and Blindness* 4 (2011): 1–11.

b. Facilitating Independent Living

Compared to people who are sighted, people who are visually impaired have twice the difficulty with daily living,²⁷ have greater difficulty in reading medication labels and adhering to medication regimens,^{28,29} and are admitted to nursing homes three years earlier on average.³⁰ Assistive technology can help in overcoming some of the problems people experience within their homes, enabling them to be more independent. Assistive technology can link people to the internet and enable them to connect with the rest of the world. However, it should be recognized that much of the internet is not fully accessible to people with a seeing disability. Advocacy and regulation is going to be necessary to achieve full internet accessibility. New assistive technology could make accessibility of the internet easier and facilitate connection of people with a seeing disability with the digital world.

c. Facilitating Engagement with the Community Compared to People Who Are Sighted

Visually impaired people experience three times as much clinical depression³¹ and have twice as much social dependence.³² Assistive devices can improve levels of depression and social dependence by assisting people with visual impairment to get out of their houses and integrate more into the community.

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- 27 Crews, John E., and Vincent A. Campbell. "Vision Impairment and Hearing Loss Among Community-Dwelling Older Americans: Implications for Health and Functioning." *American Journal of Public Health* 94, no. 5 (2004): 823–829. <https://doi.org/10.2105/ajph.94.5.823>.
- 28 Smith, Miranda, and Trista Bailey. "Identifying Solutions to Medication Adherence in the Visually Impaired Elderly." *The Consultant Pharmacist* 29, no. 2 (January 2014): 131–34. <https://doi.org/10.4140/tcp.n.2014.131>.
- 29 Leat, Susan J., Abinaya Krishnamoorthy, Antonio Carbonara, Deborah Gold, and Carlos Rojas-Fernandez. "Improving the Legibility of Prescription Medication Labels for Older Adults and Adults with Visual Impairment." *Canadian Pharmacists Journal / Revue Des Pharmaciens Du Canada* 149, no. 3 (November 2016): 174–84. <https://doi.org/10.1177/1715163516641432>.
- 30 Centre for Eye Research Australia and Access Economics. "Centrally Focused: The Impact of Age-Related Macular Degeneration." 2006. https://www.cera.org.au/wp-content/uploads/2013/12/CERA_access_amd.pdf.
- 31 Rovner, Barry W., and Mary Ganguli. "Depression and Disability Associated with Impaired Vision: The MoVIES Project." *Journal of the American Geriatrics Society* 46, no. 5 (1998): 617–19. <https://doi.org/10.1111/j.1532-5415.1998.tb01080.x>.
- 32 Ke, K. M, A.-M. Montgomery, M. Stevenson, C. Oneill, and U. Chakravarthy. "Formal and Informal Care Utilisation amongst Elderly Persons with Visual Impairment." *British Journal of Ophthalmology* 91, no. 10 (2007): 1279–81. <https://doi.org/10.1136/bjo.2006.113142>.

d. Reading, Navigation, and Home Management

A recent study by Nguyen et al.³³ assessed the needs of 878 individuals using the Aira on-demand wearable assistive technology, which utilizes a glasses-mounted video camera that connects to a live agent when required who then assists the individual with a specific task. The three main categories of needs for assistance demonstrated by this study were reading, navigation, and home management.

Of the large array of reading assistive devices, which ones are best? The answer to this question is given by a systematic review reported recently³⁴ on the use of assistive devices for reading. This review assessed the efficacy of a wide range of reading devices, ranging from optical devices such as magnifiers to stand-mounted devices (CCTV) as well as head-mounted devices and electronic devices with the camera mounted in a “mouse.” The review came to the conclusion that there was little evidence to support the use of one device over another in terms of increasing overall reading speed. Like many other choices of assistive technology, the choice of device is an individual one.

e. Assistive Devices for Diabetes Management

Nearly all patients with Type 1 diabetes and 60% of those with Type 2 diabetes develop some form of diabetic retinopathy during the first 20 years they have the disease. Most vision loss from diabetic retinopathy can be avoided through managing glucose levels, exercise, early detection, and treatment. Yet despite the extremely high need for devices to be accessible to people with visual impairment, a review conducted in 2016 by Heinemann et al.³⁵ concluded that very few devices for managing diabetes are suitable for use by people who are visually impaired or blind. There is clearly an opportunity here for the Accessible Technology Program to encourage the development of accessible devices for use by people with vision loss due to diabetic retinopathy.

33 Nguyen, Brian J., William S. Chen, Allison J. Chen, Andrew Utt, Emily Hill, Ryan Apgar, and Daniel L. Chao. “Large-Scale Assessment of Needs in Low Vision Individuals Using the Aira Assistive Technology.” *Clinical Ophthalmology Volume 13* (2019): 1853–68. <https://doi.org/10.2147/ophth.s215658>.

34 Virgili, Gianni, Ruthy Acosta, Sharon A. Bentley, Giovanni Giacomelli, Claire Allcock, and Jennifer R. Evans. “Reading Aids for Adults with Low Vision (Review).” *Cochrane Database of Systematic Reviews*, 2018. <https://doi.org/10.1002/14651858.cd003303.pub4>.

35 Heinemann, Lutz, Diana Drossel, Guido Freckmann, and Bernhard Kulzer. “Usability of Medical Devices for Patients with Diabetes Who Are Visually Impaired or Blind.” *Journal of Diabetes Science and Technology* 10, no. 6 (2016): 1382–87. <https://doi.org/10.1177/1932296816666536>.

f. Refreshable Braille Readers for People with a Seeing Disability

Refreshable Braille readers open up the world to blind people in that they may be regarded as a portable connection to the digital world. The problem is that they have been affordable by very few blind people. With this as the driving force, the World Blind Union, supported by people from a number of their member organizations, worked with a manufacturer to develop an affordable Braille reader. What emerged was the Orbit Reader, which was able to be sold at a fraction of the cost of existing readers, opening up the digital world to many people with vision loss.

g. Reviews of Assistive Devices for People with a Seeing Disability

i. Elmannai and Elleithy, in an extremely wide-ranging and detailed review, divide assistive devices for people who are blind or visually impaired into three categories: visual enhancement devices, visual substitution devices, and visual replacement devices. The number of currently available devices in each category is large and it is beyond the scope of the current report, however, this review is interesting for anyone wanting to get a good idea of the breadth and depth of the range of assistive devices.

ii. Mobile Technology

The use of technology associated with smartphones has dramatically changed the lives of people with visual impairment. A review by Hakobyan et al. concluded that every blind or visually impaired person had individual needs for mobility, orientation, and navigation that had to be recognized and accommodated in the innovation and design process of mobile assistive devices.

Another recent review by Chanana et al. assessed a wide range of currently marketed mobile technology devices and concluded that user needs assessment for the development of new devices requires the close involvement of users from the initial to final validation stages.

iii. Technology-Assisted White Cane

While the traditional white cane is the mainstay of mobility for people who are visually impaired, many devices have been created to enhance the ability of the cane to detect barriers and assist wayfinding. One review of these devices is that of Khan et al.

Conclusion

The recommendations contained herein should be adopted and implemented. Most importantly, the Accessible Technology Program (ATP) should be established as a permanent program. The need for proactive intervention to ensure that emerging technologies are accessible to people with disabilities, specifically in the case of those with vision loss, does not end. Technology is advancing exponentially, as is the increasing prevalence of vision loss across the age spectrum, but even more so with our growing seniors population. The ATP should continue to play what is an essential role in the development of accessible and assistive technology, which in turn breaks down socio-economic barriers confronting people with disabilities and has a positive effect on not only economic welfare but also Canada's commitments to human rights.

Assistive technology facilitates participation of people with vision loss in all aspects of society. As this supplementary report indicates, in our figures for employment and education we still have a ways to go to reach the stage where people with vision loss are educated and employed with a standard of economic independence at the same level as those in the sighted population. New assistive devices will continue to improve the lives of people in the vision loss community. Encouragement of the development of these devices through programs like the ATP has the potential to enable a quantum leap to be made with respect to the ultimate goal of changing what it means to be blind.



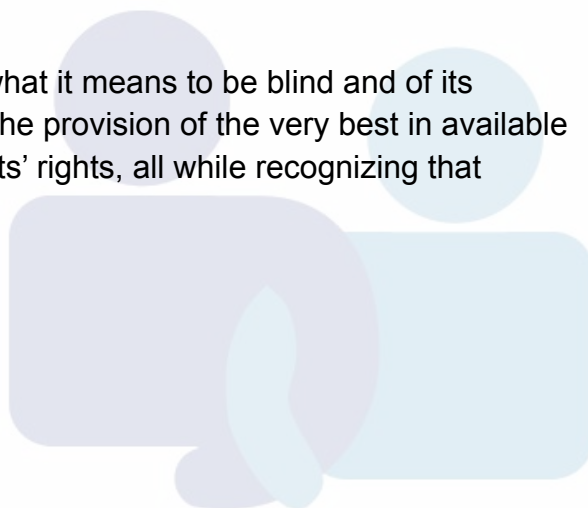


About the CCB

The Canadian Council of the Blind (CCB) is the “Voice of the Blind™” in Canada. Founded 75 years ago in 1944 by returning blind veterans and schools of the blind, the CCB is a membership-based registered charity that brings together Canadians who are blind, living with vision loss, or deaf-blind through chapters within their own local communities that provide the opportunity to share common interests and social activities. The CCB works tirelessly to improve the quality of life for persons with vision loss through advocacy, awareness, peer mentoring, sports adapted for persons with vision loss, and the promotion of health and fitness.

The CCB works with several national organizations of and for the blind, health care organizations, various accessibility committees, and international organizations all dedicated to improving the well-being of those living with vision loss. Through these relationships, we all come to a better understanding of the barriers faced by those living with vision loss in our great country.

The CCB is proud of these efforts to change what it means to be blind and of its leadership role through initiatives that call for the provision of the very best in available medical treatments and the fostering of patients’ rights, all while recognizing that blindness and vision loss are preventable.





CONTACT INFORMATION

MICHAEL BAILLARGEON
Special Advisor, Government
Relations and Special Projects
Tel. 416 651 2102
ambaillargeon@rogers.com

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CANADIAN COUNCIL OF THE BLIND NATIONAL OFFICE
20 James St. Suite 100, Ottawa, ON K2P 0T6