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INNOVATION POLICY FOR PEOPLE WITH DISABILITIES

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INNOVATION POLICY BRIEF

INNOVATION POLICY LAB, MUNK SCHOOL OF GLOBAL AFFAIRS, UNIVERSITY OF TORONTO

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Canada 

Project undertaken with the financial
support of the Government of Canada
provided through Global Affairs Canada

Innovation Policy for People with Disabilities

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This Policy Brief was made possible with the assistance of the Government of Canada. We thank Global Affairs Canada for their generous support

Technological innovation has been recognized by governments worldwide as a key policy area for driving forward sustained economic growth. What is less of a focus is the distributional outcomes of innovation policy, particularly how it can be profitably employed to include traditionally disadvantaged groups. The Government of Canada has recognized the importance of all sectors working together through its “Inclusive Innovation” agenda.¹ However, there is not a specific focus on how innovation can reach marginalized populations. Comparatively, in November of last year, the United States White House co-hosted a Disability and Inclusive Technology Summit with the American Association for Persons with Disabilities (AAPD). At the time, the United States Chief Technology Officer championed inclusive technological innovation for all.²

This policy brief investigates government innovation policy that supports a steadily growing and often marginalized group in society: People with Disabilities (PWD).³ This brief surveys existing government activities related to technological innovation for PWD to determine barriers and opportunities. Alongside Canada, this brief consulted practices in Israel, the United States, and other countries in order to understand their influence as states at the forefront of technological innovation. In addition, qualitative interviews with key stakeholders in each sector were conducted in order to obtain a deeper understanding of the interaction between government policy and technological innovation for PWD. These interviews have informed the subsequent sections of this brief.

This brief makes the following recommendations:

- Government should evaluate all relevant policy systematically through an accessibility lens.
- Government initiatives to support innovation should better include commercial firms.
- Government should support inclusive design principles through regulation.
- An interdepartmental government program or research center specializing in innovation for PWD should be created.

¹ Innovation, Science and Economic Development Canada. (2016). *Positioning Canada to lead: An inclusive innovation agenda*. Retrieved from the Government of Canada website: <http://news.gc.ca/web/article-en.do?nid=1084739>

² McFarland, F. (2016, December 20). White House Disability and Inclusive Technology Summit. *The American Association of People with Disabilities*. Retrieved from <http://www.aapd.com/white-house-disability-inclusive-technology-summit/>

³ This brief will focus predominantly on PWD experiencing physical disabilities, whether acquired through medical condition or due to aging.

Background

PWD make up nearly 14% of Canada's population over the age of 15.⁴ A 2009 OECD study found PWD are twice as likely to be unemployed than people living without disabilities across developed countries (Figure 1).⁵ Employed PWD more often experience precarious work. As a result, they are more likely to have low incomes. In a majority of OECD countries, "poverty risks of PWD have increased faster than for the rest of the working-age population" (Figure 2).⁶ Many of the specific issues faced by PWD are associated with limitations regarding mobility and communication.

What does technological innovation for PWD mean?

This brief defines technological innovation as the creation of ground breaking novel technologies or the significant adaptation of existing technologies. It is useful to think about technological innovation enabling PWD in two ways. First, as consumers and second, as producers in the labour market. While a specific product of innovation might enable PWD as consumers and producers simultaneously, an emphasis on the producer-side is justified because of its potential positive impact on the economy.

In interviewing stakeholders across sectors, it is evident that there is no singular understanding of how technological innovation can be used to support PWD. Similarly, different organizational mandates mean stakeholders have varying goals. Not-for-profits tend to focus on advocating government for increased accessibility through regulation and standard-setting. On the other hand, academic laboratories are more experimental. Yet, they face constraints in bringing products to market. These differences challenge possibilities for coordination.

Why state involvement is necessary

Is technological innovation for PWD a necessary policy arena for state intervention? It could be the case that the market is sufficiently serving this subset of the population without government intervention. PWD are potential consumers and producers and as such they present business opportunities for firms that innovate for this market niche. There is indeed evidence of private sector investment in this area. For example, in 2015, the Google Impact Challenge pledged \$20 million

⁴ Statistics Canada. (2013). *Canadian survey on disability*. Retrieved from the Government of Canada website: <http://www.statcan.gc.ca/pub/89-654-x/89-654-x2013001-eng.pdf>

⁵ OECD Directorate for Employment, Labour and Social Affairs. (2009). *Sickness, disability and work: Keeping on track in the economic downturn*. Background Paper for the High-Level Forum. Retrieved from <https://www.oecd.org/els/emp/42699911.pdf>

⁶ Ibid, p. 13.

USD in grants to 29 non-profit organizations using technology to tackle accessibility challenges.⁷ Alternatively, eSight is a Toronto-based corporation who developed a patented, assistive eye-wear device for visually impaired individuals.⁸ These examples illustrate the variation in participation and support from the private sector. However, aggregate research on the degree to which investment occurs is limited.

There are three fundamental reasons why the private sector is unlikely to satisfy the needs of PWD without government support of innovation.

1. PWD are a niche market

The market appeal of serving PWD is reduced by the fact that they constitute 14% of the population. In addition, labeling PWD as only one market is misleading. There are infinitely different ways in which individuals might experience their disabilities. For example, disabilities might impact mobility, hearing, vision, or any combination of the three. This implies that even if in the aggregate PWD constitute a large share of the population, their specific disabilities fragment them into many different market niches which require the development of different products.⁹ For this reason, the economic potential of any given product might be limited due to its specificity.

2. High uncertainty makes for risky investments

In general, any attempt to innovate contains high risk due to the uncertainty involved. This risk is exacerbated by the fragmentation of the PWD market. For this reason, governments address, in effect, a market failure of technical and market uncertainty by supporting innovation.

3. Global market and local adaptation

Markets tend to be global, however technology absorption and adaptation is local. Exclusive reliance on foreign-bought technologies runs the risk that absence of firsthand knowledge of a technology's production would result in diminished ability to adapt said technologies to local circumstances. The size of the US market is substantially larger than Canada's, with an estimated 56 million PWD with a total disposable income of \$175 to \$220 billion USD.¹⁰ This is compared to 4 million Canadian PWD with a total disposable income of \$25 billion CAD.

⁷ Google Impact Challenge: Disabilities. (n.d.). Retrieved February 12, 2017, from <https://www.google.org/impactchallenge/disabilities/>

⁸ eSight: Technology. (2017). Retrieved from <http://www.esighteyewear.com/learn-more/what-is-esight>

⁹ Mandelstam, M. (1997). *Equipment for older or disabled people and the law*. U.K., Jessica Kingsley Publishers.

¹⁰ Salah, H. & Chung, H-D. (2013). Towards an accessible future: Ontario innovators in accessibility and universal design. MaRS Market Insights. Retrieved from <https://www.marsdd.com/wp-content/uploads/2014/01/Towards-an-Accessible-Future-Ontario-Innovators-in-Accessibility-and-Universal-Design1.pdf> and

Opportunities

Despite the above barriers, there is a sizeable market opportunity in focusing technological innovation for PWD. A report by MaRS Discovery District, a not-for-profit corporation in Toronto, estimates a total \$8 billion USD market size of innovative products for PWD in Canada and the US.¹¹ This is made up of markets for vision and reading aids (\$717.2 million USD), mobility aids (\$1,140.04 million USD), and environmental aids (\$27.2 million USD). They compare this market to the potential opportunity within Universally Designed products and services, valued at over \$2,000 billion USD.

There are significant positive outcomes related to developing innovative assistive technologies. This includes enabling PWD to better take advantage of social opportunities, but also to integrate with more ease into the workforce.¹² Increases in PWD employment constitute a positive externality in the sense that beyond employer and worker utility, a component of social benefit also emerges due to higher accessibility rates. Therefore, supporting the development of assistive technologies is a way in which governments can address social inequalities and promote aggregate economic growth.

Recent developments in design thinking present an opportunity to cater to a wider market, inclusive of PWD. Principles of Universal Design (UD) have existed since the 1950s, yet have recently gained traction within innovation spaces.¹³ Universal Design refers to the design of products, environments, services and programs that can be usable by the largest portion of a population possible.¹⁴ This limits the need for companies to produce specialized or adapted designs. There are 7 principles of UD including: equitable use, flexible in use, simple and intuitive in use, perceptible information, tolerance for error, low physical effort, and size and space for approach. While universal design addresses markets that go beyond PWD, other technological developments focus on specific design at lower costs. An example of the latter is the use of 3D-Printing for PWD. Thingiverse, an online community for 3D product design, is leveraging the technology to construct 3D-printed assistive devices for the PWD community.¹⁵ Both universal and customized developments in the nature of

Donovan, R. (2013). *Sustainable value creation through disability*. Fifth Quadrant Analytics. Retrieved from <http://returnondisability.com/wp-content/uploads/2012/09/The%20Global%20Economics%20of%20Disability%20-%202013%20Annual%20Report.pdf>

¹¹Salah & Chung, 2013.

¹² Czaja, S. & Moen, P. (2004). *Technology and employment*. National Research Council (US) Steering Committee for the Workshop on Technology for Adaptive Aging; Editors: Richard W Pew and Susan B Van Heme. Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK97338/>

¹³ Institute for Human Centered Design. (2016). *History of universal design*. Retrieved from <https://www.humancentereddesign.org/universal-design/history-universal-design>

¹⁴ Institute for Human Centered Design. (2016). *History of universal design*. Retrieved from <https://www.humancentereddesign.org/universal-design/history-universal-design>

¹⁵ 3D printed exoskeleton giving people with disabilities another chance. (2014, Jul 31). GE Reports. Retrieved from <http://www.gereports.com/post/93498253523/13795/>

innovation allow for major steps forward. It should be noted that UD is not a silver bullet for accessibility and can in fact pose significant challenges when implemented without comprehensive guidelines. Interviewees discussed the potential pitfalls of regulating UD, including the lack of detail on what constitutes UD leading to well-intended, but poorly executed assistive devices. Instead, they suggest principles of Inclusive Design (ID), which aim to shift from a one-size-fits-all approach to a one-size-fits-one for everyone approach. ID puts accessibility at the center by ensuring the “full range of human diversity” is considered in the design process.¹⁶

Current Efforts

Technological innovation for PWD as a whole does not appear to be discussed across policy sectors. Current efforts tend to target accessibility issues through legislation or standard-setting, rather than through innovation policy. As a result, there is not a consensus on how technological innovation for PWD might be incentivized in practice. Canada, Israel and most other middle-and-high-income countries have made strides over recent decades in increasing accessibility for PWD at home, in public and in the workplace. These efforts, at times involved support for innovation and were instigated by different ministries and government agencies. Between July 2016 and February 2017, the Canadian federal government is running a consultation with Canadians on accessibility legislation.¹⁷ Technology initiatives concerning accessibility have been sponsored by the Ministry of Innovation, Science, and Economic Development; Ministry of Sports and Persons with Disabilities; and the Ministry of Employment, Workforce, and Labour. It should be stressed that there is no one organizational focal point in government responsible for coordinating these efforts horizontally at the federal level or linking them vertically to the provincial level.

One form in which government encourages accessibility is through the use of regulation. For example, in 2005, the Ontario government introduced the Accessibility for Ontarians with Disabilities Act (AODA). The AODA was applauded worldwide as a leader in implementing “proactive, enforceable, compliance-based accessibility legislation.”¹⁸ Similarly, independent administrative tribunals such as the Canadian Radio-Television and Telecommunications Commission (CRTC) are responsible for standard-setting with regards to accessibility.

While standards are definitely an important instrument, their limitations as a vehicle for promoting technological progress, especially when innovation is concerned, should be recognized. First, requiring employers to innovate is a tall order, especially for small firms. For example, Uber partnered with the Canadian Hearing Society to expand employment for deaf drivers through

¹⁶ Inclusive Design Research Centre. (n.d.) *What do we mean by Inclusive Design?* Retrieved from IDRC website <http://idrc.ocadu.ca/index.php/resources/idrc-online/library-of-papers/443-whatisinclusivedesign>.

¹⁷ Employment and Social Development Canada. (2016). *Consulting with Canadians on planned accessibility legislation*. Retrieved from the Government of Canada website: <https://www.canada.ca/en/employment-social-development/programs/disability/consultations/accessibility-legislation/audio.html#k2.3>

¹⁸ Salah & Chung, 2013.

flashing trip requests and trip only communication. Yet, Uber has the capital to undertake this kind of initiative. Smaller firms may not have the same resources. Second, regulation typically cannot require those regulated to achieve results that depend on utilizing technology not yet in existence. For example, American regulation concerning closed captioning on TV in the 1990s were possible due to the technological developments that occurred for a twenty year period beforehand.¹⁹ In other words, regulators are constrained to the present in terms of their technological assumptions. This constraint is not applicable to incentives that could be marshalled to create novel technologies.

Another common way in which the government encourages innovation for PWD is through the extension of grants, tax exemptions and even support in kind (e.g., use of government labs) to projects associated with developing assistive technologies. For example, government grants are important to sustain the work of the Inclusive Design Research Centre at the Ontario College of Art and Design and the Intelligent Assistive Technology and Systems Lab at the University of Toronto. These organizations, as well as not-for-profit organizations that work with government such as the Neil Squire Society, play an important role in creating assistive technologies in Canada. The Government of Ontario subsequently raises the profile of this niche market through the Accessibility Innovation Showcase and Tech Pitch Competition. This event, hosted by Ontario Centres of Excellence (OCE) in partnership with the Accessibility Directorate of Ontario (ADO) and the Ministry of Research, Innovation and Science (MRIS), connects business networks to companies with market-ready innovations.

However, innovation and support for PWD are often considered as two separate policy arenas, as evidenced by little systematic effort across the different levels of government as well as government ministries to promote innovation for PWD. As a result, initiatives to date have been sporadic and uncoordinated. In this respect, Israel may offer an alternative model in which a specific program dedicated to innovation for PWD has emerged. Being housed under the Israel Innovation Authority, the Assistive Technology for the Disabled program offers the prospects of a steady funding stream, high level of coordination across government departments and a productive relationship with external stakeholders, such as not-for-profit and private sector bodies either involved in innovation or representing the needs of PWD.²⁰ However, to date, the program (established in 2011) has received low funding and public visibility.

Recommendations

¹⁹ History of closed captioning. (n.d.). Retrieved February 20, 2017, from <http://www.ncicap.org/about-us/history-of-closed-captioning/>

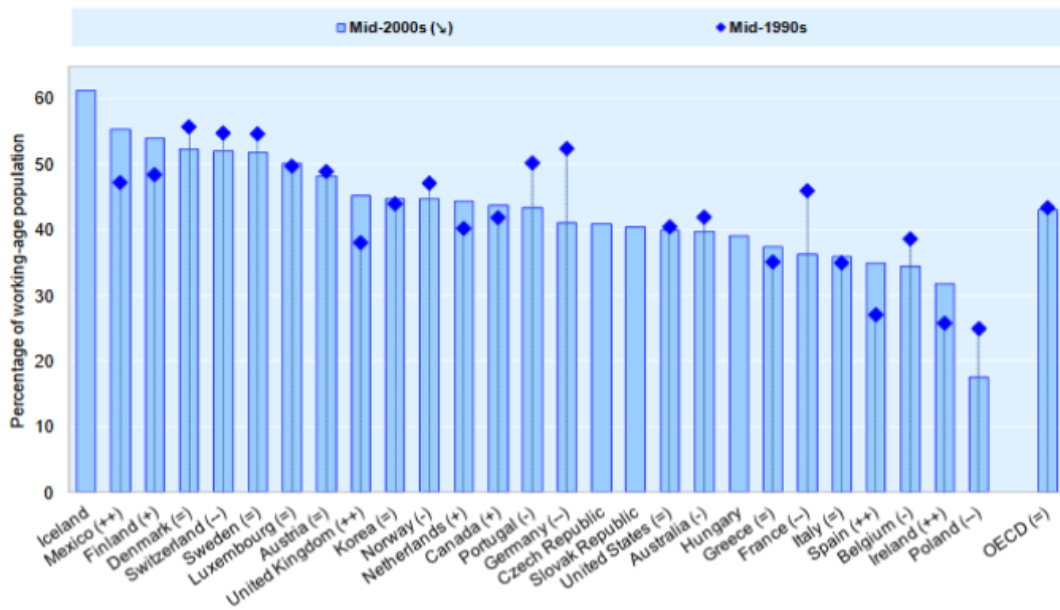
²⁰ Assistive technology for the disabled. Retrieved February 16, 2017 from <http://economy.gov.il/RnD/Programs/Pages/AssistiveTechnologyForDisabled.aspx>

Governments have grown more active in trying to integrate PWD and technology. It follows that innovation is a crucial component in enabling this integration. Conversations with diverse stakeholders in Canada have led to the following conclusions and recommendations.

1. A greater awareness of the needs of PWD should be sought by government. Similar to how government must consider policy through a gender-based lens (GBA+), they should also consider policy through an accessibility lens. The current consultations by ESDC with Canadians on new planned accessibility legislation could serve as a leverage point to incorporate an accessibility lens when creating policy and programs in other fields. For example, when government mandates new programs that require innovation, such as transportation infrastructure, considering PWD in the original design would save considerable time and money compared to "retro-fitting" scenarios.
2. Government initiatives that support innovation should consider how to better involve commercial firms. The fact that firms that specialize in innovation for PWD tend to be small suggests they could face considerable difficulties in taking advantage of tax exemptions and providing matching grants.
3. Government efforts to promote inclusive design, especially in Information and Communication Technology, should be broadened, especially because retro-fitting existing technology tends to be considerably more expensive in the long-run. It also involves a lag period in which the needs of PWD are not being met. Government could require inclusive design through regulation and also subsidize its creation in cases in which its costs over and above standard design are considered prohibitive. This will require clear guidelines on what constitutes inclusive design processes. In cases in which customized design is necessary, the case for government subsidies is strong due to the limited size (relative to inclusive design) of prospective markets.
4. An overarching government program or research center that specializes in innovation for PWD should be created. This could help boost government funding, improve internal, cross-department government coordination and awareness, and facilitate relationships with non-government sectors.

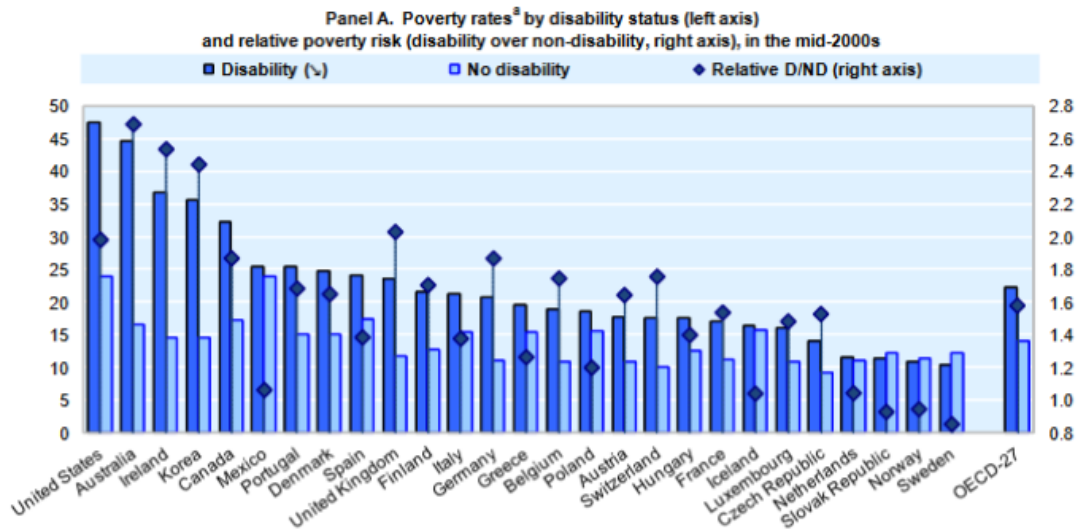
FIGURE 1²¹

Employment rates of the working-age population with disability in 27 OECD countries, mid-1990s and mid-2000s



Notes: (v) in the legend relates to the variable for which countries are ranked from left to right in decreasing order. (++)/(-) refers to a strong increase/decline of 2% or more; (+)/(-) refers to a moderate increase/decline between 0.75% and 2%; (=) refers to a rather stable trend between -0.75% and 0.75%; percentages refer to the annual average growth rate in employment rate of persons with a disability. OECD refers to the unweighted average of the 27 countries; the mid-1990s average is an estimate based on the 23 countries for which data are available.

FIGURE 2²²



²¹ Sickness, disability and work: Keeping on track in the economic downturn. (2009). *OECD*. Retrieved from <https://www.oecd.org/els/emp/42699911.pdf>, p.12

²² *Ibid*, p.35.