THE TECHNOLOGICAL FUTURE OF UNIVERSAL ACCESS FOR AIR PASSENGERS

Kirk Goodlet, Inter*VISTAS* Consulting
Solomon Wong, Inter*VISTAS* Consulting[1]

In his 1991 article, "The Role of Technology in Removing Barriers," John De Witt wrote that "in the last decade the application of technology to the particular needs of persons with disabilities has slowly gained momentum so that it is developing as a field in its own right."[1] Over 30 years later, we are at the precipice of accelerating the pace of transformative change for people with disabilities to experience travel.

This paper explores some of the ways technology continues to enhance the travel experience for people with disabilities, remove barriers, andModel some of the reasons the aviation industry must consider the application of technology to support a sustainable and resilient transportation system. While technology is not a panacea, we argue that airports and airlines must develop programs that can mitigate the risk by identifying, removing, and presenting barriers from being introduced into facilities and services. Furthermore, we argue that universal access is predicated on effective use of technology.

A 2017 study found that over 6.2 million Canadians over the age of 15 had one or more disabilities.[2] In global terms, about one in every six individuals currently experience disability. This amounts to 1.3 billion people.[3] The prevalence of disability, along with growing ageing populations, places enormous pressure on the aviation industry. Moreover, the recognition of both apparent and non-apparent disabilities, such as autism spectrum disorder, Alzheimer's disease, or hearing loss, requires industry to focus on barrier identification and remediation to maximize the useability of space and services. The population of travelers is increasingly requiring universal access and technology is one of the fundamental means of achieving a more barrier-free transportation system.

The end-to-end journey consists of many processes that are co-managed between airlines, airports, and government agencies. While air industry strives to deliver as seamless a journey as possible, many services and processes are based on antiquated requirements. The below graphic highlights key elements in the passenger journey, which are often laden by barriers to equal access. These barriers can be systemic, physical/architectural, attitudinal, information and communication, and technological.

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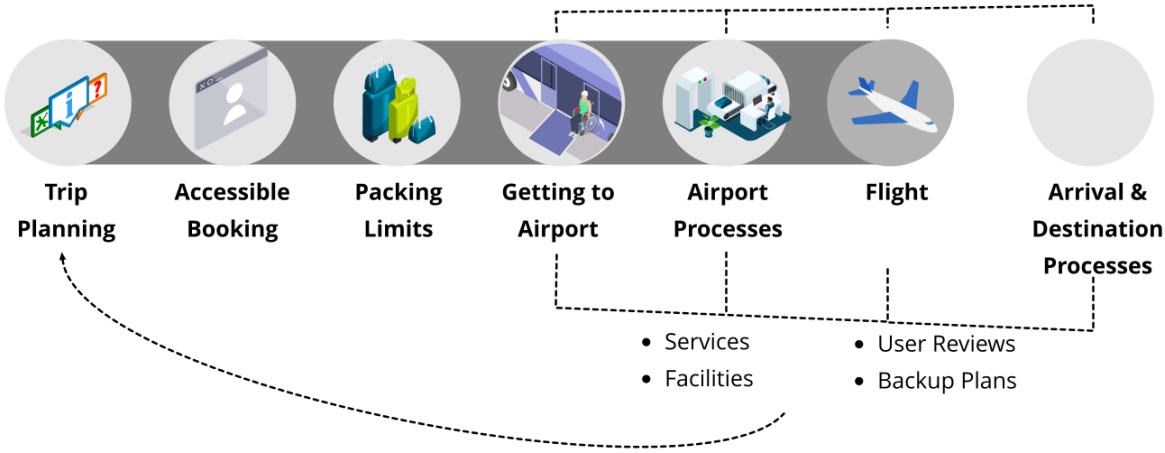
End-to-End Journey



To address barriers to universal access, industry must mobilize the power of technology efficiently and effectively. For instance, travelers who encounter barriers are most likely to pre-plan their journey well in advance. A passenger with autism, for example, may want to know in advance some of the sensory stimuli at check-in of a particular airport while a passenger with Chron's disease may want precise information about washroom locations. This requires airports and airlines to focus on website accessibility and address information and communication barriers, typically by adhering to Web Content Accessibility Guidelines 2.1 (Level AA). Similarly, some airports have started to offer augmented reality (AR) and virtual reality (VR) familiarization tours to enable pre-trip preparation from the comfort of home.

While pre-planning and digital tools are critical to support universal access, on-airport processes and technology are considerably more mature. These technologies include check-in kiosks or kiosks used to validate entry into Canada or the United States. Unlike in European countries, eGates (electronic access gates) for identity verification are only starting to gain a foothold at airports in Canada, notably at Winnipeg Richardson International Airport, Toronto Pearson, and Vancouver International Airport.

In theory, any deployment of innovative technology or device in airports must comply to accessible design standards in Canada, primarily CSA B651-18. In practice, however, there remains many questions about how best to design, deploy, and operationalize technologies in a live environment to enhance the experience for all passengers. For example, airports and airlines must consider width and height in how devices are used practically, including by those passengers who use mobility aids, prostheses, or have auditory and sensory disabilities. Additionally, features like on-screen ambient lighting or functional performance related to usage without vocal capability, hearing, or limited cognition must be considered in any technology.

The Harmonised European Standard on *Accessibility requirements for ICT products and services* (EN 301 549) helps address some of these challenges. However, there is currently no equivalent for information and communications technology (ICT) in Canada. The absence of harmonised and more detailed standards encourages industry to deploy technology in an inconsistent way, which leads to disparate services across air transportation systems. The technological future of universal access depends a great deal on increased coherence and the harmonization of standards.

Focusing on barriers as opposed to disability type is critical, as the social model of disability theory makes clear. When solutions are designed based on disability type as opposed to the barriers people encounter, they run the risk of not addressing the systemic challenges faced by passengers with disabilities. For that reason, technology represents one of the most important enablers of personalization. Personalization helps restore control over one's travel journey.

As the aviation industry looks to not only identify and remove barriers but also prevent them, there are some key trends and opportunities that can significantly enhance universal access for travelers. One is how digital twins of an environment can help prepare someone for travel. This enables an individual to rehearse the airport experience by leveraging technology in a way that has hitherto been impossible. It may also enable someone who previously thought travel too difficult to book a trip for the first time.

Tied to personalizing the travel experience is making it more predictable and reliable. Automation and machine learning can provide greater autonomy, dignity, and independence throughout the passenger journey. While several airports globally have experimented with autonomous wheelchairs, airports in Tokyo and Winnipeg have adopted them as a full service for passengers.[4] Incorporating autonomous technologies enables a passenger to reach their destination in a safe, predictable, and independent way. The latter is a critical point of a paradigm shift for so-called disabled individuals – moving from absolute dependency on another human being to a measurability greater form of liberation for independent choices supported with appropriate technologies.

Automating mobility service provides another layer of personalization and helps alleviate the stress associated with wait times for mobility assistance, which, particularly due to labour shortages after COVID, have become more acute at airports worldwide. Automation in mobility aligns to the universal design principles of equitable use, flexibility in use, and low physical effort for users.

Applications of voice-assistants have profound potential for air passengers, particularly when combined with other types of burgeoning technologies like Open AI's ChatGPT. Assistive devices like screen readers have existed for some time, but the power of artificial intelligence, voiceprint analysis, and machine learning will help shape how passengers can request assistance or book travel. For example, the option of saying to a device "Book me a flight next Thursday to Edmonton after 12 noon for less than $300" is achievable with today's technologies. At the same time, airports and airlines must also improve web accessibility to ensure that pre-travel, booking pages, and other information is barrier-free.

This is a common challenge that many people with disabilities experience. In Italy, for example, the Italian Civil Aviation Authority (ENAC) has partnered with three Italian airlines and the International Air Transport Association (IATA) to provide consistent and predictable information about services available to passengers with disabilities.[5] The "One Click Away" initiative lays the foundation on which other accessibility enhancements can be built, which should include layering additional technologies to support ease of use and simplifying a process that differs one airline to another.[6]

The Italian example highlights the need for industry to break down barriers related to customer engagement and technology. This includes the ways passengers seek out information and also how to provide feedback to airlines and airports. Industry must provide variegated means to collect and solicit feedback similar to the diverse means industry uses to share information via a multitude of channels (e.g., social media, website, etc).

Not only is technology an enabler for sustainable transportation, but it also makes good business sense. According to one source, the combined purchasing power of Canadians with disabilities is about $47 billion annually. In the United States, that number is about $544 billion annually.[7] As populations age and live longer, the discretionary spending power will commensurately increase. This bodes well for the travel industry if executives understand that investments in technology and universal access earn a return on service excellence and quality.

Over three decades have passed since De Witt's 1991 observation about the power of technology in eliminating barriers for people with disabilities. While airports, airlines, and regulators have made significant improvements to accessible transportation in Canada, the United States, and elsewhere, there remains much work to be done. Investing in technology to support universal access is one way industry can improve services and facilities. The technological future of universal access is as promising as it is fraught with the potential for barriers.

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[1] John C. De Witt, "The Role of Technology in Removing Barriers," in *Milbank Quarterly* 69, 1 / 2 (1991), 313.
[2] Stuart Morris, Gail Fawcett, Laurent Brisebois, and Jeffrey Hughes, "A demographic, employment and income profile of Canadians with disabilities aged 15 years and over, 2017," (Released 28 November 2018), https://www150.statcan.gc.ca/n1/pub/89-654-x/89-654-x2018002-eng.htm
[3] World Health Organization (WHO), "Disability: Key Facts," (Released 7 March 2023) https://www.who.int/news-room/fact-sheets/detail/disability-and-health
[4] Kirk Goodlet, "From Accessibility to Inclusivity at Canada's YWG Airport," in *International Airport Review* (September 2020) https://www.internationalairportreview.com/article/133477/accessibility-inclusivity-ywg-airport/
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[7] Brian Dawson and Rich Donovan, "Understanding the Disability Market: The Irrefutable Business Case," in *Abilities Magazine* (accessed 8 March 2023) https://www.abilities.ca/abilities-magazine/a-call-to-action-2/#:~:text=In%20Canada%2C%20PWDs%20and%20their,their%20loved%20ones%20with%20disabilities.