Contribution of the Inclusive Design Research Centre to the Council Working Group on the Internet

Online Open Consultation on Internet for Persons with Disabilities and specific needs

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# The Challenges

Digital systems are the new entranceway to essential services, they form the substrate for participation in all tenets of our society, representing a dominant means of engaging in learning, work, socialization, civil society, leisure, culture, commerce and entertainment. However, like most products and services, the interfaces to digital systems are designed for the average user. Anyone that cannot use a standard interface (ie., screen, keyboard, mouse, trackpad, touch display) must rely on assistive technology to bridge the gap (e.g., screen reader, alternative keyboard, Braille display). This arrangement is codified into our accessibility policies and laws.

To provide equal access, assistive technology must adequately interoperate with all applications, operating systems and hardware platforms to be used. These digital systems are changing so quickly and these changes originate from such complex and dependent sets of sources that the small enterprises creating assistive technology cannot keep up. Because of the diversity of needs of consumers at the margins, these same small companies have a relatively small customer base for any one product, meaning that the mounting resources needed to keep up are not available. This has resulted in a growing “technology gap.” While the standard digital systems that the average consumer relies upon are decreasing in price and increasing in functionality, reliability, availability and diversity, the opposite is true for anyone that can’t use the standard systems. Despite massive digital innovation, there were more computer accessibility features available on the market for individuals with extreme motor limitations in the 1980’s than there are today.

For a group that is grossly overrepresented below the poverty line, it costs individuals with disabilities up to 10 times as much to get online as the average consumer. Ignoring the fact that assistive technologies are usually technically inadequate, from a global perspective they are only available in a small portion of the world (28%, see G3ICT). In most countries they are not sold or maintained or they cost more than half of the average annual income. It is clear that relying on assistive technologies to bridge the gap between standard digital systems and the needs of consumers with disabilities requiring alternative access does not work.

# Approaches to Address Challenges

Fortuitously, the disruptive digital transformation that caused this challenge also came with unprecedented opportunities to address the challenge. The **malleability, modularity** and most importantly **connectivity** associated with digital systems provide opportunities to deliver one-size-fits-one services, products and environments to each individual. Unlike their non-digital counterparts, digital systems can transform through mechanisms such as style sheets, flexible layout and alternative rendering (e.g., text to speech, voice to text, etc.). Digital systems can be reassembled and augmented (e.g., mash-ups, adding captions). Most importantly digital networks enable collective production of diverse pools of resources as well as means to search, find and deliver very specific resources that match requirements.

Through numerous iterative cycles and projects that applied the innovations to community internet workstations, voting systems, library multi-user workstations, e-learning environments and open education, the globally disbursed research team has developed and refined an innovative approach (commonly referred to as the **AccessForAll** approach, the name of the ISO and IMS international standards developed by Treviranus and her team) and a supporting multi-sided platform (referred to as the Global Public Inclusive Infrastructure or **GPII**) for digital and economic inclusion. This cloud-based platform, with the hub at the Inclusive Design Institute at OCAD U but connected to projects globally supports the following functionality:

1. A means for supporting the individual in discovering accurate and current information about their individual needs and preferences in a given context, while fulfilling a given goal, and declaring this information in a common language that can be understood by technical systems and services;
2. A way to securely and privately store this information and communicate the relevant information to the right services when needed;
3. A variety of mechanisms for finding, transforming/adapting, augmenting or substituting user experiences and resources to match the individual needs and preferences anywhere, anytime, on any device or platform, and delivering these to the individual,
4. A means for addressing gaps in available systems or resources by reaching out to services and also suppliers and producers at the margins (including vulnerable youth) who are supported through training, tools and resources, certification and review; and
5. A process for the user and their support team to provide feedback or review the success of the match, to both help to refine the matching process and refine their personal needs and preference profile or statement.

## A) Inclusive Method of Design

In an attempt to address the gaps and issues with current methods of design, Jutta Treviranus and the IDRC have developed, refined and applied an inclusive design method for a digitally transformed and connected society, referred to as the *Three Dimensions of Inclusive Design (*[*http://idrc.ocadu.ca/index.php/resources/idrc-online/library-of-papers/443-whatisinclusivedesign*](http://idrc.ocadu.ca/index.php/resources/idrc-online/library-of-papers/443-whatisinclusivedesign) *),* outlined below. These methods of design have now been adopted by companies such as Microsoft (<http://inclusivethefilm.com> ) .

1. Personal – recognizing that we are all unique and that true inclusion requires a one-size-fits-one approach (enabled through digital adaptability and networked collective production), and also recognizing that each individual must be supported in understanding the optimal conditions under which they can participate and in making informed decisions about their own needs.
2. Participatory – the process of design must by participatory and participation must be diverse. Diverse perspectives enable better planning, prediction and innovation (e.g., Scott Page, The Difference). To achieve this we require design and development tools that are inclusive, as well as open, iterative, and agile community practices.
3. Pervasive – recognizing that no design is carried out in isolation and that all designs have systemic impacts that are intensified by our increasing connectedness, inclusive design considers the larger context affected by the design and attempts to elicit virtuous rather than vicious cycles.

## B) Inclusive Research Methods

As many nations move toward evidence based governance we need to update our research methods. Traditional research methods do not adequately consider the margins or outliers in any data set, and serve to minimize diversity. Designing for diversity requires diversity-supportive research methods. Emerging *Big Data* methods have inherited this preponderance to exclude, minimize or elide diversity and outliers, and are being used to guide critical decisions. In collaboration with researchers such as Deborah Estrin at Cornell who heads the Small Data Center, the partnership has begun to develop research methods and data analytics suitable for studying the full range of diversity. This includes innovative strategies for gathering and analyzing “small” and “thick” data, or personalized data and accessible methods for individuals to monitor their own data to guide health, education and other critical decisions. (See: <http://er.educause.edu/articles/2014/1/the-value-of-the-statistically-insignificant> )

## C) Emerging Disruptive Technologies and Practices

There is a timely and important opportunity to leverage emerging disruptive technologies to support greater inclusion and address growing disparities. These emerging technologies and processes must also be designed to enable inclusive participation. 3D or additive manufacturing frees us from designing for the masses and enables personalized design and manufacturing. Internet of things technologies have the potential to overcome and ease many barriers faced by individuals with disabilities, and individuals who are aging, including barriers to cognitive access. Cloud technologies and network-enabled global platforms can connect demand at the margins with supply at the margins creating a powerful new market driver that is inclusive of individuals that currently face barriers.

## D) Matching Growing Demand with Opportunities for Portable Skills and Decent Jobs

Ontario’s [web accessibility law](https://www.ontario.ca/page/how-make-websites-accessible) requires public websites to meet the Web Content Accessibility Guidelines (WCAG) which form the basis of ITU’s Web Accessibility Policy included in the ITU-G3ict [Model ICT Accessibility Policy Report](http://www.itu.int/en/ITU-D/Digital-Inclusion/Pages/Reports_and_Resources.aspx). The provincial government of Ontario is actively implementing this law, seeking to ensure that some 365,000 inaccessible PDF documents are converted to accessible formats, more than 60,000 inaccessible forms are redesigned, over 32,000 training units using inaccessible Flash are converted, enumerable Web pages repaired, and hundreds of adaptations and modifications to optimize productivity for an aging workforce are performed. The Inclusive Design Research Centre at Toronto’s OCAD University (IDRC) has developed a cloud-based infrastructure, and is training and employing youth with disabilities (including youth with autism, learning disabilities, muscular dystrophy and mental health issues) to perform some of this work, matching this demand with the supply of remote skilled workers. Its system provides demand aggregation, training, and skills-matching functions necessary to support ICT accessibility work.

Such web accessibility laws will be implemented in the provinces of Manitoba and British Columbia later this year.

The Canadian experience demonstrates that web accessibility policies not only benefit persons with disabilities and aging populations, but also promotes employment opportunities, including for people with specific needs such as persons with disabilities, youth and women.

# Government’s Role

Current research funding privileges traditional research methods, statistical power and homogenous impact by large numbers. Research into individuals who are diverse and at the margins loses out to scholarly investigation into homogenous groups that we can generalize about and draw transferrable conclusions about in any competition for limited funds. This leaves the outliers and the margins, and researchers who expand knowledge about the outliers without support.

Governments must:

* encourage diversity-supportive evidence and research,
* abandon outdated conceptions of entrepreneurship and innovation that discourage collaborative approaches and diverse measures for a diverse group of consumers,
* revise laws and regulations to hold manufacturers accountable for addressing the needs of consumers with disabilities and not depend on separate, specialized assistive technologies,
* mandate the use of design and development tools that are accessible to people with disabilities and produce accessible products,
* mandate open interoperability standards, and
* leverage the growing demand for accessible products and services to provide portable skills and training for youth.