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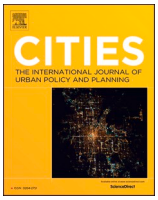

Smart cities, the digital divide, and people with disabilities

Olga Kolotouchkina [a,*], Carmen Llorente Barroso [a], Juan Luis Manfredi Sánchez [b]

[a] Complutense University of Madrid, Faculty of Information Sciences, Av. Complutense, 3, Ciudad Universitaria, 28040 Madrid, Spain
[b] Georgetown University, School of Foreign Service, 37th and O Streets, N.W., Washington, DC 20057, USA

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ABSTRACT

Urban development that is both smart and sustainable is intrinsically linked to digital innovation in city management, as well as to the transition toward digital urban governance and the practice of digital citizenship. Cities on a global scale continuously launch new digital services and smart solutions in order to become places that are more resilient, efficient, and attractive. While digitally-driven urban development has become a new paradigm for cities, the digital divide is emerging as a serious concern when it comes to the goal of making cities accessible and inclusive for everyone, especially the most vulnerable. Issues such as digital inclusion and access to key urban services, information, and experiences by people with disabilities (PwD) are critical areas in which cities face important challenges related to ethical and responsible governance. The aim of this paper is to provide conceptual and empirical insights into the culture of digital accessibility of PwD on an urban scale. It argues that leadership in digital accessibility can inspire transformative change, allowing cities to be envisioned from the standpoint of digital inclusion and equity, thereby fostering a barrier-free, digital urban logic.

1. Introduction

Cities increasingly rely on digital analytics, big data, and smart solutions to address key challenges for the urban futures (Baykurt & Raetzsch, 2020; Kandt & Batty, 2021; Lim et al., 2018). Data-driven urbanism introduces a new logic of digitally-mediated urban life, underpinned by specific rules, ethics, rights, and procedures (Kitchin, 2016). At the same time, digital technology has triggered a wide spectrum of digital urban lifestyles as well as online interaction of citizens with their places of residence (Hatuka et al., 2021).

While data-driven urbanism represents a significant leap forward in urban governance and *smartness* (Abella et al., 2017; Kitchin, 2016, 2019; Kolotouchkina & Seisdedos, 2018), a number of scholars have raised concern about the widening digital divide, which may be leading to serious digital inequalities between privileged, smart citizens and those who are "technologically illiterate, the poor, and, in general, those who are marginalised from the smart city discourse" (Vanolo, 2014, p. 893). As asserted by Graham (2002, p.35), urban polarization and "technological distancing of the powerful from the less powerful" are intensified by Information and Communication Technologies (ICTs). Similarly, Warf (2001), Van Deursen and Van Dijk (2019) question the stereotype of the democratic nature of the Internet, arguing that differences in Internet access foster greater inequalities between people, positions, and resources. Furthermore, Anastasiu (2019) notes that the lack of digital literacy hinders the ability of citizens to actively engage in urban experiences permeated by technology, and to exercise their digital rights on the smart city.

In this regard, the impact of the digital divide on the urban experience of people with disabilities (PwD) is an especially critical issue that must be addressed. People with disabilities represent 15% of the global population (WHO, 2011; #wethe15, n.d.), making it a significantly large group of underprivileged urban residents. Considering the progressive aging of the world's population, the percentage of vulnerable, underrepresented citizens within the realm of smart city practices could be even higher.

One of the main challenges of smart urban governance includes fostering digital inclusion underpinned by an affordable, robust broadband connection; offering accessibility devices that meet the needs of users; digital literacy; quality technical support; and online content designed to enable self-sufficiency and participation (NDIA, n.d.; OECD, 2020; United Nations, n.d.). Nonetheless, even though the enabling perspective of digital technologies for quality of life and social engagement of PwD has been acknowledged in extant research (Dobransky & Hargittai, 2006; Llorente-Barroso et al., 2021; Lord et al., 2014; Samant Raja, 2016; Trevisan, 2020), the role of digital inclusion and equity is far from prominent in urban governance.

* Corresponding author.
E-mail addresses: olga.kolotouchkina@ucm.es (O. Kolotouchkina), carmenllorente@ucm.es (C.L. Barroso), juan.manfredi@georgetown.edu (J.L.M. Sánchez).

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In the USA, 26 million households in urban areas do not have access to a broadband provider (NDIA, n.d.). Gaps of 19 and 16 percentage points were found between PwD and people without disabilities in owning a desktop or laptop computer and smartphone (Pew Research Center, September 9, 2021). A gap of 30 percentage points for Internet use and 10 percentage points for Internet access between disabled and non-disabled people in households was also identified (United Nations DESA, 2019). Moreover, the development of cognitive abilities and the understanding of social norms when using the Internet is one of the major challenges of digital engagement for people with intellectual disabilities (Lussier-Desrochers et al., 2017). Only 20% of young people with intellectual disabilities search for new information online compared to 86% of their peer group without disabilities (Alfredsson Ägren et al., 2020).

The low level of effectiveness and usability in the design of access devices, the lack of cognitive accessibility criteria, and the increasing complexity of technology have become additional barriers. Over 60% percent of national online portals were found to be inaccessible for PwD (United Nations DESA, 2019). Finally, digital addiction (Lin et al., 2018), online safety, and security issues (Alper & Goggin, 2017) have drawn attention to greater vulnerability of PwD in digital environments. Alfredsson Ägren et al. (2020) report a 50% differential in the incidence of bullying among young PwD compared to their non-disabled counterparts.

The aim of this viewpoint is to shed light on the emerging best practices in the field of inclusive digital governance in four global cities, which is leading to transformative change in operational modes and progress toward universal accessibility, digital inclusion, and equity on an urban scale.

2. Method

This research is supported by epistemological constructionism and interpretivism. The key research questions specifically focus on the practice of digital inclusion and the equity of PwD, as well as the related organizational framework within urban governance. Data was collected using a qualitative research methodology. Semi-structured interviews lasting an average of 1.5 h were conducted online with public officials from the areas of digital accessibility and/or the rights of people with disabilities within the city halls of New York, Madrid, Toronto, and Sao Paulo. The sample of global cities was selected based on their top regional positions in the Global Power Cities Index 2021 (MMF, 2021). The intentional selection of global cities from different continents was aimed at identifying potential regional differences. Public officials were identified on municipal websites of the selected cities and contacted by email with a request for a personal online interview. Two of the Digital Accessibility Coordinators interviewed for this research identified themselves as PwD. All interviews were recorded with the consent of the respondents and later transcribed and checked for accuracy. After the transcription was carried out, qualitative and inductive content analysis was conducted using ATLAS.ti 9 software, which enables identification and codification of the main themes of the interview guide, as well as associated sub-themes (Nowell et al., 2017).

3. Building a culture of accessibility: best practice and major challenges in the effective digital inclusion of PwD

Fostering public understanding and awareness about disabilities, ensuring fair representation and a voice for marginal communities in the digital sphere, and recognizing accessibility through the use of design as a foundational principle of any technological development are global challenges that have been highlighted by the public officials in charge of digital accessibility in the four cities mentioned above. With regard to a comprehensive approach encompassing the role of digital inclusion of PwD on an urban scale, the Digital Accessibility Coordinator of New York City summarized it best with the following words: “I consider my job to build a culture of accessibility within our city government” (Walei Sabry, 2020, personal communication). In the City of Toronto, the Accessibility Unit belongs to the Accessibility and Human Rights area: “We realize that accessibility is not just about digital channels, it is about access to our city. Anything that we do through the digital channel includes equity and inclusivity lens” (Michael Nigro, 2020, personal communication). In Madrid City Hall, the Accessibility Office is committed to ensuring a transversal approach to accessibility and personal independence of PwD. In Sao Paulo, the State Secretariat for the Rights of PwD oversees the area of digital inclusion aimed at setting global standards of accessibility at the municipal level.

There are four essential pillars that underpin the inclusive governance approach in these four global cities for the purpose of confronting the digital divide on an urban scale (see Fig. 1).

The area of Digital Accessibility is leading the transition to inclusive digital governance. This includes a new position known as the Digital Accessibility Officer, who reports directly to the Mayor. This officer has the authority to serve as the leading coordinator of digital inclusion, equity, and accessibility across all city agencies. Provided with staff and resources, this figure is responsible for the successful transformation of the digital city into an inclusive, accessible place for all citizens. The appointment of people identified as PwD to these positions indicates the effective inclusion of PwD in the core of policymaking, as well as its supervision and coordination.

The standardization of accessibility to digital channels that deliver key urban services and information is the guiding principle of digital accessibility policies. Specific regulatory frameworks emphasize compliance with global international standards of Web Content Accessibility Guidelines (WCAG), which are set by the Worldwide Web Consortium (W3C) for municipal websites and digital content production (W3C, n.d.). A wide range of accessibility resources and educational tools is provided for PwD, including digital maps, smart mobility services, free apps for sign language interpretation, closed captioning, and audio description for municipal events. The importance of WCAG and enhanced accessibility was especially evident during the COVID-19 pandemic, as digital channels became the most useful tools for PwD in gaining access to public services.

The value of public-private partnerships in addressing critical issues of digital inclusion is also noteworthy. The #a11yTO work group in Toronto has become a national benchmark for collaborative action plans, as well as for the launch of the **#a11yTO Conf** digital accessibility conference, and the accessible gaming conference known as **#a11yTO Gaming**. In New York City, the annual Digital Inclusion Conference has become a multidisciplinary city platform for public debates on digital inclusion from the perspective of multimedia accessibility, in addition to fair, authentic representation of PwD and other marginalized communities.

Finally, the prominent role of city hall employees as change-makers and key agents in creating a culture of universal accessibility within urban governance is essential. While digital inclusion cannot be achieved in isolation from in-person customer services at urban facilities, the approach to inclusion needs to be universal, removing all forms of social, physical, and communicative barriers.

The need to train city employees in accessible content, sign language interpretation, clear language principles, universal accessibility guidelines, handling adaptive tools and devices, and fostering comprehensive knowledge and understanding of disabilities are considered highly important. While the core number of employees working in Digital Accessibility areas is relatively low, the network of external agencies, designers, and developers involved in providing accessible digital infrastructures and creating content in the four cities addressed in this paper is continuously increasing.

4. Conclusions

Cities increasingly rely on digital technologies to facilitate urban

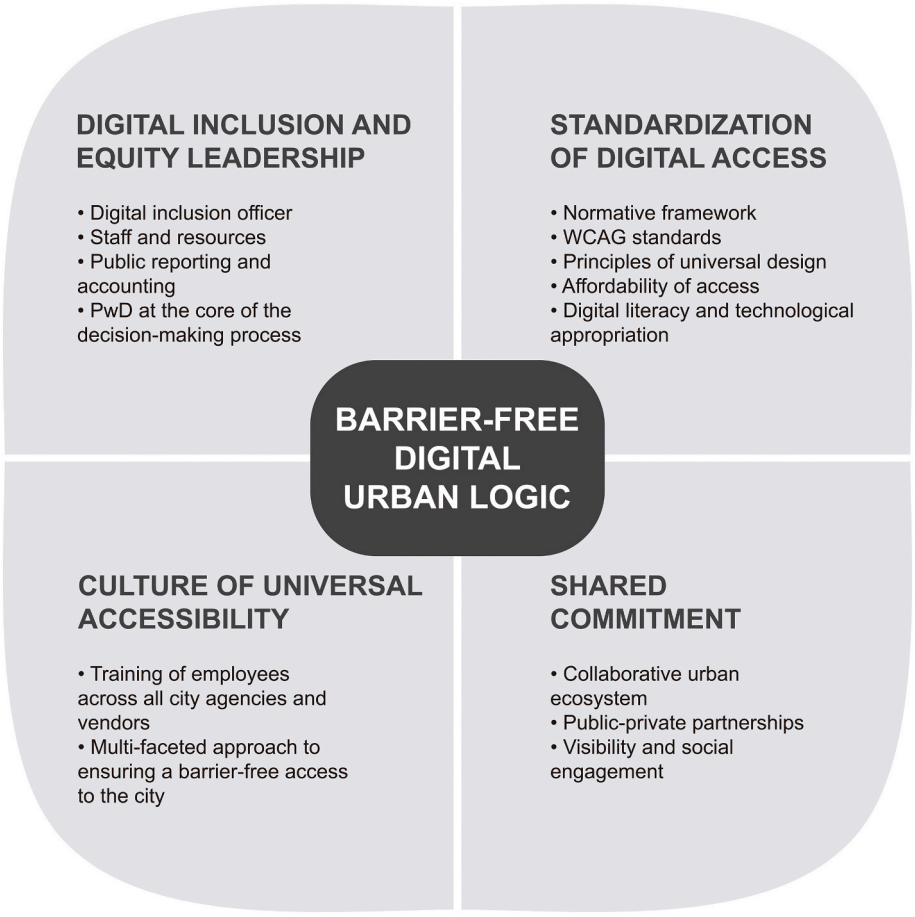

Fig. 1. Barrier-free digital urban logic.

experiences and manage urban life. While technology continues to be a significant barrier to gaining access to the digital city for many PwD, the leadership offered by Digital Accessibility areas, together with their officers in city governments, clearly indicates the emergence of a barrier-free, digital urban logic aimed at bridging the digital divide and setting a global benchmark of digitally-inclusive, ethical *placemaking*. Fostering digital inclusion and equity through the standardization of digital access, developing shared, multi-faceted stakeholder commitment, transforming regulatory urban performance, and including PwD at the heart of smart initiatives, are all factors that can help transform cities into places that are more humane, livable, and inspiring.

While the digital inclusion experiences of Madrid, New York, Toronto, and Sao Paulo are far from being commonplace on a worldwide urban scale, insights from their policymaking and innovative practices can successfully inspire transformative change in smart urban governance, allowing a new vision of cities from the vantage point of digital inclusion, thereby fostering a barrier-free, digital urban logic.

CRediT authorship contribution statement

Olga Kolotouchkina: Conceptualization, Methodology, Investigation, Writing – original draft, Writing – review & editing. **Carmen Llorente Barroso:** Methodology, Investigation, Visualization. **Juan Luis Manfredi Sánchez:** Supervision, Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Olga Kolotouchkina holds a PhD in Communication. She is an Associate Professor of Communication and Branding at Complutense University of Madrid (Madrid, Spain). Olga is a member of the American Academy of Advertising, ECREA (European Communication Research and Education Association) and International Place Branding Association. Her research interests include place branding, visibility of disability, citizen engagement and public diplomacy. She has been a visiting researcher at the Institute of Culture, Communication, and Information Technologies of University of Toronto and at Waseda University of Tokyo.

Carmen Llorente Barroso holds a PhD in Communication and Advertising. She is an Associate Professor of Advertising and Strategic Communication at Complutense University of Madrid. Her research covers strategic communication, digital communication, and vulnerable groups. Her research results have been published in leading indexed journals. She is a member of Icono14 and Association for Creativity research groups. She has been a visiting researcher at the Haas School of Business (University of California, Berkeley).

Juan Luis Manfredi Sánchez holds a PhD in Communication. He is a Visiting Prince of Asturias Chair at the School of Foreign Service, Georgetown University. His research is focused on media policy, public diplomacy and e-governance. He has been a visiting fellow at the Communication and Media Research Institute (Westminster University), Lessius Mechelen University and the National Security Archive (George Washington University).