Accessibility Research and Users with Multiple Disabilities or Complex Needs

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ABSTRACT

Conventionally, the accessibility research community centers most of its efforts on designing assistive technologies and systems related to single categories of impairments. Although this approach has contributed to valuable progress and advancements in the field, there is a growing consensus among accessibility researchers that focusing on designing technologies for single impairments oversimplifies disability since this approach may fail to adequately address the real-world experiences of a significant population of users with complex needs. Despite challenges related to conducting research with users living with multiple, profound, or complex disabilities, it is essential in terms of future work that the accessibility research community adopts a more inclusive approach where users with lived experience of multiple disabilities are directly informing and shaping the design of assistive systems and accessible technologies. Therefore, we propose the 2nd International Workshop on Accessibility Research and Users with Multiple Disabilities or Complex Needs. The workshop will act as a forum for participants to share their perspectives related to challenges and opportunities in designing accessible systems that consider the multidimensional needs of users living with multiple disabilities. This workshop intends to challenge current paradigms in the accessibility field, share latest work and foster future collaborations.

CCS CONCEPTS

• **Human-centered computing**; • **Accessibility**; • **Accessibility theory, concepts and paradigms, Social and professional topics**; • **User characteristics**; • **People with disabilities**;

KEYWORDS

Assistive Technologies, Disability Studies, Accessibility, Multiple Impairments, Complex Needs

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1 BACKGROUND

The field of accessibility research strives to address the needs of individuals with disabilities and create inclusive technologies and accessible systems. However, it is known that research involving people with multiple disabilities receive less attention compared to studies focusing on specific disabilities [25]. Conventionally, the accessibility research community has centered most of its efforts on designing and evaluating assistive technologies and systems related to single categories of impairments or disabilities. In other words, accessibility researchers often focus on evaluating technologies and addressing the needs of technology users who experience a single type of sensory [32, 34], cognitive [21, 22], or physical impairment [1, 7, 33] at a time. While this approach is justifiable and contributes to the advancement of the accessibility field, a growing consensus among accessibility researchers is that designing accessible systems and assistive technologies for one impairment at a time contributes to an oversimplification of disability. This simplification does not reflect real-world experiences of a significant number of users of technology who live with multiple disabilities and overlooks their often complex needs [19, 28, 30].

The lack of involvement of users with multiple disabilities or complex needs in accessibility research is a challenging problem that needs further attention from the field. Recently, Mack et al [25] surveyed 836 papers published at venues such as ASSETS and CHI, and found that 7% of those papers focused on multiple communities and only 1% of published research focused on users with multiple disabilities, confirming the urge for more work in this area. This becomes a pressing issue as a 2016 survey reported that almost 75% of people with disabilities in England live with more than one type of long-term impairment [36]. According to the report, the combination of sensory and mobility impairments is the most common combination of impairments among English survey respondents. However, a combination of cognitive and physical impairments is

also prevalent among older adults [13, 23]. Furthermore, findings also show that more than 20% of respondents live with at least three types of impairments [14].

Not surprisingly, 51% of those living with three or more impairments do not think current assistive technologies address their needs or support their daily activities in an adequate way. Similar American reports [15, 27] showed that the US Department of Education has to provide special accommodations for at least 122,559 students with profound or multiple impairments each year. In order to be effective, educational programs need to incorporate a variety of components, including the use of personalized assistive technologies that meet the considerable needs of these individuals. These results indicate that people with disabilities do not always belong to fixed, clearly defined categories and assistive technologies should be able to accommodate these individualities [5, 29].

Many scholars question the oversimplification of disability(ies) among accessibility researchers. Hofmann et al argue that the accessibility field frames disability as discrete and isolated blocks of impairments for practical reasons. According to the authors, these categorizations are often decontextualized [30]. Similar arguments related to the need for a multifaceted approach in the accessibility community are also made by Mankoff et al [19], Bennett et al [10, 11], Shinohara et al [26], and Frauenberger [9]. Yet, little research has explored the challenges and design considerations involved in addressing the multidimensional and often complex experiences of users of technology living with complex or multiple impairments.

It is essential in terms of future work that the accessibility research community urgently starts to adopt a more inclusive approach where users with lived experience of multiple disabilities are directly informing and shaping the design of assistive systems and accessible technologies. If we look at the work presented at ASSETS over the years [1, 6, 12], the majority of technical contributions still rely on relatively rigid categories of impairments or user groups (e.g. "older adults" or "hearing impairments") and empirical research rarely includes users with more than one impairment [25]. According to related work examining the personal experiences of people with disabilities, many individuals living with multiple disabilities do not feel like they belong to one category or the other. Often, these individuals are rejected by both communities for being "different" [29]. This issue is also reported among people with deafblindness who do not think assistive technologies designed specifically for people with "visual" or "hearing" impairments effectively address their needs [3, 5, 35]. Similar issues are faced by people in the neurodivergent community who may experience a combination of different sensorimotor and cognitive impairments [16, 21, 24].

We argue that the design of assistive technologies and accessible systems play an important role towards the participation of people with multidimensional needs in society. In accordance with Wobbrock et al [17], accessible systems should be able to accommodate the needs of different users, regardless of their abilities, extent, or complexity of their impairments. However, examples of successfully designed systems that accommodate the complex needs of users living with multiple disabilities are limited in the accessibility community. Previously explored interaction techniques, such as gaze [7], audio-visual [22, 34], haptics [18, 20, 31], or multisensory approaches [4, 8, 32], are not always easily adaptable to the multi-layered needs of users who may experience challenges in compensating one ability with another. A multidisciplinary approach to this problem could help the accessibility research community address the challenges involved in designing accessible systems that take into consideration a diversity of users living with complex access needs [37, 38].

Following the successful 1st edition of this workshop at ASSETS 2022 in Greece [2], we found that many researchers share similar challenges when conducting research with users living with multiple disabilities or complex needs. Some of these challenges are related to the lack of terminology standards, lack of resources or appropriate methods or tools for collecting data with participants, or simply lack of funding for research in this area. Therefore, we propose a continuation of the discussions initiated last year and invite researchers and practitioners from different disciplines to the 2nd International Workshop on Accessibility Research and Users with Multiple Disabilities or Complex Needs. The workshop will act as a forum for participants to share their perspectives related to challenges and opportunities in designing accessible systems that consider the multidimensional needs of users living with multiple disabilities. This workshop intends to challenge current paradigms in the accessibility field, share latest work and foster future collaborations.

2 WORKSHOP PLANS

Following the successful inaugural edition of this workshop last year during ASSETS 2022, we understood that participants shared a common desire to continue the discussions initiated during the 1st edition of the workshop and expressed interest in establishing a recurring forum to discuss issues and opportunities related to accessibility research and users with multiple disabilities or complex needs, often overlooked elsewhere.

The motivation for proposing this forum builds on our previous experience working with communities of people living with multisensory impairments (e.g. deafblindness) and other complex disabilities. As accessibility researchers, we realised that most currently available technologies do not address their user needs and that well-established research methods do not necessarily facilitate conducting work with and for these communities.

During the discussions of last year's workshop, we found that other researchers face similar challenges and find it difficult to find resources or expertise to support their research with users with multiple disabilities or complex, multifaceted needs. Therefore, we invite academics and practitioners from different disciplines to present their latest work during the event and discuss issues related to designing accessible systems and assistive technologies with and for these communities. The goal is to strengthen the community of researchers working in this underrepresented field.

The main goal for the 2nd edition of the workshop is not only to discuss common challenges related to conducting accessibility research in this area but also to expand understanding about methods, frameworks and tools that can be used to facilitate the inclusion of users with multiple disabilities in our practice. We invite plural

Table 1: - Draft structure for Saturday 28 October (all times in CEST/UTC +2)

12:00 – 12:15	Workshop presentation and description of activities for the day.
12:15 – 13:00	Invited keynote speaker + open discussion.
13:00 – 13:10	*Short break.*
13:10 – 14:10	Individual 10-minute presentations and open discussion.
14:10 – 14:20	*Short break.*
14:20 – 15:20	Individual 10-minute presentations and open discussion.
15:20 – 15:30	*Short break.*
15:30 – 16:30	Individual 10-minute presentations and open discussion.
16:30 – 17:00	Wrap up – Define future plans and consolidate multidisciplinary collaborations. What next?

perspectives and experiences from individuals with lived experiences of disability, scholars in the humanities, disability studies, engineering, human-computer interaction and other sub-domains.

Based on the feedback received during last year's event, and to add focus and rigor to our discussions, we will move the format of the workshop from group discussions in breakout rooms to individual presentation slots that allow participants to share their contributions in more depth with appropriate time for questions from the audience. Selection of participants will be based on 250-word presentation proposals submitted by potential participants and reviewed by the co-organizers prior to the workshop.

Furthermore, similar to the 1st edition of the workshop, we plan to invite our extensive collaboration networks of organizations, international agencies, special needs colleges, and industry partners to be part of the discussions. The workshop intends to challenge current paradigms in the accessibility field, devise new approaches for designing multifaceted accessible systems, and strengthen collaboration among participants with similar interests.

The workshop will be held virtually (Saturday October 28) and will involve individual 10-minute presentations by selected participants followed by an open discussion where participants can share their latest work, propose new ideas or methods, or challenge current practices. Table 1 shows a draft structure for the day, however, this schedule can be adapted based on the needs and interests of workshop participants. Similar to last year, we anticipate using the Central European Summer Time (CEST/UTC +2) to accommodate participants who will be joining from different time-zones. However, the final timing can be changed to better accommodate the final list of participants.

We also plan to invite participants to contribute to a special journal issue focused on accessibility research and users with multiple disabilities or complex needs. For that, we will discuss the best strategy for moving forward with workshop participants during the day.

3 DIVERSITY AND INCLUSION CONSIDERATIONS

The objective of the workshop is to create a space for open discussion where participants can come together to address the challenges and explore opportunities associated with designing accessible systems *with* and *for* users with complex needs. We are committed to promoting diversity and creating an inclusive event throughout the workshop. To achieve this, we will actively encourage participation from individuals representing diverse backgrounds, disciplines, and lived experiences of disability. We plan to personally invite our extended network of communities interested in this topic, including local and international organizations working in the fields of disability and inclusion.

To ensure inclusivity and fairness, participants will be required to adhere to accessible submission and presentation guidelines during the selection process. Additionally, all workshop attendees will be expected to uphold the principles outlined in the ACM Code of Ethics and Professional Conduct throughout the duration of the event. Furthermore, the organization team will ensure that accessibility accommodations are met for participants with specific access needs to participate during the virtual workshop.

Similarly, in preparation for the workshop, participants will receive workshop materials and accepted abstracts through both the dedicated workshop website and email. The workshop timings will be scheduled to ensure inclusivity and convenience for all attendees and to accommodate participants from different geographical regions, including those attending ASSETS 2023 in New York City.

4 ORGANIZERS

The workshop co-organizers have extensive experience in conducting multidisciplinary research within the boundaries of human-computer interaction, accessible computing, inclusive design and engineering, critical disability studies and autonomous systems. With diverse expertise in different research areas, we have built an understanding of the needs and perspectives of accessible technology under the lens of disability, and we all share an interest in developing work with underrepresented users such as users with multiple disabilities or complex needs. Our team includes scholars at different career stages, including both emerging researchers and established faculty members. A list of individual biographies has been included for detailed information about each workshop co-organizer:

Arthur Theil is a Lecturer in Human-Computer Interaction at the College of Computing at Birmingham City University (UK). His research focuses on the study of novel interaction techniques to support users with diverse sensory abilities. His current focus is on designing accessible interfaces for individuals with multisensory impairments (e.g. deafblindness). Arthur has also conducted accessibility research with older adults who experience age-related

changes in sensory, cognitive, and motor abilities. In addition to conducting academic work, Arthur currently also serves on the ACM SIGCHI Accessibility Committee and is part of the Program Committee for the ACM SIGACCESS ASSETS Conference.

Craig Anderton is a PhD student at the College of Computing at Birmingham City University (UK). His research interests include immersive technologies (Augmented Reality/Virtual Reality, AR/VR), Human-Computer Interaction (HCI), and accessibility. His PhD research explores designing haptic technologies for sensory augmentation in immersive environments, with a focus on VR guidance and navigation. Craig's previous research includes investigating sign language in VR, for which he was awarded the gold medal in the ACM Student Research Competition at ASSETS 2022.

Chris Creed is a Professor of Human-Computer Interaction at Birmingham City University (UK) where he leads the HCI Research Group. His core research interest is around the design and development of assistive technology for disabled people (across a range of impairments). He is leading multiple research projects focused around accessibility such as investigating new interface techniques for facilitating creative work via gaze/speech interaction (supported through an Adobe Fund for Design grant), exploring the development of inclusive AR/VR experiences (previously funded by a Meta/Facebook research award), making coding more accessible for people with physical impairments (which has received support from a Google Inclusion Research Award and a Microsoft "AI for Accessibility" grant), and investigating the potential of wearable technology to support young people with special needs (e.g. ADHD) within residential care (funded through Innovate UK). Prof. Creed's research is multidisciplinary in nature and has been conducted in close partnership with national charities, disability and accessibility organisations, special needs colleges, large arts/cultural partners, and disabled people.

Nasrine Olson is an Associate Professor in the field of Library and Information Science at SSLIS, University of Borås, Sweden. Core research interests relate to issues of power and the relationship between day-to-day action, and broader societal structures. In the more recent years the focus has been on the societal implication of ICTs and information practices that enable or hinder the potential for equal opportunity for all. Towards this, Nasrine has adopted participatory practices in her research and has developed methodologies and technical innovations for haptic communication. She has also been instrumental in creating research environments that promote, and lead to, improved inclusive technologies and environments by coordinating projects such as EU-funded projects SUITCEYES (H2020 – 2018-2021 – among others it included development of haptic technologies for communication with, and by, users with deafblindness) and MuseIT (HE – 2022-2025 – among others it involves development of multisensory representation of cultural assets for broader accessibility). Nasrine is also the director of an interdisciplinary research centre called INCLUDE – Centre for Inclusive Studies, where through critical examination the ideology of normal, the unequal treatments of societal members will be explored.

Raymond Holt is a Lecturer in Product Design in the School of Mechanical Engineering at the University of Leeds (UK), where he is a member of the Institute of Design, Robotics and Optimisation, the Immersive Cognition Lab and the Centre for Disability Studies. His core research interests are the study of haptic perception and prehension and the cocreation of assistive and rehabilitation technologies with users. He has led co-creation activities on two rehabilitation robotics projects funded by the National Institute for Health Research, and led the Leverhulme Trust-funded project Facilitating Meaningful Play for Disabled Children through Participatory Design. He has recently been part of the European Commission funded project SUITCEYES (http://suitceyes.eu), where he led activities on the sensing and navigation elements, and is currently extending this work as part of the Wellcome Trust-funded Imagining Technologies for Disability Futures project (http://itdfproject.org).

Sayan Sarcar is a Lecturer in Human-Computer Interaction within the College of Computing at Birmingham City University (UK). His research sits at the intersection of Human-Computer Interaction (HCI) and Accessibility. His research emphasises improving human individual abilities through developing intelligent systems using design and modelling practices, specifically focused on individual differences in users' sensorimotor abilities.

5 WEBSITE

https://www.mdcnworkshop.com/

6 PRE-WORKSHOP PLANS

Similar to the 1st edition of the workshop, we aim to extend invitations to different research communities for our workshop, reaching out to multiple organisations and professional networks. These include but are not limited to SIGCHI, SIGACCESS, and GATE communities. We also plan to engage practitioners affiliated with the European Disability Forum, Deafblind International, Anne Sullivan Foundation, SENSE, SCOPE, AbilityNet, African Community on Assistive Technologies, as well as members of different HCI communities in the global south. Furthermore, all workshop materials and accepted abstracts will be shared with participants well in advance of the workshop day via website and email to facilitate preparation and initiate discussions among participants.

7 CALL FOR PARTICIPATION

Conventionally, the accessibility research community centers most of its efforts on designing assistive technologies and systems related to single categories of impairments. Although this approach has contributed to valuable progress and advancements in the field, there is a growing consensus among accessibility researchers that focusing on designing technologies for single impairments oversimplifies disability since this approach may fail to adequately address the real-world experiences of a significant population of users with complex needs. This workshop intends to challenge current paradigms in the accessibility field and serve as a forum for different researchers and practitioners to share work related to accessible technologies for users with multiple disabilities or complex needs.

We invite presentation proposals from researchers and practitioners of different disciplines interested in designing accessible technologies with and for users with multiple disabilities or complex needs. Proposals should include a 250-word abstract stating their existing work, new ideas, or their critical position related to

challenges in designing technologies for users with multidimensional needs.

Abstracts should discuss issues or present novel ideas related to the workshop's theme. We also welcome submissions in the form of videos or posters. Authors must ensure the accessibility of their submission by following the SIGACCESS template and accessibility guidelines. Submissions can be made by September 15, 2023 by completing the proposal form available on the workshop website. Authors will be notified by September 22. If accepted, at least one author must attend the virtual workshop at ASSETS 2023 on Saturday 28 October (via Zoom).

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