

# Why is Accessibility So Hard? Insights From the History of Privacy

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## ABSTRACT

While HCI and CSCW research has valued accessibility, the field has primarily focused on individual capabilities and technological solutions for accessibility. Inspired by the evolution of privacy research, I argue for expanding accessibility research to influence accessibility in the real world. Similar to privacy, accessibility is driven by a poorly defined core concept and faces comparable challenges including substantial demands placed on software development and the general lack of pushback. By drawing insights from the experiences of the privacy research community, this paper explores the current challenges faced by accessibility research. In particular, I propose that centralized support and policymaking – two areas currently under-explored within accessibility research – hold rich potential for driving meaningful progress.

## CCS CONCEPTS

• **Human-centered computing** → **Accessibility**.

## KEYWORDS

accessibility; privacy; research agenda; infrastructure support; developer support; policymaking

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## 1 INTRODUCTION

Accessibility has been a central concern in HCI and CSCW research but has long primarily focused on innovative assistive technologies for individuals and accessibility issues of specific technologies [61]. Recently, the accessibility research community has tried to diversify the research focus. A growing number of studies have started focusing on disabled people's lived experiences (e.g., [43]), and critical reflections on disability, accessibility, and assistive technology design (e.g., [18, 62, 87]). The accessibility research community also seeks new research avenues by fostering collaborations with other fields, e.g., security and privacy [8]. However, accessibility remains a hard problem in practice [13].

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This present paper is positioned for research communities that concern accessibility in HCI, CSCW, and accessible computing. I aim to highlight the complex realities of accessibility and identify under-explored directions for accessibility by drawing inspiration from the history of privacy. My inspiration comes from two recent reflective articles on privacy and Algorithmic Fairness, Accountability, Transparency, and Ethics (FATE) by Hong [44, 45]. Hong argued that FATE should learn from the history of privacy research and practices because the two areas share high similarities and face comparable challenges such as ill-defined goals and lack of pushback on the issue [44]. I believe accessibility research can benefit from joining this discussion because it shares a high similarity with privacy as FATE. Similar to privacy, accessibility research is driven by an ill-defined concept. Both fields have traditionally emphasized computational and technological approaches but require insights and methods from law, policy, ethics, user experience design, systems design, and more in practice. Additionally, privacy and accessibility face similar challenges throughout the software development lifecycle, including analysis, design, coding, deployment, and maintenance. More importantly, both fields struggle with getting people to care.

Next, starting with a brief introduction to human-centered privacy and accessibility research, I discuss how similar the two fields are. Based on the lessons learned in the privacy research community, I argue that accessibility research should diversify its focus and consider centralized support and policymaking as two important directions. Taken together, this paper aims to make the following contributions: 1) I demonstrate the parallels between privacy and accessibility, emphasizing the social factors that influence accessibility in practice; 2) I suggest a broader scope in accessibility research, particularly by exploring the potential of centralized support and policymaking in advancing accessibility goals; 3) I emphasize the importance of communication and collaboration within HCI sub-fields. By forming joint forces, we may advance research and promote the development of more responsible technologies.

## 2 BACKGROUND AND RELATED WORK

This section provides a brief overview of human-centered privacy and accessibility research in terms of their history and goals. Due to the space limit, this review is not intended to be exhaustive. For a more comprehensive examination, readers can refer to review articles of the two fields [16, 51, 61].

### 2.1 Overview of Human-Centered Privacy Research

Privacy, as a long-standing human value, has gained renewed attention in the age of information and communication technologies (ICTs) [3, 16]. The widespread adoption of computing technologies has intensified the focus on the control and management of

personal information. [16]. In response, the security and privacy research community has made efforts to identify security and privacy risks within ICTs and develop privacy-enhancing/preserving techniques such as cryptography, encryption, access control, and formal methods [89].

Despite these efforts, researchers found that the adoption of privacy-friendly techniques is not only dependent on technical factors but also on usability. People may not adopt security and privacy techniques if they are not easy to understand and seamlessly integrate into their daily routines [5]. Therefore, researchers have increasingly called for greater attention to user behavior and decision-making about privacy. Pioneering this user-centric approach, Saltzer and Schroeder advocated for computer security mechanisms to be "psychologically acceptable" as early as 1975 [76]. Following these traditions, human-centered privacy and security have now become an active area covering theory development [66, 69], human-centered system building [60], user understanding [29], policymaking [40, 53, 94] and critical analysis [63, 71].

However, privacy continues to be a complex issue in real-world applications, frequently grabbing headlines due to breaches or misuse. Leveraging his two decades of experience in privacy research, Hong identified 11 key challenges in this domain (detailed in [45]):

- Privacy is a broad and fuzzy term.
- There is a wide range of privacy risks.
- Technological capabilities are rapidly growing.
- There are very strong incentives for companies to collect data about us.
- Same device, same data, different perspectives.
- The burden on end-users is too high.
- Developers have low knowledge and awareness of privacy.
- Companies get little pushback on privacy.
- It is not always clear what the right thing to do is.
- Machine learning and probabilistic behaviors make privacy hard to predict.
- Emergent behaviors make privacy hard to predict.

Many of the challenges in this list, if not all, can be mirrored in accessibility. Like privacy research, accessibility struggles with concept ambiguity, diverse user needs, rapid technological change, burdens on users and developers, and minimal pushback. I aim to unpack these similarities in this paper and suggest the potential for the two communities to learn from each other.

## 2.2 Overview of Accessibility Research

According to a basic definition by Cambridge Dictionary, accessibility is "the quality of being able to be entered or used by everyone, including people who have a disability [32]". In the context of accessible computing, this definition translates to promoting the accessibility of digital technologies for disabled people and seeking solutions that address real-world accessibility challenges. CHI 2024's subcommittee on "Accessibility and Aging" defines accessibility papers as "those that deal with technology designed for or used by people with disabilities including sensory, motor, mobility, psychosocial or cognitive, intellectual or learning disabilities, or people who identify as neurodivergent [24]."

The field of accessible computing emerged alongside the rise of disability activism in the U.S. Following the passage of Section 508

in 1986, Richard Ladner and Gregg Vanderheiden organized a dedicated panel at CHI'88 to discuss the development of accessibility guidelines and their implications for HCI [54]. Shortly after the Americans with Disabilities Act (ADA) was enacted, the Communications of the ACM published a special issue dedicated to disability and computing, emphasizing the importance of designing for disability [37]. These growing efforts culminated in the founding of The ACM Conference on Accessible Computing (ASSETS) in 1994.

While recent years witnessed the diversification of focus, accessibility research has traditionally focused on assistive technologies and individual abilities [61]. As shown in a recent systematic review of accessibility research from 1994 to 2019, the field typically focused on specific accessibility needs of disability sub-groups, such as communication needs of d/Deaf and hard-of-hearing people [61]. Inspired by similar user-centric and value-driven considerations within the privacy field, I argue for a more expansive approach to accessibility research.

## 3 HOW ARE PRIVACY AND ACCESSIBILITY SIMILAR?

I believe that accessibility research can gain valuable insights from the history of privacy research because of the two fields' similarities. Both fields are driven by a complex goal, facing diverse user needs and challenges in software development. Crucially, both fields have long faced a lack of pushback on the issue. Drawing on Hong's reflection on the challenges faced by privacy [45], I explore the shared challenges that privacy and accessibility encounter next.

### 3.1 Driven by a Complex Goal

Both privacy and accessibility are driven by an ill-defined core concept, making the goal complicated. Privacy is a broad term without universally accepted definitions [30, 45], which is often operationalized in different ways in regulations and real-world practice [35, 36]. As Hong put it,

"Privacy has been described as 'the right to be let alone [90];' control and feedback over one's data [17], data privacy (which led to the Fair Information Practices [67], which is the basis of the vast majority of legislation on privacy), anonymity (which is a popular definition among computer science researchers), presentation of self [38], boundary negotiation [10], the right to be forgotten, contextual integrity [66] (taking political, ethical, and social norms into account), and more [45]."

Even for the same device and the same data people can still have different perspectives toward privacy [7]. Moreover, research found that the understanding of privacy fluctuates over time and significantly across cultures [3, 88]. As a result, the goal of privacy is often unclear, needless to say coming up with solutions.

The goal of accessibility seems far more clear than privacy, but it is also under critical reflection. For a long time, accessibility has been treated as a technological requirement to follow, usually in the form of a checklist. For example, according to the World Wide Web Consortium (W3C), "web accessibility means that websites, tools, and technologies are designed and developed so that people with disabilities can use them [28]". However, research has

increasingly revealed that the goal may not be as straightforward as once thought. For instance, conflicting access needs can make complete accessibility an ideal rather than a reality [8, 43]. Additionally, people may have different understandings of accessibility. Critics such as John Lee Clark argue against viewing accessibility as a supplement to the original content, advocating instead for direct engagement [25]. These ongoing debates reveal accessibility as a complex goal as privacy.

### 3.2 The Wide Scope of User Needs

Both privacy and accessibility face complex user needs encompassing a broad spectrum. As noted in Section 3.1, the definition of privacy is broad and covers diverse user needs including data control, impression management, interpersonal relationship management, etc. Solove proposed a taxonomy of privacy to illustrate the wide landscape of privacy risks [81]; these risks range from concerns over data collection, processing, dissemination, etc. Moreover, privacy is highly contextual and personal, varying by person and situation [29, 86]. Experts on online safety often have competing perspectives for which threats and advice people should prioritize [91]. Effective security and privacy support often requires a holistic assessment of the situation that people face [86].

Similar to privacy, accessibility needs are broad, concerning visual, hearing, motor, mobility, speech, cognitive, intellectual, learning, and socio-psychological disabilities. Accessibility needs are also highly contextual [82] and fluid [87]. For example, d/Deaf people have diverse language backgrounds, which would pose challenges for designing language technologies for this population [84]. Blind and low-vision people may have varied preferences regarding the level of detail and object attributes included in image descriptions [82]. Access needs may even conflict with each other in ability-mixed settings [8, 43]. For instance, in video conferencing, while visual information could be important for one, it could cause distractions to others or affect their privacy [8, 43]. In certain scenarios, people might prefer a slightly less accessible experience for the sake of joy and challenge, such as in games or dances [4, 33].

Due to the high requirement for personalization, customization settings are often used in commercial products to meet personal needs for both privacy and accessibility. However, managing the settings can be cumbersome for users, requiring significant effort and knowledge to navigate [33]. While researchers have been exploring more intuitive solutions, challenges remain because of the dynamic and ever-changing nature of user needs [26, 92, 93]. Currently, the burden still falls on users, who spend significant time managing their privacy and access needs through complex settings configurations [33], navigating different systems [75], and dealing with software updates [77–79].

The ever-changing landscape of technologies makes privacy and accessibility even more complicated. Emerging technologies, such as augmented/virtual/mixed reality, the Internet of Things, smart speakers, and AI-based technologies, all keep introducing new user needs and behaviors that are hard to predict. Unfortunately, while there is an increasing call to consider privacy and accessibility in all stages of design [42, 95], they are still often taken as an afterthought or add-on feature [13].

### 3.3 Lack of Developer Support

Another challenge facing both privacy and accessibility originates from the developer side. While both are crucial requirements in software development, developers often have low knowledge and awareness of them [70]. For instance, developers may not realize the extent of data their applications are collecting because they often rely on third-party APIs [15, 57, 59]. As a result, supporting developers has become a significant area of research in privacy in recent years [2, 57].

Similarly, accessibility relies heavily on third-party APIs and development frameworks, and it may conflict with privacy [47]. Additional challenges include inadequate accessibility tools and resources and not accounting for retroactive changes in project timelines [70].

Moreover, accessibility is frequently overlooked in computing education [14]. Patel et al. found that formal education inadequately prepares developers to handle accessibility challenges in software development [70]. Students often lack motivation to learn accessibility skills because these skills are typically not required in subsequent work or classes [27]. Accessibility skills are also hard to transfer to other fields, making it hard to motivate people to acquire relevant skills.

### 3.4 Lack of Pushback

Last but not least, both privacy and accessibility face significant challenges in getting “organizations and developers to care.” [27] There appears to be minimal resistance or pushback on privacy, especially before the enforcement of regulations such as the General Data Protection Regulation (GDPR). Besides, since privacy is hard to compare, it will also not influence customer purchases. As a result, the companies have long lacked motivation to improve the privacy of their products. As for accessibility, while it is deemed a requirement in regulations such as the ADA in the U.S. [34], companies tend to limit their accessibility support to the minimum compliance [13].

## 4 WHAT MAY WORK FOR ACCESSIBILITY BASED ON THE LESSONS LEARNED IN PRIVACY?

The challenges faced by privacy have led to a rich set of research directions, e.g., privacy theories [66, 69], emerging technologies’ privacy concerns [1, 6, 31, 55, 72], personal privacy assistants to assist users in making privacy decisions [60], privacy nutrition labels to inform users of data use [49], etc. Similarly, accessibility research has been thinking about the goal of accessibility [43, 87], improving accessibility of emerging technologies [61], etc.

However, while all these efforts are valuable, translating research into practice is always hard. If we look at the history of privacy, while a great portion of the work may improve awareness of privacy, the vast majority of cases did not have much success in pushing privacy in practice [44]. On the company side, the interests of different stakeholders are still misaligned, e.g., companies, advertisers, and consumers; on the user side, even if people improve their awareness regarding the privacy of the products, there are usually no alternatives [44].

These lessons from privacy indicate that industry self-regulation and merely improving awareness are insufficient for addressing complex, value-driven issues such as privacy and accessibility. Just as with privacy, individuals have limited choices for assistive technologies and often have to tolerate the inaccessibility of mainstream technologies. There is also a lack of developer support and enforcement mechanisms.

Among the widespread efforts, it has been proven that centralized support such as smartphone app stores and external regulations such as GDPR have been among the most effective strategies for enforcing privacy in practice [44]. As Hong put it,

“...the most substantive lever for improving privacy has been comprehensive legislation and regulation such as GDPR and California Online Privacy Protection Act (CalOPPA)... Nowadays, companies and developers have to care about privacy, due to the potential for massive fines... The next most effective lever for privacy has been smartphone app stores. The centralized nature of app stores and their dominant position for distributing apps made it possible for Apple and Google to dictate certain standards for privacy. [44]”

Drawing lessons from privacy, I argue that centralized support and policymaking should be valued to effectively promote accessibility in practice.

## 4.1 Centralized Support

Centralized support would be important to ensure accessibility support is consistently enforced. Currently, inaccessibility is still a problem for many software [75]. Even when technology companies have accessibility support in their products, it is often inconsistent — for example, many websites try to meet ADA and the Web Content Accessibility Guidelines (WCAG) requirements by integrating an accessibility menu but screen reader users may consider these in-built widgets redundant or restrictive [50]. People often have to spend significant time navigating different systems to meet their accessibility needs [75]. Enforcing standards in centralized platforms such as the app stores of Apple and Google may help with this issue by enforcing consistency.

Although developers should take responsibility, simply blaming the developer side for accessibility is unhelpful because the burden on developers is also high [13], especially considering they need to consider many other issues. Sometimes, different requirements may even conflict with each other such as accessibility and aesthetics [85] (though it could be argued aesthetics is usually based on an ableist norm [46]). Therefore, providing consistent support to companies and developers will be important. For example, understanding how developers build privacy-friendly applications and considering strategies to support them is a topic gaining attention in privacy research [41, 57–59]. However, while some research focused on developers’ perspectives [19, 56, 85], developer support has still received relatively little attention in accessibility research. Future work should consider supporting developers in practicing accessibility, along with other values such as usability and privacy, at different development stages (i.e., analysis, design, coding, testing, deployment, and maintenance) [80].

Notably, one challenge in centralizing support may lie in the vast spectrum of contextual access needs as mentioned in Section 3.2. Some major technology companies have already been integrating assistive technologies and features into their systems or devices, such as screen readers, magnifiers, stabilizers, hearing aid support, and lived transcription [11, 39, 65]. These efforts help provide consistent and centralized support in terms of accessibility. However, moving forward, we are still facing many problems — With such a wide range of complex access needs, how can we build upon these existing efforts to ensure consistency in accessibility support? What support or services should (not) be made centralized in terms of accessibility? Addressing these problems could be a valuable step towards creating a more accessible digital environment.

## 4.2 Policymaking

Policymaking is another direction that deserves attention to enforce consistency in accessibility. External regulations have always been strong enforcing mechanisms for value-based issues such as privacy and accessibility. Privacy regulations such as GDPR have been among the most active areas in privacy research in recent years (e.g., [40, 53, 94]).

In the U.S., regulations like Section 508 and the ADA have long been the driving force behind accessibility standards. Established in the 1990s, WCAG has been an active area for ongoing research. Research has been exploring the root causes of inaccessibility and noncompliance with centralized guidance [73, 74]. Additionally, researchers delve into specific technical needs and best practices for emerging technologies. For example, Raja Kushalnagar and his colleagues have been developing standards for captioning and teleconference [12, 52].

Learning from the history of privacy, a policymaking perspective would be crucial for governing and ensuring the accessibility of emerging technologies. The existing WCAG offers a valuable foundation, but its reach may have limitations. As technology continues its rapid evolution, collaboration across research disciplines is essential to explore how best to develop effective policies that guarantee the safety and accessibility of these advancements for all. What would accessibility policies look like in the context of generative AI, augmented realities, virtual realities, and mixed realities? Considering that many fields such as privacy and FATE are exploring guidelines and policies for these emerging technologies as well, working together to create a unified approach would be highly beneficial.

## 5 DISCUSSION

### 5.1 Accessibility as a Multi-level Infrastructure

This paper contributes to ongoing conversations about accessibility by highlighting its complex realities and identifying under-explored areas in the field. Building on insights from the history of privacy research, I propose that addressing centralized support and policymaking is crucial to enhancing accessibility in practice. Similar to privacy, accessibility is not only specific to certain technologies or individuals; it requires support beyond the individual or application level, including support and governance at higher levels.

Building on the arguments developed in this paper, I advocate for a broader scope of accessibility research, urging a shift toward

treating accessibility as an infrastructure. Currently, accessibility research typically focuses on assistive technologies for specific needs, such as captioning [48, 64], and sign language technologies for d/Deaf and hard of hearing people [21, 22, 83]. Through this paper, I argue that research should pay more attention to the challenges in practice.

Just as privacy protections have evolved to encompass a spectrum of solutions and safeguards, accessibility must adopt a multifaceted approach to ensure standards. This involves not only technological advancements but also robust infrastructure support, such as policy regulation to enforce standards and ensure compliance across industries and independent developers. Without infrastructure support, intended accessibility efforts can even inadvertently lead to inaccessibility. For example, due to a lack of standards, disabled people now often need to navigate the use of a complex suite of software [75, 77]. Drawing insights from the development of privacy, accessibility can seek strategies to enhance it as an infrastructure and ensure holistic support. For instance, customer support [96] and community support [86] can all be great sources of accessibility support besides developer support and regulatory frameworks.

## 5.2 Fostering Cross-field Understanding and Joint Forces

The commonalities between privacy and accessibility suggest the potential for fostering cross-field communication and understanding in HCI. While interdisciplinary communication has been increasingly frequent in recent years, most of the communication is established on shared interests on a specific topic, e.g., accessibility and disability studies [62], accessibility and inclusive security & privacy [8]. This paper implies shared concerns and challenges among different HCI sub-fields, even if their goals differ. Additionally, cross-field understanding would be necessary because pursuing a goal in practice often requires people to negotiate among a wide set of values, such as privacy, security, accessibility, usability, and aesthetics [9, 20, 85].

Though this paper is positioned for the accessibility research community, I believe privacy can gain valuable insights from accessibility efforts — for example, including the most affected people in education and research initiatives [23, 43]. Considering Hong's comment on the similarity between privacy and FATE [44], the three communities may benefit from forming a joint force to promote more responsible technologies. Beyond the focus on centralized support and policymaking in this paper, accessibility, privacy, and FATE can learn from each other in tackling other shared challenges, such as how to serve diverse needs of a broad user base.

## 6 CONCLUDING THOUGHTS AND LIMITATIONS

This paper argues for the need for centralized support and external regulations to promote accessibility in practice. Drawing parallels with privacy, which shares a high-level conceptual nature and close relevance to software development, the paper advocates for mutual learning between privacy and accessibility to advance the development of responsible technologies. The argument emphasizes the

need for accessibility research to extend beyond individual disabilities and assistive technologies for personal use, recognizing accessibility as a structural issue that demands collective efforts.

I acknowledge that this paper relies heavily on Hong's comments on privacy research. I have drawn on relevant literature to provide a more comprehensive perspective on both privacy and accessibility. I intend to spark discussions on accessibility rather than offer concrete suggestions for accessibility research and practice. Additionally, I am aware that this paper is situated in the context of North America and Western Europe, as most of the sources I draw from are in the academic traditions of these places. I am aware that researchers and policymakers in many other countries are also considering promoting accessibility in practice. For example, China recently passed a new law on accessibility in 2023 [68]. Future discussions should be done in more diverse contexts.

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## REFERENCES

- [1] Noura Abdi, Xiao Zhan, Kopo M Ramokapane, and Jose Such. 2021. Privacy norms for smart home personal assistants. In *Proceedings of the 2021 CHI conference on human factors in computing systems*. 1–14.
- [2] Yasemin Acar, Sascha Fahl, and Michelle L Mazurek. 2016. You are not your developer, either: A research agenda for usable security and privacy research beyond end users. *2016 IEEE Cybersecurity Development (SecDev) (2016)*, 3–8.
- [3] Alessandro Acquisti, Laura Brandimarte, and Jeff Hancock. 2022. How privacy's past may shape its future. *Science* 375, 6578 (2022), 270–272.
- [4] Kelsie Acton. 2020. "Just with you": Professional integrated dancers' practices of access and access intimacy in timing. (2020).
- [5] Anne Adams and Martina Angela Sasse. 1999. Users are not the enemy. *Commun. ACM* 42, 12 (1999), 40–46.
- [6] Devon Adams, Alseny Bah, Catherine Barwulor, Nureli Musaby, Kadeem Pitkin, and Elissa M Redmiles. 2018. Ethics emerging: the story of privacy and security perceptions in virtual reality. In *Fourteenth Symposium on Usable Privacy and Security (SOUPS 2018)*. 427–442.
- [7] Taslima Akter, Bryan Dosono, Tousif Ahmed, Apu Kapadia, and Bryan Semaan. 2020. "I am uncomfortable sharing what I can't see": Privacy Concerns of the Visually Impaired with Camera Based Assistive Applications. In *29th USENIX Security Symposium (USENIX Security 20)*. 1929–1948.
- [8] Rahaf Alharbi, John Tang, and Karl Henderson. 2023. Accessibility Barriers, Conflicts, and Repairs: Understanding the Experience of Professionals with Disabilities in Hybrid Meetings. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*. 1–15.
- [9] Rahaf Alharbi, John Tang, and Karl Henderson. 2023. Accessibility Barriers, Conflicts, and Repairs: Understanding the Experience of Professionals with Disabilities in Hybrid Meetings. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (Hamburg, Germany) (CHI '23)*. Association for Computing Machinery, New York, NY, USA, Article 605, 15 pages. <https://doi.org/10.1145/3544548.3581541>
- [10] Irwin Altman. 1975. The environment and social behavior: privacy, personal space, territory, and crowding. (1975).
- [11] Apple. Retrieved July, 2024. Accessibility. <https://www.apple.com/accessibility/>.
- [12] Mariana Arroyo Chavez, Molly Feanny, Matthew Seita, Bernard Thompson, Keith Delk, Skyler Officer, Abraham Glasser, Raja Kushalnagar, and Christian Vogler. 2024. How Users Experience Closed Captions on Live Television: Quality Metrics Remain a Challenge. In *Proceedings of the CHI Conference on Human Factors in Computing Systems*. 1–16.
- [13] Shiri Azenkot, Margot J Hanley, and Catherine M Baker. 2021. How accessibility practitioners promote the creation of accessible products in large companies. *Proceedings of the ACM on Human-Computer Interaction* 5, CSCW1 (2021), 1–27.
- [14] Catherine M Baker, Yasmine N Elglaly, Anne Spencer Ross, and Kristen Shinohara. 2022. Including accessibility in computer science education. In *Proceedings of the 24th International ACM SIGACCESS Conference on Computers and Accessibility*. 1–5.
- [15] Rebecca Balebako, Abigail Marsh, Jialiu Lin, Jason Hong, and Lorrie Faith Cranor. 2014. The privacy and security behaviors of smartphone app developers. In

- Workshop on Usable Security*. The Internet Society Reston, VA, USA, 1–10.
- [16] France Bélanger and Robert E Crossler. 2011. Privacy in the digital age: a review of information privacy research in information systems. *MIS quarterly* (2011), 1017–1041.
  - [17] Victoria Bellotti and Abigail Sellen. 1993. Design for privacy in ubiquitous computing environments. In *Proceedings of the Third European Conference on Computer-Supported Cooperative Work 13–17 September 1993, Milan, Italy EC-SCW'93*. Springer, 77–92.
  - [18] Cynthia L Bennett, Erin Brady, and Stacy M Branham. 2018. Interdependence as a frame for assistive technology research and design. In *Proceedings of the 20th international acm sigaccess conference on computers and accessibility*. 161–173.
  - [19] Tingting Bi, Xin Xia, David Lo, John Grundy, Thomas Zimmermann, and Denae Ford. 2022. Accessibility in software practice: A practitioner's perspective. *ACM Transactions on Software Engineering and Methodology (TOSEM)* 31, 4 (2022), 1–26.
  - [20] Jeffrey P Bigham, Irene Lin, and Saiph Savage. 2017. The Effects of "Not Knowing What You Don't Know" on Web Accessibility for Blind Web Users. In *Proceedings of the 19th international ACM SIGACCESS conference on computers and accessibility*. 101–109.
  - [21] Danielle Bragg, Naomi Caselli, Julie A Hochgesang, Matt Huenerfauth, Leah Katz-Hernandez, Oscar Koller, Raja Kushalnagar, Christian Vogler, and Richard E Ladner. 2021. The fate landscape of sign language ai datasets: An interdisciplinary perspective. *ACM Transactions on Accessible Computing (TACCESS)* 14, 2 (2021), 1–45.
  - [22] Danielle Bragg, Oscar Koller, Mary Bellard, Larwan Berke, Patrick Boudreault, Annelies Braffort, Naomi Caselli, Matt Huenerfauth, Hernisa Kacorri, Tessa Verhoef, et al. 2019. Sign language recognition, generation, and translation: An interdisciplinary perspective. In *The 21st international ACM SIGACCESS conference on computers and accessibility*. 16–31.
  - [23] Sheryl Burgstahler and Richard Ladner. 2006. An alliance to increase the participation of individuals with disabilities in computing careers. *ACM SIGACCESS Accessibility and Computing* 85 (2006), 3–9.
  - [24] CHI2024. Retrieved July, 2024. Selecting a Subcommittee — Accessibility and Aging. <https://chi2024.acm.org/subcommittees/selecting-a-subcommittee/#accessibility>.
  - [25] John Lee Clark. Retrieved January, 2024. Against Access. [https://audio.mcsweeney.net/transcripts/against\\_access.html](https://audio.mcsweeney.net/transcripts/against_access.html).
  - [26] Jessica Colnago, Yuanyuan Feng, Tharangini Palanivel, Sarah Pearman, Megan Ung, Alessandro Acquisti, Lorrie Faith Cranor, and Norman Sadeh. 2020. Informing the design of a personalized privacy assistant for the internet of things. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. 1–13.
  - [27] Paula Conn, Taylor Gotfrid, Qiwen Zhao, Rachel Celestine, Vaishnavi Mande, Kristen Shinohara, Stephanie Ludi, and Matt Huenerfauth. 2020. Understanding the motivations of final-year computing undergraduates for considering accessibility. *ACM Transactions on Computing Education (TOCE)* 20, 2 (2020), 1–22.
  - [28] The World Wide Web Consortium. Retrieved January, 2024. Introduction to Web Accessibility. <https://www.w3.org/WAI/fundamentals/accessibility-intro/>.
  - [29] Raymundo Cornejo, Robin Brewer, Caroline Edasis, and Anne Marie Piper. 2016. Vulnerability, sharing, and privacy: Analyzing art therapy for older adults with dementia. In *Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing*. 1572–1583.
  - [30] Sauvik Das, Hao-Ping Lee, and Jodi Forlizzi. 2023. Privacy in the Age of AI. *Commun. ACM* 66, 11 (2023), 29–31.
  - [31] Jaybie A De Guzman, Kanchana Thilakarathna, and Aruna Seneviratne. 2019. Security and privacy approaches in mixed reality: A literature survey. *ACM Computing Surveys (CSUR)* 52, 6 (2019), 1–37.
  - [32] Cambridge Dictionary. Retrieved July, 2024. accessibility. <https://dictionary.cambridge.org/us/dictionary/english/accessibility>.
  - [33] Frank Elavsky. 2023. Option-Driven Design: Context, Tradeoffs, and Considerations for Accessibility. *arXiv preprint arXiv:2304.08748* (2023).
  - [34] Elizabeth F Emens. 2012. Disabling attitudes: US disability law and the ADA Amendments Act. *The American Journal of Comparative Law* 60, 1 (2012), 205–234.
  - [35] Organisation for Economic Co-operation and Development. Retrieved January, 2024. OECD Guidelines on the Protection of Privacy and Transborder Flows of Personal Data. [https://bj.a.ojp.gov/sites/g/files/xyckuh186/files/media/document/oecd\\_fips.pdf](https://bj.a.ojp.gov/sites/g/files/xyckuh186/files/media/document/oecd_fips.pdf).
  - [36] GENERAL DATA PROTECTION REGULATION (GDPR). Retrieved January, 2024. Right to be Forgotten. <https://gdpr-info.eu/issues/right-to-be-forgotten/>.
  - [37] Ephraim P Glinert and Bryant W York. 1992. Computers and people with disabilities. *Commun. ACM* 35, 5 (1992), 32–35.
  - [38] Erving Goffman. 2023. The presentation of self in everyday life. In *Social theory re-wired*. Routledge, 450–459.
  - [39] Google. Retrieved July, 2024. Accessibility in our products. [https://about.google/intl/ALL\\_us/belonging/disability-inclusion/product-accessibility/](https://about.google/intl/ALL_us/belonging/disability-inclusion/product-accessibility/).
  - [40] Johanna Gunawan, Cristiana Santos, and Irene Kamara. 2022. Redress for dark patterns privacy harms? A case study on consent interactions. In *Proceedings of the 2022 Symposium on Computer Science and Law*. 181–194.
  - [41] Irit Hadar, Tomer Hasson, Oshrat Ayalon, Eran Toch, Michael Birnhack, Sofia Sherman, and Arod Balissa. 2018. Privacy by designers: software developers' privacy mindset. *Empirical Software Engineering* 23 (2018), 259–289.
  - [42] Shawn Lawton Henry. 2007. *Just ask: integrating accessibility throughout design*. Lulu. com.
  - [43] Megan Hofmann, Devva Kasnitz, Jennifer Mankoff, and Cynthia L Bennett. 2020. Living disability theory: Reflections on access, research, and design. In *Proceedings of the 22nd International ACM SIGACCESS Conference on Computers and Accessibility*. 1–13.
  - [44] Jason I Hong. 2023. Teaching the FATE Community about Privacy. *Commun. ACM* 66, 8 (2023), 10–11.
  - [45] Jason I Hong. Retrieved August, 2023. Why is Privacy So Hard? <https://cacm.acm.org/blogs/blog-cacm/235401-why-is-privacy-so-hard/fulltext>.
  - [46] Stacy Hsueh, Beatrice Vincenzi, Akshata Murdeshwar, and Marianela Ciolfi Felice. 2023. Crippling Data Visualizations: Crip Technoscience as a Critical Lens for Designing Digital Access. In *Proceedings of the 25th International ACM SIGACCESS Conference on Computers and Accessibility*. 1–16.
  - [47] Jie Huang, Michael Backes, and Sven Bugiel. 2021. A11y and Privacy don't have to be mutually exclusive: Constraining Accessibility Service Misuse on Android. In *30th USENIX Security Symposium (USENIX Security 21)*. 3631–3648.
  - [48] Sushant Kafle and Matt Huenerfauth. 2017. Evaluating the usability of automatically generated captions for people who are deaf or hard of hearing. In *Proceedings of the 19th International ACM SIGACCESS Conference on Computers and Accessibility*. 165–174.
  - [49] Patrick Gage Kelley, Joanna Bresee, Lorrie Faith Cranor, and Robert W Reeder. 2009. A "nutrition label" for privacy. In *Proceedings of the 5th Symposium on Usable Privacy and Security*. 1–12.
  - [50] Tanner Kohler. Retrieved July, 2024. Challenges for Screen-Reader Users on Mobile. <https://www.nngroup.com/articles/screen-reader-users-on-mobile/>.
  - [51] Spyros Kokolakis. 2017. Privacy attitudes and privacy behaviour: A review of current research on the privacy paradox phenomenon. *Computers & security* 64 (2017), 122–134.
  - [52] Raja S Kushalnagar and Christian Vogler. 2020. Teleconference accessibility and guidelines for deaf and hard of hearing users. In *Proceedings of the 22nd International ACM SIGACCESS Conference on Computers and Accessibility*. 1–6.
  - [53] Lin Kyi, Sushil Ammanaghatta Shivakumar, Cristiana Teixeira Santos, Franziska Roesner, Frederike Zufall, and Asia J Biega. 2023. Investigating deceptive design in GDPR's legitimate interest. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*. 1–16.
  - [54] Richard E Ladner, Francis A McDonough, William Roth, Lawrence A Scadden, and Gregg C Vanderheiden. 1988. Public law 99-506,"Section 508" Electronic equipment accessibility for disabled workers. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 219–222.
  - [55] Josephine Lau, Benjamin Zimmerman, and Florian Schaub. 2018. Alexa, are you listening? Privacy perceptions, concerns and privacy-seeking behaviors with smart speakers. *Proceedings of the ACM on human-computer interaction* 2, CSCW (2018), 1–31.
  - [56] Jonathan Lazar, Alfreda Dudley-Sponaugle, and Kisha-Dawn Greenidge. 2004. Improving web accessibility: a study of webmaster perceptions. *Computers in human behavior* 20, 2 (2004), 269–288.
  - [57] Tianshi Li, Yuvraj Agarwal, and Jason I Hong. 2018. Coconut: An IDE plugin for developing privacy-friendly apps. *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies* 2, 4 (2018), 1–35.
  - [58] Tianshi Li, Elizabeth Louie, Laura Dabbish, and Jason I Hong. 2021. How developers talk about personal data and what it means for user privacy: A case study of a developer forum on reddit. *Proceedings of the ACM on Human-Computer Interaction* 4, CSCW3 (2021), 1–28.
  - [59] Tianshi Li, Kayla Reiman, Yuvraj Agarwal, Lorrie Faith Cranor, and Jason I Hong. 2022. Understanding challenges for developers to create accurate privacy nutrition labels. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems*. 1–24.
  - [60] Bin Liu, Mads Schaarup Andersen, Florian Schaub, Hazim Almuhammedi, Shikun Aerin Zhang, Norman Sadeh, Yuvraj Agarwal, and Alessandro Acquisti. 2016. Follow my recommendations: A personalized privacy assistant for mobile app permissions. In *Twelfth symposium on usable privacy and security (SOUPS 2016)*. 27–41.
  - [61] Kelly Mack, Emma McDonnell, Dhruv Jain, Lucy Lu Wang, Jon E. Froehlich, and Leah Findlater. 2021. What do we mean by "accessibility research"? A literature survey of accessibility papers in CHI and ASSETS from 1994 to 2019. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. 1–18.
  - [62] Jennifer Mankoff, Gillian R Hayes, and Devva Kasnitz. 2010. Disability studies as a source of critical inquiry for the field of assistive technology. In *Proceedings of the 12th international ACM SIGACCESS conference on Computers and accessibility*. 3–10.

- [63] Nora McDonald and Andrea Forte. 2020. The politics of privacy theories: Moving from norms to vulnerabilities. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. 1–14.
- [64] Emma J McDonnell, Ping Liu, Steven M Goodman, Raja Kushalnagar, Jon E Froehlich, and Leah Findlater. 2021. Social, environmental, and technical: Factors at play in the current use and future design of small-group captioning. *Proceedings of the ACM on Human-Computer Interaction* 5, CSCW2 (2021), 1–25.
- [65] Microsoft. Retrieved July, 2024. Accessibility. <https://www.microsoft.com/en-us/accessibility>.
- [66] Helen Nissenbaum. 2004. Privacy as contextual integrity. *Wash. L. Rev.* 79 (2004), 119.
- [67] OECD. 2002. *OECD Guidelines on the Protection of Privacy and Transborder Flows of Personal Data*. 64 pages. <https://doi.org/https://doi.org/10.1787/9789264196391-en>
- [68] Ministry of Justice of the People's Republic of China. Retrieved July, 2024. China passes new law on barrier-free living environment. [http://en.moj.gov.cn/2023-06/29/c\\_898657.htm](http://en.moj.gov.cn/2023-06/29/c_898657.htm).
- [69] Leysia Palen and Paul Dourish. 2003. Unpacking "privacy" for a networked world. In *Proceedings of the SIGCHI conference on human factors in computing systems*. 129–136.
- [70] Rohan Patel, Pedro Breton, Catherine M Baker, Yasmine N El-Glaly, and Kristen Shinohara. 2020. Why software is not accessible: Technology professionals' perspectives and challenges. In *Extended abstracts of the 2020 CHI conference on human factors in computing systems*. 1–9.
- [71] Elissa M Redmiles, Noel Warford, Amritha Jayanti, Aravind Koneru, Sean Kross, Miraida Morales, Rock Stevens, and Michelle L Mazurek. 2020. A comprehensive quality evaluation of security and privacy advice on the web. In *29th USENIX Security Symposium (USENIX Security 20)*. 89–108.
- [72] Franziska Roesner, Tadayoshi Kohno, and David Molnar. 2014. Security and privacy for augmented reality systems. *Commun. ACM* 57, 4 (2014), 88–96.
- [73] Anne Spencer Ross, Xiaoyi Zhang, James Fogarty, and Jacob O Wobbrock. 2017. Epidemiology as a framework for large-scale mobile application accessibility assessment. In *Proceedings of the 19th international ACM SIGACCESS conference on computers and accessibility*. 2–11.
- [74] Anne Spencer Ross, Xiaoyi Zhang, James Fogarty, and Jacob O Wobbrock. 2018. Examining image-based button labeling for accessibility in Android apps through large-scale analysis. In *Proceedings of the 20th International ACM SIGACCESS Conference on Computers and Accessibility*. 119–130.
- [75] Abir Saha and Anne Marie Piper. 2020. Understanding audio production practices of people with vision impairments. In *The 22nd International ACM SIGACCESS Conference on Computers and Accessibility*. 1–13.
- [76] Jerome H Saltzer and Michael D Schroeder. 1975. The protection of information in computer systems. *Proc. IEEE* 63, 9 (1975), 1278–1308.
- [77] Kristen Shinohara, Michael McQuaid, and Nayeri Jacobo. 2020. Access differential and inequitable access: Inaccessibility for doctoral students in computing. In *Proceedings of the 22nd International ACM SIGACCESS Conference on Computers and Accessibility*. 1–12.
- [78] Kristen Shinohara, Mick McQuaid, and Nayeri Jacobo. 2021. The burden of survival: how doctoral students in computing bridge the chasm of inaccessibility. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. 1–13.
- [79] Kristen Shinohara, Murtaza Tamjeed, Michael McQuaid, and Dymen A Barkins. 2022. Usability, Accessibility and Social Entanglements in Advanced Tool Use by Vision Impaired Graduate Students. *Proceedings of the ACM on Human-Computer Interaction* 6, CSCW2 (2022), 1–21.
- [80] João Sousa e Silva, Ramiro Gonçalves, Frederico Branco, António Pereira, Manuel Au-Yong-Oliveira, and José Martins. 2019. Accessible software development: a conceptual model proposal. *Universal Access in the Information Society* 18 (2019), 703–716.
- [81] Daniel J Solove. 2005. A taxonomy of privacy. *U. Pa. L. Rev.* 154 (2005), 477.
- [82] Abigale Stangl, Nitin Verma, Kenneth R Fleischmann, Meredith Ringel Morris, and Danna Gurari. 2021. Going beyond one-size-fits-all image descriptions to satisfy the information wants of people who are blind or have low vision. In *Proceedings of the 23rd International ACM SIGACCESS Conference on Computers and Accessibility*. 1–15.
- [83] Thad Starner and Alex Pentland. 1995. Real-time american sign language recognition from video using hidden markov models. In *Proceedings of International Symposium on Computer Vision-ISCV*. IEEE, 265–270.
- [84] Xinru Tang, Xiang Chang, Nuoran Chen, Yingjie Ni, RAY LC, and Xin Tong. 2023. Community-Driven Information Accessibility: Online Sign Language Content Creation within d/Deaf Communities. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*. 1–24.
- [85] Shari Trewin, Brian Cragun, Cal Swart, Jonathan Brezin, and John Richards. 2010. Accessibility challenges and tool features: an IBM Web developer perspective. In *Proceedings of the 2010 international cross disciplinary conference on web accessibility (W4A)*. 1–10.
- [86] Emily Tseng, Mehrnaz Sabet, Rosanna Bellini, Harkiran Kaur Sodhi, Thomas Ristenpart, and Nicola Dell. 2022. Care infrastructures for digital security in intimate partner violence. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems*. 1–20.
- [87] Emily Q Wang and Anne Marie Piper. 2018. Accessibility in action: Co-located collaboration among deaf and hearing professionals. *Proceedings of the ACM on Human-Computer Interaction* 2, CSCW (2018), 1–25.
- [88] Hao-Chuan Wang, Susan F Fussell, and Leslie D Setlock. 2009. Cultural difference and adaptation of communication styles in computer-mediated group brainstorming. In *Proceedings of the SIGCHI conference on human factors in computing systems*. 669–678.
- [89] Yang Wang. 2017. The third wave? Inclusive privacy and security. In *Proceedings of the 2017 new security paradigms workshop*. 122–130.
- [90] Samuel D. Warren and Louis D. Brandeis. Retrieved July, 2024. The Right to Privacy. <https://louisville.edu/law/library/special-collections/the-louis-d.-brandeis-collection/the-right-to-privacy>.
- [91] Miranda Wei, Sunny Consolvo, Patrick Gage Kelley, Tadayoshi Kohno, Franziska Roesner, and Kurt Thomas. 2023. "There's so much responsibility on users right now:" Expert Advice for Staying Safer From Hate and Harassment. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*. 1–17.
- [92] Jacob O Wobbrock, Krzysztof Z Gajos, Shaun K Kane, and Gregg C Vanderheiden. 2018. Ability-based design. *Commun. ACM* 61, 6 (2018), 62–71.
- [93] Jacob O Wobbrock, Shaun K Kane, Krzysztof Z Gajos, Susumu Harada, and Jon Froehlich. 2011. Ability-based design: Concept, principles and examples. *ACM Transactions on Accessible Computing (TACCESS)* 3, 3 (2011), 1–27.
- [94] Richmond Y Wong, Andrew Chong, and R Cooper Aspegren. 2023. Privacy Legislation as Business Risks: How GDPR and CCPA are Represented in Technology Companies' Investment Risk Disclosures. *Proceedings of the ACM on Human-Computer Interaction* 7, CSCW1 (2023), 1–26.
- [95] Richmond Y Wong and Deirdre K Mulligan. 2019. Bringing design to the privacy table: Broadening "design" in "privacy by design" through the lens of HCI. In *Proceedings of the 2019 CHI conference on human factors in computing systems*. 1–17.
- [96] Yixin Zou, Allison McDonald, Julia Narakornpichit, Nicola Dell, Thomas Ristenpart, Kevin Roundy, Florian Schaub, and Acar Tamer Soy. 2021. The role of computer security customer support in helping survivors of intimate partner violence. In *30th USENIX security symposium (USENIX Security 21)*. 429–446.