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Flower in the Mirror, Moon on the Water: Bridging Perspectives on Alternative Text and Recommendations for Practice

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ABSTRACT

Alternative text (alt text) is one of the most prevalent Web accessibility barriers affecting a wide range of media. Despite manifold efforts addressing its absence, recent work highlighted that unsuitable alt text is equally problematic and is underpinned by a lack of understanding and guidelines on what constitutes suitable alt text. In this work, we present an empirical exploratory study that investigates perceptions of Web content creators and visually impaired users on suitable alt text to bridge the functional gap between experiences and best available practice. Following a qualitative approach, 11 Web content creators and 11 visually impaired users were interviewed, and findings are reported on Web accessibility via screen readers and reasons for its deprioritization, WCAG conformance, and perceptions on alt text authorship, and suitability. The first much-needed trainability and suitability recommendations for alt text suitability are further proposed, and avenues for future work are discussed.

KEYWORDS

Accessibility; Web; assistive technology; visual impairment; alt text; empirical study; guidelines

1. Introduction

Web accessibility is an ongoing issue that is underpinned by a plurality of legal acts and policies around the globe (Persson et al., 2015; Sanderson-Mann and McCandless, 2005; Lawson, 2011; European Parliament and Council, 2019). It has been shown that designing with accessibility in mind entails multiple benefits, such as improved usability (Spyridonis et al., 2017), an improved overall navigation (Hackett et al., 2003; McCarthy and Swierenga, 2010), reduced content adjustability needs (Burgstahler, 2009), increased consumer market reach and consumer satisfaction (Moreno et al., 2019; Waller et al., 2015), as well as an improved overall Web product quality (Vollenwyder et al., 2023). However and despite such benefits, a recent survey found that accessibility is deprioritized with major reasons including poor communication of its benefits, unwillingness to train in accessibility, and budget and time constraints (Open Inclusion, 2023). As a result, recent work revealed that 95.9% of Website home pages have detectable accessibility failures and there has only been a 1.9% decrease in such failures over the last five years (WebAIM, 2024), which points to a lack of substantial progress in making the Web more accessible for all.

More specifically, accessibility failures typically refer to conformance failures with the Web *Content Accessibility Guidelines* (WCAG), which rank Web content in three levels of conformance – Level A, AA and AAA (World Wide Web Consortium, 2023a, 2023b). However, the complexity of understanding and applying WCAG has been well reported (Spyridonis et al., 2017; Lengua et al., 2022; Muehlbradt and Kane, 2022; Green, 2022; Spyridonis and Daylamani-Zad, 2019; Spyridonis and Daylamani-Zad, 2021), which inevitably has led to inadequate WCAG conformance by a notable number of Websites (McCarthy and Swierenga, 2010; WebAIM, 2024; Crespo et al., 2016). It has been also well-reported that 96.3% of all detected conformance failures are encompassed by six main Web accessibility barriers, namely *low contrast text, missing alternative text (or alt text) for images, missing form input labels, empty links, empty buttons, and missing document language* (WebAIM, 2024). McEwan and Weerts (2007) and Takagi et al. (2009), and more recently Pierrès and Darvishy (2022) and Zong et al. (2022) argue that missing alt text, which is typically defined as "…a textual substitute for non-text content in Web pages" (WebAIM, 2023), is the most prevalent Web accessibility barrier for non-text Web content for visually impaired users. In fact, the inaccessibility of non-text content, incl. images, infographics, CAPTCHA (Completely Automated Public Turing test to Tell Computers and Human Apart), videos and audio, remains an unaddressed matter (Muehlbradt and Kane, 2022). Whilst issues with missing alt text are well-documented, more recent work by Salisbury et al. (2017) and Mack et al. (2021) highlighted that *unsuitable alt text* can be equally problematic or even more problematic than alt text absence, especially in cases of more than one impairment.

However, WCAG conformance is not the full picture of Web accessibility (Vollenwyder et al., 2023; Power et al.,

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2012; Cooper, 2016; Iniesto et al., 2021). It has been shown that WCAG seem to neglect *population diversity*, namely the appreciation of a plurality of abilities and contexts (Stratton et al., 2022), with Aizpurua, Harper and Vigo's work distinguishing Web accessibility between accessibility per WCAG conformance and per users' hands-on experiences (Aizpurua et al., 2016). In fact, past research has intimated a **perception mismatch** between Web content creators (individuals responsible for authoring Web content) and Web content consumers (individuals who interact with Web content) in relation to what makes Web content accessible (Lengua et al., 2022; Harris, 2020; Hanley et al., 2021). Past work by Muehlbradt and Kane highlighted a 22% increase in alt text inclusion (Muehlbradt and Kane, 2022), and although a further 12% increase in alt text inclusion has been reported since 2019 (WebAIM, 2024), recent findings revealed that alt text must not only be present, but it must also be accurate, clear, and of sufficient volume. Web content must therefore also consist of *suitable* alt text (Salisbury et al., 2017; Kaur and Kumar, 2015; Kaur and Kumar, 2015; Lee and Ashok, 2022), in addition to being available, however, there has only been a 2.2% decrease in unsuitable alt text over the last five years (WebAIM, 2024; WebAIM, 2024). This points to a lack of understanding of what constitutes suitable alt text which is underpinned by a gap in terms of appropriate guidelines on what makes alt text suitable (Muehlbradt and Kane, 2022; McCall and Chagnon, 2022), which is in fairness an inherently difficult and ethically fraught task (Hanley et al., 2021). In this study, suitable alt text is defined as alt text that is accurate, complete and concise in relation to the context in which the image is used (Mack et al., 2021). Accordingly, trainability, namely the ability of a solution to train individuals to author more suitable alt text, is a further challenge (Edwards et al., 2023). It is hence imperative that both alt text unavailability and unsuitability are considered in tandem when considering Web accessibility.

Therefore, there is a *functional gap* between reported accessibility based on WCAG conformance and accessibility reported based on Web content consumers' experiences of interacting with Web content. Accordingly, the aim of this work is to help bridge this gap by investigating Web content creators' and Web content consumers' perceptions in the context of what constitutes suitable alt text, which can help understand what they believe to be useful for themselves, difficulties they face, and how best to introduce new guidelines or solutions that will lead to long-term and improved accessibility. To the best of our knowledge, *there are no recent guidelines that take into consideration the mismatch between Web content creators' and Web content consumers' perceptions in the context of alt text suitability*. There have been past alt text authorship approaches that mainly deal with alt text availability (see Section 2.3), but existing work is devoid of comparison of suitability perceptions between Web content creators and Web content consumers. The goal of our work is therefore to appreciate such scholarly efforts and see in how far those are corroborated by experiential understandings from both Web content creators and Web content consumers with a focus on visually impaired users. It is expected that rethinking Web accessibility from this more holistic lens will present opportunities to develop guidelines and solutions to improve alt text accessibility. This work addressed three research questions:

- RQ1. What are the perceptions of Web content creators on the accessibility of the Web through screen readers against visually impaired users' Web navigation experiences?
- RQ2. What are the perceptions of Web content creators on WCAG against those of visually impaired users?
- RQ3. What makes alt text suitable according to both visually impaired users and Web content creators?

Accordingly, semi-structured online interviews with 11 Web content creators and 11 visually impaired users were conducted and data were analyzed using a reflexive thematic analysis approach (Braun and Clarke, 2021; Braun and Clarke, 2019). Challenges and strategies that participants had encountered when authoring and/or interacting with Web content, use and consideration of assistive technologies (ATs) such as screen readers to help with navigating the Web, as well as considerations to inform the design of accessible alt text were discussed. This study makes the following contributions:

A. Alt text trainability and suitability recommendations drawing on a set of six themes, which are to the best of our knowledge, one of the first such efforts to compare and bring together the views of Web content creators and visually impaired users on alt text suitability, thereby offering a contrast to prior evidence (e.g., Lengua et al., 2022; Harris, 2020; Hanley et al., 2021) on the persistence of a mismatch between their views.
B. Empirical evidence clarifying two previously recognized alt text Web accessibility barriers, hereby named **non-null alt text** and **image misuse**, as well as supporting a distinction in how alt text and plain text are accessed by screen readers (i.e., the former is accessed as a chunk of text, while plain text is accessed line by line), which whilst documented in certain accessibility resources (e.g., Bureau of Internet Accessibility, 2018; Bureau of Internet Accessibility, 2024; Accessibility for Ontarians with Disabilities Act (AODA), 2005), they have not yet been formally addressed in academic literature.

Accordingly, this study has the following three limitations, which are further discussed in Section 5.2:

A. A small sample size that does not allow for broader generalizations to be made; however, it is consistent with previous Web accessibility studies (e.g., Muehlbradt and Kane, 2022; Mack et al., 2021; Aizpurua et al., 2016; Lee and Ashok, 2022), where sample sizes are small for a variety of documented reasons.
B. The Web Content Creator participants had an average of nine years of experience in Web accessibility (see Table 2), and, as such, the findings of this work reflect a blend of their personal experience in creating

accessible Web content and observations of their clients in doing so.

C. This work focuses on how alt-text-related barriers are experienced by visually impaired users alone; further similar studies focusing on diverse impairments are encouraged to capture the broader scope of alt-text-related barriers.

This paper is structured as follows. Section 2 discusses the background and motivation for this work. Section 3 then presents the process followed to collect and analyze the data to arrive at a set of themes based on which much-needed recommendations and guidelines are proposed for trainability and making alt text suitable. Then, Section 4 synthesizes and contextualizes the data in relation to the literature using a combination of analyst narrative and illustrative data extracts with each theme being a subsection of its own. Finally, Section 5 presents a concluding discussion of the findings and proposed directions for future work.

2. Background and related work

To understand the gaps in current research and the importance of this work's research questions, prior related work is first discussed in this section that examines screen readers, their primary users and their needs in relation to alt text suitability, as well as state-of-the-art approaches to authorship of alt text.

2.1. Visually impaired users and screen reader usage

Visual impairment is a condition characterized by a reduction in vision and has profound implications for individuals and societies worldwide. This multifaceted condition encompasses a spectrum of visual disabilities, ranging from partial sight loss to complete blindness. According to the World Health Organization (WHO), at least 2.2 billion people globally have a vision impairment with at least 1 billion cases being preventable or unaddressed (World Health Organization, 2024). Visual impairment can profoundly impact an individual's quality of life, affecting their ability to perform daily activities, access education and employment opportunities, access information, and participate in social and cultural activities (Crews and Campbell, 2004; Nyman et al., 2010).

Advancements in technologies, and in particular assistive technologies, have played a crucial role in mitigating the challenges faced by individuals with visual impairments. Screen readers, magnifiers, braille displays/haptic feedback, voice input, and wearable technologies have facilitated access to digital information and communication (Hersh and Johnson, 2008; Messaoudi et al., 2022). Specifically, screen readers which are a type of assistive software (such as JAWS, NVDA and VoiceOver (Lee and Ashok, 2022)), are typically used by people with a disability to handle access barriers and surmount the interaction burden during Web navigation (Amado-Salvatierra et al., 2016). They work by reading out loud digital content (incl. text and alt text for non-text content) that is displayed on computer screens and are primarily used by people with visual impairments for Web navigation. However, past research identified that Web navigation via screen readers differs per impairment (McCarthy and Swierenga, 2010; Friedman and Bryen, 2007; Berger et al., 2010) which adds to this ongoing challenge. Despite such efforts, visual impairment still poses significant challenges in accessing visual content, especially non-text content, and alt text availability and suitability plays a crucial role in addressing this issue. This is particularly important considering that screen readers are mainly required to access alt text, but the variable ability or the total inability per screen reader software to detect or grant access to alt text has been reported as an important consideration (McCall and Chagnon, 2022; Petrie et al., 2022).

In response, Morris et al. developed a taxonomy of promising alt text elements to improve alt text in the form of five categories, namely interactivity, stability, representation, structure, and personalization (Morris et al., 2018). However, users with cognitive impairments prioritized ease of extracting information and preferred alt text written in everyday language, rather than being attentive to detail as seen for users with low vision and blindness (McCarthy and Swierenga, 2010; Vollenwyder et al., 2023; Lee and Ashok, 2022). Similarly, Friedman and Bryen reported that although proper screen reader support for alt text is the fifth most cited recommendation (35%) for users with cognitive impairments, screen readers have been found burdensome to interact with and expensive to obtain for these users (Friedman and Bryen, 2007). In a similar vein, users with dyslexia have been shown to appreciate the utility of alt text for Web content comprehension, valuing customizability in areas such as color scheme, configurability, and screen reader audio and text synchronization for improved reading speeds and Web browsing experience (McCarthy and Swierenga, 2010). Moreover, users with a motor impairment have also been shown to benefit from alt text, as they typically browse the Web via alternative input devices, such as non-traditional keyboard or mouse, which can be integrated into screen readers, thus allowing these users to understand non-text content without the need to interact with it (Berger et al., 2010).

The above discussion highlights that there is an important variability in needs and requirements for alt text suitability per type of impairment, which can even be identified at the level of screen reader usage, and which is often found to be conflicting between people with visual impairments who use a screen reader and other screen reader users. Given the reliance of the former upon screen readers, in this study it is imperative to explore their perceptions in an effort to inform and contribute to relevant scholarly work towards alt text suitability.

2.2. Web content creators and accessibility

Conversely, there is a *mismatch* between the perceptions of visually impaired users highlighted in the previous section, and those of Web content creators in the context of accessible Web navigation. For Web content creators, their knowledge

often stems from their reliance on accessibility tools and guidelines, such as WCAG. However, whilst WCAG have been available for more than 20 years (World Wide Web Consortium (W3C), 2023a; Crespo et al., 2016), advancements in accessibility have been largely outpaced by advancements in technology (Spyridonis et al., 2017; Stratton et al., 2022; Scott et al., 2015). This can be largely attributed to the increasingly visual nature of the Web making alt text suitability even more challenging to implement, but it also very much depends on factors such as the complexity of the visual content itself, the context and the domain (Muehlbradt and Kane, 2022; Crespo et al., 2016; Miranda and Araujo, 2022; Bi et al., 2022). Although past research has produced a much-needed compilation of specifications for alt text to be suitable (Salisbury et al., 2017; Mack et al., 2021; McCall and Chagnon, 2022; Zhong et al., 2020; Williams et al., 2022), the previous section highlighted that there is no one-size-fits-all approach to warranty the suitability of alt text, as it varies per context, content, domain, disability, as well as per Web content creator and consumer preferences and knowledge of Web accessibility. Additionally, WCAG are not the full picture of Web accessibility, as they neglect population diversity and are perceived as prohibitively complex (Spyridonis et al., 2017; Lengua et al., 2022; Muehlbradt and Kane, 2022; Green, 2022). It is therefore not surprising how Web content creators' reliance on such guidelines in comparison with consumers' hands-on navigation experiences creates a functional perception gap (Aizpurua et al., 2016).

Inevitably, it is also not surprising that 88.5% of Web content creators rely on Content Management Systems (CMS) for Web accessibility issue resolution (Petrie et al., 2011), agreeing well with Hanson and Richards' notion about advancements in accessibility which have been, traditionally, due to advancements in technology (Hanson and Richards, 2013). This, however, is in contrast with recent reports from screen-reader users that better (more accessible) Websites would have a bigger impact on improvements to Web accessibility than better assistive technology (WebAIM, 2024), which further highlights the *mismatch* between the perceptions of Web content creators and visually impaired users in the context of accessible Web navigation. Accordingly, it is argued that this mismatch between Web content creators' and Web content consumers' perceptions about alt text suitability points towards the need to revisit the unnegotiable passive role of Web content consumers in the authorship of alt text.

2.3. Alternative text and authorship approaches

As a first step towards understanding and appreciating the reported mismatch in the previous section, alt text authorship approaches and how they reflect this mismatch are next discussed. Authoring alt text for suitability is an inherently difficult task (Mack et al., 2021). In response, there have been suggestions to include functionality in the form of different versions of alt text per disability (Crespo et al., 2016); however, the lack of scholarly efforts comparing the suitability perceptions between Web content creators and visually impaired users is a prohibiting factor to achieve this (Muehlbradt and Kane, 2022; Zong et al., 2022), as the former need to be aware of what information needs to be included or omitted for suitability per type of impairment (Muehlbradt and Kane, 2022; Crespo et al., 2016; Zong et al., 2022). Nevertheless, a variety of authorship approaches have been reported in the literature ranging from automated to crowdsourced efforts.

2.3.1. Automated authorship

Recent advancements in Computer Vision (CV) have led to the use of technologies to automate alt text authorship, which on the other hand presents concerns in terms of suitability. Indicatively, *Microsoft* and *Google* have employed automated systems to generate alt text and suggest that in certain cases CV has propelled past the need to rely on human judgment for alt text suitability (Mazzoni, 2023; Roach, 2020). Similarly, Wu et al. developed an automated system that uses CV to draw on the depicted and surrounding content of *Facebook* images to automatically generate alt text (Wu et al., 2017). The authors stressed the pivotal role of CV in improving the accessibility and usability of images for users with blindness or low vision, however, they sounded a note of caution about the risk of compromising quality and the possibility of ethical concerns (Hanley et al., 2021) when automating the approach. This is based on screen-reader users having strong expectations and placing a lot of trust in alt text descriptions (Lengua et al., 2022; Salisbury et al., 2017; Gleason et al., 2019; MacLeod et al., 2017). Taken together, the above efforts highlight how automated approaches can scale alt text authorship/availability, but they also raise prohibitive inaccuracies in the context of suitability, which has been shown to be equally or even more important than alt text presence for visually impaired users, especially in cases of more than one impairment.

2.3.2. Manual authorship

In contrast to automated authorship, manual approaches are considered in cases where the need for alt text suitability outweighs the need to scale authorship, e.g., for smaller Websites or for Websites lacking in rich non-text informative content. It has also been acknowledged that automated authorship becomes less appropriate if the non-text content that needs to be described is more complex (Gleason et al., 2019; Chintalapati et al., 2022), such as infographics. Chintalapati, Bragg and Wang used an existing framework to provide Web content creators with guidelines for authoring alt text for infographics in an academic context, but only half of the 1085 manually authored alt text contained content-related or contextual information beyond high-level specifications, such as graph type, axes labels and plotted data (Chintalapati et al., 2022). In a related vein, Mack et al. developed two prototype systems for manual alt text authorship conducting a combination of interviews and usability tests with 12 authors and 6 screen-reader users (Mack et al., 2021), demonstrating a significant increase in suitability when alt text was authored manually from scratch.

However, meeting modern scalability needs has led authors to explore alternative, as in more scalable, solutions which range from combinations of automated and manual approaches (Stangl et al., 2020; Gleason et al., 2019) to outsourcing alt text authorship to a large number of non-expert authors (i.e., crowdsourcing approaches) (see next section). Taken together, the above efforts underscore how manual approaches become more relevant when scalability can be compromised and suitability is paramount, but on the other hand, they cannot guarantee suitability due to the variability of expertise in Web accessibility and the reported lack of unambiguous guidelines.

2.3.3. Crowdsourced authorship

The inconsistency of automated approaches to suitably describe complex non-text content (Chintalapati et al., 2022), the reluctance of authors to employ guidelines (Williams et al., 2022; Morash et al., 2015), and the need to scale suitable alt text authorship further (Salisbury et al., 2017; Stangl et al., 2020) have spurred the afore-mentioned shift to crowdsourcing solutions. Crowdsourcing is defined as "the act of taking a task traditionally performed by a designated agent (such as an employee or a contractor) and outsourcing it by making an open call to an undefined but large group of people" (Howe, 2008). In the case of non-text Web content, crowdsourcing approaches seem to stem from *social accessibility* initiatives, namely approaches that allow users to report and suggest ways of fixing cases of unavailable and/or unsuitable alt text and, as such, build a repository of such user-reported and/or -fixed data (Kawanaka et al., 2008). In effect, social accessibility and crowdsourcing both aim to leverage the crowds' wisdom to solve alt text unavailability and unsuitability barriers, and such approaches also present the possibility to scale suitable alt text authorship (Gleason et al., 2020).

However, past work (Yang and Lai, 2010; Droutsas, 2021) asserted that motivational factors to participate in crowdsourcing approaches are essential. Indicatively, Zhong et al. combined automated authorship and *microworking*, which is a type of crowdsourcing whose motivational factor is offering users a small financial incentive to complete computationally difficult tasks to prevent the automated system from generating false positives for Web images (Zhong et al., 2020). Relatedly, Gleason et al. provided alt text authorship guidelines and requested users of *Amazon Mechanical Turk* (AMT or MTurk)[1], which is one of the first and most popular microworking platforms, to re-author unsuitable alt text as a final suitability measure (Gleason et al., 2020). Microworking is, however, ill-advised for large-scale tasks due to its cost increasing proportionately with the number of alt text authorship requests (Chamberlain et al., 2013) and it lacks the means to incorporate real-time instructions (Morash et al., 2015). Accordingly, Brady, Morris and Bigham developed a Facebook application based on *friendsourcing*, which is another type of crowdsourcing that involves, in this case, blind users outsourcing alt text authorship requests to their social media contacts (Brady et al., 2014). Their results intimated friendsourcing as a promising approach to mitigate costliness risks related to microworking and contradicted previous evidence on friendsourcing not being well-received by blind users out of fear of being stigmatized or burdening their social media contacts (Brady et al., 2013). Taken together, the above efforts highlight how crowdsourcing approaches show promise to involve non-experts and, as such, address the variability in Web accessibility expertise, but current approaches fail to guarantee suitability and scalability.

2.4. Summary and way forward

This section discussed visually impaired users with a particular emphasis on the suitability challenges they typically face when accessing non-text content. It further highlighted numerous efforts in the literature to improve alt text availability and suitability from an authorship perspective. However, this section also identified that alt text suitability remains largely unaddressed mainly due to the fact that Web content creators and Web content consumers often have different views on what constitutes suitable alt text in different contexts, whilst available guidelines are inconsistent, ambiguous and are not reflecting the plurality of impairments. Accordingly, there is a pressing need to "clear the air" which will help take a forward leap towards identifying common ground on what constitutes suitable alt text and best ways to achieve this. This work is the first effort to the best of our knowledge that brings the perceptions of Web content authors and visually impaired Web content consumers together in an attempt to help bridge this functional perception gap and identify actionable ways forward to improve alt text suitability. It also explores how far scholarly efforts are corroborated by the experiential understandings from both Web content creators and visually impaired users; in other words, this work contributes to similar efforts in the literature by providing an empirical account of what Web content creators and visually impaired users are also "saying" as opposed to their experiences of "doing" in the context of alt text suitability.

3. Methodology

An exploratory study following a qualitative approach through semi-structured online interviews was conducted, which are generally preferred in this type of research (Aizpurua et al., 2016; Harris, 2020). This section discusses the participants, the study protocol and the analysis approach.

3.1. Participants and recruitment

In total, 22 participants (11 Web content creators (WCC) and 11 visually impaired users (VIU)) were recruited and interviewed from January to March 2024. Six of the participants identified as male and five as female in the former group, whilst eight identified as male and three as female in the latter. The mean age across both groups was 44 years (range 22–70; SD 14). Tables 1 and 2 provide an overview of the two participant groups. The specific inclusion criteria

Table 1. Visually impaired users and self-reported experiences.

ID	Age range	Gender	Visual impairment	Yrs. of web use	Yrs. of screen reader use
VIU1	18–24	Male	Blindness	15	15
VIU2	45–54	Male	Retinitis pigmentosa	30	27
VIU3	55–64	Female	Retinopathy of prematurity	30	37
VIU4	18–24	Female	Severe sight impairment (Registered blindness)	6	6
VIU5	35–44	Female	Blindness	24	26
VIU6	25–34	Male	Severe sight impairment (Registered blindness)	10	10
VIU7	35–44	Male	Blindness since birth	25	25
VIU8	45–54	Male	Blindness NLP (No light perception)	26	28
VIU9	65+	Male	Uveitis (Registered severe visual impairment – Blindness)	30	18
VIU10	45–54	Male	Blindness	30	35
VIU11	45–54	Male	Blindness	30	30

Table 2. Web content creators and self-reported experiences.

ID	Age range	Gender	Job title	Web experience (in yrs)	Accessibility experience (in yrs)
WCC1	65+	Male	Web Accessibility Consultant	28	20
WCC2	55–64	Female	Accessibility Coordinator	3	3
WCC3	45–54	Male	Digital Delivery Manager and Digital Accessibility Lead	25	5
WCC4	25–34	Male	Accessibility Engineer and Consultant	7	7
WCC5	45–54	Female	Senior Accessibility Engineer	12	12
WCC6	55–64	Female	Web Accessibility Consultant	14	4
WCC7	18–24	Male	Digital Media Developer	4	0
WCC8	25–34	Female	Digital Accessibility Specialist	3	3
WCC9	35–44	Female	User Experience (UX) Designer	10	5
WCC10	45–54	Male	Business Owner	18	18
WCC11	35–44	Male	Principal Engineer	22	16

were broad by design to recruit a diverse sample of Web content creators and visually impaired users, including (1) being at least 18 years old at the time of the interview, (2) have minimum two years of experience with creating and/or evaluating Web content, and (3) some experience with creating accessible Web content was desirable, particularly writing and/or evaluating alt text descriptions; for the former. Similarly, the inclusion criteria for the latter included (1) being at least 18 years old at the time of the interview, (2) being a frequent user of the Web, and (3) use or having used screen readers to navigate the Web. The exclusion criteria for both groups were (1) do not speak or understand English and (2) not able to provide consent independently. As such, all participants were fluent in English. All participants were recruited from relevant institutions and organizations, including the Royal National Institute of Blind People (UK),[2] WebAIM,[3] AbilityNet,[4] the National Federation of the Blind (Greece),[5] Silktide,[6] KreativeInc Agency Ltd,[7] and Scope.[8] It was requested that they share the call for participation with their members through internal mailing lists. Snowball sampling was then used until saturation was achieved. Participants who were interested in participating contacted the first author, and if they qualified based on the inclusion and exclusion criteria, they were then handed a participant information sheet and a consent form to sign before proceeding to scheduling an interview. Potential participants were also informed that interviews would be recorded. The ethics protocol was approved by the authors' institutional Research Ethics Committee (Ref: 41665-LR-Jun/2023- 45191-3).

3.2. Interview protocol

The interviews took place online using *Zoom* or *Microsoft Teams* video conferencing software and oral or written informed consent was obtained from each participant beforehand. A semi-structured interview format was followed using an open-ended questions script by design (see Appendices A and B) to encourage participants to share their personal experiences and insights. For Web content creators, the interviews included questions about their experience with accessible Web content creation, related accessibility barriers, and their experience authoring or evaluating alt text, as well as their expectations for its suitability. Visually impaired users were asked questions about their Web browsing experience and associated barriers, screen reader usage experience, as well as their experience with alt text and their expectations in regard to its suitability. Each interview lasted between 45 and 100 min, and they were video recorded while the first author was also taking notes by hand.

Specifically, the interview process was composed of four parts for both participant groups. For visually impaired users, demographic and general questions were first asked to elaborate on their Web navigation experience. In the second part, they were asked more specifically about screen readers and Web accessibility barriers. Finally, in the third part of the interview, they were asked about their experience and expectations with alt text. The interview was then concluded with a Website browsing task, where they were asked to browse the inaccessible and accessible versions of the "News Page" from W3C's Demo[9] and, as such, share their opinion in relation to alt text. For Web content creators, they were first asked demographic and general questions about their years of experience in Web content creation and related accessibility efforts. In the second part, they were asked about Web accessibility barriers, particularly those related to the use of screen readers, and what do they do to deal with such barriers, as well as their familiarization with WCAG. Then, in the third part of the interview, they were asked more specifically about alt text, including their experience in

authoring or evaluating alt text, as well as their perceptions as regards its suitability. Finally, the interviews with Web content creators were also concluded with the same Website browsing task, where they were asked about the sufficiency of the "accessible" version, not least in relation to alt text. It must be noted at this stage that the Website browsing task was part of the interview and not a separate task, thus the generated qualitative insights were formulated into a single data set, which were then captured in the themes resulting from the data analysis process explained in the next section. Also, whilst the intention was to follow the above question flow, this was occasionally altered to accommodate each discussion and how it progressed.

3.3. Data analysis

In total, close to 25 hours of interviews were recorded and transcribed. Interview transcripts were analyzed by the first author following Braun and Clarke's reflexive thematic analysis six-phase approach (Braun and Clarke, 2021; Braun and Clarke, 2019), which highlights individual researcher subjectivity as the desired resource for knowledge generation, as opposed to other thematic analysis approaches relying on the involvement of multiple coders for bias mitigation (Byrne, 2022). Nonetheless, another member of the research team was asked to independently sense-check the themes and narrative generated by the first author at the end of the six phases of the analysis outlined in Table 3. It must be noted that the involvement of more than one researcher was made in accordance with principles of the reflexive approach aiming for increased nuance of meaning, rather than achieving consensus of meaning, as it is common in the coding reliability thematic analysis approach (Clarke and Braun, 2013). The latter approach is often misinterpreted as a reliability measure, rather than a separate thematic analysis approach (Byrne, 2022). Deferring to the distinction of Braun and Clarke between coding reliability and reflexive thematic analyses (Braun and Clarke, 2021) therefore, an inductive approach to the analysis (Braun and Clarke, 2006) to identify key themes was adopted in this study, whilst trustworthiness and reliability criteria consistent with the reflexive approach were achieved through ensuring a rich description of the analysis process and by including plentiful descriptions of participant quotes (Nowell et al., 2017). This resulted in a list of close to 400 codes, which were later revised by the first author through the phases discussed in Table 3 below to arrive at the broader themes presented in the findings. Indicatively, the various phases of Braun and Clarke's approach begin with the generation of initial codes (Braun and Clarke, 2021). The transition from codes to themes, typically, involves techniques such as latent or semantic coding, namely coding that involves and does not involve interpretation, respectively, as well as the generation of subthemes (Braun and Clarke, 2016). Importantly, there is no correct number of themes in reflexive thematic analysis, with too many themes posing coherence-related risks and too few themes posing depth- and breadth-related risks (Byrne, 2022). Therefore, Lichtman's rule of thumb of not exceeding five to seven themes per data set was followed (Lichtman, 2013).

4. Findings

In this section, the analysis of the themes using key data extracts is reported, highlighting each theme's unique nuances and anchoring them to the scholarly field and the RQs. Finally, to the best of our knowledge, the first much-needed set of recommendations on alt text suitability and trainability is presented that takes into account the needs of both visually impaired users and Web content creators.

4.1. Web content creator perceptions

The findings from the semi-structured interviews with the 11 Web content creators are first presented focusing on their perceptions on Web accessibility for screen readers, WCAG conformance, and alt text suitability, as well as reasons for the deprioritization of Web accessibility. Accordingly, a set of

Table 3. Reflexive thematic analysis phases and descriptions.

Phases of reflexive thematic analysis	Phase adaptation description and trustworthiness
Phase one: Familiarization with the data	First, the first author revisited the physical notes he had taken while recording the interviews and then transcribed the data in *Microsoft Excel* spreadsheets after listening to the recordings for a general understanding and engagement with the data corpus as a whole.
Phase two: Generating initial codes	The first author generated initial codes for the entire data corpus to avoid missing links between data items (Braun and Clarke, 2006). Both latent and semantic coding were used, with no attempt to prioritize one over the other on any given occasion to ensure interpretation of both participant-communicated and researcher-interpreted meaning (Patton, 1990).
Phase three: Generating themes	Next, the first author compiled the full list of codes in search of shared meaning between the codes to generate themes and their respective subthemes (Braun and Clarke, 2016).
Phase four: Reviewing potential themes	The first author aimed to finalize the list of themes using Patton's dual criteria, viz., internal homogeneity within the themes and external homogeneity among the themes (Patton, 1990). Six themes were conceived in the analysis of the entire data set.
Phase five: Defining and naming themes	The first author then revisited and refined the names of the themes to divert from names that wholly described each theme to captivating names highlighting one important aspect of the theme in question, and that can later be understood in detail via an analytic narrative (Braun and Clarke, 2021).
Phase six: Producing the report	Finally, the first author conceived an *analytic* narrative, consistently with Braun and Clarke's instructions (Braun and Clarke, 2019), that includes data extracts scrutinized in relation to theory and our RQs as and when they are reported, which is considered the most optimal way for disseminating results from reflexive thematic analyses, as opposed to the typical split between a "Results" and a "Discussion" section (Clarke and Braun, 2013; Terry et al., 2017). The narrative was later reviewed by the second author for coherence and trustworthiness.

trainability recommendations for accessibility-related training has been established and presented.

4.1.1. Unhealthy foundation (RQ1, RQ3)

A mental resistance on the part of WCCs to engage with Web accessibility was a key factor among WCCs indicating that there seems to be an unhealthy foundation from the outset. WCC10 notably emphasized that "Once you get people's mind changed everything else falls into place!," which is in line with past evidence on the low allocation of resources towards accessibility and the reluctance of WCCs to engage with Web accessibility-related training (Miranda and Araujo, 2022; Williams et al., 2022; Abuaddous et al., 2016) that points to such an unhealthy foundation. WCCs appear to be aware of the numerous benefits that Web accessibility offers highlighting that "There's definitely business benefits to it. You're missing out on hundreds of millions of potential customers for example … They also have billions of dollars' worth of money to spend that you're also then missing out on … .Also, there's the legal case for it, which I think is why we've seen a lot of people and companies starting to care about, because they're getting sued … And I think related to that, which I kind of said earlier, when you create accessible Web experiences from the beginning, you're also making it even—you may have unexpected benefits or making it accessible and usable for other people in ways that you haven't foreseen." [WCC9]. In particular, a decreased market reach due to low accessibility efforts is in line with previous evidence on missing out on growing, aging, and impaired user markets (Moreno et al., 2019; Waller et al., 2015), whilst in terms of inclusivity it has been shown that it can both increase brand reputation and improve Web navigation for all users, owing to inclusive Web products being 35% more usable by everyone (Clark, 2001).

However, these benefits are often miscommunicated and WCCs are instead being warned about potential legal repercussions if they do not focus their efforts on accessibility, as WCC2 indicated that "The main benefit is that you're less likely to be sued. Well, if I'm being realistic that is why. I think that's why they created these new policies that we had to follow, but of course they were creating policies when we didn't have people on staff with the expertise to meet these policies." This extract is very telling in relation to where WCCs' mental resistance stems from indicating that the main benefit that is communicated to them relates to fear motivation. Indeed, past similar work corroborates that avoidance of legal repercussions was by far the most cited motivational factor for WCCs to engage with accessibility (Open Inclusion, 2023; Kaur and Kumar, 2015). Accordingly, the above further supports that not facing legal repercussions is the main consideration of businesses, especially considering brand reputation which was highlighted as another key motivational factor (Open Inclusion, 2023). Nevertheless, the interviews surmised that **intrinsic motivational factors** should instead be emphasized with WCC11 indicating that "In general, it's a legal requirement to make accessible websites.—Just in general, it's like, you know, if I can spend that hour or whatever making this work for everyone, why wouldn't I?"

Unsurprisingly, the legal case for Web accessibility is also criticized as an unhealthy approach to highlight benefits that can better motivate WCCs. Mott et al. suggest that if WCCs were to adopt a more positive mentality towards Web accessibility, then there would be more flexibility towards overall user needs (Mott et al., 2019). This was supported by WCC3 who discussed that "It's important to initially understand why accessibility is needed … and get people talking about it. To normalize attitudes towards it, because really making stuff accessible, especially on the Web, is just doing your job properly. My experience is that stuff gets deprioritized and that attitudes on accessibility should be turned around. It's one of the biggest hurdles: changing people's attitudes." This further highlights the connection between the mentality resistance and the miscommunication of benefits of Web accessibility, acknowledging both how accessibility is deprioritized and how it is the responsibility of WCCs to deliver accessibility.

Past research is in fact in line with accessibility being an integral responsibility of the WCC role (Crespo et al., 2016; Power and Petrie, 2007), however, overcoming WCCs' mentality resistance towards inclusivity appears to be the most persistent challenge, which agrees well with Nedelkina's notion that WCCs often prefer to rely on stereotypes and their own assumptions about the Web navigation experience of users with impairments (Nedelkina, 2022). Instead, as WCC8 put forward "I think it's that like push to tell people: "C"mon guys do this accessibly!' … because they might be missing on something that can only be experienced by someone who uses a screen reader frequently. I think one of the biggest challenges at the moment is actually when people talk about: "We're doing accessibility and what they mean is that they have checked it with a screen reader … They don't think of other things like color contrast or that not everyone who is visually-impaired accesses things in the same ways." In an alt text context, for example, WCC10 highlights one of the most encountered mishaps on the Web stating "'An image of a cat,' because alt text describes an image, so you don't say: 'An image of,' you say: 'A cat.' It [the screen reader] knows it's an image or graphic, so you don't say: 'A photo of,' 'An image of;' you just say what it is." Similar mishaps related to the length and the language alt text is authored in are addressed by WCC9, stating that "If you use too much information it might be necessary and it might be annoying to the people using screen readers as well, so the length of your alt text definitely needs to be considered; not too long but also not too short; that's not useful either … They need concepts broken down into plain language; they shouldn't be reading like all these things being written on a graduate level."

Evidently, however, current accessible Web design efforts focus more closely on specific impairments and, as such, deprioritize diversity, which aligns with Aizpurua et al.'s previously identified functional gap between how inaccessibility is perceived and how it is experienced (Aizpurua et al., 2016). This is indeed reminiscent of the large body of

accessibility literature explaining that guidelines and scholarly efforts are overfocused on blindness (Friedman and Bryen, 2007; Berger et al., 2010; Miranda and Araujo, 2022; Petrie et al., 2005). The findings of this work on the other hand stress the need to foster empathy towards inaccessible Web navigation experiences to transition to understanding and designing for accessibility. Vollenwyder et al. have, in fact, recently shown how WCCs' motivation to engage with Web accessibility increases when they are first given a chance to relate to what inaccessible Web navigation feels like (Vollenwyder et al., 2023). It can therefore be conjectured that offering a glimpse into inaccessibility is a promising way against the unhealthy foundation that WCCs' mental resistance to engage with Web accessibility stems from.

4.1.2. WCAG myth (RQ2, RQ3)

Section 2 also highlighted that WCCs typically over rely on the WCAG, which are principally meant to guide rather than dictate how to create accessible Web products. WCC5 in particular confirmed this: "What is WCAG? They're actually guidelines—Insert joke from the Pirates of the Caribbean: 'The Code is more what you'd call guidelines than actual rules!' ," which is in line with past research calling attention to the insufficiency of WCAG to fully capture Web accessibility (McCarthy and Swierenga, 2010; Crespo et al., 2016). Other participants appeared to be in agreement with this notion, with WCC3 stating that WCAG is " … a piece of documentation that is widely misunderstood. A lot of government and regulators will point to WCAG as a standard while it's not a standard, it's a guideline, and a standard is something that you have to meet hence people talk about compliance all the time, but actually a guideline is: "Broadly speaking, in this situation you need to have a thing that works and looks like this." It's not the law, so literally, it's not the law. And people often go: "Oh, do you meet the standard?"" This last comment further highlights that WCAG are far too often misinterpreted as standards rather than guidelines, and this appears to be the main reason that WCCs abide by the WCAG conformance logic, which more closely relates to standards.

It is in fact evident that a lot of academic scrutiny has gone into WCAG conformance (Lengua et al., 2022; Power et al., 2012; Cooper, 2016; Pascual et al., 2014; Moreno et al., 2011) which highlights that WCAG conformance is often inadequate considering that they are guidelines that are often misinterpreted as rules. This view was not shared by all participants with WCC11 stating "I view the standards as tools really. The ultimate goal here is not to conform to a document. It's to create a good user experience and if it came down to following the rules in a doc … I would rather create a good user experience." Interestingly, however, recent work by McCall and Shagnon showed that usability and user experience are all but ignored by WCAG conformance (McCall and Chagnon, 2022), with the former especially being considered a prerequisite to more holistically address user experience in a Web context (Gartland et al., 2022). This finding was confirmed by participants with WCC6 highlighting that "A website that conforms to WCAG is not necessarily a user-friendly website. Just building a website to WCAG regulations and then assessing it like that is like assessing a meal by the ingredients and not by the taste of it." However, it has to be noted that previous work suggested that WCAG conformance should be a first, albeit ironclad, step towards the creation of accessible Web products (Vollenwyder et al., 2023; Lengua et al., 2022; Dobransky and Hargittai, 2016; Power et al., 2018), which the authors are in agreement with in the efforts to address issues with an unhealthy foundation (see Section 4.1.1).

Finally, a participant (WCC8) emphasized that WCAG are not particularly helpful as a comprehensive resource to guide accessible Web design decisions stating that "There are initiatives to turn the language that the WCAG guidelines are written in into plain English. They are a nightmare!," which further fosters an unhealthy foundation. In fact, the complexity of WCAG is not new (Spyridonis et al., 2017) which led to various efforts in the literature to increase the motivation of WCCs to engage with the WCAG (Spyridonis and Daylamani-Zad, 2019; Spyridonis and Daylamani-Zad, 2021; Lorgat et al., 2024; Grammenos, 2008; Katsanos et al., 2012; Chatziemmanouil and Katsanos, 2024). More specifically in relation to alt text, WCC4 highlights an important distinction between alt text and plain text; indicatively, "Putting all that huge information as a text alternative is very bad, because if it were text, the screen reader would have the ability to go line by line, and if they do not understand, they can go back to the previous line and they can go back to the next one later, but the text alternative will get announced all at once, so the screen reader will not have the ability to, okay, I want to hear again, this particular part of it. They won't have this ability." This ironclad distinction between alt text and plain text with regards to how they are being treated by screen readers is corroborated by VIUs (see Section 4.2). To the best of our knowledge, however, it has never been formalized in a scholarly context or in well-acclaimed Web accessibility guidelines, although it has been identified and reported in certain accessibility resources (Accessibility for Ontarians with Disabilities Act (AODA), 2005). Accordingly, this explains the shared expectations on alt text for graphs, with WCC3 emphasizing "You've got to have a brief description of the data represented underneath in a couple of sentences. Also, you'd link back to the source data. The user would want to find out what it was from some other place, which'd be a broader piece of research, but from that page they can get a high-level understanding of what that thing represents. Let's say: "This graph shows blah blah blah, the summary of which is this, and that's it." Taken together, alt text for graphs is best approached with a brief description that includes the type of the graph and any conclusion that can be drawn from it, as well as information about where a detailed description in plain text can be found.

4.1.3. Pseudo-experts squad (RQ1, RQ3)

The issues identified in the previous sections are exacerbated by the reported low relevance of Web accessibility "expertise," which has been shown to vary in multiple occasions (Petrie et al., 2011). The importance of the variability and diversity

of perceptions with respect to Web accessibility expertise was highlighted by WCC5 stating that "If you ask: 'Is this an accessible thing?,' and you ask five different accessibility experts, you're gonna get six different opinions." This is very evident in the context of alt text, where some WCCs advise that no image is purely decorative, namely images that add nothing beyond visual aesthetics to a Webpage: "Decorative images enhance the appreciation of a Webpage. Images of all kinds do. So, I think pretty much all images should have alt text. It's back to poetry, yeah?" [WCC10], while others highlight the need for such images to be marked as decorative, so that screen readers skip them during navigation: "Don't be afraid to mark things as decorative, you see far too much alt text on stuff that's decorative and I think people are worried that they are gonna get it wrong." [WCC8]. Drawing on the latter extract, it can be surmised that in the absence of a healthy foundation, adequate support is not in place for WCCs to confidently decide on whether images should or not be marked as decorative in different contexts.

Moreover, a different participant (WCC3) emphasized that building a healthier foundation for engaging WCCs with Web accessibility is imperative and that Web accessibility guidelines should only complement such a foundation as support tools:" … you wanna get people to understand why they're doing it and who they're doing it for … I don't wanna say you don't need the guidance, but the guidance becomes a support. Making sure that the right support is in place, so that they're allowed to make mistakes. If you support people when they didn't do something right, and they should have done it, then the next time they do it, they'll do it right. And also, if you make people not afraid to ask questions." Importantly, this highlights a low confidence of WCCs to make accessibility-related decisions out of fear of making mistakes, especially when knowing the impact of such decisions to visually impaired users.

The need for confidence in one's own ability to create Web products that are accessible is indeed emphasized in WCC9's comment: "I always kind of doubt myself because I don't know how I compare to other people's skillset, but I feel confident. I have done quite a bit of reading and I've applied things to the work I do, but there's always more to learn for sure." In addition, this participant stresses the need for good and bad examples of accessibility practice, as well as a way to assess one's understanding: "In addition to the guidelines if there was more examples and I feel there's never enough examples. I want multiple examples so I can understand and, you know, in different contexts what is a good example of alt text and what is sufficient and maybe also examples of what is bad alt text, so the more examples you can give the more it makes sense and then on top of that if there was some type of tool or a quiz that you could take that you're maybe given a photo and you have to generate the alt text so that it can somehow be graded."

However, the need for proceduralizing specific Web accessibility tasks, such as alt text authorship, is not encompassed by existing guidelines. Interestingly, this was picked up by one of the participants (WCC11) who suggested that what they " … would like to see is a tool for developers where they experience the Web as a text adventure like a forest and here's a well, using the accessibility tree, you know, like can you navigate it using that kind of navigation? And I think that would sort of build empathy and also, yeah, surface accessibility challenges." In a similar vein, WCC6 touched upon the need for the learning process to become more informed and constructive, suggesting providing " … feedback to make some more changes and make the Website even better. It's that openness to learn." Both past research (Open Inclusion, 2023; Lengua et al., 2022; Abuaddous et al., 2016) and findings in this work suggest that the mental resistance to engage WCCs with accessibility is the greatest challenge; thus, it is imperative that the right support is in place to leverage their zeal when WCCs are engaged, so that such zeal is not misused.

Finally, the above comment further highlights the need to afford opportunities for visually impaired users to reach out to WCCs about anything that they have found to be inaccessible on the Web. This has in fact been recently suggested by Loseby (2024) and is in line with a recent user survey revealing that 67% of users seldom or never reach out to WCCs about encountered barriers, but it remains unclear if the Websites allowed for them to reach out in the first place (WebAIM, 2024). Reaching out to WCCs is therefore essential, as it has been advocated that the only true experts in accessibility are those who experience inaccessibility (Muehlbradt and Kane, 2022; Vollenwyder et al., 2020).

4.1.4. Trainability recommendations per WCCs

This section discussed the perceptions of WCCs in relation to Web accessibility, not least in relation to screen readers and alt text. WCCs emphasize the need to build a healthier foundation for engaging with Web accessibility-related training, as current motivational factors and official guidelines, such as WCAG, are insufficient and are being misinterpreted, respectively. Taken together, they create a mental resistance which our experienced WCCs deem as accessibility efforts' worst enemy. As such, the findings so far point to the need for accessibility-related training that:

- **Is structured**: Coaxing WCCs into understanding how to deliver accessibility, rather than only overwhelming them with complex and gargantuan documentation, such as WCAG (Sections 4.1.1 & 4.1.2).
- **Is example-driven**: Allows for the use of good and bad examples, e.g., suitable and unsuitable alt text in different contexts, to coax WCCs into accessibility (Section 4.1.3).
- **Is appreciative of reasons that demotivate WCCs to engage with training**: There is no "one-size-fits-all" to accessibility to alleviate WCCs' atelophobia as regards time and cost-of-error (Sections 4.1.1 & 4.1.3).
- **Is inclusive of reaching out opportunities**: Allows for VIUs to reach out to WCCs when they encounter barriers, as even when accessibility expertise is high, it is important to respect that VIUs are the only ones who can tell whether a Website is accessible, useable and/or user-friendly to navigate via a screen reader (Sections 4.1.2 & 4.1.3).

4.2. Visually impaired user perceptions

Following on from the findings from the interviews with WCCs, the results from the semi-structured interviews with the 11 visually impaired users are presented next focusing on their experiential understanding of Web navigation via screen readers, their preferred role in relation to the authorship of alt text, and their perceptions of what makes alt text suitable. As in the previous section, a second set of trainability recommendations for accessibility-related training has been established.

4.2.1. Coin flipping (RQ1, RQ3)

Unsurprisingly, VIUs appear to have low expectations on Web accessibility, not least in relation to alt text availability and suitability, as they are typically used to no alt text being available. VIU4's comment on how Web navigation using screen readers resembles a "coin flip," i.e., the result is either an accessible or inaccessible Website, is alarming: "It's about how lucky you get. If you're lucky you get a description and you can get an idea. Sometimes you might not get a description at all, or the description might not be very clear. It's all about luck." This aligns well with recent findings on the minuscule (2.2%) decrease in unsuitable alt text over the last five years compared to a general increase in alt text provision (WebAIM, 2024; Muehlbradt and Kane, 2022). This is supported by a different participant (VIU6) who stated that "I find navigation a bit difficult. I am worried about whether something is accessible more than whether it's usable or enjoyable. There isn't a lot out there, because I don't really expect the Websites to have alternative descriptions for example, because a lot of them don't. It's more like if they got a description then that's great, but there's probably not gonna be a description. Feels like you are stuck. It's like you can only go so far down until you get stuck." This latest comment further highlights a worry of ending up on the wrong side of the coin flip, which has them disregarding usability and user experience; interestingly, this is reminiscent of this work's findings about accessibility through WCAG conformance (see Section 4.1.2). Zong et al. have in fact implied that Web accessibility-related decisions are made only by WCCs (Zong et al., 2022), and Miranda and Araujo have recently shown that such decisions are typically limited to WCAG conformance (Miranda and Araujo, 2022).

The above participants' comments highlighted key aspects of the VIUs' Web navigation experience that seem to be very much aligned with this work's findings on how WCCs typically approach Web accessibility. Their concerns and low expectations extend to other types of media too, with VIU1 stating "I've only experienced alt text for images and only on social media, specifically Facebook and Twitter. Automated alt text is not good there. It's obvious it's not written by a human and it doesn't sound human." Furthermore, VIU1's comment stresses the need for suitability instead of automatically generated alt text; however, as discussed in the previous section, WCCs need to empathize with the Web navigation experience of VIUs, but such empathy cannot be fostered when relying on automated approaches. Relatedly, Gleason et al. first experimented with a semi-automated approach for alt text suitability on Twitter (now known as "X") where automation only worked for memes, which were less hard to describe suitably in an automated manner, before advocating the use of crowdsourcing-based approaches in social media contexts (Gleason et al., 2019; Gleason et al., 2020).

Diving a bit deeper into the reasons for VIUs' low expectations, VIU2 highlighted the need for suitability, as alt text is often ignored: "What does "Click here" mean? We should actually know where this link is gonna take you and to have something in its label which indicates where you're going, because content using a screen reader is much more focused. I don't think I would be missing out on a great deal if alt text was all set to 0. I think I kind of ignore it most of the time." VIUs ignoring alt text due to its unsuitability, in fact, supports some WCCs' views (see Section 4.1.3) on the need for images to be marked as decorative to avoid Webpage navigation disruption that, at the same time, addresses a further barrier in alt text being left unlabeled, namely **non-null alt text,** with VIU2 stating that "The screen reader just ignores it, but if it's just been left unlabeled, I get unlabeled graphic, unlabeled graphic, unlabeled graphic—that's all the time!" Whilst the non-null alt text barrier is currently mentioned in certain accessibility resources (Caprette, 2025), again, it has not yet been formalized in academic literature. Another participant (VIU11) corroborates the burden of Web navigation via screen readers being disrupted for the narration of alt text non-involving of any functionality, stating that "The description needs to be functional. I'm not interested in the image being a scissors or a folder; I'd want to hear that it's a cut or a save. Or it can be decorative, so I mustn't listen to anything."

Suitability, therefore, becomes a graver concern when non-text content is also functional, e.g., an image that is also a Web link; as per the comment above, if the alt text does not describe where the Web link leads to, then the coin-flipping nature of Web navigation is again evident. It is important to note at this stage that although WCAG highlights the need for the purpose of images to be described in alt text (W3C, 2024), there is no suitable guideline on how to properly author alt text for images that are also Web links despite available efforts (Gudhka, 2024) which are deemed inconsistent in different contexts. Another participant (VIU11) explains how this extends to alt text for graphs "For graphs, it should give you with one phrase the conclusion you draw from this graph and the information about where you can find the full-text description." This comment agrees well with WCCs' view (see Section 4.1.2) on the need for alt text to link to a detailed plain text description of the data presented in the graph, rather than being more detailed itself. Importantly, the previously mentioned distinction between alt text and plain text with regards to the way those are treated by screen readers, is also highlighted by VIU10 "The problem with putting hugely detailed information into alt text is that for screen readers to browse that alt text line by line or word for word, you can't; you read it as a chunk."

4.2.2. Pseudo-experts squad (RQ1, RQ3)

Notably, the analysis revealed that the pseudo-experts squad theme is shared between WCCs and VIUs, which highlights how the latter put their trust in WCCs in terms of Web accessibility. As VIU9 mentioned "Because I can't see, I have to trust that what you're telling me is exactly what is there," a comment which is in line with previous studies discussing how VIUs place a lot of trust in WCCs to have catered to accessibility, not least in relation to alt text (Lengua et al., 2022; Salisbury et al., 2017; MacLeod et al., 2017). The above comment also stresses that a reason that such trust is forced upon VIUs is because they cannot know what is there to describe it in alt text. Interestingly, this contradicts past scholarly work about the need to renegotiate the role of VIUs and to turn them into alt text authors (Vollenwyder et al., 2023; Chisholm and Henry, 2005; Heylighen et al., 2017), which aligns better with recent findings suggesting that WCCs need to learn how to create more accessible Websites as their preferred way towards a more inclusive Web navigation experience (WebAIM, 2024).

Similarly, the focus on WCCs engaging more with how to deliver accessible Web navigation experiences is also highlighted in a comment by VIU7 who questioned the ability of assistive technology: "Does the screen reader have to make up for the mistakes that Web developers are making? JAWS has tried to do that because they get a lot of feedback of their users and it's their job to try to improve that experience. Theoretically, assistive tech is not up to date to deal with all the accessibility errors, but I don't think that the screen reader is supposed to make up for that." Interestingly, this comment adds to previous claims in the literature that advancements in technology have outpaced advancements in assistive technologies (Stratton et al., 2022), and again highlights that accessibility is neither the responsibility of VIUs, nor of assistive technologies. The "silver bullet" myth therefore (see Section 2.2.) is not well-received by VIUs, which is consistent with recent findings that only a small percentage (14.1%) wanting advancements in screen readers (WebAIM, 2024).

Another interesting point identified in the analysis was the need for equity with respect to Web navigation, stressing in particular the limits of alt text and the need for suitability. Participant VIU5 highlighted that "… it [alt text] can never be as good as an image because it's a kind of translation in a way, it's a … so complex, but it should give you something because if it doesn't give you anything, better to do equal 0. They should never be done by AI, because as good as they are, only a person could identify and think, okay, how complex do I have to make it, what is the context, why do I need it, I think it's something that only a human being can do in this way." This comment further demonstrates that automatically generated alt text (e.g., by AI) is perceived as vastly inferior to manually authored alt text, which stresses the need for WCCs to train in suitable alt text authorship. In fact, past work corroborates that the suitability of alt text is very much dependent on context research (Muehlbradt and Kane, 2022; Crespo et al., 2016; Miranda and Araujo, 2022), and WCCs are the only ones who can interact with said context to decide how it should be described as suitable alt text. A different participant (VIU11) in fact highlights the suitability gap in AI-generated and manually authored alt text, stating that "It's very important to know what is made by AI and what is real content. As in an extra label on alt text that tells me whether it's made by AI."

Section 4.1 highlighted that there is a mental resistance challenge among WCCs to dealing with alt text unavailability and unsuitability barriers. This is still relevant in the context of the present discussion, with VIU10 noting the need for WCCs to be trained in alt text suitability: "Education. First of all, the actual mechanics of writing alt text is easy. Adding the alt text is easy. Getting the mindset that you want to actually add the alt text is the thing." Therefore, there seems to be a point among VIUs underlining that WCCs should be the only authors of alt text and appreciating that current efforts largely lean towards inaccessibility. Accordingly, these findings highlight that VIUs don't perceive themselves alone as adequate to be alt text authors, and further stress that this task is the responsibility of WCCs. We therefore argue that alt text authorship could benefit from more collaborative ways between VIUs and WCCs, where the former are positioned as evaluators and are able to reach out to WCCs about alt text barriers (see Section 4.1.3).

Finally, when it comes to what kind of training WCCs should undertake to become "experts" in Web accessibility, VIU11 (who is also a WCC) discussed that "The first thing when I want to write a good alt text is which information in an image description are important to what audience and then group them in a way that they are simple, understandable, language-wise, and solid, and that, objectively, will give me a good alt text, but of course the enemy of good is the better, but that is no concerns to us. What concerns us is that we've put a reasonable effort that leads us to a result above mediocrity and we have exercised all the correct guidelines for the authorship of a good alt text. The whether it could have been done better, well, everything could have been done better." This comment aligns well with this work's findings about the variability of such expertise among WCCs (see Section 4.1), and points to the need to strive towards "pseudo-expertise" instead. The need for a common blueprint for WCCs that is more realistic and engaging than Web accessibility guidelines is also highlighted in the above extract, and some indicative guidelines about alt text suitability are also provided.

4.2.3. Blindfolding (RQ2, RQ3)

Following on from the identified pressing need for training WCCs in Web accessibility and the biggest challenge thereof being their mental resistance in so doing, the following comment from VIU3 highlights a *mismatch* between what WCCs include in alt text and how this is redundant for VIUs: "They think that I need to know the color, the length, the distance, or they say "People look like Colin Firth" … I've never seen Colin Firth!." This is particularly useful to pinpoint the need to foster empathy and understand Web navigation via screen

readers early on in the process, which interestingly, aligns with the findings for WCCs in Section 4.1.

The need to foster empathy is also highlighted by VIU2 who explained: "Whoever's deciding, you know, the developer, they need to think, as a screen reader user. Do they actually wanna know descriptions of all of these pictures? And I'll say the answer to that question is: "Probably not." There's always a certain judgment call to be made. Alt text equals 0 is a very good starting point for all graphics, because it's giving some sympathy to the fact that I have to listen to all of this. That's the world I live in. It's a world which is audio and sympathy towards that is important and alt text equals 0 is a service, because you're saving me from all that stuff that I don't wanna listen to." This is indeed an important finding, as it highlights VIUs' preference to include null alt text, which it will indicate to assistive technology that an image can be safely ignored (W3C, 2024); its inclusion therefore can help avoid the interruption of VIUs' Web navigation experience, as otherwise the screen reader would stop the navigation midway to narrate that an alt text is empty. Null alt text is in fact advised for decorative images (see Section 4.2.1), but Lengua, Rubano and Vitali recently showed that distinguishing a non-decorative from a decorative image can be challenging for human authors and almost impossible for AI (Lengua et al., 2022). In a related vein, participant VIU7 sheds light on another barrier relating to the misuse of alt text, not for decorative images but for images of text "My main problem is that people make images of text. It's not about if that image should have a text alternative; this image shouldn't have existed in the first place." This relates to the discussion on the difference between how screen readers treat alt text and plain text (see Section 4.1.2), with the latter posing no navigation disruption barriers, and the identified barrier, namely **image misuse**, involves the ill use of images, which can present barriers as alternatives to text, which does not, and it is further corroborated by VIU10: "I'd want to read it, but I can't read it because it's not a text; it's an image." Similarly to the non-null alt text barrier, certain accessibility resources have mentioned the image misuse barrier (Bureau of Internet Accessibility, 2018), but again to the best of our knowledge, this barrier has not yet been formalized in academic literature.

Staying with the Web navigation experience of VIUs, participant VIU1 explained that such experience is fundamentally distinct from the visual experience: "They need to start looking at the image and describing it like a human who cares. Maybe if you used a screen reader you might figure it out. We need to educate people who don't use it or who don't know what it is. I don't know how you do that though … How do you educate people who don't know what it is?" Web accessibility-related training should therefore first make this fundamental distinction clearer to foster empathy and, as such, address the afore-mentioned mental resistance challenge among WCCs. In an alt text context, for instance, VIUs mention how the language alt text is authored in results in contextual information being missed: "Language-wise alt text needs to be aligned to its surrounding context, e.g., in a site with comics and humor, alt text descriptions of images should equally have instances of humor" [VIU11]. Participant VIU7, in fact, stresses the key role of context in dictating how or if alt text should be authored beyond language considerations: "It's not the image that decides what is the text alternative, but for a big part it's the context of which that image is used that influences whether you need the text alternative." It is, however, important to note that alt text is not only accessed by blind people, and VIU3 emphasizes that it should be authored by taking into consideration all potential screen reader users: "Within the VI [visually impaired] community, there's always a compromise: Enough to give me a hint and enough to give someone who is partially sighted or sight impaired sufficiency as well."

Furthermore, the previously identified unhealthy foundation in terms of the motivation of WCCs to engage with Web accessibility (see Section 4.1.1) was also brought up with participant VIU7 stating: "I think there is some added value in don't just … interpreting the guidelines. Sometimes you have to say that this is a failure according to the guidelines, but in reality no one really cares. That's what we try to tell people do it not for compliance or for legal … If this motivates you then go ahead but I guess the best motivation is to have more customers and happy customers. Try to imagine the image is not there and what information do you lose, but it seems too analytic for people to do." Training in this regard needs to be based on healthier benefits, such as happier users, and it should involve a way to get into the shoes of VIUs when experiencing Web navigation to foster empathy.

Accordingly, the discussion so far indicates that WCCs are more suitable to author alt text, as unlike VIUs, they can see the non-text content that they need to describe: "Ask Web designers: 'Just close your eyes. Close your eyes!' And you know that's the picture of a banana, how would you tell yourself that's a picture of a banana? Go backwards and then go forward, empty the alt text and let it describe it. You have an added advantage, because you can see it, but close your eyes and look at it from a blind person's perspective for a second" [VIU9]. Effectively, this requires them to transition between the two Web navigation experiences via a simulation of VIU experiences. This blindfolding simulation therefore is an essential part of any training for WCCs in Web accessibility to motivate them towards accessibility in a healthier way, and further introduce them to guidelines about how to cater towards specific Web accessibility barriers. Importantly, it is not implied that engagement with such a simulation will foster empathy; rather, the theme emphasizes the need for accessibility solutions that incorporate means to foster empathy before any training takes place, a finding that is in line with principles of the human-centered design process (Bennett and Rosner, 2019).

4.2.4. Trainability recommendations per VIUs

This section discussed the perceptions of VIUs in relation to Web accessibility, not least in relation to screen readers and alt text. VIUs emphasize the resemblance of Web navigation

via screen readers with the flip of a coin, due to low effort allocation towards accessibility, resulting in VIUs having low expectations with regards to content being accessible via screen readers. Agreeing well with our WCCs (see Section 4.1.4), VIUs also highlight a mental resistance as accessibility's worst enemy and further underline the need for WCCs to empathize with Web navigation via screen readers as the first step to any accessibility-related training. Additionally, a few VIUs expressed a dislike towards the use of AI for catering to Web accessibility, not least in relation to alt text, which they almost always consider unsuitable when authored by AI, while they also necessitate that WCCs are the only ones responsible for delivering accessibility, contradicting past evidence on assistive technology improvements and VIUs being actively involved in delivering accessibility that were considered as viable future avenues. Taken together, these findings point to the need for accessibility-related training that:

- **Is the responsibility of WCCs or is a collaborative effort between WCCs and VIUs**: Drive perceptions away from efforts that put the responsibility of ensuring the accessibility of uploaded Web content away from the uploader (Section 4.2.2).
- **Is initiated with a glimpse of Web navigation via screen readers**: Allows for empathizing with the nature of the experience of navigating the Web via screen readers (Sections 4.2.1 & 4.2.3) in line with human-centered design principles.
- **Is example-driven**: Allows for understanding that accessibility cannot be perfect, but it should involve every reasonable effort in recognizing and staying away from inaccessibility in a plurality of contexts (Section 4.2.2).

4.3. Alt text suitability recommendations

Accordingly, a further set of recommendations for alt text suitability (Table 4) is proposed using codes from phase two of the reflexive thematic analysis process presented in Table 3, which are to the best of our knowledge, the first guidelines that compare and bring together the views of both WCCs and VIUs in the context of alt text suitability.

The above table is revealing in several ways. First, it contradicts past evidence (e.g., Lengua et al., 2022; Harris, 2020; Hanley et al., 2021) on the persistence of a mismatch between the perceptions of WCCs and VIUs on alt text suitability, as this mismatch is very negligible and only evident for less regularly reported guidelines in the table. However, it is important to heed that the sample of WCCs in this work had an average of nine years of experience in Web accessibility, and it is thus not as surprising that their views align well with those of VIUs. It can, thus, be surmised that a mismatch persists when expertise in Web accessibility has been gained through an unhealthy foundation, as discussed in Section 4.2, about the low encounter rate of suitable alt text and the coin flipping nature of Web navigation via screen readers overall. Second, it highlights Website context as the main determining factor of how and if alt text should be authored followed by the need to mark images as decorative if there is no functionality, which also address the afore-identified **non-null alt text** barrier (see Section 4.2.1). Similarly, the need to replace images of text with plain text, deferring to the **image misuse** barrier (see Section 4.2.3), is stressed by VIUs, while the need for alt text to be concise and non-repetitive of surrounding content is stressed by both groups. Finally, both groups highlight that alt text for graphs should be treated uniquely via a brief description

Table 4. Alt text suitability recommendations—web content creators ft. visually impaired users.

Recommendation	WCC (# of participants)	VIUs (# of participants)	Example extract
Context-specific	9	8	*It's not the image that decides what is the text alternative, but for a big part it's the context of which that image is used that influences whether you need the text alternative.* [VIU 7]
Decorative Case[a]	8	7	*Don't be afraid to mark things as decorative, you see far too much alt text on stuff that's decorative* and I think people are worried that they are gonna get it wrong [WCC 8].
Graph-specific	5	6	*For graphs, it should give you with one phrase the conclusion you draw from this graph and the information about where you can find the full-text description.* [VIU 11]
Functionality Prioritization	6	5	*The description needs to be functional. I'm not interested in the image being a scissors or a folder; I'd want to hear that it's a cut or a save. Or it can be decorative, so I mustn't listen to anything.* [VIU 11]
Concise	4	5	*If you use too much information it might be necessary and it might be annoying to the people using screen readers as well, so the length of your alt text definitely needs to be considered; not too long but also not too short; that's not useful either.* [WCC 9]
Non-repetitive	3	4	*"An image of a cat," because alt text describes an image, so you don't say: "An image of," you say: "A cat." It [the screen reader] knows it's an image or graphic, so you don't say: "A photo of," "An image of;" you just say what it is.* [WCC 10]
Poetry Case[b]	3	4	*Decorative images enhance the appreciation of a Webpage. Images of all kinds do. So, I think pretty much all images should have alt text. It's back to poetry, yeah?* [WCC 10]
Images ≠ Text[c]	0	4	*My main problem is that people make images of text. It's not about if that image should have a text alternative; this image shouldn't have existed in the first place.* [VIU 7]
Disability-specific	0	3	*Within the VI [visually impaired] community, there's always a compromise: Enough to give me a hint and enough to give someone who is partially sighted or sight impaired sufficiency as well.* [VIU 3]
Author Transparency	0	2	*It's very important to know what is made by AI and what is real content. As in an extra label on alt text that tells me whether it's made by AI.* [VIU 11]
Plain Language	2	0	*They need concepts broken down into plain language; they shouldn't be reading like all these things being written on a graduate level* [WCC 9]

[a]Null alt for decorative images.
[b]All images should have alt text, no image is decorative.
[c]Communicate to the author that the image should be converted to text, as images of text should not exist.

that includes the type of the graph and any conclusion that can be drawn from it, and information about where a detailed description in plain text can be found.

5. Concluding discussion

This section discusses the overall findings and presents the identified implications and contributions of this work. It also highlights avenues for future research work.

5.1. Overall findings and contributions

In this work, a qualitative user study with 11 WCCs and 11 VIUs was conducted to address the reported mismatch in relevant literature between their perceptions when it comes to Web inaccessibility overall, and then more specifically, in relation to alt text suitability. A reflexive thematic analysis approach was followed (Table 3) presenting an analytic narrative anchored to theory and this work's RQs. The findings highlighted that the afore-mentioned mismatch between WCCs and VIUs stems from the formers' lack of experiential understanding of Web navigation via screen readers.

More specifically, in terms of the perceptions of WCCs on the accessibility of the Web through screen readers and on WCAG against VIUs' Web navigation experiences and views (*RQ1, RQ2*), the findings from interviews with WCCs (Section 4.1) identified issues with the why and how expertise in Web accessibility is gained, as well as inconsistencies with well-regarded reference points, such as WCAG and common misconceptions thereof; ultimately, stressing the need to more healthily engage Web content creators into accessibility. Accordingly, the findings from interviews with VIUs (Section 4.2) highlighted the uncertainties and low expectations entailed in the chronic experience of inaccessible Web navigation via screen readers, as well as role dependencies in making such experience accessible, stressing the need to foster empathy towards such Web navigation experiences as an ironclad first step to any Web accessibility-related training. Taken together, both the WCC and VIU participants in this work essentialize the responsibility of the former to train in alt text authorship and, as such, refute previous evidence (Vollenwyder et al., 2023; Chisholm and Henry, 2005; Heylighen et al., 2017) on the desire and need of VIUs to become active alt text authors. However, collaborative efforts between VIUs and WCCs where the former are positioned as evaluators of alt text with the option to reach out to WCCs about alt text barriers are very much encouraged (Sections 4.1.3 and 4.2.2). On the other hand, recent work highlighted that it is imperative that content consumers (VIUs), accessibility experts, and content authors (WCCs) are engaged in an inclusive and constructive iterative dialogue in an effort to reduce the perception gap identified (Droutsas et al., 2025). In response, this work also presents **a much-needed set of trainability recommendations** (Sections 4.1.4 and 4.2.4) that were formed based on the reported themes in Section 4 and which specify that for the task of suitable alt text authorship, training needs to be structured and be example-driven to foster experiential empathy and alleviate cost-of-error-related fears.

In terms of what makes alt text suitable for both WCCs and VIUs (*RQ3*), the findings in Section 4 stressed the key distinction between the way screen readers access alt text and plain text, namely alt text can only be relistened to in full while the latter is accessed line by line, allowing users to skip, pause or relisten on request. In a similar vein, both participant groups shared the view that alt text needs to be concise, and in the case of more complex graphics such as graphs and charts, it should refer users to the whereabouts of a detailed description of the graphic in plain text, which is not obtrusive. Accordingly, two Web accessibility barriers were empirically formalized in this work in addition to alt text unavailability and unsuitability, namely "non-null alt text" and "image misuse." Furthermore**, a further set of recommendations for alt text suitability** (Table 4) is proposed, which are to the best of our knowledge, the first set of recommendations that compares and brings together the views of both WCCs and VIUs in the context of alt text suitability. Importantly, our guidelines contradicted past evidence (Lengua et al., 2022; Harris, 2020; Hanley et al., 2021) on the afore-mentioned mismatch between the perceptions of WCCs and VIUs with regards to Web inaccessibility extending into the context of alt text suitability.

Overall, the main contributions of this work therefore are:

A. Alt text trainability and suitability recommendations drawing on a set of six themes, which are to the best of our knowledge, one of the first such efforts to compare and bring together the views of Web content creators and visually impaired users on alt text suitability, thereby offering a contrast to prior evidence (e.g., Lengua et al., 2022; Harris, 2020; Hanley et al., 2021) on the persistence of a mismatch between their views.
B. Empirical evidence clarifying two previously recognized alt text Web accessibility barriers, hereby named **non-null alt text** and **image misuse**, as well as supporting a distinction in how alt text and plain text are accessed by screen readers (i.e., the former is accessed as a chunk of text, while plain text is accessed line by line), which whilst documented in certain accessibility resources (e.g., Bureau of Internet Accessibility, 2018; Bureau of Internet Accessibility, 2024; Accessibility for Ontarians with Disabilities Act (AODA), 2005), they have not yet been formally addressed in academic literature.

Comparingly, both the WCC and VIU participants highlighted dissatisfying views and experiences, respectively, in the context of alt text, not least in relation to suitability. The WCC participants acknowledged a lackluster motivation to engage with accessibility, whilst the VIU participants highlighted a novice treatment of accessibility, as they reported high encounter rates of barriers that require little to no accessibility expertise, such as the non-null alt text and image misuse barriers. In this regard, both participant groups' views resonate with each other that inaccessibility,

not least in relation to alt text barriers, is very often the result of no effort being focused on accessibility rather than the complexity of accessibility tasks, e.g., it is not difficult for a sighted WCC to tell whether an image only depicts text. Therefore, it is not surprising that both participant groups suggest increased efforts to gain *pseudo-expertise* in accessibility (Sections 4.1.3 and 4.2.2) rather than less efforts aimed at accessibility expertise, especially considering the variability of such expertise. This points to an increased relevance of crowdsourcing solutions (Section 2.3.3), which have shown promise to recruit non-experts with a plurality of motivational factors to achieve such recruitment.

The foundation therefore laid by attempting to bridge the perception gap between WCCs and VIUs when it comes to what constitutes suitable alt text is an important first step in the effort to improve this long-lasting and fundamental issue in Web accessibility practice. Furthermore, the findings of this work are relevant beyond Web content, as alt text can also be found in mobile apps, Virtual Reality (VR), and other emerging technologies.

5.2. Limitations and future directions

This work and findings present some limitations that need to be considered. First, it is acknowledged that the sample size does not allow for wide generalizations to be drawn from the reported conclusions. In line with past research (Muehlbradt and Kane, 2022), the characteristics of the target sample made it difficult to recruit a larger sample of participants; however, it has to be noted that repetition was observed in the participants' answers after eight participants, for both groups. Whilst we recognize that richer qualitative data would have benefited our work, our sample population size is in line with peer studies (e.g., Muehlbradt and Kane, 2022; Mack et al., 2021; Aizpurua et al., 2016; Lee and Ashok, 2022), and our analysis maximizes the data obtained therein. To the best of our knowledge, our sample is also unique in comparing the perceptions of VIUs and WCCs in the same study. It is however necessary to carry out similar work to sharpen the image further with regard to the roles of WCCs and VIUs in alt text authorship, as whilst the findings agree with latest similar findings on the need to train WCCs (WebAIM, 2024), on the other hand, they also contradict past work on the need for VIUs to become active alt text authors (Vollenwyder et al., 2023; Chisholm and Henry, 2005; Heylighen et al., 2017).

Second, in this work the WCC participants had an average of nine years of experience in Web accessibility, which is important to take into consideration when comparing the findings with past studies, as expertise in Web accessibility has been shown to vary. Importantly, it is clarified that our findings in relation to the WCC participants reflect a blend of their personal experience in creating Web content and their observations of their clients in doing so. It is therefore recognized that the contradiction with past evidence on the persistence of the afore-mentioned mismatch can very well be due to past evidence being based on data from WCCs that were less experienced in Web accessibility. More studies that compare the perceptions of VIUs and WCCs in relation to Web navigation and alt text suitability are therefore much needed, and it is recommended that such studies disclose the types of disabilities, assistive technologies used, and Web accessibility experience of participants, by design. Accordingly, studies that compare the perceptions of novice and expert Web content creators are very much encouraged to further inquire into the validity of the afore-mentioned mismatch. Relatedly, mixed-group focus studies with the potential to also involve participants that belong to both participant groups (e.g., VIU participants who are also WCCs) are recommended as a valuable future endeavor to further explore this mismatch and help identify pathways towards reconciliation. Finally, while diverse impairments were acknowledged in the context of alt-text-related barriers, this work only focused on such barriers as experienced by VIUs. Further similar studies focusing on diverse impairments are encouraged to capture the broader scope of alt-text-related barriers and inform more inclusive practices.

Third, the interviews showed that there is a pressing need for the development of appropriate approaches and processes to address Web accessibility barriers, such as alt text unsuitability, which encompass trainability of WCCs. It is recommended that such approaches and processes need to first engage WCCs with Web accessibility in a way that fosters empathy towards inaccessible Web navigation experiences, and then provide structured training in more specific accessibility tasks. This confirms past research work that urges the need for organization change as an important driver for skill development changes (Whelan-Berry and Somerville, 2010). Future work can, in this same vein, leverage the alt text trainability and suitability recommendations proposed in this study to develop solutions that include training and examples able to put such recommendations into practice. It is further recommended that interdisciplinary research can be helpful in designing solutions that facilitate a healthier engagement of WCCs with Web accessibility. For instance, there is room to explore the use of psychology theories, such as the Self-Determination Theory (SDT) (Deci and Ryan, 2013; Deci and Ryan, 2000) which suggests that addressing the human needs for *autonomy*, *competence* and *relatedness* can underlie growth and development, and therefore can foster WCCs' motivation and subsequent engagement with Web accessibility. Finally, all findings in this study are participant self-reported perceptions, which is in line with the goal of this work, however, they are subjective in nature. Although the themes generated in this study are also informed by insights from our Website browsing task, such insights remain subjective in nature and did not reveal clear discrepancies between what participants "say" and "do." Conjecturably, the browsing task being a simplified demo of an inaccessible and an accessible version of a Webpage along with the expertise of our participant groups made accessibility issues easily identifiable. A further study using a mixed-methods approach can provide additional insights into what participants also do in addition to say and this constitutes part of our future research directions. Overall,

this work can contribute to ongoing efforts to improve alt text authorship.

Notes

1. https://www.mturk.com.
2. https://www.rnib.org.uk.
3. https://webaim.org.
4. https://abilitynet.org.uk.
5. https://www.eoty.gr.
6. https://silktide.com.
7. https://kreativeincagency.co.uk.
8. https://www.scope.org.uk.
9. https://www.w3.org/WAI/demos/bad/Overview.html.

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Author contributions

CRediT: **Nikolaos Droutsas**: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Validation, Visualization, Writing – original draft, Writing – review & editing; **Fotios Spyridonis**: Project administration, Supervision, Validation, Writing – review & editing; **Damon Daylamani-Zad**: Supervision, Validation, Writing – review & editing; **Gheorghita Ghinea**: Validation, Writing – review & editing.

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Data availability statement

The data that support the findings of this study are available from the corresponding author, FS, upon reasonable request.

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Appendix A. Interview questions for visually impaired users

The core set of questions used in tandem with a Web browsing task (see Section 3.2) to guide discussions with VIUs are listed below. Not all were asked in every interview, but they rather acted as a guide and were adapted to the natural progression of each conversation.

A.1. Introduction questions

- Tell me about your experience in navigating the Web.
- How accessible do you feel Web content is to you?
- What are the main challenges you face in navigating the Web?
- Do you do something to help deal with such challenges?

A.2. Screen readers and barriers

- Can you tell me about your experience using screen readers to navigate the Web?
- What are the main challenges you face in navigating the Web via screen readers?

A.3. Experience and expectations with alt text

- Can you tell me about your experience with alternative descriptions of Web content like images?
- How satisfied are you with the quality of such descriptions on the Web?
- Do you feel that you could improve such descriptions if you could edit them?
- Do you have any specific expectations from such descriptions?
- All in all, what is the one thing that you feel is needed to improve the quality of such descriptions?

Appendix B. Interview questions for web content creators

The core set of questions used in tandem with a Web browsing task (see Section 3.2) to guide discussions with WCCs are listed below. Not all were asked in every interview, but they rather acted as a guide and were adapted to the natural progression of each conversation.

B.1. Introduction questions

- How long have you been involved in the creation of Web content?
- Have you been involved in efforts to create accessible Web content?
- Can you describe to me how do you go about creating accessible Web content?
- How proficient would you say you are with creating accessible Web content?
  - What do you think are the main benefits in focusing Web design efforts towards accessibility?
    Or
  - What are the main reasons for not being involved much in the creation of accessible Web content?

B.2. Barriers and WCAG

- Do you use any resources to increase your understanding in Web accessibility?
- Are you familiar with Web accessibility guidelines, such as WCAG?
  - To what extent do you aim to conform with such guidelines?
  - Do you think that conforming with such guidelines is sufficient to make Web content accessible to all users?
- What do you think are the main challenges that people with disabilities or impairments face in navigating the Web?
- Do you do something to help surmount such challenges to make Web content accessible to people with disabilities or impairments?

B.3. Experience and expectations with screen readers and alt text

What is your experience with screen readers:

- Have you, for example, created or evaluated Web content specifically for being accessible to screen readers?
- What do you think are the main challenges that people who use screen readers face when navigating the Web?
- How proficient would you say you are in writing good alt text descriptions?
- How effective do you believe alt text description that accompany Web content are in describing such content?
- Do you have any key expectations from such descriptions to be of good quality?
- All in all, what is the one thing that you feel is needed to improve the quality of such descriptions?