






Web Accessibility: An Overlooked Right

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Abstract. The digitalisation of the public sphere is an ongoing process accelerated by the ubiquitousness of the internet. For the over a billion people estimated to live with an impairment, this digitalisation comes with barriers that can represent an altogether exclusion from the digital realm, hindering their full participation in society. This context should compel stakeholders involved in the development of digital products to consider accessibility as an essential requirement. However, that may not always be the case. This work is the product of a scoping literature review guided by the overarching topic of accessibility in the context of the web. After arguing that disability as a phenomenon might be more prevalent than one would think, it frames web accessibility as a human right that benefits all individuals, while also having important dimensions that businesses would regret ignoring.

Keywords: Accessibility · Web Accessibility · Digital Accessibility · Impairments · Disability · Inequality

1 Introduction

Today the internet is ubiquitous. It is used as a gateway to essential services, healthcare, job opportunities, social activities and education. This digitalisation of the public sphere represents a major shift in paradigm that comes with many benefits. However, that digitalisation may also represent the mutation of physical barriers to digital ones [61].

For the over a billion people the World Health Organization (WHO) estimates live with an impairment around the world [67], those barriers can effectively represent an altogether exclusion from the digital realm, hindering their full participation in society. For that reason, web accessibility needs to be thought of as a necessity rather than just a quality attribute.

This work is the product of a scoping [33, 53] literature review guided by the overarching topic of accessibility in the context of the web. It aims to provide an overview of the topic while substantiating arguments for its importance. It will first touch on the different types of impairments that interact with contextual

factors to disable individuals, and then challenge the notion that phenomenon is reserved for a small segment of the population. Then, supported by the bibliography, it weaves considerations on the topic of web accessibility before presenting a general landscape of its implementation.

Throughout this work, the terms *impairment* and *disability* are used in a noninterchangeable way. Further reasoning for this is presented in Sect. 2 but, fundamentally, this decision was anchored in the dichotomy between those two terms set by the social model of disability. This model defines disability as a social creation stemming from the relationship between people with impairments and a disabling environment [48].

2 On Disability

One could be tempted to define disability solely in the context of health, however that would place the burden exclusively on the medical condition of an individual when there are other factors relevant to disabling someone that should be considered.

That understanding seems to be embodied in the United Nations' (UN) *Convention On The Rights Of Persons With Disabilities* (UNCRPD) and in the WHO's *International Classification of Functioning, Disability and Health* (ICF). Both adhere to the notion that disability arises from the interaction between a person with an impairment (e.g., a health condition) and that person's contextual factors (e.g., attitudinal and environmental barriers) [57,66].

The professionals involved in the development of websites and mobile applications are, most probably, not capable to alleviate the physiological condition impairing a user. Nevertheless, by knowing those conditions and deploying strategies to better accommodate people living with them, they might be able to dissolve some environmental barriers.

In an effort to better understand the notion of disability, this section will first present some of the underlying physiological conditions (impairments), and then try to bridge the gap between those that live with them and those that do not.

2.1 Different Types of Impairments

The ICF [66] categorizes different types of body functions that, when impaired, interact with contextual factors in disabling ways. We can leverage that taxonomy to better understand the types of impairments that the World Wide Web Consortium (W3C) recognises might hinder human-computer interaction (refer to Table 1). Those are: auditory, cognitive, learning, and neurological, physical, visual, and speech [70].

Auditory. Hearing loss can range from slight to profound, impact one or both ears and be able to be mitigated with auditory devices or not. These disparities might be explained by the existence of two types of hearing losses [28]:

Table 1. W3C's types of impairments and related ICF's body functions

ICF's body functions	W3C's types of impairments
Hearing functions	Auditory
Mental functions	Cognitive, learning, and neurological
Neuromusculoskeletal and movement-related functions	Physical
Seeing and related functions	Visual
Voice and speech functions	Speech

- **Conductive** hearing losses are caused by diseases or obstructions in the outer or middle ear. They affect all frequencies of hearing evenly and do not result in severe losses.
- **Sensorineural** hearing losses result from damage to the sensory hair cells of the inner ear or the nerves supplying them. They result in mild to profound losses and affect certain frequencies more than others.

Cognitive, Learning, and Neurological. Cognitive, learning, and neurological impairments are diverse in origin and impact [47]. They can either stem from neurological or mental health disorders and affect an individual's hearing, movement, vision and speech. However, they do not necessarily impact one's intelligence.

Examples include: attention deficit hyperactivity disorder (ADHD), autism spectrum disorder (ASD), memory impairments and dyslexia.

Physical. Physical, or motor, impairments could manifest as weakened and limited muscular control, limitations to sensation, joint disorders, pain that impedes movement, and missing limbs [70].

Dexterity impairments have the potential to greatly impact a user's interaction with the internet since they affect the hands and arms, body parts usually seen as indispensable to human-computer interaction. Impaired dexterity may come as a consequence of [54]:

- **Musculoskeletal impairments** arising in the muscle or skeletal system or in the interaction between them. They are usually caused by deformity, injury or disease. Examples include arthritis and carpal tunnel syndrome.
- **Movement disorders** result from damages to the nervous or neuromuscular system that can occur, for instance, after a stroke. Examples include ataxia and parkinsonism.

Visual. There are four critical visual functions [2]:

- **Visual acuity** is a measure of the ability of the eye to distinguish shapes and the details of objects at a given distance [29].

- **Contrast sensitivity** is the extent to which one can discern subtle differences in shades of gray.
- **Field of vision** is the visual area an eye sees at a given instant.
- **Color perception** refers to the eye’s ability to interpret correctly the wavelengths of different colors.

When one or more of those four functions is affected, one’s visual capabilities may be considered impaired. For example, difficulty to focus on far away or close objects (myopia and hyperopia respectively) and the distortion of what is being seen (astigmatism) will have negative impacts on an individual’s visual acuity and contrast sensitivity. The presence of opacities (cataracts) in the eye lens will also prove detrimental to one’s visual acuity while restricting the field of vision. Furthermore, the lack of the necessary cones in one’s retina to interpret the color red (protanopia) will hinder color perception.

Speech. Speech impairments may be divided into either those that affect its production or its fluency [44]. The first, largely result from physical conditions affecting the face, mouth, tongue or vocal cords while the latter, may take the form of stuttering or apraxia of speech, a disorder impacting the brain pathways involved in sequencing the movements needed to speak.

2.2 Demystifying the Notion of “other”

The condition of the impaired is often seen as undesirable and the discourse about it relegated to a more seclusive realm of the public sphere [34]. However, one should acknowledge that the WHO estimates there are over a billion people living with some kind of impairment [67]. The immensity of this number lends itself nicely to the conclusion that, to live with an impairment does not place one in a unique and unheard of condition that is ought to be shunned and ignored by the public.

Instead, it would be of benefit to the population as a whole for the struggles of those living with an impairment to be discussed and, ideally, alleviated since it is likely an individual ends up living with an impairment at some point, as we will see in this section.

The passing of time is inevitable and with it comes ageing, something inexorable from the human condition. In recent decades, the Organisation for Economic Co-operation and Development (OECD) countries saw the share of population aged 65 and over double from 9% in 1960 to 18% in 2021 with projections indicating a rise to 27% by 2050. Declining fertility rates and a rising life expectancy – on average, in OECD countries, one can expect to live 19.5 more years at 65 – help explain this increase [38].

A number of impairments may arise from the degenerative effects of ageing [27]:

- Presbycusis is another word for age-related **hearing** loss. Its mere existence attests to the prevalence and normalcy of the issue. The deterioration evolves

from the reduction in the ability to understand speech to the ability to detect, identify, and localise sounds [21].

- **Cognitive** impairments relating to memory or to maintaining focus and attention on an activity for a long time may become more common.
- **Psychical** impairments become more prevalent as movement range becomes limited and motor control declines.
- **Vision** is often affected since ageing individuals may have to deal with issues like the proneness for their eyes to get fatigued or dry, the thinning of the most sensitive cells of the eye (age-related macular degeneration) or the loss of the eyes' ability to focus on nearby objects (presbyopia).

Apart from the inevitability of ageing, during a lifetime one is also likely to suffer from a temporary impairment like a broken limb or the short-term effect of a medical intervention like an eye surgery.

Furthermore, it would be remiss to ignore situationally-induced impairments. The mobile computing paradigm brought upon an age where the user is no longer necessarily sitting in front of a desktop, but rather can be in an ample variety of situations, contexts and environments [65]. Navigating these situations while interacting with, for instance, a smartphone can be analogous to the experience of someone with a physiological impairment.

With Eurostat stating that 81.48% of the European Union's (EU) population was using smartphones to access the internet in 2021 [17], and the OECD announcing 127.9 as the number of mobile broadband subscriptions per 100 inhabitant in their member countries [37], we understand that universal usage of mobile devices as access points to the internet may be a reality sooner than later, and with it the rise of situationally-induced impairments.

Ultimately, if disability can come to be because of an inevitable physiological impairment, because of the contextual barriers formed by the way we interact with the internet today, or even because of a combination of both, then we need to understand it as a shared aspect of the human condition, and not as the condition of the "other". It is therefore, imperative to shift the focus from the condition of the impaired to the disabling aspects arising from contextual factors.

3 Web Accessibility

As discussed in Sect. 2, a disabling experience stems from the interaction between an individual's impairment and their contextual factors. If those contextual factors take on the form of online browsing, then, to ensure a non-excluding experience, web accessibility must be a concern.

During the development project of an online platform, there will, most likely, be a heterogeneous group of stakeholders involved. In a simple one, done in the context of a company, you might have [36]:

- A **client** working in a specific sector of the economy. They will probably want rapid development of a quality product.

- A **product owner** translating the client’s needs into actionable tasks for the rest of the stakeholders and making sure the project is delivered.
- A **designer** working towards a visually appealing and polished final product.
- A **development team** making decisions about the technological infrastructure and translating the design into code. Traditionally, this team will have **front-end** and **back-end** developers. The first specialize in the creation of the user interface, while the later will be involved in what happens server-side.

This rather heterogeneous group, or at least its last three members, seem to generally agree that web accessibility as a quality should be included in the design process [68]. However, that heterogeneity, in experiences, knowledge, and even in the used jargon, calls for an harmonization of all of web accessibility’s complex socio-technical dimensions in an agreed upon definition for it.

In a study by Yesilada et al. [69], 300 participants with an interest in accessibility but different career and education paths, were tasked with choosing their preferred definition for web accessibility from a list of five. The majority opted for the W3C definition:

“Web accessibility means that people with disabilities can use the Web. More specifically, Web accessibility means that people with disabilities can perceive, understand, navigate and interact with the Web, and that they can contribute to the Web” [23].

In second came one from the US federal government:

“Technology is accessible if it can be used as effectively by people with disabilities as by those without” [46].

Nevertheless, some participants in the study criticized the distinction made between types of users - those with or without disabilities - by these definitions.

Trough the analysis of the responses given and sentiments shared, the authors concluded that, in order to find a definition with a high degree of consensus, it ought to be realistic and concise, should consider situational impairments and equal access, while not focusing on users with disabilities, and be proactive about accessibility as opposed to it being an afterthought.

Elsewhere, Petrie et al. [43] aimed to unify the definition of web accessibility by conducting an analysis of 50 definitions present in papers and guidelines. From them, they were able to extract six core concepts used by many:

1. Groups of users, characteristics, needs of users.
2. What users should be able to do.
3. Technologies used.
4. Characteristics of the website.
5. Design and development of the website.
6. Characteristics of the situations of use.

Incorporating them into a unique definition of web accessibility, they came up with:

“all people, particularly disabled and older people, can use websites in a range of contexts of use, including mainstream and assistive technologies; to achieve this, websites need to be designed and developed to support usability across these contexts” [43].

Although not particularly concise, this definition seems to be in agreement with Yesilada et al.’s assertion as to how a consensual definition of web accessibility should be produced. It is realistic, alludes to situational impairments when it speaks of a “range of contexts of use”, mentions disabled people without placing the focus on that group and implies a proactive approach by suggesting web accessibility should be considered during the design and development phases.

3.1 It Benefits All

As alluded to in Sect. 2.2, during a lifetime, one is likely to have a disabling impairment that can hinder interaction with the web. This likelihood increases during the later phase, when the consequences of ageing are felt and can have a compounding effect resulting on the exclusion from digital participation. Pérez-Escolar and Canet [41] seem to confirm this by stating that the elderly are the most likely group to be excluded from the digital realm. The universality of the ageing phenomenon is a good argument towards understanding how an accessible web benefits all. However, more can be said on this.

Apart from accessibility, another concept commonly associated with the interaction between a user and the web is usability, which is defined by ISO 9241 as:

“the extent to which a system, product or service can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use” [40].

If we consider “specified users” to be those with impairments, and “specified context of use” the disabling environments or assistive technologies, that definition could easily be borrowed by accessibility. However, they are usually seen as distinct qualities of a web product, albeit, with some overlap. Usability is often correlated with the general user experience (UX) design and studies aspects that impact all users, often not sufficiently addressing the needs of people with impairments [49].

Nevertheless, better accessibility will often be directly correlated with better usability. Petrie and Kheir [42] shows that there is some communality between them, as more recently does Zhao et al. [71]. The latter, analysing accessibility issues from popular GitHub projects and their fixes, found that, among quality attributes, usability is the one interacting with accessibility more frequently, and that when accessibility issues were resolved, the usability issues were greatly improved. In sum, one can affirm that to alleviate the constraints of people with impairments will also result in a better user experience for all.

3.2 A Human Right

As the internet cements itself as the primary intermediary connecting individuals to essential services, healthcare, education, employment opportunities and social interactions, it becomes apparent that to hinder online participation equates to restricting involvement in society.

Article 1 of the UN's *Universal Declaration of Human Rights* (UDHR) states that:

“all human beings are born free and equal in dignity and rights” [56].

At its time of writing in 1948, it would be hard to envision the advent of the web. In 2006 however, it was already a reality. In that year the UN published the *Convention On The Rights Of Persons With Disabilities* (UNCRPD) where article 9 demands for accessible information and communications technologies [57]. On the same text, article 21 speaks on the right one with an impairment has to exercise freedom of speech, and to seek information on an equal basis with everyone else. Since public discourse is increasingly had online, and the internet became the *de facto* source of information, to not have an accessible web is to violate the UNCRPD.

While the UDHR sets a fundamental guiding norm of equality that is ought to be kept in mind as the web's ubiquitousness and importance expands, the UNCRPD situates web accessibility as a human right, qualifies it as necessary precondition for equality, and acknowledges its importance as a tool for social participation and inclusion [19].

A particular driver of social participation is also a human right. In article 23 of the UDHR, we can read that everyone has the right to work, and with it, the:

“right to just and favourable remuneration ensuring for himself and his family an existence worthy of human dignity” [56].

As technology advances, the way we exercise that right changes. In 2022, close to 30% of employed people in the EU reported using digital devices for the entirety or most of their working time [16]. Were those digital devices fully accessible, these jobs could probably be performed by people with impairments.

However, among people with impairments there still is a disproportionate rate of poverty and social exclusion compared with those without one. Eurostat data for 2022 shows us that, in the EU, 28.8% of the people in the first group were at risk of poverty or social exclusion, a number 10.5% higher that of the latter group [18].

A way to reduce that gap is to better assimilate people with impairments in the workforce, therefore allowing them to fully realize their human right. Nevertheless, several hypothetical factors might work against that assimilation. For one, in violation of the UNCRPD's article 9, those digital devices could be inaccessible. Another reason, could be an employers stigma towards those with impairments [20], which would violate article 1 of the UDHR. A third possibility might be the low education rate of those with impairments, which

implies a violation of another human right, the one within article 26, the right to education. The strength of this last hypothesis increases when faced with UNICEF data showing us that, compared with children without impairments, children with impairments are 49% more likely to have never attended school [55].

The role of higher education, in particular as a device for the attainment of better living conditions, needs considering. According to Eurostat data [15], in 2022 in the EU, 86% of those that had completed a program of tertiary education were employed. That number drops to 74.2% when considering those that completed upper secondary or post secondary non-tertiary education and falls to 57.2% among those that, at best, attained lower secondary education.

Work towards the integral fulfillment of both the UDHR and UNCRPD still has to be done, and that seems to be in the UN's agenda with its 17 goals for sustainable development [58]. Among them, the most relevant to our discussion are:

- *“Goal 1 - End poverty in all its forms everywhere”.*
- *“Goal 4 - Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”.*
- *“Goal 10 - Reduce inequality within and among countries”.*

Working towards generalized digital accessibility is a way to help attain goal 10, and also goal 4 if we consider how digital inaccessibility may be blocking people from obtaining an education in an increasingly digitalised world. As we have seen, full realization of goals 4 and 10 can potentially remove some of the people living with impairments from a self-perpetuating cycle of poverty and, therefore, not fully realize goal 1, but at least contribute towards it.

3.3 The Business Side

More than it being a fundamental human right, there are other angles to the accessibility question that businesses could regret ignoring.

Even with the higher risk for impoverishment that we have discussed in the previous section, the global disability market, considering people with impairments and their friends and family, commands over 13 trillion US dollars [10]. Given the demographic paradigm and the impacts of ageing we discussed in Sect. 2.2, we can postulate that with each passing year that figure will only increase.

In 2022, Eurostat estimated more than two thirds (68%) of the population between 16–74 in the EU had bought or ordered something over the internet in the 12 preceding months [13]. Other data points to 44.1% of large (250 or more persons employed) enterprises in the EU having e-commerce sales [14].

However, what is now a common practice for most of the population, may prove to be a tall task for people with impairments [51]. By building inaccessible e-commerce platforms, business are alienating a vast portion of their potential consumer base, therefore not fully realizing their earning potential and effectively losing money.

Apart from this opportunity to extend market reach, the W3C identifies three other added benefits from implementing accessibility [45]:

- It **drives innovation**: accessible design thinking may result in new and flexible ways to interact with websites. Furthermore, those solutions may end up improving the experience of all users (refer to Sect. 3.1).

The W3C retells how Google’s advances for accessible products and services, translated into innovative solutions for everyone. Among them are inventions already entrenched in our everyday lives like auto-complete and voice control. Additionally, those advances also play a part in propelling forward more contemporary innovations, such as artificial intelligence, that have only recently gained wider prominence.

Concisely, and as Eve Anderson, senior director for Google, currently leading their accessibility effort, puts it:

“The accessibility problems of today are the mainstream breakthroughs of tomorrow.” [7]

In the intersection between innovation and legal obligation, which we will touch on next, resides another example given by the W3C. In the early 2000s, students in the California State University (CSU) were unable to take advantage of an educational program built into Apple’s iTunes because of it not being accessible to blind students. That resulted in teachers within the university being prohibited from using iTunes. In response, the tech company took note of the problem and worked towards making it more accessible. That software, and its educational programs were soon after being used in CSU, as the matter was solved through innovation rather than litigation.

Apart from an example as to how communication between societal stakeholders may bring forth accessibility, it also serves as a cautionary tale. If the adoption of accessibility is not a requirement, then the question becomes if market forces and technical change will or will not choose to enable access for those with impairments [6].

- It **minimizes legal risk**: the ratification of the UNCRPD by the EU in 2010 [59], led it to pass legislation like the *European Accessibility Act* (EAA) (*Directive 2019/882*) [12].

The EAA identifies product and service features that must be made accessible. Among them are products like computers, operating systems, and smartphones, but also services like e-commerce, online banking and websites that provide information on transport services. From the 28th of June 2025, citizens will be able to file complaints with national courts if services or products do not respect the directive [11].

Therefore, compliance with the eventual laws each country member will pass resulting from the transposition of the EAA, will mitigate the risk for an organization operating within the EU to be involved in legal action.

In the United States of America, even though the country never ratified the UNCRPD [59], lawsuits have been filed under the Americans with Disabilities Act (ADA) because of inaccessible online platforms.

Among them, a case filed in 2017 against a large sporting good corporation. The plaintiff argued the defendant failed to:

“design, construct, maintain, and operate its website to be fully accessible to and independently usable by the plaintiff and other blind or visually-impaired people” [32].

- It **enhances the brand**: a commitment to accessibility can demonstrate a business’ sense of Corporate Social Responsibility (CSR), which, in turn, may lead to enhanced brand image and reputation, increased sales and customer loyalty, improved workforce diversity among others [52].

Connected to CSR’s are Environmental, Social, and Corporate Governance (ESG) factors. We can consider accessibility to be an ESG since it pertains to inclusion and human rights (refer to Sect. 3.2). Data pointing to the 35.3 trillion US dollars in investment driven by ESG’s (an increase of 55% from 2016 to 2020) [22], allows us to postulate investors are increasingly interested in ESG’s.

Organizations ought to take steps towards protecting and enhancing their brands in accordance to a CSR philosophy and with ESG’s in mind. Publicly listed companies in particular need to take the latter in consideration, since studies [9, 72] point to there being a correlation between ESG’s and market value.

4 Web Accessibility in Practice

Up to this point, we have been discussing impairments that, conjugated with the environment, disable individuals. It is of particular interest to this work when that environment gains the form of a digital platform. To that point, we have been framing web accessibility as something beneficial to all, a human right and a potential advantage for businesses.

However, we are yet to address a critical element to this discussion. An analysis on its practical application is called for, in order to understand if web accessibility is already a reality, or if it is still an elusive necessity.

It would be difficult to have this discussion without a measure for accessibility. When the subject of study is the information on a web page or application, we usually refer to the W3C’s *Web Content Accessibility Guidelines (WCAG)* [24]. In their most recent iteration – 2.2 published on the 5th October 2023 – there are 13 guidelines organized under four principles [62]:

- **Perceivable** – Users must be able to perceive the information being presented.
- **Operable** – User interface components and navigation must be operable. They cannot require an interaction the user cannot perform.
- **Understandable** – A user must be able to understand the information and the operation of the user interface.
- **Robust** – Users must be able to access the content as technology advances.

Every guideline has testable success criteria, each with its own level of conformance: A (lowest), AA, and AAA (highest).

Starting in 2019, the non-profit organization WebAIM publishes a yearly report on the accessibility of one million home pages. In 2023, they found that 96.3% of those pages had WCAG failures. Among them the most common were low contrast – present in 83.6% of pages – and missing alternative text – found in 58.2% [64].

The first constitutes a failure to meet success criterion *1.4.3 Contrast (Minimum)*, a level AA criterion for the guideline *1.4 Distinguishable*. The later represent failure in meeting the level A success criterion *1.1.1 Non-text Content* of the *1.1 Text Alternatives* guideline. Both are guidelines of the perceivable principle [63].

Elsewhere, Bi et al. [4] analyzed 1000 GitHub projects and found that, around 70% of them had reported accessibility issues. Similarly, Alshayban et al. [1] studied 1000 Android apps to find that most had accessibility issues. Likewise, Martins and Duarte [31] found that among close to three million pages, only less than 1% presented no accessibility issue.

4.1 Sentiments Towards It

We have previously established web accessibility’s importance (refer to Sect. 3.2), yet we are now faced with a somewhat troubling picture of inaccessibility throughout the web. In this section, we will explore the sentiments towards it of some of the stakeholders mentioned in the beginning of Sect. 3 to understand if they explain a generalized disinterest.

In Inal et al. [25], 167 UX professionals from Nordic countries revealed, through an online questionnaire, how they view and practice accessibility. As to what pertains to their personal motivations in digital accessibility they rate being inclusive and designing better products as the two main propellers. They also mention motives like being ethical, complying with the law, and increasing revenue.

In Yesilada et al. [69], the 300 participants gave similar answers when asked as to their motivations for being involved with web accessibility. By decreasing number of respondents, some of the reasons were: being inclusive, design better products, be ethical and comply with the law.

Another study by Bi et al. [5], had 365 participants, the majority of which working either on web app or mobile app development, giving their opinions on statements about accessibility. Some noteworthy that gathered a relevant level of agreement (more than four in a six point Likert scale) are: accessibility needs to be incorporated into all software projects, it is not only for people who are unable to use standard software, and it is a marketing strategy.

Vollenwyder et al. [60], advances a study on the intention to consider web accessibility anchored on the *Theory of Planned Behavior* (TPB). A core concept associated to TPB is *intention*, the immediate antecedent to the performance of a behaviour. According to this theory, *intention* is formed by three factors:

1. **Attitude**, a personal opinion regarding the behaviour.

2. **Subjective norm**, the perceived social pressure to perform or not the behaviour.
3. **Perceived behavioural control** the perceived ease or difficulty of performing the behaviour.

These factors are influenced by *salient beliefs* emerging from the individual, social and informational backgrounds. The authors identified 12 of them associated with web accessibility and built around them a questionnaire that was answered by 342 participants, most of which, web practitioners like testers, managers, and developers.

The gathered answers allowed them to identify the main beneficial *salient beliefs* to web accessibility as:

- User advocacy, a subjective norm pertaining to the users demand for web accessibility.
- Self-perception as specialist, a subjective norm with perceived behavioural control implications, related to the individual’s role as a web specialist.
- Product quality, an attitude correlating accessibility with better overall quality of the work.

Most of these motivations and perceptions have direct correspondence to topics we discussed previously. The notion that accessibility helps design better products for all was touched upon on Sect. 3.1. Web accessibility’s potential to increase revenue, the legal risk of not complying with the law in what pertains to it, and its usage as a marketing strategy to enhance the brand was discussed on Sect. 3.3. Furthermore, the perception that, to design accessible platforms is to be ethical, may be rooted in the correlation between accessibility and human rights, established in Sect. 3.2.

Lastly, this section would be remiss to not address how the motivation to be inclusive, identified in Inal et al. [25] and Yesilada et al. [69], and the self-perception as specialist, the salient belief advanced by Vollenwyder et al. [60], can be a detriment to the narrative that there is no “other” (refer to Sect. 2.2) by problematically framing the question of accessibility as one where there are two non-intercepting groups, those that help by including, and those that are helped by being included.

Inclusivity may have as precursor empathy, which, according to Bennett and Rosner [3], may distance those that work on accessibility from the lives and experiences they hope to bring near. They present the idea that empathy may work as a mean of reinforcing on the web practitioner a feeling of superior training – or their self-perception as specialist, as Vollenwyder et al. [60] puts it – that makes them apt to resolve problems in domains they do not master.

They also point to how empathic modelling activities reproduce negative stereotypes, fail to highlight the challenges felt by those with impairments, and lead towards an inaccurate and incomplete notion of what makes an experience disabling. More disconcerting, these activities may even help practitioners distance themselves from those with impairments, therefore framing the latter’s

identity as one different from the former's, which consequently works against the notion that accessibility is not for the "other".

Although it can be framed somewhat problematically, empathy's ability to lead to the development of accessible solutions should not be disdained when it is genuine. However, that empathy should neither negate the fact accessibility is for all and not the "other", nor be used as false pretence aimed to cover another, legitimate, truer intention like the ones listed in Sect. 3.3.

In an hypothetical case of an e-commerce website, to claim accessibility was implemented purely because of empathy, without contemplating the increased revenue the interaction with the untapped market of people with impairments would generate, creates the false narrative that change happened, not because of the buyer's ability to advocate for it, but rather due to samaritanism on the seller's end. Ultimately, and paradoxically, this course of action guided by virtue signalling, could eventually even serve as a deterrent to the proliferation of accessibility were the paradigm to shift, and empathetic decisions started being met by the general public with indifference rather than praise.

Ultimately, respect among fellow humans should prevail as the guiding norm, and the fundamental rights for one's existence a constant not dependent on the good will, or empathy, of others.

4.2 Barriers

From the information gathered, it would not be a stretch to state that, in broad terms, stakeholders are in favour of implementing web accessibility. However, there must be some force pulling in the opposing direction. Otherwise, there would not be such a high prevalence of inaccessible platforms as the one reported in the beginning of this section.

A first clue as to why that is the case, may lead us to question if students are being adequately introduced to the problem. Cao and Loiacano [8], found that students of Computer Science or Information Technology programs, were not familiar with guidelines like the WCAG, even after having taken development and design courses.

This gap in knowledge tends to follow students to their professional careers. In fact, lack of training or of skills and knowledge is often cited as a challenge to the implementation of web accessibility [5,25], which among the stakeholders evidences a need for training in digital accessibility [39].

Other barriers to web accessibility pointed by participants of Inal et al.'s study [25] include time and cost constraints, placing the focus on other users, the work overload, and it not being a requirement neither for their organization nor for the client.

If we take a moment to analyze these barriers in light of what we have been discussing, we find that this line of thought is fraught with potential issues, but also with a relevant insight serving as silver lining.

As alluded to in Sect. 2.2, the notion of "other" is one that needs to be applied cautiously. In this particular case one needs to understand that, if we say we are focusing on "other users", it creates the illusion that those with,

and those without impairments are non intercepting and distinguishable groups, when in reality, most frequently, they are not. Furthermore, as seen on Sect. 3.1, to better prepare a platform to be used by someone with an impairment will often bring advantages to the whole user base.

Additionally, web accessibility not being a requirement is a paradigm being shifted by the legislative power. As discussed on Sect. 3.3, those organizations and clients referred to by the professionals in Inal et al. [25] have more to gain by being proactive on this matter and, therefore, avoid future legal actions that can result in costs that far outweigh the ones incurred on during the process of implementing web accessibility.

However, the notion that professionals do not have enough time for accessibility implementation because they are overloaded with work, is one requiring further investigation. The majority (55.7%) of the enquired estimated they spend under 10% of total working time on accessibility issues [25]. We can postulate this figure is connected to accessibility not being perceived as mandatory by their organizations, which therefore conditions them to divert their attention from the issue. It may also end up generalizing the idea accessibility is not as relevant as other software qualities, which can have a performative effect on the job market that ends up perpetuating the issue.

Martin et al. [30] studies 5920 job postings from 2062 different companies on LinkedIn to investigate if organizations seek software designers and developers versed in accessibility. They divided those posting into two categories: “general software roles” that represented close to 70% of the studied universe, and “accessibility specific roles”. On the former group, less than 6% had the keyword “accessibility” on its description. Of the latter, it was required to have extensive technical accessibility knowledge, and to function as accessibility educators and advocates within the company.

This, in line with the sentiments gathered through the analysis of Inal et al., sets the tone for accessibility to be demoted in importance by workers of the first, bigger, group, while setting the second, smaller, group up for the inglorious and overloading task of being preaching advocates for the first’s reluctant ears.

Moreover, Martin et al.’s data may also be correlated with another feeling shared by participants of Inal et al. that some workers are more responsible than others for the inclusion of accessibility in a project. This theory can work as a tactic of evasion of a responsibility that should be shared by all, and does a disservice to the idea that web accessibility should be a preoccupation throughout the entirety of the software development life-cycle [4, 6, 26, 68].

Apart from widespread understating that everyone will eventually have an impairment, for awareness of the accessibility issue to be more prevalent, these barriers dissipated, and their struggles alleviated, users with permanent impairments need to play an active role in promoting their needs among stakeholders [35]. However, that is hard to do from the frail position of the marginalized. To help exit that position, legislation and public opinion need to keep nudging stakeholders in the right direction until those with impairments can fully partic-

ipate in our increasingly digital society and lobby for their interests. After all, structural changes trump punctual caritative actions as:

“no individual is free and a full citizen if they are dependent on the will of others” [50].

5 Conclusion

Throughout this work, an overview of the web accessibility topic was provided, alongside arguments for the importance of its generalized implementation.

The framing of accessibility as a human right allows for a better understanding of the extent to which an inaccessible web can impose virtual barriers to the fulfillment of a complete and dignified existence for those living with impairments. Likewise, demystifying the notion of the “other” allows us to gain insight into the universality and prevalence of impairments, therefore further advancing the argument that web accessibility is a necessity.

However, fueled by the presented barriers, accessibility issues still abound online. Nevertheless, positive sentiments towards it from stakeholders, the benefits it brings to businesses, and an increasingly conscious legislative power, strengthen hope for a more accessible web in a near future.

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