Writing Towards Promoting the Empowerment of Persons With Disabilities in Digital Inclusion Texts

Bernardo Alves Villarinho Lima[1*], **Patricia da Silva Leite**[2†], **Leonelo Dell Anhol Almeida**[1,2‡]
[1]Academic Department of Informatics (DAINF)
[2]Postgraduate Program in Technology and Society (PPGTE)
Federal University of Technology - Paraná (UTFPR)
Av. Sete de Setembro, 3165
Curitiba, PR – Brasil
berlim@alunos.utfpr.edu.br*, patriciasleite@gmail.com†, leoneloalmeida@utfpr.edu.br‡

ABSTRACT
Writing technical texts that promote the empowerment of persons with disabilities is an important step towards the social inclusion of persons with diverse needs and conditions. However, few Computer Science events and journals present guidelines for writing about them - even those whose topics of interest involve persons with disabilities - and those that present guidelines often are limited to the adjustment of terminology or digital document accessibility. We review current and emergent practices of writing technical texts about digital accessibility and inclusion of persons who use accessibility resources, and we propose means to direct technical communication towards the promotion of empowerment when writing about persons with disabilities, reviewing not only terminology and document accessibility, but also approaches, and concepts, for user involvement, as well as the creation of narratives that are aware of the users' personal power. We expect this paper to provide directions for technical communicators on writing texts that are more aligned with the fact that each person has power to make a change on their own lives, and that artifacts can be used as means for furthering these choices and enabling persons towards their own objectives.

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H.5.1. Multimedia Information Systems; H.5.2. User Interfaces.

Author Keywords
Accessibility; Digital Inclusion; Empowerment; Narrative; Technical Communication; User-Centered Design.

INTRODUCTION
Social inclusion is a process which consists of society adapting its own collective actions, artifacts, production, and thinking in order to enable persons with different needs, abilities and material conditions to take agency and assume a social role. It is a bilateral process in which both the persons who are part of society and the persons who are excluded must decide and act on ways to promote equal opportunities to each individual, so that everyone can have power over their own lives [40][50].

The process in which a person, or a group, uses their own personal power to make changes on their lives is called empowerment [40]. The notion of empowerment is aligned with social inclusion as, in a society which includes persons, it is required that society's members use their own power to make decisions pertaining their individual and collective lives [40]. Though it is impossible for a person, even when supported by artifacts, to bestow empowerment upon another person, empowerment can be promoted through access to knowledge and artifacts that can spur the process of perceiving and using personal power, enabling persons to develop a set of skills required to make informed decisions about their lives [42][48].

According to Warschauer [50], enabling each person to access, create and adapt new knowledge is critical to the actualization of social inclusion. However, information and communication technology (ICT) artifacts, which are widely used for managing knowledge in our society, may sometimes impose barriers upon persons who attempt to use them, consequently hindering the fruition of those persons' goals and desires. ICT developers and researchers have, over the last decades, devised a number of approaches to minimize these barriers and their effects on users, promoting what is called digital accessibility: the property of an ICT artifact of offering the possibility of appropriation by persons with diverse abilities, needs, physiological, and intellectual conditions [50].

The promotion of digital accessibility is a relevant goal towards social inclusion since ICT artifacts can be used as means by which persons can participate in society and acquire knowledge to pursue their personal goals [41][50]. The universal and participatory access to information has been regarded as one of the Grand Research Challenges of Computer Science by the Brazilian Computer Society, on their last iteration of the Challenges report [41]. The process of expanding the reach of the benefits and challenges of ICT throughout society, adjusting artifacts to make them relevant according to each community's needs, and expanding the extent of which persons are enabled to pursue their own goals through the use of technology, is defined as Digital Inclusion [27][50]. Many works in Computer Science have aimed the promotion of Di-

gital Inclusion through Digital Accessibility, through research in the field of Interaction Design [17].

Interaction Design is a research field in Computer Science whose objective is to create interactive systems that better support persons in their works and lives [34]. One of the known approaches of Interaction Design is called User-Centered Design (UCD), whose principle is to bring forth the expectations, practices, and knowledge of users into the creation of designs which, in fact, provide support for users to do their activities [48]. The objective of UCD can be tied to the ideal of empowerment, since artifacts that are created whilst considering the users' perspective can enable persons to exercise their personal power over their daily lives, with some disciplines related to UCD, such as Participatory Design (PD), directly considering user empowerment as their final goal [42].

Spinuzzi [48], however, states that appropriating an approach which seeks to bring users into the production process does not inherently guarantee the promotion of empowerment, because users can still be considered unable to solve their own problems. This perspective considers the user as a victim awaiting a heroic designer to save them from their current work and living conditions by means of their designs. The narrative of user victimization is present not only in the design of artifacts using UCD, but also in Interaction Design literature [24][48].

The choice of words, phrases and narrative tropes can lead into the creation narratives in which designers are in a superior position when compared to users. Cavender et al. [4] state that choices of language in written material can influence the community's action. Therefore, it is important that the language and the narrative are promoting the idea of empowerment, representing persons as agents with personal power, with ICT artifacts not changing their lives for them, but supporting them on making their own decisions [24].

Lima and Almeida [24] investigated papers about Digital Accessibility in the Brazilian Symposium on Human Factors in Computer Systems (IHC) in order to verify whether narratives of victimization appeared in the content of texts about digital accessibility, however, their work was limited to highlighting occurrences of disempowering narratives in the papers, not exposing means to construct works that promote empowerment. This paper exposes a review of current and emergent practices of writing technical texts about digital inclusion of persons with disabilities (PwD), and proposes means to direct technical communication towards the creation of texts and narratives which are more inclusive and aware of each persons' power over their own lives. We employed bibliographical and documentary research (as exposed in [15]) in order to acquire the required sources for discussing this paper's themes and forwarding its objective.

This paper is motivated by the fact that few conferences provide standards on creating accessible and inclusive documents and writing about accessibility and inclusion; also most works about writing for inclusion limit themselves to guiding the creation of inclusive texts through accessibility of digital documents and through structuring of terminology towards appropriately refer to persons. We expose these topics in this paper, but we go beyond that, reviewing approaches to the creation of artifacts for empowerment through user involvement and reviewing the creation of narratives that accurately represent the personal power each person has, of making choices and changes about their own lives. Furthermore, this paper is limited to reviewing and proposing changes on the content of the technical communication about Digital Inclusion, refraining from judging the quality of past and future papers about Digital Inclusion, also refraining from being normative.

This paper is organized as follows: the next section presents considerations on accessibility-related research methodology; followed by a review on terminology practices for writing about persons with disabilities; an exposition on the creation of empowering narratives through the avoidance of the victimization trope; a review on the practices for accessibility in digital documents; and our conclusion.

ACCESSIBILITY-RELATED RESEARCH METHODOLOGY

In this section we explore some methodological aspects related to reporting accessibility researches. This is essential for providing readers with sufficient information to understand authors' compromises and intended research and social outcomes. Ideally, such compromises should be considered since the initial stages of a research. Also, they should be made explicit when writing about accessibility and inclusion. Next subsections will provide insights on accessibility-related design approaches, the concepts of accessibility and usability, and approaches for persons involvement.

Accessible and Universal Design

In the summary of her book about HCI theories, Rogers [39] opens the discussion citing an excerpt from Halverson: "Theories are more like a pair of dark glasses. We put them on and the world is tinted. The change brings some objects into sharper contrast, while others fade into obscurity." [20, p. 245]. Even when choosing among theories on the same subject, different approaches will lead to different findings and discussions. Thus, writing about accessibility-related studies should also clearly present the approach being followed, adapted or proposed. We present two approaches for accessibility-related design: Accessible Design, and Universal Design.

Accessible Design is a design process that takes into consideration needs and preferences of persons with disabilities. In 2004, Bob Regan [36] compiled some strategies and practices for supporting designers in cultivating innovative solutions on accessible design. This was a response to the assumption that concerns about accessibility are a strong constraint to designers' creativity, or a "failure of the imagination". Currently, accessible design is supported by several sets of design patterns (e.g [10]), guidelines (e.g. [2]), and other sources of already known good practices for designing accessible products. Also, it is increasingly recognized that products can be both accessible and aesthetically attractive.

Universal Design was initially defined by The Center for Universal Design [14] as "the design of products and environments to be usable by all persons, to the greatest extent possible, without the need for adaptation or specialized design". Currently, the development of digital products employing universal

design principles is less about monolithic and more about highly flexible products. Flexibility should not be considered as a drawback to the universal design objective, rather it represents a necessary requirement for providing resources that fit individual and collective needs.

Accessible Design and Universal Design are not conflicting approaches, however they could diverge about the intended extent of use. Artifacts designed by an Accessible Design approach are designed either to attend specific groups of persons, with specific needs, or to provide alternative means for persons with specific needs to interact with artifacts. On the other hand, a universally designed product is supposed to provide identical or, when necessary, equivalent services for attending the extent of persons the product is intended for.

Therefore, it is important that researchers indicate their purpose, especially in cases like Shneiderman's work [44], which comprehends "universal" as being successfully accessible to 90% of the public. This approach, which disregards the other 10%, can be understood as conflicting with the proposal of a fully universal approach for design, which must aims towards attending everyone, even if the state-of-the-art and techniques cannot possibly lead a design to that goal.

Access and Use

Accessibility and usability are qualities widely investigated in the HCI community. However, attention must be paid in relation to the meaning of such concepts in each research. Several studies discuss the relation between access and use (e.g. [35], [44], [51]), since they coexist during interactive situations and constantly shift from one to another in cycles of "accessing-using".

Accessibility refers to broadening the access to health facilities, goods and services, and according to the World Health Organization (WHO) [31], accessibility has four overlapping dimensions: (a) non-discrimination; (b) physical accessibility; (c) economical accessibility; and (d) information accessibility. On the context of persons with disabilities, the United Nations (UN) [25], indicate that accessibility enables these persons to live independently and participate fully in all aspects of life.

Usability refers how much specific persons can reach specific goals, in specific context of use [22]. This quality emerges from factors such as how effective, efficient or satisfying an artifact is for a person, a group, or an organization as a whole.

According to this two definitions, accessibility and usability are different terms, and refer to different characteristics, though some works indicate how they can be overlapped (e.g. [35]). Moreover, some researches indicate how accessibility can be considered a usability requisite, and how accessibility is not sufficient to ensure usability [35]. However, using these terms interchangeably can indicate a research inconsistency, since it is impossible to use an artifact without having access to it, or is purposeless to access an artifact without it is being useful to the person. Therefore, it is important that the researchers make clear what concept they adopt in their text, and their purpose when referring to access and use.

Approaches for Involving Persons

HCI is a discipline that focuses on actively involving persons who are often considered as clients in computing research and development cycles and provides several approaches, methods and techniques for organizing such involvement. Choosing an approach for user involvement is an essential step in a product or research life-cycle since it will indicate the moment of involvement, openness for non-designer participation, and type of activities performed during the design process. The moment of involvement usually refers to phases of the product life-cycle. The degrees of non-designer participation may vary according to each approach. Some examples include consultative participation (e.g. choosing among alternative prototypes), democratic empowerment, as proposed in the Scandinavian proposal of PD [47], and protagonist participation based on self-determination and technical expertise [23]. The type of activities and information considered during the involvement must be aligned to the chosen methods and techniques.

It is not our intent to provide an exhaustive reference to approaches for persons involvement, instead we discuss on Ladner's [23] Design for User Empowerment (DUE) approach and contrast it with other HCI-related approaches, and the considerations on how they may influence technical writing. DUE brings users to protagonism and establishes two main criteria for their involvement: self-determination and technical expertise. Ladner focuses on persons with disabilities and their involvement in the software life-cycle. Protagonism in DUE means not only being able to participate in decision-making processes as subject matter experts, as proposed by PD, it also requires persons with disabilities being those who will propose and conduct the research or development. To reach such protagonism, Ladner argues in favor of: (a) self-determination, defending that persons with disabilities should assume leadership of design teams; and (b) technical expertise, which refers to the technical competence for participation in a certain step of the product life-cycle and, consequently, having the power to solve their own accessibility problems.

UCD [22] proposes the involvement of persons that will use or be affected by a product, since they usually are not the product's developers. This approach provides methods and techniques with different styles of involvement (e.g., performing predetermined activities, exploring products), and steps in product life-cycle (e.g. requirements analysis, prototyping, evaluation). In the last decades HCI employed UCD and pushed software development out of controlled facilities to the context in which action takes place [18].

PD, in its Scandinavian original proposal, intended to promote democratic empowerment, giving "workers a decision-making role in operational planning as well as organizational and technological" [47, p. 209]. However, most of recent studies using PD are more interested in applying and proposing methods and techniques for promoting persons participation, frequently, limited to functional empowerment, defined as "a degree of power over how to execute the tasks" [47, p. 209].

DUE, UCD and PD are relevant approaches for user involvement in the development life-cycle of ICT artifacts. All of them have particularities that make them fit better, or worse,

in different contexts. For instance, DUE proposes protagonism of involved persons, while this is not a requirement for several UCD and PD methods and techniques. Furthermore, it is possible to instantiate a product development process based on PD that empowers involved persons as protagonists as long as there are both openness for adjustments in the design team and representative persons with technical expertise on product development aspects. Also, finding protagonists, as required by DUE, may be difficult in certain communities, since protagonists are required to have design skills.

TERMINOLOGY

Terminology for referring to persons with disabilities change over time and according to each community [40]. Considering this scenario, several organizations and governments publish terminology guides to write about persons with disabilities (e.g. [11, 26, 29, 43]). Based on these documents, this section will indicate current terms used on writing about persons with disabilities. The terminology exposed in this section is not definitive, and may not be considered correct in every community, however, the terms evidentiate aspects that need to be considered in writing about persons with disabilities.

Laws and official documents are examples about how terminology for writing about persons with disabilities can change over time. The original text of the Declaration on the Rights of Disabled Persons (DRDP), for example, used the term "disabled person" to refer to persons with disabilities, terminology which is currently consider inadequate in some communities, as Americans with Disabilities Act (ADA). This reveals how cultural and social context can change the usage of terms [40].

Since cultural context can define writing terms, we can observe that terminology for writing about persons with disabilities changes over location. The UK government recommends communicators to use the term "disabled people", while the ADA indicates to avoid "disabled person" and instead use "person with a disability" or "people with disabilities" [26][43]. Meanwhile People with Disability Australia Incorporated (PWDA) recommends to use "people with disability" rather than "people with disabilities" [52].

Considering these examples, we recommend authors to research the terminology each community prefers to use, bearing in mind authors location and goal on writing. Moreover, the community documents themselves indicate they are not definitive or exhaustive, and depend on the cultural and social context in which they will be applied.

Although they have differences in terminology, most of the language community documents about persons with disabilities, over different communities, emphasizes how using the correct terminology matters [26][52]. The main points addressed in most community documents are: (1) the non-victimization of persons with disabilities and avoid use the disability as a term with negative value; (2) the emphasis on the subjects' abilities, rather than their limitations; (3) respect for personal characteristics and abilities of each individual; and (4) referring first to the person and after, when necessary or relevant, to their disability [26][43] [52].

Regarding specific disabilities, we also recommend authors to look for information in each community, since some persons prefer to be identified as a member of some community, e.g. the "deaf community", in which some members prefer to be identified as Deaf with capital "D" [43]. Cases in which the researchers does not find specific terms to refer to some communities, the ADA suggest to use the recommendations contained in community documents for writing about persons with disabilities, what means refers to persons with specific disabilities as "Person with [specify disability]", e.g. "Person with Down syndrome" [29].

In order to refer to persons who do not have any disability, ADA recommends the term "People without disabilities", rather than "normal" or "healthy" [26]. Since the sense of normalization is founded in our culture and reflect a social power relationship [46], we suggest that terminology which treats persons with disabilities as abnormal should be avoided.

Considering the diverse manners of writing about persons with disabilities, and based in American and British community documents, Table 1 indicates the most accepted terms to write about persons with disabilities, and which terms to avoid. Although this table represents the compilation of some terminology guides for English-speaking countries, we recommend each author to seek the current terminology when writing about persons with disabilities, specially after understanding how that terms can change over time, community and location.

PROMOTING EMPOWERMENT THROUGH NARRATIVE

Digital inclusion is a process in which individuals and society must collaborate in order to expand the reach of benefits and challenges of ICT artifacts. Like social inclusion, it requires efforts from both the persons who are already included, and the persons who are not. Since the appropriation of ICT artifacts requires agency from users, the personal power of those being affected by ICT artifacts must be considered when making contributions towards the promotion of inclusion [40][50].

Technical writing that considers persons as equally imbued with power to make decisions on their own, who have the liberty to change their own lives regardless of abilities, disabilities and conditions, can clear misconceptions about persons and the groups they are part of [3][4]. Considering each person's power can lead to the promotion of their inclusion [48], and involving those who will be affected by ICT artifacts in development has the potential of mitigating risks inherent to introducing them to a community [42].

Historically, however, persons with disabilities are often considered as clients, who receive benefits of accessibility interventions without being expected to offer inputs about them, or to create solutions for enabling them to overcome access barriers [4][19]. In this section, we expose models for comprehending the concept of disability and how it is inserted in society, and we propose suggestions of how to avoid creating narratives that represent these persons as being unable to make decisions about how they use, and how they want to use, ICT artifacts.

The next subsections will: review models regarding persons with disabilities in society; review narrative tropes about persons with disabilities presented in mass and technical commu-

Recommended terms	Terms to avoid
Person with a disability, people with disabilities [US], disabled (people), disabled person [UK]	disabled person [US], (the) handicapped, (the) disabled, cripple, invalid [UK]
Person with [specific disability], e.g Person with autism [UK, US]	Autistic person [UK, US]
Person who uses a wheelchair [US], wheelchair user [UK]	Confined to a wheelchair, wheelchair bound [UK, US]
Person with a brain injury [UK, US]	Brain damaged, brain injury sufferer [UK, US]
Accessible restroom [US]	Disabled restroom [US]
People without disabilities [US], non-disabled [UK]	Normal, healthy, able-bodied, whole, non-disabled [US], able-bodied [UK]

Table 1: Recommended terms, and terms to avoid, in writing about persons with disabilities in British and American English.

nication; and propose suggestions for writing about persons who use accessible artifacts as empowered individuals.

Models and perspectives of Disability Studies

The way persons with disabilities are considered in society changes over time [19]. Many models and perspectives were proposed in order to understand how persons with disabilities are included, integrated, excluded, and segregated, in order to offer support in modifying how persons with disabilities are inserted in society. One such models is called the Social Model, proposed for the first time in 1975 [28].

The Social Model interprets disability as a form of oppression enacted to those whose physical conditions do not allow them to fit into industrial capitalism. Work about this model focuses on political and economic aspects to shape the meaning of disability, this model does not present disabilities as bodily phenomenons, and has limitations in representing persons with disabilities as forming their own cultures [19].

In order to comprehend how disabilities are defined in society, and how they impact and are impacted by local cultures, the Minority Model is presented by Grue [19]. This model considers disability as a form of cultural otherness, and considers persons with disabilities as being from a separate culture, which may have dissonances with the culture in the society they are in [19]. Through the lens of this model, disabilities are considered as not something to be fixed, but as something to be valued. According to Grue [19], however, this model fails in exposing material relations between persons with disabilities and society around them.

Both Social and Minority models are tied to studies in humanities, however, the field of medicine is the one with a longest lasting historical connection to disabilities [40]. This connection between disabilities and medicine has contributed to the proposal of Medical Models for comprehending persons with disabilities [19]. The Medical Models have been criticized in Disability Studies and Digital Accessibility academia, due to the fact that this positioning can reduce persons with disabilities simply to persons which have "abnormal bodies", who cannot do anything on their own unless medical science intervenes in order to "fix" them.

Currently, the medical community does not explicitly endorse the medical model. The World Health Organization currently follows the Biopsychosocial Model. This model comprehends disability not only as a bodily phenomenon, but also as a factor which impacts over how a person acts in society, and how society acts on a person. This model represents an integration of the Social Model and the Medical Model, while reinforcing that disabilities should not be treated as diseases [30]. The Biopsychosocial approach does not integrate the Minority Model, since it is still emergent, however, the position of the global community about disabilities may change over time.

Narrative tropes of representation and discourse regarding persons with disabilities

Due to historical influences of how societies consider persons with disabilities, it is not uncommon to encounter mass communication texts treating these persons as:

- Figures who compensate their disabilities by another sort of ability or artifact, forcing their way through access barriers, overcoming them and achieving impressive feats, that not even persons without disabilities could achieve without a great deal of investment or effort [19][38]; or
- Figures who are prevented from living in society due to the presence of access barriers, about which they cannot do anything without assistance from health professionals. These figures often depend on caregivers for most daily activities, and require developers to take them from this situation and remove the access barriers for them [38].

Although these tropes are widely employed in mass communication [49], and sometimes make their way into technical texts [24], neither trope is desirable for representing persons with disabilities, as both narratives consider disability as a problem that can, and must, be solved. These discourses lack the precision required to promote the empowerment of persons regardless of ability, either by overlooking the complexity of aspects that consist living in society as a person with disability [38], or by ignoring the agency each person has over their own lives, regardless of their desires, needs and abilities [19].

According to Spinuzzi [48], reducing a person to a helpless client (or a victim) without agency, that is unable to make

changes on heir own lives and work situations, is a common narrative trope in Interaction Design texts, even in texts that directly involve persons using artifacts to solve problems. This narrative considers developers of artifacts as savior figures (or heroes), attempting to improve everyone's lives by creating artifacts that persons will most certainly use and benefit from, all according to the way the designer expects them to, in order to free them from oppressive social conditions (or tyrannies).

Field work done by Spinuzzi [48], as well as other works reported by Schuler and Namioka [42], have shown that these narratives are not only unrealistic, but can also be dangerous to the persons who will use the designs, since this discourse disregards use and appropriation of technology as a bilateral process, in which both developers and persons who will use the artifacts articulate compromises that can make the users' work environment more economically viable while also potentially improving work conditions. Additionally, since Digital Inclusion is a bilateral process, it is linked to the use of ICT artifacts. The design of artifacts that seek to promote digital inclusion and not impose access barriers to persons who will use them must take into consideration how persons already solve their own problems, even if these problems are caused by other ICT artifacts, in order to propose interventions that can be appropriated by the community being worked on.

In order to promote the digital inclusion of persons with disabilities, it is therefore important to represent these persons and groups with precision. Stating concrete facts about disabilities and access barriers as they are, rather than using narrative tropes to elevate either of these facts [19][23]. Lima and Almeida [24] have exposed a set of instances of text content, from proceedings of the IHC, which did consider the agency of the persons with disabilities they were working with, or producing artifacts to, representing them as persons with power over their own lives, making decisions about whether and how to use and integrate ICT artifacts into their routines.

Suggestions towards promoting empowerment in accessibility technical literature

We reviewed the research data made publicly available by Lima and Almeida [24], which consists of a relation of text fragments from the IHC proceedings which either contain the narrative trope of victimization, or consider the personal power of users. Based on this review, we propose the following suggestions for writing about digital accessibility for the promotion of Digital Inclusion, in a way that foments the empowerment of the persons who will use the accessible ICT. These suggestions are not prescriptive, and are subject to change over time, but the examples are from papers published in previous editions of the IHC:

1. **Present developers and authors as not being the only ones able to create innovation, and not always able to anticipate the outcomes of a design**: persons who develop artifacts are not the only source of innovation. Those who use them can also create new, and often unexpected ways, to change their works and lives through the use of ICT artifacts [42][48]. For instance, while working with students with diverse degrees of abilities, Posada and Baranauskas [32] found that, when involving users directly into the production of ICT artifacts, "it was possible to identify different uses and contexts not imagined before the workshops". We suggest that users are presented as being able to change their means of working through the use of the new contributions. Every person has potential to create innovation, regardless of ability and condition, and should be represented as such;
2. **Present persons you are writing about as persons with personality**: the way each person does their activities can vary greatly depending on the person and on the organization they are in [48], in order to promote empowerment. We suggest that the people being written about should be represented as having a will of their own (e.g [1][8]);
3. **Present persons you are writing about as being inserted in a culture, occasionally different from the authors'**: we suggest that it is important to comprehend the cultural backgrounds of the persons who will be written about, in order to better understand how they can benefit from ICT artifacts, as different cultures differ in the way they interact with technology. Groups of persons with disability can sometimes develop their own identity over time (e.g. the Deaf community) [43];
4. **Present persons you are writing about as different individuals, even when they possess the same disability or condition**: even when social practices refer to a group of persons as having the same disability or condition that, while not a disability, may cause them to require accessibility resources (e.g. [16]), we suggest that it is important to clarify that each person has unique and different needs, as well as different abilities and limitations [19][50];
5. **Present life and work environments, access barriers and disabilities as they are, with as much precision as possible, and only when needed**: backing up information about disabilities and access barriers with facts and evidence can support authors in avoiding tropes of exaltation and compensation, which were previously discussed in this section. Rather than focusing at what persons cannot do due to access barriers, we suggest that the writing should be focused on what persons with disabilities are doing about their environments, and how authors seek to support them through research and development [19][23]. For instance, Borges et al. [9] have stated that not even severe motor disability can prevent persons from contributing to a design process, and focused their narrative on what the persons they worked with had done, rather than what they were kept from doing due to their disabilities.

By following this set of suggestions, we expect that authors of works about digital accessibility and inclusion define their approaches with more precision, and refer to their public whilst considering their abilities. The objective of ICT artifacts in a narrative that promotes empowerment is for them to enable persons to achieve their own goals and needs, but only according to their own will.

ACCESSIBLE DIGITAL DOCUMENTS

Promoting digital accessibility can broaden the reach of ICT artifacts towards persons who were previously excluded due

to access barriers [40]. Furthermore, the access to technical communication by persons with disabilities can lead to the empowerment of more persons with diverse abilities, disabilities, conditions and needs, as people can develop research and skills to produce contributions towards the solution of their own problems, contributions which can positively affect persons in similar situations to them [23]. Enabling persons with disabilities to read scientific texts through document accessibility, however, is not sufficient by itself. Developing accessible tools for people with diverse abilities and disabilities to produce new contributions is critical to the promotion of Digital Inclusion [12][23][40]. In this section we present approaches for the development of accessible authoring tools, as well as accessible documents.

Accessible Authoring Tools

The World Wide Web Consortium (W3C) published the Authoring Tool Accessibility Guidelines (ATAG), with the objective of promoting the creation of universally accessible artifacts which can be used to create accessible web content [37]. The ATAG is composed by eight principles, each with a varying number of guidelines: (A) the first four refer to the creation of accessible authoring tools; and (B) the last four refer to the creation of accessible content. The principles are defined as:

- A.1. "Authoring tool user interfaces follow applicable accessibility guidelines": the tools must conform to current accessibility principles for web content, as well as principles for non-web platforms that authors may need to interact with when using an authoring tool, such as operating systems and hardware. It is important to check how the operating system interacts with assistive technologies through the use of accessibility APIs;
- A.2. "Editing-views are perceivable": the tools provide alternative means for giving interaction feedback, enabling authors to perceive how their texts are rendered in multiple interfaces;
- A.3. "Editing-views are operable": some authors may be limited in the ways and speed they can operate tools. The tools must provide the authors with alternatives for input;
- A.4. "Editing-views are understandable": the tools provide support in the prevention of mistakes by authors, and provide documentation of accessibility features;
- B.1. "Fully automatic processes produce accessible content": the tools produce accessible content without the authors needing to perform any additional tasks, and the content's accessibility must be preserved through conversions in the document;
- B.2. "Authors are supported in producing accessible content": the tools enable the user to produce web content that conforms with current guidelines for web content;
- B.3. "Authors are supported in improving the accessibility of existing content": the tools provide ways for authors to check and repair accessibility problems in their documents;
- B.4. "Authoring tools promote and integrate their accessibility features": the tools have their accessibility features enabled by default, and must provide documentation on how to use these features.

Upon searching for the term "ATAG" in the ACM Digital Library and in the IEEE Xplore, we found that only nine works in these libraries currently mention the ATAG when creating contributions about accessible authoring[1]. However, the principles and guidelines remain relevant in providing developers with established directions on how to expand the reach of authoring, as well as the reach of digital documents. The ATAG provides documentation on how to implement the accessibility principles.

Universally Accessible Document Content

While authoring is quintessential for promoting the empowerment and inclusion of persons who were previously, or still are, excluded, reading is also a core activity of research and development. Conferences on Interaction Design and digital accessibility have shown interest in promoting accessibility for readers of digital documents.

Currently, copies of technical texts are available in digital format through the use of digital libraries, hence, promoting accessibility in the libraries and the documents themselves is relevant to the promotion of digital inclusion. There are many formats that are used in academia for the distribution of technical texts, such as: the Microsoft Document Format (DOC); the Portable Document Format (PDF); and the Hypertext Markup Language (HTML). The LaTeX document preparation system is widely adopted for the creation of PDF documents for technical and scientific documents.

Among the resources of instructions for document accessibility, we highlight the Web Content Accessibility Guidelines (WCAG), and the accessibility guide from the International Web for All Conference (W4A). The WCAG were published by the W3C and became the ISO/IEC 40500:2012 [21]. The WCAG present guidelines for constructing HTML and PDF documents that are accessible to a wider range of people with disabilities, including blindness and low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities, photosensitivity and combinations of these [6]. The WCAG present four normative attributes of web accessibility, which are:

- "Perceivable": user interface components must be presented in a way that can be perceived in different ways, the same information must be presented for every person that accesses a component the same way, regardless of which medium was used for output;
- "Operable": user interface can be navigated by any person, regardless of their physical and cognitive conditions;
- "Understandable": the content must be readable and predictable;
- "Robust": the content must be implemented in a way that can be interpreted by a wide range of interfaces, including assistive technologies, without loss of information from interpretation.

[1] this search conducted in april 2017

Although the WCAG were created for promoting accessibility in web content, they can still be applied in content that is not web. The W3C has published a guide on applying the guidelines to non-Web ICT artifacts [7]. However, following these guidelines during the creation of any type of artifact is not a guarantee that this artifact will be universally accessible. As new contexts of use emerge, new accessibility problems may emerge as well. For instance, in a series of accessibility evaluations by User Observation made by Power et al. [33], only half of the accessibility problems encountered were covered by the WCAG. Therefore, while it is important to follow accepted principles for accessibility, it is critical to consider and listen to the persons who will use the tools, as well as the persons who will be affected by tools, and seek to include them in the production of artifacts.

The Association for Computing Machinery Conference on Human Factors in Computing Systems (CHI) recommends that submissions should be made friendly to screen readers, and states that accessibility may become a requirement for submissions in future editions, while The International Web for All Conference (W4A) currently lists digital document accessibility as a requirement for paper submissions [13][45]. The W4A provides a guide for creating accessible DOC files [13]. According to the W4A call for papers, some elements in documents, in particular, can cause the screen reader to produce output that is difficult to comprehend, and should be priority when checked for accessibility, these elements are: document language setting; titles inside the document; figures; acronyms; and words in foreign languages.

None of the two calls for papers, however, explicitly require or recommend accessibility for persons other than those who use screen readers, as the content in submissions is presented in a visual medium. These conferences allow, however, authors to submit supplemental material that can be in other types of media. Authors can follow the WCAG in the creation of supplemental material containing video, audio or interactive media, in order to promote the accessibility of the material [2].

Finally, it is worth mentioning that accessibility guidelines, as well as techniques for creating accessible material, do change over time, as new principles emerge from society's needs, and as guidelines become inapplicable due to changes in culture [5]. Accessibility for deaf-blind persons and persons with motor disabilities, for instance, are emergent research fields in Interaction Design [12], and researchers developing for these groups may need to cover new topics to address their needs. When aiming for universal access, researchers must be cautious about changes in society, and about changes on the state-of-the-art and techniques, as new challenges, and opportunities for new research, emerge as more people seek to use artifacts.

CONCLUSION

In this paper, we reviewed current and emergent practices about writing and creating artifacts towards digital inclusion. We exposed and discussed: methods and concepts related to the accessibility and the universality of usability and design; terminology for writing about persons with disabilities; narrative tropes related to the disempowerment of persons who are targeted by ICT artifacts; and guidelines and practices for universalizing the access of knowledge and the production of text content by, and not only for, persons with disabilities.

We reviewed approaches for designing accessible artifacts, the concepts of access and use and how they intersect, and indicated the relevance to describe the approaches for involving users in development, as well as terminology for writing about persons with disabilities, in order to expose how research inconsistencies and gaps may become evident from the misappropriation of approaches and terms in papers.

Guided by previous works in the Brazilian Symposium of Human Factors in Computing systems, we proposed a set of suggestions for writing about ICT artifacts toward digital inclusion, suggesting ways for future authors of accessibility research papers to portray users and designers with more precision and define their roles realistically, rather than considering users as being unable to do anything about their own situations.

We also exposed current guidelines for creating ICT interventions according to the principles of the Universal Accessibility, which, as we discussed, is not the only path towards Digital Inclusion, but is relevant to the point of being an international standard.

We expect that this work helps clear some of the doubts researchers and developers might have when considering the empowerment of persons who they will target with their work, so that more artifacts are created not to save their public from the wrongs of our society, but to support each person on participating in society the way they desire, and to do their work and activities as they deem best. Considering the empowerment of every person, and creating environments where each person's individuality is considered, is an important step towards the goal of social inclusion in our society. The HCI community, as a whole, can help towards this step, starting by changing how we report our studies.

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