

Understanding Web Accessibility and Its Drivers

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ABSTRACT

Access is what the web is ‘about’, it is the motivation behind its creation, and it is the rationale behind HTML. The desire to provide all users at CERN with the ability to access all documents was Tim Berners-Lee’s primary goal, and this goal must also be carried through to equal access for all users. But this equality of access – accessibility – is difficult to quantify, define, or agree upon. In a constantly evolving field, understanding each other can be tricky; indeed, there are many different definitions in the literature, all with a different perspective. This makes it difficult for our community to interact, reach agreement, or share understanding. What is more, it makes it very difficult for those outside the web accessibility community to understand, plan, budget, enact policy, or conform to accessibility requirements and legislation when the community itself has so many, in some cases, conflicting definitions. We asked over 300 people, with an interest in accessibility, to discuss their views and definitions in an attempt to harmonise our understanding and support the expectations of users outside the community. We find that misunderstanding accessibility definitions, language, and terms might cause tension between different groups. That social, and not economic, aspects drive our perspectives of accessibility, and that definitions used by standards and regulatory bodies are most accepted - not those of individual experts. Forcing accessibility adoption does not encourage the acceptance of an accessibility ethos, but providing empirical evidence that accessibility benefits all, does. Finally, realistic and concise language was preferred when attempting to communicate, or define accessibility.

Categories and Subject Descriptors

H.5.2 [Information Interfaces and Presentation]: User Interfaces—*Evaluation/methodology, input devices and strategies, user-centred design, interaction styles*; K.4.2 [Computers and Society]: Social Issues—*Handicapped persons/special needs, assistive technologies for persons with disabilities*

General Terms

Human Factors, Experimentation

Keywords

Web accessibility, usability, definition, user experience

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1. INTRODUCTION

Access to CERN’s vast document store, by everyone, at any time, and on any machine was the motivator for Tim Berners-Lee’s creation of, what has come to be known as, the World Wide Web (web). Research extending this ethos of access to disabled users has likewise been present from the early days of the web’s creation. However, as is often the case with fast moving, evolving, nascent domains, it has been hard to gain a common agreement on the nature and scope of web accessibility. This inability to reach agreement has, and still is, causing problems both inside and outside the web accessibility community; without a common understanding, how can we talk cohesively about any subject, especially one as important and socio-technically complex as web accessibility?

There are many definitions of web accessibility each with a different scope and nature [1, 18, 20, 22]. Some of these definitions are user centred, some refer to different levels of interaction, some refer to equal access, some specifically refer to disabled people, some refer to all people and some others focus on ‘usability’ properties such as effectiveness, satisfaction and efficiency (see Table 1).

There are also different views on the relationship between accessibility and usability [16], a relationship which can be seen in different ways: 1. accessibility and usability problems are two distinct, nonintersecting sets of problems, meaning people with disabilities and people without disabilities experience different sets of problems [16]; 2. accessibility problems might be a subset of usability problems [20]; 3. both usability and accessibility problems are encompassed by “universal usability”, meaning that the traditional scope of usability can be expanded to also address problems experienced by disabled people [17]. Even though research [16] has provided us with some insights into the relationship, we still do not have no clear understanding. Similarly, we also do not know how web accessibility relates to with recent developments in User Experience (UX) [12].

It has also been observed that people without disabilities [23] and older people [3] experience similar difficulties to people with disabilities. Some research suggests that it is appropriate to extend accessibility from a strict view, where it is bound to people with disabilities [22, 18] only, to a more general one encompassing problems created by technology, environment, and the context of use¹ [24].

Another widely discussed matter is the importance of evaluating web pages for their accessibility support [4]. There has been a significant amount of research on web accessibility evaluation [2], especially with regard to the automation of the evaluation process [11, 21]. However, it is not clear to what extent different accessibility evaluation methods affect the notion of accessibility or whether

¹<http://www.w3.org/WAI/bcase/Overview.html>

web accessibility needs to be evaluated by orchestrating different techniques, for instance conducting user evaluations in combination with automated tools and some informal measures [5].

If we consider these different views of web accessibility, we see that there are many questions to be answered: what is the relationship between web accessibility and usability? Is web accessibility for all or is it strictly for disabled people? What kind of evaluation methods, ethos, and rationale are key? How important is context for web accessibility? Investigating these questions will help us to:

1. guide and help in better teaching web accessibility by solidifying ideas, concepts, and language into a more solid bedrock of understanding;
2. better communicate the meaning of the concept to people who are not in the field, and thereby making communication with the wider community, companies, and governments more harmonious and insightful;
3. advance web accessibility as a research field by providing a shared understanding, grammar, and lexicons;
4. improve penetration of web accessibility into commercial and industrial settings by harmonising the language and therefore the expectations of companies with regard to planning, budgeting, enacting policy, or conforming to accessibility requirements and legislation.

To investigate the questions stated above, we conducted a survey which is presented in detail in the following sections. This survey is inspired by a similar works conducted to better understand the scope and nature of both the UX [12] and the usability [10] domains. Our work takes a generic approach, much like the UX work; and focuses on a survey of 100 experienced² and 200 non-experienced web accessibility people.

2. THE SURVEY

The overall goal of this survey was to promote active discussions on the nature of web accessibility involving a heterogeneous group of people, and thereby potentially leading to a shared definition of web accessibility.

Questionnaire

The questionnaire used in the survey consists of an information sheet explaining the goals and rights of the respondents, followed by three sets of questions: 1) demographics, 2) definitions and 3) statements. These questions were organised into three parts in this given order.

Part 1: respondents were asked to provide some *demographics* information which include gender, age, country, work, role, education, specialisation and interest. There were also questions about the percentage of work hours per week they dedicate to web accessibility and the number of years they have been working in web accessibility.

Part 2: in the *definitions* section, respondents were asked to rank five definitions listed in Table 1. There are so many different web accessibility definitions [22, 1, 20, 14, 6, 13, 16, 8, 4, 7, 15, 19, 18] and in order to choose the definitions to be investigated in the survey, we first systematically collected as many definitions as possible and then chose five definitions to be investigated. To collect definitions, we performed a literature review on published books and published research literature; we checked the definitions used by legislation or standardisation bodies and we also checked the definitions used by the well established web accessibility experts. Then, by consensus among the four authors, we chose five defi-

²We see experience – expertise if you will – as a function of specialization and time; and expand more upon this in § 3.

D1	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 [22].
D2	Technology is accessible if it can be used as effectively by people with disabilities as by those without [1].
D3	The extent to which a product website can be used by specified users with specified disabilities to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use [18].
D4	A website is accessible if it is effective, efficient and satisfactory for more people in more situations [20].
D5	The removal of all technical barriers to effective interaction.

Table 1: Five definitions of web accessibility.

nitions representing views from those technically oriented, to predominantly those with a social orientation.

In the survey, after the respondents ranked these five definitions, they were asked to specify what they liked and did not like about each definition. Finally, the respondents were asked to provide their own definition if they did not like any of the provided ones.

Part 3: the last section included a number of web accessibility *statements* and respondents were asked to rate these statements. They were asked to rate them with five point Likert scale (strongly agree - strongly disagree). There were 32 statements which were specifically included to investigate the following: the relationship between accessibility and usability, accessibility for all vs for disabled people, web accessibility vs user experience, inclusion vs exclusion, marketing, legislation, standardisation, user-centred design, context and web accessibility evaluation statements. These statements were gathered from web accessibility literature and from our experience. Due to space limitations, in this paper we focus on parts 1 and 2.

Survey Administration and Response

This survey was implemented using SurveyGizmo³. The survey was conducted for a month between August to September, 2011. The call for participation was distributed in a number of web accessibility related mailing lists which include W3C WAI IG⁴, Mozilla web accessibility, CHI announcements, SIGACCESS announcements, WEBAIM mailing lists and also sent to personal contacts and groups working on web accessibility. 1,186 people accessed the survey and 379 of them completed the survey.

Research Questions

In this paper, we focus on the data related to accessibility motivations and definitions, and we particularly ask the following questions:

- Does age have an effect on the view of web accessibility?
- Do people from different country have different view of web accessibility?
- Does work (industry/academia/governmental organisation/) have an effect on the view of accessibility?
- Does role (researcher/consultant/manager/practitioner/student) have an effect on the view of accessibility?

³<http://www.surveygizmo.com/s3/599408/Web-Accessibility-Survey>

⁴<http://lists.w3.org/Archives/Public/w3c-wai-ig/2011JulSep/0102.html>

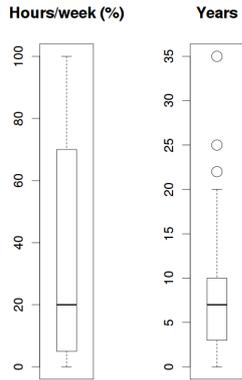


Figure 1: Boxplot of distribution of accessibility efforts.

- Does education background (computer science/rehabilitation engineering/medical science/social science/other science and engineering/psychology/art/design) have an effect on the view of accessibility?
- Does specialisation (HCI specialist/software engineer/computer scientist/designer/rehabilitation engineer/web accessibility expert/artist/social scientist) have an effect on the view of accessibility?
- Does interest (be ethical/be inclusive/comply with law/design for mobile web/design for better products/forced to do it/interested in research challenges/increase revenue/optimize for search engine) have an effect on the view of accessibility?
- Does experience affect the view on accessibility?
- Which definition is the most widely accepted?

3. RESULTS

From this survey, we received 379 responses; 75 of them (about 20%) lacked demographic information and were removed; other four of them lacked responses on definitions and accessibility statements ranking, and were likewise removed.

Of the 300 valid responses that were retained and analyzed, 119 (40%) came from females; 8 (3%) from individuals aged between 18 and 24, 96 (32%) from the 25-34 age group, 143 (48%) from the 35-54 group, and 53 (18%) from people aged 55 or more. Table 2 shows the distribution of country, work sector, education and specialization areas of respondents.

Two questions concern the amount of accessibility work people do (“what percentage of your work hours you dedicate to web accessibility?” and “how many years have you been working in web accessibility?”). Figure 1 shows that half of the respondents devote to web accessibility at least 20% of their week-hours, that they worked at least for 7 years in the web accessibility field; it also shows that half of the respondents spend between 5 and 70% of their week-hours working on accessibility, and that they worked between 3 and 10 years. Some of them are not working on accessibility, while others spend their entire time in accessibility and have been working on accessibility since 35 years.

Should we consider as experts the individuals that are above the medians for both variables, then we get exactly 100 “experts” and 200 “non-experts”. Fifty two “experts” (52%) declared to be web accessibility experts (as specialization), and among web accessi-

bility experts 56% are classified as “experts”. Thus we see that characterizing expertise with respect to the time people spend or spent on accessibility does not match with their perception of being experts.

Respondents are also grouped according to their technical background; as a result, they are characterized as being technical (262 - %87), non-technical (29 - %10), and other (9 - %3).

Interest

The motivation for being involved with web accessibility for 139 people (46%) is “being inclusive”, followed by “design better product” (62, 21%), “research challenges” (35, 12%), “be ethical” (28, 9%), “comply with law” (17, 6%) and a few others.

Across different specializations, web accessibility experts (93) and HCI specialists (70) show a similar pattern: in both cases 49% declare interest in being inclusive, followed by designing better products (19 vs 21%) and research challenges (10 vs 17%). Also software engineers (32) and designers (28) are similar: designing better products (28 vs 36%), being inclusive (22 vs 36%) and being ethical (13 vs 7%). Other specializations are more unrelated.

Both technical and non-technical specialists declare being inclusive as their main interest (41 vs 47%), followed by designing better products (21 vs 17%) and being interested in research challenges (11 vs 14%). Non-technical people appear to be slightly more interested in complying with law (10 vs 5%); conversely, technical people slightly more interested in being ethical (10 vs 7%).

When we group interests according to education we see that business people are mostly interested on being inclusive (70%), while research challenges motivate mainly computer scientists (57%).

If we group respondents by role, then there is little difference between consultants (82), practitioners (81) and managers (30): 46 vs 44 vs 40% are interested in being inclusive, 26 vs 23 vs 27% in designing better products, 12 vs 10 vs 20% in being ethical. Researchers (79) differ because after interest in being inclusive (48%), the second most frequent choice is research challenges (29%), followed by designing better products (14%). Only 6 people (out of 300) stated that they are interested in web accessibility because of designing for the mobile web.

Compared to consultants, managers, practitioners, designers and developers, researchers appeared to be the least interested in being ethical, as can be seen in Figure 2. If we analyse the data by work, being inclusive leads the motivation of all significant groups: government (61%), NGO (50%), academia (45%) and industry (42%). As of the second motivation to adopt accessibility, 33% in industry and 16% in NGOs are lead by designing better products, while 29% in academia do it because of the research challenges involved. Being ethical is also more frequent for people working in government (26%), NGOs (16%) and industry (10%) than academia (1%). Complying with law is highest for NGOs (9%) and accounts for less than 6% for the other categories.

Definitions

We asked respondents to rank (1 to 5, 1 being the most important) 5 web accessibility definitions, which are given in Table 1.

Overall, D1 was ranked #1 by 99 (45%) of respondents, followed by D2 (69, 32%), D4 (22, 10%), D5 (20, 9%) and D3 (18, 9%). Conversely, D5 was ranked #5 by 84 (39%) respondents, followed by D3 (64, 30%), D4 (35, 16%), D2 and D1 (14, 7%). Figure 3 provides a visual comparison.

D1 & D2 are preferred regardless of age.

Across the three categories of “less than 35”, “35-54” and “55 or

Country			Work			Education			Specialisation		
USA	146	%49	industry	120	40%	comp. science	115	38%	web accessibility	93	31%
Canada	23	%8	academia	100	33%	social sciences	62	21%	HCI	70	23%
Europe	96	%32	consultants	82	27%	othr sci. and eng.	55	18%	software eng.	32	11%
Australia	16	%5	practitioners	81	27%	psychology	14	5%	design	28	9%
Others: (Algeria, Antigua, Argentina, Brazil, China, Ecuador, India, Is- rael, Mexico, New Zealand and South Korea)	18	%6	researchers	79	26%	design	13	4%	computer sci.	22	7%
			gov. agencies	38	13%				business	12	4%
			NGOs	32	11%				UX	10	3%
			managers	30	10%						

Table 2: Country, work, education and specialisation data.

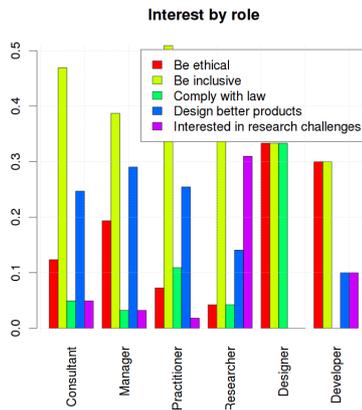


Figure 2: Relative frequency of different motivations for involvement with web accessibility across different work roles and different areas.

more” years old, there is no substantial difference in the relative number of times that rank #1 was assigned to definitions D1 and D2 (between 41% and 49% for D1, 29% and 37% for D2). Among the other definitions, D5 was preferred by people in the middle category (for the three categories, percentages are 4, 13, 8%), D4 was preferred by older people (5, 8, 12%), and D3 was preferred by younger people (14, 10, 4%).

D1 & D2 are preferred regardless of participants country.

Regarding countries, the fraction of rank #1 of D1 is highest everywhere. In particular, in the US it is 41% (out of 112 ranks given to D1), in Europe it is 39% (out of 66) and elsewhere it is 68% (out of 40) — see Figure 4. It is remarkable that D2, a definition that is referred to by the US regulation Section 508, is deemed equally important both in Europe and in the US, and much less important in other countries. D2 features a low support outside Europe and the USA.

D1 is preferred across work sectors, and regardless of profession.

On the basis of the four most frequent work areas (industry, academia, government, NGOs), the frequency of rank #1 is consistently highest for D1 (namely, 44%, 38%, 53% and 56%, respectively). D2 consistently holds the second place (37%, 30%, 22% and 36%). NGOs are the most judgmental in the sense that D3 and D4 were never ranked #1, whereas in academia no definition received a fraction of rank=1 less than 10%. The relative difference between D1 and D2 is highest for people working in government (D1=53% and D2=22%, a spread of 31 points); in other cases the differences are

7% (industry), 8% (academia), 20% (NGOs).

For the most popular work roles (consultant, 82; practitioner, 81; researcher, 79; and manager, 30), D1 again is the preferred one by everybody (53%, 42%, 36% and 43%), followed by D2 (37%, 33%, 31% and 30%). Definitions that seldom reach rank #1 are D3 and D4 for consultants (5%), D3 for practitioners (6%), D5 for researchers (7%) and D4 for managers (5%). For consultants the least preferred definitions (those with a highest number of rank #5) are D4 (30%) and D3 (28%); for practitioners D4 (42%), for researchers D5 (46%) and D3 (32%), and for managers D4 (32%).

D1 is preferred by those with a scientific/technical education.

Across education types, psychologists (14 of them), designers (13) and business people (10) rank D2 as #1 more frequently than other definitions (54%, 50% and 50%, respectively). For computer scientists (115), social scientists (62) and people that got a scientific/technical education (“other sciences and engineering”, 55) D1

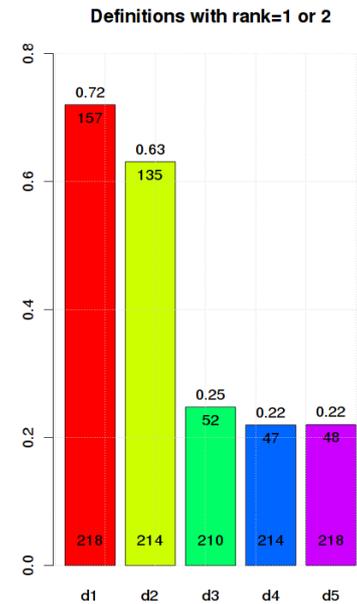


Figure 3: Relative number of times a definition was ranked as #1 or #2; the number at the bottom is the total number of ranks that we collected for a definition, the whole number at the top is the number of times that the definition got position 1 or 2, and the fractional number is the ratio.

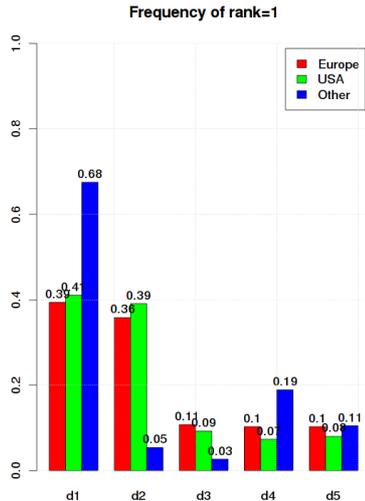


Figure 4: Relative number of times a definition was ranked as #1 across different geographical areas.

is the definition that was ranked #1 most often: 50%, 42%, 49%, respectively. The least preferred definition for computer scientists is D4 (40% of the time it is ranked as #5); for social scientists it is also D4 (38%); for other sciences it is D5 (30%); for psychologists it is D4 (58%); for designers D4 (40%) and for businessmen it is both D4 and D5 (29%).

Regarding specialization areas (namely web accessibility (93), HCI (70), software engineering (32), design (28), computer science (22), business (12) and UX (10)), web accessibility experts, HCI experts, software engineers, computer scientists and businessmen preferred D1 (*i.e.*, they gave to D1 the rank #1 more frequently than other definitions; 54%, 41%, 63%, 56%, 48% respectively). Designers and UX specialists preferred D2 (56% and 62%). The least preferred definitions for web accessibility specialists is D5 (in 40% of times it received rank #5), similarly to HCI specialists (43%) and to software engineers (50%). For designers all three D3, D4 and D5 were deemed equally unpreferred (about 28%); for computer scientists it is D5 again (47%); for business specialists it is D4 (50%), whereas for UX specialists D4 and D5 reach the same level (38%).

When distinguishing between technical and non-technical specializations (262 and 29 cases, respectively), we see that D1 is the definition with the highest relative number of ranks #1 for technical specialists (48%, compared to D2 reaching 32%). For non-technical specialists the difference between D1 and D2 is small (35% vs 33%). The least preferred definition for technical specialists is D5 (41% of rank #5, followed by D3 with 30%); for non-technical specialists D3, D4 and D5 all are between 28 and 30%.

Expertise, characterized on the basis of hours/week and years spent on web accessibility, does not affect which definition is most often ranked #1; in fact, D1 and D2 are in first and second place with similar percentages (45 and 46% for D1, 31 and 36% for D2).

D1 preferred by those motivated by legislation and inclusion, D2 by those motivated by ethics and research challenges.

When crossing interests in web accessibility with importance of

definitions, we see that D1 is most often ranked as #1 by people motivated by being inclusive (52%) and by people who want to comply with law (54%). Conversely, people motivated by being ethical and research challenges prefer D2 (50% and 44%). Those who aim at better products are equally distributed between D1 and D2 (31%). The least preferred definition by people motivated by being ethical are D3 and D4 (33 and 32%); by those motivated by being inclusive D5 (43%); by those motivated by producing better products D3 (50%); by those motivated by compliance with law D3 and D4 (31%) and finally by those motivated by research challenges D5 (50%).

Qualitative opinions varied.

When respondent ranked definitions, they were also asked to provide their own positive and negative comments on each of them. In order to systematically analyse these comments, we have labelled each of them with the overall message they were trying to convey. We then counted these labels and Table 3 shows the top three comments about each of these definitions as well as the overall number or positive and negative comments.

Regarding D1, 17 respondents agreed it was good that this definition refers to different levels of interaction. One respondent said “I like this as it explains all the ways that we interact online - perceiving, understanding and navigating and also creating content”. On the other hand, 51 respondents said that it is too specific to people with disabilities. For instance, one comment was “I don’t like this because it is specific to people with disabilities. Yes, considering people with disabilities is a large component...but it is not restricted to that set. This definition is too narrow”.

For D2, 20 mentioned “equal access” as a positive aspect; one indicated “I like this because it directly speaks to the aspect of equal access for people with disabilities”. Conversely, 13 did not like that it differentiates people with and without disabilities, for instance one respondent said “disabilities derive from the particular situation a person is in, they are not necessarily permanent, so I don’t like the distinction between people that have and people that does not have them”.

Three respondents like that D3 explicitly talks about effectiveness, efficiency and satisfaction. One said “I like this definition the most because it takes under account effectiveness, efficiency and satisfaction within specific context of use and by specific groups of people. You cannot have a website/product totally accessible by all people in all contexts of use. This definition gives the foundation for specifying the limits of minimum acceptable accessibility. This way web accessibility can become more specific, realistic and effective in its enforcement”. However, 28 people said that in D3 there are too many “specified”. One said “the specified specified specified. Sounds limiting and designed to help lawyers argue that any given case isn’t important, which is an impression that doesn’t inspire trust”.

A positive aspect of D4 is that it is inclusive (12 respondents). One said “I like that it is inclusive in that it refers to ‘more’ people rather than ‘disabled’ people”. However, 88 respondents found the term ‘more people more situations’ too vague; one respondent said that “More than what? It could be ‘more’ accessible than before some change, and nevertheless have poor accessibility”.

Finally, nine respondents liked that D5 is a simple definition. One respondent said that “It’s the simplest, yet closest to complete”. However, 70 respondents found the term ‘technical barriers’ ambiguous. For example, one participant said “Not all of the ‘barriers’ affecting accessibility are ‘technical’”, another participant said “Technical barriers needs to be defined”, another said “technical barriers is too broad”.

Definition 1

<i>Positive</i>	<i>101</i>	<i>Negative</i>	<i>115</i>
Includes different levels of interaction	17	Too specific to people with disabilities	51
Contribution aspect	10	Too Long	26
Covers authoring	9	Too wordy	9

Definition 2

<i>Positive</i>	<i>107</i>	<i>Negative</i>	<i>86</i>
Equal access	20	Differentiates people with and without disabilities	13
Simple	17	Too specific to people with disabilities	10
Clear	10	Utopic	10

Definition 3

<i>Positive</i>	<i>17</i>	<i>Negative</i>	<i>143</i>
Use of effectiveness, efficiency and satisfaction	3	Too many "specified"	28
Inclusive	2	Too wordy	13
Realistic	2	Too long	11

Definition 4

<i>Positive</i>	<i>54</i>	<i>Negative</i>	<i>134</i>
Inclusive	12	More people in more situations	61
Is not specific to people with disabilities	6	Vague	27
Simple	6	Does not mention people with disabilities	7

Definition 5

<i>Positive</i>	<i>49</i>	<i>Negative</i>	<i>178</i>
Simple	9	Technical barriers, ambiguous term	62
Short	8	Too vague	8
Clear	6	Removing all barriers, not achievable	7

Table 3: Most popular comments for definitions (see Table 1).

4. DISCUSSION

The primary motivation of our respondents to embrace web accessibility was "being inclusive", which was not surprising. However, it was interesting to see very few respondents who specified their motivation in web accessibility as "design for mobile web" (only 6 people) and "increase revenue" (3 people), and nobody chose "optimise for search engine" as their motivation. We thought it is widely known that these are very important benefits of web accessibility in the broader context [9]. The main interest of respondents relies by far on social factors: "being inclusive" and "be ethical" account for 55% of the responses. Then, technical aspects follow although respondents' preferences are pretty unbalanced. Finally, legal and especially financial factors do not incentive the interest for accessibility, which is rather surprising considering the effort made by standardization bodies and the community to emphasize these aspects. This probably shows us that as web accessibility community we are not good at promoting these important benefits which can encourage people make their sites accessible. Although this result could be because of our respondents general profile or because we did not target the right group of people, in any case we believe this shows us we have to do better in promoting these important benefits of web accessibility.

"Designing better products" is the principal reason why engineers embrace accessibility principle but "being inclusive" is still the principle reason for technical people as a whole.

When we look at the relationship between specialisation and interest, it was not surprising to see that web accessibility and HCI people have similar patterns of interest, in that most of them (49%) are driven by social issues. In the case of software engineers and designers this figure abruptly drops 27 and 13 percentage points

respectively. "Designing better products" is the principal reason why engineers embrace accessibility, while in the case of designers, there is no prevailing interest as technical and social focus hold it equally. Therefore, it is interesting to see that even though software engineers and designers are mainly product focused and are interested in designing better products, they are still aim at being inclusive. Similarly, when we regroup specialisations as technical and non-technical, we see that majority of the technical people still think "being inclusive" is their main motivation. Even though there is a general belief that technical people do not know much about web accessibility, this finding shows that they are aware of its social impact and are mainly driven by the importance of being inclusive. The data also shows that very few people are forced to do web accessibility; in fact, only very few designers are forced to do it. Therefore, this suggests that currently, enforcing the law is not the main motivation of our respondents to embrace web accessibility or, maybe it is hidden behind more politically correct statements. Again, our data also shows that very few people across different specialisations are interested in the increasing revenue and in the financial aspects that accessibility can potentially bring about.

Inclusion and social issues are key across all types of participants.

When we considered "education" aspect, we expected to see that people with business background would be more interested in increasing revenues. However, we again see that they are also interested in being inclusive, and none of them indicated that they are interested in increasing revenues. This could again be because of several reasons: 1. people think ensuring web accessibility is another cost instead of a factor that they can invest in and expect a return on; 2. our respondents were not that kind of people with business education; 3. perhaps the existing case studies⁵ are not persuasive enough to adopt accessibility or 4. instead, the community has failed to put these benefits across, and 5. finally, even if business aspects are also considered, the social focus prevails over remaining aspects.

When we look at the role and interest, our data show that a majority of consultants, practitioners, managers and researchers agree on their main motivation to be the social aspect of accessibility (inclusion and ethical reasons), which accounts for the 52-60% of their responses. Researchers are the least interested in being ethical although this is counterbalanced with their strong interest in inclusion. These figures are followed by 23-27% who answered that designing better products was their foremost reason among the above mentioned roles but researchers. It is surprising too see how managers or consultants are concerned about product quality not only from a managerial or requirements analysis perspective but also from the role that accessibility may play on such quality. Almost 1 out of 3 researchers indicated that their primary motivation is the research challenges posed by web accessibility. This can be explained in two non-exclusive ways: 1. the output of research can benefit the society as well as researchers themselves in terms of reputation, career prospects or salary; 2. technical issues faced by the researcher are exciting, challenging and fulfilling and its social implications are relegated to the background. In any case, there is a personal and perhaps selfish motivation (backed by the low interest raised by ethical issues) for researchers and this makes research challenges to be more important than designing good products, which decreases 10 percentage points compared to the preferences of the consultants, practitioners and managers.

⁵<http://www.w3.org/WAI/bcase/resources#cases>

Social responsibility prevails over legal compliance, even for businesses.

When we look at the sector people work in (industry, academia, governmental organisation and non-governmental organisation) and their interest, we were also surprised to see that complying with law is quite low in industry and governmental organisations. We expected to see that complying with law would be one of the important reasons for people in industry and government to work on web accessibility. It is again the social focus the one that prevails: being inclusive jointly with being ethical promotes accessibility to the larger extent. The important role that designing better products and research challenges play in industry and academia respectively should also be considered. This again raises a lot of questions about the success of forcing the law to ensure web accessibility.

4.1 On Definitions

The five definitions used in the survey (Table 1) show fundamental differences: D1 and D3 specifically focus on people with disabilities, while D2, D4 and D5 target all users; D5 has a strong technical perspective; D3 and D4 explicitly refer to efficiency, satisfaction and effectiveness, which are the three major usability metrics; effectiveness is also mentioned by D2. When we look at the comments given for these definitions and think about what people liked and disliked about these definitions, we can see some common ideas on web accessibility.

Definitions should not just include disabled users.

Some people prefer a definition that is not specific to disabled people. Both D1 and D3 are criticised that they are both specific to disabled people. For D1, one said “accessibility is not limited to ‘disabilities’, as this segregates the purpose of accessibility from the mainstream; and accessibility should be defined in terms of enabling all people”. Similarly for D3, one said “I don’t like again the focus on PWD leaving out situationally impaired users”. Additionally, some do not like making a distinction between people with disabilities and those without them. For D2, one respondent stated that the definition was “focused on disability, which I dislike”. Therefore, some people dislike defining accessibility focusing on people with disabilities no matter if the needs of those without disabilities are also addressed (as D2 does). So it is not the absence of considering remaining users but the distinction made between types of users which is controversial. This is supported by 13 negative comments for D2 in this regard. There is some contradictory information though. We can see from comments given to D4 (negative comment, “does not mention people with disabilities”) and mainly from the support received by D1 that some people prefer to see that disabilities are mentioned explicitly in a definition. However, it seems that more people will argue about a focus on people with disabilities (51 in D1) than arguing about its absence (7 in D4). There is also a general feel that they would like to see the context of accessibility expanded to people who do experience situational impairments. All the above should be considered if we aim at building a definition that would get a higher level of consensus.

Definitions should refer to different levels of interaction.

People like a definition that refers to different levels of interaction. D1 is the only one that achieves this and a positive comment, amongst many others was “specifies behaviours that must be enabled”. Similarly, some people prefer a definition that takes into account the user contribution aspect of web interaction. D1 is the only definition that takes into account and one positive comment for D1 was “Like: includes ‘contributing’ not just ‘using’”.

Achievable and realistic definitions are preferred.

Some people also want to see a definition that is achievable, realistic and is not utopic. For example, D2 and D5 received negative comments about this. For D2, one said “this statement seems like an impossibility” and another respondent said “unrealistic and would be a failure”. Similar comments were made for D5, for example one said “Too absolutist and utopian and therefore demotivating” and another said “It’s impossible to implement”.

Simple and clear definitions are preferred.

Some respondents claim for simple, clear and not too long definitions: there were 35 negative comments in this regard for D1 and 24 for D3; on the other hand, there was a clear preference for these features in D2, D4 and D5. Sixth, there are some complains, especially for D4 and D5, about being ambiguous or vague. This suggests that people prefer a concise definition for web accessibility.

Accessibility should not be an afterthought.

Finally, people do not want to see a definition that gives the impression that accessibility is an afterthought. Regarding this, some negative comments were given for D5. Among the five definitions, D5 is the only one that talks about removal of technical barriers, and as can be seen from the comments, many people did not like this. They did not like the fact that it has the term “removal” which can potentially sound that web accessibility is an afterthought process. People would like to see that web accessibility is considered from the beginning. For example, for D5 one said “The removal of all technical barriers” makes it sound as if something is designed already and then your having to go back to fix something that’s already been designed, the hope/goal is to design all things with web accessibility in mind from the get go”.

Definition #1 is our clear winner.

When we look at the popularity aspect of these definitions, we can see that D1 is the clear winner. The strong points of D1 are its wide coverage of all the interaction aspects and the active role of users. For the majority D1 is the best definition among all followed by D2; the remaining definitions are not that popular as none of them reaches over a 10%. One of the strengths of D1 and D2 is their low number of detractors: only a 7% of respondents considered D1 and D2 the worst definitions; the tie is broken by D2 as it gets the lower number of negative comments (86) compared to D1 (115). In any case, we think that the success of D1 can be attributed to the fact that a number of national policies on web accessibility are based on WCAG guidelines and that W3C WAI is doing a good job at publicising web accessibility.

When we consider the originating country of these definitions, we were expecting to see that D2 were more popular in the US and D1 in Europe because of familiarity reasons; however, our data suggests that it is not the case, as respondents from Europe and the US show a very similar profile with almost equal preference of around 40% for D1 and D2. This probably can be attributed to the global nature of the Web, to the pioneering work of Section 508 in promoting inclusion not only in the US but also elsewhere and to the success of W3C WAI promoting web accessibility across all countries. This last statement is supported by the fact that the vast majority of respondents who do not belong to Europe or the US showed their preference for D1. This group of respondents shifts the balance towards D1.

As far as the relationship of respondents’ age group is concerned, there is no age effect as the three groups prefer D1 and to the lesser extent D2. Similarly, expertise does not play a role.

D1 is the principal choice over all work areas, but the gap between D1 & D2 widens for NGOs.

Work areas again repeat the general pattern of ranking D1 and D2 above the rest of definitions; D1 is the principal choice of respondents belonging to academia, government, NGOs and industry. As mentioned, ranks for D1 and D2 in academia and industry are quite close (the distance is between 7 and 8 percentage points). In contrast, the gap between D1 and D2 widens for NGOs (20 percentage points) and especially for those working in government (31 percentage points); this highlights the reliance that these institutions have on standardization bodies. Hence, we can say that people working for NGOs and government lean towards a comprehensive definition that explicitly depicts people with disabilities and their interaction needs. This understanding about web accessibility in D1 prevails over the equal access notion in D2, whereas people in industry and academia are mainly divided between D1 and D2. The null interest in D3 and D4 by NGOs may reflect the lack of acceptance of defining accessibility in terms of usability qualities, as opposed to the support shown by 21% and 27% of respondents working for governments and in academia respectively. Some tensions may arise when these sort of issues are discussed between people belonging to the mentioned groups. For instance, the way web accessibility should be tested can be controversial if academics and people working on charities try to reach a consensus in this regards. Academics can meet strong opposition if procedures used in usability testing are suggested to test accessibility.

Work roles do not show variance in the rankings, D1 is still #1.

Regarding work roles (consultant, practitioner, researcher and manager) a similar pattern is again shown in their answers: D1 prevails over D2 and the remaining definitions get comparatively a quite low number of hits. The largest distance between D1 and D2 is shown by consultants (16 percentage points) where more than a half of them prefer D1, which leads to us to the belief that standards play an important role in companies dealing with accessibility; on the other hand, researchers narrow the gap to 7 points. Again, researchers hold disparate opinions on accessibility and their level of agreement is lower. When it comes to remaining definitions, those related to usability qualities are not successful at all for consultants and managers (10% and 14% respectively) while researchers and practitioners account for 32% and 21%. We suggest that understanding (and therefore assessing and measuring) accessibility in terms of usability qualities has permeated to a certain extent into those (researchers and practitioners) that are closer to the phenomena of accessibility and have to deal with it (and fix it). Consultants and managers, even if knowledgeable, may have a distant relationship with these issues and prefer more traditional definitions. This might have implications as some frictions may arise within companies where consultants and practitioners are members of the same team. In any case, this has nothing to do with having a technical background as our data suggests that 26% of those who are non-technical prefer D3 and D4; 19% of respondents with a technical background prefer these definitions; a majority of them also leans towards D1 while non-technical respondents are equally split between D1 and D2.

Engineers prefer D1, most others prefer D2.

When we look at education, we see that people who are not educated in the areas related to computer science (business, psychology and design) prefer D2, whereas people who studied subjects related to engineering prefer D1. We think this is mainly because they are more likely to be familiar with the W3C's work and there-

fore they are better exposed to WAI's work. If we pay attention to just D1 and D2, we observe that those having a business and social sciences education do not have a prevailing preference as the gap between them is not larger than 7 percentage points. On the other hand, some education backgrounds are more assertive about definitions: the D1-D2 distance reaches 46 points in favour of D2 in the case of psychologists and 33 in the case of HCI and rehabilitation supporting D1. In some cases, the second best definition are neither D1 or D2 but D4, as is the case for the 33% of respondents with a rehabilitation background; and D3 and D4 with a support of 17% each by psychologists. It seems that psychologists dislike the definition of the WAI (only 8% of support) and lean more towards a usability oriented definition (D3+D4 gets 34%). Similarly, rehabilitation people show the same enthusiasm for the usability scented definition (D4 with 33% is their second best choice) and relegate D2 to the background. Note that people with a HCI education do not support the consideration of accessibility in usability terms (D3 and D4 get no hits). These data may suggest that respondents from rehabilitation and psychology believe there is an overlap between accessibility and usability (or even consider them the same quality), while those with an HCI education think that accessibility and usability are distinct qualities.

As far as specialization is concerned, the vast majority (more than 54%) of computers scientist, software engineers and web accessibility experts that support D1 shows how these respondents adhere to WAI's definition. Consequently they believe that to a greater extent accessibility benefits people with disabilities and emphasize on the active role that users may take on the Web. This view might be influenced by their working experience and education during their careers. Conversely, designers and UX experts widely support D2 with more than 56% of respondents backing this definition, which may entail that their understanding about accessibility covers all audiences. We can attribute this view to the "accessibility benefits all" statement by which UX experts and designers are often introduced to accessibility.

5. CONCLUSIONS

The results of the survey and their underlying implications have consequences on some of the questions we posed. The main contribution is the design of better communications about web accessibility: we know what drives people to embrace accessibility and which are the weak points in fostering accessibility. This is an invaluable tool to attract and engage people to the field so that they participate and adopt accessibility practices. It also contributes to comprehend the different viewpoints on accessibility for those with contrasting profiles that can eventually work together or collaborate. The following statements summarize our findings:

1. Those definitions disseminated by widespread institutions - either standardization (D1) or regulatory bodies (D2) - account for the broader level of acceptance. We understand that the dissemination of guidelines gives visibility and credibility at the same time.
2. Most respondents are led by the social aspect of accessibility. Apparently, the economic revenue, search engine optimization or design for mobile do not get due attention and only attract a few. Traditionally, these aspects have been highlighted as a way to engage outsiders in accessibility. However, it seems that these areas still require more emphasis as they can potentially help to spread accessibility awareness.
3. Forcing people to adopt accessibility practices does not engage people on accessibility. There are some large groups that, in addition to the social aspects, embrace accessibility because of the challenges posed (academics and researchers)

and because it leads them to design better products (designers and engineers).

4. The research community should focus on providing empirical evidence about how accessibility benefits all. Case studies such as [25] are needed to populate a corpus that can show the strengths of this design paradigm.
5. The different understanding of accessibility can generate tensions between different groups if, amongst many others, web accessibility assessment is to be discussed. These controversies can occur within companies, in interdisciplinary panels and between different entities (for example, NGO and academia).
6. If we aim at finding the higher level of consensus to define web accessibility this definition should be realistic and concise. It should consider situational impairments and equal access but should not put the focus on users with disabilities. Lastly, the definition should be proactive about accessibility as opposed to being an afterthought.

By discussing the different aspects of this survey our goal was to shed some light on the understanding of people about web accessibility. This paves the way towards a consensus to define accessibility, helps to challenge stereotypes, and allows to discover areas of growth and improvement.

Finally, our survey is not without limitations. We know that not all our respondents were experts in web accessibility and we are not sure if we targeted representative group of people for conducting this survey. Therefore, we are planning to conduct future research to reduce these limitations.

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