

## Post-print version

Leitner, M., Strauss, C. & Stummer, C. Web accessibility implementation in private sector organizations: motivations and business impact. *Univ Access Inf Soc* **15**, 249–260 (2016).

DOI 10.1007/s10209-014-0380-1

This is a post-peer-review, pre-copyedit version of an article published in "Universal Access in the Information Society". The final authenticated version is available online at: <https://doi.org/10.1007/s10209-014-0380-1>

## Web accessibility implementation in private sector organizations: Motivations and business impact

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**Abstract.** Despite the prominence of the World Wide Web in people's everyday lives, most web presences in private sector organizations still fail to comply with contemporary accessibility standards. As a consequence, a large group of users – i.e., people with impairments – is excluded from accessing these web presences. In order to explain the managerial rationale, an exploratory case study was conducted in three industry sectors. The results of the analysis shed light on organizations' motivations to implement or reject web accessibility standards, reveal positive and negative consequences of implementation, and provide in-depth insights into the determinants for successful and unsuccessful web accessibility implementation. This study supports organizations in making better decisions on the implementation of web accessibility.

**Keywords** *web accessibility implementation, private sector organizations, business impact, case study research*

## 1. Introduction

Since the emergence of Web 2.0, Information and Communication Technology (ICT) captures a vital part in the life of many people, and may improve personal autonomy and quality of life. Worldwide, almost every third person has Internet access; in the European Union (EU), the Internet penetration rate was 73% in 2012 [53]. Although the World Wide Web has become an indispensable source of information and services, the Internet's universal accessibility has not been realized to date. People with motor, cognitive, visual, or auditory impairments require not only assistive devices (e.g., screen readers, Braille displays) but also proper, i.e., accessible, websites. Thus, the Internet – originally based on the idea of offering equal opportunities to each and everybody – has emerged as a medium for the creation of digital divide as it excludes large groups of users.

In many European countries, legal regulations stipulate that public organizations' websites have to be accessible (cf., on the example of Austria, the Austrian e-Government Act). Despite various efforts to raise awareness for web accessibility, implementation of accessibility in private sector organizations seems to be still in its infancy. Apparently, mere social drivers do not suffice for private organizations to provide accessible websites, but need to be accompanied by evidence for potential (positive) business impacts.

The study at hand therefore addresses web accessibility implementation issues from a business perspective (i.e., motivations, business impacts, reasons for success or failure) in the Business-To-Consumer (B2C) segment on the example of three industry sectors in Austria. This work provides detailed insights into private sector organizations' rationale to implement (or not to implement) web accessibility.

The remainder of this paper proceeds as follows: Section 2 outlines the current state of research in the field of web accessibility. Section 3 then describes the design of the exploratory case study research approach. Next, findings of the study are presented and discussed in Section 4. Finally, the paper concludes with a summary and an outlook to further research in Section 5.

## 2. Background

The notion of web accessibility has existed for over a decade and generally means *“that people with disabilities can perceive, understand, navigate, and interact*

*with the Web, and that they can contribute to the Web*” [49]. In the EU at least one out of every six citizens between the age of 16 and 64 is assumed to have some long standing health problem or disability [12]. Note that people with impairments may be even more dependent on using the Internet as the main source of information, because alternative sources, like printed information or personal advice, may be difficult or even impossible to access.

The World Wide Web Consortium (W3C) has developed numerous guidelines and techniques for accessible websites. The Web Content Accessibility Guidelines 2.0 (WCAG 2.0) contain testable criteria for the development of accessible website information (e.g., text, image, forms, sounds). Moreover, guidelines for accessible user agents (e.g., web browsers, media players) or authoring tools (software for website creation) were issued by the W3C. Following these guidelines should ensure accessibility to a large extent and also contribute largely to the quality of a website (including user agents and authoring tools).

An alternative for boosting website quality is to increase its usability, so that “specified users can achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use” [18]. Usability and accessibility are closely interrelated. Petrie and Kheir summarize different attempts to confine usability and accessibility, e.g. usability to be treated as a subset of accessibility; or accessibility to be considered as a subset of usability [38]. In many cases, an improvement in one of the two concepts may lead to an enhancement of the other (e.g., high color contrast, well-structured text). Still, usable sites will not necessarily be fully accessible and vice versa – both concepts are distinct and need to be considered equally in the web development process.

Over the years, web accessibility has become a research field for a number of scientific disciplines. In computer science, this is well documented by works on web accessibility evaluation (e.g., [8], [14], [16], [26], [45]), the development of evaluation tools and methods (e.g., [3], [24], [35]), and human computer interaction (e.g., [19]) as well as usability (e.g., [32], [37]). Web accessibility also plays a role in law concerning legal regulations on national level regarding accessible design of websites<sup>1</sup>. In education and pedagogy, Ortner and

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<sup>1</sup> The German speaking countries (i.e., Austria, Germany, and Switzerland) all have issued an Equalization Act from 2002 to 2006. Further examples are Ireland’s Disability Act 2005, Italy’s Stanca Acts 2004 and 2013, or the UK Equality Act 2010.

Miesenberger [34], and Matausch et al. [27] develop curricula for web accessibility in higher education, and Johnson and Ruppert [21] create accessible learning environments for students. Finally, in the area of ethics, web accessibility takes over a major part, dealing with social responsibility, e-inclusion and human rights issues (e.g., [9]).

In business administration or management science, however, the issue of web accessibility has gained little attention to date. Previous research widely focused on theoretical models for benefit analysis [39] and cost-benefit scenarios [10], [17], though lacked empirical foundation. Experiences of organizations with web accessibility implementation, however, have not been investigated so far. This is remarkable, because – in addition to some legal compulsion being already enacted (in Austria, most prominently by the Austrian Equalization Act [2]) – future business opportunities provide a propelling argument for an implementation of web accessibility in private sector organizations. Note that the increasing number of mobile device internet users (cf., e.g., [52]) are facing similar barriers (e.g., they rarely use a mouse device) [50]. The same holds for elderly people with age-related conditions, being comparable to those experienced by the disabled (e.g., vision impairments, hearing loss, motor skill diminishment)<sup>2</sup>. Given that the Internet-accustomed population in developed countries is aging rapidly (e.g., the EU estimates that by 2050, 29.3% of the EU population will be older than 65 years [48]), the increase in size of this target group will be enormous. This development and the relevance of the Web channel in many industries (cf., e.g., [51]), will make accessibility of (corporate) websites extraordinarily relevant from an economic point of view.

The bottom line is that organizations with accessible websites may profit at least in two ways. Firstly, they reduce the risk of negative image impact as well as penalties as a result of arbitration processes. Secondly, and more importantly, they will be able to significantly enlarge their customer group as their websites are accessible to people with disabilities, mobile device users, and elderly people.

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<sup>2</sup> In spite of similarities in limitations, there are still differences between elderly people and young disabled people in coping with these limitations as the elderly may have limited opportunities to learn to compensate. For a rich discussion on web accessibility for older users see a special issue in the *Universal Access in the Information Society Journal* [4].

### 3. Research design

Guidelines by Eisenhardt [7] and Yin [54] were followed and an embedded, multiple case study design was set up, for which organizations in the B2C segment of three industry sectors, namely tourism, financial services, and information services were selected. Thus, these sectors were chosen as they (i) have high relevance in electronic business, and (ii) include day-to-day operations that provide facilitations for people with disabilities when performed online. In each of the three sectors, a three-step accessibility evaluation was performed in order to screen the sector for its accessibility level. In the first step, the organizations to be screened were selected. In this step research was based on data from the Austrian platform for accessible tourism (for the tourism sector), Austrian Commercial Register data (for the financial services sector), and a study conducted by the Austrian Web Analysis (for the information services sector), and, thus, identified 89 candidate websites<sup>3</sup>. In the second step, the Total Validator Tool was used for an automated web accessibility evaluation based on a randomly selected sample of three webpages from each website. This freeware tool checks the source code for web accessibility errors based on the WCAG 2.0, and provides a report with errors and warnings in various categories (e.g., accessibility, parsing, mark-up). For websites where no accessibility errors<sup>4</sup> have been reported, a third step was performed, based on the Lynx browser and the Firefox Web Developer Toolbar for manual accessibility checks<sup>5</sup>. This resulted to one sample of accessible websites<sup>6</sup> that have passed automated as well as manual tests and another sample of inaccessible websites for each sector. From these two groups twelve organizations were randomly selected in accordance with literature on case study research suggesting at least four cases for sound research results [7].

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<sup>3</sup> Two non-Austrian banking institutions have been added to supplement the evaluation. Both institutions have been BIENE award winners (German web accessibility award).

<sup>4</sup> Errors in other categories were not taken into account for this evaluation.

<sup>5</sup> Manual accessibility checks are crucial as some errors may not be detected automatically (e.g., inappropriate alt-attributes).

<sup>6</sup> Although being aware that there is no accessible system per se, but just more or less accessible systems, for the sake of selection of firms to be approached in order to interview managers a website was considered to be (sufficiently) accessible once it has passed the automated as well as the manual tests.

Then, managers were approached in these organizations who were involved in the accessibility implementation process (in firms from the successful implementation sample) or managers who would have been responsible for web accessibility implementation (in firms from the failed implementation sample) for semi-structured interviews. The organizations' industry branch, the country of origin, (rounded) number of employees, the function of the interviewee in the organization, and the outcome (success or failure) of accessibility implementation are summarized in Table 1.

**Table 1: Organizations and interviewees**

Industry	Country	Employees	Function	Implementation
Financial Services	Germany	21000	Project manager IT	Successful
Financial Services	Switzerland	47800	Project manager	Successful
Financial Services	Austria	5000	Content manager	Successful
Financial Services	Austria	5000	Member of general secretariat	Failed
Financial Services	Austria	63000	Project manager IT	Failed
Financial Services	Austria	140	Content manager	Failed
Information Services	Austria	7	Marketing manager	Successful
Information Services	Austria	51	Technical manager	Successful
Information Services	Austria	9	Director	Successful
Information Services	Austria	12	Director	Failed
Tourism	Austria	19	Marketing manager	Successful
Tourism	Austria	140	Director	Failed

The interviews lasted between 45 and 90 minutes, were audiotaped and transcribed verbatim. Eight of the twelve interviews have been conducted by the leading author of this paper; two trained researchers performed the remaining four interviews. Interviewees were informed beforehand (by e-mail or telephone) about the interview's topic; anonymity for the participants and their organizations was agreed on. Interviewers were provided with a brief guideline with the most relevant topics in order to ensure comparability across cases [28]. However, interviews were guided by the interviewees in order to minimize interviewer-induced bias. Thus, the interviewers only asked questions just in case of breaks in the conversation.

The data were interpreted and analyzed following the grounded theory method [11]. In total, 646 interview minutes (10.8 hours) were transcribed which resulted in a total amount of 181 transcription pages, single spaced font size 11. When analyzing the interviews, two researchers went iteratively back and forth in data

for the identification of common themes, subsequently developed categories, and, finally, relationships between categories. Open and axial coding procedures were applied for this purpose [46]. Moreover, the authors focused only on patterns that often reappeared in the data in order to attain saturation<sup>7</sup>. Overall, both quantitative and qualitative data were considered (for an overview see Table 2).

**Table 2: Data sources**

Type of information	Type of evidence	Tourism	Financial Services	Information Services	Data type
company specific	In-depth interviews	2	6	4	qualitative
company specific	Personal documentation (interviewer's notes, meeting notes)	3	7	5	qualitative
company specific	Information about organizations interviewed (annual reports, website, press releases, Austrian Web Analysis data, Commercial Register data)	5	14	10	qualitative/ quantitative
sector specific	Quantitative website evaluation	52	19	18	quantitative
sector specific	Industry information (Internet, brochures, research)	10	6	3	qualitative
sector specific	Accessibility in the three industries (Internet, reports, studies, audiofiles)	16	3	7	qualitative
<b>Total number of documents used</b>		<b>88</b>	<b>55</b>	<b>47</b>	

Company - specific data used for this case study included information about organizations interviewed (e.g., annual reports). In addition, interviewers took notes during each interview, and post meeting notes were taken after discussing each sector's interviews. Sector - specific information used for this case study included quantitative website evaluation, general industry information, and information about the accessibility in the three industries.

## 4. Findings

### 4.1 Web accessibility evaluations

In total, 12% of the analyzed websites passed the accessibility evaluation while the vast majority failed (cf. Table 3). This result underlines the original assumption of low accessibility in private sector websites, particularly when compared to websites in the Austrian public sector <sup>8</sup>.

<sup>7</sup> A minimum number of twelve interviews is recommended for attaining data saturation in purposive samples [13].

<sup>8</sup> An Austrian study on the accessibility of public web sites showed that 94% out of 68 tested sites fulfilled the WCAG A criteria [23].

**Table 3: Results of website evaluations**

	Tourism		Financial Services		Information Services		Total	
	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.
Pages checked	52	100%	19	100%	18	100%	89	100%
Failed automated tests	45	87%	15	79%	14	78%	74	83%
Failed manual tests	4	8%	0	0%	0	0%	4	4%
<b>Passed all tests</b>	<b>3</b>	<b>6%</b>	<b>4</b>	<b>21%</b>	<b>4</b>	<b>22%</b>	<b>11</b>	<b>12%</b>

Most common errors on the tested websites are HTML markup mistakes (71% in the tourism sector, 79% in the financial services sector, 94% in the information sector). A reason for this high number of markup mistakes may be found in the tolerance of modern graphical browsers that tend to “pardon” markup errors and still display the text correctly. This is not the case with text-only browsers (e.g., Lynx), Braille displays, or screen readers. The analysis revealed recurrent accessibility errors (e.g., missing alt-attributes, the usage of unlabeled frames or flash, the usage of JavaScript in an inaccessible way). Note that passing this evaluation is not to be misinterpreted as a proof of full accessibility of the site since no elaborate methodologies of accessibility evaluation (e.g., Unified Web Evaluation Methodology) have been applied; these sites therefore can be categorized as “being on the right way” toward accessibility. The application of a more detailed evaluation method may have revealed further shortcomings in accessibility.

The results of the website evaluation show a low web accessibility implementation rate in the three sectors under review; only a minority of organizations has successfully implemented web accessibility. These results lead to the assumption that there might be issues that hamper accessibility implementation. Moreover, a comparison of this website evaluation with a study on public websites in Austria (cf., [23]) showing reverse results, justifies further in-depth examination of this current state.

#### 4.2 Motivations for web accessibility implementation

Motives in the three investigated sectors can roughly be classified in economic, social, and technical motivations. Table 4 provides an introductory overview of motivations and reasons for implementation of accessible websites and a selection of underpinning quotations.

**Table 4: Motivations for web accessibility implementation**



Motivation	Reasons for implementation	Sector	Selected quotation
Economic	Differentiation	F	<i>"We tried to be the first to implement accessibility in order to be different from our competitors".</i>
	Elderly Customers	F,I	<i>"Our website is being used by elderly people above average".</i>
	Fear of negative image	F	<i>"We cannot afford negative headlines".</i>
	Importance of website	T	<i>"Every guest will see our web page first, judge it, and then decide if he wants to come or not".</i>
Social	Consumer consciousness	F	<i>"Ethical criteria are more and more being included in the purchase decision process".</i>
	Design for all	T,F	<i>"Our main reason was 'simple and for all'; the simpler the better and the more customers will understand and buy the product".</i>
	Key personality	T,F,I	<i>"The technical department colleague's girlfriend has a hearing impairment; he had first suggestions about the issue".</i>
	Social commitment	T,F,I	<i>"We have always had awareness for social issues. In this case, implementation of web accessibility is easier; when the awareness already exists".</i>
	Top management support	F	<i>"We had the advantage that one member of the management board was 150% web affine; this made it easier to convince him".</i>
Technical	Website quality	T,I	<i>"Nobody was satisfied with the old website. It did not look good, did not work satisfyingly, and did not have enough traffic".</i>

T=tourism, F=financial services, I=information services

Firstly, the implementation of web accessibility in an organization can be initiated out of *economic motivations*. In this case, organizations focus on customer satisfaction and implement an accessible website mainly as a means to increase turnover, image, and customer base. Organizations with Internet presence (“click and mortar” companies with an additional offline presence as well as straight online companies) face the problem of lower switching costs for customers compared to traditional (“brick and mortar”) companies. Accordingly, the importance of customer satisfaction and loyalty increases tremendously [5]. At the same time and for similar reasons, competition and, thus, the need for differentiation becomes more important. Web accessibility implementation may provoke competitive advantage due to differentiation from direct competitors. One interviewee, for example, forthrightly stated that “[we] tried to be the first to implement accessibility in order to be different from our competitors”. The ongoing demographic shift and the increasing share of elderly people using the Internet constitute further economic motivations for web accessibility implementation. An interviewee recorded that “[the] usage of our website by elderly people is higher than average”. Elderly people are a rapidly growing segment of the Internet economy [47] with significant purchasing power [42], and may have mobility limitations similar to people with disabilities. An interviewee took up this issue when stating “[the] wealthy customers are the elderly; they have the money”. Thus, for organizations with accessible web presences elderly people apparently constitute an additional customer group.

Potential image improvement through web accessibility may be another major motivation for organizations. This aspect is closely related to the differentiation aspect and also has a strong link to social reasons for web accessibility implementation (e.g., social commitment). The way in which an organization is perceived by its customers influences customer loyalty which is, in turn, strongly related to a firm's profitability [41]. On the other hand, negative publicity can seriously harm corporate image [6]. An interviewee pointed out that they wanted to "avoid a headline such as 'This financial services institution does not care about the elderly'". From psychology can be learned that during evaluation of people, objects, and ideas, more weight is put on negative than on positive information [29] and that this effect is more likely to emerge when consumers are highly involved with the product category [1]. This may be the case especially in the tourism sector in which the customer perception of the website (and its accessibility among other features) is decisive for the booking behavior. Secondly, **social motivations** may also trigger web accessibility implementation. If so, web accessibility efforts primarily target people with disabilities. Social aspects, such as equality, ethical behavior, social commitment, and responsible attitude toward society, become the main drivers for web accessibility implementation. Organizations with elaborate social values (particularly if explicitly laid out in a corporate social responsibility strategy and corporate culture) will rather implement web accessibility out of social reasons. The organization of an interviewee, which has succeeded in web accessibility implementation, falls into this category; he stated that "[when] I joined this organization in 1989, social awareness already existed. I have grown in this culture and I experience it every day".

The degree of social commitment of an organization is usually closely linked to its corporate culture. This is supported by a study showing that social responsibility of organizations represents one of the central motivations for corporate culture [44]. The important role of corporate culture in conjunction with web accessibility implementation out of social motivations becomes obvious. Besides other factors, organizational culture is influential on the readiness of employees for organizational change [22]. In their "competing values framework", Quinn and Rohrbaugh [40] conclude that the culture focusing on human relations and morale has a higher readiness for change. Drawing on these

assumptions, the change process of web accessibility implementation can be facilitated in a culture based on social commitment. Social commitment as a reason for web accessibility implementation has actually been identified across all three sectors. This is particularly true for large organizations in which it is traditionally more likely to have a clearly defined corporate social responsibility strategy [36] because “the power and resources of large companies produce responsibility to use that power and develop those resources responsibly” [20]. Furthermore, in some businesses the demand of (re-)establishing their reputation has played an important role. As a consequence of the financial crisis activities of banking institutions, for example, are closely observed by the public which has motivated them to put more emphasis on social issues. Interviewees in the financial services sector accordingly have expressed the need to be perceived as a “*decent bank*” that “*cares for others*” and “*does the right things*” as a reason for web accessibility consideration.

It can therefore be concluded that organizations with a corporate social responsibility strategy and corporate culture may rather implement web accessibility out of social reasons. Furthermore, organizations in crisis-ridden business sectors (e.g., financial services sector in times of economic crisis) especially focus on image improvement by means of social instruments. These motivations particularly can be found in large organizations as they are typically the ones with an explicit corporate social responsibility strategy.

Thirdly, web accessibility implementation can be initiated out of ***technical motivations*** which encompass the intentions of an organization to improve the website from a technical point of view in order to obtain a stable and secure site of high quality. Not surprisingly, this is often initiated by IT experts who are aware of the advantages of accessibility in terms of quality of webpages. Poor quality of current web sites thus constitutes a major reason for the consideration of accessibility, because improving accessibility includes several measures that also increase simplicity, clarity, usability, download speed, and website quality. The usage of structural elements (e.g., headings, lists), for example, contributes to a clearly arranged web presence, the separation of content and layout reduces code and provokes a reduction of download times, and the consistent navigation and layout for the whole web presence causes an increase in usability. In short, accessible websites usually have higher quality than inaccessible ones.

As a matter of fact, mere focus on the aesthetic design of a website goes at the expense of its usability, and may therefore ultimately cause frustration by the customer [5]. Moreover, websites with numerous design elements tend to be more voluminous, and thus require longer download times. This is a crucial issue for many customers, and thus decisive for the success of the firm. Cox and Dale identify six key quality factors for websites, namely, clarity of purpose, design, accessibility and speed, content, customer service, and customer relationships, among which they classify accessibility as the “*most critical factor for any website*” [5]. The increasing use of mobile devices for Internet access further promotes the use of accessible websites, as they ensure device independency. Organizations from the information services sector have been more concerned about the stability and quality of their websites than others. An interviewee stated that “[we] stumbled across it [i.e., web accessibility] *only because our old site was bad and poorly coded*”. Similarly, another interviewee indicated that “*nobody was satisfied with the old website. It did not look good, did not work satisfyingly, and did not have enough traffic*”. Technical reasons were among the major motivations for web accessibility implementation in this sector, also driven by the high fluctuation of website contents particularly in the online media sector, which was summarized by one interviewee stating that “[we] wanted a *top-quality website that conforms to standards, is usable and accessible*”. However, the improvement of website quality was an issue in all investigated sectors. Its importance highly correlated with the value of the web presence for the organization and was also noted as more important in those organizations with websites for which content is subject to high fluctuations. Despite economic, social, and technical motivations for web accessibility implementation, in the interviews of the present study, the importance of key persons who initiate the web accessibility project and are sufficiently committed to the subject also became obvious. Across all three sectors investigated, these key persons had some personal relation either from their private life or in their business environment. For instance, they have either a disability themselves, friends or family members with disabilities (“*My brother has a severe sight disability. He has to use magnification software when he uses the computer. He told me to take care for the magnification aspect when designing a new site.*”), or friends or family members with expert knowledge about web accessibility (“*My*

friend is an expert, he told me to make the site accessible.”). Their interest may also stem from their business background (e.g., colleagues with impairments/technical interest, cooperation with interest groups) and accessibility events or presentations. Table 5 lists such relations, categorizes them in personal vs. business contexts, and refers to selected quotations.

**Table 5: Decisive relations of key persons**

Background	Key Person Relations	Sector	Selected quotation
Personal	Disability	F	"I initiated the project, because the bank's website was not accessible with my screenreader".
	Friends and family with disabilities	T	"My brother has a severe sight disability. He uses magnification software and told me to take care for the magnification aspect when designing a new site".
	Friends with expert knowledge in the field of web accessibility	T	"My friend is an expert. He told me about accessibility".
Business	Colleagues with impairments	F	"A colleague from the technical department has a girlfriend with a hearing impairment. He had the first suggestions about this issue".
	Colleagues with technical interest	I	"According to my opinion, you can pique web developers' interest in accessibility. Sometimes they then implement it proactively without the management forcing it".
	Interest groups/disability organizations	F	"We have worked in cooperation with the institute of the blind".
	Former colleagues with impairments	F	"A former colleague has a sight disability and works for the institute of the blind".
	Other inputs (presentations, events)	F	"I have been at a lecture given by a sight disabled person. This has impressed me a lot".

T=tourism, F=financial services, I=information services

### 4.3 Impacts of web accessibility implementation

This study has identified economic, social, and technical impacts of web accessibility implementation. **Economic impacts** following web accessibility implementation are multifaceted. In terms of costs, most organizations having implemented accessible websites regard this as a long term investment that is assumed to lead to cost efficiencies in the long run: *"The website is much more cost efficient as we do not have to recode it so often. It is not subject to trends anymore. In the first programming phase we may have invested [...] more than for an inaccessible site. However, we have it for the third year now and it is unbelievably maintenance neutral and one can easily change the content"*. Although, admittedly, organizations are unable to exactly quantify their costs and savings, the cost criterion has usually not been mentioned as a critical issue. Furthermore, web accessibility implementation may allow for differentiation [30] and customer loyalty building [31], both adding to competitive advantage. Obviously, some kind of communicating the accessibility efforts to the public in order to achieve awareness and/or earn credits for the achievement remains

necessary, as accessibility of webpages is not visible for the average user. To this end, some organizations have indicated their accessibility status on the website, others have had their sites labeled, but some have opted to not communicate their efforts to the public at all. At EU level, there have been attempts to establish quality marks for accessible websites. However, very few Member States have issued a quality mark so far.<sup>9</sup> Any impartial evaluation may provoke higher credibility than the organization “just” claiming their efforts.

After successful implementation of accessible websites, indicators for **social impacts** have been observed as well. Employees with disabilities sense a higher degree of integration into the company. The notion that their handicap is taken seriously and respected by the organization leads to a higher degree of motivation of employees with special needs; in turn, this provokes an intrinsic incentive, and therefore a higher motivation for their work. The implementation of web accessibility is observed to be a learning process. Some organizations have established knowledge management tools that foster knowledge exchange among employees on that subject (e.g., internal knowledge platforms); these tools enable knowledge exchange and contribute to the transfer from tacit to explicit knowledge [33]. Moreover, an increase in awareness among both customers and employees is created.

Not surprisingly, also **technical impacts** have been mentioned. In terms of maintenance, considerable facilitation is reported, particularly with respect to faster effectuation of changes and update of website content (“*Changes and maintenance of our site have become considerably easier.*”), a faster training of new employees (“*We can train new employees much faster because every web page has the same structure now.*”), and device and browser independence (“*The release of a new browser used to provoke a crisis because we had to recode almost all the websites. This is no longer the case.*”). The ease of maintenance is mentioned in all sectors though seems to be especially important for organizations with a high fluctuation of website content. However, limitations are reported by these organizations in terms of quality assurance. Despite well trained staff,

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<sup>9</sup> Web accessibility quality marks have been issued in some European countries but depend on different criteria and evaluation methodologies. The Euracert label is an attempt to unite these quality marks. For details on web accessibility certification issues, difficulties involved, and possible implementation scenarios see [25].

checks on every description for non-text elements (e.g., images, videos) are crucial although impractical for very large web presences (e.g., online newspaper).

Across all three sectors, a higher ranking in search engine results and, as a consequence, higher website traffic is reported from accessible web presences. This is in line with another empirical study by Hartjes that also reported significant increases in website traffic (visits, time on site, returning visits) through search engine optimization of accessible web presences [15]. Moreover, an increase in simplicity and usability are among the technical changes of web accessibility implementation: *“We used to have disputations within the organizations, because some people wanted their text to be positioned above right, others below left, and others again in bigger letters, etc. These disputes do not exist anymore as the structure is now predetermined. This also means an economy of time.”* Apparently, these effects contribute to a better website quality on both the back end with respect to quality improvements in terms of maintenance facilitations, as well as the front end in terms of usability and simplicity increases provoking a higher website quality. As a consequence, website quality and search engine optimization result in an increase of website traffic of accessible web presences. An interviewee from the information services sector pointed out that *“one cannot be as clumsy as to not attain a better search engine ranking with accessible sites”*. The above - described impacts are summarized in Table 6 and underpinned by selected quotations.

**Table 6: Impacts of web accessibility implementation**

Category	Impacts of implementation	Sector	Selected quotation
Economic	Competitive advantage	I	"With our accessible website we have definitely gained advantage in the market".
	Cost efficiency	T,I	"The website is much more cost efficient as we do not have to recode it so often".
	Customer loyalty	F	"Before the implementation of accessibility, 75% of the customers who wanted to open an account stayed with our bank, after the implementation this number increased to 95%".
	Corporate image	F	"These days where banks are associated with negative things, it is very important to show that we are doing positive things".
	Website traffic	I	"Our accessible site has become a traffic driver. 94% of our website visits come from search engines".
Social	In-house knowledge exchange	F	"I have made the experience that committed employees who work with the internet but come from different departments now talk about web accessibility. A knowledge exchange is happening".
	Awareness	F, I	"For those who were not familiar with the issue, it has activated a thinking process".
	Integration	F	"A sudden sensitization has occurred for employees with disabilities. [...] They have been given motivation and self-confidence".
Technical	Maintenance	T,F,I	"The website editors do not understand why some fields are now obligatory. [...] This is difficult to check because we have about 50 editors in our organization and we cannot check on every attribute inserted".
	Search engine ranking	T,F,I	"Our website is found more easily by search engines now because of the higher amount of keywords in the code".
	Simplicity/Usability	T,F	"We used to have disputations within the organizations because some people wanted their text to be positioned above right, others below left and others again in bigger letters, etc. These conversations do not exist anymore as the structure is now predetermined. This also means an economy of time".
	Website quality	I	"It has shown that accessibility entails better structure of websites".

T=tourism, F=financial services, I=information services

However, various difficulties have been mentioned by the interviewees. In the presence of numerous website editors, for instance, problems in terms of quality assurance may arise. Despite employee trainings on accessibility, human errors or negligence are difficult to check in case of a high frequency of web content actualization and a high number of people changing content. This may be aggravated as time and resources for quality assurance checks may not be available. Next, a lack of awareness and media echo has been experienced in organizations that rather focused on technical than on social or economic reasons in the course of web accessibility implementation. Moreover, in case of adaptations of extant web presences, substantial initial costs have been reported by some organizations. An interviewee drew a comparison to illustrate this finding: "Changing an existing site into an accessible site is like changing a motorbus to a Porsche". Consequently, a complete website re-launch may be more efficient than adaptations of extant web presences. In many cases, the Content Management Systems (CMS) in use did not provide accessibility features. Therefore, organizations had to decide on either adapting the current



CMS or implementing a new CMS with both options causing software development and further employee training.

#### **4.4 Reasons for failure of web accessibility implementation**

This section is based on interviews in organizations that failed web accessibility implementation. The authors discovered reasons for failure due to design or layout of the website on the one hand and argumentation deficits on the other (cf. Table 7 for an overview and illustrative quotations).

Especially in multinationals and large organizations, strict corporate design requirements have been issued which include detailed definitions for consistent website layout. In several cases these requirements do not conform to web accessibility guidelines and local web accessibility initiatives fail. An interviewee from the financial service sector reported that “[the] headquarters issued requirements on how a web presence had to look like that were contrary to our accessible website proposal. It was completely impossible for us to succeed”.

Insufficient contrast of company colors may serve as an example for an obstacle for accessible websites. The effort of changing inaccessible corporate design requires approval of many internal decision makers which usually is deemed to be unrealistic. Additionally, accessibility initiators state that accessibility deteriorates the website layout because it limits design options. It is remarkable, however, that corporate design adaptations have been made relatively easily in small and medium organizations. In those organizations in which social values are part of the company culture and the awareness for accessibility is prioritized, these obstacles were overcome.

Another reason for lacking implementation is the absence of awareness for web accessibility (for similar experiences at university libraries cf. [43]). It may be caused by misconceptions (e.g., “web accessibility only concerns blind people”) that need clear and concise presentation of web accessibility facts. Additionally, a lack of knowledge of the social, business, and technical benefits of web accessibility implementation has been reported as a reason for failure. Lack of awareness, existence of misconceptions, and lack of argumentation thus are the three major reasons that may cause a failure of web accessibility implementation.

#### **Table 7: Reasons for failure of web accessibility implementation**

Category	Reasons for failure of implementation	Sector	Selected quotation
Argumentation	Lack of arguments	F	"I have only pointed out the social argument which was the reason why it has not been considered further".
	Lack of awareness	T,I	"The basic understanding of accessibility is not available".
	Lack of top management support	F	"The marketing department turned my effort down with the words: We do not have many sight-disabled customers. As long as this is not stated by law, we do not implement it".
	Misconceptions	F	"We do not have blind customers. This would not be profitable".
Design/Layout	Corporate design requirements	F,I	"The headquarters issued requirements on how a web presence had to look like that were contrary to our accessible website proposal. It was completely impossible for us to succeed".
	Differences in accessible layout	F	"If we had implemented accessibility, our website would be worse compared to our competitors' sites".

T=tourism, F=financial services, I=information services

Across all cases, organizations that failed on web accessibility implementation are characterized by (i) no or poor indication of elaborate corporate social responsibility strategies or social values anchored in their corporate culture; (ii) project initiators who were not convinced of the issue; (iii) project initiators who were not well prepared and not aware of the full range of argumentation at the time of project presentation; and/or (iv) a web accessibility implementation that was conducted as an ad hoc attempt.

## 5. Conclusions

In this study, across three industrial sectors (tourism, financial services, and information services), the level of accessibility of web presences, and the reasons for and impacts after web accessibility implementation (or reasons for failure, respectively) have been investigated. Social, economic, and/or technical motivations have been identified. The kind of motivation depends on the size and complexity of organizations, the organizational sector, the corporate culture and degree of readiness for change, and the purpose and degree of complexity of the web presence. Complex organizations in the financial services sector, for instance, most often implement web accessibility out of social motivations. This is caused by several factors: an existing general social responsibility in the financial services sector per se, elaborate corporate social responsibility strategies of complex organizations, and negative image associations with financial services institutions that are meant to be weakened by means of socially responsible activities. By contrast, small organizations in the information services sector rather draw on technical motivations. Reasons for this development include a generic technology-affinity of the information services sector, a high importance

of website quality since the service is consumed directly on the site, a high fluctuation of website content, and a low adoption tendency of corporate social responsibility strategies by small organizations. In general, organizations are more likely to implement web accessibility when featuring the following characteristics: (i) elaborate corporate culture with commitment to social values and corporate social responsibility strategies, (ii) high importance of extant web presence for core business, (iii) website content subject to frequent changes, (iv) relevance of elderly customers for core business, and (v) in-house availability of key personalities.

The perceived impact of successful web accessibility implementation also varies across organizational sectors, sizes, and website characteristics. In analogy to the motivations for web accessibility implementation, social, technical, and economic impacts have been found. For instance, organizations have experienced a higher degree of employee integration, knowledge exchange, and awareness for this issue. In terms of economic impact, an increase in image, customer loyalty, and website traffic have been reported. Additionally, web presences have improved in quality.

On the other hand, several challenges have been identified. Organizations with numerous website editors and a considerable fluctuation of website content often face difficulties in terms of quality assurance, as just one mistake of a single website editor may render a site inaccessible. Moreover, errors may remain undetected for a long period of time, because daily quality checks on extensive data are not feasible. A lack of automated evaluation tools as well as insufficient time and/or resources for quality checks aggravate this situation. By now, the enduring quality of accessible web presences can only be fostered by measures such as routine check-up and regular staff training. Further problems comprise less media attention than expected (which is particularly true for organizations for which accessibility was regarded as a side effect of quality improvement), the need for promoting the improved accessibility in order to gain business benefits from it, high initial costs in case of adaptations of extant web presences, and coding difficulties (and, thus, increasing time effort) for complex sites.

Given that in most cases the advantages outweigh the disadvantages, the question remains why only few organizations in the private sector have adopted accessibility so far. Several reasons have been identified: In some cases it seems

that the initiators did not have a strategic plan in mind and only proceeded on a trial-and-error basis. Such “ad hoc” implementation decisions, possibly coupled with corporate design incompatibilities or argumentation problems, often result in a failure of implementation. Furthermore, corporate culture, climate and values influence the employees’ resistance to change and management decision making. However, the lack of implementation is not only due to argumentation problems or corporate design incompatibilities. In many cases, the awareness for the issue of web accessibility is not present in private sector organizations. This is a remarkable phenomenon, since almost every banking institution has ramps, every hotel considered for evaluation has wheelchair accessible rooms, but only a minority of them has accessible websites, even though the adaptation of buildings undoubtedly requires higher investment than accessible web presences. Further research may extend this study horizontally (i.e., by adding sectors and, particularly, firms from other countries) as well as vertically (i.e., by including more organizations from each sector). Either way, the case study research framework introduced may be applied and will enable sound cross-industry, cross-organizational, and/or cross-country comparisons. A stepwise enrichment of the study may reveal additional relationships and/or differences between industries or countries, respectively, enrich the knowledge base for organizations, and thus increase relevance for research and organizational practice.

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