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Volha Pontus & Silvia Rodríguez Vázquez

Language-related criteria for evaluating the accessibility of localised multilingual websites

Research track

Abstract

This paper presents a selection of the main findings from a recent large-scale accessibility study of localised, corporate websites in three language versions: English, French and German (Pontus 2019). The sites were evaluated with defined ad hoc manual criteria, largely based on the Web Content Accessibility Guidelines (WCAG) 2.1 (Kirkpatrick et al. 2018). Web accessibility levels observed were higher in most cases in the English version of the sample websites, in comparison with their localised French or German equivalent. The study also identified several language-related accessibility issues for multilingual content that may be overlooked by routine checks and deserve special attention by localisation professionals.

1 Introduction

Airline websites are heavily localised — i.e. linguistically and culturally adapted — to serve consumers in many regional markets. An airline serving Switzerland, for example, would have an English, French, German and Italian version, or a combination of these depending on which airports they operate in. This reliance on localisation practices brings forward interesting questions in relation to the multilingual aspects of web accessibility. Are all language versions of a site equally accessible or do accessibility outcomes sometimes vary across language versions? Similarly, given that corporate sites tend to be first developed in an international version (usually English) and then localised, do problems from the original version transfer to localised ones? If so, which accessibility standards are harder to meet?

This paper sheds light on some of the observations made in this regard after a large-scale web accessibility study on the performance of 50 localised airline company websites in multiple language versions; namely English, French and German. The study focused on the challenges of achieving accessibility for multilingual websites, and featured both automated and manual evaluation. The present paper summarises the main findings of this research. It presents ten ad hoc criteria for manual evaluation that were gathered and applied considering their special relevance for multilingual web content, and it seeks to encourage further discussion and analysis on the topic.

2 Motivation and related work

Accessibility is an acknowledged problem for professionals managing corporate sites, in addition to the other demands derived from the creation of multilingual and localised content (Sohaib and Kang 2016). However, the relationships between multilingual content, localisation processes and accessibility standards have been traditionally underexplored. While numerous studies have examined general web accessibility issues in the public sector (Beaudin 2001; Ellison 2004; Kuzma 2010; Gambino, Pirrone, and Giorgio 2016), only a handful of scholarly contributions have addressed accessibility with regard to multilingual content (Casalegno 2018; Rodríguez Vázquez 2016). To the

researchers' knowledge, there are no large-scale studies on the language-related aspects of accessibility. The few available studies suggest significant problems for accessibility outcomes in different language versions of a site (Quazzico 2016; Venkatesan and Kuppusamy 2017; Casalegno 2018; Minacapilli 2018; LeBlanc 2018). The two most recent studies of Minacapilli (2018) and LeBlanc (2018) deserve particular attention. Minacapilli (2018) concluded that Italian museum sites in their original language version (Italian) had fewer accessibility and usability problems than the (localised) English version of these sites. LeBlanc (2018), in a similar study of municipal government websites in Canada, made similar findings.

In contrast to the work on public institution sites, the private sector is largely neglected in the literature. The few available large-scale studies on private sector sites found that general accessibility levels were low in the period between 2004 to 2016 (Loiacono and McCoy 2004; Sohaib and Kang 2016; Leitner, Strauss, and Stummer 2016). This neglect should be addressed, however, with the introduction of specific accessibility requirements in EU, UK and US law that apply to businesses (see Pontus 2019 for a larger discussion on the topic). In the US, for example, transportation laws require that international airline sites are accessible to a certain level (Article 382.43, ACAA 1986). Airline companies can be fined by US authorities for non-compliance (ACAA 1986). Compliance is therefore one reason for greater interest in this area. In addition, private businesses could also have an important economic interest in ensuring that their content is accessible, in order to better reach a larger base of consumers and generate additional revenues.

Taking the above into account, we considered it pertinent to embark upon a large-scale study of private sector sites in an industry and market where localisation and multilingual accessibility requirements were challenging. The airline sector attracted our attention in this regard given that it must, by definition, reach and serve consumers across different languages and national or regional groupings. Switzerland, with four official languages, a developed economy and a large market for air travel was deemed appropriate as a geographical context for our research. A significant proportion of the Swiss population is reported as living with a disability and having visual impairments (Federal Statistical Office 2017). If a website is not fully accessible in the preferred language, for example, it may prevent users from accessing its services. The objective of our work was to identify common issues that may be encountered by this consumer segment and offer suggestions for the evaluation of multilingual sites.

3 Methods

In the context of our study, we sought to answer the following research question: "What is the degree of multilingual web accessibility achieved by the airline sector when assessed through manual testing?" Concretely, we formulated two hypotheses: 1) "Multilingual web accessibility performance of sites in the airline sector sample will vary depending on the language version tested" and 2) "There are fewer errors related to multilingual web accessibility in the English version than in the French and German versions of sites in the airline sector sample."

In order to test these hypotheses, a sample of 50 private sector (airline company) home pages was evaluated in two phases. First, we used automated testing to assess the whole sample for general web accessibility. The second phase, which consisted in manual testing, was conducted on a sub-sample of ten sites. The complete list of sites, including English, French and German versions, is available in Pontus (2019).

The study, which was carried out in September–November 2018, took the Web

Content Accessibility Guidelines (WCAG) 2.1 (Kirkpatrick et al. 2018) as the reference point for both phases of the evaluation and focused on issues of most relevance to individuals with visual impairments. The WAVE tool (WebAIM 2020) was selected for automated testing, given publicly available documentation on its algorithm. For manual testing, a selection of criteria were defined drawing from WCAG, usability principles and the literature on multilingual content. All home pages were first tested with WAVE, with errors being tabulated by each site language version and error type. A total of 150 home pages were therefore evaluated. Due to the practical limitations typically associated with manual evaluation (i.e. higher investment in terms of time, funding and human resources), however, a smaller selection of airline websites was chosen for manual testing.

Rather than randomly select airlines for manual checks, the study adopted a grouping approach similar to that used by Pribeanu et al. (2015). The decision was to manually test two airlines from each "performance bracket". Five performance brackets were defined based on the number of errors or known issues detected during the first evaluation phase through the use of WAVE (Pontus 2019, 67). Two sites from each performance grouping were then selected for manual evaluation on language-related aspects of accessibility. Manual evaluation was conducted in the form of conformance review by closely examining each page's source code. Table 1 outlines the manual criteria (MC) that were selected for the purposes of this study together with the corresponding WCAG 2.1 reference. A more detailed explanation of each MC can be found in Pontus (2019).

Manual Criterion (MC)	**WCAG Reference/Equivalent/Criterion Level**
MC1 Alt attributes for images	1.1.1 Non-text content (Level A)
MC2 Bypass blocks	2.4.1 Bypass blocks (Level A)
MC3 Page title	2.4.2 Page titled (Level A)
MC4 Links and buttons	2.4.4 Link purpose (in context)/ (Level A) 2.4.9 Link purpose (link only) (Level AAA)
MC5 Headings and labels	1.3.1 Info and relationships (Level A) 1.3.2 Meaningful sequence (Level A) 2.4.6 Headings and labels (Level AA) 3.3.2 Labels or instructions (Level A) 2.4.10 Section headings (Level AAA)
MC6 Language of page	3.1.1 Language of page (Level A)
MC7 Language of parts	3.1.2 Language of parts (Level AA)
MC8 Error identification/ error suggestion	3.3.1 Error identification (Level A) 3.3.3 Error suggestion (Level AA)
MC9 Language selector	N/A (localisation-related)
MC10 Abbreviations	3.1.4 Abbreviations (Level AAA)

Table 1. Manual Criteria

It is worth pointing out that the primary interest when using manual test criteria was not only to determine whether these best practices were followed, but also to evaluate if the solutions proposed were (i) appropriate in language terms (i.e., they corresponded to the primary language of the page being tested) and (ii) pertinent for the relevant web content, for example, an image, a link, a button, the page itself, etc. Similarly, applying these manual criteria was deemed necessary for different reasons. First, the tools usually used for automated testing do not support these types of checks in multilingual websites. For instance, it has been observed that automated evaluation software disregards more than half of the provisions of various standards, including those related to language that

appear in the WCAG (Rodríguez Vázquez 2016). Second, the definition of these manual criteria allowed for a more contextualised user-oriented evaluation, considering (i) issues that would mostly affect users with visual impairments and (ii) those identified in the literature as relevant in the case of multilingual content (Rodríguez Vázquez 2015; Venkatesan and Kuppusamy 2017).

4 Main findings

The results obtained indicate that accessibility varied considerably among airlines serving Switzerland. Accessibility outcomes also varied across language version, both when tested through automated means for general accessibility and when tested manually according to the criteria defined.

The results from automated testing support general consensus in the literature that web accessibility conformance is low in the private sector (Loiacono and McCoy 2004; Sohaib and Kang 2016). In the first phase of testing, 6% (N=3) of the 50 airline sites had no errors, according to WAVE's report. For these three airlines (Swiss International Air Lines, Icelandair and Eurowings), no errors were found on their English, French or German sites. Twenty-eight per cent (28%) of the sites (N=14) had one to ten errors across their English, French, and German versions. The remaining 66% (N=33) of the airlines' sites, had 11 or more errors. Of these 50 airlines, WAVE results were identical across language versions in 16 cases (32% of the sample) and results varied by language version in 34 cases (68% of the sample).

These results are in line with the findings of the existing literature concerning the types of problems that commonly occur (Ellison 2004; Gambino, Pirrone, and Giorgio 2016; Kuzma 2010) in relation to: (a) form labels, (b) empty links, (c) empty buttons, and (d) missing `alt` attributes. Contravening these best practices is likely to have a significant impact on the interaction of visually impaired users with airline websites. Greater awareness of these already well-known issues should prompt further checks in the airline industry. We contend that automatic testing, such as the one we conducted with WAVE, may be a simple and cost-effective method to identify obvious problems on critical pages, including issues that have an impact on transactional functionalities, such as the inaccessibility of form labels and buttons. A more exhaustive description of the findings resulting from the automatic testing phase of the study can be consulted in Pontus (2019).

As indicated in Section 3, a sub-sample of 10 sites was subjected to manual testing with defined criteria. Table 2 summarises the problems detected across the 10 airlines by error type, listing them for each language with percentages relative to the total number of errors for EN, FR and DE respectively, in descending order (from the MC in EN with the highest number of errors recorded to the MC with the fewest number of errors registered).

Manual Criterion	EN	FR	DE	Mean	Standard Deviation	% of Total	MC Total
MC5 Headings and labels (Level AA)	183 *32.5%*	260 *25.3%*	258 *24.5%*	233.7	43.9	26.5%	701
MC10 Abbreviations (Level AAA)	139 *24.7%*	189 *18.4%*	171 *16.2%*	166.3	25.3	18.9%	499
MC4 Link purpose (Level A, Level AAA)	105 *18.7%*	239 *23.2%*	274 *26%*	206	89.2	23.4%	618

Manual Criterion	EN	FR	DE	Mean	Standard Deviation	% of Total	MC Total
MC1 Non-text content ("alt-text") (Level A)	74 *13.1%*	129 *12.5%*	135 *12.8%*	112.7	33.6	12.8%	338
MC9 Language selector (Level N/A)	38 *6.7%*	37 *3.6%*	37 *3.5%*	37.3	0.6	4.2%	112
MC7 Language of parts (Level AA)	13 *2.3%*	113 *11%*	117 *11.1%*	81	58.9	9.2%	243
MC8 Error identification/ error suggestion (forms) (Level A, Level AA)	8 *1.4%*	28 *2.7%*	28 *2.7%*	21.3	11.5	2.4%	64
MC2 Bypass blocks (Level A)	2 *0.4%*	28 *2.7%*	29 *2.8%*	19.7	15.3	2.2%	59
MC6 Language of page (Level A)	1 *0.2%*	3 *0.3%*	3 *0.3%*	2.3	1.2	< 0.2%	7
MC3 Page title (Level A)	0 *0%*	2 *0.2%*	2 *0.2%*	1.3	1.2	< 0.2%	4
TOTAL	**563**	**1,028**	**1,054**			**~ 100%**	**2,645**

Table 2. Manual Testing Results by Error Category/Type

As shown in Table 2, problems with headings and labels (MC5, 26.5%), abbreviations (MC10, 18.9%), link purpose (MC4, 23.4%) and non-text content (MC1, 12.8%) represented most of the errors found in the airline sample in the second phase. Significant but fewer problems were found with language selectors (MC9), language of parts on a page (MC7) and error identification (MC8). There were effectively no problems with page language coding (MC6) or page titles (MC3). Some of the issues found, for example, incorrect headings or incomplete error identification notes within a flight booking form, may make a site's transactional functions unusable. In addition, mistranslated or inappropriate values were detected in manual testing; these would not have triggered any error or warning in current automated evaluation tools. These types of problems occur when headings and labels (MC5), link purposes or description text (MC4), alt-text values (MC1) and text content blocks (MC7) have not been translated into the language of the page or have been given the incorrect accessibility coding for a foreign language. One clear observation is that English values often 'travel' unmodified to the French and German sites, creating accessibility problems in the way Ó Broin (2004) described. These types of problems may easily be missed in superficial checks. It is worth mentioning that WAVE checks for accessibility features but cannot detect errors for untranslated or inappropriate values.

A key finding in our study was that accessibility levels varied by tested language. This was the case in the ten sites subjected to manual evaluation, supporting the first hypothesis ("Multilingual web accessibility performance of sites in the airline sector sample will vary depending on the language version tested"). Additionally, in 80% of cases, English sites had fewer accessibility errors than French or German site versions, which lead us to support our second hypothesis ("There are fewer errors related to multilingual web accessibility in the EN version than in the FR- and DE-language versions of sites in the airline sector sample"). More precisely, eight out of ten airlines had fewer errors on their English version. The disparity of outcomes between language versions was considerable: the English sites in the sample had 563 accessibility errors,

while the French and German sites had 1,028 and 1,054 errors respectively.

Our findings align with recent literature, which suggests that accessibility levels are affected by multilingual content and that problems may depend on the language of each site version (Casalegno 2018; LeBlanc 2018; Minacapilli 2018). Casalegno (2018), for instance, found a "definite prevalence" of language-related issues in localised site versions. Minacapilli (2018), in working with Italian source sites localised into English, also found that localised sites presented more usability problems related to accessibility than original versions. LeBlanc (2018) concluded that the "minority" language in her Canadian work, whether English or French depending on the scenario, was often mistreated with the result that accessibility principles were not respected.

In the particular context of our study, this may suggest that the 'international' version of the sites tested was initially created in English and subsequently localised for Switzerland in French and German. If this assumption would be correct, improvements in localisation workflows for accessibility elements would be strongly advisable (Gutiérrez y Restrepo and Martínez Normand 2010; Rodríguez Vázquez 2016).

5 Conclusion

This research has aimed to contribute to the literature on web accessibility, with an emphasis on the underexplored interaction between general accessibility standards and multilingual content. Unlike other large-scale web accessibility evaluation studies, our work examined three language versions per website and applied a combination of automated and manual checks. The findings, which show a disparity in outcomes across languages and across a large number of private companies, support the view that multilingual accessibility is a specific problem requiring special attention, not only in the academic community but also from professionals who work in localisation or who maintain corporate sites. More specifically, English versions were found to have a higher degree of accessibility (with fewer errors) than the French- and German-language versions, for which necessary accessibility elements were often missing or insufficient.

In our study, we did not evaluate all transactional elements on the airline sites: it was not possible to test booking or check-in options all the way through to completion of a transaction. In the future, this could be done by having real users involved in a long-term study or in cooperation with the airline companies themselves. We are also aware of the limitations associated with the manual testing, particularly in relation to the reduced number of criteria and airlines tested. Notwithstanding these limitations, we contend that the results of our study shed light on the pertinence of manual evaluation for the analysis of accessibility on multilingual sites, given that mistranslated or inappropriate values may not raise any flags during automated testing. They also suggest that it is important to encourage further work on the interaction between accessibility, localisation practices and multilingual content.

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