

A Communicative Approach to Evaluate Web Accessibility Localisation Using a Controlled Language Checker: the Case of Text Alternatives for Images

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Abstract

As researchers in web localisation, web accessibility and controlled-language (CL) software, we have noticed a gap in the way the three can be brought together in mutually advantageous ways. Localisation in general has shown little awareness of accessibility matters. The different accessibility checkers that are available are seldom used by localisers and web accessibility regulatory bodies and assessment tools have traditionally been very vague about language-related requirements. In this paper, we explore a linguistic approach based on semiotics and communicative value to help localisers analyse the accessibility needs of web content (and, in particular, non-verbal elements such as images) by means of an evaluation methodology based on controlled-language rules integrated in a content authoring tool.

Keywords: *Web localisation, web accessibility, controlled language checker, images, text alternatives, accessibility evaluation, linguistic accessibility, semiotic analysis, communicative value*

1. Introduction

Broadband access to the World Wide Web and other internet services has very quickly become synonymous with having full citizenship in the 21st century. Texts, media, software, services, games: all commodities are converging into the Web (or the Cloud), which "has developed from a medium of information exchange and archiving in the academic community to the most commercially significant", the most influential global forum, "a mainstream mass communication medium" for all kinds of organisations and individuals (Boardman 2005, unit 1).

The Internet has created numerous new opportunities in the professional, academic, institutional, political, economic and social spheres, but in doing so, it has also opened a vast space of exclusion for those who have no access and are disconnected. As Tim Berners-Lee, W3C Director and inventor of the World Wide Web, has famously put it: "The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect" (<http://www.w3.org/WAI/>). Today, no one can be remotely up-to-date in any of the aforementioned areas without some regular quality access to the

Internet.

It follows that when people cannot have access to it, and to the network of people, places, goods, knowledge and information that are instantly and ubiquitously offered, they are profoundly discriminated against. Therefore, we might argue that the most important barrier, besides personal or regional economics and language proficiency, has to do with physical and intellectual abilities. However, we prefer Harper and Yesilada's (2008, p.75) somewhat different diagnostics for web users with functional diversity: "People are disabled not by their impairment but are handicapped by the technology, infrastructure surrounding them, and the environment in which people are working in".

The World Wide Web Consortium (W3C) has made every effort to lower accessibility barriers. As early as 1997, the W3C launched the "Web Accessibility Initiative (WAI) to promote and achieve Web functionality for people with disabilities." They published the seminal Web Content Accessibility Guidelines (WCAG) as a Recommendation in 1999, and version 2.0 in 2008, with significant additions and redefinitions. This key document is structured around four principles of accessibility (webs must be

Perceivable, Operable, Understandable and Robust –the POUR principles), twelve guidelines to help implement these principles, and 61 different testable success criteria, so as to determine the degree to which each guideline is met (<http://www.w3.org/TR/WCAG/>).

In this context, what happens when a website needs to be made multilingual? What kinds of accessibility strategies or techniques will localisers implement, whether accessibility is explicitly included in the localisation brief, it is prescribed by national or regional law, it is identified by localisers as part of the intention, form or message in the "original" website, or it is felt as a professional duty? What tools are available to help them achieve target accessibility? Localisation in general and localisers in particular have shown little awareness of accessibility matters, probably because it has traditionally been considered beyond their "mild" technical prerogatives or capabilities, and mainly a developer's concern. The different accessibility checkers available are seldom used by these professionals, since most results seem to be of little relevance to localisers' mostly linguistic and macro-structural knowledge and expertise, or just a matter of poor *original* design. On the other hand, web accessibility regulatory bodies and assessment tools have usually been very vague about language-related requirements and have mainly focused on making sure alternative or simpler representations *exist* for components that can only be perceived, operated upon and understood by means of particular sensory capacities or intellectual conditions.

In this article, we will consider accessibilised web content as a kind of controlled language (CL), and webpages and websites as (hyper)texts comprising verbal and non-verbal communicative items, as well as language-dependent embedded applications. As Sharon O'Brien (2006, p.17) put it, the "objective of a CL is to improve the readability/comprehensibility of a text and/or its translatability". Since the relation between localisation and web accessibility has to do with localising controlled language, it makes sense to look at ways in which authoring and evaluation software based on CL rules can help the work of the professional localiser, in a similar way as QA or terminology checkers integrate with translators' toolboxes. A very positive collateral effect of this implementation would be to raise awareness about accessibility matters, which are quickly becoming a moral (and usually, legal) requirement for digital information.

2. Accessibility, Localisation and Language

Localisation and Accessibility have always been closely linked, if only because both activities aim at making a product accessible to a wider range of users than originally designed for. Like the former, the latter stands at the interface between a particular individual or user, a product or content to be used or processed, and the technology that makes that product possible and processable, both at the developer and the user ends (see Figure 1). To make something accessible ideally requires providing any users, irrespective of their abilities or according to their functional diversity, with a similar experience, or, at least, with a product that offers them equivalent value. Substitute linguistic variant for functional diversity (or language for ability) and we have the definition of localisation again. However, if we scratch the surface, differences start to emerge, as well as the need to redefine each on the basis of one another.

To start with, the "Web for all" main principles (<http://www.w3.org/Consortium/mission.html>) of the W3C include Social and Economic Development and Accessibility, but then also Internationalisation (not Localisation), "to make it possible to use Web technologies with different languages, scripts, and cultures" (<http://www.w3.org/International/>).

According to Pym (2001, p.1), Internationalisation "is the process of generalizing a product so that it can handle multiple languages and cultural conventions without the need for re-design". If we consider accessibility as "just another language" (Ó Broin 2004) —and we may add, *just another culture*, i.e. another set of conventions, usages, and interaction needs and habits to be taken into account, then we are talking about accessibility as synonymous with (or complementary to) internationalisation, as the process of at-source "neutralisation" of particular (technical, linguistic, cultural) traits for all languages and cultures. On the other hand, by turning around the equation of localisation as "a form of accessibility" (ibid.), the latter could be seen as the process of localising *into* particular accessible (*target*) languages. In short, accessibility means universalising, globalising, but also personalising, localising.

Accessibility, like internationalisation, can be part of the original design, or it can be a later adjustment. It is generally recommended that, for designers, internationalisation should be a mindset and not an

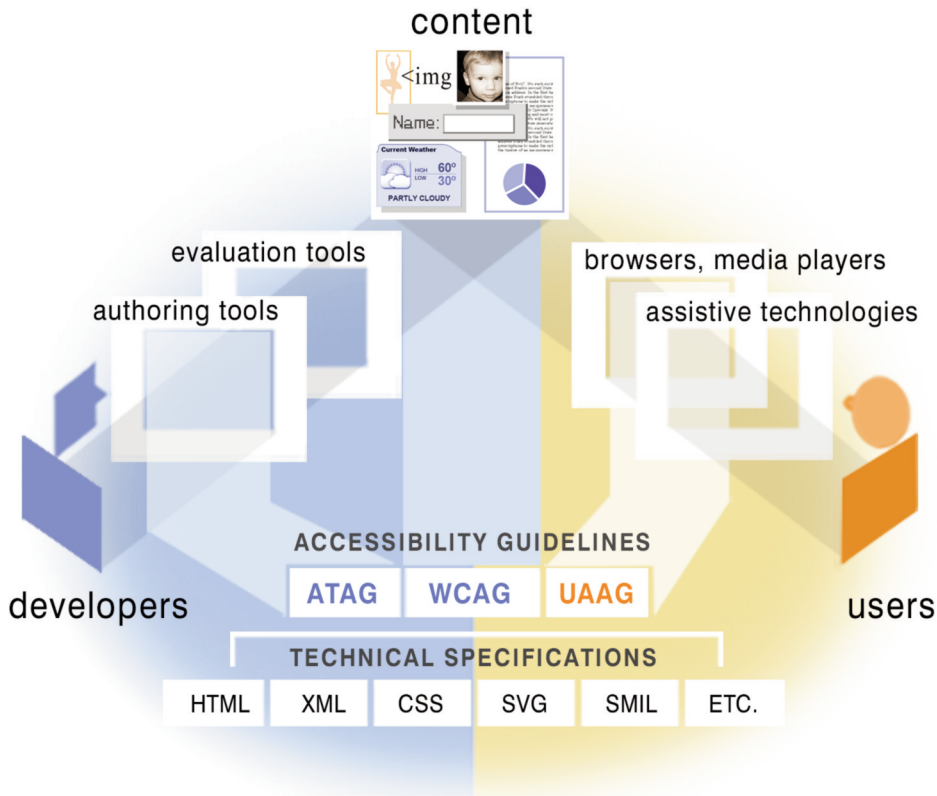


Figure 1: Essential Components (and Interaction) of Web Accessibility¹

afterthought, in order to avoid as many problems as possible, as well as to make localisation smoother. This can be easily applied to accessibility, as that would mean, from a design perspective, to try to account for as many communities of users as possible in the product experience. From a localiser's perspective, a similar choice can be made between considering that accessibility must be *transferred* in parallel with content and, on the other hand, adopting a broader perspective or strategy whereby the product and its experience has to be made useable for as many as possible of the functionally-diverse target communities, thus localising with accessibility in (body and) mind.

As is well known in Translation Studies, a straight transfer ideology is problematic, since the message or content depends at least on context, shared or diverging expectations, intentions and knowledge, channel, form, and, most importantly, on what is implicit. If we combine it with the aforementioned recommendation for internationalisation —together

with the idea that digital products are not just about content, but also (or mainly) about experiencing, doing and interacting— then we should conclude that internationalisation, accessibilisation or universalisation could never be achieved in full, since a technological product needs to communicate its potential use through verbal and non-verbal language, usage conventions, collective references to metaphors and to other cultural (thus culture-bound) products. Similarly, the way users interact with a technological product depends on shared codes (language) and assumptions, but also on the way their bodies and minds work. Functionally diverse users, therefore, need to build and share alternative or complementary codes and assumptions, based both on the “mainstream” ones and on the way they experience reality.

From the opposite perspective, technology pervades everything in a digital product, but technology is based on intelligence, which is also constructed through language. Now, language reflects how

¹ Image by Michael Duffy, from: Essential Components of Web Accessibility. S.L. Henry, ed. W3C (MIT, ERCIM, Keio). Status: Updated August 2005. www.w3.org/WAI/intro/components [accessed 5 Sept. 2012]

designers and code writers understand the world and interact with it, which, at the same time, depends on the way a language uses categories, names objects, builds and weaves relations through morphosyntax, lexical associations, semantics and pragmatics. Granted, many accessibility techniques are "just" embedded in the technology: for instance, the separation of content and layout through CSS; making sure all actions can be made via the keyboard; providing alternative descriptions to images; conforming code to specifications; making time limits or speed adjustable, and so on. However, most such techniques are dependent on language and communication as understood in our approach, and must be filled with actual representations and choices of content, layout, key conventions, informational structures, etc., which need to be recoded for different (or a comprehensive range of) user cultures. Even the 4.1 Robustness guideline, aimed at maximising compatibility with current and future user agents, has an important bearing on the localiser, not only because if a well-formed piece of code is broken in the process of localisation, the assistive technology might not be able to parse (Success Criterion 4.1.1.) and render the content to the user; but also because understanding the way standardised or localisable names, roles, values, properties or labels (Success Criterion 4.1.2) of specific web elements and components are used may be key to carrying meaning, intention and function across in a way that "assistive technologies can recognize and interact with"

(<http://www.w3.org/TR/UNDERSTANDING-WCAG20/ensure-compat.html>).

3. Localising Web Accessibility

3.1 Language-related web accessibility recommendations and techniques

With the purpose of assisting web authors, designers and developers in the promotion and implementation of accessibility in websites, the WAI introduced a set of sufficient and advisory techniques² to help meet three different accessibility levels (A, AA or AAA) of conformance with the success criteria in which the WCAG 2.0 guidelines have been divided up (see Figure 1). As the number of techniques introduced amounted to as many as 570, a series of subcategories were created so as to improve the usability of the document: General, HTML and XHTML, CSS, Client-side Scripting, Server-side Scripting, SMIL, Plain Text, ARIA, Flash, Silverlight

and PDF Techniques. Although fairly complete and evidence-based, their universal and informative (not mandatory) nature has often distracted web professionals from taking a deep dive into the explanations, examples and essential recommendations linked to each guideline. As a consequence, these professionals have tended to favour alternative sets of techniques, equally acceptable, which were introduced by different relevant bodies or organizations, web accessibility stakeholders or their clients. What is more, authors have also ended up relying on their own judgment, or simply overlooking conformance to guidelines, finding them not relevant or too time-consuming to implement (Harper and Yesilada 2008).

As far as *language* accessibility guidance is concerned, WCAG 2.0 guidelines and success criteria often remain particularly abstract, which contrasts with the concreteness of the recommendations addressing more technical accessibility aspects. Similarly, through WCAG 2.0 Techniques, no specific semantic, syntactic or lexical hints are provided on how the final text should be written. The only advice given is very general in nature, thus inevitably making it subject to ample interpretation. Such techniques would include, for instance, using the clearest and simplest language appropriate for the content, clarifying the purpose of a link using the title element, or correctly describing the subject of the webpage in the text content of the <a> tag, while ensuring that it makes sense when read out of context (for example, by a screen reader or in a list of search results).

Another noticeable feature is that there is no subcategory fully addressing language-related issues (Plain Text Techniques embrace merely formatting conventions in accordance with Guideline 1.3 [Adaptable: Create content that can be presented in different ways without losing information or structure]). When present, language-related concerns are usually listed under General or HTML Technique groups, thus hampering their visibility and compliance by web authors. For example, Techniques G17 (indicate new content with boldface and a text indicator), H39 and H73 (use caption and summary elements to provide relevant information about tables), or G96 (ensure that items within a webpage are referenced in the content not only by shape, size, sound or location, but also in ways that do not depend on that sensory perception). On the

² "The 'sufficient techniques' are considered sufficient by the WCAG Working Group to meet the success criteria... 'Advisory techniques' can enhance accessibility, but did not qualify as sufficient techniques because they are not sufficient to meet the full requirements of the Success Criteria, they are not testable, and/or because they are good and effective techniques in some circumstances but not effective or helpful in others" (W3C, WAI 2008) <http://www.w3.org/TR/WCAG20-TECHS/>.

other hand, sufficient techniques usually cover, in more detail, methods for the accessibilisation of non-verbal elements of the website (e.g. colours, mark-up languages, videos...), whereas references to textual accessibility can often be found only under advisory techniques (for example, in the case of techniques for Guideline 3.1 [Make text content readable and understandable]). Thus, not surprisingly, cognitive, language and learning areas are normally highlighted as the weakest points in web accessibility assessments (Harper and Yesilada 2008; Access for all 2011).

This gap in the aforementioned accessibility areas has led researchers to look at related fields of study for answers. Many have underlined the potential of the use of the Semantic Web, stating that “it might enable typical Web content to be converted to a simplified, clearer or symbolic representation” (Seeman 2004, p.70), and arguing that “if a page’s content is expressed through ontologies, this means that the application is able to manage this content and modify it, so that it can be shown in the most convenient way, following the guidelines for web accessibility” (Sevilla *et al* 2007, p.12). Similarly, Natural Language Processing (NLP) modules and web technologies have been combined in research studies in order to tackle obstacles faced by individuals with cognitive impairments or low literacy skills through syntactic and lexical simplification and elaboration, automatic summarisation, or name entities recognition and PoS —classification (Watanabe *et al* 2010). Nevertheless, approaches have usually been presented from a monolingual point of view, occasionally suggesting that “knowledge based accessibility techniques ubiquitously promote other aims of Web Design including device independence, internalization and localization” (Seeman 2004, p.68).

3.2 A framework to analyse localisation-related accessibility issues

As mentioned earlier, the accessibility transfer is hardly ever recognised as a fundamental step in the localisation process (or in the training of localisers, for that matter). Localisation professionals usually fail to prove the necessary accessibility know-how when adapting web products to the target audience, and to master the appropriate web accessibility evaluation tools. In fact, while results of an exploratory pilot study showed that analysing and improving the source webpage in terms of linguistic and stylistic accessibility before translation helped the localisation expert to achieve better readability

results, localisers’ accessibility knowledge also influenced the degree of language accessibility obtained in their respective target products (Rodríguez Vázquez and Torres del Rey 2011). This implies that, even if problems faced by people with cognitive, language and learning disabilities had been reduced in the source page, localised versions would still need to be assessed in terms of accessibility. So, how does a localiser go about checking whether a website is being properly accessibilised? Where does a localiser’s attention need to focus to make sure accessibility is part of the medium and the message being projected onto the target locales (including, so to speak, target “sensoriales” or “funcionales” [*ibid.*])? What elements of the web language can be controlled with the help of a combined authoring-evaluation tool?

In an inspiring recent article, Gutiérrez y Restrepo and Martínez Normand (2010) presented the WACG 2.0 requirements that, on the basis of their extensive work experience with web accessibility and technical translation, they believed to be most relevant for web content localisation. The localisation-related accessibility issues brought forward were organised around the four POUR principles and, ultimately, the success criteria associated with the twelve Web Content Accessibility Guidelines. However, no rationale was given as to how to come up with a consistent communicative framework to assess the degree of success. In this regard, as we have argued that web accessibilisation involves the use of a controlled language (CL), we might want to try to formalise the WCAG 2.0 success criteria into CL rules which take into account desired linguistic accessibility guidelines. Take, for instance, the categories and subcategories compiled by Sharon O’Brien (2003), who draws on Bloor and Bloor’s criterion of primary functionality (what language area is influenced most: lexical, syntactic, textual and pragmatic rules). And yet, we are still missing a key aspect: many of the web components that a localiser must check for proper textual accessibilisation are non verbal, so before considering whether a certain rule must be followed, there must be a proper analysis of the communicative value of the items that need to be accessible. This is the gap we are trying to address.

We need a type of analysis that is based on a more comprehensive idea of language. After all, language-related accessibility techniques depend very much on users’ diverse functionalities, but also on the way verbal and non-verbal (hyper)textual elements can

interact with each other and with the agents (assistive and/or human). All web elements can be considered to have linguistic structure (with subjects, agents, or actors; verbs or actions; objects acted upon; properties, etc.) and communicative value (there must be some sort of agreement as to what the web and the user can do at every moment). As Winograd and Flores argued (1986, p.176), communication “is not a process of transmitting information and symbols, but one of commitment and interpretation”; and digital objects (such as websites) are a “structured dynamic communication medium” that can represent and manipulate this “network of commitments” systematically. What is more, as technological objects, they are (like language) human extensions in the world (McLuhan & Powers 1995, p.24). Therefore, lexical, syntactic, textual and pragmatic rules must be extended to accommodate non-verbal communication and interaction.

This can be done by introducing a more semiotic framework, as understood, for instance, by Roland Barthes (1968). “Signs take the form of words, images, sounds, odours, flavours, acts or objects ... Anything can be a sign as long as someone interprets it as 'signifying' something - referring to or standing for something other than itself. We interpret things as signs largely unconsciously by relating them to familiar systems of conventions. It is this meaningful use of signs which is at the heart of the concerns of semiotics” (Chandler 1999). In Barthes’s view, verbal and non-verbal signs must all ultimately resort to the system and the process of language, where their signification is the result of the joint action of the signified (content) and the signifier (the material form, the designation, and the layout): “it appears increasingly more difficult to conceive a system of images and objects whose signifieds can exist independently of language: to perceive what a substance signifies is inevitably to fall back on the individuation of a language: there is no meaning which is not designated, and the world of signifieds is none other than that of language” (Barthes: introduction).

For the French semiotician (as for Widdowson), *value* (as opposed to “pure” signification) is the meaning of a sign *in context, in relation with other signs*, when it is put to use for *communicative purposes*. It is this concept of value that we will use in order to assess the meaning and significance of the different signs in a webpage, and, crucially, as a benchmark for appraising success in localising

accessibility. From a communicative, linguistic or semiotic point of view (we use these adjectives interchangeably as regards our approach, given their interrelationship), we might want to look into theories regarding speech acts, or any other accounts of non-referential uses of language, for a definition of the possible values of communicative items found in and around websites. To simplify, however, we suggest that attention should be focused on certain linguistic values of the content and layout of the different signs (roughly, computer code elements such as paragraph text, tables, images, hyperlinks, embedded video, and so on) present in a website: apart from *referential* meaning, it is important to assess the *functional*, *aesthetic* and *structural* value, which every sign irradiates (and is irradiated) about itself and the surrounding signs to a lower or higher degree through content and layout. In order to illustrate this approach, we will take the example of images (coded within the `` tag), and particularly its *alt* attribute, which helps users determine what the non-verbal content is.

3.3 An example: text alternatives for images

The most common method to introduce short text alternatives³ for images is providing an *alt* attribute within the HTML `` element. Its main function is to serve as a substitute for the image in cases where the image itself cannot be displayed—for instance, when images are disabled through the web browser, while waiting for the images to download, when using text-only browsers...—or seen—for example, by users of screen readers or refreshable Braille devices with visual disabilities—(Craven 2006; WebAIM 2005). While the use of the *alt* attribute is explicitly recommended in Success Criteria 1.1.1 [All non-text content that is presented to the user has a text alternative that serves the equivalent purpose], under Guideline 1.1 [Provide text alternatives], there are multiple WCAG 2.0 Techniques covering the different usages of images and their text equivalent, either under the HTML subcategory or the General subcategory (see Table 1). Although they are not within the scope of this paper, it is worth mentioning that methods to provide descriptive information in other contexts are also present in various WCAG 2.0 Techniques; for example, G158 refers to the alternative text accompanying audio content and recommends the bracketed addition of “text transcript follows” or “text description follows” after the title of the file; and through G74, the WAI recommends to introduce a pertinent description of the non-verbal element as part of the standard

³ When it is necessary to introduce a long-text description, W3C-WAI recommends the use of longdesc attributes (WCAG 2.0 Technique H45).

Image	Sample scenario	WCAG 2.0 Techniques: Best practice for alt usage	Suggested accessible alt content
Referential Value			
image complementing main textual content	A picture shows how a knot is tied including arrows showing how the ropes go to make the knot	G94: Convey same purpose and information as the non-text content	The text alternative describes how to tie the knot, not what the picture looks like.
ASCII art, emoticons and leetspeak	=8-0	H86: Offer a text explanation of what the picture is	“fright”
interactive area	Image depicting the floor plan of a building	H24: The <i>alt</i> serves the same purpose as the selectable regions of an image map	“Building’s floor plan. Select a room for more information about the purpose or content of the room.”
content image	Rating system in HTML: three filled stars and two empty stars	G196: Avoid unnecessary duplication that occurs when a grouping of adjacent non-text content is used to present information or functionality	First star: “3 out of 5 stars” Other four stars: “” [null alt] ⁴
Functional Value			
icon	A link contains text and icon, and the icon provides additional information about the target	H30: Use descriptive title for the link and add information about the target in the <i>alt</i>	“PDF format”
complex image, chart, graphic	Image/chart too complex	H45: Provide information in a separate file when a short text alternative does not adequately convey the function or information provided in the image	“a complex chart”
button	There are multiple submit buttons on a page, and each lead to different results.	H36: Using <i>alt</i> attributes on images used as submit buttons to indicate their specific function.	“submit form”
CAPTCHA	A CAPTCHA test asks the user to type in text that is displayed in an obscured image	G143: Provide a text alternative that describes the purpose of the CAPTCHA	“Type the word in the image”
Aesthetic & Structural Value			
decorative image	Image with an spiral introduced as a decorative element	H67: Mark images that should be ignored by Assistive Technology	null alt ⁵ , or a definition of mood or aesthetics being transmitted
image representing unordered list	Bullet points used in a list as a visual formatting hint	Not explicitly considered under WCAG 2.0 Techniques. Recommendation by authors: either the list punctuation or an equivalent expression should be employed, at least if not obtrusive	“bullet point”, “new item”, “next item in the list”
general image, line	Line(s) dividing the webpage in different sections	Not explicitly considered under WCAG 2.0 Techniques. Use of CSS is usually recommended for this purpose. Recommendation by authors: Offer a text explanation section boundaries.	“End of section 1. Beginning of section 2”.

Table 1: Classification of images () based on their communicative value and examples of recommended accessible alt content in English

⁴ Except for the last two ones, sample scenarios have been taken from WCAG 2.0 Techniques.

⁵ If the *alt* text is set to null (i.e. alt="" —recommended— or alt=" "), it means for assistive technology that the image can be safely ignored (W3C, WAI). Having a "null" *alt* attribute is not the same as having no *alt* attribute. While the former conveys a clear message to the user (it communicates), the latter, considered as a non-accessible technique, could lead users to think that they are missing important content in the page. Also, when the image has no *alt* attribute, some screen readers read the file name of the image, which can be confusing to listen to (WebAIM).

presentation, for instance, by locating it near the non-text content (e.g., “October sales chart for top three salespeople. Details in text following the chart: ”).

The lack of accurate and standardised guidelines on how to apply short-text alternatives for images has resulted in many sets of recommendations published by different bodies, both at national and international level (WAI, WebAIM, US Access Board), and academics (like Slatin, Pilgrim, MacAlpine or Korpela). Contrary to what was expected, this has made what was a problematic situation into a chaotic one, triggering endless discussions on when to write the alternative texts and by whom, if they should exist or not depending on the type of image, which words to use, or how many total characters the wording should have (Craven 2006). However, in our research, based on the updated version of the WCAG 2.0 Techniques (dating from 3rd January 2012), we will apply a semiotic framework, as described in the previous subsection 3.2, to classify alternative texts on the basis of the communicative value of the

perspective, both at source and target levels.

Table 1 shows an example of a possible analysis of alternative texts for images based on the communicative value of the image as a sign within a webpage. Images are grouped according to the main (but not only) value of their content, position or layout. The last column offers a suggested text alternative according to the different communicative values perceived for the image:

4. Language-related web accessibility evaluation (WAE)

4.1 State of the art

4.1.1 General scenario

The achievement of linguistic accessibility in websites, regardless of or in accordance with their locale, is, as we have seen, a goal far from being met on a large scale nowadays. The vagueness of language-related techniques has influenced their evaluation, including the definition of linguistic

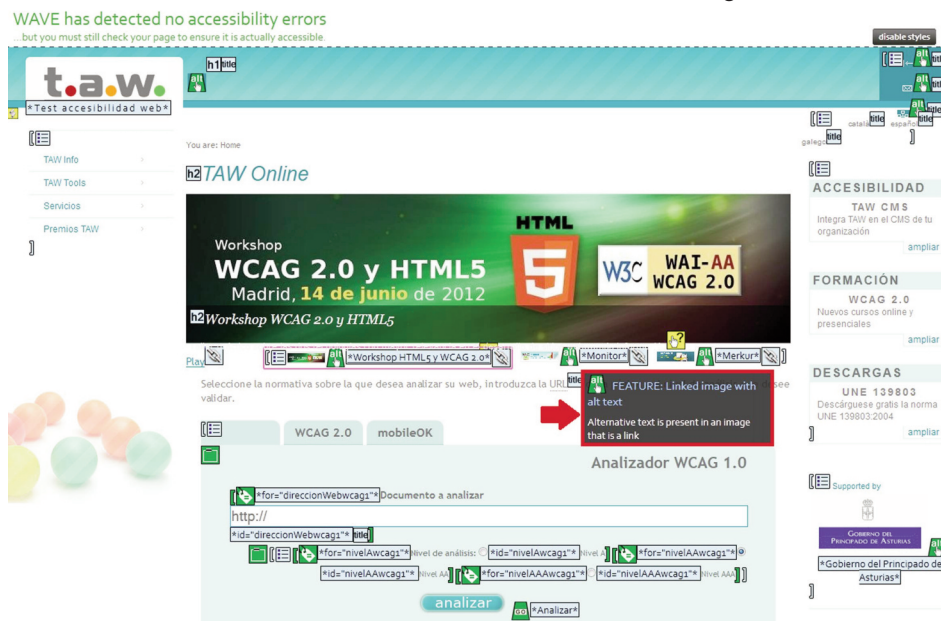


Figure 2: www.tawdis.net web site checked by WebAIM’s web accessibility evaluation tool WAVE

corresponding image. We believe that this approach would enhance the language accessibility degree achieved both during web authoring and localisation processes, since the value of the message that needs to be transferred would be easier to retrieve and convey from a linguistic point of view. Besides, this might prove to be a potentially useful evaluation methodology for alternative text for images, which could be applied from a controlled language

patterns to be recommended or avoided. Generally speaking, “different methods exist to evaluate accessibility of web pages, which can be categorized into five groups: Inspection methods, automated testing, screening techniques, subjective assessment, and user testing” (Brajnik *et al* 2011, pp.249-250), although an even broader distinction is commonly made between automatic evaluation and human-based evaluation techniques. The former, despite the

obvious advantages it has (higher volume of data processed, time savings, among others) —as it is “performed by software, without the need of direct human intervention, and with expertise embedded in a software framework/tool” (Fernandes and Carriço 2012, p.2)—, also presents important limitations, not only in terms of the depth and completeness of the analysis carried out (*idem.*), but also regarding the transparency of the results, since the successful production of error messages by the accessibility checking software often prevents the evaluator from knowing whether an important aspect has been omitted in the process.

provide a more detailed evaluation report, some tools have come up with solutions that are intuitive and offer more guidance to the user, such as classifying the errors per principle, guidelines, success criteria and techniques, or according to different typologies of error; in the case of IBM’s web accessibility checker aDesigner, accessibility problems are labelled with colours which indicate, for instance, if the error has to be confirmed, or if it is an issue that needs a human check. And yet, techniques are just mentioned, but no further description about how to meet them is provided (see Figure 3: 42 items were listed under “Human check”; one of the remarks

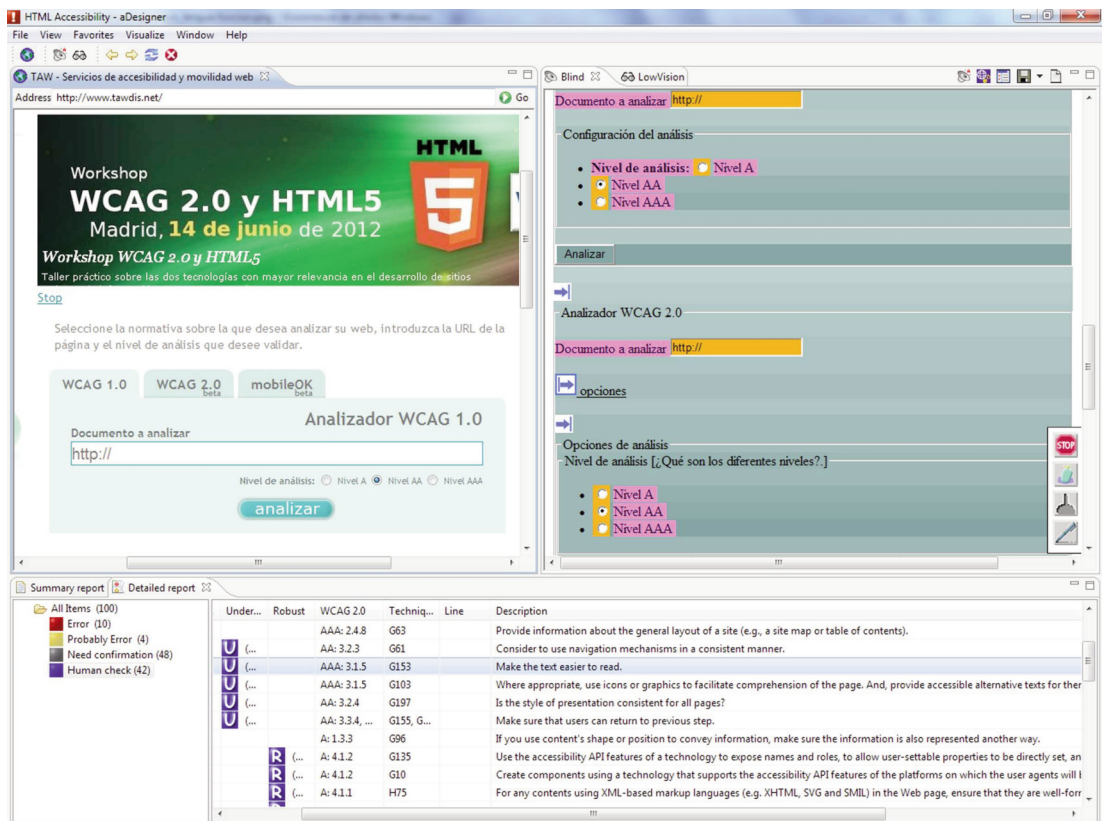


Figure 3: www.tawdis.net web site analysed by IBM’s web accessibility checker aDesigner.

In Figure 2, for example, we can see that WAVE, the free web accessibility evaluation tool provided by WebAIM, has detected no accessibility errors. However, in the case of the message regarding the alternative text of an image (see arrow: “Feature: Linked image with alt text. Alternative text is present in an image that is a link”), the checker acknowledges the existence of the *alt* attribute but no information is given about its content. In order to

points to Technique G153 [Make the text easier to read]). It is finally worth mentioning that no direct references to specific linguistic issues (syntactic, stylistic, grammatical or lexical) as regards the language of the page (in this case, Spanish) are made in any of the examples from the figures.

All of these warnings usually create unnecessary noise, since they are given when “it is not possible to identify certain characteristic of an element as right

or wrong, without the need of an expert intervention” (Fernandes and Carriço 2012, p.2), and, sometimes, they point at accessibility issues that might already be solved. Evaluation verdicts in these cases very much depend on the metrics applied⁶. In order to clarify these warnings, simulations, subjective assessments and user testing sessions are usually carried out by a selection of people with functional diversity or by experts, who “can be characterized in terms of (a) the practice in using a specific evaluation method... and (b) the knowledge, practice, and skill in accessibility in general (on assistive technologies, typical accessibility problems, user behaviours or user preferences)” (Brajnik *et al* 2011, p.251). Nonetheless, what is known as the “evaluator effect” phenomenon still causes discrepancies regarding the existence of accessibility barriers or how severe they are (*idem.*). Although efforts have been made to create a Unified Web Evaluation Methodology (UWEM, http://www.wabcluster.org/uwem1_2/), covering also methods for manual content selection and interpretation of test results, the current version (1.2) has not been updated and still does not cover WCAG 2.0 Guidelines and Techniques.

In this regard, language-related accessibility testing guidance has often been consigned to oblivion, probably due to the factors that we have presented earlier. Incipient research is being carried out regarding syntactic simplification, and more broadly speaking, text adaptation to specific users, generally following two main operations: “remove unnecessary information from the text, and add information that better explains difficult terms” (Watanabe *et al* 2010). However, up to the present time, no communicative approach has been applied, multilingualism has not been taken into account, and only the needs of particular groups of users (people with low-literacy skills, people with dyslexia...) have been addressed. There is no doubt that final users should be involved in accessibility evaluations, but as deduced from different studies, the level of expertise of the evaluators plays a fundamental role in the quality of web accessibility assessments, as well as the metrics applied (Brajnik *et al* 2011). Taking this assertion into account, localisers should appear as the appropriate actors to validate linguistic accessibility issues, given their interdisciplinary knowledge, covering linguistic, cultural and technical web aspects. For instance, consistency and coherence issues (e.g. Technique H2, aiming at avoiding

unnecessary duplication that occurs when adjacent text and iconic versions of a link are contained in a document) might go unnoticed to end users of accessible websites, contrary to what would be expected from localisation professionals.

4.1.2 Evaluating accessible text alternatives for images

As in the case of web textual content evaluation, assessment of text alternatives for images also relies on the subjectivity of the users performing the accessibility test. Besides, although the detection of *alt* attributes can be fully automated nowadays (see Figure 2), no deeper analysis of its content is featured in regular automatic web accessibility validators. Both facts, as well as authors’ usual lack of awareness and advanced knowledge about the subject and the use of publishing software that automatically assigns text alternatives to images, have led us to consider the non-existence of good quality *alt* content as one of the main barriers identified throughout web accessibility studies (Access for all 2011). In order to bridge this gap, several automated checking methods have been introduced based on optical character recognition (OCR) techniques (analysing whether there is textual information in the image and whether it corresponds to the *alt* content), classification algorithms (such as Nearest Neighbor and Naïve Bayes), statistical data extraction, and dictionary-based word search (Bigam 2007). Other techniques have included comparative analysis of *alt* text length and image file size, or *alt* text length and number of images on the page (Craven 2006), as well as pattern recognition approaches. The latter have mainly shed light on elements that should not be present in the value of the attribute; for instance, non alphabet characters, file type abbreviations, HTML code or a continued series of numbers (e.g. `alt="0111243.gif"`) (Goodwin 2010). Yet, already “many screen reader users write custom scripts in their screen reading software that prevents alternative text known to be bad, such as 'image', 'spacer' or '*' from being spoken” (Bigam 2007, p.349). Despite this significant progress, achieved in research projects still under development, a more language-focused approach is needed to reduce meaningless noise in automatic check results and provide specific linguistic-oriented guidelines.

4.2 Linguistic accessibility evaluation proposal Machine-verifiable accessibility checkpoints are

⁶ Fernandes and Carriço (2012), for instance, have used specific metrics in their experimental studies including three different rates: a Conservative rate (where ‘warn’ results are interpreted as failure), Optimistic rate (where ‘warn’ results are interpreted as passed) and Strict rate (where ‘warn’ results are dismissed). Depending on the rate chosen, a given webpage might be considered more or less accessible.

similar in number to those that cannot be validated through software (Vigo *et al* cited in Lopes and Carriço 2010). We are particularly concerned with bridging this gap with regard to language based accessibility issues. Our ultimate goal is to develop a methodology through which expert and automated evaluation practices are merged by means of a state-of-the-art controlled language checker, such as Acrolinx IQ, which would allow us to apply a non universal, customisable evaluation method, depending on the locale, the product, or even the end user's group(s). The first evaluation level of *alt* text (simple detection of *alt* attribute presence or omission within the element) is already covered, as we have seen, by most accessibility validators. Our proposal, however, aims at reaching a second level of analysis, by providing users of accessibility checkers (whether web creators or localisers) with pertinent and valuable feedback on the linguistic accessibility quality that has been achieved, given a set of human-oriented controlled language (HOCL)-based rules covering lexical, grammatical and stylistic characteristics of accessible texts (for instance, avoidance of double negatives, length of sentences, degree and type of subordination, etc.). In this regard, and at this very same second level, spelling and grammar checks can also be run automatically, according to the locale of the page.

Yet, the potential of using such a tool for linguistic accessibility validation goes even further. Through the Acrolinx IQ Batch Checker, for instance, it is possible to reach a third level of analysis, and define the elements of the web document that we want to evaluate. Context Segmentation Definition (CSD) files determine the document segmentation settings, indicating which part or element (or sign, in our framework) of the web content will be checked against a certain group of rules. Based on this functionality, we propose an approach both for 1) achieving a more linguistically accurate evaluation of text alternatives based on their web context, and 2) guiding the localiser on how to accessibilise image-based content from a different perspective, that is, providing them with controlled language patterns and pragmatic information about the semiotic value of the *alt* attributes in the web page being localised.

The latter would constitute a fourth level of communicative analysis. After filtering (through CSDs) what signs (e.g. images) and subsigns (e.g.

interactive areas or image maps, or graphic submit buttons) to validate (the above-mentioned third level of context- or sign- based analysis), the tool would provide the localiser with:

- 1) Hints about their semiotic value (e.g. Text alternatives for image maps are often descriptive, but also need to convey an instructive message at the end, so that users know how to interact with them);
- 2) The linguistic patterns (formalised in rules) often used or recommended when trying to communicate that specific value (e.g. noun phrases should be used for the first descriptive part, whereas the imperative form of certain verbs should be used in order to indicate orders);
- 3) Accessible and non-accessible examples of that category (see again suggested accessible *alt* content for interactive areas in Table 1).

In order to define those patterns, we need to analyse, beforehand, how the communicative value of images can be linguistically formalised, and to create context-based rules, to assign them to a given CSD. Feedback to the user would be provided through “negative accessibility indicators” (following O’Brien and Roturier’s terminology, 2007) but also through positive guidance. This means, on the one hand, that the tool will not only look for accessibility problems, but it will also present the specific errors spotted and possible suggestions (if any) to correct them. On the other hand, it will show the text that has been validated, and offer an explanation of the linguistic patterns and associated communicative strategies that may have been used originally to accessibilise the web element, thus providing the localiser with important information for the task at hand.

Another important benefit of implementing this use of Acrolinx IQ, especially within the localisation process, would be the high level of customisation of the evaluation patterns depending on the language or locale. Since linguistic rules (and eventually the values of non-verbal signs⁷) are not always transferable from one locale to another, validation results would be more pertinent and reliable. We could even expand the tool’s functionality to allow it to compare the language accessibility rules followed in each locale version of the webpage, which would

⁷ Take, for instance, icon images such as ticks (check-marks), country flags, crosses or culture related mailboxes. Their meaning and semiotic value in the web might vary depending on the culture, the web product or the target users.

provide the localiser with valuable information about what was accessible in the source page, what needs to be maintained and what requires being adapted to the target locale. Taking all of the above into account, more CSD could be developed to assess the linguistic accessibility of other web elements containing text, such as <summary>, <caption>, <blockquote> and <legend>, or attributes like *title* or *longdesc*. Prior analysis from our proposed communicative approach would help to determine their linguistic characterisation, and applied rules could be created for a new controlled-language check.

5. Conclusions and future work

In this article we have brought to the forefront the idea that language is a key aspect in web accessibility. This definition of accessibility, which shares a lot of common ground with localisation, as underlined by Ultan Ó Broin (2004) and Gutiérrez y Restrepo (2010), has inspired our research, leading us to the proposal of a new theoretical communicative framework aimed at designing an evaluation methodology that could be helpful for web authors and for localisers. On the other hand, complementing existing WAE tools with state-of-the-art NLP-based software, such as Acrolinx IQ, could mean a significant improvement on the current degree of linguistic validation offered by web accessibility evaluation technology. From a localisation perspective, professionals in the field could also leverage the advantages of a language-based accessibility validator, either as a quality assurance technology or as a complementary tool to compensate for the lack of advanced knowledge in the matter.

The proposed theoretical framework has not yet been fully tested empirically, although there are indicators from the research and the industry communities that this path is worth pursuing. Pilot studies on linguistic accessibility validation have been successfully carried out with Acrolinx IQ up to the second level of analysis described at the beginning of subsection 4.2. We are currently analysing the data regarding image text alternatives extracted from an accessibility study on 100 Swiss pages (Access for all 2011) and we expect to have some positive results soon. We also intend to evaluate those outcomes involving both end users of accessible web pages and localisers. Although it still is an incipient work, our proposal offers the potential of interconnecting the fields of web accessibility, localisation, and NLP in a unique way that we believe will have an important impact on

our research community.

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