

Assistive Tools to Reach European Accessibility Web Standards

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Abstract. People with disabilities can use assistive technology to browse the Internet, but web sites must respect WCAG recommendations in order to be easily visited. Creating accessible web sites can be a difficult task for small communities because web sites are sometimes managed by beginner webmasters. We have developed tools for helping them to reach accessibility compliance. It can be used to create or modify a web site in order to reach, step-by-step, a better level of accessibility. It is designed to assess the compliance to HTML, CSS and WCAG specifications. Our tool integrates the UWEM specifications published by the WAB Cluster for harmonizing assessment methods in Europe.

Keywords: web accessibility, guideline, automatic corrector tools.

1 Introduction

With the fast Web development, many services have been proposed to users. Among them there are commercial services (online purchases, plane or train ticket reservation...) and administrative services [11]. These online services can be perceived as a faster method to obtain documents, information or objects. For example, administrative approaches which requires a travel - as well ordinary or trivial are they - actually remains not easily accessible for blind people. However, access to written documents (digital ones or not) is not so simple for visually handicapped people. During centuries, only rich blind persons have accessed to written culture with the help of sighted readers. The Braille writing has enabled a real evolution for autonomy of many visual disabled people. Braille devices and voice synthesizers have permitted blind people to use computers autonomously. It is then possible for them to browse the Web with autonomy. Other handicapped people use also assistive technologies adapted to their disability. Nevertheless, to be able to be correctly interpreted by these assistive technologies, Web sites must respect some criteria defined by the Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C) [9].

To facilitate web access for disabled people, various laws have been passed making mandatory to respect WCAG (Web Content Accessibility Guidelines) criteria [6] of the WAI. From 1998, the united States have begun to feel concerned about

numerical accessibility through the law about readjustment of handicapped people. More recently, European countries passed similar laws to bind public sites to reach accessibility. It is only during February 2005 that this law was passed in France [3].

An INSEE investigation [12] made it possible to count in France 8 million people with reduced mobility and 6 million of sensory deficient people — of which 3 million have a visual attack. Among them, blind person number was estimated to 70000 [13]. All these people have particular needs for Internet browsing, and are directly concerned with an accessible Web. Building an accessible site allows to enforce the legislation but also to increase greatly the number of visitors. They also will be able to become possible customers for commercial Web sites. By definition, an accessible site allows an equivalent access for all people and all consultation technology used. An accessible site also allows a facilitated access to seniors and wandering Net surfers. Finally, it allows a better use of sites for any Net surfer.

However, although law imposes accessibility in France to institutional Web sites, the migration towards an accessible Web site can prove complex especially if aforementioned site was set up by a novice webmaster, particularly in the case of small collectivity. In order to help local communities in the field of accessibility and in collaboration with the General Council of Indre-et-Loire, we have created several assistive tools for the creation and migration of accessible Internet sites: a guide, a validator and a corrector. The goal is to supply a set of tools adapted to small community's French needs: tools with teaching aid, easily usable, which allow obtaining Web sites compatibility towards WCAG standards but also French [5] and European [21] standards.

In this paper, we describe each of the tools: we first present our assistive tool to reach accessibility compliance; in the next section we describe our accessibility validator; and in the third section we present our automatic corrector. Finally we conclude with main perspectives.

2 Guide for Creation and Migration of Accessible Web Sites

The guide we have developed makes possible to inform and to help people wanting to reach or create an accessible web site. Guides already exist on Internet and some of them summarize what is accessibility. The main French guides available are for example Voir+ [19], Braillenet [8], La Grange [10], et Accès-pour-tous [1] They also provide links towards tools for automatic validation such as HTML Validator [23], CSS Validator [24] and towards accessibility validation tools. The Voir+ guide is composed of official documentation links, i.e. HTML [16], CSS (Cascading Style Sheets) [22] and WCAG recommendations. Some guides like Braillenet, La Grange and Accès-pour-tous propose technical forms allowing the resolution of errors highlighted by the validation tools. The Accès-pour-tous guide also proposes validation tools, with which it is possible to test a site according to priority levels to reach. About errors, they are displayed directly inside the HTML source code. For each error, there is its corresponding level of priority and a help for its resolution. Beyond a purely computer-science approach, the characteristic of the "Dive into accessibility" guide of La Grange is to bring to knowledge some handicaps. With this goal,

characters are presented in situations, in order to make the public aware of the difficulties that they can encounter on Internet.

Our tool gives information on accessibility concepts. It explains why it is advisable to make an accessible site, and presents the legislative context in France. Information about visual handicap and assistive technologies to solve problems encountered by visually handicapped people on the Web is also described. Moreover HTML, CSS and WCAG standards, and official documents are referred. In addition to the references of the various existing tools for automatic validation, it provides help for use. It also provides explanations of the most often errors observed on Web sites (pictures, links...), and proposes solutions for them. In addition, our tool has a more practical mission which consists in offering real instructions to reach or create an accessible site. For example user can record his progress in validation of technical forms. Moreover a form is used to state the kind of site to consider. It provides detailed instructions containing various steps to be followed. We discern two different cases: firstly the creation of accessible Web site, and secondly the creation of accessible Web site from an existing Web site. Figure 1 illustrates the two stages suggested in the first case (create an accessible Web site). These stages differ according to the size of the site, which is the principal differentiation criterion of local communities Web sites.

Our software also provides a set of practical tools (technical forms, explanations on main validation tool used, and helps to correct main errors). These tools can be used alone or while the various stages to create or reach an accessible site are performed.

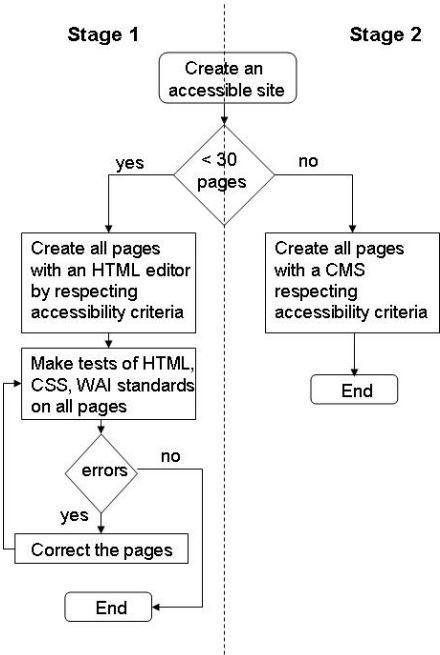


Fig. 1. Two possible stages to create a new accessible Web site

3 Automatic Validator to Check European Accessibility Criteria

At the site creation or modification phase, in order to reach accessibility compliance it is necessary to check the compliance with accessibility standards (it’s a checkpoint tackled in personalized instructions of our guide). Several automatic tools which are able to check code are available on-line. The most important ones are HTML Validator and CSS Validator which make possible to test whether page’s code does respect the standards. We can also find various tools such as WebXACT [20], Ocawa [18] and A-Prompt [4] related to WCAG standards about Web sites accessibility. So user must use three different validators: one for HTML, one for CSS, and another one for accessibility. Moreover these validators provide a listing of errors ordered by their apparition in source code. However it is easier for a beginning webmaster to correct one error repeatedly instead of following the order of source code.

For these reasons, our tool possesses its private automatic validation tool. Like other validators, it permits to verify on line web pages and to verify pages by uploading them. Moreover our validator can check several pages in one check. This validator is also able to check HTML specifications, CSS specifications and WCAG specifications in one check. So it is not necessary to use many validators for each specification. Results are aggregate by error and can be classified according to HTML, CSS, or WCAG conformity, by themes (pictures, tables, scripts...), and by WCAG priorities.

The figure 2 presents an extract of HTML, CSS and WCAG results for all theme errors. Here only priority 1 WCAG errors are presented, because in this example user want obtain WCAG–A compliance.

Un site Web accessible

Outil d'aide à la création et à la migration de sites accessibles

Accueil - Plan - Glossaire -

| Erreur | Type | Attribut | Directive | Priorité | E/W |
|--|-----------|--------------|-----------|----------|--------------|
| required attribute "ALT" not specified | HTML 4.01 | alt | | | 53 erreurs + |
| there is no attribute "BACKGROUND" | HTML 4.01 | background | | | 1 erreur + |
| there is no attribute "HEIGHT" | HTML 4.01 | height | | | 2 erreurs + |
| there is no attribute "MARGINHEIGHT". | HTML 4.01 | marginheight | | | 1 erreur + |
| there is no attribute "MARGINWIDTH" | HTML 4.01 | marginwidth | | | 1 erreur + |
| required attribute "TYPE" not specified | HTML 4.01 | type | | | 2 erreurs + |
| no document type declaration; implying DOCTYPE HTML SYSTEM | HTML 4.01 | | | | 1 erreur + |
| there is no attribute "LEFTMARGIN" | HTML 4.01 | | | | 1 erreur + |
| there is no attribute "TOPMARGIN" | HTML 4.01 | | | | 1 erreur + |
| Il y a 53 images sans texte alternatif | WCAG1.0 | | 1 | P1 | 1 erreur + |
| Vérifiez qu'il n'y ait pas une information transmise seulement par la couleur. | WCAG1.0 | | 2 | P1 | 1 warning + |

Fig. 2. HTML, CSS and WCAG results

3.1 Our Validator Structure

For developing this validator we used various existing and open source validator. For testing HTML standards we used W3C HTML validator and for testing CSS

standards we used W3C CSS validator. For testing WCAG standards we used free and open source software called HERA [17]. The HERA validator has been developed by the Fundacio Sidar. These three validators are executed in one operation on web pages. The test results are saved in a database, which is used to check the failures of the web sites. So user can visualize the results of validation later, without restarting the validator. For a tested page, we save in database the following data: title error, type error, attribute or marker which causes HTML or CSS error, and WCAG checkpoint corresponding to WCAG error. This corresponds to the dynamic part of the database. The second part of the database is static. Each attribute or marker corresponds to a theme and is linked to one chapter of HTML or CSS specifications. Each WCAG checkpoint belongs to a guideline which is linked to the corresponding chapter in official documentation. Moreover each checkpoint corresponds to a theme.

3.2 The European Accessibility Standards

WCAG recommendations have been adopted widely in Europe and several labels have been developed on them. For example AnySurfer [2] (Belgium), See-it-Right [14] (England), Drempels Weg [15] (Netherlands), Sello de Accesibilidad MEWA [5] (Spain) and Accessiweb [5] (France) are national recommendations developed on WCAG recommendations. The WAB Cluster has published the UWEM Methodology [21] to harmonize assessment methods. Actually, Accessiweb, Sello de Accesibilidad and AnySurfer have joined this European project. Our tool integrates the UWEM specifications. For each error detected, our validator presents the UWEM tests corresponding. This makes possible to integrate also the correspondences between different labels and the UWEM, following the recommendations of a CEN Workshop Agreement, and the Support-EAM project. For instance we have integrated the Accessiweb/WCAG correspondence for France and we plan to extend this to labels used in other European countries, such as Sello de Accesibilidad and AnySurfer.

The figure 3 presents results obtained by testing Accessiweb criteria (level “Bronze”). By clicking on the button “+”, user can see Accessiweb checkpoint and visualize corresponding chapter in Accessiweb recommendations. He/she can also see UWEM tests with corresponding chapter in UWEM translation realized by BrailleNet association.



Fig. 3. Accessiweb results and corresponding UWEM criteria

4 Automatic Corrector of Accessibility Errors

Although enumerated (for example by a validator), a novice webmaster can meet difficulties to correct errors. Therefore, we carried out a Web page corrector to help webmaster.

4.1 Corrector Structure

In order to facilitate development of our tool, we created it like a treatment's platform on Web pages, which makes it possible to create and use processing easily, without modifying entirely the program. We have separated our tool in two distinct parts: the Web pages transformation motor, and some plug-ins managing each one a processing. Plug-ins corresponds to various processing which it is possible to execute on a Web page. For example, a processing can allow carrying out Web page statistics, source code indentation... Our aim is to carry out some plug-ins, which allows obtaining an accessible Web site. Thus we have created a specific plug-in for each WCAG checkpoint.

4.2 Plug-In Choice

Each plug-in must correct pages in order that they respect the corresponding specification. To reach this purpose, we have studied WCAG specifications to determine: (1) if correction requires only human intervention: in this case, it is not useful to create a plug-in; (2) if correction can be carried out in a semi-automatically way: in this case, a plug-in can be created to ease correction. This kind of plug-in must be executed by motor in "manual" mode; (3) if correction can be carried out automatically: in this case, a plug-in must be created. This plug-in can be executed in "automatic" mode to make transformation without human intervention, or in "manual" mode for webmaster to choose among several transformation configurations. This platform has been created for novice webmaster, therefore webmaster intervention, in manual mode, is simple and intuitive.

Our application being initially intended for webmasters of local authorities, we estimated the WCAG 1.0 accessibility on 50 Web sites of Indre-et-Loire city. Results of this study are given in figure 4. We can see 4631 errors detected, which are dividing up essentially on the guideline 3, 11, and 1 (with respectively 43 %, 42 % and 9 % of the errors). Moreover we can see on figure 4 (b), that the checkpoint 5 obtains 26% of warnings. This distribution of main errors is not the same in the evaluation of small collectivity Web sites and in the evaluation of commercial French web sites. In commercial French Web sites errors are dividing up essentially on the guidelines 6, 10, and 3 (with respectively 25 %, 22 % and 18 % of the errors). Indeed commercial Web sites use a lot of scripts and applets, but small collectivities Web sites do not use these technologies. Our tool is designed for small collectivities; so we have firstly realized plug-ins for most important errors in French small collectivity Web sites: checkpoints 5 (about tables), 1 (about picture image maps), 11 (about deprecated features of W3C technologies) and 3 (about header elements, CSS, lists).

4.3 Use of Plug-In

All developed plug-in can be used in manual mode. This mode requires the intervention of webmaster. Graphical interface suggests alternative solution or asks information to the webmaster.

For example, figures 5 and 6 illustrate interfaces for the checkpoint 1.1 which consists in adding alternative texts for all non-textual elements. On figure 5 we can see the interface presented to webmaster used to add textual information for a picture.

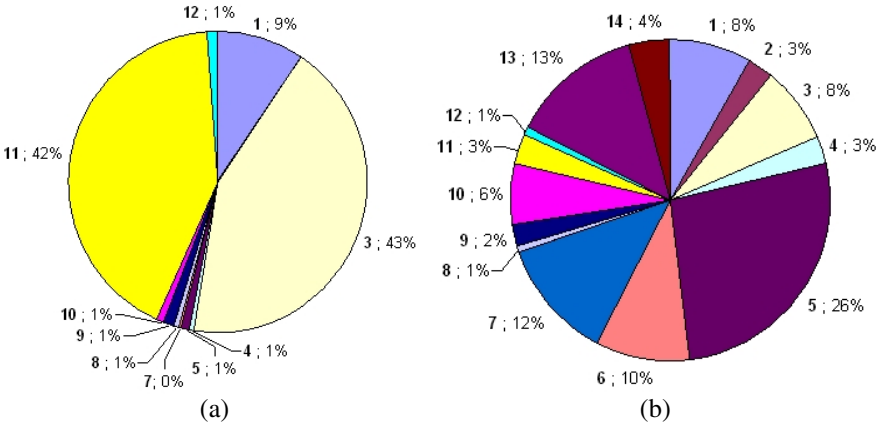


Fig. 4. Errors (a) and warnings (b) distribution in a study realized on 50 Indre-et-Loire city Web sites. The first number is le number of WCAG Guideline and the second is the percentage among errors (a) or warnings (b).

The Figure 6 depicts the interface used to add textual information for image map regions. To help webmasters to give alternative text, the non textual element is displayed.

Regarding tables, checkpoint 5.3 specifies that layout tables should not be used. The plug-in of this checkpoint allows to detect tables and to restructure information they contain if they are not data tables. The window of figure 7 appears when a layout table is detected. A general survey of layout table is visible in top of this window. The example table used in figure 7 has a direction with a linear reading. Thus this table can be preserved from causing damage to the page accessibility. So, it is possible to

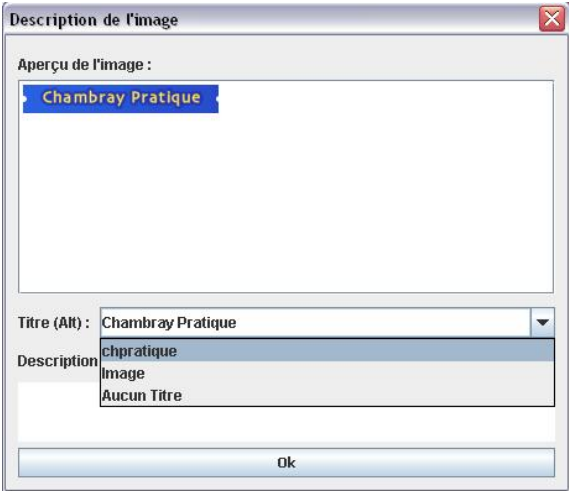


Fig. 5. Plug-in interface to add alternative text for pictures (checkpoint 1.1)

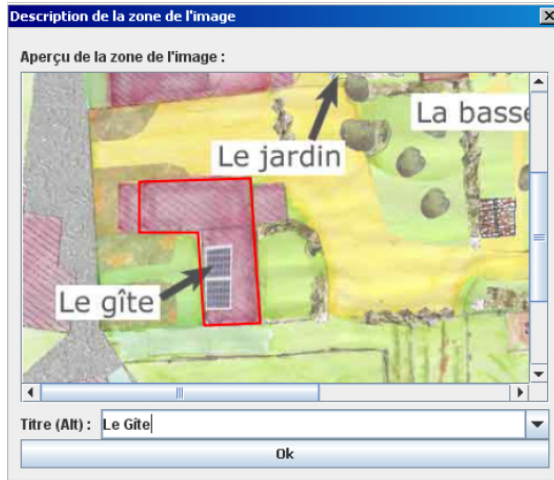


Fig. 6. Plug-in interface to add alternative text for image map regions (checkpoint 1.1)

click “*Ne pas modifier*” (do not modify) choice (to keep layout table unmodified). But the webmaster can choose to remove this table by choosing one of the three other configurations: (1) reorganization of the table which has a horizontal reading direction; (2) reorganization of the table which has a vertical reading direction; (3) deletion of the table with preservation of table cells positioning. In automatic mode, the 3rd configuration (conservation of table boxes positioning) is applied for all layout tables.

Some of plug-in can not be used only in manual mode, while other can be also used in automatic mode. In this mode there are no webmaster interventions. This mode is a deteriorate version of manual mode. Indeed a lot of errors can not be corrected completely.

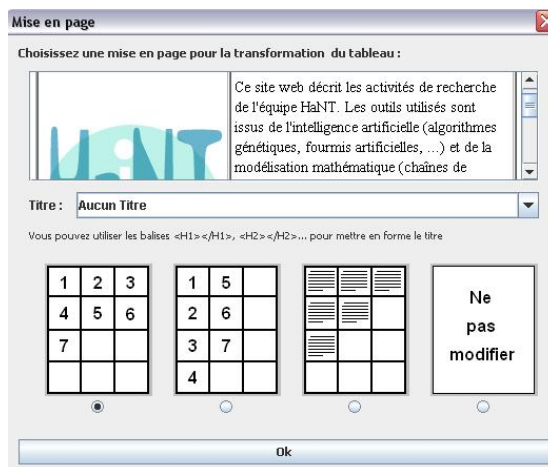


Fig. 7. Plug-in interface to delete layout tables (checkpoint 5.3)

4.4 Tests

To evaluate work carried out by our Web pages treatments platform, we have realized statistics on small collectivities of Indre-et-Loire Web sites before and after transformation. The figure 8 illustrates results obtained concerning errors on guideline 1.

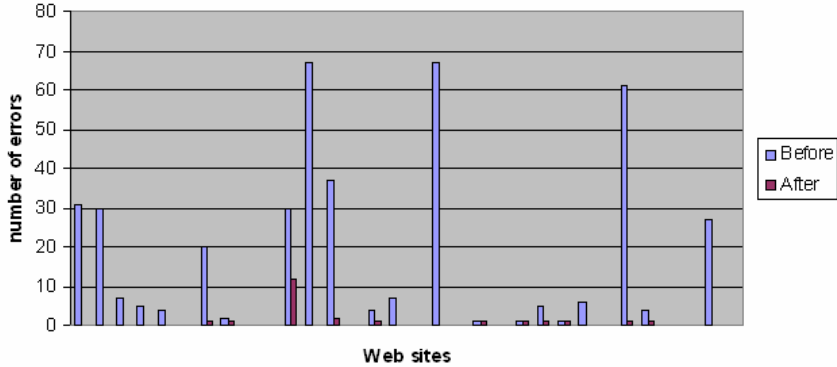


Fig. 8. Errors detected on Web sites about guideline 1 before and after correction

We can observe for many of pages a totally disappearance of errors about guideline 1. Errors which always exist before transformation correspond to checkpoint not implemented (checkpoints 1.2 to 1.5).

5 Perspectives and Conclusion

Creating accessible web sites can be a difficult task in small communities because web sites are often managed by beginners. A law imposes web accessibility but there is no financial support to bring help to the small municipalities and there is no organization to accompany accessibility compliance projects. In order to allow a simple and rapid approach towards accessibility, our tool gathers all the recommendations and the tools necessary to make an accessible Web site. This tool is a personalized guide with a multi-page and multi-recommendation validator, used in order to reach a better level of accessibility, and an automatic or semi-automatic corrector. This work has been done in cooperation with the General Council of Indre-et-Loire.

In the future, our goal is that other European recommendations are added to provide a single validator for several European countries joining a European accessibility scheme. Moreover these tools are actually in pass to be adapted to the new official guideline WCAG 2.0 [25].

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