A METHOD PROPOSAL FOR IMPLEMENTING ACCESSIBILITY IN DESKTOP APPLICATIONS FOR VISUALLY IMPAIRED USERS

Livia Cristina Gabos Martins and Bruno Elias Penteado
MStech, Bauru, Brazil

Keywords: Accessibility, Flash, Desktop applications, WCAG.

Abstract: Currently, little is said about the accessibility-oriented desktop applications. In the case of this study, problems related to the application structure, which has characteristics of a legacy software, brings challenges that hinder the implementation of accessibility. This article shows an implementation of accessibility by applying the concepts of web standards in desktop applications, addressing factors such as controlling the events of Flash components to make data accessible to screen readers and communication between the layers of user interface and business taking into account information accessibility through the use of technology MSAA.

1 INTRODUCTION

In general, accessibility can be understood by removing the barriers which prevents disabled people to participate in activities of a social context, including services, products and information (Santarosa, L. M. C. et al., 2007). In a digital context, accessibility means that people with different kinds of disabilities can understand, browse and interact with the web as well as with other people, benefiting even those without any disability (W3C, 2005).

The use of standards for developing accessible applications emerged in 1997 with the creation of HTML 4.0 (W3C, 1997) by W3C (World Wide Web Consortium) - the international community where associated organizations work together to develop standards for the Web. In this version of HTML some elements were introduced which facilitated the distinction between structure and presentation of the document. There was also improvement in the semantics of documents, the addition of medias to content formatting via the cascading style sheets (CSS) towards Braille, among others.

Aimed at accessible Web development, the WAI (Web Accessibility Initiative), a division of W3C, established a standard known as WCAG 1.0 (Web Content Accessibility Guidelines 1.0) (W3C, 1999) for Web developers and designers This standard defines techniques so that people with disabilities, such as inability to see, hear, or move properly - named visually, hearing and motor impaired, respectively - can read and understand the information available on the Internet.

Another standard established for this purpose was the WAI-ARIA (Web Acessibility Initiative - Accessible Rich Internet Applications) (W3C, 2008) created to establish specifications of accessibility for Web applications using Ajax, HTML, JavaScript and other related technologies in its composition - also known as rich Internet applications.

The standards described are meant to help the communication with assistive technologies. This term is used to identify resources and services that contribute to provide or increase the functional abilities of people with various types of impairments (Sonza, 2008). As examples such resources, we can highlight: the screen readers and magnifiers, much used by the visually impaired; speech recognizers, used to trigger commands by voice; data input devices, as alternative to the keyboard and mouse; among others.

Currently, to our knowledge, there is not a specific standard for implementing accessibility for desktop applications. We can find some studies on best practices and observations to this issue (IBM Corporation, 2009; The University of Wisconsin, 1997), but none declared as official. In general,

Gabos Martins L. and Elias Penteado B..
A METHOD PROPOSAL FOR IMPLEMENTING ACCESSIBILITY IN DESKTOP APPLICATIONS FOR VISUALLY IMPAIRED USERS.
DOI: 10.5220/0003495702870290
In *Proceedings of the 13th International Conference on Enterprise Information Systems* (ICEIS-2011), pages 287-290
ISBN: 978-989-8425-56-0

utility tools are used - the built-in assistive technologies in operating systems, with no equivalent standard for the Web.

According to the World Health Organization (WHO) (WHO, 2009) about 314 million people worldwide are visually impaired, of which 45 million are blind. In Brazil, according to the IBGE (Brazilian Institute of Geography and Statistics), 16.6 million people have some degree of visual impairment, with almost 150 thousand people reported blind (IBGE, 2005).

According to Filho (2005), the visually impaired are very prejudiced by the lack of accessibility on the Web because, most of the time, it is one of the few ways they obtain information. Hence the importance of ensuring accessibility, not only to the Web, but also to the desktop applications that provides access to such information, sometimes even getting information from the Web.

The problem to be addressed in this case study is related to the use of a desktop application for visually impaired people, using techniques and standards originally established for Web applications and its application in a legacy software.

2 SOFTWARE AND METHOD

The software used in this case study is *blueControl*, created by the technology company MStech (MStech, 2011). This is an application for computer labs in schools, widely used in educational programs in Brazil, responsible for managing (from the computer of the technician responsible for the lab) the access to computers for students or community members who use the school computers. With *blueControl*, one can provide access for use of lab computers, block inappropriate software or websites, print documents, report of events and use of computers, among other features. It is usually operated by a technician who manages all computers connected to that network and where they can perform the functions described above.

The *blueControl* is commonly used in educational programs that provide access to computer labs for classes, training and access to the general public. The technicians responsible for the school's or institution's labs are trained to use the application in their jobs, such as how to turn on computers in a room for a class. Impaired people are hired by the government obeying the Brazilian Law 8213/91, also known as *Law of Quota*, which guarantees a percentage of employment for impaired people.

The inability to use the *blueControl* software for the visually impaired entails the exclusion of these people from everyday activities such as the management of computer laboratories, usually waiting for a resolution of the problem with the help of others.

The use of this tool, as originally designed, in day-to-day laboratory showed that most of its features did not meet the needs of visually impaired people responsible for the laboratory, demanding a redesign of its user interface.

However, being an application also used by people who have not visual impairment and being also widely marketed, with manuals created and distributed, one of the assumptions in the redesign of the application was that its interface could not be changed abruptly to meet the accessibility need.

When the *blueControl* software was firstly designed, it was not pondered the possibility of making it accessible for the visually impaired people. Therefore, problems were faced by the development team to adapt it.

The *blueControl* application was implemented in three layers, using the C# language, the .Net Framework 2.0 in the layers of business logic and persistence to the database – Microsoft SQL Server 2005. The interface layer was implemented using Flash Action Script 2.0 technology.

Normally, when best practices are applied in the development of accessible websites using Flash technology, screen readers can identify the website information, due to MSAA technology (Microsoft Active Accessibility) (Microsoft, 2000). MSAA is a technology based on COM (Component Object Model), which enables communication between applications and operating system and exists only on Windows.

So that the interface could represent the state of the inner logic an additional messaging service layer was created. The messaging service layer helps assistive technology interact with the operating system. Due to this, browsers can send the information, if any, for screen readers. As *blueControl* was designed to run only on Windows, a new service layer was created, to capture the interface information and make it available to assistive technology MSAA.

As the business layer was developed in C#, the function of this new service layer is to pass the accessibility information from Flash user interface to the operating system, through MSAA, where screen readers can identify the information (Figure 1).

To improve the user experience in using *blueControl*, it was added a button that takes the

user to a help screen about the accessibility implemented. On this screen the user finds all information on how to operate *blueControl* by using the shortcut keys.

The development team followed the WCAG 1.0 standard for the modifications. This standard is divided in three levels of priorities, namely: i) Priority 1 - should be fully satisfied, ii) Priority 2 - should be met and iii) Priority 3 - can be met. In this study, the three levels have been met, while respecting the differences in concepts and procedures between web and desktop.

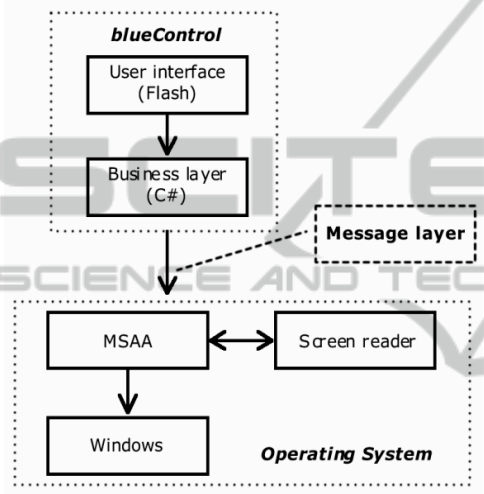

Figure 1: Diagram of communication.

Thus, our method to enable accessibility in desktop applications consists in the observance of WCAG guidelines for desktop applications along with the new service layer to help the communication with assistive technologies.

3 METHOD EVALUATION

A small group of 3 people was selected to preliminarily assess the *blueControl* application. The group was restricted to visually impaired people, due to the focus of this study. They were classified according to the WHO definition regarding blindness and low vision (WHO and DIMDI, 2007).

In this study we used the environment DOSVOX (Borges, 2002) as assistive technology for testing. It is a system only for Windows, which communicates with the user via speech synthesis, enabling the use of computers by the visually impaired. It is considered an environment and not just a screen reader, due to the many features it has and by letting the user not navigate by operating system directly.

DOSVOX was chosen because it is a free environment, widely used and distributed in government programs in Brazil and has a good support for Flash on desktop environment.

Another popular tools of assistive technology, such NVDA and JAWS were not used in this case study, since they were not distributed along with *blueControl*. Thus, we used DOSVOX for standardization of testing. Besides, for the tests with *blueControl* a group who had training on its usage was selected, providing equal knowledge in the assessment.

In possession of the new software version, with the changes implementing accessibility features, users of the selected group were instructed to perform their tasks as taught in their training for the management activities of the laboratory.

After applying the suggested method in the user interface redesign, the selected users were able to perform their regular tasks. During the first use, some delay was caused at first experience, as they get accustomed to the software and its layout. Further interactions with the software showed natural to their experience, as they had previous experience with screen readers.

There were some drawbacks though, in the implementation: some components, like *Calendar*, needed an alternative input, since it could not provide direct access to the information needed (e.g. a specific day in the future), making it difficult to handle and time consuming to use it often. The *DataGrid* component, used to display a table of records, came up as a problem too. An alternative and simplified version, merging the columns into a single one was used. Also, the excess of explaining texts in some forms made difficult the fluent execution of some tasks. The broad solution to these components was a proper navigation by keyboard. Though the implementation had some issues, the basic concepts of WCAG were met properly, with minor adjustments.

4 CONCLUSIONS

Currently, little is disseminated on the issue of accessibility in software, although the standards or even the law regarding accessibility. Usually the topic is bound to the development of Web applications.

Although there is not a specific standard to the implementation of accessibility in a desktop application, this case study demonstrated the

technical feasibility of implementing the concepts of web accessibility in a desktop application using only different methods of implementation, regarding desktop specificities, which was possible due to the similarity of elements and features.

Although there are some points where Flash technology does not allow an implementation of accessibility in a less laborious way, it is an interesting technology for use in desktop applications, since it offers the possibility of creating richer interfaces.

With the adjustments implemented in this case study it was possible to adapt a legacy desktop application, already in market, to meet the accessibility levels set for Web applications, ensuring adherence to laws and inclusion of visually impaired users in their everyday work.

Though this work has only used one screen reader, DOSVOX, other tools from the most popular screen readers must be tested to assess the comprehensiveness of this approach.

As an ongoing project, we have as a next step the application of surveys, based on WCAG recommendations, to the visually impaired who work on a daily basis with *blueControl* so that we can evaluate what are the achievements of our approach. In future, it could be extended to other types of disabilities such as motor impairment.

REFERENCES

Santarosa, L. M. C. et al., 2007. *Inclusão e Diversidade : referenciais na construção da acessibilidade para Ambientes Virtuais de formação de Professores*.In:Simpósio Brasileiro de Informática na Educação.São Paulo,Brazil 2007.Brasília:Sociedade Brasileira de Computação.

Borges, J. A, 2002. *O que é o Dosvox*. Núcleo de Computação Eletrônica da UFRJ – Universidade Federal do Rio de Janeiro. Available at: <http://intervox.nce.ufrj.br/dosvox/intro.htm> [Accessed April, 2010].

Filho, L. P. P., 2005. *Como a falta de acessibilidade na web pode afetar os portadores de deficiência visual*. Graduation. Faculdade Integrada do Recife.

IBGE,2005. *IBGE e CORDE abrem encontro internacional de estatísticas sobre pessoas com deficiência*. (Hitting the headlines article)[online] Available at: <http://www.ibge.gov.br/home/presidencia/noticias/noticia_visualiza.php?id_noticia=438&id_pagina=1> [Accessed May, 2010].

IBM Corporation, 2009. *Software checklist*.[online] Available at:<http://www-03.ibm.com/able/guidelines/software/accesssoftware.html> [Accessed June, 2010].

Microsoft Corporation, 2000.*Microsoft Active Accessibility: Architecture*. [online] Available at: <http://msdn.microsoft.com/en-us/library/ms971310.aspx#actvaccess_topic1> [Accessed May, 2010].

MStech,2011. *MStech*. [online] Available at:<http://www.mstech.com.br/>.[Accessed January, 2011].

Sonza, A.P., 2008. *Ambientes virtuais acessíveis sob a perspectiva de usuários com limitação visual*. Doctorate.Universidade Federal do Rio Grande do Sul.

The University of Wisconsin, 1997.*Requirements for accessible software design*. [online] Place: University of Wisconsin-Madison. Available at: <http://trace.wisc.edu/docs/ed_dept_software_guidelines/software.htm>. [Accessed June, 2010].

W3C, 1997. *HTML 4.0 Specification*. [online] Available at: <http://www.w3.org/TR/REC-html40-971218/> [Accessed June, 2010]

W3C, 1999. *Web Content Accessibility Guidelines 1.0*. [online] Available at: <http://www.w3.org/TR/WCAG10/>. [Accessed March, 2010].

W3C, 2005. *Introduction to Web Accessibility*. [online] (Updated September 2005) Available at: <http://www.w3.org/WAI/intro/accessibility.php> [Accessed January, 2011].

W3C, 2008. *WAI-ARIA Overview*. [online] (Updated 18 January 2011) Available at: <http://www.w3.org/WAI/intro/aria.php> [Accessed April, 2010].

WHO, 2009. *World Health Organization - Visual impairment and blindness – Fact Sheet no. 282*. [online] Available at:<http://www.who.int/mediacentre/factsheets/fs282/en/> [Accessed March, 2010].

WHO,DIMDI, 2007. *World Health Organization - Chapter VII - Diseases of the eye and adnexa*. [online] Available at: <http://apps.who.int/classifications/apps/icd/icd10online/?gH53.htm+h540> [Accessed December, 2010].