1 Introduction

1.1. Problem and Motivation

Accessibility is a major issue in a large set of domains. Depending on the scope and the context of the investigation, accessibility can be differently defined and understood. As pointed out by Alvarez, accessibility is "*...the capacity of an environment, object, or tool to be used by all persons as safely, comfortably, and independently as possible*" (Alvarez, 2004). Or, as shown in Hull's definition, something can be said to be accessible if it is: "*i) capable of being reached or used; ii) easy to meet or get along with; iii) easily obtained; iv) being at hand when needed*" (Hull, 2004). When considering the web, WAI[1] states that "*...accessibility means that people with disabilities can use the Web*" (W3C). But, as Ferreira and Nunes warn, web accessibility goes beyond a resource being accessed by the disabled. It requires taking into account the diverse characteristics presented by the user (Ferreira, et al., 2008).

In this work the domain of interest is the web. Web accessibility awareness has been increasing in the past few years and many efforts have been made in this direction. Nevertheless, the ideal web in which all citizens will have equal and abundant access to all resources is still far from reality, regardless of their personal characteristics or country of origin.

The web as it is today does not deal well with some easy-to-find differences among users. For example, according to recent statistics, the number of Brazilian Internet users in 2007 corresponds to 34% of the population, and these are individuals from socio-economic classes A (wealthier), B and C (Santos, 2007). At the same time, other sources estimate that only 28% of the whole Brazilian population between the ages 15 and 64 can be considered fully literate (Educativa, 2007). Given that great part of the web content is presented in *textual* form, two questions immediately arise. What percentage of Brazilian Internet users can read and understand textual material on Brazilian web pages? And what is the quality of written material on Brazilian web pages? Is this material easily understandable by every literate person?

---

[1] Web Accessibility Initiative - http://www.w3.org/WAI/

Web site designers as well as tool and browser developers seldom create their products thinking of the whole set of possible users. So, if web designers and information architects don't realize that a considerable part of Brazilian Internet users are likely not to understand textual information on web pages, a significant number of these users may be prevented from using most web resources. As illustrated by Walton and Vukovic (Walton, 2003), the challenge of creating an accessible web goes beyond the interface level. The use of the web in developing countries directs us to a non-physical kind of disability: the difficulty in understanding larger portions of written text.

But there is yet a larger set of users with special needs. This population also includes visually impaired users, users with motor and cognitive disabilities, and even users that simply find it difficult to navigate the web and/or use computer technologies. According to Temporini and Kara-José, blind users in Brazil represent 0.4% to 0.5% of the population (Temporini, et al., 2004). One is to think of the difficulties this group of people face when navigating the web, knowing that "*the primary mode of interaction with the web is via graphical browsers, designed for visual interaction*" (Mahmud, et al., 2007). Indeed, despite the great effort already done to help these users with the web navigation, most of the Brazilian web pages still pose accessibility problems. According to the study developed by Ferreira et al, only 22% of the 87 Brazilian governmental sites verified in 2007 were accessible, which is still a very low number (Ferreira, et al., 2007). The statistics for other non-governmental sites also meant to be accessed by *everyone*, such as banks, e-commerce sites, news, universities, etc., are probably even worse, since they suffer less pressure, or no pressure at all, by the accessibility legislation to conform to the accessibility guidelines than the former.

1.2. Purpose and Contributions

In order to begin to address these shortcomings, the dissertation presents Web Navigation Helper (WNH), a web system for assisting web navigation, based on an existing tool called CoScripter (CS) (CoScripter, 2008). WNH users are guided through the steps of navigation and assisted throughout the process, and need not read the whole content of the pages in order to reach the desired resource. WNH combines different techniques such as automation, collaboration[2] and

---

[2] The Merriam-Webster Dictionary defines collaborate as "to work jointly with others or together especially in an intellectual endeavor", deriving from the Latin words *com-* + *labore*, to

assistance in its solution, and the aim is to provide a new form of navigation that should be easier and more efficient for blind and functionally illiterate users than the current classic one. This work suggests an innovative approach to web accessibility.

The dissertation statement is: **WNH is a promising tool for helping blind and functionally illiterate users in navigating the web**. In defending this claim, the dissertation makes the following contributions:

- **WNH-see**, a web navigation and resource-finding tool for blind end-users;

- **WNH-read**, a web navigation and resource-finding tool for end-users with reading and understanding difficulties;

- **WNH-support**, a web tool for supporting a community of volunteer helpers in creating and maintaining the processes that will be run and executed by the end-users;

- It is a **first research of its kind** about a combined solution for both functionally illiterate and blind users in Internet navigation;

As will be shown later, this dissertation promotes an innovative approach of web navigation based on automated process reproduction and collaboration that amplifies the range of possibilities in web accessibility.

The reason for joining these two populations together in the same research is that in the early stages of my studies I was targeting at a single solution for both audiences: both groups of users have difficulties in accessing web pages, one due to difficulties in reading, the other due to inaccessible web pages. The primary concept was to develop a tool that overcomes these difficulties and present information in a customized way: to functionally illiterate users, in a simplified language; to blind users, through a screen reader based on interaction threads rather than on page and information structure. As will be shown in the course of this work, things did not really turn out as expected.

---

labor together, to work alongside one another. As pointed out in (Kvan, 2000), "Collaboration can be thought of as joint problem solving. It means working with others with shared goals for which the team attempt to find solutions that are satisfying to all concerned". As will be shown later, WNH is designed to be used by a group of volunteers that create and support the automated processes that will be run by the targeted users, and this is the reason for using here the term 'collaborative'.

1.3. Outline

The remainder of this dissertation is set out as follows: Chapter 2 describes the universe of people this research tries to help. In Chapter 3 the WNH prototype is presented, followed by an account of experimental evaluation done with its experiment in Chapter 4. Finally, I end by discussing the experiment in Chapter 5, and drawing conclusions and directions for future work in Chapter 6.