



Chantal Intrator

Using Scripts to Improve Web Accessibility

DISSERTAÇÃO DE MESTRADO

Dissertation presented to the Postgraduate Program in Informatics of the Departamento de Informática, PUC-Rio as partial fulfillment of the requirements for the degree of Mestre em Informática

Advisor: Prof^ª. Clarisse Sieckenius de Souza

Rio de Janeiro
July 2009



Chantal Intrator

Using Scripts to Improve Web Accessibility

**Dissertation presented to the Postgraduate Program of the
Departamento de Informática do Centro Técnico Científico da
PUC-Rio, as partial fulfillment of the requirements for the degree
of Mestre em Informática**

Prof^ª. Clarisse Sieckenius de Souza

Advisor

Departamento de Informática – PUC-Rio

Prof. Alberto Barbosa Raposo

Departamento de Informática – PUC-Rio

Prof^ª. Simone Bacellar Leal Ferreira

Departamento de Informática Aplicada – UNIRIO

Prof. José Eugenio Leal

Coordinator of the Centro Técnico Científico da PUC-Rio

Rio de Janeiro, 13 / 07 / 2009

All rights reserved.

Chantal Intrator

Graduate in Computer Science from Technion-Israel Institute of Technology, in 1997. Has been working as a software developer and as a Team Leader in companies such as Intel Israel, Orkit Communications, Tioga, Quality Software, Certisign and Mundo Babel.

Bibliographic data

Intrator, Chantal

Using Scripts to Improve Web Accessibility / Chantal Intrator;
advisor: Clárisse Sieckenius de Souza - 2009.

103 f.: il.; 21,0cm X 29,7cm

Dissertação (Mestrado em Informática) – Pontifícia Universidade
Católica do Rio de Janeiro, Rio de Janeiro 2009

Inclui bibliografia.

1. Computadores e Sociedade: assuntos sociais – tese; 2.
Acessibilidade na Web; 3. Deficientes Visuais; 4. Analfabetos
Funcionais; 5. Deficiência; 6. Scripting; 7. Colaboração na Web.

CDD: 004

Acknowledgment

This research has, to a greater or lesser degree, been influenced by the following entities and people: Allen Cypher and the CoScripter Team at IBM Almaden Research; Ana M.B. Pavani; Ruy Luiz Milidiu and his helpful team of students; NEAD- Núcleo de Educação de Adultos; each individual user that agreed to participate in the experiments of this dissertation; my colleagues at SERG laboratory; Tiago Correa; Rubens Amaral; family and friends. I am sincerely thankful to all of them.

I am very grateful to my sweet aunt Hadara Perpignan.

Special thanks go to my always supportive and encouraging advisor Clarisse Sieckenius de Souza.

Finally, I extend all my gratitude to my adorable mom.

Chantal Intrator was partially supported by a CAPES fellowship.

Abstract

Intrator, Chantal; de Souza, Clarisse Sieckenius. **Using scripts to Improve Web Accessibility** Rio de Janeiro, 2009. 103p. MSc. Dissertation - Departamento de Informática, Pontifícia Universidade Católica do Rio de Janeiro.

As more and more resources become available online, the World Wide Web is turning into an important stakeholder in every individuals' lives. Nevertheless, not every segment of the distinct populations worldwide is able to freely access and use it. A new approach of navigating the web, in which users make use of automated processes created by a community of volunteers, is presented in this dissertation. The primary intent of this approach is to help blind and functionally-illiterate users in navigating the web and accessing its resources. This, though, is only the starting point for further investigations with other populations with special needs. This dissertation presents a collaborative web system, designed on top of an existing tool, for improving web accessibility.

Keywords

1. Computers and Society: social issues – thesis; 2. Web accessibility; 3. Visually-impaired; 4. Functionally-Illiterate; 5. Disabilities; 6. Scripting; 7. Web Collaboration.

Resumo

Intrator, Chantal; de Souza, Clarisse Sieckenius. **Utilizando scripts para Melhorar a Acessibilidade na Web**. Rio de Janeiro, 2009. 103p. Dissertação de Mestrado - Departamento de Informática, Pontifícia Universidade Católica do Rio de Janeiro.

À medida que mais recursos vêm sendo disponibilizados *online*, a Internet está se tornando um participante de grande importância na vida dos indivíduos. No entanto, nem todo segmento das distintas populações mundiais é capaz de acessá-la e usá-la livremente. Uma nova abordagem de navegação na web, na qual os usuários fazem uso de processos automáticos criados por uma comunidade de voluntários, é apresentada nesta dissertação. O primeiro objetivo desta abordagem é ajudar usuários cegos e analfabetos funcionais a navegar na web e acessar tais recursos. Isto, no entanto, é o passo inicial para futuras investigações com outros públicos de necessidades especiais. Esta dissertação apresenta um sistema web colaborativo, desenhado sobre uma ferramenta já existente, para melhorar a acessibilidade na web.

Palavras-Chave

1. Computadores e Sociedade: assuntos sociais – tese; 2. Acessibilidade na Web; 3. Deficientes Visuais; 4. Analfabetos Funcionais; 5. Deficiência; 6. Scripting; 7. Colaboração na Web.

Contents

1 Introduction	11
1.1. Problem and Motivation	11
1.2. Purpose and Contributions	12
1.3. Outline	14
2 Users with Special Needs and Related Work	15
2.1. People with difficulty seeing web contents	15
2.1.1. Related work (helping web navigation for the blind)	17
2.1.2. Difficulties with web navigation for the blind	22
2.2. People with difficulty reading and understanding web contents	23
2.2.1. Related work (helping web navigation for the functionally-illiterate)	24
2.2.2. Difficulties with web navigation for the functionally-illiterate	26
3 WNH: Web Navigation Helper	29
3.1. CoScripter	29
3.2. Detailed Description	32
3.2.1. WNH-see and WNH-read	33
3.2.2. Differences between WNH-see and WNH-read	36
3.2.3. WNH-support	37
3.2.4. History of the project	39
3.3. Architecture	41
3.4. Illustration	46
3.4.1. Blind User Interaction	46
3.4.2. Functionally Illiterate User Interaction	50
3.4.3. Support User Interaction	53
3.5. Error Prevention, Error Detection and Error Recovery during Interaction	56
4 The Experiment	57
4.1. Experiments with Group 1 (alleviating sight problems)	57
4.1.1. Participants	58
4.1.2. Preparation	58

4.1.3. Results	61
4.1.4. Discussion	64
4.2. Experiments with Group 2 (alleviating reading problems)	65
4.2.1. Participants	65
4.2.2. Preparation	66
4.2.3. Results	68
4.2.4. Discussion	71
4.3. Difficulties evidenced during the experiments	72
5 Discussion	73
5.1. How does WNH help or not help functionally illiterate and blind users in navigating the web?	73
5.2. How can WNH be improved to suit these two (blind and functionally illiterate) different classes of users with special needs more appropriately?	80
6 Conclusions and Future Work	82
7 Glossary	84
8 References	86
9 Appendix A – Consent Terms Read Aloud to the Blind	91
10 Appendix B – Experiment Scenario for the Blind	92
11 Appendix C – Consent Term for the Functionally-Illiterate	93
12 Appendix D – Experiment Scenario for the Functionally-Illiterate	94
13 Appendix E – Short Paper Presented at IHC2008	95

Note: this document was written in English since it is part of a joint project involving the SERG laboratory at PUC-Rio and the CoScripter research group at IBM Almaden Research – Human Computer Interaction Group.

List of Figures

Figure 1: Screen-Readers reading order.....	18
Figure 2: CoScripter	30
Figure 3: Web Navigation Helper	34
Figure 4: <i>captcha</i> when running WNH.....	38
Figure 5: CoScripter Architecture	44
Figure 6: WNH Architecture	46
Figure 7: Step 3 out of 15 (blind users WNH navigation).....	47
Figure 8: Step 6 out of 15 (blind users WNH navigation).....	47
Figure 9: Step in which the CPF Id is requested (blind users WNH navigation)	48
Figure 10: Step that notifies of the audio captcha (blind users WNH navigation)	49
Figure 11: Step in which the audio captcha is being read (blind users WNH navigation)	50
Figure 12: Step that requests the captcha (functionally illiterate users WNH navigation)	51
Figure 13: Step that requests the complete name (functionally illiterate users WNH navigation) .	52
Figure 14: Step that informs the user to fill the birthday directly in the web page (functionally illiterate users WNH navigation).....	53
Figure 15: Volunteers' visualization of step 1 from functionally illiterate's script	54
Figure 16: Volunteers' visualization of captcha step from functionally illiterate's script.....	54
Figure 17: WNH-support Sites Tracker Bot command line execution	55
Figure 18: WNH guidance pop-up window	60
Figure 19: Restarting the process or starting a new one	61
Figure 20: WNH before (A) and after (B) left sidebar information was omitted.	67

List of Tables

Table1 – Computer and Internet Usage According to Years of Study in Brazil	25
--	----