

WEB Accessibility for People with



Michael G. Paciello

Web Accessibility for People with Disabilities

Michael G. Paciello



CRC Press

Taylor & Francis Group

Boca Raton London New York

CRC Press is an imprint of the
Taylor & Francis Group, an **informa** business

CRC Press
Taylor & Francis Group
6000 Broken Sound Parkway NW, Suite 300
Boca Raton, FL 33487-2742

First issued in hardback 2017

Copyright © 2000, Taylor & Francis.

CRC Press is an imprint of Taylor & Francis Group, an Informa business

No claim to original U.S. Government works

ISBN 13: 978-1-138-41231-6 (hbk)

ISBN 13: 978-1-929629-08-4 (pbk)

This book contains information obtained from authentic and highly regarded sources. Reasonable efforts have been made to publish reliable data and information, but the author and publisher cannot assume responsibility for the validity of all materials or the consequences of their use. The authors and publishers have attempted to trace the copyright holders of all material reproduced in this publication and apologize to copyright holders if permission to publish in this form has not been obtained. If any copyright material has not been acknowledged please write and let us know so we may rectify in any future reprint.

Except as permitted under U.S. Copyright Law, no part of this book may be reprinted, reproduced, transmitted, or utilized in any form by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying, microfilming, and recording, or in any information storage or retrieval system, without written permission from the publishers.

For permission to photocopy or use material electronically from this work, please access www.copyright.com (<http://www.copyright.com/>) or contact the Copyright Clearance Center, Inc. (CCC), 222 Rosewood Drive, Danvers, MA 01923, 978-750-8400. CCC is a not-for-profit organization that provides licenses and registration for a variety of users. For organizations that have been granted a photocopy license by the CCC, a separate system of payment has been arranged.

Trademark Notice: Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation without intent to infringe.

Visit the Taylor & Francis Web site at
<http://www.taylorandfrancis.com>

and the CRC Press Web site at
<http://www.crcpress.com>

Cover art credit: © FPG International LLC.

***To my wife Kim,
whose selflessness is second to none.
To my children, Shane, Ryan, Lindsey, and Kyle —
the pride and victories of my life.***

***In memory of my good friend,
Yuri Rubinsky,
the silent advocate of accessibility for people
with disabilities.***



Taylor & Francis

Taylor & Francis Group

<http://taylorandfrancis.com>

Table of Contents

Foreword **xi**

Preface **xiii**

 Who Are You? xiv

 What You'll Learn xiv

 How This Book Is Organized xv

 How to Use This Book xvi

 Contacting Me xvi

Acknowledgments **xvii**

About the Author **xix**

Part I The Web and People with Disabilities

Chapter 1 Introducing Web Accessibility **3**

 In This Chapter. 3

 Why Make Your Site Accessible? 4

 Getting to Know the Disability Communities 6

 500 Million and Growing — A New Market Niche 11

 Applying the Golden Rule. 15

 Reaching the Third Wave 21

 Summary 21

 References. 22

Chapter 2 Legal Requirements, Policies and Standards 23

In This Chapter 23

The Fifth Principle 24

Understanding the “Casey Martin Syndrome” 25

Using the ADA to Enforce Web Accessibility 30

Section 508 of the Rehabilitation Act 33

Additional U.S. Policies and Standards That Promote Accessibility 35

International Policies and Standards 39

Summary 44

References 45

Chapter 3 Using Standards and Guidelines 47

In This Chapter 47

The WAI Guidelines 48

Standards 53

Best Practices and Guidelines 55

Additional Support Guidelines 65

Summary 67

References 67

Chapter 4 Identifying Web Accessibility Barriers . . 69

In This Chapter 69

Access Technologies for People with Disabilities 70

Additional Web Accessibility Barriers 82

Summary 83

References 84

Part II Accessible Web Site Design

Chapter 5 Creating Accessible Web Sites with HTML 87

In This Chapter 87

Introduction to Accessibility Design Issues 88

If You Already Have a Web Site 92

If You Are Creating a New Web Site 94

Summary of HTML 4.0 Enhancements for Accessibility 95

The Importance of Separating Structure from Presentation 96

Describe Everything 97

Increase Efficiency	102
Creating Accessible Forms	104
Frames and Tables	107
Summary	118
References	118
 Chapter 6 Testing and Validation	119
In This Chapter	119
The Importance of Testing and Validating	120
Performing a Web Site Accessibility Review	120
Validation Services	125
Testing Utilities and Tools	133
Summary	138
Resources	138
 Chapter 7 Browsing	139
In This Chapter	139
Accessibility Browsers	140
Text Browsers	154
GUI Browsers	156
Telephony Systems	172
Summary	174
References	175
 Chapter 8 Publishing Tools	177
In This Chapter	177
Why Worry About Tools?	177
Text Editors	181
Visual Editors	192
Converters	209
Guidelines for Creating Accessible Authoring Tools	210
Summary	211
References	212
 Chapter 9 Programming for Web Accessibility . . .	213
In This Chapter	213
Web Programming and Accessibility	213
Java Accessibility Programs	214
Microsoft Active Accessibility and Java	218
Java Speech API	221
Summary	225
References	225

Part III Development Resources

Chapter 10 Specialized Web Accessibility

Software 229

In This Chapter 229

Introduction to Accessibility Tools 230

Operating System Tools 231

Screen Readers 242

Multimedia Tools 247

Other Useful Web Accessibility Services 254

Summary 258

References 259

Chapter 11 Looking Ahead Towards Emerging

Technology 261

In This Chapter 261

Enabling Technology: Is There a Future? 262

The National Technology Grid 262

Personal Computing 264

The Web and TV 266

Software Architectures 268

Achieving Pervasive Accessibility 272

Summary 274

References 274

Chapter 12 Web Accessibility Resources 275

In This Chapter 275

WAI-ing the Difference 276

Identifying the Industry Supporters 276

Interesting Research Organizations 279

Accessing Government Agencies 281

Contacting Charities and Nonprofits 283

Disability Support Organizations 284

Other Useful Sites 285

Summary 287

Chapter 13 Disability Resources 289

In This Chapter 289

Disability Organizations 290

Charities and Nonprofits 294

Education and Research Sites	298
U.S. Government Resources	300
International Government Resources	302
Commercial Sites	303
Informational Sites	307
Summary	309
 Appendix A The WAI Content Authoring	
Guidelines	311
W3C Recommendation 5-May-1999	311
Abstract	312
Status of this document.	313
Table of Contents	314
 Appendix B Cascading Style Sheets	
Specification	347
Cascading Style Sheets	347
 Glossary	373
 Index	381

Foreword

The social and economic impact of the Internet and Information Technology (IT) has made its presence clear. Over the past several years, information technology has accounted for one-third of U.S. economic growth. To compete and win in today's global marketplace, companies are using IT to develop products more rapidly, forge closer relationships with their customers and their suppliers, and deliver "just-in-time" training to their employees. One hundred and fifty-eight million people now have access to the global Internet — 79 million in the United States alone. Electronic commerce is beginning to explode, and it could exceed \$1.3 trillion in the United States by 2003.

In addition to its commercial significance, IT can also be a powerful tool for addressing some of our most pressing social challenges. In some schools, children are using the Internet to take field trips to the bottom of the ocean, tap into the Library of Congress to research a history paper, or use a remote telescope to explore the universe. People in rural communities can access better quality health care through telemedicine. Governments can be more open, responsive, and provide better services to their citizens — since there is no line online.

The incredible economic and social potential of IT makes it all the more important that it be accessible for people with disabilities. If it is accessible, IT could significantly improve the quality of life for people with disabilities by increasing their independence and their ability to participate in the work-

force. If it is not, it could further isolate people with disabilities, and prevent them from being full participants in the Information Society.

That's why President Clinton and Vice President Gore have pushed to ensure that the World Wide Web and other computing and communications technologies are accessible. The Web Accessibility Initiative (WAI) of the World Wide Web Consortium grew out of a meeting held at the White House. President Clinton strongly endorsed WAI in 1997, stating that "it is vital that the Web be accessible to everyone." U.S. government agencies (the National Institute on Disability and Rehabilitation Research and the National Science Foundation) joined with leading IT companies and the European Commission to fund this important initiative.

On January 13, 1999, President Clinton unveiled a major initiative to increase employment opportunities for people with disabilities. As part of this effort, he announced new steps to ensure that IT is accessible to people with disabilities — including making the federal government a model user of accessible technology, providing low-interest loans to people with disabilities who might not otherwise be able to afford accessible technology, and investing in research and development to improve state-of-the-art accessible technology such as speech and gesture recognition, text-to-speech, and automatic captioning.

Making the Web accessible for everyone is critical. It will help not only the hundreds of millions of people worldwide with disabilities, but also mobile professionals who may be trying to access the Web in a "hands-busy, eyes-busy" environment or by using a cellular phone. Making the Web accessible is not only the ethical thing to do, but in many countries, it's the law.

That's why Mike Paciello's book is so important. We can't have an accessible Web unless everyone who is building the Web understands the importance of making it accessible, and has the technical know-how to do it. I hope that everyone who is building the Web will read this book and take its lessons to heart.

Thomas Kalil

Special Assistant for Economic Policy to President Clinton

Preface

The World Wide Web is the quintessential information broker, the ultimate library, the metacenter of information technology. It is the epitome of a “give free, receive free” model where anyone can create content for the Web and anyone can retrieve that same information. Better still, the Web is a virtual world of communities, businesses, schools, and governments all seamlessly connected and — at first glance — completely accessible to every human.

However, the Web is really *not* accessible to every human. Rather, the Web is a living dichotomy: It is a highly interactive, advanced technology designed to increase communication and collaboration. But the user interface is complex, lacks intuitiveness, and is certainly not easy to use by many human communities — particularly those with disabilities.

Overlaid with a graphical user interface (GUI), blind users find the Web increasingly difficult to access, navigate, and interpret. People who are deaf and hard of hearing are served Web content that includes audio but does not contain captioning or text transcripts. Web devices and appliances (for example, WebTV and Web kiosks) present challenges to people with physical disabilities or repetitive strain injuries (RSI). These Web devices are often hard to access by a person in a wheelchair and contain controls, buttons, and touch screens that are difficult to manipulate.

The future indicates more challenging user requirements. For example, new desktops that implement a natural speech interface. Designed to remove the mundane chore of the “point and click” mouse action, this

emerging technology could make it next to impossible for the deaf and people with speaking disabilities to communicate on the Web.

If the Web existed simply as an advanced information technology shared and used primarily by “geeks” or “Webheads,” accessibility would be of little importance. But the Web is emerging as a critical path to practically every aspect of human life. Banking, consumer product sales, federal aid, healthcare, and entertainment are just a few of the services that have moved toward the one-to-one customer paradigm shift. The result is direct customer interaction that is efficient, expeditious, cost-effective and, most of all, profitable.

The fact is that the Web is not as accessible as many would have you believe. These critical citizen and customer services are not easily available to an individual with a disability. Worse yet, the geeks and Webheads responsible for the next generation Web have little or no idea how to make the Web accessible to the disabled. To further complicate the situation, people with disabilities, government agencies, and civil rights activists are beginning to use the legal system to force accessibility . . . and they are winning.

Who Are You?

Web Accessibility for People with Disabilities is a comprehensive resource for Internet and Web administrators and developers who are faced with the challenge of providing access to their site for people with disabilities. This book’s goal is to aid and encourage you through the process of making your site accessible to people with disabilities. To accomplish this, I guide you through the design and setup process, describing commonly available tools and utilities that have been specifically created to implement assistive aids (several of which are available through WebABLE!). Additional material including information, development, research, and product solution providers is also included.

What You’ll Learn

Web Accessibility for People with Disabilities provides a unique perspective of the Information Superhighway. A first of its kind, this book describes the world and challenges of people with disabilities and accessibility to the World Wide Web. The intent of the book is to serve as a vital resource to people *without* disabilities. In effect, the book “welcomes you to our world.”

WebABLE! focuses on the issues that employers, Internet service providers, and Web administrators face when dealing with Internet and Web access for people with disabilities. It provides insight on the legal parameters involving Web accessibility and why you may be required by law to ensure access to your Web site.

This book provides answers to questions like: How can I provide highly graphic and visual content to the blind? How will people with physical disabilities access Internet kiosks? What will the deaf do when faced with voice output and audio-based multimedia they cannot hear? How will individuals who cannot speak interact with an information kiosk that is built on a voice-recognition platform?

This book relies heavily on the Web for its resource material. Most standards, laws, references, guidelines, hints, and tips can be found on the Web. All of this is due to the hard work of many throughout the world who have shared these invaluable resources on their Web sites.

Lastly, this book promotes Web accessibility for all people. In spite of its inherent barriers, people with disabilities make up a large segment of the Web user population. Why? Because the Web clearly offers *everyone* an opportunity to enhance his or her life. An accessible Web opens new doors to communication, education, employment, and entrepreneurial opportunities — regardless of ability. On the accessible Web, there are people with different abilities — not disabilities. You have no idea that the person you are interacting with is blind, deaf, or physically challenged. Chances are, you don't care either. That's the beauty of the Web, particularly to a person with a disability. The accessible Web breaks down the myths and misconceptions about a person's physical or mental ability. Perhaps that is the greatest barrier of all. This is the goal of the book — to make the Web free of all barriers. To make it WebABLE!

How This Book Is Organized

Part I examines the key reasons for building an accessible Web. I discuss the ethical, legal and technological motivations for designing accessibility, specifically addressing the user needs of people with disabilities. This section provides statistical information about the disabilities population as well as an in-depth description of the kind of barriers people with disabilities must overcome in order to use the World Wide Web as it exists today. Part I also emphasizes how businesses in the United States can be held liable by virtue of legal requirements, policies, and standards including the Americans with Disabilities Act (ADA) for not designing accessible Web sites. This section concludes with an in-depth discussion of the Web's barriers for people with disabilities.

Part II is a guide for building an accessible Web site. Web site administration involving specialized disability requirements, browsers, and content design is explained. Part II describes the various authoring tools, utilities, and validation services that Web site administrators can use to ensure the accessibility of their Web site.

Part III examines issues, concepts, standards, and products involving emerging technology and the World Wide Web, and concludes with a complete reference listing of various accessibility product solution providers, research centers, organizations, and general disability Web sites.

The Appendixes provide additional reference information, as well as a glossary of terms.

How to Use This Book

This book uses the following special symbols and features to highlight particular areas of interest.



Tip

This icon provides special hints, tricks, or insight to an accessibility feature. To help you develop good accessibility habits, I introduce specialized techniques and tips developed by the Web Accessibility Initiative (WAI) working groups.



Note

This icon identifies terms and concepts related to the world of accessibility, acronyms associated with the World Wide Web, and other noteworthy information that I hope you find interesting.



Cross-Reference

I've highlighted information that you can access — either on the Web or through other sources — with a cross-reference icon.

Contacting Me

Designing accessible Web sites is a work in progress. Advancements are made daily, almost as fast as the Web is being developed itself. Should you require updated information or general help in developing an accessible Web site, please feel free to contact me by sending e-mail to paciello@webable.com. You can also surf over to my Web site at <http://www.webable.com>.

Acknowledgments

This book has been a dream of mine for several years. Seeing it to completion could never have happened without the help and support of more people than I could possibly name in a few short lines.

Thanks to everyone in the disabilities and technology community who contributed to this book and to WebABLE. Many thanks to every Web site creator whose home page has contributed to the advancement of the accessibility of the Web and ultimately to this book's publication. All of the credit goes to you. And thanks to all the members of the WAI interest and working groups — the Web is a great place to live because of you!

Berney Williams and Paul Temme, the key folks at CMP who encouraged me from the start to write this book, found the way to make it happen, and then did all the right things to keep me plugging away at it. I am indebted to you and your colleagues at CMP whose enthusiasm, perseverance, and guidance were indispensable.

John Osborn, who started me on this journey and stuck with me when others didn't believe.

Ann Navarro and Kathy Gill were chiefly responsible for writing and editing Chapters 5, 8, and 9. Like John, I am indebted to you both.

Harvey Bingham, lead technical reviewer for this book and a colleague second to none.

Jim Miller, Tom Kalil, and Daniel Dardailler, who dedicated months of their time to work with me to create and launch the Web Accessibility Initiative, still the hallmark of my career.

Tim Berners-Lee, Jean-Francois Abramatic, Robert Cailliau, Sally Khudairi, Dave Raggett, Dan Connolly, Chris Lilley, Henrik Frystyk-Nielsen, Judy Brewer, and Susan Hardy — thank you for your enthusiastic support of the WAI.

Joseph Hardin, a good friend and staunch supporter of access for people with disabilities.

George Kerscher, T.V. Raman, Jim Allen, Gregg Vanderheiden, Murray Maloney, Molly Mannon, Charles Goldfarb, Harry Murphy, Joe Sullivan, Jon Gunderson, Mary Evans, Gary Moulton, Greg Lowney, Earl Johnson, Rick Brown, Ken Berk, Cynthia Waddell, Peter Sharpe, Tim Bray, Eve Maler, Bob Yeraska, Lee Fogal, Kevin St. George, Paul Hammerstrom, Herman Tavani, Dennis Wixon, Tom Spine, Mary Utt, Rick Frankosky, Betsy Comstock, Charles Abernethy, George Casaday, Marc Chardon, Sue Gault, Karen Shor, Minette Beabes, Jim Fruchterman, Jim Thatcher, Jason White, Hiroshi Kawamura, Josh Krieger, Danny Hilton-Chalfen, Norm Coombs, Dick Banks, Jim Rebman, Mark Novak, Jutta Treviranus, Jaron Lanier, Sandy Ressler, Larry Scadden, Frank Bowe, Fred Leung, Constantine Stephanidis, Michael Pieper, Clas Thorén, Jim Isaak, Curtis Chong, Deb Kaplan, Uli Strempel, Doug Wakefield, Judy Dixon, Dave Jaffe, Alan Cantor, Larry Goldberg, Jan Engelen, Tom Wesley, Wendy Chisolm, Dave Bolnick, and “Willie” Walker — just a handful of technologists I’ve had the great privilege of working with over the past 17 years.

Colin Moock for the original WebABLE! site design. Karin Trgovic for developing the original WebABLE! accessibility database. Kevin Nguyen and Kris Coward for the WebABLE! site administration. The University of Toronto and their Adaptive Technology Resource Center (ATRC).

Mac and Marti McCuller, who have hosted WebABLE for the past couple of years and supported my accessibility mission.

The “Friends” who supported the short-lived Yuri Rubinsky Insight Foundation. To all of you, everywhere. Special thoughts to Anna and Andrew (Yuri’s parents) and Holley (Yuri’s wife).

Yuri Rubinsky, who challenged the great technologists and visionaries to make this world accessible to all people.

My mom, the epitome of dedication and devotion.

Lastly, I want to thank my wife Kim and my children, Shane, Ryan, Lindsey, and Kyle.

About the Author

Michael Paciello is Chief Accessibility Officer of WebABLE, Inc. WebABLE is dedicated to stimulating education, research and development of technologies that will ensure equality of access to information for all people.

Mr. Paciello has more than 17 years experience in the area of assistive technology and user interface design, including 10 years as Program Manager for Digital Equipment Corporation's Vision Impaired Information Services (VIIS) office and 3 years as Director of the Yuri Rubinsky Insight Foundation (YRIF). At Digital Equipment Corporation, Mr. Paciello produced the computer industry's first mainstream CD-ROM containing computer documentation that was accessible to the blind and visually impaired (VIOLD).

As a professional speaker, Mike has delivered speeches and conducted seminars in the area of web and internet accessibility for clients including Microsoft, Adobe, Sun Microsystems, Easter Seals, Compaq, The Hartford Insurance Company, Yale, MIT, and the National Aeronautics and Space Administration (NASA).

Mr. Paciello received recognition from President William Clinton for creating and launching the Web Accessibility Initiative (WAI) on behalf of the World Wide Web Consortium (W3C) and the White House. He is cofounder of the International Committee for Accessible Document Design (ICADD), and is the creator of WebABLE!, a powerful information Web portal for people with disabilities (<http://www.webable.com/>).

Part I

The Web and People with Disabilities



Taylor & Francis

Taylor & Francis Group

<http://taylorandfrancis.com>

Chapter 1

Introducing Web Accessibility

In This Chapter

- Why make your site accessible?
- Getting to know the disabilities community
- 500 million and growing — a new market niche
- Applying the golden rule
- Reaching the third wave

Chapter 1 introduces you to the world of Web accessibility involving people with disabilities. You will see how the level of awareness has been raised regarding the information needs of people with disabilities and how they are directly affected by elements of the World Wide Web that are currently inaccessible to them.

In this chapter, you will get a sense of the world's population of people with disabilities and better understand their user needs in the information society. In turn, this information will help you appreciate how developing an

accessible Web for them now will ensure their continued use of it in the future.

Why Make Your Site Accessible?

The World Wide Web (WWW, or simply the Web) has long surpassed original predictions that it would be “the next killer app” of the Internet. What started out as the home of computer gurus is now an integral part of human society. The Web has become a commodity that everyone has to have and everyone needs to use because it is built upon the most important commodity of the next millennium: information.

Beginning with the launch of the *Web Accessibility Initiative* (or WAI, pronounced “way”) in April 1997, it became clear that building and redesigning the Web to be accessible to people with disabilities would become an important directive of the *World Wide Web Consortium* (W3C). Tim Berners-Lee, director of the W3C and inventor of the Web, launched the WAI with the following statement:

Worldwide, there are more than 750 million people with disabilities. As we move towards a highly connected world, it is critical that the Web be usable by anyone, regardless of individual capabilities and disabilities. The W3C is committed to removing accessibility barriers for all people with disabilities — including the deaf, blind, physically challenged, and cognitive or visually impaired. We plan to work aggressively with government, industry, and community leaders to establish and attain Web accessibility goals.

The Web Accessibility Initiative was launched during the sixth International World Wide Web Conference in 1997. The WAI’s (<http://www.w3.org/WAI/>) mission is as follows:

The W3C’s commitment to lead the Web to its full potential includes promoting a high degree of usability for people with disabilities. The Web Accessibility Initiative (WAI), in coordination with organizations around the world, is pursuing accessibility of the Web through five primary areas of work: technology, guidelines, tools, education and outreach, and research and development.

The World Wide Web Consortium (<http://www.w3.org/>) is the international industry consortium whose mission is “to lead the World Wide Web to its full potential by developing common protocols that promote its evolution and ensure its interoperability.”

Lending his support to the WAI, U.S. President William Clinton stated: “Given the explosive growth in the use of the World Wide Web for publishing, electronic commerce, lifelong learning and the delivery of government services, it is vital that the Web be accessible to everyone.”

If you are a person with a disability, no doubt the Web is just as important to you as your “able-bodied” neighbor or coworker. In fact, one could easily argue that the Web is more important to you because it provides access to services, products, and information that are not as easily obtained by you because of circumstances related to your disability. If you are not able to walk or cannot be easily transported from your house to the local Best Buy electronics superstore, you can go to <http://www.bestbuy.com/> on the Web and purchase a new digital television without having to leave your home. Web technology has advanced to the extent that you can do this and many more things quickly and safely.

On the other hand, you don’t need to have a disability to understand the advantages of the Web. An individual without a disability is just as easily motivated to purchase products and services online. The convenience factor alone is enough reason to shop online.

So what’s the problem? Simply this: Where accessibility and usability of the Web are concerned, there are distinct advantages for able-bodied people over people with disabilities. Common Web tasks such as reading, searching, and purchasing are often difficult, or in some cases impossible, for a person with a disability to perform. Many Web sites are not accessible to large segments of the disability communities — particularly people who are blind, deaf, or hard of hearing. As the interactive nature of the Web continues to expand, those with physical disabilities or speech disabilities may have trouble with immersive virtual reality systems that require walking, reaching, and grasping, or human-to-computer voice response systems that require clear speech.

Not convinced? Think I’m exaggerating? Turn off image loading in your Web browser and spend one hour surfing the Web. Visit your favorite sites and bookmarks. Peruse anywhere you want. And don’t be satisfied with just viewing the sites’ home pages. Surf as you normally would, going down into the site at least one or two levels. I guarantee that you’ll find it extremely challenging because most of the sites you visit have not consistently implemented the simplest of all accessibility attributes: the `alt` (alternative) text attribute to the HTML element `IMG` (image). The result is a Web page that is extremely difficult to navigate, particularly for people who are blind. If the `alt` text were present, it would replace the image, providing the user with the same information a sighted person receives.

So whose fault is it? The Web engineering community because it failed to recognize the need early on in the Web development cycle? Web site designers and content creators because they have not taken time to familiarize themselves with appropriate accessibility coding and design? Standards

organizations because they have not enforced or implemented standards that ensure the accessibility of the Internet or the Web? Industry because their focus is on revenue and not product usability? Disability organizations and assistive technology corporations because they are not able to keep pace with emerging technology? There's no rocket science here — everyone shares a measure of the responsibility.

My point is not to focus on the problems, but to identify the solutions. Many do exist. Where solutions do not exist, the goal is to build enough awareness about the issue so a solution can be developed. The primary objectives of this book are to thoroughly educate you (the designer, the developer, and the user) about accessibility issues and to present the solutions required to make the Web accessible — that is, WebABLE!

Since the WAI launch, hundreds of individuals, organizations, and businesses all over the world have swarmed to support the mission of the WAI and its program office. Perhaps the most amazing aspect of their support is that most of it is donated time — volunteer work that is totally pro bono.

That's right, free labor. Why? What motivates so many people to want to take on a seemingly impossible task? Actually, there are several very good reasons that start with the community of people with disabilities themselves. Who are they? Why are things so difficult for them? How is the Web inaccessible to them?

Getting to Know the Disability Communities

The subject matter in this book centers on people with disabilities. It is much easier to explain what you need to do to make your Web site more accessible when administrators, designers, and engineers understand the user characteristics of the disabled. If you are not a person with a disability — for example, loss of vision, hearing, or mobility — then likely you're not

familiar with their needs as Web surfers. In the development of any interface, the first rule of thumb is “know thy user.”



Note

The following descriptions of the different groups of people with disabilities are not intended to be complete or exhaustive. For the purposes of this book, I try to identify the communities of people with disabilities who appear to be most affected by the inaccessibility of the Web today. Therefore, in addition to descriptions of the disability, each category also briefly highlights the barriers that people with disabilities must overcome in order to use the Web.

This does not imply that other communities are, in some way, affected less or not affected at all. Remember that the goal is to achieve accessibility to the greatest extent possible for all people with disabilities. By building awareness around the current issues and the most visible areas of inaccessibility, this book helps identify new areas that can be resolved in the near future.

People Who Are Blind or Visually Disabled

Of all the disability communities concerned by the inaccessibility of the Web, people with visual disabilities probably rank first. This is primarily due to the graphical nature of the Web's client-server interface.

Visual disabilities vary in category including low vision, color blindness, and total blindness. The following sections contain a description of each.

Low Vision

The American Academy of Ophthalmology (http://www.eyenet.org/aao_index.html) defines low vision as follows:

If ordinary eyeglasses, contact lenses or intraocular lens implants don't give you clear vision, you are said to have low vision. Don't confuse this condition with blindness. People with low vision still have useful vision that can often be improved with visual devices. Whether your visual impairment is mild or severe, low vision generally means that your vision does not meet your needs. Using visual devices to improve your vision usually begins after your ophthalmologist has completed medical or surgical treatment or determined that such treatments will not improve your vision.

On the Web and when using computers, many people with low vision use specialized monitors or software that increases the size of text or images large enough for the individual to see. Web sites that use absolute font sizes make it difficult for the low vision user to make this adjustment using his or her computer.

Additionally, some low vision users have difficulty making out certain font styles. Italic text, for example, may be difficult for a low vision user to read without assistive software. (However, in all honesty, italic text is difficult for individuals with good vision to read. This is often due to inadequate screen resolution or poor font quality.)

Color Blindness

People who are color blind often have difficulties in distinguishing between combinations and/or pairs of colors.

On his Web site, (<http://www.delamare.unr.edu/cb/>), Andrew Oakley provides in-depth descriptions of the various types of color blindness:

At the back of your eyes you have Cones and Rods. Cones pick up colour. Rods pick up brightness. There are blue cones, red cones and green cones. They pick up different wavelengths of light. Colour blind people have less numbers of particular cones than normal, so they get colours confused. Some people are more colour blind than others.

Web accessibility issues for individuals who are color blind often involve color combinations that are not properly coordinated or do not provide high contrast. Images without alternative text are also an inconvenience, particularly when the individual is not able to discern what the image is due to the nature of his or her blindness.

You can learn more about color blindness at the Lighthouse International Web site at http://www.lighthouse.org/color_contrast.htm.

Blindness

Blindness comes in a variety of degrees. Most people defined as being blind often do have a measure of sight, as limited as it might be. For example, a person whose level of sight is equal to or less than 20/200 — even with corrective glasses or lenses — is considered *legally blind*. A person who is completely sightless is considered to be *blind*.

Many diseases and conditions contribute to or cause blindness including cataracts, cerebral palsy, diabetes, glaucoma, and multiple sclerosis. Many of these conditions are more prevalent as we age.

Web accessibility for people who are blind is a considerable challenge based on the obvious fact that the Web is a visual interface. Images without associated text, frames, tables, forms, and interactive content are just a few of the problems that perplex these users.

People Who Are Deaf or Hard of Hearing

Up front, it's very important that so-called "able-bodied" people understand some important distinctions regarding those who are typically classified as "people with disabilities." For example, this section purposely differentiates between people who are *deaf* and people who are *hard of hearing*. This is a crucial distinction. Generally speaking, the deaf do not consider themselves hard of hearing. Their hearing is not impaired; it simply does not exist.

Quite obviously, then, a person who is hard of hearing is one who has lost a degree of his or her ability to hear. These individuals may need an amplifying device in order to have functional hearing.

It is also important to know that people who are deaf do not consider themselves "disabled" or "functionally limited." They prefer the distinction of being their own culture that includes their own form of communication, which is usually sign language. Deaf World Web (<http://www.deafworldweb.org/asl/>) is an excellent resource that provides information about the deaf culture and includes a useful American Sign Language dictionary.

The fact that the deaf culture is included in the category of people with disabilities is primarily based on the increasing prevalence of Web multimedia content that includes dialogue and sound but does not include captioning. Additionally, with the growing popularity of speech recognition interfaces, people within the deaf culture who have limited speech capacity (or none at all) run the risk of being shut out of next-generation computing interfaces all together.

People with Speech Disabilities

Individuals who have speech limitations or speech disabilities collectively include a population of people who have weakened speaking ability or a complete loss of their ability to speak.

You may not consider the population of people with limited speaking ability to be that significant. In fact, there are a variety of disabilities and conditions that include limited speech functionality as a secondary aspect of

the disability. The publication titled *Extend Their Reach* notes the following:

Speech limitations, like other disabilities vary greatly in severity and cause. They might result from severe language delay, cerebral palsy, mental retardation, autism, traumatic brain injury, or stroke. Speech problems can also result from several disorders affecting nerves and muscles including ALS, dystonia, Huntington's disease, multiple sclerosis, and muscular dystrophy.

Similar to the problems facing people who are deaf and hard of hearing, individuals with speech disabilities are dangerously at risk of being ignored as speech recognition interfaces become the norm.

People with Physical Disabilities and Motor Impairments

For people with physical disabilities or motor impairments, accessibility issues can take on a wide range of challenges. Some people have use of their hands while others do not. Some have the ability to use mouth sticks and head pointers while others rely on infrared devices.

Physical impairments are wide and varied. They include conditions such as muscle weakness, paralysis, joint discomfort, and spinal injuries, or disease processes such as arthritis and muscular dystrophy.

Functional limitations as a result of Repetitive Strain Injury (RSI) have increased dramatically over the years. Ironically, one of the key reasons for this increase is directly related to use of personal computers. This led to a growth in the use of emerging technologies such as speech recognition.

The growing popularity of Web appliances and devices such as WebTV and Web kiosks, if not properly designed and tested, will present numerous challenges for the physically challenged user.

People with Cognitive or Neurological Disabilities

Cognitive and neurological disabilities may seem a little more difficult to address. However, as with outwardly apparent physical disabilities, the improvements made to your Web authoring techniques will serve more than the disabilities community.

Individuals with dyslexia, dyscalculia, and auditory perception difficulties benefit from information being presented in short, discrete units. Easily digestible chunks of data make the important points in your content stand out as well.

Some neurological conditions can result in users being sensitive to excessive flashing in animations or blinking that occurs within certain ranges of frequencies. Seizure disorders have been known to be triggered by such events. Any time that the eye is distracted from the real content of the page, your meaning may be lost.

500 Million and Growing — A New Market Niche

At first glance, it's hard to believe that more than 500 million people make up what has always been viewed by mainstream industry as a small niche market. This is in fact a 1980 estimate maintained by the United Nations and contained in their report on the World Programme of Action Concerning People with Disabilities. No doubt this number has increased in 20 years. Of course, not all of those people are impacted by accessibility issues on the Web. It's important to remember, however, that people with disabilities are found in all socio-economic levels. Therefore it's likely that the number of disabled users with access to the Internet will be proportionally similar.

Even among Internet users who have disabilities, not all of them present accessibility issues. For example, someone who is paraplegic will likely not have trouble typing, operating a mouse, seeing, or hearing, unless they have an additional unrelated disability. Someone who must refrain from strenuous aerobic activity due to a heart condition won't necessarily have trouble surfing the Web.

This doesn't mean, however, that the community of people with disabilities that do impact Internet use isn't statistically meaningful. Indeed, this community numbers in the tens of millions.

As more and more people gain access to the Internet, the wired disability community continues to grow at incredible rates.

Note the following statistics:

- In the European Community, approximately 37 million people (or 1 in every 10 citizens) have a disability.
- There are more than 4 million Canadians (or 1 in every 7 individuals) with a disability.
- Approximately 3.7 million Australians live with a disability.
- In the United States, according to statistics available in the 1997 U.S. census, approximately 54 million people live with at least one disability.

There's no hiding the fact that the population of able-bodied people outnumbered the population of those with disabilities. This remains true on the

Internet. On the other hand, tens of millions is an enormous number, regardless of what the population is for the rest of the world. Can you think of any business that wouldn't jump at the opportunity to position and sell a product or service to as little as 1 percent of that number? With the growth of electronic commerce making it easier for businesses to reach the consumer, who could afford to miss the opportunity? A report posted in *Internet World* based on data compiled by Jupiter Communications forecasts that online consumer spending will reach \$29.4 billion by the year 2002.

Perhaps best of all, the Web enables you to market and sell your products to the disabilities community market with minimal effort and cost. In most cases, it's no more work than simply ensuring that your Web site includes a text description of the products and services you are selling. E-commerce is the new wave for businesses. In one fell swoop, you can go online, reach bigger markets, and establish a new clientele.

The purchasing power of people with disabilities is also at an all-time high. According to a 1998 report released by the President's Committee on Employment of People with Disabilities, "Consumers with disabilities control more than \$175 billion in discretionary income. They, like all consumers, are more likely to patronize businesses where they feel welcome. Accessible stores, products and services, along with employees with disabilities, will help customers with disabilities feel that their business is appreciated."

Clearly, the effect of the population of consumers with disabilities on electronic commerce has influenced world governments and international standards-based industry organizations to launch creative initiatives to address the needs of the disabled consumer. Exactly how large is the market?

National Statistics

In December 1997, based on a census taken during the four-month period of October 1994 to January 1995, the U.S. Department of Commerce's Bureau of Census reported that 1 in 5 Americans or (54 million people), have some kind of disability. This is about 20 percent of all U.S. citizens, which comprises a larger minority population than African Americans (approximately 30 million).

Additionally, the same report highlighted the following breakdown of those same statistics:

- 1 in 10 Americans has a severe disability.
- Among American children aged 6–14, 1 in 8 have some type of disability.

- 1 in 2 Americans 65 years and older has a disability.
- 1 in 5 Americans between the ages of 15 and 64 years has a disability

To further emphasize that nearly 20 percent of all Americans have some kind of disability, InfoUse's 1996 edition of the *Chartbook on Disability in the United States* (<http://www.infouse.com/disabilitydata/chartbook.choices.html>) estimated that 19.4 percent of noninstitutionalized U.S. citizens had a disability at that time.

Of those, an estimated 24.1 million people had a severe disability. The report estimated that 13.1 million people use assistive technology for anatomical, mobility, hearing, vision, and speech disabilities

Another interesting series of data related to people with disabilities involves the workforce. The *Chartbook on Disability in the United States* (1996 edition) noted that in 1994, 52 percent of the disabilities population were part of the workforce. Continuing advances in assistive technology are enabling more people with disabilities to enter the workforce in greater numbers than ever before. The Internet and Web have played important roles in this advancement, simply by providing greater access to information and services to all people.

While the statistics regarding the population of people with disabilities may come as a surprise to some, almost 30 percent of all families in the United States are affected by a member who has some type of disability. The report titled *Families with Disabilities in the United States*, released in 1996, noted the following:

- An estimated 20.3 million families, or 29 percent of all 69.6 million families in the United States, have at least one member with a disability (as measured by having an activity limitation).
- When a family has a member with a disability, that member is most likely to be a householder. For example, in 88 percent of partnered families with disabilities, one or both partners have a disability.
- An estimated 2.3 million partnered families contain one or more children with a disability.
- Some 3.8 million families, or 6 percent of all families, contain one or more children with disabilities. Most of these (3.4 million, or 89 percent) have one child with a disability.

- The rate of disability is 29 percent for white families, 32 percent for black families, and 22 percent for other races. Among Hispanic families, 23 percent have members with disabilities.



Cross-Reference

You can find the *Families with Disabilities in the United States* report at <http://dsc.ucsf.edu/UCSF/>.

Almost without a doubt, very few families in the United States are left untouched or unattached to an individual with a disability.

International Statistics

On the international front, the statistics are not as easy to come by, but those that are available are consistent with the United Nation's report that approximately 1 in 10 people in the world has a disability.

In Europe, 1 in every 10 people, or approximately 37 million people, have a disability. The European Community (EC) is committed to the mainstreaming of their citizens with disabilities. In a report distributed by the European Commission on the Equality of Opportunity for People with Disabilities, the Commission reported that 5.5 billion ECU would be allocated during the five-year period of 1994–1999 to combat exclusion of people with disabilities in the workforce.

This report also noted that the Employment-HORIZON initiative, a part of the EC's Employment Community Initiative, was allocated 513 million ECU to advance employment opportunities for people with disabilities.

Again, to further emphasize the high level of awareness involving issues of accessibility to information, the Commission on Equality of Opportunity stated the following in Part VI of "Mainstreaming: Information and Communication Technologies (ICTs)" (emphasis is mine):

49. The Commission is actively interested in exploring the possibilities for **harnessing all aspects of the Information Society in the achievement of equal opportunities for people with disabilities** and in improving their living and working conditions. These questions are discussed in general in the Commission's Green Paper on Living and Working in the Information Society: "People First". An internal ad hoc group will be set up by the Commission to take this forward with the mandate to examine the scope for a special initiative at European level, building on relevant experience to date, for example in the TIDE Initiative. This will be based on a review of good applications of Information and Communication Technologies (ICTs) in favour of people with disabilities, and the further potential for developing economies of scale in making ICTs more widely accessible and useful to people with disabilities.

A 1996 report published by the Canadian Premier's Council on the Status of Disabled Persons in Canada indicated that of the 27.3 million Canadians, about 1 in 7 (or approximately 4.2 million) have a disability. In Australia, according to a 1997 publication by the Australian Institute of Health and Welfare, the Australian Bureau of Statistics (ABS) reported in 1993 that there were 3,176,700 people in Australia with a disability. This constituted approximately 18 percent of the Australian population at that time.

Applying the Golden Rule

Now that Web accessibility issues are gaining mainstream attention, some companies are beginning to wake up and adjust their development strategies to include accessible user features. In the past, Web accessibility for people with disabilities was an afterthought. At best, corporations would support an adaptation or a fix to the interface or application after the finished product was released to the public.

The basis for this strategy often is dictated by inadequate market studies, limited user focus, and the perception that a small population of people with disabilities actually use the Web. However, as we have seen from the statistics previously referenced, approximately 1 in 10 Americans has a disability that could impact their Web surfing experience.

There are other compelling reasons for designing Web accessibility today, including government legislation and international technical standards. A very practical approach (and one that I have personally found to be quite influential) toward motivating anyone is to hit them where they'll feel it the most — in the heart. Because statistics indicate that almost 30 percent of all families living in the United States include someone with a disability, there's no doubt that the percentage of those affected is much higher when you include acquaintances and friends.

One of the greatest privileges I've had in my professional life was to meet and briefly work with the internationally known linguist Dr. Tony Vitale. Tony was instrumental in the development of the DECtalk synthetic speech synthesizer for Digital Equipment Corporation (since bought and absorbed by PC giant, Compaq Computer Corporation). DECtalk is still one of the most widely used speech synthesizers by people with disabilities. Blind people use DECtalk to read the contents of their computer screens. Individuals who are not able to speak use DECtalk to speak for them. Children with learning disabilities have DECtalk read stories to them. Professor and physicist Stephen Hawking's voice uses the DECtalk speech technology. You can

see why Tony is generally revered in the disabilities community for his significant contribution.

Suddenly and with little warning, Tony was diagnosed with Amyotrophic Lateral Sclerosis (ALS), more commonly known as Lou Gehrig's disease. ALS is a fatal, neuromuscular disease that causes rapid deterioration of motor cells in the brain and spinal cord, ultimately leading to severe impairment of mobility, speech, and respiratory functions (Stephen Hawking also has ALS). Tony's health deteriorated quickly, and within months, he no longer was able to speak without the aid of a speech synthesizer. The very device that he was responsible for developing became essential to his ability to communicate with others.

The irony in this incredible turn of events is heart-wrenching to say the least. Perhaps more eye-opening are the statistics that indicate situations like Tony's are not nearly so uncommon as you may have thought. For example, a 1991 report by the U.S. Congress House Committee on Ways and Means stated that individuals between the ages of 35 and 65 have a 30 percent chance of experiencing a disability.

The report also noted that a person's greatest earning potential occurs between the ages of 35 and 65. Gives new meaning to the term *disability insurance*, doesn't it?

When you see the world through someone else's eyes, it's much easier to appreciate why so many Web engineers have made it their mission to improve the quality of the Web for people with disabilities. The biblical principle "Do unto others as you would have them do unto you" applies with equal measure, especially in high-tech circles. In technical jargon, the golden rule is evident through *usability*, or designing for the user. When you design for the user, particularly for the user with a disability, you are doing the right thing.

Do the Right Thing

Let's review "doing the right thing" from the user's perspective. Take a look at your Web site. Is it filled with images, image maps, tables, frames, multimedia, and programming scripts? If so, have you taken the appropriate steps to ensure that each mechanism is accessible? Does your Web site support style sheets? Have you ever included blind or deaf people in your Web site

review process? Do you have a Web site review process? Are you HTML 4.0 compliant? If not, why not?

I

1



Tip

You can easily check your Web site for most accessibility errors and conditions by using a number of publicly available tools like Bobby (<http://www.cast.org/bobby/>), LIFT (<http://www.usablenet.com/>), WebSAT (<http://zing.ncsl.nist.gov/webmet/sat/websat-process.html>), and WHAT (<http://cmos-eng.rehab.uiuc.edu/what/>). LIFT and Bobby are also available through WebABLE (<http://www.webable.com/>).

Additionally, the W3C provides an HTML 4.0 validation service (<http://validator.w3.org/>) that verifies proper HTML accessibility coding.



Cross-Reference

Please refer to Chapter 7 for additional information about Web accessibility and HTML validation services.

The point is that, barring copyright or privacy rules, isn't access to content by the largest number of people possible the vision of the Web? *PC Computing* magazine put it succinctly: "Your data will be everywhere." The whole driving force of the Web is to get your content and Web services to the public, on a global basis. Why wouldn't you design and create that information for the widest population, including people with disabilities? Seems to me that 500 million is a reasonably-sized market, so there are at least 500 million good reasons for doing it.

The Third Age

Remember too that the Third Age generation (the elderly) comprises the largest and fastest growing population segment in the world. Contrast the demographics of a report generated by the World Health Organization (WHO) in 1997 (Figure 1.1) with the projected increase of the elderly population by the year 2025 (Figure 1.2). In several nations, nearly 20 percent of the population will consist of elderly people!

Figure 1.1 WHO demographics for population of people 65 and older in 1997

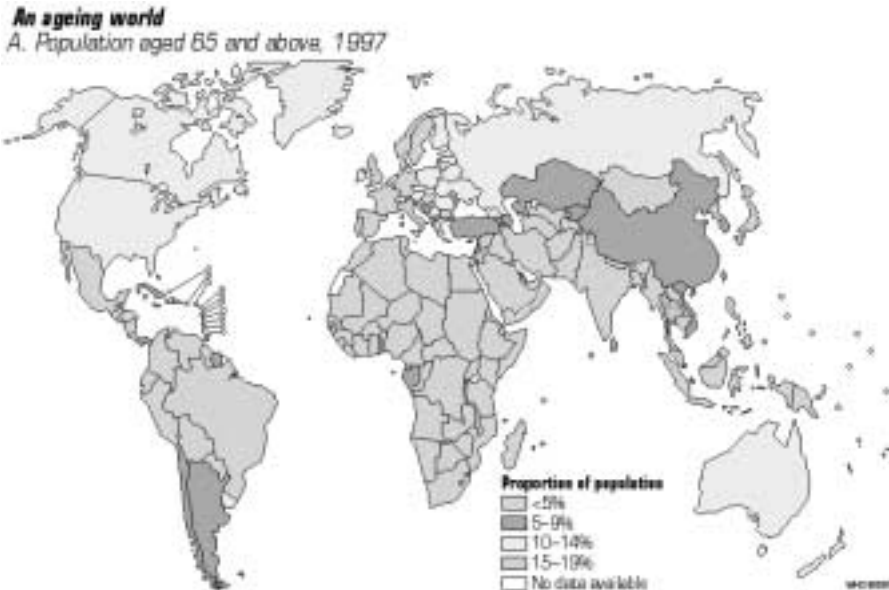


Figure 1.2 WHO demographics for population of people 65 and older by 2025



The Third Age generation is also made up of a significant population of individuals with *multiple disabilities* — people affected by more than one type of disability. As people age, it is quite common to experience loss of sensory combinations including vision, hearing, and mobility.

Regarding the elderly and causes of disability, WHO also reported the following:

- Cancer and heart disease are more related to the 70–75 age group than any other; people over 75 are more prone to impairments of hearing, vision, mobility, and mental function.
- Over 80 percent of circulatory disease deaths occur in people over 65 years of age. Worldwide, circulatory disease is the leading cause of death and disability in people over 65 years of age.

In spite of these statistics, make no mistake about it: The Third Age generation is quite adept at using the Web. Web sites set up and maintained for and by senior Web users abound. Just take a peek at Web sites for organizations like the American Association of Retired Persons (<http://www.aarp.org/>) and the Third Age home page (<http://www.thirdage.com/>).

Lack of Awareness

My personal experience has been that most Web site designers will make their sites accessible when (and if) they know how. I spend more time delivering seminars, workshops, and conference presentations about web accessibility than other single task I can think of.

However, understanding the problem is only half the battle. Misconceptions abound. I believe that at least 50 percent of the problem involving Web accessibility is lack of awareness. Most people involved with the Web, whether as developers or users, simply are not well informed when it comes to accessibility.

Preparing for the Future

What about the future Web? The current technology buzz involves computers and Web browsers that feature speech input/output subsystems. Now you can talk to your computer using voice commands rather than typing them. Today, new cars are being built with Web browsers and navigational systems that feature speech-based interfaces.

New technology? The next wave? Hardly! People with disabilities have relied on this technology for years. Speech technology is a primary tool in the adaptive and assistive technology communities. These “next-generation

products” were designed to aid the blind, physically challenged, and non-verbal. Suddenly what was an assistive technology is now a mainstream consumer electronic device.

Everyone, Everywhere

Let’s not forget that the challenge of Web accessibility is of great importance on the international front — particularly where awareness is concerned. In the past two years, primarily due to the work coming out of the Web Accessibility Initiative (WAI), several organizations in Europe, Asia, and Australia have examined the complex issues involving internationalization and Web accessibility for the disabilities population. WAI’s work resulted in the implementation of country- and community-specific guidelines as well as new products and tools. No doubt, this fervor will spread to the remaining continents in the near future.

One example of the effect Web accessibility is having on the international front is highlighted by the collaborative effort accomplished by consortia members of the HARMONY (Horizontal Action for the Harmonisation of Accessible Structured Documents) Project (<http://www.esat.kuleuven.ac.be/teo/docarch/projecten/harmony/harmony.en.htm>). HARMONY is a funded program developed by the Technology Initiative for Disabled Elderly People (TIDE). TIDE is also a valuable funding resource for the WAI in Europe.

HARMONY’s chief goal as stated in their final report is as follows:

To increase the *quantity and quality* of information accessible to “print-disabled” people — especially in daily newspapers — by stimulating the publishing community via a process of involvement, lobbying and standardization, and by encouraging them to adapt their existing electronic production systems to make use of appropriate new document-structuring concepts.

Initially, the HARMONY Project started out as an initiative concentrating on print-based material. However, because of the overwhelming prominence of the Web, the project strategy was extended to include the Web. Implementation of that strategy resulted in significant accessibility enhancements for newspapers, publishers, information providers, and specialized print services throughout the European Community.

Reaching the Third Wave

I 1

The fact that the Web is inherently inaccessible is not the result of some malicious or premeditated intent. The Web followed a very typical development process based on standard engineering processes that, all too often, do not include considerations for people with disabilities. Web page designers and content producers observe similar methods. Subsequently, most advanced technologies are not accessible to people with disabilities. Until now, it was satisfactory to create an assistive or adaptive device (or application). Until now, very few laws or standards mandated accessibility.

The Web is a growing, pervasive phenomenon. It is a global technology that requires programmers to think in holistic terms, fully understanding the number of people who are directly affected by current Web barriers and redesigning Web interfaces to adapt to the user. This is the essence of true *personalization* — Web design that ensures accessibility for every user by adapting to the user's preferences.

To clarify, I'm not talking about *customization*, which is the ability of a Web surfer to visit a particular Web site and custom start his or her own page. In essence, that's no more powerful than being able to adjust the desktop on your PC. Rather, a personalized Web, based on recognized user characteristics or preferences, serves content of any construct to users in any form they like.

The personalized Web service is dynamic and pervasive. Regardless of where you are or what you want, you get what you want the way you want it. Even when extracting that data from multiple sources, likely including multiple content types, you get personalized service.

Web personalization is still in the early stages of development and likely, it will be a few years before the average user sees it. In technology, the best way to implement accessibility is through usability. Focus on the user's ability to interact effectively and efficiently with your interface and you'll achieve a greater level of user satisfaction. Include people with disabilities in your user studies and testing. Keep in mind that people with disabilities are not looking for your sympathy. Rather, they encourage Web designers to develop creative solutions that include all users.

Summary

In this chapter, you learned that the number of disabled Web users is far larger than most people might have thought. These individuals have a wide variety of challenges to overcome when accessing Web sites, from dealing