

# Leveraging Universal Design in a Financial Services Company

*Marguerite Bergel, Ann Chadwick-Dias and Tom Tullis*

Fidelity Investments, Fidelity Center for Applied Technology, Human Interface Design

E-mail: {marguerite.bergel, annmarie.chadwick-dias, tom.tullis}@fidelity.com

## Introduction

E-commerce companies must strive to understand the changing physical, cognitive, and social requirements of their customers. The older demographic is the fastest growing worldwide [10, 15, 16, 20] and also the fastest growing online [8, 13]. In many countries, this aging trend is driven by the increase in birth rate that occurred after World War II. This generation is often defined as those born between 1946 and 1964 and includes the US “baby boomers” and the Japanese “dankai no sedai” (clumped generation). As this generation ages, the average age of the population will rise, and so will the incidence of impairments that influence how people use the Web including visual (cataracts, diabetic retinopathy, glaucoma, etc.), auditory (presbycusis, otosclerosis), motor (arthritis, stroke), neurodegenerative (Parkinson’s disease), and cognitive (Alzheimer’s disease) impairments. In the U.S. alone, over 14 million adults have some type of visual impairment and 28 million have some type of hearing loss (10 million of whom are over the age of 65). In addition to the changing demographics, international and domestic laws [12, 17, 18] are becoming ever more stringent, requiring equal access to information on the Web for all users, including those with disabilities. These changing demographics and sociopolitical issues, combined with a gradual trend toward corporate social responsibility, will likely encourage more companies to integrate universal design standards into their internal and externally-facing Web sites.

Providing accessible Web content to a much wider range of potential customers is critical in the financial services industry. As the baby boomers approach retirement, they will likely look for ways to invest and manage their assets as they adjust to a new phase in life. They are also a demographic with a lot of money. Estimates suggest they represent \$20 trillion in potential assets [1]. Accordingly, it makes good business sense for us to explore universal Web design to expand the reach of our business. Furthermore, as we explore more universally accessible approaches to design, there is greater likelihood of devising interfaces that work more effectively on a broader range of hardware. As people worldwide continue to access the Web increasingly via portable devices such as smart phones, PDAs, in-car browsers, and portable media centers, it also makes good business sense to move away from optimizing sites for desktop computers with conventional browsers. In fact, forecasters predict that PDA sales will more than double in the U.S. by 2008 (and that sales in Europe will more than triple those in the U.S.) lead primarily by sales of Web-enabled cell phones [8]. Early adopters of this cutting-edge technology also tend to be high-net-worth individuals. Naturally, retirees and the growing numbers of portable device users are potential customers we hope to be able to accommodate.

At Fidelity Investments, most of our business occurs online. Ninety-four percent of our commissionable trades (more than 78,000 per day) are placed online. Our retail site alone

supports an average of 1 million contacts per day. Customer assets at Fidelity total \$2.1 trillion as of January 31, 2005, including \$1.1 trillion in managed assets. Apart from servicing individual investors, a significant part of our business stems from management of retirement plans of institutional clients like businesses, government agencies, and non-profit institutions. Almost 12 million U.S. employees save through a Fidelity-administered plan, which comprises over 43% of our customer assets. The institutional side of our business has grown exponentially and now accounts for over half of our annual revenue. Accordingly, Web sites that support this part of our business already must comply with Section 508 standards wherever they have any indirect or direct relationship with the government. But given that the Web is our primary medium for conducting business, we cannot assume that complying with Section 508 standards in limited areas of our business is enough.

## **Educating ourselves and our firm**

Before we can begin designing our Web sites to meet the needs of customers who use specialized technology to access them, we must learn what their requirements are. Establishing relationships with local area organizations servicing people with disabilities has proven the most important element in our learning about the needs of these users. Our association with groups like the National Braille Press [11], and a local users' group called VIBUG (Visually Impaired/Blind Users' Group) [19], have been instrumental in helping us begin to understand the unique challenges and concerns of this population online and elsewhere. For example, our interactions with these groups have enabled us to learn many of the specific strategies these users employ when navigating the Web with various assistive technologies. These groups have also proven invaluable in recruiting for usability studies and focus groups at Fidelity involving low-vision and blind Web users.

Internally, our user-centered design group works to spread what we learn about accessible design to designers and developers throughout Fidelity. We disseminate findings from our usability and accessibility research internally via an online and printed quarterly newsletter, and through our Web Design Guide (both online and print versions) that we are now augmenting with accessibility guidelines.

We also lead tutorials on accessible Web design for developers and designers where, among other exercises, we ask participants to wear glasses (simulating macular degeneration) and thick gloves (simulating arthritis and difficulty with fine motor control) when working on tasks at the computer to get a better sense for the challenges faced by our aging and visually impaired customers (Figures 1 & 2). Recently, several accessibility experts have come to Fidelity to teach our developers about the more technical aspects of accessible development including advanced HTML and CSS coding. Later this year, we plan to have an Accessibility Day involving tutorials and invited speakers who will talk to the importance of accessibility in technology from a variety of perspectives.



**Figure 1.** Fidelity Web developers wearing thick gloves while using a mouse to simulate fine motor control issues.



**Figure 2.** A Fidelity Web developer attempting to use the Web while wearing glasses with solids dots placed in the middle of the lenses to simulate macular degeneration.

Currently, we are preparing to build an accessibility lab with a physical layout and a range of assistive technologies that will enable us to more effectively conduct research with users of all abilities. In addition to research, the lab will serve as a resource to Fidelity developers who, for example, will be able to arrange to hear how various screen readers will read their particular site. In the meantime, our group is striving to develop proficiencies with the technologies we will make available in our lab to not only be better able to assist those internally who have questions, but more importantly, to help us better connect with our customers who use them. This month, members of our human interface design group will learn how to navigate the Web using JAWS during a day-long training at the Carroll Center for the Blind [3].

### **Our user-centered design research**

While our approach to accessibility at Fidelity is multifaceted, we continuously try to involve users of all abilities in forward-looking, user-centered research.

For the past four years, we have been studying how to better meet the needs of our aging Web customer base [4, 5, 6, 7, 14] (Figure 3). Our research has shown us consistently that improvements intended to enhance ease of access and usability for the aging Web user, also improve the ease of access and usability for all users. Similarly, our recent work with blind and low-vision users indicates that design decisions intended to improve Web accessibility for that demographic improves accessibility for other demographics including novice Web users and those with low levels of financial expertise.



**Figure 3.** A woman over the age of 65 works at a computer during a usability study of a Fidelity prototype.

Our recent preliminary studies with low-vision [2] and blind users taught us a specific challenge both populations encounter when coming to unfamiliar Web pages is learning the primary functions and overall hierarchy of that page. While sighted users quickly visually scan a page to understand its overall content and hierarchy, visually-impaired and blind users must gather this same information either through magnification or screen reader software, both of which make this task far more challenging and time-consuming.

### ***Page Overviews***

Based on suggestions from users in our preliminary studies, we began to consider the potential advantages of providing some sort of page overview function that would be accessible to both sighted and non-sighted customers. We developed some prototype pages and conducted focus groups with blind and low-vision users to gather feedback on this concept (Figure 4).



**Figure 4.** Fidelity focus group with blind and low-vision users.

## Low-Vision Users

For sighted users, the prototype pages provided visible, keyboard accessible controls that allowed users to play recorded audio page overviews. One prototype had an overview conveying information about the page and site in one generic, recorded audio file. A second prototype “chunked” the information into the following “chapters”: a general description of the site, a general description of the page, a list of site-wide and page-specific access keys, a description of the main navigation, and a description of the page’s visual layout.

## Blind Users

For blind users, we placed an invisible GIF file at the top of the page. For the prototype that had one long overview, we added a long description to the image file that allowed blind users to hear the overview read by JAWS. For the “chaptered” prototype, we added five GIF files to the top of the page. Each file had alt tag text that corresponded to the chapters described above. JAWS would read each alt tag in order thereby allowing blind users to control access to this information. Each GIF file was also assigned an access key.

## *Preliminary Results and Follow-Up Research*

All user responses were uniformly positive to the concept of page overviews. The majority of users preferred the “chaptered” version. We are currently planning a follow-up study with blind users that will have them using a prototype that utilizes page overviews in addition to several other assistive features suggested by our focus group participants. We will then directly compare their performance on a similar prototype that is Section 508 compliant, but does not provide page overviews.

Much of what we aim to learn in our current research is what we can do “beyond Section 508” compliance that will improve accessibility of information for all customers. We believe investigating other more universally accessible design principles than are called for in Section 508 or the W3C will one day help all of our customers to have more satisfying experiences on our sites no matter what their capabilities or technological constraints.

## Future Research Questions and Directions

There is an abundance of research yet to be conducted on practical issues related to universal design and access, such as the following:

- **Understanding how best to design for low-vision users.** More research has been conducted attempting to understand the requirements of blind users than those who have various types of visual impairments, but still use the graphical interface. These two populations likely have very different requirements and more needs to be understood about how best to design for both populations.
- **Learning more about using aural style sheets.** Most screen readers currently do not support the use of aural style sheets, but should, and likely will in the near future. Since very little is currently understood about how aural style sheets may best assist screen reader users, there is much work to be done in this area.

- **Working towards incorporating accessibility and usability into corporate culture and processes.** Just as usability practices vary from firm to firm depending on many factors, accessibility practices face the same challenges. A true user-centered design approach would naturally incorporate both usability and accessibility into design and development cycles. Understanding how best to incorporate these practices and demonstrate a high ROI is a critical research question.
- **Understanding more about audio interfaces.** While the Web is currently primarily driven by visual interaction, there will be increasing demand for more interactive content as companies attempt to meet the needs of various demographics, including, younger, older, and visually-impaired users. Audio interfaces (meaning audio output) provide potential advantages for all users.
- **Moving towards voice-mediated interface design.** Voice-mediated interfaces (audio input and output) offer advantages for not only blind and visually-impaired customers, but also sighted customers who may require a hands-free means of interaction (mobile, PDA, etc.). While technical constraints are still a major factor in this area of research, it is likely to be the future of interaction on the Web. While there are obvious advantages of being able to interact with the Web via voice, much research remains on how to optimally design such interfaces.

## Conclusion

Usability issues have traditionally been studied via a user-centered design approach, where representative users provide input during all phases of the design and development process to ensure a usable design. To date, accessibility issues have often been addressed more by applying heuristics than by actually working with the various user groups. Our approach is to actively involve users who have these disabilities in the design and evaluation process. Accessibility is not different from usability; it just means including the right users in your user-centered design approach. Much work remains to understand how to better meet the changing needs of our internal and external customers. Fortunately, our preliminary efforts at incorporating accessibility into business and development practices at Fidelity are already helping us understand more about potential strategies for universal interface design.

## References

1. Amend, James M. (2005) Retiring Boomers Represent Next Big Windfall for Fund Industry. April 11, 2005. Available at <http://www.financialplanning.com/pubs/fpi/20050411102.html>
2. Bergel, Marguerite, Chadwick-Dias, A., & Tullis, T. (2005). Web Accessibility for the Low Vision User. To be presented at the *Usability Professionals Association Annual Conference*, Montreal, Canada. June 2005.
3. Carroll Center for the Blind, Newton, MA. Available at: <http://www.carroll.org/>
4. Chadwick-Dias, A., Bergel, M., LeDoux, L., and Tullis, T. (2005). How to Improve Web Usability for Older Users. To be presented at *Human Computer Interaction International*, Las Vegas, July 2005.

5. Chadwick-Dias, A., McNulty, M., Tullis, T. (2003). Web Usability and Age: How Design Changes Can Improve Performance. *Proceedings of the 2003 Conference on Universal Usability*, November 2003, 30-37.
6. Chadwick-Dias, A., Tedesco, D., and Tullis, T. (2004a). Demographic Differences in Preferred Web Site Content. *Proceedings of Usability Professionals' Association Annual Conference*, Minnesota, June 2004.
7. Chadwick-Dias, A., Tedesco, D., and Tullis, T. (2004b). Older Adults and Web Usability: Is Web Experience the Same as Web Expertise? *Proceedings of ACM 2004 conference on Computer-Human Interaction*, 1391-1394.
8. Etforecasts Press Release on June 16, 2003. Smartphones Have Started to Impact PDA Sales: Most Future PDA Sales Increases Will Come from Smartphones. Available at: <http://www.etforecasts.com/pr/pr0603.htm>
9. Fox, Susannah (2004). Older Americans and the Internet, Pew Internet & Family Life. Available at:1. [http://www.pewinternet.org/PPF/r/117/report\\_display.asp](http://www.pewinternet.org/PPF/r/117/report_display.asp)
10. 2. INSEE France. France in Figures, Edition 2004. Annual census surveys: Preliminary findings of the 2004 census - Principal population and housing characteristics Available at [http://www.insee.fr/fr/ffc/docs\\_ffc/IP1001.pdf](http://www.insee.fr/fr/ffc/docs_ffc/IP1001.pdf)
11. 3. National Braille Press, Boston, MA. Available at: <http://www.nbp.org/>
12. 4. New British Standard – BS 7000-6:2005: Guide to Managing Inclusive Design. Available at: <http://www.hhrc.rca.ac.uk/resources/publications/BS7000-6.pdf>
13. 5. Nielsen NetRatings Report (2003). Senior Citizens Lead Internet Growth, November.
14. 6. Tedesco, D., McNulty, M., and Tullis, T. (2005). Usability Testing with Older Adults. To be presented at Usability Professionals Association Annual Conference, Montreal, Canada. June 2005.
15. 7. U.S. Administration on Aging and U.S. Bureau of the Census. A Profile of Older Americans: 2001.
16. 8. U.S. Bureau of the Census, The 65 Years and Over Population: 2000. Census 2000 Brief. October 2001.
17. 9. US Americans with Disabilities Act (ADA ). Available at: <http://www.usdoj.gov/crt/ada/adahom1.htm>
18. 10. US Section 508 of the Rehabilitation Act: Electronic and Information Technology Accessibility Standards. Available at: <http://www.section508.gov/index.cfm?FuseAction=Content&ID=12>
19. 11. Visually Impaired and Blind User Group (VIBUG), Boston, MA. Available at: <http://www.vibug.org/>
20. World Health Organization, Press Release, April 1999 Available at <http://w3.whosea.org/prsrles/>