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CUU: Bridging the Digital Divide with Universal Usability

How do you explain a trashcan to a culture that doesn't have one? How do you describe a "stop loss limit order" to retirees managing their funds? Can you design a text-only interface that conveys the contents and experience of an animated Flash presentation?

These puzzles emerged during the first ACM Conference on Universal Usability (CUU; www.acm.org/sigchi/cuu/), held November 15–17, 2000, in Arlington, Va. The Association for Computing Machinery has taken a visionary commitment on universal usability through its Code of Ethics: "In a fair society, all individuals would have equal opportunity to participate in, or benefit from, the use of computer resources regardless of race, sex, religion, age, disability, national origin, or other such similar factors." I believe that information and communications professionals will be enriched by and respected for their commitment

to serving diverse users. Designing for diversity is the right thing to do and it is also the smart thing to do. It increases audiences and produces better experiences for all users. Diversity promotes quality.

The conference participants shared this commitment. However, they were concerned that although the goal is far-reaching, strong action is needed to begin achieving it. They noted that lacking that action creates an increasing "digital divide," the growing inequality in people's access to technology and the benefits it can bring. This conference was held not only to understand what the problems are, but more important, to explore what solutions can be taken, and most important, to foster more of that action. The conference was a call to arms.

The international group of organizers, presenters, and attendees of the conference shared an unusual com-

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mitment to and passion for making information and communications services accessible, usable, and useful. They want to see effective health care services and appealing distance education. They want to create successful e-commerce and accessible government services for everyone. Realizing these possibilities requires more than low-cost hardware or broadband networks. These mass-market services are often too complex, unusable, or irrelevant for too many users [2]; usability and design become the keys to success.

The source of these problems was often attributed to designers who make incorrect assumptions about user knowledge. This leads to difficulties with technical terminology and advanced concepts that are not balanced by adequate online help or live assistance. Unfortunately, most designers never see the pain they inflict on novice and even expert users. These problems have contributed to the growing digital divide in adoption levels of Internet technologies between low-income, poorly educated users and high-income, well-educated users [3]. Even as the gap between male and female Internet users has been eliminated and the gap between young and old is shrinking, the slow adoption rates by poor and poorly educated users remain a problem. Low-cost equipment is needed, but progress in design will help make Internet services more accessible to more people.

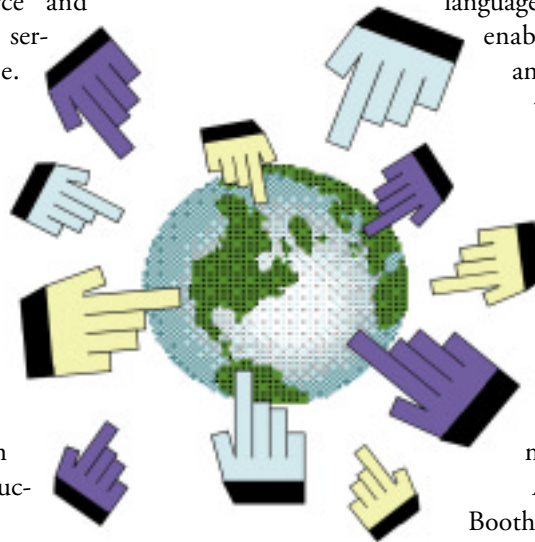
Although hardware devices, software architectures, and user interfaces have improved during the past two decades, users' needs and expectations have grown faster. The challenges faced by designers were illustrated by the exemplary work of Gary Perlman [1], who had to develop an accessible English, French, and Spanish Web site for Windows and

Macintosh, using Microsoft Internet Explorer and Netscape Navigator. He also accommodated a range of screen sizes, network bandwidths, and print formats. His software architecture, based on display and language independence, also enabled hand-held access and user-controlled customization. But the punch line to his story was that the software architecture also facilitated rapid revisions when management presented new system requirements, thus saving substantial time and money.

A paper by Baecker, Booth, et al. of the University of Toronto presented three projects to make complex designs more accessible to novices, including a three-level word processor to give novices control over the complexity of the interface. Two of the early heroes in the movement for universal design, Alan Newell and Gregg Vanderheiden, helped in the conference planning and participated by presenting their latest work. Newell described user-sensitive inclusive design paradigms and Vanderheiden detailed EZ Access, which offers multimodal help, for mobile devices and kiosks, at a cost increase of only one percent of the retail price.

Other papers presented ambitious technical goals, for example,

- Making information and communications technology available at low cost and improving the quality of service;
- Reducing system complexity and user frustration and expanding functionality;
- Enabling users with older equipment or slower network access to participate fully and advancing high-end technologies;
- Increasing the utility and comprehensibility of services for low-income and poorly educated users and enabling



- advanced users to explore novel strategies;
- Facilitating access by users who need support for visual, auditory, physical, and other disabilities; and
- Enabling multilingual, multiplatform designs for diverse users and reducing development time and maintenance costs.

Many participants' enthusiasm for designing for diverse users was inspiring. Their devotion to serving poorly educated, novice, disabled, or elderly users helps to expand our repertoire of techniques that could benefit all users. They talked about how to apply usability testing to prevent mysterious metaphors, technical terminology, and unreasonably long load times. Presenters described strategies for minimizing confusing menu choices, disorganized Web sites, and the traditional problems of incomprehensible error messages, incompatible file formats, and unexpected crashes. These problems were often cited as barriers to novice and discretionary users, but the evidence is growing that they confuse and disturb even motivated and experienced users. Fresh strategies with substantial commercial potential were proposed to accommodate varying network bandwidth, processor speed, or screen size. Using cell phones to obtain access to Internet services by text or voice was a frequently expressed goal, but automatic conversion from a display independent markup language is still a research and development challenge.

The conference organizers benefited greatly from the willingness of professionals in ACM and related associations to promote our conference. The ACM's Special Interest Group on Computer-Human Interaction (SIGCHI) took the lead, and its Executive Council was strongly supportive, especially chair Marilyn Tremaine. Similarly, the ACM United States Public Policy Committee (USACM) chaired by Gene Spafford and Barbara Simons warmly supported our cause.

But SIGCHI was not alone in this effort. Cooperation in publicizing our activities was given by five other Special Interest Groups:

- Computers and Society (SIGCAS)
- Computers and the Physically Handicapped (SIGCAPH)
- Documentation (SIGDOC)
- Computer Graphics and Interactive Techniques (SIGGRAPH)
- Information Retrieval (SIGIR)

They were joined by a remarkable set of professional groups who cooperated in organizing the conference by

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contributing suggestions and spreading the word within their organizations:

- American Library Association Office of Information Technology Policy
- American Society for Information Science
- Association Francophone d'Interaction Homme-Machine (AFIHM)
- British HCI Group
- Computer Professionals for Social Responsibility
- Human Factors & Ergonomics Society
- Internet Policy Institute
- The Internet Society
- The National Urban League
- Society for Technical Communication
- Usability Professionals Association

In addition, sponsorship was provided by both industry (Intel, Oracle, The Morino Institute, Motorola, Sun Microsystems) and government (U.S. National Institute of Standards and Technology, U.S. National Science Foundation).

Conference management was provided by the University of Maryland Institute for Advanced Computer Studies. David Novick, who was a conference co-chair, handled sponsor relations. Susan Harkness Regli was our treasurer and Donald Day coordinated publicity and generated press releases.

Two special features of the Conference on Universal Usability were Student Fellows and the CUU Fellows. The 20 Student Fellows from the United States had travel support from the National Science Foundation that was obtained by Jenny Preece and administered by the University of Maryland, Baltimore County. Eight additional international Student Fellows were supported by funds from our sponsors. They were led by Kori Inkpen, Brad Mehlenbacher, and Joanna McGrenere, who coordinated their efforts before the conference to construct a Web site with relevant resources (www.univers usability.org). During the conference the students provided valuable support and wrote session summaries with digital photos that were timely placed on the conference Web site (www1.acm.org/sigs/sigchi/cuu/proceedings/report.html), by the conference Webmaster,

Keith Instone. This provided a permanent record for attendees and others. We appreciated the contributions of the students, but the organizers also wanted to energize the next generation of leaders in addressing these important themes.

The CUU Fellows program, organized by Joelle Coutaz, was another creative and administrative challenge. Joelle convened a committee of organizers, who solicited applications from international representatives of diverse cultures, elders, and minority, low-income, and disabled users. In the months leading up to the conference, the CUU Fellows, from countries such as Australia, Ireland, Malaysia, Romania, and Vietnam, had an e-mail discussion to get acquainted and to identify key issues. On the day before the full conference, the CUU Fellows met with the organizers to prepare their conference presentation.

Their compelling presentation (which will appear in SIGCHI Bulletin) was built around three stories. The first was Addie's shoes, which focused on the unanticipated but simple changes a cobbler had to make in his custom shoes to accommodate the needs of an elderly client. The second story was about Deane, a man whose desire for independence in the face of a disabling illness propelled him to find appropriate software to allow him to get a college degree. Deane and his wife had traveled from Australia to participate and won respect for their thoughtful contributions. The third story involved a Vietnamese fisherman's son, which discussed the difficulties in learning to use computers for citizens of developing nations whose culture is very different from the software designer's expectations.

White House senior economic adviser Tom Kalil delivered the opening speech, "Creating Digital Opportunity." He reported on four admirable goals of the Clinton-Gore administration: Bridge digital divide domestically, make information technology more accessible for people with disabilities, address international issues (gaps between developed and developing countries), and increase federal investment in human-computer and information management.

Michael Burks of AT&T spoke about raising awareness of the economic advantages of universal design. He examined four occasions when the high cost of universal usability prevented efforts from proceeding. He called for press coverage to change public perceptions, education to inform corporate and legislative decision makers, and technical information to inform programmers in developing universally usable Web sites and software.

One immediate outcome of the conference is the refinement of a proposal for universal usability statements (described in an accompanying article in this issue). These declarations, by Web site designers, describe the contents of a site, browser requirements, network requirements, and other characteristics that may influence its usability. Imagine the increase in successful Web site visits if users know that it has been tested with their screen reader software, WebTV, or their mobile device and that it does not require plugins or long downloads.

The sold-out crowd of 250 conference attendees included about 50 percent computing practitioners, 40 percent university affiliates, and 10 percent government representatives. Everyone came away with a richer awareness of the problems and potential solutions. Some minds and hearts were changed. Some partnerships and collaborations were started.

The best indicator of this impassioned commitment to universal usability was that 30 volunteers immediately offered to help organize a conference in 2002. You can contribute and join the organizing committee by contacting Marilyn Tremaine (ACM SIGCHI Chair, tremaine@acm.org). CUU Proceedings, edited by Technical Program co-chairs Jean Scholtz and John Thomas, are available from ACM's Digital Library (www.acm.org/dl) or on paper (store.acm.org/acm-store/).

References

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