



Usability Professionals' Association

Starting from People

Remarks by
Whitney Quesenbery, Director
UPA Voting and Usability Project

at the
NIST Symposium on Building Trust
and Confidence in Voting Systems

December 10-11, 2003

I'd like to thank NIST, but especially Sharon Laskowski for this wonderful symposium, and for their ongoing work on tools and standards for usability.

I am here not as an expert in voting system design, but as someone from a related field, in this case usability and user-centered design.

I am also here with an interest in voting systems. Like so many others my interest was sparked by the events of the 2000 Presidential election. At the time, I had just been elected to the board of directors of the Usability Professionals' Association. Usability is not often the topic of national headlines, so our collective attention was naturally drawn to an event in which usability problems occupied the national news.

I started the UPA Voting and Usability project to provide information about how usability and accessibility issues can affect an election. We were interested in how the things we know about the user experience, usability testing and user research could help improve both new and current voting systems. We provide members with updates on guidelines and legislation, as well as making informational presentations to local groups and participating as usability experts in symposia like this one.

What I would like to do today is to share with you a little bit about usability and user-centered design and some thoughts about how it can (and should) be applied to the design of both voting systems and the ballots for specific elections.

promoting usability concepts and techniques worldwide



140 North Bloomingdale Road
Bloomingdale, IL 60108-1017

Telephone: 630/980-4997
Fax: 630/351-8490

www.upassoc.org
office@upassoc.org

How hard is it to put an "x" next to your candidate's name? Most people manage it just fine!

One of the biggest challenges in talking to people about the usability of voting systems is getting any attention for the issue at all. People tend to gloss over usability.

Some say things like "how hard is it to put an x next to your candidate's name - most people manage just fine". This is often followed with "my grandmother has no problems with our system" In some ways, it's hard not to agree. The act of voting should be *that* simple. This may be one of the most important places for universal access to the system and for the best possible usability of the user interface. The user

group includes almost every citizen of voting age, no matter what their physical disabilities or literacy level might be.

Unfortunately, we have much evidence of how poorly the goal of universal accessibility is met in many of our current voting systems. We have the ability to correct this, and there is no reason for us not to do so.

The other argument against taking usability seriously is that "it's the last thing we should be worried about - if we can't trust the technology, nothing else matters." Again, I have to agree that the technical integrity of the system is the first question, but this does not mean that the voting interface an aesthetic that can be added at the end of the process.

Usability is the last thing we should be worried about...if we can't trust the technology nothing else matters

In the HCI and usability community, this is sometimes referred to as the "peanut butter theory". The name comes from a quote from Clayton Lewis that "usability is not a quality that can be spread out to cover a poor design like a layer of peanut butter."

The case for usability and user-centered design

Usability and the user experience -- not technology -- should be the starting point for the design of any voting system.

Only through a user-centered design approach can we design voting systems that meet the needs of all the people who use it: voters, officials, candidates, and society as a whole.

With that introduction, let me put my cards on the table and say that only by starting from an understanding of the human context of use can we design voting systems that truly work for the participants and for our society.

Too often, we start by designing the technology and only after it is complete do we think about how to "fit it in" to the human, social and political context where it must work.

Or, we treat the humans as operators of the machines, rather than the machines as the assistants or tools for the people.

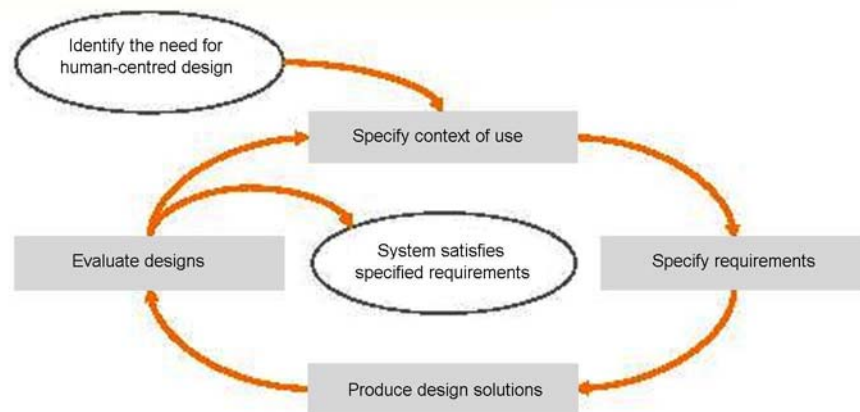
Or, we assume that problems can be solved by throwing technology at them.

Don't get me wrong. I am not anti-technology. Technology is neither inherently good nor bad, but if the human process is not considered in designing the use of that technology, the results will be a poor fit to the

reality of a real election, difficult to use in unpredictable ways, and ultimately untrustworthy. We have seen this over and over again in commercial enterprise software.

The good news, however, is that we have an answer. We have methodologies and techniques that can help us create systems that work not only functionally, but in a way that meets human needs.

This general approach to the design of a human-computer interface is called user-centered design, with usability evaluation as a key component. There is even an international standard to describe this. It is ISO 13407, titled "Human-centered design process." There is an entire body of research and literature to support the overall approach and to suggest specific methods for implementing such a process.



ISO 13407 Iterative Design Cycle

Simply stated, a human (or user) centered design process starts with (1) an awareness of the need for such a process. It then moves into an iterative cycle of (2) understanding of context of use -- the people who will use it, what they will use it for and the conditions under which they will use it. From this understanding, (3) a set of requirements - especially usability requirements - are drawn up, (4) a possible design solution is proposed and (5) that solution is evaluated.

The results of that evaluation are used to improve the design, which is then re-tested. This process is repeated through successive iterations until the system meets the requirements.

Good requirements include functionality, what the system must do (such as accurately count votes), but they also include how it must do it, such as specifying how much time is acceptable, how much instruction or training will be available, or how the system will allow the users to see and correct errors.

If this all sounds like common sense to you, I congratulate you. This is a sensible way to develop a new system, with a structure that allows it to be realistically tested throughout the design and development process.

Unfortunately, this is not how most systems are actually created.

If we are going to make usability a requirement for any voting system, perhaps this is a good time to define what we mean by usability. Once again, we have an international standard to help us. ISO 9241-11 defines usability as

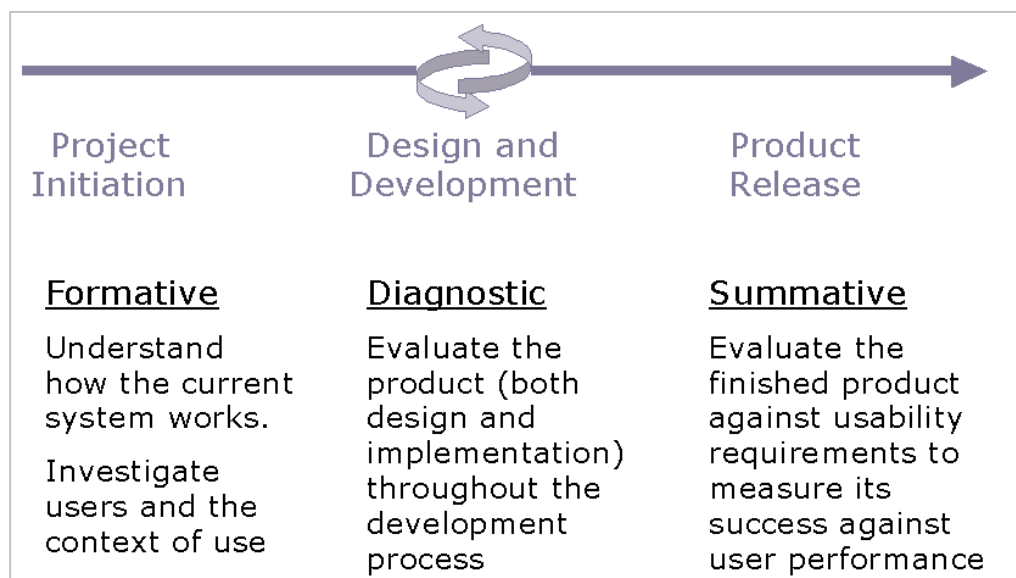
“The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specific context of use.”

What any usability performance standards must do is to spell out who those users are, what the context of use is and what we mean by effective, efficient and satisfying, and provide a means to test a proposed system against that standard.

Usability testing

For those of you who may not be familiar with usability testing, this covers a whole range of techniques in which people are observed using a system to set not its functional validity but how well a range of those pesky, uncontrollable users can interact with the system to complete a task such as laying out a ballot, setting up the system or voting.

Usability testing is used in three different ways during the design and development of a new system:



At the beginning of the project, it is used to understand the current solution and to investigate both users and the context of use. This is called “formative” usability evaluation.

During the design and development process, diagnostic testing is used as part of an iterative process - as described in 13407 - to evaluate the emerging design. This work is often done with low numbers of participants and is focused not on validation but on uncovering and diagnosing problems and suggesting improvements to a design.

Formative and diagnostic testing is good practice, as part of a design process. They do not test user performance with the final system.

Finally, at the end of the development cycle, summative testing is used to evaluate the finished product against usability requirements. Success in these tests is determined by measuring user performance against the goals of the requirements, for example for the speed with which the task can be completed or how accurate the user can be in that work. These summative evaluations are usually more procedurally rigorous and use a larger number of participants in order to have statistical relevance.

Usability standards for human performance are evaluated with summative techniques. We look to NIST to set standards for the usability requirements for a voting system as well as the best techniques for testing against those requirements.

There is one final role of usability testing, which is to test the system during use. In addition to any acceptance tests, usability can assist in the operation of an election, for example, to evaluate a ballot before it is used or to measure the impact on voters of any change in procedure.

Usability and user-centered design techniques can improve trust in a voting system by allowing officials to look at that system from the point of view of a voter.

Quality and usability are different

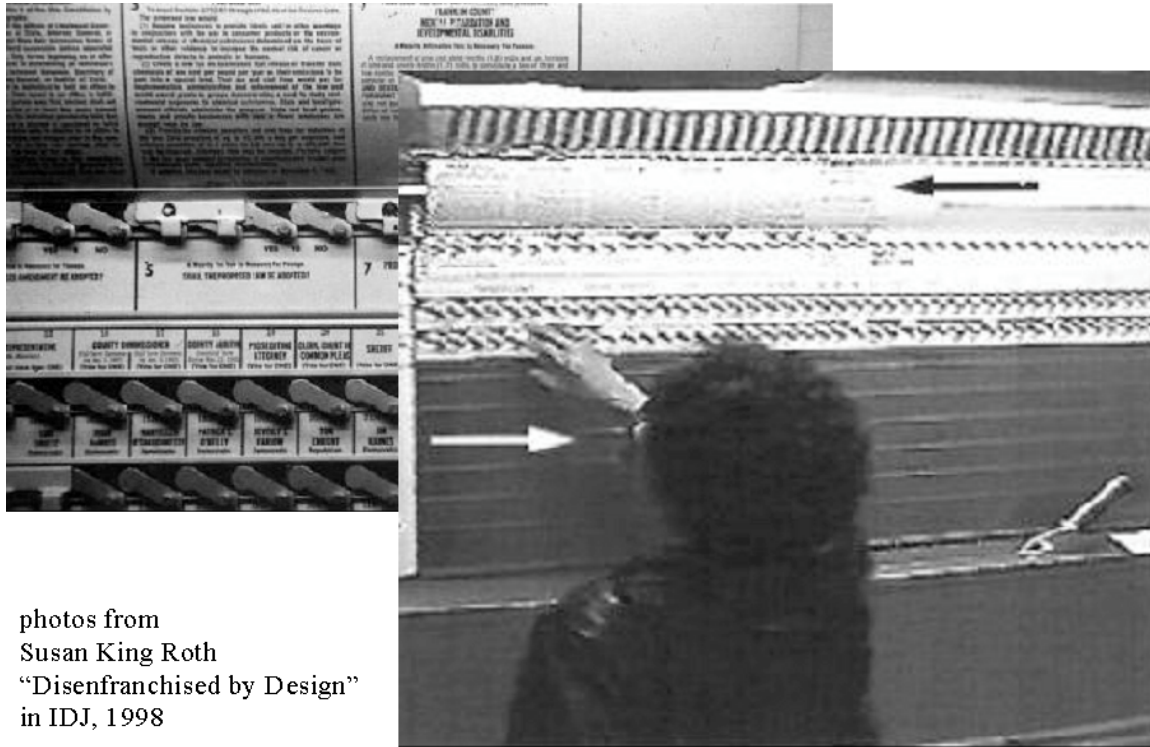
Usability is not the same as quality, though it is an aspect of a high-quality system. There are some aspects of a ballot design that might be included in a usability specification that can be tested by inspection, but quality testing and usability testing fill different purposes.

A quality test looks for things like correctly spelled names, placement of candidates in an approved location on the ballot, relative font size, color contrast and so on. These can all be tested by looking at the ballot and seeing if they meet the standard.

A usability test may look at some of the same issues, but does so from a different perspective. It might look, for example, for places where voters are confused by an ambiguity in how they should vote, or whether they have difficulty reading the text or understanding (or even finding) the instructions. And, it looks for problems that can only be found by watching a wide range of real people using a system under real (or as close to real as can be simulated) conditions.

Observing users in context

When you watch voters in context - that is real people, in our full range of shapes and sizes, you quickly learn things that are not evident during the design process, or even during an inspection. These pictures from Susan King Roth's widely quoted 1998 article on the design and usability of voting systems clearly show the difficulty that this voter has using a machine intended for someone much taller.



photos from
Susan King Roth
“Disenfranchised by Design”
in IDJ, 1998

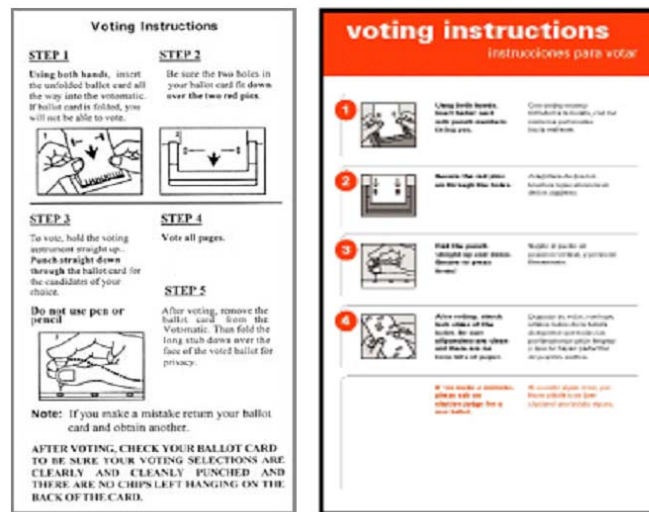
I like this example because it is an accessibility problem being experienced by someone who would not be classified as a person with a disability - just someone for whom the system was not designed properly.

By testing the system both during design (as a matter of good design practice) and as part of certification of a system, we increase the confidence that the system will work as intended, for everyone.

Good design supports usability

Part of the context of an election is the signage and instructions available to voters and at the polling place. We know a lot about good document design and how to create readable, usable, and useful information both online and in print. But what we usually see is clumsily written and designed information. Signs that are difficult to read. Procedures that don't read in order.

Instructions that scream out in difficult-to-read ALL CAPITAL LETTERS. Ambiguous, poorly worded or misleading instructions.



Original instructions

Redesigns by Design for Democracy

These illustrations show two version of the same basic instructions for using a voting system. The version on the left was used in the 2000 election; the one on the right was redesigned by the Chicago-based Design for Democracy project. It places the instructions in a sequential order and uses graphic design techniques to make it simpler, more readable and easier to follow. Good visual design is part of usability when it helps provide focus, directs the eye and makes text easier to read.

There is no reason for our voting interfaces, signage and instructions to use "typewriter design" in a computer age. We need to apply what we know about designing forms and instructions to make the ancillary elections materials as usable as the voting systems themselves should be.

Where laws governing ballot and signage design are in conflict with good design, they should be examined to see if they can be changed. A simple example is that many states require certain information to be displayed in ALL CAPS. We have research evidence, however, that it is easier to read text in mixed case -with capitals only at the beginning of words.

As we "upgrade" our voting system standards, we also need to upgrade our standards for document design and ballot layout.

Usability support for voting systems in use

Finally, I'd like to come back to the issue of how usability testing can be used after a system has been released, and is in use for elections.



When I started thinking about the usability of voting systems, I was focused on the voter and the voting interface. I don't know exactly how I thought ballots were designed and elections conducted...like many citizens, I didn't think about these issues at all. Perhaps that is as it should be. However, if we are to have public trust in voting systems, one element of that trust will be how well we support our voting officials.



Dorothy Tirpok, Hunterdon, NJ

When I speak to other usability professionals, I use this picture of my own County Clerk. It's a way of reminding us that elections are run by real people. People who do their best to do the right thing and to run elections well. Any systems we create need to support our local elections officials. They need to know when individual ballots may need special attention or testing because something has changed. Perhaps there are more candidates for an office than the ballot was ever tested with; or a longer proposition; or any of a number of issues that might come up in the normal course of elections.

While I don't want to dwell on the past, I would like to share with you the saddest words in everything that I read about the 2000 Florida election. They are from the Palm Beach County supervisor of elections. She said:

"I was trying to make the print bigger so elderly people in Palm Beach County can read it. We sent out sample ballots to all registered voters, and no one said a word." – Teresa LaPore, Supervisor of Elections, Palm Beach County, November 2000

The reason these words are so sad is because she was trying to solve something she perceived as a problem; trying to respond to the information that usability for the elderly is improved when text is larger, making it easier for older eyes to read. In

doing so, she triggered a completely unintended consequence and a chain of events that lead directly to this room.

We clearly need guidance for local officials to help them design and test the individual ballots so that they can go into the election with confidence—so that we can all trust that they have the tools and support they need to do their jobs well.

Conclusion

When ballots were simple paper designs and voting was as simple as marking an “x” in the box next to a name, there was little need for usability standards.

There should have been usability standards for the mechanical systems that are in use, and the new standards included some usability requirements.

As we move to various electronic devices for voting - it is critical that the standards cover not just functional testing, but usability testing of the system with realistic participants, representing a full range of voters, under realistic conditions. I look forward to standards that ensure the accessibility and usability of our voting systems.

Thank you.

Whitney Quesenbery
UPA Voting and Usability Project

Whitney Interactive Design
whitneyq@wqusability.com

About the UPA

The UPA supports those who promote and advance the development of usable products, reaching out to people who act as advocates for usability and the user experience. Members come from across the broad family of disciplines that create the user experience.

The goals of the UPA are to:

- ❑ Provide an international network through which usability professionals can share information about the techniques and methodologies in the profession.
- ❑ Create an inclusive community for those interested in usability, whether it is their primary focus or a related discipline.
- ❑ Change new product development processes to include a concern for the people who use them by presenting the business case for usability in product development to colleagues, customers, the public and governmental agencies.
- ❑ Increase the body of knowledge about usability and user-centered design through professional education, meetings and conventions and other professional interchanges

About the Voting and Usability Project

- ❑ Project founded in late 2000
- ❑ Focus on the user experience of an election and what knowledge and skills usability professionals can bring to improving the elections process
- ❑ Interested in guidelines for usability testing of voting systems
- ❑ Cooperation with other efforts, such as the Design for Democracy , AIGA and ACM SIGCHI
- ❑ International e-list provides a discussion forum and a place for researchers in usability in e-voting and e-participation to meet
- ❑ Online at:
http://www.usabilityprofessionals.org/upa_projects/voting_and_usability/