How to Conduct Usability Studies for Accessibility

Methodology Guidelines for Testing Websites and Intranets
With People Who Use Assistive Technology

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The Product Lifecycle, and Testing for Accessibility and Usability

1. **EMPLOY ITERATIVE TESTING AND DESIGN.**

Like any usability testing, evaluating for accessibility should happen early and often. We recommend researching which assistive technologies people in your target user population will use, and including these people in your usability testing and site visits. We must acknowledge that development organizations don't have unlimited time or resources, and will need to make tradeoffs when allocating usability resources, budget, and schedule for accessibility testing. So, we recommend that you consider users of assistive technology as yet another user profile. You do not need to conduct a full round of accessibility studies with five users of assistive technology every time you conduct testing. Instead, include users of assistive technology as one or two of the five or six test users in your sessions.[1] For example, if you normally have three novice users and two experienced participants in a study, simply create another profile for people using screen readers, and add one participant with this background to the mix.

If people with low vision and no vision are both important target user populations, keep in mind that these are very different user groups and they are not interchangeable. If they are both very important, we recommend adding both a screen reader and screen magnifier user to each of your participant pools. Two people in each group would be better than one, but you must determine how important each type of user is to your project, and make tradeoffs.

Our research in the United States and Japan revealed that Web users who are blind typically use screen readers, not Braille devices. Thus, we recommend spending less time on trying to recruit users of Braille devices. In countries outside the U.S. and Japan, we recommend you do a quick survey of how many users of Braille devices are in your target population.

2. **INCLUDE USERS OF ASSISTIVE TECHNOLOGY IN YOUR USER PROFILES.**

In every development organization, we recommend that you create user profiles or personas to remind your development team of how typical users think, and what tasks are important to them.[2] To integrate designing for accessibility in your product development cycle, include profiles of people with disabilities who use different assistive technologies. To collect the information for these profiles, conduct site visits, interviews, and usability tests. Also, take pictures of people and their workspace, including their assistive devices. Present this data with the rest of your user profiles. Videos of people using assistive technology can also be very telling for developers and designers who have never seen these devices in use before.

3. **PLAN TO TEST WITH PROTOTYPES AND FINISHED CODE.**

Testing with high-fidelity prototypes or working software can help you catch the major flaws easily and accurately. However, once the software is coded, it is typically much more work to redesign and recode the product. Also, often times it is too late

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[1] This number will vary depending on how many different technologies you want to include in your evaluation. For more information about iterative testing and the number of participants to include in a study, see *Usability Engineering* by Jakob Nielsen, Morgan Kaufmann Publishers, San Francisco, CA, 1994. ISBN 0-12-518406-9.

[2] For more information about user profiles, see *The Inmates are Running the Asylum* by Alan Cooper, Sams, Indianapolis, Indiana, 1999. ISBN 0672316498.

in the schedule to make the changes, so the fixes must wait for the next release. If accessible and usable design is a new priority for your organization, at the very least, attempt to schedule time at the end of the project to make major changes to improve accessibility.

With some imagination, you can learn about accessibility by conducting low fidelity usability tests. Adapt the paper prototyping method to suit the user type. For example, when preparing for a session with a participant who is blind and who uses a screen reader, instead of drawing a paper prototype make an "audio paper prototype." Write a script for each part of the interface based on what a screen reader would actually read. Sections of the script will be recited depending on what the user selects. In the session, the person who usually plays the computer and places paper pieces of the interface in front of the tester will instead read pieces of the interface to the tester, as a screen reader would.

Screen magnifiers and Braille devices would be far more difficult to simulate. For screen magnification, use slideshow/ presentation software that allows you to magnify pages and hyperlink to other magnified pages. We anticipate that these tests would take about five times longer to do, so each session would probably reap only a small amount of data. For prototype tests with participants with motor skill disabilities, we recommend using an on-screen prototype, so you can focus on how well the design works for buttons, link size, and proximity. If you have already created a paper prototype, you can scan it and use the online images.

4. **IF YOU HAVE A LAB, MODIFY IT FOR CONDUCTING ACCESSIBILITY STUDIES.**
We recommend conducting studies with people who use assistive technology at the user's home or office. However, realistically only one or two people can observe sessions at the user's site. A lab can enable more people to see users working real-time. If you choose to use your lab, consider allowing the test participant to spend some time with the assistive device, whether it's a screen reader or screen magnifier, before the session begins. With no observers present, encourage users to customize the device for their preferences. Offer both a speech synthesizer device and computer speakers, and allow the participant choose whichever he or she is used to. Make sure it's possible to move the synthesizer so people can place it for optimal hearing. Taking these steps will make the user more comfortable, though the setting will still not completely match the user's real work environment.

For people with physical disabilities, unless they are using a simple device like a keyguard, it will be much more difficult to make a lab workspace realistic and familiar to them. Begin by putting Velcro on the bottom of the keyboard and on several places on the desk so people can move the keyboard to a comfortable place and secure it there. Also, provide a moveable and adjustable chair and computer monitor, and be ready to help the participant move the equipment. Have a few different kinds of keyguards available for them to use.

5. **ENCOURAGE RELATIONSHIPS BETWEEN MEMBERS OF YOUR DEVELOPMENT TEAM AND USERS OF ASSISTIVE TECHNOLOGY.**
In addition to regular usability testing, we also highly recommend hiring or contracting some people who use assistive technology to regularly test your design iterations. Quality testing can be the first step toward better usability. Having a person or a few people on staff who use a screen reader or screen magnifier can help you catch many usability issues in daily product builds or prototypes. This can also help you get feedback from your product's more experienced users.

About Our Accessibility Usability Studies

When designing for usability and accessibility, we strongly recommend that you conduct usability studies on your website or intranet. Guidelines in this report are meant to help you do just that. These recommendations are based on what we learned while conducing more than 100 usability evaluations with users of assistive technology. These evaluations were conducted to gather data, examples, and insights for another report, titled *Beyond ALT Text: Making the Web Easy to Use for Users with Disabilities*.[3]

The difference between the two reports is simple: the present report will help you conduct your own studies, testing your own design with customers or employees who use assistive technology. The *Beyond ALT Text* report contains the findings from our study of many different designs tested with a large number of people who use several different assistive technologies. It also contains recommendations for design elements that will make websites and intranet designs for users with disabilities.

Design guidelines (in the *Beyond ALT Text* report) and usability testing (this report) are both valuable usability methods to help you improve the quality of your designs. It is easy and fast to leverage the findings from studies when they are packaged into the form of design guidelines. At the same time, guidelines have to be general in nature because they are intended to apply to all designs. Nothing beats the specific information you gain from supplementing the general guidelines with empirical tests of your own design with your own users.

All of the facilitators agree that our accessibility study was very interesting and inspiring. When conducting any usability study most of us feel empathy for usability test participants, regardless of the product or user group, be they savvy network administrators or people who mistake a mouse for a foot pedal. It's never easy to watch people struggle, but we do it so that we can learn and improve design for all users. Still, in this study, we were more amazed, bewildered, and humbled than usual.

QUANTITATIVE AND QUALITATIVE STUDIES
The discussion of the guidelines in this report reference both qualitative and quantitative studies. Qualitative studies aim at generating insights about the usability of a design but do not provide numbers to precisely measure its level of usability. Such studies are faster to run because they require fewer test participants and are usually less scripted and in some ways less rigorous in the preparation. In contrast, quantitative studies produce numbers that measure the levels of various usability metrics, such as task time and success rate, achieved by a design. These studies require more test participants in order to achieve statistically reliable averages. However, quantitative studies usually generate fewer insights into the underlying design issues because the emphasis is on measuring numbers. Most of the advice provided in the report is valid for both qualitative and quantitative types of studies, but we note cases where the advice is specific to only one type.

We conducted quantitative studies with 60 participants to collect numeric data about how well the Web is currently designed for people using assistive technology. Data

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[3] To buy a copy, download from: http://www.nngroup.com/reports/accessibility . The information and guidelines are designed to help Web developers and designers create usable, accessible websites and intranets.

included task timings, task completion, and task success rate. Twenty screen reader users, 20 screen magnifier users, and 20 sighted users who used no assistive technology, all performed the same five tasks on the same websites. Sessions were scripted for the test facilitators, and task timing methods and success ratings were specific and predetermined. This ensured consistency and eliminated bias in data collection and evaluation. Users were not asked to think out loud, nor did the facilitators prompt them in any way during the sessions.

We conducted qualitative sessions with 44 participants: 15 used screen readers (10 in the US, 5 in Japan); 12 used screen magnifiers (8 in the US, 4 in Japan); 8 used Braille devices (all in the US); and 9 used assistive technologies for a physical disability (5 in the US, 4 in Japan.) Specific tasks in the qualitative study differed depending on the sites tested, though we gave users the same type of tasks on each site. We asked users to look at ten different websites in the US, and six different websites in Japan. All users and test facilitators in the U.S. spoke English and used sites written in English. All users and test facilitators in Japan spoke Japanese and used sites written in Japanese.

In the qualitative sessions, we asked users to think out loud. Users were sometimes prompted and encouraged to continue down a path they were interested in.

In both the quantitative and qualitative studies, we measured success and collected subjective satisfaction ratings. However, in the qualitative sessions, we did not measure time, or errors, and the facilitators had more interaction with the users.

You can do a large-scale study like ours, or you can get good results from a test with less than five users of assistive technology. For most development organizations, qualitative studies are a sufficient, economical method for learning about usable and unusable elements in your design. Quantitative studies are costly, time-consuming, and require more usability specialists to complete them. We recommend quantitative studies only when you absolutely need numeric data, are comparing two or more products, or are comparing releases of the same product to determine whether it has improved and by how much.

Guidelines

The following guidelines describe some of the methods we used in our study, and recommendations for planning and facilitating usability evaluations with participants who use assistive technology. Doing studies will help you improve the accessibility and usability of your website or intranet. This report also includes discussion of the reasoning behind these guidelines.

THE PRODUCT LIFECYCLE, AND TESTING FOR ACCESSIBILITY AND USABILITY
Discussion appears in the previous section, beginning on page 3

1. Employ iterative testing and design.
2. Include users of assistive technology in your user profiles.
3. Plan to test with prototypes and finished code.
4. If you have a lab, modify it for conducting accessibility studies.
5. Encourage relationships between members of your development team and users of assistive technology.

TRUST, CONSENT FORMS, PICTURES, AND VIDEO
Discussion begins on page 9

6. Ask all users to sign a consent form.
7. Read consent forms aloud to users who cannot see.
8. Offer users a copy of the consent form. Before the study, e-mail it to users who cannot see.
9. Offer Braille consent forms if you can, but they are not mandatory.
10. Give users an honorarium, pay it in cash, and deliberately state what bills you are handing them.
11. Leave your business card with people, even if it is not printed in Braille.

USING VIDEO AND STILL CAMERAS
Discussion begins on page 12

12. When taking pictures or video, tell participants what you will use them for.
13. Let users know when you are taping them.

CONDUCTING STUDIES AT THE USER'S HOME OR OFFICE
Discussion begins on page 13

14. Conduct studies on site. Let people use the technology they are familiar with.
15. When scheduling the visit, verify that users have working monitors.
16. When scheduling the visit, verify that users have Internet access.
17. Predetermine roles if multiple facilitators attend a session.
18. In quantitative studies, predetermine protocol for interruptions.
19. Allow time for and prepare for travel.

20. When possible, take control of some of the lighting.

21. Tell participants if you move anything.

22. Expect more animals than usual on site.

SPECIFIC TIPS FOR SCREEN READER AND BRAILLE SESSIONS
Discussion begins on page 15

23. Before sessions, study the websites you are testing.

24. Get familiar with the technology before going on any sessions.

25. Sit as close to the speech synthesizer or computer speakers as possible.

26. Don't be overly sensitive.

27. Reevaluate your methods for responding to and encouraging users during sessions.

SPECIFIC TIPS FOR MOTOR SKILL ASSISTIVE TECHNOLOGY SESSIONS
Discussion begins on page 18

28. Carefully monitor the participant's fatigue level.

RECRUITING AND PREPARING PARTICIPANTS
Discussion begins on page 19

29. Get in touch with actual potential participants. They are generally receptive, but like everyone else, they're also cautious.

30. Prepare simple screening documents so it is quick and easy to recruit, schedule, or disqualify participants.

31. After any usability test session, send the participant a thank-you note.

32. Consider hiring interns, or even specialized recruiting agencies.

33. Expect recruiting to take longer than usual.

STUDY TIPS: QUANTITATIVE AND QUALITATIVE
Discussion begins on page 20

34. Prepare a script and practice.

35. Conduct pilot tests.

36. Read tasks aloud to users.

37. Review and label pictures, video, and screenshots right after sessions.

MEASUREMENTS
Discussion begins on page 22

38. Consider and predetermine any measurements you want to collect.

39. Create concise rules and protocols for dealing with any measurements you choose to collect.

40. Predetermine task end points.

Trust, Consent Forms, Pictures, and Video

6. **ASK ALL USERS TO SIGN A CONSENT FORM.**

The consent form should note how you will use the information you collect, and whether the user consents to pictures and/or video. We had three versions of the consent form and let users choose the level of consent they preferred: 1) basic; 2) basic, plus they'd let us take a picture of their workspace; and 3) basic, plus they'd let us take a picture of their workspace and video tape them at any time during the session. *These three forms are in this report, beginning on page 41.* Almost all users in the qualitative study agreed to number three, the highest level of consent.

Participants were conscientious about signing their name on the line designated for it. Some people had a signature stamp, a rubber stamp of their signature. Other users had a signature guide, basically two parallel metal sticks held together with two pieces of rubber. Participants asked the facilitator to place it on the signature line so that their signatures would be straight.

The following picture shows a participant using a signature guide to sign a consent form.
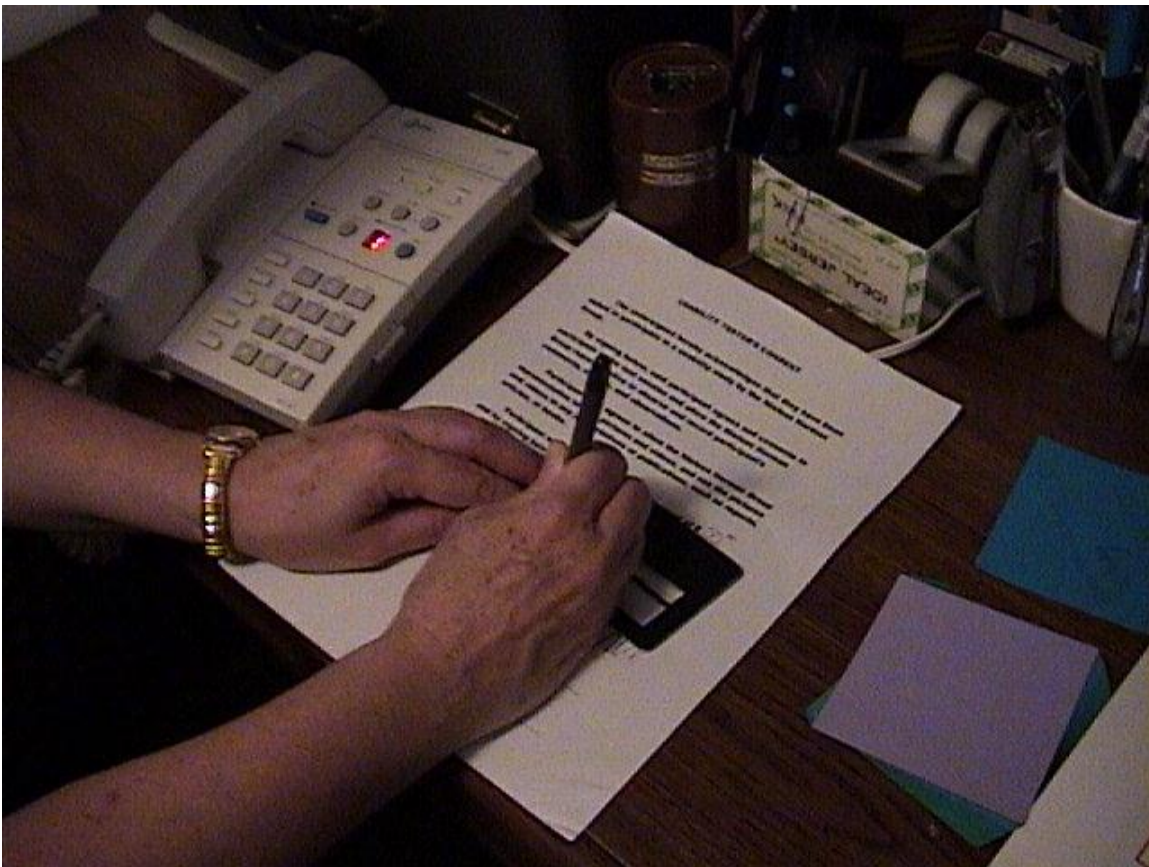

Other users did not have a signature guide, but used another straight-edged object, such as a CD case, a small book, or a comb, to help them execute a straight signature. A few chose to sign an "x" in lieu of their name. Be prepared for any of these. We usually said something like: "Here is the form. Do you want me to point

out where the line is?" If they said yes, we'd take their pen, position it on the line, and point out the direction the line was moving.

At least 13 tests occurred in offices that had a closed circuit television, (CCTV). In a few cases, participants with low vision used these to read and sign forms.

The following picture shows a participant using a CCTV to sign a consent form.
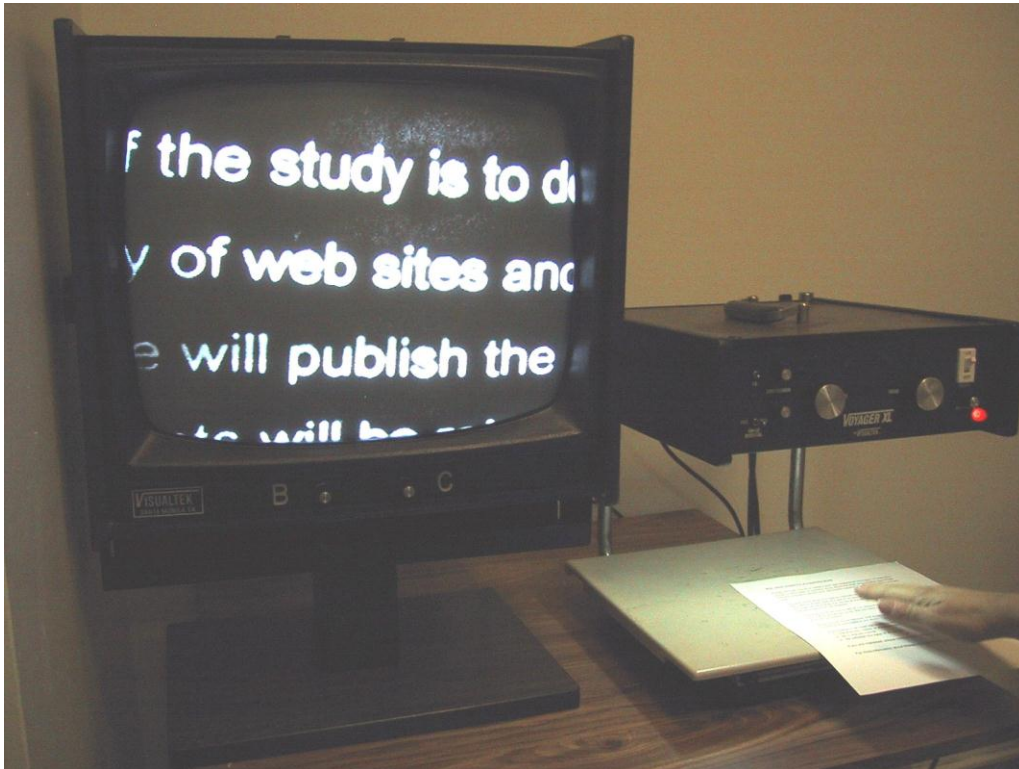
7. READ CONSENT FORMS ALOUD TO USERS WHO CANNOT SEE.
For consistency, we read the form out loud to all users in the quantitative study. In the qualitative study, we read the form to most users, unless they said they could read it themselves.

8. OFFER USERS A COPY OF THE CONSENT FORM. BEFORE THE STUDY, E-MAIL IT TO USERS WHO CANNOT SEE.
We asked all users if they wanted us to leave a copy of the form with them. In many cases, we also e-mailed the form to users. E-mailing the consent form to users enabled them to read it themselves, using their screen reader, screen magnifier, or Braille device before we arrived on site.

9. OFFER BRAILLE CONSENT FORMS IF YOU CAN, BUT THEY ARE NOT MANDATORY.
Going into the sessions we were concerned about not having Braille consent forms. But, we found that it is not uncommon to ask people who are blind to sign a consent form that is not in Braille. Only a small percentage of our participants were able to read Braille anyway. "The estimated 85,000 Braille readers constitute fewer than 10 percent of the estimated number of persons who are legally blind in the United States and slightly fewer than 40 percent of the estimated number who are

'functionally blind' (defined as those whose ability to see is light perception or less)."[4] It's worthwhile to note that these Braille figures include the 5.5 million people over the age of 65 who are blind.[5]

10. GIVE USERS AN HONORARIUM, PAY IT IN CASH, AND DELIBERATELY TELL THEM WHAT BILLS YOU ARE GIVING THEM.
Make sure to tell participants who are blind or who have low vision what bills you are giving them. For example, "Here is your honorarium of fifty dollars. Here are two twenty's, and here is the ten." Several people in this study said they fold bills a certain way so they can easily tell them apart.

Some users with low vision said they could distinguish between the pictures on the back of U.S. bills (the White House on a twenty-dollar bill) more easily than they can between the pictures of the U.S. Presidents on the front. So, we recommend that you hand people U.S. dollars with the back facing up.

In the U.S., we paid each participant $50 in cash. In Japan, we paid each participant ¥10,000 (about US$80) by transferring it to their bank account after the session. We also paid ¥5,000 to an organization that mediated between participants.

The size of honorarium depends on local traditions in different countries. It can also depend on the participant's occupation or availability. You often need to pay a higher honorarium when targeting certain occupations, such as computer consultants. Sometimes you pay lower honorariums to students or to people who are unemployed.[6]

11. LEAVE YOUR BUSINESS CARD WITH PEOPLE, EVEN IF IT IS NOT PRINTED IN BRAILLE.
Most people said they had someone who could help them read a business card. You can also call the American Printing House for the Blind and get a template made for the "Impressor" to make your own Braille business cards. This costs about US$90. (See http://www.aph.org/.)

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[4] American Foundation for the Blind, "Estimated Number of Adult Braille Readers in the United States.

[5] American Foundation for the Blind, http://www.afb.org/section.aspx?SectionID=15#comp

[6] For more information about honoraria paid to different categories of users (and the costs of using recruiting agencies), please see our report *233 Tips and Tricks for Recruiting Users as Participants in Usability Studies*, http://www.nngroup.com/reports/tips/recruiting

Using Video and Still Cameras

12. **WHEN TAKING PICTURES OR VIDEO, TELL PARTICIPANTS WHAT YOU WILL USE THEM FOR.**
Tell people whether you will use the pictures and video in a report, seminar, or just for your own review records.

Offer participants the option to have pictures or video taken or not. If they agree to allow you to take video, offer the option to keep their face out of the picture or video. Some users allowed us to videotape the computer screen, their comments, and said it was fine if their hands appear in the video. (Be frank and tell people their hands will always be in the pictures.) However, they did not want their faces used in any presentations or reports at all. In those cases, we decided not to get their faces in shots at all, rather than try to edit them out later. Even without their faces, it was still helpful to have their comments and their computer screen on videotape.

13. **LET USERS KNOW WHEN YOU ARE TAPING THEM.**
Because we chose only to tape some tasks rather than the entire sessions, we told users that when they hear a beep, it is either the camera going off, going on, recording, or stopping a recording segment. This way they were not surprised or wondering what the beeps were. In the pilot studies, we also told people every time we started or stopped recording, but this was overkill, and the studies ran more smoothly when we stopped doing that.

Conducting Studies at the User's Home or Office

14. **CONDUCT STUDIES ON SITE. LET PEOPLE USE THE TECHNOLOGY THEY ARE FAMILIAR WITH.**
For these studies, we thought it was particularly important to go to the user's site. We did not want a lab setup to contribute to any issues users encountered. We also wanted to see the preferences users had set themselves in their screen readers or magnifiers, not just the defaults in a lab setup. Finally, for users with motor skill challenges, we weren't sure we could simulate their actual environment, and in any case, we wanted to see their set-up.

15. **WHEN SCHEDULING THE VISIT, VERIFY THAT USERS HAVE WORKING MONITORS.**
All users in our study had working computer monitors. They said they needed them either because they shared the computer with other people who were sighted, or because they sometimes needed help from a sighted person when installing software or troubleshooting. Although all of our participants had monitors, some did not initially turn them on for the sessions. Others did turn on the monitors for our benefit.

In a few sessions, people had their monitors on the top shelf of their desks, perched high above them, which left their workspace uncluttered but still allowed co-workers (and the test facilitator) to see what they were doing online.

16. **WHEN SCHEDULING THE VISIT, VERIFY THAT USERS HAVE INTERNET ACCESS.**
Sometimes, user's network connections were not set up when the facilitator arrived. The facilitators thus spent time helping to connect modems, cables, and even printers. When the facilitator had already invested an hour in travel and almost an hour in recruiting and scheduling, it was worth spending this additional time to be able to conduct the study. As for connecting printers or other devices that were not necessary for the study, it was just not easy to say no to people when they asked for help.

17. **PREDETERMINE ROLES IF MULTIPLE FACILITATORS ATTEND A SESSION.**
We sometimes had two facilitators at a session. The secondary facilitator must not speak, and must take any position he or she can get, such as sitting on a bed, standing in the hallway, and so on. This means you often cannot see the user's screen or hear the screen reader. In qualitative studies, facilitators can move around a bit and even ask users to turn up the sound, turn on their monitors, or open browser windows. (In quantitative studies, you cannot.) If you are the secondary facilitator, you must to do the best you can with what you can hear and see.

18. **IN QUANTITATIVE STUDIES, PREDETERMINE PROTOCOL FOR INTERRUPTIONS.**
In participants' offices and homes, their telephones and doorbells rang during sessions. Sometimes participants ignored them, other times they answered. In the quantitative study, we stopped the timer when the phone began ringing.

19. **ALLOW TIME FOR AND PREPARE FOR TRAVEL.**
Facilitators spent a lot of time traveling to and from user sites. In particularly difficult recruiting situations, facilitators traveled to other states to conduct sessions. In very few cases, scheduled participants were not home or not ready when the facilitators arrived. Even after several confirmation calls, this sometimes happens. We do think it is worth the risk since going on site is so valuable.

If you are driving, use http://maps.yahoo.com/ or www.mapquest.com and print directions. Cab drivers want them, too.

It was extremely helpful to have a Global Positioning System, (GPS), in cars.

Cellular phones are a must. If you are lost or late, a mobile phone is a savior. Plus, you can do other work when sitting in traffic or waiting for a bus.

Note that some tests took place in areas of New York City and Boston known for being less than safe. We had no issues.

20. **WHEN POSSIBLE, TAKE CONTROL OF SOME OF THE LIGHTING.**
Some participants who are blind or who have low vision were extremely sensitive to light. Others did not notice that the lights were off or that room lighting was very low. This makes taking pictures and video (and even writing notes) challenging. When we first began the sessions, we didn't want to disturb participants or make them feel uncomfortable by turning on lights. After watching a few bad, much too dark videos, we started asking people if they minded our turning on a few lights so we could see our notes, and our pictures and videos would come out. They never seemed to mind at all, and we recommend doing this. The only time this was a little bit tricky was when tests began around dusk. In those cases, when the tests started we didn't need lights on, but as the sun set we had to interrupt the sessions to turn on lights. (We only did this in the qualitative sessions.) We usually just waited for a natural break and did it as quickly as possible.

Some users are very aware of the lighting in their homes and realized (perhaps by the time of day) that it was dark; they either turned on lights for us or asked us if we wanted them to turn them on.

21. **TELL PARTICIPANTS IF YOU MOVE ANYTHING.**
When you go to the home of a person with low vision or no vision, it's important to tell them if you move anything, like the chair you sit on. Also tell them when you move it back at the end of the session.

22. **EXPECT MORE ANIMALS THAN USUAL ON SITE.**
If you have allergies to animals, especially dogs, take your medicine before going on site. (Some of us with dog allergies spent days with itchy eyes.) Almost every participant who was blind in our study had a seeing-eye dog.[7]

Some seeing-eye dogs (and other pets) are very friendly and some are just curious. Others are very protective or even a bit overprotective of their owners. Once out of harness and not "working," most seeing-eye dogs we encountered tended to act like typical house pets. Reminder: Never pat a seeing-eye dog, in or out of harness, without first asking the owner's permission. If the dog is in harness, we recommend not even asking if you can pat them because they are undoubtedly working.

(As for attire, think twice before wearing open-toed shoes or clothes you really care about. Facilitators who were animal-lovers had their feet licked by cats more than once, and had a lot of canine contact.)

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[7] This is not representative of the population at large, as only 2% of people who are legally blind use a guide dog, according to the Braille Institute http://www.brailleinstitute.org/

Specific Tips for Screen Reader and Braille Sessions

23. BEFORE SESSIONS, STUDY THE WEBSITES YOU ARE TESTING.
The screen reader turns the text on the screen to speech, but the facilitator is at a disadvantage because it's not always easy to hear the screen reader or to tell what is selected by looking at the screen. The text selection is sometimes off the screen and not visible. Also, while the average person reads at a speed of about 250 words per minute, some screen reader users turned the reading speed up to a much higher rate than this- even up to 550 words per minute. For the untrained listener, it is very difficult to distinguish the words at these high speeds. In qualitative sessions, facilitators did sometimes accept the participants' offers to slow down the reader speed. But in the quantitative sessions, we did not.

People using a screen reader or Braille device don't seem to notice or care whether their browser is maximized or very small. The screen reader reads the text even if the text is not visible in a minimized browser window.

In the qualitative studies only, users were asked to think out loud. When listening to screen readers, users tend to think out loud a little less. There is a lot of listening necessary already, just to use the website. So trying to talk a lot is more difficult, since they are concentrating on listening to the screen reader.

When facilitating these studies, it's more important than ever to watch what the users are doing and draw conclusions from their behavior. You can also think of specific questions about the interface to ask users after they complete the tasks. At the end of sessions, consider asking users to the places in the interface you are interested in and ask them to talk through what they were doing there during the study. Ask them very targeted questions then. Do this after you administer any post-task questionnaires, so your questions and attention to particular areas don't impact their responses.

24. GET FAMILIAR WITH THE TECHNOLOGY BEFORE GOING ON ANY SESSIONS.
In some cases when we could not get our hands on a particular technology, we scheduled a demonstration session with a user and asked them to thoroughly explain the technology to us as they used it. This was very helpful. These sessions were not counted in our study findings, as there was too much interaction with the users. (We also paid an honorarium for these sessions.)

If you have never used a screen reader or Braille device, it can be very difficult to understand what the user is doing during the sessions. We recommend using the devices before going on any sessions.

The following table includes information about some assistive (or *adaptive*) devices that people used in our study. As you can see, some devices are extremely expensive, but you can download some for free. This list is far from exhaustive. There are many more assistive devices, both low tech and high tech.

PRODUCT/TECHNOLOGY AND URL	PRICE
FOR VISION ASSISTANCE	
PowerBraille 80 (Braille display) http://www.4access.com/Refresh_Braille.asp	$10,495
Speech synthesizer/communication tool (can be trained and used as input device) Prentke Romich Company http://www.prentrom.com/	$7,995
Braille Lite 40 (Braille display) http://www.4access.com/Refresh_Braille.asp	$5,495
JAWS Job Access with Speech (screen reader) http://www.freedomscientific.com/fs_products/software_jaws.asp Free trial software download available.	Between $795 and $1,195
DECTalk Express (speech synthesizer) http://www.gwmicro.com/catalog/	$1,095
Window-Eyes (screen reader) http://www.gwmicro.com/catalog/ Free trial software download available.	$595
ZoomText (screen magnification software) http://www.aisquared.com/ Free trial software download available.	Between $395 and $595
MAGic (screen magnification software) http://www.freedomscientific.com/fs_products/software_jaws.asp Free trial software download available.	$295 and up
Opticon (handheld scanner and reader) http://www.opticonusa.com	$120 and up
FOR PHYSICAL ASSISTANCE	
Infrared Headpointer (input device for people with better head control than hand control) Prentke Romich Company http://www.prentrom.com/	$580 and up
Raku Raku Mouse (intended for people who cannot use a standard mouse because of hand tremors) Fukushi Media Station http://www.fukusi.softopia.pref.gifu.jp/eng/sub/kk/kiki02.htm	About $250.00 (29,800 Japanese Yen)
Keyguard (a plate fits over the keyboard so users with hand tremors can press one key at a time) http://web.ukonline.co.uk/specialaccess/whatis.html	Between $20 and $100

25. SIT AS CLOSE TO THE SPEECH SYNTHESIZER OR COMPUTER SPEAKERS AS POSSIBLE.
The facilitator needs to know what is going on, and if the participant is using a reader, the facilitator needs to hear it. Choose your seat wisely at the beginning of the session. Sit very close to the speakers or speech synthesizer.

26. DON'T BE OVERLY SENSITIVE.
This may seem like a silly point, but don't overcompensate or act differently around users who are blind or who have speech disabilities.[8] For example, if you have trouble understanding something a user with cerebral palsy says, ask them to repeat themselves and don't feel badly about it. People want to be understood. Also, when talking with users who are blind, there is no need to avoid the word *see,* as in: *Did you see that?* In our studies people who are blind used this word like everyone else.

27. REEVALUATE YOUR METHODS FOR RESPONDING TO AND ENCOURAGING USERS DURING SESSIONS.
When conducting usability evaluations, facilitators have very different methods for encouraging users to verbalize their thoughts. Many of these include subtle visual cues, which enable you to make a point without talking or being too leading. For example, a certain facial expression made by the facilitator can encourage users to talk more. Or a nod or obvious, rapid note taking can help participants realize the facilitator heard them. There is a natural tendency for users to want to engage in conversation with the facilitator. Looking down at your tasks or taking notes can deter users from continuing the discussion, and get them to direct their attention away from conversation and toward the task at hand.

None of these visual cues works when you conduct studies with users who are blind. Instead of visual cues, we suggest a simple "unhum" to signal to users that you heard them, and that's all you are going to say. Avoid words such as: yes, I agree, okay, and great. These can indicate some agreement or affirmation about what the user is doing. You can also explain to users at the beginning of the session that you will be taking notes on paper or your laptop, and that they probably will hear you throughout the session. Sometimes, users hear the typing or scratching of the pen on paper and realize that you are busy taking notes.

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[8] For more information, refer to "Disability Etiquette," produced by the Eastern Paralyzed Veterans Association. This pamphlet can be ordered by calling 1.800.444.0120 or e-mailing publications@epva.org .

Specific Tips for Motor Skill Assistive Technology Sessions

28. **CAREFULLY MONITOR THE PARTICIPANT'S FATIGUE LEVEL.**
In general, usability test participants tend to be very accommodating and want to tell you what they are thinking. However, expressing thoughts was sometimes challenging for participants who had speech impairments. For example, one person with cerebral palsy spoke very slowly for the facilitator and was very patient in repeating words several times. It was no doubt frustrating for him, but after a few repeats, the facilitator understood and always recapped to ensure she heard him correctly. This worked well. Obviously, facilitating a test like this takes a bit longer, usually about twice as long for a qualitative study when you are asking people to think out loud.

In these sessions some users expressed their thoughts in writing instead of verbally. For example, another user with cerebral palsy, who the facilitator wasn't able to understand well at first, also spoke slowly and repeated words for the facilitator. However, if the facilitator didn't understand her after she repeated something two or three times, she typed her comments in her word processor. She increased the point to 24 so the facilitator could see, and kept this document opened in the background so she could easily switch to it when she wanted to say something. Her younger brother sat on the couch and listened to the session. Sometimes she would turn to him, and he would tell us what she had said. All this seemed very tiring, and, at an hour and forty-five minutes, the session seemed much too long. It was probably tiring enough just to do the tasks and communicate with us, not to mention any additional fatigue from having people, including her brother, observing her.

Another user with cerebral palsy said that doing the tasks and talking was not at all tiring, but typing and scrolling a lot was extremely tiring and difficult.

Recruiting and Preparing Participants

It requires gaining some trust to get access to people's homes, offices, or home offices. We did not have any evidence that this was any truer for users with disabilities than it was for users without disabilities.

29. **GET IN TOUCH WITH ACTUAL POTENTIAL PARTICIPANTS. THEY ARE GENERALLY RECEPTIVE, BUT LIKE EVERYONE ELSE, THEY'RE ALSO CAUTIOUS.**

When recruiting users who cannot see, the actual possible participant was typically much more receptive and forthcoming than the person speaking for them or their organization. For example, when contacting organizations for the blind, it was difficult to get through some gatekeepers. But, once you got an actual person who qualified as a participant, they were typically very excited about doing the study and wanted to participate.

30. **PREPARE SIMPLE SCREENING DOCUMENTS SO IT IS QUICK AND EASY TO RECRUIT, SCHEDULE, OR DISQUALIFY PARTICIPANTS.**

When you have several people recruiting 100 participants over a few months time, it helps if everyone is working from the same standard screener form.

31. **AFTER ANY USABILITY TEST SESSION, SEND THE PARTICIPANT A THANK-YOU NOTE.**

Although Miss Manners might not condone e-mail thank-you notes, they are a good idea for participants who use screen readers, screen magnifiers, or Braille devices. For people who use screen magnifiers, you can handwrite a thank you note, but write very large and choose a paper and pen color that have good contrast so they can read the note themselves. If people are lucky enough to have a scanning device, it helps if the material is typed instead of handwritten.

As with all usability studies, sending thank-you notes can help you get more referrals for recruiting participants. The notes remind people about you, your study, and the experience they had, and they are usually willing to call friends and colleagues and send your information to them.

32. **CONSIDER HIRING INTERNS, OR EVEN SPECIALIZED RECRUITING AGENCIES.**

Using a recruiting agency is far simpler than doing the recruiting yourself. But, in our case, it was about 40 times more expensive than getting competent interns. Of course, capable interns can be difficult to locate, but it is worth the time to find them if you are planning a major study or a series of multiple smaller studies.

33. **EXPECT RECRUITING TO TAKE LONGER THAN USUAL.**

People who use screen magnification software and Braille devices were difficult to recruit in the U.S. We suspect finding Braille users was difficult for two reasons. First, only a relatively small percentage of people who are blind reportedly know how to read Braille. Second, the Braille assistive devices are much more expensive than screen reader software.

People who use screen magnification software proved to be another difficult group to recruit. Our anecdotal evidence suggests that many people with low vision don't use this type of assistive software and instead use screen readers. Possible sources for recruiting test participants are rehabilitation centers and organizations that work with people with disabilities, such as Vocational Rehabilitation State Offices in the U.S.[9]

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[9] See http://janweb.icdi.wvu.edu/SBSES/VOCREHAB.HTM.

Study Tips: Quantitative and Qualitative

34. PREPARE A SCRIPT AND PRACTICE.

Test facilitators should practice and have a very strict script to follow. Also, prepare some simple rules about answering questions or reacting to questionable situations. Our facilitation sheet included predicted questions and canned answers so that all users would hear the same information.

In our studies, five people contributed to writing the test tasks, and the lead facilitator wrote the facilitation packets, which included tasks, questionnaires, and very specific instructions. Two research assistants conducted the quantitative sessions. Since more than one person ran the quantitative studies, they referred to a very explicit and tested script throughout the studies.

35. CONDUCT PILOT TESTS.

Pilot test all tasks and expect to change them. We changed the quantitative ones quite a bit between each pilot study. Allow all facilitators to conduct a pilot study, since they will be the ones using the materials. We pilot tested the set of quantitative tasks four times, each time with a different pair of facilitators. Between each test, the tasks and materials changed. For example, one task asked users to buy Madonna's CD titled, "Music." This was confusing because people thought we were just saying it was a music CD, and they found different Madonna CDs.

In another task, we realized several users could not spell "Schwab." Because we were not studying whether people could find that site, we eliminated this probable error by adding this phrase at the end of the task: "That's s – c – h – w – a – b."

Some tasks required users to enter credit card information. At first, we didn't give users any credit card information to enter, but they were uncomfortable with this, and it created too much variability in the quantitative study. We then gave them a number if they asked for it. However, neither approach worked well for the quantitative study. Finally, in the actual sessions with users, we told users we would give them false credit card information to enter when they asked for it. Although this basically told them that they'd need credit card information, and thus tipped them a bit about the task, it was the fairest way to do this task.

In the Chicago Transit site task, we asked users to find a bus or train that would get them to a specific place by a specific time. We ended up making this task far simpler than it would have been for someone really approaching it. One large issue is that the *Trip Planner* feature acts differently if the user enters the city, Chicago, or leaves it blank. Another issue is that there are many Chicago streets with North, South, East, or West in the name. While this is typical, the *Trip Planner* does not work at all when the user types the entire word, such as *West*. It only works when they type the first letter, like "W" for West. We had to change the street name many times to better accommodate this design flaw.

Initially, we created a special Log Form for the quantitative facilitators to note what was happening during the sessions. This was basically a blank sheet of paper they could take notes on; a list of things to remember to do and look for; and a few labeled boxes at the bottom to log success, time, errors, and so on. We subsequently eliminated this log form and added to the facilitation sheet the table of items to log. We let facilitators take their own notes however they were most comfortable. This

worked well. In the facilitation packet, we clearly noted data that they needed to collect, and they referred to this list throughout the test.

Arrange all session facilitation notes, recruiting screeners, and questionnaires in a single packet for the session. That way, the facilitator will not forget anything or become disorganized, and the packet can act as a script for the quantitative studies. Using a single packet also means there is less chance for inconsistencies between sessions, and facilitators have a constant reminder of the data they need to capture and what they can and cannot say. Finally, when you're facilitating at the user site, you typically don't have much space. Having everything you need in a neat binder really helps keep everything manageable and organized.

36. **READ TASKS ALOUD TO USERS.**
For consistency, facilitators should read all tasks out loud to all users, even members of a control group who can see. For this reason, we kept the number of words in all tasks short.

Most participants could not easily read or refer to the tasks, but we knew they would probably want to. We didn't want participants to feel like they were bothering us by asking us to read tasks again. We thus informed participants in the pre-test preparation that we would be happy to read the whole task again. It's important to let users know that you will gladly reread tasks as often as they want. For the quantitative study, the facilitator could reread Web addresses and spell them out without rereading the whole task. Facilitators stopped the clock when users asked to have a task reread, and restarted the clock again after they'd finished rereading.

37. **REVIEW AND LABEL PICTURES, VIDEO, AND SCREENSHOTS RIGHT AFTER SESSIONS.**
Download pictures from the digital camera and annotate videotapes right after the sessions. When you do many sessions, it's easy to forget who is who and where you have interesting video.

Take screenshots of websites right after sessions. Some live sites change frequently.

Prepare a spreadsheet that correlates tasks with the sites studied. Enter basic quantitative data in a spreadsheet right after the sessions. There is a lot of data, and it can be overwhelming unless you process it right away.

Measurements

38. **CONSIDER AND PREDETERMINE ANY MEASUREMENTS YOU WANT TO COLLECT.**
In both the quantitative and qualitative studies, we measured success and collected subjective satisfaction ratings. However, in the qualitative sessions, we did not measure time, or errors, and the facilitators had more interaction with the users.

39. **CREATE CONCISE RULES AND PROTOCOLS FOR DEALING WITH ANY MEASUREMENTS YOU CHOOSE TO COLLECT.**

CLICK ERRORS
When a user clicked a link that led them to the wrong place or down the wrong path, it was counted as an error. Once they were down an error path, more clicks down that path were not counted as errors, nor was clicking the *Back* button to recover from the error. For example, say a user is buying a CD, and has the right one selected, in the correct quantity. They now need to check out. Instead of clicking the *Checkout* button, a user clicks the *Login* button on a site they have never visited. This is counted as one error. Say they then fill in the *login* field with their email address*,* thinking they can just go ahead and log in, even though they have never registered with the site. This is not counted as an error since it happened on the same error path that had already been counted. They then click the *Back* button because they realize what is happening. This is not counted as an error either. And so on.

What is and is not an error is very difficult to determine. We discussed and documented guidelines in the facilitation notes. Often, after sessions, we needed to discuss clicks that could be errors. This is another reason why writing down exactly what a user clicks during each session is extremely important.

Please note that we don't consider click errors user errors, but instead as indicators of designs that were misleading to the users.

SUBJECTIVE SATISFACTION RATINGS
After each task, in both the quantitative and qualitative studies, we asked participants to rate their confidence, satisfaction, and frustration on a 1 to 7 Likert scale. Facilitators read the questions and scale to people, and wrote down their responses.

SUCCESS RATINGS
For each task, we pre-assigned success scores and criteria for complete success. Users' answers dictated the success scores. The highest score a website and user combination could achieve on each task was four points. We also evaluated the users' steps and answers after the study, to ensure fairness and consistency across sessions.

TIMING TASKS
Consider what you want to learn from task timing. We did not time tasks in the qualitative sessions, and this worked well. If you are just trying to learn about good designs and issues with a few users in a qualitative study, task timing is not extremely telling or accurate. In our case, we asked the users to think aloud, interrupted them, and sometimes even changed the tasks in the middle. Also, in the qualitative sessions, we looked at many different sites and the tasks were different on every site.

We did use a task time measurement in the quantitative sessions. When pilot testing the tasks, we knew some users would take fifteen minutes to do them. We decided to add another five minutes on the task time limit, and give users twenty minutes for each task. This is longer than users would typically want to spend on a simple Web task like the ones we gave them. (They would either give up or become miserable and fatigued.) Nonetheless, we knew some users would need more time. In the tests, we didn't tell users there was a time limit, but simply stopped them and began asking questions after twenty minutes. We were slightly concerned that once we stopped users for one task, they might continue on subsequent tasks past the point of comfort because they thought we would end the task. That is, assuming we would stop them, they would simply try to use up the time allotted, even if they didn't want to continue or didn't feel successful. (This did not prove to be a problem, based on the number of times users stopped themselves before the limit.)

In our quantitative studies, the facilitator started the stopwatch once the target website was visible on the page. Since we were not testing whether users could find a site, we gave them the URL in the tasks, and only started the timer after those sites were loaded. If the user's browser was minimized, the stopwatch was started once the screen reader began reading the page. If the user asked the facilitator to reread a task, the facilitator stopped the timer, read the task, and started the timer again.

For the general Web search task, we did not give users a URL. Facilitators started the stopwatch once the browser was launched and the homepage was loaded.

If a user answered the phone or was in some way interrupted, the facilitator stopped the clock. If the user's Internet connection went down, the facilitator stopped the clock.

When timing tasks, get a stopwatch that does not beep when you start and stop it. Beeps are distracting.

During the study, keep the timer in a visible place so you remember to start and stop it.

40. PREDETERMINE TASK END POINTS.
Consider whether you want to allow users to quit or not. Some might consider it unethical to make users proceed when they really want to quit. We always let users quit if they want to. This does, however, impact any measurements you want to create between success and time spent on tasks. The ratio is less important for qualitative studies, but if you are doing a large-scale quantitative study, think about the impact that letting users quit will have on the fairness and validity of the numbers.

Sample Documents for Accessibility Studies

The following are sample documents for a usability study with people with disabilities. Most of these forms are the ones we used in our quantitative study, but they can be adapted to qualitative studies:

- Recruiting Screener, page 25
- Checklist, page 30
- Facilitation Notes, page 31
- Question Sheet, page 36
- Three different versions of the Consent Form, page 41.

Recruiting Screener Used in the Quantitative Part of the Study

SCREENER: QUANTITATIVE, ACCESSIBILITY STUDY

BACKGROUND TO KNOW BEFORE CALLING
These sessions must be conducted at the user's home or work site, using their computer, Internet connection, and assistive technology, if any.
We will pay people $50 cash for the session.
If a few people are affiliated with the same institution or cause, in lieu of an honorarium we can make a donation to the vocational school, etc.

QUESTIONS THAT MIGHT COME UP
How will the information you collect be used?
We will write a report and guidelines for Web designers that should help them make the Web easier to use for people using assistive technology. There is always the possibility that information from our reports will go into a book someday, too. Neither your name nor your company name will be used in the report. *If taking a picture:* The picture of your workspace, not you, could be included in these publications.

Will my name be used in your report?
No, neither your name nor your company name will be used in any publications.

How many people will come to my house (or office?)
Probably one, sometimes two.

How long will it take?
Anywhere between one and two hours.

Do I need to practice or anything?
No, we are trying to learn about real situations. Please do not practice or anything for us.

Will you be timing me?
We will time tasks because we need this information for our analysis, but you shouldn't feel any pressure.

Should I "think out loud" or tell you what I am thinking as I work?
(For Quantitative part:) No, only if you want to and usually work that way.
(For Qualitative part: Yes, we would like you to "think out loud." Tell the facilitator what you are doing and why, and what you are thinking.

Can I take a break?
Yes, just let the facilitator know. *Make sure to stop the clock if they do.*

Hello, my name is _____ and I'm calling on behalf of Nielsen Norman Group, a usability consulting firm.

We are conducting a study about using the Internet.

*If cold calling a referral say, "you were referred to us by (say appropriate organization or referral name) _____."

To all respondents, "These interviews last approximately 2 hours and will take place during the day sometime this summer, at the time of your choice, either at your home or your work location, your choice. We will give you $50.00 in cash on the day of the study. We will ask you to try and perform certain tasks using the Internet. We will be recording what you do, so we can learn about what is designed well, and what is not designed well. We are testing the websites, and in no way will we be testing your ability. We will need to use your computer and Internet connection for the study.

Are you interested in participating in these in-home or at-work interviews?"

NAME:

Gender   (OBSERVED)

[   ]   MALE
[   ]   FEMALE

2.   What is your occupation?   _____

          What company do you work at? _____

What kind of company is that? _____

          In what industry is that?   _____

MUST BE EMPLOYED OR RECENTLY UNEMPLOYED TO QUALIFY

3. For how many years have you been working in this field?
[   ]   More than fifteen
[   ]   Between ten and fifteen
[   ]   Between five and ten
[   ]   Between one and five
[   ]   Less than one

4.   Do you or any immediate family members work in any of the following industries?

[T   ]   Software programming/ software development design
[T   ]   Web programming / Web development design
[T   ]   Software or Web usability research

TERMINATE IF "YES" TO ANY OF THE ABOVE

5.   Which of the following best describes your age?

[   ]   20 to 29
[   ]   30 to 39
[   ]   40 to 49
[   ]   50 to 55
[   ]   56 to 64 TERMINATE FOR ALL GROUPS

GET A MIX OF 21-55 for all groups

6.   How long have you been using the Internet?

[T   ]   less than three months   TERMINATE (all)
[   ]   three months to a year
[   ]   1 to 3 years
[   ]   more than 3 years

TRY FOR A MIX, BUT ALL RESPONDENTS MUST USE THE INTERNET and for at least 3
Months

7.   What kind of sites do you visit or what activities do you typically do when you
use the Internet?
_____
_____
_____
_____

8. What Internet Browser do you use? _____

9. What is your connection speed? _____

10. How frequently do you use the Internet?
[   ]   Every day
[   ]   Several times a week, but not every day
[   ]   A few times a month
[   ]   Less than a few times a month
[   ]   Never

TRY FOR A MIX

11. Which of the following best describes your vision?
[   ]   Sighted
[   ]   Low vision
[   ]   No vision

12. Do you use any assistive technology with your computer to help you overcome your visual challenges? If so, what do you use?

	Name of device	For how long have you been using this technology?
Screen reader		
Braille device that is connected to your computer		
Screen magnifier		
Any others?		

13. Do you have any motor skill challenges that prevent you from using a mouse or keyboard?

14. If so, describe what device(s) you use to help you use the computer?_____
_____

RECORD AND PROCEED TO INVITATION

* If no to the screen text enlargement question, ask "Do you have any other methods for visually enhancing your computer screen while accessing the Internet?"
RECORD _____
_____

IN ORDER TO QUALIFY, MUST BE IN ONE GROUP:
Quantitative:
SCREEN READER
SCREEN MAGNIFIER

CONTROL GROUP

OTHERWISE POLITELY TERMINATE

Qualitative:
SCREEN READER
SCREEN MAGNIFIER
BRAILLE COMPUTER ASSISTIVE TECHNOLOGY
MOTOR SKILL CHALLENGES

OTHERWISE POLITELY TERMINATE

We are conducting website usability evaluations to learn what is easy and what is difficult for people with low vision, no vision, or motor skill challenges.
The test is not of your ability, rather, the test is about the website usability.
We will write a report and guidelines for Web designers that should help them make the Web easier to use for people using assistive technology.

There is always the possibility that information from our reports will go into a book someday, too.

Neither your name nor your company name will be used in the report. *If taking a picture:* The picture of your workspace, not you, could be included in these publications.

INVITATION

PLEASE EXPLAIN THAT THESE ARE IN-HOME OR AT-WORK ETHNOGRAPHIC INTERVIEWS. WE NEED EITHER A HOME OR WORK LOCATION WITH THEIR COMPUTER, THEIR INTERNET ACCESS, AND THEIR SCREEN READER IF THEY USE ONE

INVITE PARTICIPATION, HAVE THEM PICK:

--A DATE _____
--A TIME _____
--A LOCATION ADDRESS (w/ DIRECTIONS
_____
_____
_____

--A TELEPHONE NUMBER _____

Give them your e-mail and phone number so they can call you if there are any scheduling issues.

Checklist Used in the Quantitative Part of the Study

DOCUMENTS
- ❑ Screener: Quantitative, Accessibility Study

- ❑ Facilitation notes

- ❑ Log sheets

- ❑ Question sheet

- ❑ Consent/participation agreement; all four types: 1) basic consent with honorarium, 2) basic with no honorarium, 3) with honorarium and with photo note, 4) no honorarium and no photo note

OTHER ITEMS
- ❑ User's name, address, telephone number, directions, and profile

- ❑ Business cards

- ❑ Stopwatch or watch with second hand

- ❑ Camera (when applicable)

- ❑ Honorarium

TO DO
- ❑ Take a picture of their workspace--not them--if they will let you.

- ❑ Check the address so you can send a thank-you note.

Facilitation Notes Used in the Quantitative Part of the Study

Thank you for participating in our study. We appreciate your help.
We are researching which things are easy to do and which are difficult to do on the Web.
Please remember that we are not in any way testing your ability.
We are evaluating the websites' usability.

- Give honorarium here, when applicable

- Ask them if you can take a picture of their workspace

- Ask them to sign the appropriate consent form—this is also the receipt for the honorarium, so they need to sign one. (We then send it to accounting to get reimbursed for the $.)

- Read the consent form to them.

- Offer them a copy of the form.

- Be professional and friendly, but don't get too chit-chatty here.

Before we begin, I would like to just confirm your background.

Refer to screener. Should have the background questionnaire answered from screener. Bring that screener and confirm the information on it.

- Now we can begin.

- I will read you tasks and ask you to do them. When you feel you are finished with a task, please tell me. It's very important that you tell me when you are finished.

- Some tasks contain very specific information. I am happy to reread tasks any time you request.

- After each task, I will ask you a few questions. Then we will move on to the next task. At the end of this session, I might ask you some more questions.

- I will be observing you and taking notes as you work on the tasks.

- I will be nearby, but cannot answer any questions you may have during the session.

- Just to reiterate, we are not testing you, we are testing the websites.

- Do you have any questions before we begin?

- It is nice to give people this opportunity to ask a pressing question, but we can answer very few questions before the study. Most of the time, the answer to questions should be: I will be happy to answer that question, but can you please wait until after we have completed the study? We

need to make all of the sessions as consistent as possible and answering questions before will create data integrity issues.

Questions that might come up before the study that we can answer then, and responses, include:

- How long will this take?
    - Anywhere between one and two hours.

- Will you be timing me?
    - We will time tasks because we need this information for our analysis, but you shouldn't feel any pressure.

- Should I "think out loud" or tell you what I am thinking as I work?
    - No, only if you want to and usually work that way.

- Can I take a break?
    - Yes, just let me know. *Make sure to stop the clock if they do.*

- How will the information you collect be used?
    - We will write a report and guidelines for Web designers that should help them make the Web easier to use for people using assistive technology. There is always the possibility that information from our reports will go into a book someday, too. Neither your name nor your company name will be used in the report. *If taking a picture:* The picture of your workspace, not you, could be included in these publications.

- Will my name be used in your report?
    - No, neither will your company name.

- After their questions are answered, read task one.

During tasks, log:
    - Everywhere they go and the order
    - Errors
    - Quotes
    - Total time
    - Success criteria
        - Where they are successful, and your suspicions about why
        - Where they unsuccessful, and your suspicions about why

Process, Path suggested indicators

- *process*   e *error*   > *page change*   "quote"
(screen reader)

Other Notable Areas to Log
- Search (whole Web or site search)
- Find
- Screen reader/ device issues
- Buy
- Help

Task One
Using the Web, find the average temperature in Dallas, Texas in January. Tell me the answer when you think you have it.

❖ Do not tell them any website--let them do it however they want to.

❖ Start the timer once they launch the browser (note: their browser might look different from what you are used to.)

❖ Ending:
❖ If they have not found the answer and stated so within **20 minutes,** stop them and say: **"I am going to ask you to answer some questions now."** Then pause, and read the post-task questions to them.
❖ They might apologize or feel silly. If they do, say: **"This is fine. I am learning from this."** Then read the next task.
❖ After they tell you they are finished with the task, read the post-task questions to them.

I am going to ask you to rate some things on a 1 to 7 scale. You can choose one, or seven, or any number in between.

Refer to question sheet.

❖ Read task two

Task Two
Your friend's birthday is coming up soon. Send her Janet Jackson's latest CD, called "All for You." Buy it from Target, at www.target.com. Please act as if you were really doing this, but stop right before you complete the purchase. I will give you false credit card information when you request it.

❖ Start timer after they reach www.target.com.

❖ Stop them on the order form after they have entered the credit card information and clicked CONTINUE, and are on the page called YOUR ORDER, Please take a minute to review… this is before they have actually bought anything. Let them go through the forms, especially the shipping/ billing one. If they ask if they should choose any real friend and use the information, say **yes.**

❖ Can I have credit card info?
Discover Card
number 6011 6754 9864 5368
expires zero two, zero four **(02/04)**

❖ Ending:
❖ If they have not found the answer and stated so within **20 minutes,** stop them and say**: "I am going to ask you to answer some questions now."** Then pause, and read the questions.

❖ They might apologize or feel silly. If they do, say: **"This is fine. I am learning from this."** Then read the next task.
❖ After they tell you they are finished with the task, read the post-task questions to them.

Refer to question sheet.

❖ Read task three.

Task Three
Your friend in Chicago is having a party next Saturday at 2:00 P.M. You want to take a bus right from O'Hare airport to 300 W. Division St. Look at the Chicago Transit Authority website, which is: www.transitchicago.com. Find the bus you need, when it leaves, and the fare.

❖ Start the timer after they reach www.transitchicago.com.

❖ Ending:
❖ If they have not found the answer and stated so within **20 minutes,** stop them and say: **"I am going to ask you to answer some questions now."** Then pause, and read the questions.
❖ They might apologize or feel silly. If they do, say: **"This is fine. I am learning from this."** Then read the next task.
❖ After they tell you they are finished with the task, read the post-task questions to them.

Refer to question sheet.

❖ Read task four.

Task Four
Pretend you are investing in a mutual fund. You are looking for a fund dealing in precious metals or natural resources, with medium to medium-high risk, but not very high risk. You don't want to pay a transaction fee or load. Use Charles Schwab, www.schwab.com. That's s-c-h-w-a-b.
Find a fund and when you do, tell me the name of it.

❖ Start timer when they reach www.schwab.com.

❖ Ending:
❖ If they have not found the answer and stated so within **20 minutes,** stop them and say**: "I am going to ask that we end the task portion of the study. I would like to ask you some questions now."** Then pause, and read the post-test questions.

❖ They might apologize or feel silly. If they do, say: **"This is fine. I am learning from this."** Then read the questions.

❖ After they tell you they are finished with the task, read the post-task questions to them.

<div style="border:1px solid black; padding:10px;">

Refer to question sheet.

</div>

❖ This concludes the quantitative part of the study.
❖ When they have completed the last task and answered the questions for it, ask this question:

Do you have any additional comments about any of the tasks and websites you used in this session?

❖ Wait and don't be afraid of a long pause. If they say no, still wait another few seconds because sometimes people instinctively say no first, and then add comments. Log their comments if they make any.
❖ If there is time, and everyone is still willing and alert, you can add your own tasks here, or ask them about any websites they are currently using.

Thank you very much for your participation. We really appreciate it.

Question Sheet Used in the Quantitative Part of the Study

Name: _____ Date: _____

Facilitator: _____ Time: _____

❖   Attach filled-in screener here and refer to it.

GO BACK TO TASKS (Facilitation sheet)

TASK ONE QUESTIONS
❖   If they try to do a half or other fraction, say: Please choose a whole number.
❖   You need to read all the text in the question to them here--please do not improvise or skip words. If they say, "You don't need to read it," keep reading. You can say, "For consistency, I have to read all the questions the same way."

TASK ONE		
1	How confident are you that you found the right temperature? Use this 1 to 7 scale, 1 being not confident and 7 being very confident.	not confident very confident 1 2 3 4 5 6 7
2	Was doing this task satisfying? Use this 1 to 7 scale, 1 being very unsatisfying and 7 being very satisfying.	very unsatisfying very satisfying 1 2 3 4 5 6 7
3	Was it frustrating to do this task? Use this 1 to 7 scale, 1 being very frustrating and 7 being not frustrating.	very frustrating not frustrating 1 2 3 4 5 6 7

❖   Log Success, Time, and Outcome
         o   Answer: about 44 or 45 degrees Fahrenheit.

SCORING	**Worth points**	**Points in this session**
Correct temperature within 5 degrees--average, or average high and average low	1	
Average for a month, not just the day	1	
For the right place, Dallas, Texas.	1	
For the right month, January	1	

SUCCESS RATING:

TOTAL TASK TIME:

TASK OUTCOME:

❖ If they make any other comments, write them down, but do not ask them any questions.

GO BACK TO TASKS (Facilitation sheet)

TASK TWO QUESTIONS
❖ If they try to do a ½ or other fraction, say: Please choose a whole number.
❖ You need to read all the text in the question to them here--please do not improvise or skip words.

TASK TWO		
1	How confident are you that your friend will get the specified CD and by her birthday? Use this 1 to 7 scale, 1 being not confident and 7 being very confident.	not confident very confident 1 2 3 4 5 6 7
2	Was using this website satisfying? Use this 1 to 7 scale, 1 being very unsatisfying and 7 being very satisfying.	very unsatisfying very satisfying 1 2 3 4 5 6 7
3	Was it frustrating to use this website? Use this 1 to 7 scale, 1 being very frustrating and 7 being not frustrating.	very frustrating not frustrating 1 2 3 4 5 6 7

❖ Log Success, Time, and Outcome

SCORING	**Worth points**	**Points in this session**
Criterion 1	1	
Criterion 2	1	
Criterion 3	1	
Criterion 4	1	

SUCCESS RATING:

TOTAL TASK TIME:

TASK OUTCOME:

❖ If they make any other comments, write them down, but do not ask them any questions.

GO BACK TO TASKS (Facilitation sheet)

TASK THREE QUESTIONS

TASK THREE		
1	How confident are you that you found a bus that will get you to the party and on time? Use this 1 to 7 scale, 1 being not confident and 7 being very confident.	not confident very confident 1 2 3 4 5 6 7
2	Was using this website satisfying? Use this 1 to 7 scale, 1 being very unsatisfying and 7 being very satisfying.	very unsatisfying very satisfying 1 2 3 4 5 6 7
3	Was it frustrating to use this website? Use this 1 to 7 scale, 1 being very frustrating and 7 being not frustrating.	very frustrating not frustrating 1 2 3 4 5 6 7

❖ Log Success, Time, and Outcome
  o Answer (might be more possible too):

Walk 0.5 mile NE from O'HARE AIRPORT to O'HARE CTA (BLUE - O'HARE)
Take CTA BLUE LINE TRAIN (FOREST PARK)
Depart: O'HARE CTA   At 01:15 PM
Arrive: DIVISION CTA   At 01:48 PM
Transfer
  Take CTA BUS # 70 DIVISION EASTBOUND
Depart: DIVISION & MILWAUKEE   At 01:52 PM
Arrive: DIVISION & 300 W   At 01:59 PM
Regular Fare: $1.80   Senior/Disabled Fare: $.90

SCORING	Worth points	Points in this session
Criterion 1		1
Criterion 2		1

Criterion 3	1
Criterion 4	1
SUCCESS RATING:	
TOTAL TASK TIME:	
TASK OUTCOME:	

❖ If they make any other comments, write them down, but do not ask them any questions.

GO BACK TO TASKS (Facilitation sheet)

TASK FOUR QUESTIONS

TASK FOUR		
1	How confident are you that you found the best mutual fund for you to invest in? Use this 1 to 7 scale, 1 being not confident and 7 being very confident.	not confident very confident 1 2 3 4 5 6 7
2	Was using this website satisfying? Use this 1 to 7 scale, 1 being very unsatisfying and 7 being very satisfying.	very unsatisfying very satisfying 1 2 3 4 5 6 7
3	Was it frustrating to use this website? Use this 1 to 7 scale, 1 being very frustrating and 7 being not frustrating.	very frustrating not frustrating 1 2 3 4 5 6 7

❖ Log Success, Time, and Outcome
    o Answers:
BGRIX American Century Global Nat Res Inv; risk: medium
UMESX Excelsior Energy & Nat Resources; risk: medium-high
FANAX Fidelity Advisor Natural Res A; risk: medium-high
ICENX Icon Energy; risk: medium-high
RSNRX RS Global Natural Resources; risk: medium-high
SENGX Strong Energy; risk: medium-high
PSPFX U.S. Global Investors Global Res; risk: medium-high
SCGDX Scudder Gold S; risk: medium-high

SCORING	*Worth points*	*Points in this session*
Criterion 1	1.5	
Criterion 2	1.5	

Criterion 3   1

SUCCESS RATING:

TOTAL TASK TIME:

TASK OUTCOME:

- ❖   If they make any other comments, write them down.

GO BACK TO TASKS (Facilitation sheet)

Consent Forms

Below are the three different versions of the consent form we used for this study. The first version does not mention any media, the second version mentions photographs, and the third version mentions both photographs and video.

USABILITY TESTER'S CONSENT

The undersigned hereby acknowledges that they have been asked to participate in a usability study by the Nielsen Norman Group.

By signing below, said participant agrees and consents to participate in the test session and allow the Nielsen Norman Group representative to observe and record participant's comments, actions, and observations.

Participant will be compensated in the amount of $_____ and by signing below acknowledges receipt of said amount.

_____
Signature

_____
Participant Name

_____
Street Address

_____
City, State, Zip

USABILITY TESTER'S CONSENT

The undersigned hereby acknowledges that they have been asked to participate in a usability study by the Nielsen Norman Group.

By signing below, said participant agrees and consents to participate in the test session and allow the Nielsen Norman Group representative to observe and record participant's comments, actions, and observations.

Participant also agrees to allow the Nielsen Norman Group representative to take pictures of the workspace and use the pictures in any presentations or publications, such as reports, articles, or books.

Participant will be compensated in the amount of $_____ and by signing below acknowledges receipt of said amount.

_____
Signature

_____
Participant Name

_____
Street Address

_____
City, State, Zip

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Participant will be compensated in the amount of $_____ and by signing below acknowledges receipt of said amount.

_____
Signature

_____
Participant Name

_____
Street Address

_____
City, State, Zip

About the Authors

Kara Pernice is the Managing Director at Nielsen Norman Group and has more than 20 years of experience in use experience (UX) research and design. *The Wall Street Journal* called Pernice an "intranet guru." Since joining Nielsen Norman Group, Pernice has led many major intercontinental research studies and authored a variety of research reports and hundreds of guidelines, and is coauthor of the book *Eyetracking Web Usability*. She has lectured around the world on a wide range of topics, and her client work spans many businesses and industries. Before joining NN/g, Pernice gained invaluable experience about building and managing UX in an assortment of development environments and established several successful user experience programs. A champion for usability, Pernice chaired the Usability Professionals' Association 2000 and 2001 conferences, and served as 2002 conference advisor. She holds an M.B.A. from Northeastern University and a B.A. from Simmons College.

Jakob Nielsen, Ph.D., is a Principal of Nielsen Norman Group. He is the founder of the "discount usability engineering" movement, which emphasizes fast and efficient methods for improving the quality of user interfaces. Nielsen, noted as "the world's leading expert on web usability" by *U.S. News and World Report* and "the next best thing to a true time machine" by *USA Today*, is the author of the best-selling book *Designing Web Usability: The Practice of Simplicity*, which has sold more than a quarter of a million copies in 22 languages. His other books include *Usability Engineering*, *Usability Inspection Methods*, *International User Interfaces*, *Homepage Usability: 50 Websites Deconstructed*, *Prioritizing Web Usability*, *Eyetracking Web Usability*, and *Mobile Usability*.

Nielsen's Alertbox column on web usability has been published on the internet since 1995 and currently has about 200,000 readers. From 1994 to 1998, Nielsen was a Sun Microsystems Distinguished Engineer. His previous affiliations include Bell Communications Research, the Technical University of Denmark, and the IBM User Interface Institute. He holds 79 United States patents, mainly on ways of making the internet easier to use.

Acknowledgements

Participants in our accessibility study invited us into their homes and offices. They allowed us to observe them and many permitted us to videotape them. Most people discussed some very personal issues with us. Participants are promised full anonymity so we do not name them or their affiliations here. We are grateful for their participation, frankness, and cooperation.

In doing this study, the following people were very involved in conducting sessions and refining the methodology.

Susan Farrell
Sachi Mizobuchi
Naoko Ishida
Amy Stover
Michael Yohay
Elizabeth Franko
Aimee Richardson

We would like to thank Torry Colichio, George Agudow, and Midori Yasuda for their help in finding excellent research assistants to work on this project.

We would also like to thank Denise Shaw for the initial template design this report is based on, and Elizabeth Franko and Keri Schreiner for their editing work.

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