

Design Process and Evaluation

There are several usability-related issues,

methods, and procedures that require careful consideration when designing, developing, and testing websites. The most important of these are presented in this chapter, including “up-front” issues such as setting clear and concise goals for a website, determining a correct and exhaustive set of user requirements, ensuring that the website meets user’s expectations, setting usability goals, taking usability measurements of the existing site for later comparison, and providing useful content.

To ensure the best possible outcome, designers should consider a full range of user interface issues, and work to create a website that enables the best possible human performance. The current research suggests that the best way to begin the construction of a website is to have many different people propose design solutions (i.e., parallel design), and then to follow-up using an iterative design approach. This requires conducting the appropriate usability tests and using the findings to make changes to the website.

There are two major considerations when conducting usability testing. The first is to ensure that the correct number of test participants are used; and the second is to reduce “tester bias” as much as possible. Software-based automatic usability evaluation tools are available and should be used in addition to traditional usability testing. However, some popular usability testing methods (particularly heuristic evaluations and cognitive walkthroughs) must be used with caution.

1:1 Set and State Goals

Guideline: Identify and clearly articulate the primary goals of the website before beginning the design process.

Comments: Before starting design work, identify the primary goals of the website (educate, inform, entertain, sell, etc.). Goals determine the audience, content, function, and the site's unique look and feel. It is also a good idea to communicate the goals to, and develop consensus for the site goals from, management and those working on the website.

Sources: Badre, 2002; Coney and Steehouder, 2000; Detweiler and Omanson, 1996.

Relative Importance:

12345

Strength of Evidence:

12000

1:2 Use an Iterative Design Approach

Guideline: Develop and test prototypes through an iterative design approach to create the most useful and usable website.

Comments: Iterative design consists of creating paper and software prototypes, testing the prototypes, and then making changes based on the test results. The "test and make changes" process is repeated until the website meets performance benchmarks ("usability goals"). When these goals are met, the iterative process ends. Software tools are available to assist and facilitate the development of prototypes.

Sources: Badre, 2002; Bailey, 1993; Bradley and Johnk, 1995; Egan, Remde, Gomez, et al., 1989; Hong, et al., 2001; Jeffries, et al., 1991; Karat, Campbell and Fiegler, 1992; Redish and Dumas, 1993; Tan, et al., 2001.

Relative Importance:

12345

Strength of Evidence:

12345

1:3 Evaluate Websites Before and After Making Changes

Guideline: Conduct "before and after" studies when revising a website to determine changes in usability.

Comments: Conducting usability studies prior to and after a redesign will help designers determine if changes actually made a difference in the usability of the site. One study reported that only twenty-two percent of users were able to buy items on an original website. After a major redesign effort, eighty-eight percent of users successfully purchased products on that site.

Keep in mind that not all changes made by designers in each iteration may be beneficial—this will require additional, iterative rounds of testing.

Sources: John and Marks, 1997; Karat, 1994a; Ramey, 2000; Rehman, 2000; Williams, 2000; Wixon and Jones, 1996.

Relative Importance:

12345

Strength of Evidence:

12300

1:4 Provide Useful Content

Guideline: Provide content that is engaging, relevant, and appropriate to the audience.

Comments: Content is the information provided on a website. Do not waste resources providing easy access and good usability to the wrong content. One study found that content is the most critical element of a website. Other studies have reported that content is more important than navigation, visual design, functionality, and interactivity.

Sources: Asher, 1980; Badre, 2002; Baldwin, Peleg-Bruckner and McClintock, 1985; Celsi and Olson, 1988; Evans, 1998; Levine, 1996; Nielsen and Tahir, 2002; Nielsen, 1997b; Nielsen, 2000; Rajani and Rosenberg, 1999; Sano, 1996; Sinha, et al., 2001; Spyridakis, 2000; Stevens, 1980.

Relative Importance:

12345

Strength of Evidence:

12345

1:5 Understand and Meet Users' Expectations

Guideline: Ensure that the website format meets user expectations, especially related to navigation, content, and organization.

Relative Importance:



Strength of Evidence:



Comments: It is important for designers to develop an understanding of their users' expectations through task analyses and other research. Users can have expectations based on their prior knowledge and past experience. One study found that users acted on their own expectations even when there were indications on the screen to counter those expectations.

The use of familiar formatting and navigation schemes makes it easier for users to learn and remember the layout of a site. It's best to assume that a certain percentage of users will not use a website frequently enough to learn to use it efficiently. Therefore, using familiar conventions works best.

Sources: Carroll, 1990; Detweiler and Omanson, 1996; Lynch and Horton, 2002; Spool, et al., 1997; Wilson, 2000.

Example:



The Copyright Office website meets user expectations—links to the most likely user activities or queries (searching records, licensing and registering works, etc.) are prominently displayed and logically ordered, and there are very few distractions on the page.

1:6 Establish User Requirements

Relative Importance:



Strength of Evidence:



Guideline: Use all available resources to better understand users' requirements.

Comments: The greater the number of exchanges of information with potential users, the better the developers' understanding of the users' requirements. The more information that can be exchanged between developers and users, the higher the probability of having a successful website. These could include customer support lines, customer surveys and interviews, bulletin boards, sales people, user groups, trade show experiences, focus groups, etc. Successful projects require at least four (and average five) different sources of information. Do not rely too heavily on user intermediaries.

Sources: Adkisson, 2002; Brinck, Gergle and Wood, 2002; Buller, et al., 2001; Coble, Karat and Kahn, 1997; Keil and Carmel, 1995; Norman, 1993; Osborn and Elliott, 2002; Ramey, 2000; Vora, 1998; Zimmerman, et al., 2002.

1:7 Use Parallel Design

Relative Importance:



Strength of Evidence:



Guideline: Have several developers independently propose designs and use the best elements from each design.

Comments: Do not have individuals make design decisions by themselves or rely on the ideas of a single designer. Most designers tend to adopt a strategy that focuses on initial, satisfactory, but less than optimal, solutions. Group discussions of design issues (brainstorming) do not lead to the best solutions.

The best approach is parallel design, where designers independently evaluate the design issues and propose solutions. Attempt to "saturate the design space" before selecting the ideal solution. The more varied and independent the ideas that are considered, the better the final product will be.

Sources: Ball, Evans and Dennis, 1994; Buller, et al., 2001; Macbeth, Moroney and Biers, 2000; McGrew, 2001; Ovaska and Raiha, 1995; Zimmerman, et al., 2002.

See page xxi for detailed descriptions of the rating scales



1:8 Consider Many User Interface Issues

Guideline: Consider as many user interface issues as possible during the design process.

Comments: Consider numerous usability-related issues during the creation of a website. These can include: the context within which users will be visiting a website; the experience levels of the users; the types of tasks users will perform on the site; the types of computer and connection speeds used when visiting the site; evaluation of prototypes; and the results of usability tests.

Sources: Bailey, 1996; Buller, et al., 2001; Graham, Kennedy and Benyon, 2000; Mayhew, 1992; Miller and Stimart, 1994; Zimmerman, et al., 2002.

Relative Importance:

12340

Strength of Evidence:

12300

1:9 Focus on Performance Before Preference

Guideline: If user performance is important, make decisions about content, format, interaction, and navigation before deciding on colors and decorative graphics.

Comments: Focus on achieving a high rate of user performance before dealing with aesthetics. Graphics issues tend to have little impact, if any, on users' success rates or speed of performance.

Sources: Baca and Cassidy, 1999; Grose, et al., 1999; Tractinsky, 1997.

Relative Importance:

12340

Strength of Evidence:

12300

1:10 Set Usability Goals

Guideline: Set performance goals that include success rates and the time it takes users to find specific information, or preference goals that address satisfaction and acceptance by users.

Comments: Setting user performance and/or preference goals helps developers build better websites. It can also help make usability testing more effective. For example, some intranet websites have set the goal that information will be found eighty percent of the time and in less than one minute.

Sources: Baca and Cassidy, 1999; Bradley and Johnk, 1995; Grose, et al., 1999; Sears, 1995.

Relative Importance:

12340

Strength of Evidence:

12300

1:11 Select the Right Number of Participants

Guideline: Select the right number of participants when using different usability techniques. Using too few may reduce the usability of a website; using too many wastes valuable resources.

Comments: Selecting the number of participants to use when conducting usability evaluations depends on the method being used:

- Inspection evaluation by usability specialists
 - The typical goal of an inspection evaluation is to have usability experts separately inspect a user interface by applying a set of broad usability guidelines. This is usually done with two to five people.
 - The research shows that as more experts are involved in evaluating the usability of a product, the greater the number of usability issues will be identified. However, for every true usability problem identified, there will be at least one usability issue that is not a real problem. Having more evaluators does decrease the number of misses, but it also increases the number of false positives. Generally, the more expert the usability specialists, the more useful the results.
- Performance usability testing with users
 - Early in the design process usability testing with a small number of users (approximately six) is sufficient to identify problems with the information architecture (navigation) and overall design issues. If the website has very different types of users (e.g., novices and experts), it is important to test with six or more of each type of user. Another critical factor in this preliminary testing is having trained usability specialists as the usability test facilitator and primary observers.
 - Once the navigation, basic content, and display features are in place, quantitative performance testing (measuring time, wrong pathways, failure to find content, etc.) can be conducted to ensure that usability objectives are being met. To measure each usability objective to a particular confidence level, such as 95%, requires a larger number of users in the usability tests.
 - When the performance of two sites is compared (i.e., an original site and a revised site), quantitative usability testing should be employed. Depending on how confident the usability specialist wants to be in the results, these tests could require a larger number of participants.
 - It is best to perform iterative cycles of usability testing over the course of the website's development. This enables usability specialists and designers to observe and listen to many users.

Sources: Bailey, 1996; Bailey, 2000c; Brinck and Hofer, 2002; Chin, 2001; Dumas, 2001; Gray and Salzman, 1998; Lewis, 1993; Lewis, 1994; Nielsen and Landauer, 1993; Perfetti and Landesman, 2001b; Virzi, 1990; Virzi, 1992.

Relative Importance:

12340

Strength of Evidence:

12340

1:12 Be Easily Found on the Web

Guideline: In order to have a high probability of being accessed, ensure that a website is in the "top thirty" references presented from a major search engine.

Comments: One study showed that users usually do not look at websites that are not in the "top thirty." Some of the features required to be in the "top thirty" include appropriate meta-content and page titles, the number of links to the website, as well as updated registration with the major search engines.

Sources: Amento, et al., 1999; Dumais, Cutrell and Chen, 2001; Lynch and Horton, 2002; Spink, Bateman and Jansen 1999.

Example:

The below snippet of html code illustrates one important way of ensuring that a website will be found by search engines—embedding keyword metatags. These keywords are read by search engines and used to categorize websites; understanding typical users will provide clues as to what keywords should be used.

```
<meta name="description" content="U. S. Department of State Home Page">
```

```
<meta name="keywords" content="DOS, Department of State, Public Diplomacy, Country, Bureau, Government, United States Foreign Policy, Powell, Secretary of State, U.S. Department of State, Embassy, Consulate, American Culture, Society, Values, International, Public Affairs, Economic">
```

Relative Importance:
12340
Strength of Evidence:
12340

1:13 Recognize Tester Bias

Guideline: Recognize that a strong individual and group tester bias seems to exist when evaluating the usability of websites.

Comments: All testers seem to have a bias toward finding certain numbers and types of usability problems. One study reported that four testing teams found a range of four to ninety-eight usability problems when performance testing the exact same system. More than ninety percent of the problems found by each team were found only by the one team.

Another study reported that nine independent testing teams found a range of 10 to 150 usability problems when performance testing the exact same website. In this study, more than half of the problems found by each team were found only by that team.

Designers should precisely indicate the usability objectives of their websites to usability testers and evaluators.

Sources: Hertzum and Jacobsen, 2001; Jacobsen, Hertzum and John, 1998; Molich, et al., 1998; Molich, et al., 1999; Nielsen and Molich, 1990; Nielsen, 1992; Nielsen, 1993; Redish and Dumas, 1993; Selvidge, 2000.

Relative Importance:
12300
Strength of Evidence:
12345

1:14 Use Heuristics Cautiously

Guideline: Use heuristic evaluations and expert reviews with caution.

Comments: It is a common practice to conduct a heuristic evaluation (i.e., expert review) and resolve obvious problems before conducting usability performance tests. Heuristic evaluations should be used cautiously because they appear to detect far more potential problems than actually exist, when compared with performance testing results. Of the potential problems predicted by heuristic evaluations, studies have shown that less than fifty percent were found to be actual problems in a performance usability test. In addition, more than thirty-five percent of actual problems in the performance test were missed altogether by several heuristic evaluators. Heuristic reviews may best be used to identify potential usability issues to evaluate during usability testing.

Sources: Bailey, Allen and Raiello, 1992; Catani and Biers, 1998; Cockton and Woolrych, 2001; Nielsen and Landauer, 1993; Rooden, Green and Kanis, 1999; Stanton and Stevenage, 1998.

Relative Importance:
12000
Strength of Evidence:
12345



See page xxi for detailed descriptions of the rating scales
12340

1:15 Use Cognitive Walkthroughs Cautiously

Guideline: Use cognitive walkthroughs with caution.

Comments: Cognitive walkthroughs are often conducted to resolve obvious problems before conducting performance tests. The cognitive walkthrough appears to detect far more potential problems than actually exist, when compared with performance usability testing results. Several studies have shown that only about twenty-five percent of the potential problems predicted by the cognitive walkthrough were found to be actual problems in a performance test. About thirteen percent of actual problems in the performance test were missed altogether in the cognitive walkthrough. Cognitive walkthroughs may best be used to identify potential usability issues to evaluate during usability testing.

Sources: Blackmon, et al., 2002; Desurvire, Kondziela and Atwood, 1992; Hassenzahl, 2000; Jacobsen and John, 2000; Jeffries and Desurvire, 1992; John and Mashyna, 1997; Karat, 1994b; Karat, Campbell and Fiegel, 1992; Spencer, 2000.

Relative Importance:

12000

Strength of Evidence:

12345

1:16 Apply Automatic Evaluation Methods

Guideline: Use appropriate 'automatic evaluation' methods to conduct initial evaluations on websites.

Comments: An 'automatic evaluation' method is one where software is used to evaluate a website. An 'automatic evaluation' tool can help find certain types of design difficulties, such as pages that will load slowly, missing links, use of jargon, potential accessibility problems, etc. While 'automatic evaluation' methods are useful, they should not be used as a substitute for evaluations or usability testing with typical users. There are many commercially available automatic evaluation methods available for checking on a variety of website parameters.

Sources: Brajnik, 2000; Campbell and Stanley, 1963; Gray and Salzman, 1998; Holleran, 1991; Ivory and Hearst, 2002; Ramey, 2000; Scholtz, 1998; World Wide Web Consortium, 2001.

Relative Importance:

10000

Strength of Evidence:

12300