

Web Usability Guide

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Using the Guide

This guide suggests strategies to improve the overall usability of NEES websites. Many of the guidelines are derived from case studies where users were presented with alternative designs for websites in order to gather information on what features confuse users, affect their ability to find key materials, or fail to meet their expectations.

The guide is organized into three sections:

1. **Site Design** discusses the overall organization of websites, the selection of elements to be shared on multiple pages, and procedures for testing and maintaining sites.
 - ["Dos and Don'ts"](#). General guidelines that apply to the website as a whole.
 - [Site Organization](#). Suggestions for how to make the value of your website clear and to maintain credibility.
 - [Elements Shared by All Site Pages](#). Why a "common look and feel" is important, and what elements users expect to find on all pages of your website.
 - [Testing/Maintenance](#). Suggestions for testing the usability of your site, both before it opens and as it evolves over time.
2. **Page Design** introduces guidelines for how to use fonts, text, images, and other page elements to ensure that users get the most out of your webpage content.
 - ["Dos and Don'ts"](#). General guidelines that apply to all page content
 - [Page Size](#). Why you need to be concerned about page size and what you can do to maximize the usability of each page.
 - [Use of Fonts](#). The factors that influence font readability, with guidelines for achieving the best legibility possible on computer screens.

- [Use of Textual Elements](#). Guidelines for using text, block text, tables, lists, etc. to improve the readability and usability of your webpages.
 - [Use of Images](#). The factors that influence the visibility and usefulness of photographs, diagrams, plots animations, and other types of images.
 - [Helping Users Find Key Content](#). Suggestions for how to use visual elements in order to attract users' eyes to key content.
3. **Navigation Aids** describes the most effective ways to implement links, menubars, and navigation bars (like the one along the left side of this page).
- ["Dos and Don'ts"](#). General guidelines about the purpose and need for navigation aids throughout your website.
 - [Effective Use of Links](#). Guidelines for how and where links should appear in order to be most helpful and most efficient for users.
 - [Menubars and Menus](#). Suggestions for how menus should be organized, ordered, and presented to maximize usability.
 - [Navigation Bars and Other Contextual Aids](#). Discussion of what kind of assistance users need in maintaining a sense of context and suggestions for how to create effective contextual aids.

Because usability tests continue to reveal new information about how users approach Web materials, this guide should be considered a work-in-progress which will be added to over time. **Questions, comments, and suggestions** for improvement are welcome; simply use the Questions/Comments link on the navigation bar.

For additional reading, we recommend the following books and websites.

Books:

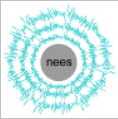
- *Designing Web Usability: The Practice of Simplicity*, by Jakob Nielsen (New Riders, 1999). Practical design rules to help you make your web pages more readable and usable, based on usability tests of a wide range of websites. Examples clearly illustrate the effects of applying the design rules.
- *Web Navigation: Designing the User Experience*, by Jennifer Fleming (O'Reilly, 1998). Best introduction to usability engineering techniques and how to apply them in designing your website. Particularly good distinctions of how "navigation design" - which the author uses to refer generally to site organization that facilitates user exploration - can be tailored for "identity sites," "learning sites," and "information sites."
- *Homepage Usability: 50 Websites Deconstructed*, by Jakob Nielsen and Marie Tahir (New Riders, 2001). Limited to homepages, but provides clear examples of the features that

attract - or repel - users who visit your homepage.

Websites:

- www.usableweb.com/, Usable Web - Guide to Web Usability Resources. Online collection of resources related to website design, implementation, and testing.
- www.useit.com/, Usable Information Technology. Jakob Nielsen's site, including many of his articles and papers on web usability and user testing.
- www.useit.com/papers/webwriting/, Writing for the Web. Nielsen's pages describing the basic principles for writing webpages.

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Site Design

There is no single approach to developing a usable website. The guidelines in this section deal with overall site structure and design. They are based on studies of what users like and dislike about commercial websites, and what features help users accomplish their tasks with the least effort and errors.

Key Usability "DOs"

User tests have identified some characteristics that particularly help users:

1. To the extent possible, **pages at a single website should share a common look-and-feel**. Users become annoyed when they can find a particular feature - such as "search" or "help" - on some portions of the site, but not others. It's even worse when links, menus, or button labels change dramatically from one page to the next. See [Elements Shared by All Site Pages](#) for more information.
2. Starting with the homepage, **each webpage should include real content**, not just promises of other materials to come (see [Site Organization](#)). This page, for example, actually begins describing usability rather than just listing sections that are available on other pages.
3. Webpages should **honor the user's browser settings**, rather than overriding them. Users may have particular reasons for employing particular font sizes or link colors, and will not appreciate pages that hardcode values to defeat those settings (see [Page Design](#) for examples).
4. Whenever possible, webpages should **support browser resizing**. Given the wide range of screen sizes and resolutions available, no particular size can be assumed; in addition, users may have an important reason for resizing (e.g., to capture a screendump of particular dimensions). Pages should be written so that at least the primary textual content can expand or contract as the window is resized (see [Page Size](#)).

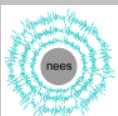
Key Usability "DON'Ts"

Usability studies have also indicated that a few general website features are guaranteed to discourage users. All of them are easily avoidable:

1. **Don't use frames.** Users object vigorously to frames, for a number of reasons:
 - Printing doesn't "work properly" from the user's standpoint - users expect to print exactly what they see, not just a portion of it.
 - Navigation is just plain clumsier with frames. This is particularly true when the right mouse button is needed - most users never employ that mouse button, period.
 - The back button doesn't "work properly" in many browsers, in the sense that it may not take the user where he/she expects to go.
 - Most browsers are unable to bookmark individual pages within the site in the presence of frames.
 - Users can't cut-and-paste URLs to send to other people - or to embed them as cross-references from their own Web pages.
 - In some implementations, links leading to other Websites get messed up as well. For example, after following the link to NSF's NEES Website, the browser may still show your site as the URL!
2. In general, **don't pop up windows without the user's permission.** Instead, links should just transfer the window to the new URL. This allows the user to maintain control over how the screen is used. Obvious exceptions are:
 - Help facilities, since the user needs to see not just the help description but also what's being described.
 - Video and audio clips, which require special players.

If you think an additional window is necessary, let the user know as part of the link; e.g., "Visualization of Sensor Data (in new window)".
3. **Don't have a "banner page"**, even if it transitions automatically to your homepage. Users appear to dislike these because they are "too slick" and imply a marketing pitch. Users particularly object when the banner page includes animation or sound.
4. **Don't say "welcome"** on your webpages. Users already know you want them to visit your site - why be "cute" about it?
5. **Don't bother including a copyright notice**, since it is no longer needed to establish ownership to Web materials. If you feel strongly about having this, it should appear on the homepage only, not on every page.

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Site Organization

Making Value Clear

Users don't read webpages the way they would a book. Rather than scanning content from top left to bottom right, their eyes "hop" to visually highlighted elements (see [Helping Users Find Key Content](#)). In many cases a user doesn't do more than glance at a page before moving on. The following guidelines will help you adapt your materials to this novel communications medium.

Organize your site into **bite-size pieces** that can be traversed in a number of different ways to take advantage of the Web's navigation flexibility. In this context, a "bite-size" unit means that text shouldn't fill much more than what the browser window holds when it is occupying the full width of the screen (less than a printed page).

Give the user **at least some content on every page**, not just a list of links or contents of other pages. In this guide, for example, choosing any of the top-level headings on the navigation bar takes the user directly to the text about the first topic in that section, not just to a table-of-contents.

Key information should be positioned so that it is **visible even when the browser window has been shrunk** to about half the screen width. This is similar to the guideline in the newspaper business that all enticing headlines need to be *above the fold* (i.e., showing even when the paper is folded).

Make sure pointers to **related topics are clearly visible** somewhere in the upper portion of the page. In this guide, for example, the topics under Site Design are listed in the navigation bar to the left; only the current topic is expanded so that all headings fall above the fold (alternatively, they could be shown in a row across the top of the page).

Short does not mean "dumbed down." A user's reluctance to read long blocks of text does not reflect lack of intelligence or interest, but rather the desire to quickly identify what material is available - and where - on your website. Webpages should be used as the equivalent of an executive summary on a proposal or report. A succinct summary lets the reader know what to expect and helps him/her capture key information without having to read through an entire document. It's perfectly fine to include longer documents, but they **should always be accessed through a shorter summary**. This usually means that any full documents should be at least three levels deep in the webpage

hierarchy.

Maintaining Credibility

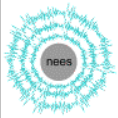
Except for the name of your organization or site at the top of the page, **avoid blocks of text displayed in a large font** or colored background block, particularly if the font is fancy. Studies have shown that users ignore anything that appears to be "marketeting."

Don't request that users provide email addresses unless you clearly specify why it's needed and precisely how you will use the information. Users have become suspicious of sites that gather email addresses. If it's necessary to have users login to your site, make sure that plenty of valuable information is available before logging in, or you'll drive potential users away.

Be careful about what **proportion of each page you are devoting to meaningful content**, as compared to the amount of space occupied by artwork, organization logos, blank or colored areas, menubars, etc. Users are quick to dismiss content-poor pages as "too marketing-oriented."

Avoid the statement "This site is under construction" or the equivalent "Please visit us again soon." Any website that is any good is constantly under construction or re-construction - so why state the obvious?

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Elements Shared by All Site Pages

A Common Look and Feel

Help users become familiar with your site, with less effort on their part, by developing a **consistent page style** that repeats common elements throughout the site. This guide, for example, presents the same information and graphics at the top and bottom of each page and consistently uses a navigation bar along the lefthand side to show users where they are in the content matter.

In addition to creating a sense of familiaring, **reusing the same image on every page improves speed**, since the image can be cached by the browser. For example, the simple graphic at the top of this page did not need to be downloaded when the page was displayed, since it had already been downloaded for the previous page(s).

In general, common elements should be **concentrated at the top and bottom of each page** or along the lefthand side. This reserves the most visible portion - the central area - for "new" content. That in turn allows users to visually "ignore" the shared elements when searching and reading, and focus their attention on the main content area.

How to Implement Common Elements

There are three primary ways to develop your webpages so that they support common elements:

1. The simplest way is through [Server-Side Includes](#), or SSI. By using a special HTML tag, `#include`, you can direct the server to insert additional HTML text as though the lines had been stored directly in your file. Thus, you can write separate files containing the common elements (such as a header strip with a menubar) and be certain that exactly the same information is included on each page. SSI are available with most current web servers, including Apache version 1.3 or later.

Example: This guide uses SSI to provide the standard header, navigation bar, and footer that appear on each page. See [How Includes Work for This Guide](#). SSIs even include "variables" so that you can vary the content of menus and navigation bars contained in an include-file. This guide, for example, uses a variable to tell the navigation bar when to expand the topics included in the "current" section.

2. A more complicated but more flexible mechanism is [PHP](#), a general scripting capability that lets you specify how your web server should tailor pages before sending them to the user's browser. PHP has a much steeper learning curve than SSI, and is probably overkill if all you want to do is support common elements.
3. It is also possible to simply cut-and-paste identical code at the top and bottom of each HTML file to provide standard headers and footers. The disadvantage to this approach is that if you want to make a change, you will have to modify the files for every webpage. With either SSI or PHP, you only have to make the change once, and it automatically affects every webpage.

Style sheets are also intended to support common elements. However, the way cascading style sheets have been implemented makes them susceptible to complete change if the user has his/her own style sheets - which often happens quite accidentally - so it's more reliable to use one of the mechanisms listed.

What Users Expect in Common Elements

According to usability studies, **users have come to expect certain elements** to be readily available on each page. They also expect to find some of these in particular locations. See [Navigation Aids](#) for details about link, navigation bar, and menu placement.

Users expect to be able to **get to the home page by clicking on the site's icon** (generally in the upper lefthand corner of the screen) on any page. This can take the place of a "Home" link, or can be a second way of accessing the site homepage. Note that **on the home page itself**, there's no point in having either the icon or "Home" actually be a live link; why waste the user's time reloading the same page he/she is already viewing?

A **"Contact Us" mechanism should be prominently displayed**, but there is no need to distinguish contacting you about Web problems from contacting you about anything else. If you particularly want to direct different types of communications to different groups, have "Contact Us" (alternatively, it could be named "Contact Name-of-organization") take the user to a lower-level page, where the types of communications and relevant email addresses are listed in some organized way.

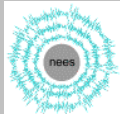
Information intended primarily for sponsoring agencies should be gathered under "About Us" (or "About Name-of-organization") rather than being given more general exposure on the home page or other top-level pages. While sponsors are important users, they represent a very small proportion of total usage. Moreover, sponsors are more likely to spend time looking around the site, so requiring more clicks won't inconvenience them.

A search mechanism is not really needed unless your site includes a hundred pages or more. If you decide to include them, **search**

capabilities should only cover your own site. Users know that to search the entire Web, they will do much better by going to Google, Lycos, or whatever their favorite (and most familiar) site is. Be sure that search is *not* shown until it works robustly; a poorly implemented search will cost you more users than it gains.

Similarly, include a **help feature only if it provides substantive information.** Users will be annoyed if they click "Help" and then just find logos or links to other materials.

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Site Testing & Maintenance

Browsers are notoriously inconsistent about how they display even the simplest HTML documents. Regular testing and maintenance are necessary to ensure that your users can see what you intended.

Initial Testing

To ensure the quality of your pages, test your design and each new page:

- Using **at least Internet Explorer and Netscape**. You can count on the fact that not all users will have the same browser.
- If possible, using **at least two versions of each browser**. Not all users have the most recent version installed, and there are major changes from one release to the next.
- With **different browser window widths**. Make sure your pages are readable with the window set to 600 and 800 pixels wide, as well as maximized. As a rule of thumb, no horizontal scrolling should be necessary if the window is 800 pixels wide, and all key page elements should be visible even if the window is only 400 pixels high.

Hint: To test Web pages at different window sizes and screen resolutions, [download BrowserSizer](#) free-of-charge.

- With **images disabled**. This will allow you to verify that you have provided appropriate ALT= settings.

Hint: In IE, use Tools-> Internet Options-> Advanced-> Multimedia to disable images. In Netscape, use Edit-> Preferences-> Privacy & Security

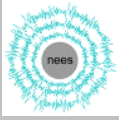
- Using a **dialup connection**. Check how long it takes your pages to download, particularly those that are graphics-intensive. Remember that users bail out of sites that are slow to download.

Ongoing Maintenance

Since Web pages tend to change over time, it is also important to perform regular maintenance activities. At least once a month, you should **verify that all links are still active**. Most Web servers provide utilities for doing this; alternatively, you can download a separate link-checking program. Repair all broken links immediately, as users tend to leave websites once a couple of links have failed.

Whenever you modify a webpage, double check that its links are working properly. Manually check each link appearing on the page to ensure that it leads to the proper location. In addition, test at least one link in to this webpage from elsewhere on the site to ensure that the filename has been spelled correctly and that the file permissions allow users to access it.

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Page Design

This section presents guidelines for designing and implementing individual web pages. For general "Dos and Don'ts" about using frames, popup windows, and other special page elements, see [Site Design](#).

Key Usability "DOs"

The following attributes characterize the pages that users have said they find most appealing and useful:

1. **Treat screen real estate as a valuable commodity.** This doesn't mean pages should be packed with tightly spaced text, but rather that how space is used is just as important as what content is included.
2. The main page **content should fit in the browser window's width**, even when the window is not "maximized" to fill the entire screen. Users find it annoying to have to scroll horizontally just to read a line on the page. It's even worse when they adjust the browser's font or window size to improve viewing of a page, then must re-adjust it when they move to a new page. See [Page Size](#) for details.
3. **Design webpages so the browser can resize them** according to the display space available. This is particularly important with the increasing use of small-screen portable computers, PDAs, and cellphones to access web content. Specifics on how to make content re-size to fit the browser window will be found under the topic [Page Size](#).
4. **Keep the size of most webpages small enough to download in under 10 seconds.** Many user studies have established that failure to do so will cause users to move their attention to something else or leave the website. For the rare page that really requires longer download time (such as a video clip or animation), warn the user ahead of time so that he/she can choose whether or not to incur the extra time. Note that this is just one reason to keep files small; others were laid out in the section on [Site Design](#).
5. **Use visual highlighting to draw the user's eye to key information**, such as the key phrases in this list of "dos and don'ts." Boldface or large fonts are not the only elements that draw the eye. Tables, the interspersing of bullets with text, and

"white space" (blank areas) can all be used judiciously to ensure that the user doesn't miss key information. Specific examples of how to do this effectively will be found under [Helping Users Find Key Content](#).

6. **Limit images to elements that are really meaningful.** This doesn't necessarily mean pages have to be dull, since there are lots of alternatives to provide visual interest. But usability studies have shown clearly that dense graphics alienate many users, due to their affect on the time required to download and display pages and a pervasive assumption that sites with too many or too advanced graphics are "all flash and no substance." further, heavy use of graphics indicates an insensitivity to users who dislike graphics or cannot see them well.
7. **Use block text rather than creating .gif or .jpg images of "display text".** Image files take substantially longer to load. They do not resize properly or display well on very small screens. Finally, they cannot be interpreted by browsers that have been voice-enabled for visually impaired users.

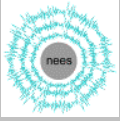
Key Usability "DON'Ts"

Studies have also indicated that certain page design features are particularly likely to frustrate or annoy users and should therefore be avoided:

1. **Don't specify fonts using absolute sizes (e.g., `size="14pt"`),** since that robs users of any control over the appearance of the webpage. Relative sizing will not only allow users to increase or decrease the size to fit their display screens, but also opens the door to improvements when the page is processed through a voice-synthesis interface (see [Use of Fonts](#)).
2. **Don't use all-caps for text unless you are referring to an acronym.** Use of all capital letters has been demonstrated to take at least 25% longer to read, and typically results in significantly more user errors than mixed-case or lower-case alone. Generally speaking, follow the conventions for capitalization used in most books: titles (including menus, buttons, and links) in mixed upper- and lower-case, text in lower case except for proper nouns.
3. **Don't get carried away with creative fonts.** Many "artistic" fonts are actually quite difficult to read when displayed in a small browser window (see [Use of Fonts](#)). In addition, users find that combining a lot of different font sizes and styles becomes distracting.
4. **Don't use animation unless it's truly needed.** Animation can be a valuable tool for showing change over time, but gratuitous movement on web pages is annoying to users and ignores the fact that many users have older versions of browsers or do not have the newest sets of plug-ins available. Save animation for worthwhile things like time-series information, fly-throughs of 3-D spaces or visualizations, or live camera images.

5. **Don't assume all users can see what you see.** Your web pages should be accessible to users even if the images have not been downloaded. In some cases, this is because the user is visually-impaired. In others, it's because the user wishes to make pages display faster or because he/she prefers a browser with a voice-synthesis interface. Either way, it's important to include ALT= tags for all images (see [Helping Users Find Key Content](#)).

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Page Size

Page size is critical to usability in two ways: the speed with which pages can be downloaded and displayed, and the ability of pages to be resized in different ways to fit the display area available. This topic provides general guidelines on page size and flexibility. Additional information will be found under [Use of Images](#)

File Size

The key to sizing webpages effectively is **the length of time it takes to download a page from the server and display it** in the browser window. The time from when a user requests a page and when it has displayed completely is referred to as *response time*, and has been the subject of many user tests over the last few years. In general, response time:

- Must be within 0.1 second to make system "feel interactive" (i.e., sensed as an immediate response)
- Must be less than 1 second in order to fit into the user's chain of thought
- Must be less than 10 seconds to keep user's attention; otherwise, the user moves his/her mind to something else, starts doing something else - or bails out of your website!

In case you are not convinced, usability studies have also proved conclusively that websites that are fast (a) get more traffic, and (b) have lower bailout rates.

The basic guideline is that you should **warn users if a webpage or file will take more than 10 seconds to download**, so they can choose whether or not it will be worth the wait.

What size page can be downloaded within 10 seconds? We assume that most users will be accessing NEES websites via the network - rather than a modem - but that it will likely be a shared connection with a reasonable level of traffic, since this is the situation typical at universities. The table indicates realistic pages sizes for achieving both 1-second and 10-second response times.

Realistic page sizes for achieving key response times
(adapted from Niesen, *Designing Web Usability*)

	Response Time = 1 sec	10 secs
56K Modem	1.5KB	25KB
ISDN	6KB	110KB

Shared network	12KB	250KB
Dedicated T1 network	75KB	1.5MB

This means that **webpages should be less than 150KB in size wherever possible**. Further, **any file larger than about 250KB should be separated out** and identified to the user as a large file, preferably with an indication of approximately *how* large it is.

Note that total **page size includes the size of all embedded graphics**, since they will have to be downloaded, too, unless they're being reused (see [Use of Images](#)). That doesn't necessarily mean webpages have to be boring (see [Helping Users Find Key Content](#)).

Making Pages Resizable

Users need to have control over the size of their browser windows, and become annoyed when webpages cannot be sized to fit appropriately. While you may be developing your webpages on a desktop system with a large display, your users may be relying on portables or older model desktops with much smaller screens. They may also have reasons for needing to compare the content of multiple browser windows, which will require that each window be significantly smaller than the capacity of the screen. For all these reasons, it is essential that you **design your webpages so they can be resized to fit within a wide range of window sizes**.

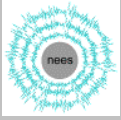
As a minimum, **no horizontal scrolling should be necessary if the window is 800 pixels wide**. If images are wider, show a "thumbnail version" that links to the larger version, so that the user can choose whether or not to view the image full-scale.

Similarly, **all key page elements should be visible without scrolling if the window is 400 pixels high**. This accommodates some of today's smaller portable screens; it also makes it easier for users to take snapshots of your webpages to include in their presentations or reports.

Use relative rather than absolute sizes for elements the browser is capable of resizing, such as tables and colored blocks of text; for example, `width=50%` allows the browser to adjust the size of an object, but `width=85` does not. This practice not only supports a wider range of display screens, but also allows the browser to adjust what is displayed when the user changes the window from maximized (full screen) to a smaller size.

Consider resizeability when designing headers, footers, and other elements that are common across your website. This guide, for example, chose a header image that stretches and shrinks substantially without impeding legibility. The "standard NEES footer" can also be resized, by expanding the space between the central and side images. Look at [How Includes Work for This Guide](#) to see how this is done.

Next: [Use of Fonts and Textual Elements](#)



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Use of Fonts

Fonts are used to create most types of webpage elements: headers and footers, links, navigation bars, menus, buttons, lists, tables, etc. - not to mention the text that will convey most of your website's content. This topic describes how fonts affect legibility and general usability.

Effects of Fonts on Legibility

In HTML, fonts are described in terms of face, style, size, and color. All of these may be used as attributes on the FONT tag.

Font faces fall into two general categories:

- **Serif:** Fonts that have small appendages at the tops and bottoms of letter (e.g., Times Roman, Bookman, Century, Courier). In standard typography, these are the preferred faces for large blocks of text since serifs make it easier to read long lines.
- **Sans-serif:** Fonts that consist of only primary linestrokes and therefore are simpler in shape (e.g., Helvetica, Arial, Futura). In standard typography, these faces are primarily used for short phrases such as titles, button labels, and outlines.

Example: In this guide, serif fonts are used only for the colored blocks of text marked "Hint" or "Example". All other text is sans-serif (unless, of course, your browser does not honor the font requests).

Currently, however, computer screens do a better job of displaying san-serif than serif fonts, so we recommend that you **use sans-serif fonts for text on all NEES websites.**

It is important to note that **different browsers support different font faces.** For that reason, the NEES guides and the templates we provide for your webpages specify multiple fonts. In particular, they specify the two sans-serif faces most likely to be supported on Windows, Unix, and Macintosh platforms.

Hint: use `` to specify a sans-serif font that most browsers can display successfully. Arial is used by browsers on Windows and Unix, Helvetica on Macintosh.

Font style refers to the use of boldface, italics, or underlining (or some combination thereof) to emphasize textual elements. **Don't use underlining on your webpages,** as users have come to associate that with links (see [Effective Use of Links](#)). **Use boldface judiciously,** since it is highly visible and therefore can become visually intrusive

(see [Helping Users Find Key Content](#)). **Italics can be used to define terms or emphasize an occasional word**, but they should be infrequent since they are not very legible on computer screens.

Font size can be specified in HTML in either relative or absolute terms. **Avoid absolute font sizes**, as they prevent users from adjusting text size to match the requirements of their display devices. That is, instead of specifying a font as `SIZE="14pt"`, use `SIZE="+1"` or `SIZE="200%"`. Better yet, use HTML's style tags (e.g., `<H2>`), since these apply typography standards to vary text size only in certain increments. If you are keeping your webpages short and following other guidelines, **there should be very little need to vary the font size at all** - it's best to let the user control the size of text.

Example: In this guide, the user's default is used for everything except section headings (which use HTML's style tags for headings) and the navigation bar and footer, where the font is reduced one size to make the page content stand out more.

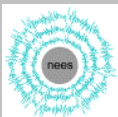
Font color refers, of course, to the color used to draw the text. **Color should be chosen carefully, to maximize legibility against your background color** while minimizing any confusion with the standard link colors (see [Effective Use of Links](#)). If the background is light - which we recommend - this means a dark blue, dark green, dark brown, or black font. **If the background is dark, text will be harder to read;** the color should be white, pale yellow, pale orange, or pale green. Avoid blue or light blue letters on a dark background. Since color can be very distracting, a general guideline is to **use just one or possibly two font colors per page**, other than the link colors.

Finally, **don't get carried away in using font faces, styles, sizes, and colors**. Too much variation is highly distracting, and runs the risk that users will miss the most important content.

Fonts That Are Really Images

Avoid the use of .gif or .jpg images of text to get special effects, except for logos and header/footer images. There are several reasons for this. First image files take substantially longer to load and rarely display as clearly as text generated by the browser. Second, they do not usually resize properly, and can be particularly problematical when the display screen is very small. Third, since they are not really text at all, they cannot be interpreted and read aloud by browsers that have been voice-enabled for visually impaired users. For guidelines concerning image format, etc., see [Use of Images](#).

Next: [Use of Textual Elements](#)



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Use of Textual Elements

Most of the core content of your website will be conveyed through the use of text, lists, and tables. Editorial style for NEES websites is addressed in the [Editorial Guide](#). This topic discusses how to improve the usability of your website's textual elements.

Writing Webpage Text

Because users don't read webpages the way they would a book or other printed matter, **it's essential to write in a style that not only conveys information, but reflects how websites are actually used.** This doesn't mean that you should "dumb down" your writing style. Rather, adjust it to be less dependent on long sentences and paragraphs. What looks good on a printed page - a long, even expanse of words with neatly justified margins - it virtually unreadable in the web environment.

Jakob Nielsen, who has conducted more user tests of websites than anyone else in the world, sums up the writing requirements by saying that web text must be concise, scannable, and objective (see his [Writing for the Web](#) site for more detail and examples). Here, we outline the concepts by adopting one of Nielsen's examples. He and a colleague tested five different versions of the same site to determine the impact of three types of text improvement. The baseline example, as shown below, was wordy and hard to follow.

Baseline example:

Nebraska is filled with internationally recognized attractions that draw large crowds of people every year, without fail. In 1996, some of the most popular places were Fort Robinson State park (355,000 visitors), Scotts Bluff National Monument (132,166), Arbor Lodge State Historical Park & Museum (100,000), Carhenge (86,958), Stuhr Museum of the Prairie Pioneer (60,082), and Buffalo Bill Ranch State Historical Park(28,446).

The first recommendation is to **make text as concise as possible**; that is, reduce the amount of text by eliminating words that are not strictly needed. As the following text shows, it was possible to eliminate 50% of the words in the baseline. Tests with actual users revealed that this version was 58% better than the original.

After reducing the word count by 50% (ranked by users as 58% better):

In 1996, six of the best-attended attractions in Nebraska were Fort Robinson State Park, Scotts Bluff National Monument, Arbor Lodge State Historical Park & Museum, Carhenge, Stuhr Museum of the Prairie Pioneer, and Buffalo Bill Ranch State Historical Park.

A second usability guideline is to **convert the layout of the text to a format that is more "scannable"**. For example, bulleted or numbered lists and tables can be scanned much more quickly than long lines of traditional text. When this improvement was made to the baseline example, the result was rated as a 47% improvement.

After changing baseline to scannable format (47% better):

Nebraska is filled with internationally recognized attractions that draw large crowds of people every year, without fail. In 1996, some of the most popular places were:

- Fort Robinson State Park (355,000 visitors)
- Scotts Bluff National Monument (132,166)
- Arbor Lodge State Historical Park & Museum (100,000)
- Stuhr Museum of the Prairie Pioneer (60,002)
- Buffalo Bill Ranch State Historical Park (28,446)

Converting subjective or exaggerated language to more neutral terms is a third mechanism for improving text. The following example shows the result of applying this to the baseline text; it was judged to be 27% better than the original.

After changing baseline to objective language (27% better):

Nebraska has several attractions. In 1996, some of the most-visited places were Fort Robinson State Park (355,000 visitors), Scotts Bluff National Monument (132,166), Arbor Lodge State Historical Park & Museum (100,000), Carhenge (86,598), Stuhr Museum of the Prairie Pioneer (60,002), and Buffalo Bill Ranch State Historical Park (28,446).

By far the **biggest payoffs come from combining all three techniques**. Once that had been done to the baseline example, users considered it to be fully 124% better than the original.

After applying all three improvements (124% better):

In 1996, six of the most-visited places in Nebraska were:

- Fort Robinson State Park
- Scotts Bluff National Monument
- Arbor Lodge State Historical Park & Museum
- Carhenge
- Stuhr Museum of the Prairie Pioneer
- Buffalo Bill Ranch State Historical Park

Formatting Lists, Block Text, and Tables

Menu titles and menu items should be **formatted using upper- and lower-case letters**, following the conventions for titles. That is, nouns, pronouns, verbs, adjectives, and adverbs should begin with a capital letter, while conjunctions and articles should be all lower-case.

Lists are straightforward in HTML, and have the advantage of attracting the user's eye. The only significant usability problem associated with lists is the difficulty of interpreting lists that are nested within other lists. **Keep lists to one or two levels of nesting**; if additional nesting is really essentially, accomplish it by breaking up the list with other, more appropriate structures such as headings, block text, or tables.

Block text refers to sections of text that are set off from other text, by indentation, use of a colored background, use of a different font, or combinations of these. **Be careful to test any block text on multiple browsers**, since contrary to popular opinion, HTML does not require that `blockquote`, `dl`, or even `display` tags actually result in indentation. The only safe way to indent is to use a table whose width has been set to some fraction (e.g., 95%) of the text above and below it.

Example: These examples are created using a centered table whose width is set to 90%. It's the only way to guarantee that the text will actually be indented, regardless of which browser is used.

Tables are an extremely useful way of conveying material in very little space, and in a way that attracts user attention (see [Helping Users Find Key Content](#)). **Spend a few extra seconds to include the attributes that improve table performance and usability**. Explicit size attributes speed up tables dramatically, since the browser doesn't have to parse the text in order to determine how wide columns should be. Use `WIDTH=` and `HEIGHT=` specifications on both the `TABLE` definition itself, and for all `TD` cell specifications. Note that by using percentages to specify the size, you also allow the browser to resize the table as needed to fit within the user's viewing area.

Also remember that complex tables can take a long time to render. To improve performance, **split content into multiple, simpler tables** rather than nesting tables three or more levels deep.

Example: This guide split the page into three tables, corresponding to the table, the footer, and the central portion, rather than a single table with others nested inside.

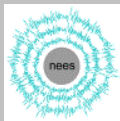
Improving Webpage Accessibility

The most important thing you can do to improve the accessibility of text is to **use HTML style tags to identify headings**. Voice-enabled browsers scan through the webpage looking for headings, and read them off outline-style to help the user become oriented and gain a synopsis of page content. If you fail to use them, or use them

inconsistently, the user will be confused.

Another aid to accessibility is to **use text rather than images wherever possible**. Consider using colored blocks of text, tables, and bullet lists rather than set-in images. In many cases, these are just as effective at conveying information - and they have the added advantage of loading faster than the corresponding images would. Use images only as a last resort.

Next: [Use of Images](#)



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Use of Images

One of the key factors for the popularity of the web is the creativity with which images of all sorts - photographs, diagrams, artwork, plots, multimedia clips, animations, etc. - can be integrated with textual elements. At the same time, users typically blame images for many of the usability problems that plague web access.

When to Use Images

Because images both attract and distract users, it's important to **limit graphics graphics to elements that are really needed**. Wherever possible, use alternatives such as blocks of text on colored backgrounds, interspersed lists of bullets, "white space" (blank areas), and tables. Before adding any image, ask yourself what unique contribution it makes to the webpage and consider making that point in some other way. Reducing images is also a key tool for ensuring that your webpages are of proper size (see [Page Size](#)).

When you do use a graphic, **consider reusing it on other pages**. Today's browsers are able to cache images, which means that they don't have to be downloaded again the next time a page refers to them. Reuse also has the advantage of giving the user a sense of familiarity with your site. Within a webpage, reuse any arrows, buttons, or icons. Across pages, reuse the logo, header and footer images, and even photos. Performance-wise, **the worst thing you can do is use a different photo on each page of your website**.

According to user tests, animations are particularly annoying and can actually drive users away from a webpage or site. **Don't use animation unless it truly adds to the meaning of the information**. Animation can be a valuable tool, particularly for showing change over time; it should be saved for things like time-series information, fly-throughs of 3-D spaces or visualizations, or live camera images. Gratuitous movement on web pages, on the other hand, annoys users and ignores the fact that many users have older versions of browsers or do not have the newest sets of plug-ins available. (Contrary to what some web page developers believe, users will not download a new plug-in just because your page requires it.)

Making Images More Efficient

In addition to reuse, there are several ways you can handle images that will cost a little development time, but result in significant performance

savings.

Always use the most efficient format for your images. For photographs, use JPEG with as much compression as possible. Other types of images should be stored using GIF format. Using an inappropriate format can double or treble the size of the file and the download time.

Reduce the resolution of the image as much as possible. If the image is primarily for viewing over the web, it can be quite small since computer displays are not capable of very high resolution anyway. In other words, any extra resolution is "wasted" but costs the user both time and space. Every reduction in resolution improves the image's download performance.

The only time a web image should be very high resolution is if it is intended for printing only (since printers have much higher resolution). In that case, be sure to **include a thumbnail image on your webpage that links to the larger image**, so that users not interested in printing a high-quality image do not have to download it.

Where possible, **reduce the number of colors.** There are only 216 colors that display consistently on all browsers, so why waste space and efficiency with an image containing many more colors? Many software programs allow you to "posterize" photos, thereby reducing the color requirements. Powerpoint tends to generate relatively efficient GIF diagrams and images, but if you're using Photoshop, Illustrator, or some other specialized software, save as many things as possible using "exact palette" or "reduced palette".

Example: A drawing with just four colors may "carry" hundreds of extra color data when saved in PhotoShop if you don't specify "exact palette." Careful choice of format can save literally megabytes of data.

If you prepare a lot of images, **use a commercial image compression tool** to reduce the size of the image files.

Spend a few extra seconds to include HTML attributes that improve performance. Explicit size attributes speed up the display of webpages, since the browser doesn't have to actually load the image in order to determine how much space to leave for it. Use WIDTH= and HEIGHT= specifications for all images. Also add ALT=short-description-of-graphic to each image specification so that users will be able to interact with the page, even before the images have been downloaded and displayed.

Improving Webpage Accessibility

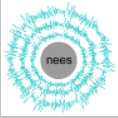
Accessibility is an important issue, not just because it is socially unacceptable to disenfranchise users who do not have the same sensory capabilities as you do, but also because **many users simply choose to disable images or sound from their web displays.** This may be to reduce the downloading time, to make webpages fit on small displays

like PDAs, or simply because the user does not care for graphics.

It is worth reiterating that you should **use text rather than images wherever possible**. Consider using colored blocks of text, tables, and bullet lists rather than set-in images. In many cases, these are just as effective at conveying information - and they have the added advantage of loading faster than the corresponding images would.

When images are needed, **always include the ALT= attribute with a meaningful description of the image**. Without these attributes, users with images disabled or who are visually impaired see nothing but a "missing image" icon. Useful ALT= text allows voice-enabled browsers to read out your webpage content and accommodate small-scale displays and slow modem connections. If used in combination with explicit size attributes, it can also make it possible for users to take action (such as clicking on an image link) before the entire page has downloaded.

Next: [Helping Users Find Key Content](#)



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Helping Users Find Key Content

On the web, **useful real estate is extremely limited**. The available browser window may occupy just a small portion of an already small display screen, and your website's identity and navigation elements - header, footer, navigation bar, etc. - occupies some of that precious space.

On top of that **users don't read webpages serially, they hop from one visual element to another**. Thus, while technically you can make webpages as large as you like, the reality is that long webpages have generally poor usability. The biggest design challenge you will face is how to use visual elements effectively in order to draw the user's eye to key content.

Catching the User's Eye

Usability studies show that most web users are very goal-oriented; they are looking for something of use to them, and know that the best way to find it is to **glance quickly at a page and move on if it doesn't seem to have the desired content**.

Move quickly through any set of webpages. What does your eye notice first? The eye jumps to elements that are highlighted visually in some way. Such elements include:

- images
- links
- headings or other large text
- boldface text for key phrases (italics aren't very visible on web pages)
- areas where the background color is different
- bulleted lists
- tables

In fact, the eye is drawn everywhere *except* to text. The reality of web use is that **users won't read your text unless you entice them to do so**.

Many of the recommendations in this guide have to do with making decisions about where to pare down content and how to present it so that as little user effort as possible is needed for grasping the key elements. In addition, the format of the guide itself is intended to help you realize what formatting styles help you locate and use material

quickly.

Providing Visual Hierarchies

In addition to attracting the user's eye, it's important to **help users understand the hierarchy of webpage content by reinforcing it with a hierarchy of visual dominance**. The idea is to show relationships among different webpage elements by manipulating their relative size, position, proximity, color, and contrast, and in some cases, movement. (In this context, "elements" refers to units of text, images, tables, bulleted or numbered lists, indented materials, etc.).

Example: Chapter titles and headings in books, for example, typically appear in more visually dominant fonts than text (see [Use of Fonts](#) for a discussion of the visual impact of different fonts). If all text were the same size, the user would have to first read all of it, then infer the relative importance, in order to understand how the information is organized.

Varying element *size* is the most straightforward way of indicating their relative importance, since larger items both attract the eye and dominate the user's field of vision. **Use size to help the user understand which elements fall where in the content hierarchy.**

This is what the HTML style tags do for text headings; <H1> appears in a larger font than <H2>, etc. The same principle can also be applied to images, tables, and other webpage elements. Look at your page and compare the amount of space being taken up by each element - is it proportional to its importance?

Element *position*, or location with respect to the overall webpage, communicates both relative importance and sequencing. As readers of European languages, we have been trained to scan printed media from top left to bottom right. Therefore, **items above and to the left of the center of the page tend to be noticed first**, and are generally considered to be more important. This is precisely why navigation bars are most commonly placed at the lefthand side of the window. Once the user has visited a couple of your webpages, he/she will be visually "ignoring" the navigation bar, so it will be the upper and lefthand portion of the main content area that will have visual dominance. In addition, **users will assume that a row of similar elements - such as images - should be "read" from left to right** or top to bottom. If you intend them to be a sequence, order them in this way. If they do not form a sequence, don't line them up in a row.

The *proximity* of elements to one another implies the degree to which they are interrelated. **Use whitespace to group related elements together, and to create distance between groupings.**

Example: In the navigation bar, the topics under Page Design have been placed closer to that title than to the one that follows, Navigation Aids. Spacing them equally between the two would imply that they are related to both.

Element *color* also conveys a sense of grouping or relationships. **Use**

the same color to create a common thread among elements that cannot be placed next to one another. For example, choosing a common color scheme for all x/y plots links them together logically even if they are physically separated on the webpage. Color also can be used to visually emphasize or deemphasize elements. A warm, bright color (such as yellow or red) seems to "stand out" on the page, while cool and dim colors (such as gray or dull blue) recede.

The most important aspect of color for most webpages is the relative amount of *contrast* between an object and its background. **Most text should have the greatest possible contrast**, which is why letters on a light background should be in black or very dark colors. Less important text can be visually de-emphasize by lightening the color and/or darkening the background.

Example: In this guide, text in the main content area is black to provide maximum contrast. The gray background of the navigation bar has the effect of reducing the visibility of that text. In the footer, the text is dimmed *and* displayed against a gray background to reduce its dominance even more.

Movement is the most difficult attribute to use successfully because it serves as a magnet for attention, with the result that other elements on the webpage may be missed entirely. As discussed in [Use of Images](#), **animation should be used only when it contributes significantly to the meaning of webpage content.**

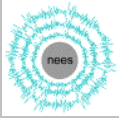
Eliminating Distractions

Don't develop webpages the way you would an article or report. Instead, spend time identifying what users will most want to do on your site, structure your pages accordingly, provide navigation aids in standardized places so users don't have to hunt for them, and then concentrate on making the content succinct. Finally, use visual highlighting mechanisms to draw the user's eye to key content and entice him/her to explore the rest.

The danger in providing visual interest is that it can be distracting as well as attracting. Keep a "style sheet" where you record the different visual highlighting techniques and what they are being used for. **Make them as consistent as possible across the entire site.** If you are using a colored background to provide examples, use some other convention for showing "see also" information.

Test the final design of each webpage by eliminating visual elements, one at a time. If removing the special font or the image doesn't not actually *detract* from the value of the content, the element is gratuitous and should be eliminated. Only a very harsh final editing of your pages will ensure that they are the best you can provide.

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Navigation Aids

Key Usability "DOs"

A number of empirical studies have been conducted on how users "navigate" - i.e., find their way around - websites using various navigation aids (links, menus, navigation bars, buttons, site maps, etc.). Many of the findings are related to how and where navigation aids should appear. The most important ones for NEES websites are the following:

1. **Organize navigation aids with user tasks in mind.** Many sites expose the organization of the site's files, rather than trying to predict what the key user questions and goals are and showing clearly how a user can meet his/her goal.

What are the **top 10 things a user wants to do on your site?** Spend time figuring out what those tasks are, then adjust your site's navigation to make them easy to accomplish. This will contribute more to site usability than almost anything else you can do (see [Navigation Bars and Other Contextual Aids](#)).

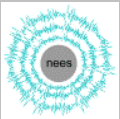
2. Conform to the standard practice of having **all links underlined**, and don't underline any text that isn't a link. Users have become so familiar with this convention that they automatically correlate underlining with links.
3. **Navigation bars (or bread-crum trails) are critical in order to give the user an understanding of where he/she is on your site.** Don't count on links and menus to help users find and use your key content. Specific guidelines will be found under [Navigation Bars and Other Contextual Aids](#).
4. **Deactivate any link, menu item, or navigation bar item that leads to the "current location".** There's no point in having the user select a link that will re-load the same location, since it simply wastes time. Eliminate the link or deactivate the menu or navigation bar item by changing it from a link to text. This guide, for example, deactivates the item on the navigation bar that brought the user to this page. That visually reinforces where the "current location" is, and also saves the user from accidentally re-loading the same page. (A user who purposely wants to re-load it can always use the browser's Reload button.)

Key Usability "DON'Ts"

Equally important are the findings that indicate how navigation aids should *not* be used:

1. **Don't assume that users will familiarize themselves with your site.** On the contrary, a user who is thwarted in carrying out his/her first task will never bother to learn about the other things your site offers.
2. **Don't change the standard colors for links.** That is, links that have not yet been visited are shown in blue, and visited links in magenta or purple. If more visibility is needed (see [Use of Fonts](#)), change the link colors to a darker shade - but keep them unmistakably blue and purple.
3. **Don't label links, buttons, or menu items with meaningless phrases like "Click Here".** Users already know what links/menus/buttons are and how to use them. What they need to see is text identifying what will happen if they do click the element (see [Effective Use of Links](#)).
4. **Don't confuse your users by implementing menus in "creative" ways.** Follow standard usability guidelines for the design and placement of menus, as discussed in [Menubars and Menus](#).

Next: [Effective Use of Links](#)



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Effective Use of Links

This topic focuses on the most common mechanism supporting website navigation: links. For the most part, the guidelines provide reminders that **links should do what the user expects, rather than surprising him/her by leading to an unanticipated page.**

Remember that if users become too confused, they will simply leave your site. Therefore, it's important to provide structural navigation aids as well, as discussed in the other topics under Navigation Aids.

Appearance of Links

Webpages use links in three different ways:

1. To provide quick access to other parts of the site (these links most commonly occur in menubars or navigation bars like the one at the left)
2. To point users to pages with more information about the text or graphic mentioned in the link
3. To point users to an alternative source, in case the current page isn't what they're looking for (these are typically phrased as "See also")

Regardless of the purpose, users expect links to have a predictable appearance. As listed under [Usability "Dos and Don'ts"](#), **all links should be underlined and use the standard colors** of blue for non-visited and purple or magenta for previously visited links. Usability studies have shown conclusively that users dislike non-standard links - and make more errors using them.

An obvious corollary is that **non-link text should never be underlined** and should largely avoid the standard link colors.

Links should be **formatted using upper- and lower-case letters**, following the conventions for titles (see [Use of Fonts](#). That is, nouns, pronouns, verbs, adjectives, and adverbs should begin with a capital letter, while conjunctions and articles should be all lower-case.

Where and How to Use Links

Link text must be chosen carefully, since their color and underlining automatically make links an eye-catching part of any webpage. Exploit this visibility. Links can be extremely effective when they visually highlight the most important words or concepts on the page at the same time as providing access to more information about them (see [Helping Users Find Key Content](#)).

All links should be self-explanatory without having to read any of the

surrounding text. Avoid meaningless phrases like "Click Here" or "To See Information on" - they take up space and require time to read, without adding any significant content. Instead, give the user a short phrase that indicates why he/she should try the link.

To improve the readability of links, **underline the words that really matter**, not the whole title of a document or webpage. In general, that means keeping link text to 6 words or less.

Example: Compare how easily you can grasp the purpose of these paired links:

See the NEES CD Deliverables: NEES SI Training and Documentation Plan and NEES Consortium Development and System Integration Projects: Communications Agreement

See the NEES CD Deliverables: NEES SI Training and Documentation Plan and CD/SI Communications Agreement

To help clarify the purpose of links, **include additional explanatory information, but not as part of the link itself**.

Example: Here, the extra information clarifies what might be a meaningless title to someone not involved in the NEES program:

SI Project Execution Plan: How and when the information technology system to connect NEES laboratories will be developed

Special attention is needed **when multiple links appear in a list**. Group the links into categories, taking care that their titles (the underlined portions) clearly distinguish one from another. Within each group, order the links according to their importance to the casual user. Order the groups in similar fashion so that the first thing the user sees is the most important link of the most important group.

Links based on people's names should lead to short biographies or their own webpages, not to an email dialog. The implication of a link is that it will help the user find more information about the subject, not communicate with the subject. If you want to include an email link, show the email address rather than the person's name.

Improving User Efficiency

Locate alternative ("See Also") links at the top of the webpage, so users will see them as soon as they discover it's not the content they were looking for. Putting these links at the bottom of the page assumes that readers will scroll to the bottom even if the page isn't of interest - not a likely event.

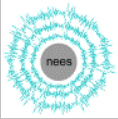
Always refer to the same link target using the same URL, so that the browser can detect if the page has already been visited. If you use two different URLs (e.g., `./nav_links.html` and `http://www.nacse.org/NEESweb/usability/nav_links.html`), this may not be possible.

When you want to link to a larger copy of an image, **make the image itself be the link**. The border around the image cues the user to the fact that it can be

clicked on for a larger view, and you avoid cluttering the page with the name of an image file (which is usually pretty ugly). Alternatively, make the key phrase in the caption serve as the link.

Add an ending slash to any URL that refers to a directory (i.e., implicitly to the index.html file). This improves performance slightly for each such link by avoiding the need for re-direction as the server tells the browser that the link refers to a directory.

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Menus and Menubars

Many websites use a menubar, typically located at the top of all webpages, to provide basic navigation functionality. The menubar may simply include a number of links, or it may hold the titles of menus which drop down as the user's cursor passes over them or when the user clicks on them.

In general, **menus are not the best way to help users keep track of where content can be found**; the reasons for this are discussed under the topic of [Navigation Bars](#). However, since a menubar occupies little vertical real estate, it can be a useful way of providing access to key functionality where space is at a premium (see [Page Design](#)). It can also be used in conjunction with other navigation aids, such as navigation bars, for sites that are just too complex to represent in their entirety. Therefore, although this guide encourages NEES web developers to use other mechanisms, there may be times when a menubar is needed.

Appearance of Menus and Menu Items

If menus are necessary, anchor them to a menubar across the top of the webpage. This is the customary location for menus in general software products as well as other webpages.

Make sure the menu is obviously a menu by making the title look like a link. Menus that appear and disappear as the user mouses over arbitrary words may never be discovered by users. If it looks like a link, the user will at least be cued to the fact that those those words can be used to access another location.

Menu titles should be short and form a consistent group. Since the menubar is limited in width, keep menu titles to 1-2 words and make them as distinct as possible. Users don't want to have to drop down a menu just to figure out what the menu title is all about.

Wherever possible, menu items should be of the form verb-object. Remember that the purpose of menus is to give the user access to "operations." This will be clearer if the first word is a verb.

Example: The verb-object phrases on the left more obviously refer to user actions than the titles on the right:

Propose Experiment	NEES Proposals
Plan Future Experiment	Future Experiments
Observe Ongoing Experiment	Current Experiments
Contact On-Site Staff	On-Site Staff

Menu titles and menu items should be **formatted using upper- and lower-case letters**, following the conventions for titles (see [Use of Fonts](#)). That is, nouns, pronouns, verbs, adjectives, and adverbs should begin with a capital letter, while conjunctions and articles should be all lower-case.

Organizing Items within Menus

Group menu items together logically. Maximize the similarity of items within a category by making the language consistent yet clearly distinguishable. Expanding on the previous example, all actions related to "experiments" should be listed together, taking care to vary the verb and/or adverbs to differentiate the different operations.

Use a separator (horizontal line) to differentiate one category from the next. This will improve how accurately the user can find and apply operations.

Within a category, **order items by the natural order in which they would be used.** This will cue the user as to which operations he/she needs to perform first.

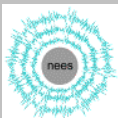
Don't use cascading (multi-level) menus. User studies show that cascading menus are both frustrating and error-prone for users. Not only does the cursor movement need to be precise, but the user is effectively forced to memorize not just what a menu contains, but what each sub-menu contains. Users consistently complain that they can't find the items they need.

Organizing Menus on a Menubar

Follow the standard software conventions for locating certain types of menus:

- If you include Help, it should be the rightmost menu. However, consider carefully before including this (see [Elements Shared by All Site Pages](#)).
- If you include Contact Us, it should be just to the left of Help.
- If you have a File menu, it should be the leftmost on the menubar.

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Navigation Bars and Other Contextual Aids

One of the most important factors influencing website usability is the degree to which a user can *see* answers to key navigation questions:

- Where am I now?
- Where can I go from here?
- How do I get there?
- How can I get back to where I was before?

Since each user operates in isolation, the answers must be clearly apparent at all times. This is why **navigation mechanisms that provide the user with a sense of "context" have become so important.**

Contextual aids are the part of website design that require the most knowledge about target user audiences and usability engineering. This guide presents only a very superficial treatment; the user should consult the recommended references (see [Using the Guide](#)) for more information.

Types of Navigation Aids

A *navigation bar* lays out the structure of the website - or a portion of the site - in a hierarchical, outline form. It is typically located along one side of the webpage or in a box at the top of the webpage's main content area.

Example: This guide provides a hierarchical table of contents at the lefthand side of each page. It expands and contracts according to the location of the user in the hierarchy in order to ensure that all topics in the "current section" are visible even if the browser window is quite small.

This guide discusses navigation bars in particular, because that is **the standard mechanism that has been adopted for the NEES program-wide web style** (see [Style Guide](#)).

So-called *bread-crumbs* are another contextual aid; they show the path of links that led to the present page, typically in a horizontal row at the top of the page (e.g., [Home](#) -> [Usability Guide](#) -> [Navigation Aids](#) -> Navigation Bars). However, this mechanism only answers the first and last questions, so it is **not as effective as a navigation bar.**

A *site index*, like a book index, provides an alphabetical listing of topics areas found on your site. This is a familiar convention for users, but unfortunately it is extremely susceptible to misinterpretation. A user looking for "centrifuge" materials may never see that the entry was structured as "laboratory equipment, centrifuge." **A thesaurus is usually required to make a site index effective**, but it is quite time-intensive to implement.

The other type of contextual aid, a *site map*, is a graphical representation of the website's structure. This can be very helpful to you in managing the growth and organization of your site, but it is **less likely to be of assistance to users**. Graphical representations of complex structures have to rely on cryptic locational names (indeed, site maps often refer to the names of directories and even files) rather than clearly indicating the content that is included in that location. They can be hard to generate and require significant download time. For those reasons, it is not as effective an aid as the more user-oriented navigation bar.

Using the Navigation Bar Effectively

As discussed in the ["Dos and Don'ts"](#) at the beginning of this section, the most important thing you can do in developing the navigation bar is to **identify the top 10 things that users will want to do on your site**. An understanding of user tasks is necessary in order to organize website materials in ways that are easily navigable.

Navigation structure and labels must be selected carefully. This is an art rather than a science, since it's based on common sense and sensitivity to user needs rather than on standard practices and vocabularies. The following process has been effective for a number of website designers in various fields of science and engineering:

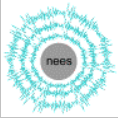
1. Based on your analysis of the 10 top user tasks, create a list of all the functionalities (operations) that your website will have to support for users to accomplish those tasks. For example, if one task is to plan new experiments, the functionalities might include observing how previous experiments were planned, calculating the costs of constructing a model, determining the type and placement of instrumentation, consulting with on-site experts, etc.
2. Write the functionalities on individual index cards. (Of course, it's also possible to carry out these steps using electronic lists, but it's easier to describe the process in terms of index cards.)
3. Spread out the cards and begin grouping them into logical categories. Once you think the categories are correct, order the cards within each category. Record the results of your categorization.
4. Find at least 5 potential users - hopefully representing the diversity of your intended user audience(s) - and have them go through the same exercise. Allow them to modify the names of the functionalities if they choose, or add key functionalities that

they think are missing.

5. Compare the results of all the sortings. If your functionalities are appropriate for the user tasks you identified, some pattern of categorization should be emerging (even though details like precise ordering are likely to vary from one sorting to another). If not, start over again in defining the user tasks and functionalities.
6. Once the categories arrived at by most users are roughly similar, use them to create an outline of your proposed website structure. Adjust the titles of the functionalities to reflect the users' corrections and modifications.
7. Show the outlined structure to at least 5 other users, asking them to modify the organization or naming of the functionalities. Repeat the process as needed. You'll know you have a "good solution" when all further changes are trivial.

Repetition of this process as many times as needed to arrive at a solution that most users agree on is tedious, but it will ultimately save you huge amounts of effort in developing the structure of your website and its navigation aids.

For other suggestions about usability engineering methods, see the recommended references.



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