

# Creating User-Friendly Web Sites

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# I. Information Architecture

## Organization

### **Select content to match user needs.**

Become familiar with your site's users to discover their information requirements.

#### ***What should I do?***

Determine who you want the site to address (for example, patients, clinicians, and researchers).

For each user group, list that group's information requirements.

Try to approach this from both your organization's perspective (what information do you want to share?) and from the audience's perspective (what information do different groups want?). You might interview different users or other stakeholders to get data that can help you with this.

#### ***Why should I do it?***

If your site grows "organically," without regard to specific user groups and their needs, and without attention to the messages you want to send, you risk creating a structure that is confusing and inconsistent; you also risk not including information that your user groups want, while including information they don't want.

Creating content requirements systematically also makes it easier to create your site's organizational structure systematically.

### **Inventory your current content.**

Map out current site content to determine how well the site addresses user information needs.

#### ***What should I do?***

Perform a content audit, or inventory, to list each page on your existing site, its current location, and its basic contents.

Assess your inventory from the perspective of your user groups.

Do gaps exist between the content you currently have and the information requirements? Are any important subjects missing? Are there significant overlaps between existing site sections or individual pages? Too much repeated information can be as frustrating for users as not finding what they are looking for. Based on this gap analysis, add new pages to your content inventory (which becomes a content plan) and delete redundant or useless ones.

### ***Why should I do it?***

When you create and analyze a content inventory, you ensure that your site includes all the information mandated by your identified requirements, and nothing extraneous to those requirements. The inventory also provides the starting point for arranging your site's content.

### ***Learn more***

[Usability.gov inventory materials](#)

## **Arrange content according to user expectations**

Create sections that facilitate user tasks.

### ***What should I do?***

Create categories for your content.

### ***How?***

If appropriate, consider providing separate sections for different audiences (such as patients, clinicians, and researchers).

Try to include sections that users have come to expect from most Web sites.

Prioritize your site sections according to user needs.

The most important information should be immediately accessible from the home page.

### ***Why should I do it?***

If user groups have widely different needs, levels of knowledge, and vocabularies, they might also need different categories. For example, researchers and patients not only need different information, they also use different terminology.

Users have expectations based on interactions with other sites and will look for common sections, such as:

- About Us or Contact Us sections.
- Frequently asked questions (FAQ).

### ***Example***

The Center for Disease Control organizes content for a wide variety of user groups.



The sections for healthcare providers and researchers show the CDC resources that each group is most likely to want.

### CDC for healthcare providers

**CDC for Healthcare Providers**

CDC Home > CDC For You

**Top Resources**

- 2006 STD Treatment Guidelines
- Antibiotic Resistance Resources for Healthcare Providers
- Contraindications to Vaccine Chart
- Care of Pregnant Women During Disasters by Non-obstetric Providers
- Education and Training for Immunization
- Emerging Infectious Diseases
- FASD Prevention Toolkit for Healthcare Providers
- Folic Acid Professional Resources
- Guidelines for the Management of Acute Diarrhea After a Disaster
- Healthcare-associated Infections
- Morbidity and Mortality Weekly Report
- NIOSH Safety & Health topic Healthcare Workers
- Nutrition Resources for Health Professionals
- Oral Health Guidelines and Recommendations
- Physical Activity Resources for Health Professionals
- Preconception Care FAQ for Professionals
- Protecting Healthcare Workers from Bloodborne Pathogens
- Sexual Health
- The Atlas of Heart Disease and Stroke
- The Community Guide (publication)
- The Community Guide: For Public Health Professionals
- Travel Notices Including Outbreaks
- Vaccine Delays and Shortages
- Vaccine Resources for Healthcare Providers
- Vaccine Requirements by State
- Vaccine Safety Information for Healthcare Providers
- WISEWOMAN – Resources for Health Professionals
- Yellow Book (Health Information for International Travel)

## Navigation and search

Users should know:

- Where they are in the site currently.
- Where they will go if they click a link.

Quick access to important content should always be available.

Complex sites should include search.

### Enable orientation

Help users figure out where they are within the site by providing consistent, clearly grouped navigation options and user feedback.

#### ***What should I do?***

Group navigation options to facilitate page scanning.

Place groups of navigation options consistently on each page. For example, you might place primary navigation in the left-hand side of the page, but place navigation specific to a site section at the upper portion of the content area.

Provide feedback on a user's location within the site. One way of doing this is by using "breadcrumbs," or a horizontal list at the top of a page that shows the user's location within the site hierarchy.

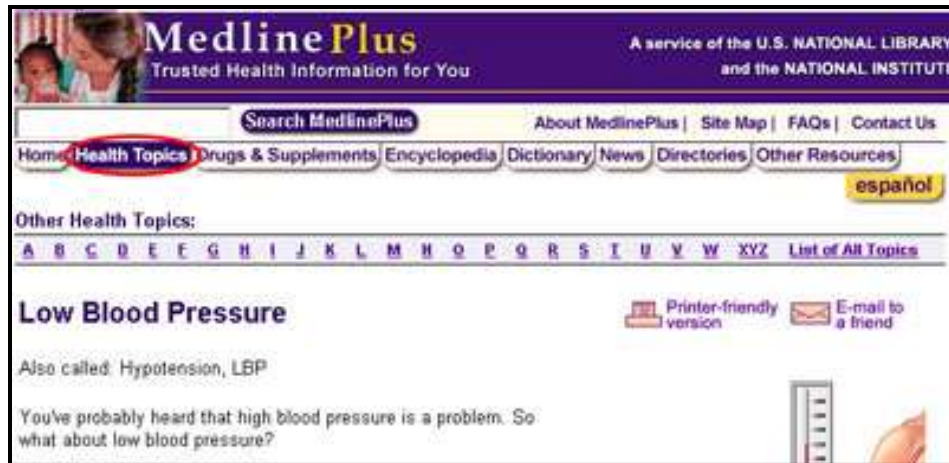
For complex sites, make a site map available. A site map can be as simple as an outline representation of the site's structure.

#### ***Why should I do it?***

Users want to feel like they are in control and know where they are going. If they become disoriented, they may get frustrated. Consistent and clear placement of navigation options facilitates a sense of orientation. A site map provides orientation help if users get lost; location feedback helps with this as well.

#### ***Example***

On this page from MedlinePlus, note how Health Topics in the top navigation bar is highlighted to show the current location. The top and top-right navigation areas are consistent from page to page inside the site. The top-right navigation comprises secondary information: administrative and help services (such as the site map). The top navigation, which is more prominent, shows the main content categories.



## Provide easy access

Enable quick access to important content by making it simple to get to and from the home page and by placing more important navigation options first in a group.

### *What should I do?*

- Enable access to the home page from every other page on the site.
- Place links to all major site sections directly on the home page.
- Place more important navigation options first in a group.
- For critical information, provide more than one link on the home page.
- Do not disable the Back button (for example, in a pop-up window).

### *Why should I do it?*

Users don't want to spend too much time figuring out where things are on your site, so the most important information should be immediately accessible. However, remember that it's just as important to help users recover from mistakes as it is to prevent them. The home page is your site's home base, so users should always be able to get back to it and reorient themselves.

### *Example*

On the left-hand navigation group for Medline Plus, Health Topics is first (start here!), and Other Resources last in the list.





## Clarify links

Make it obvious what will happen when links are clicked.

### *What should I do?*

- Use color or some other means to designate links that have been clicked.
- Match link names with titles of the linked pages; the names and titles should be clearly and specifically named.
- Indicate when links will take users to another site or open external pages in a new window.
- Make it easy to tell what is clickable on a page. You don't want users to be constantly passing the mouse over images, wondering if they are actually links.

### *Why should I do it?*

Clicking a link changes the user's environment. Winding up in an unexpected location is not only disorienting, it can take up the user's time because the new page has to load. For this reason, it's important to clarify what links look like, where they lead to, and if that path has already been traveled.

### *Example*

The IRS Web site links to outside companies that provide free access to tax filing software for people that make under a certain amount per year. When a user clicks to access one of those sites, the IRS clarifies that the user is leaving the IRS site and going to another location.



## Include search

If the site is large and complex, implement an internal search feature.

### *What should I do?*

- If your site has a search box, make it available from every page.
- Ensure that search results are easy to scan.  
Some guidelines for results:
  - Users should be reminded of what they searched for.
  - Results should have enough description to enable users to predict if the page will be relevant. Highlighting search terms in page descriptions is useful; make sure to include the page's title.
  - It should be clear how the results are ordered, particularly if they are not ordered by relevance (for example, by date, by author name, and so on).
  - The total number of results should be listed, as well as the number of results per page.
  - It should be easy to page between results.
  - It can be helpful to number results.

## Why should I do it?

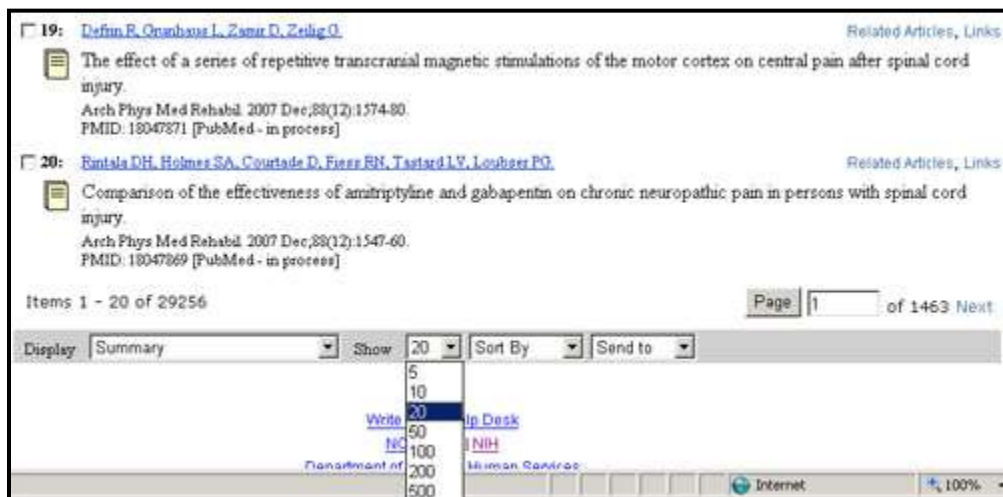
Search features can help users find specific information very quickly. However, if users can't tell which results will actually be helpful, they can end up spending a lot of time looking through the results and rejecting pages that don't fulfill their needs.

## Examples

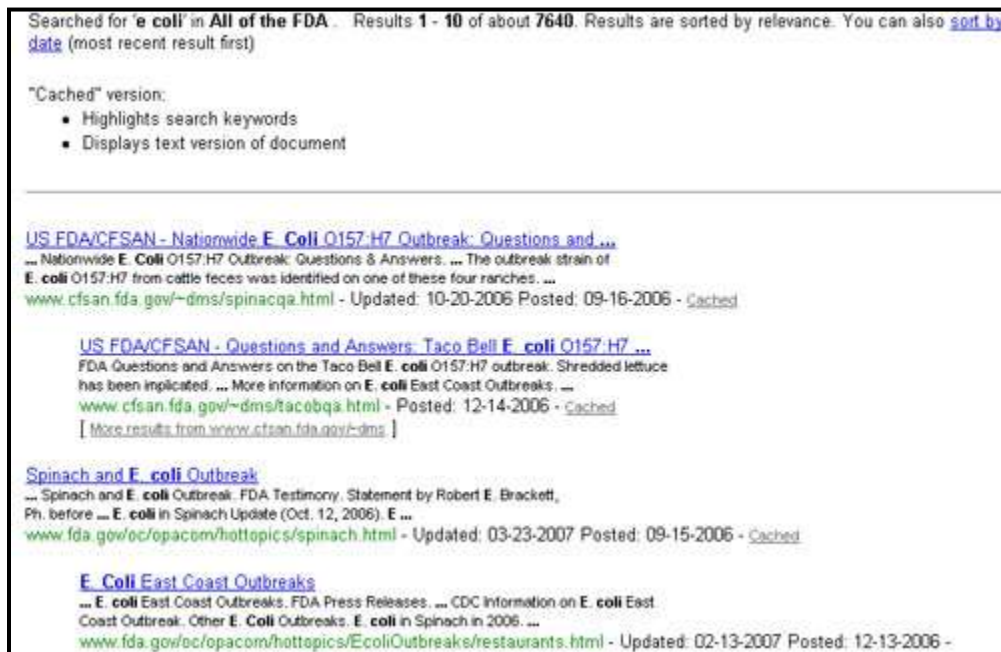
The search feature for the National Science Foundation enables filtering of results for different topic areas (the tabs) or filtering by different areas of the NSF (the drop-down list). You can also arrange the results by date as well as by relevance. The search term is bold in the content excerpt for each page.



PubMed search numbers results. Users can decide how many results to show per page (helpful for large results sets).



The search for the Food and Drug Administration shows when results were last updated and when they were originally posted, so that users can focus on more recent content. This implementation also enables use of a cached version of the results (and explains what "cached" means in this context).



## Naming

- Names of page elements should be specific, descriptive, and concise.
- Names should employ the users' language, not the designers' language.

## Resources

### Books

Lou Rosenfeld and Peter Morville. (2006) *Information Architecture and the World Wide Web: Designing Large-Scale Web Sites*. 3rd ed. Sebastopol, CA: O'Reilly.

Dan Brown. (2006) *Communicating Design: Developing Web Site Documentation for Design and Planning*. New Riders Press.

Peter Morville. (2005) *Ambient Findability What We Find Changes Who We Become*. Sebastopol, CA: O'Reilly.

### Web sites

Boxes and Arrows. (<http://www.boxesandarrows.com/>)

Information Architecture Institute. (<http://iainstitute.org/>)



## II. Information Design

Determines the user's ability to *understand information*.

### Writing style and language

Writing for the Web should be concise, objective and use language that readers can readily understand.

Users are less likely to read text that is too lengthy, dense or filled with confusing terms or inessential information.

### Page-level organization and content

Users look for cues to tell them whether a page contains information they are interested in reading.

If it is too hard or time-consuming for users to determine what the page contains, they are less likely to start reading and more likely to go elsewhere for the information.

### Make key ideas obvious at a glance

Use headings, subheadings and bulleted lists.

#### ***What should I do?***

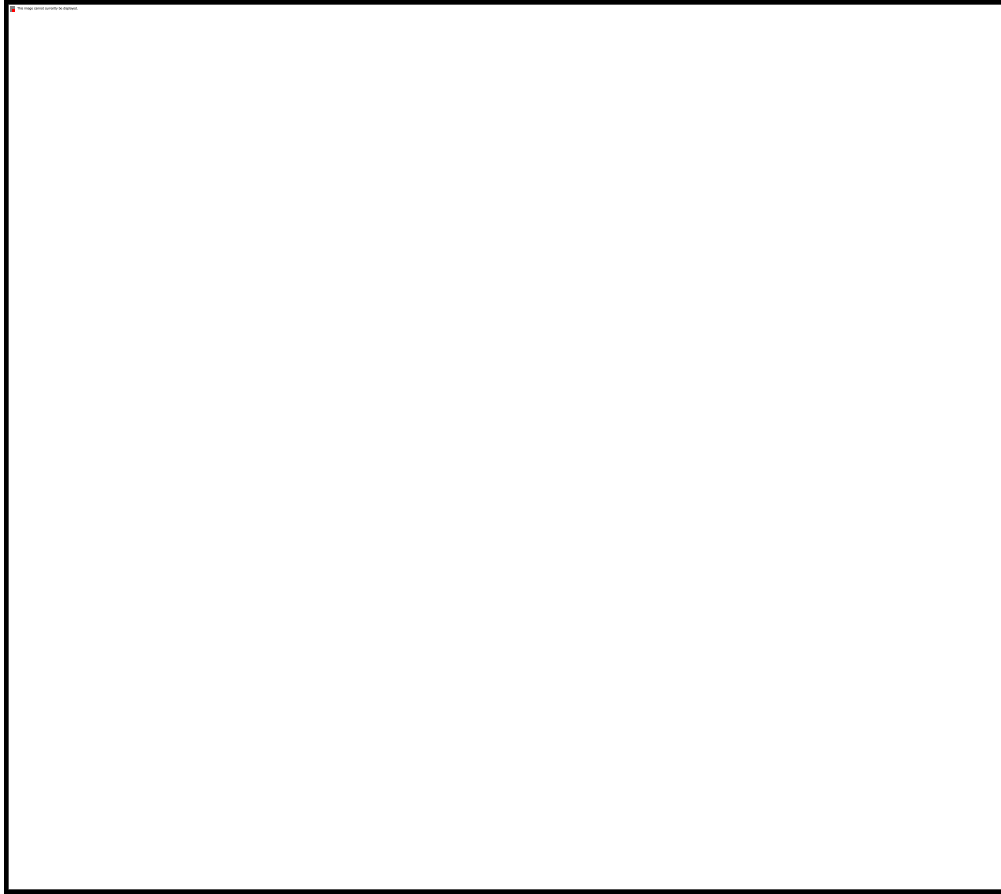
Use meaningful headings and subheadings to highlight page contents and reveal the organization of information. Break paragraphs into bulleted statements where possible.

#### ***Why should I do it?***

Most users (80%) visually scan a page looking for cues to tell them whether the page contains information they are interested in reading. If it is too hard or time-consuming to determine what the page contains, users are less likely to start reading and more likely to go elsewhere for the information. When pages are easy to scan, users find information faster, retain information better, and report higher satisfaction with the site.

#### ***Example***

This Centers for Disease Control Web page breaks up text with headings, subheadings and bulleted statements so users can easily find and read information.



## **Make long reports easier to read**

Provide a clickable list of content subheadings at the top of the page.

### ***What should I do?***

For pages that contain lengthy text, provide a clickable list of sections or contents at the top of the page.

### ***Why should I do it?***

Users look for cues to tell them whether the page contains information they are interested in reading. They are less likely to read a long report if they don't know ahead of time whether it will be worth the effort. Clickable lists (also called "anchor" or "within-page" links) show what is on the page and allow users to quickly navigate to the desired information.

### ***Example***

In this long report on the National Institutes of Health Web site, a list of clickable subheadings shows readers what the report contains and gives them quick access to specific sections of interest.



## What Diabetes Is

### Chapter 1 of 6

Diabetes means your blood glucose (often called blood sugar) is too high. Your blood always has some glucose in it because your body needs glucose for energy to keep you going. But too much glucose in the blood isn't good for your health.

#### On this page:

- [How do you get high blood glucose?](#)
- [What is pre-diabetes?](#)
- [What are the signs of diabetes?](#)
- [What kind of diabetes do you have?](#)
- [Why do you need to take care of your diabetes?](#)
- [What's a desirable blood glucose level?](#)

### How do you get high blood glucose?

Glucose comes from the food you eat and is also made in your liver and muscles. Your blood carries the glucose to all the cells in your body. Insulin is a chemical (a hormone) made by the pancreas. The pancreas releases insulin into the blood. Insulin helps the glucose from food get into your cells. If your body doesn't make enough insulin, or if the insulin doesn't work the way it should, glucose can't get into your cells. It stays in your blood instead. Your blood glucose level then gets too high, causing pre-diabetes or diabetes.

[\[Top\]](#)

### What is pre-diabetes?

## Make first sentences descriptive

Include the primary theme of a paragraph in the first sentence.

### ***What should I do?***

Include the main theme of each paragraph in the first sentence of each paragraph.

### ***Why should I do it?***

When skimming a page looking for information, users tend to read only the first sentence or two of each paragraph to determine whether the page contains information of interest.

### ***Example***

This page from the Stem Cell Information section of the National Institutes of Health Web site uses descriptive first sentences (underlined in red) to set the theme of each paragraph.



Stem cells are unspecialized. One of the fundamental properties of a stem cell is that it does not have any tissue-specific structures that allow it to perform specialized functions. A stem cell cannot work with its neighbors to pump blood through the body (like a heart muscle cell); it cannot carry molecules of oxygen through the bloodstream (like a red blood cell); and it cannot fire electrochemical **signals** to other cells that allow the body to move or speak (like a nerve cell). However, unspecialized stem cells can give rise to specialized cells, including heart muscle cells, blood cells, or nerve cells.

Stem cells are capable of dividing and renewing themselves for long periods. Unlike muscle cells, blood cells, or nerve cells—which do not normally replicate themselves—stem cells may replicate many times. When cells replicate themselves many times over it is called proliferation. A starting population of stem cells that proliferates for many months in the laboratory can yield millions of cells. If the resulting cells continue to be unspecialized, like the parent stem cells, the cells are said to be capable of long-term self-renewal.

The specific factors and conditions that allow stem cells to remain unspecialized are of great interest to scientists. It has taken scientists many years of trial and error to learn to grow stem cells in the laboratory without them spontaneously differentiating into specific cell types. For example, it took 20 years to learn how to grow **human embryonic stem cells** in the laboratory following the development of conditions for growing mouse stem cells. Therefore, an important area of research is understanding the signals in a mature organism that cause a stem cell population to proliferate and remain unspecialized until the cells are needed for repair of a specific tissue. Such information is critical for scientists to be able to grow large numbers of unspecialized stem cells in the laboratory for further experimentation.

Stem cells can give rise to specialized cells. When unspecialized stem cells give rise to specialized cells, the process is called **differentiation**. Scientists are just beginning to understand the signals inside and outside cells that trigger stem cell differentiation. The internal signals are controlled by a cell's **genes**, which are interspersed across long strands of DNA, and carry coded instructions for all the structures and functions of a cell. The external signals for cell differentiation include chemicals secreted by other cells, physical contact with neighboring cells, and certain molecules in the **microenvironment**.

Therefore, many questions about stem cell differentiation remain. For example, are the internal and external signals for cell differentiation similar for all kinds of stem cells? Can specific sets of signals be identified that promote differentiation into specific cell types? Addressing these questions is critical because the answers may lead scientists to find new ways of controlling stem cell differentiation in the laboratory, thereby growing cells or tissues that can be used for specific purposes including **cell-based therapies**.

## References

- Spyridakis JH, Guidelines for authoring comprehensible web pages and evaluating their success. *Technical Communication*. 2000;47(3):359-82.
- Research-Based Web Design & Usability Guidelines*. Version 2. Washington, DC: U.S. Department of Health and Human Services, and U.S. General Services Administration; 2004.
- Nielsen J. *Designing Web Usability*. Indianapolis, IN: Hew Riders Publishing; 2000.

# III. User Interface

*User interface* is concerned with the way layout and presentation of elements on the Web page affect the user's experience.

## Text and graphics

- Choice of colors, backgrounds, font size and style should enhance the user's ability to access and read information.
- Document formats (PDF versus HTML) should be based on how the user will be reading the text (printout versus online).
- Graphics should be used purposefully and not interfere with page loading.

## Use purposeful graphics only

Graphics that add no value to a user's understanding of a site or its content distract and frustrate the user, especially if loading takes a long time.

## Avoid cluttered, overly dense displays

Too many items on a page and too much crowding makes it difficult for the user to find information.

### ***What should I do?***

Keep pages clean and uncluttered. Avoid crowding too many items on any one page.

### ***Why should I do it?***

Clutter and crowding distract the user, make it hard for the user to find information, increasing user frustration.

### ***Example***

This home page contains too many competing images and sections, making it difficult to determine which is most important information or where to look for different types of information.



## Font size and style

Use familiar font styles sized at a minimum of 12 points. Familiar fonts include Times New Roman, Georgia, Arial, Helvetica or Verdana.

## Text and background colors

Use dark text on plain, light-colored background for best contrast.

### *What should I do?*

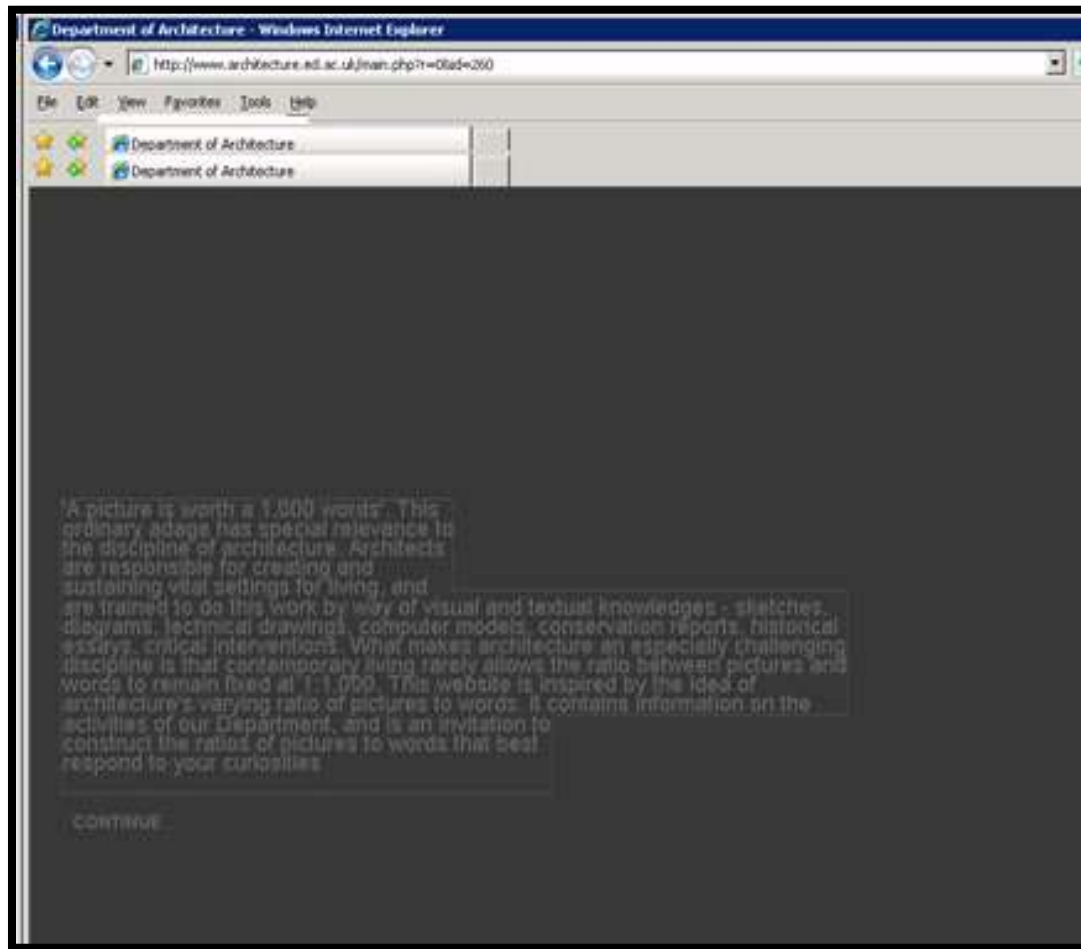
Use dark text on plain, high-contrast backgrounds.

### *Why should I do it?*

Users read faster with pages that have dark text on light backgrounds. The higher the contrast, the easier the page is to read.

### **Examples**

The two examples below do not provide adequate contrast between text and background.





## Text format options

Use HTML files for reading online; use PDF files for printing.

### ***What should I do?***

Use HTML for all documents meant to be read on the computer; use PDF only for documents intended for printing and hardcopy reading.

### ***Why should I do it?***

PDF documents are difficult to read on computer screens and are not accessible to all users.

### ***Example***

This site offers a Web text version for reading online and a link (circled in red) to a .pdf version for printing.



**National Institute of General Medical Sciences** [Order a Book](#)

## Inside the Cell

**Home**

- [Preface: The Microscopic Metropolis Inside You](#)
- [Chapter 1: An Owner's Guide to the Cell](#)
- [Chapter 2: Cells 101: Business Basics](#)
- [Chapter 3: On the Job: Cellular Specialties](#)
- [Chapter 4: Cellular Reproduction: Multiplication by Division](#)
- [Chapter 5: The Last Chapter: Cell Aging and Death](#)
- [Glossary](#)
- [Extras: Animations and Movies](#)
- [Download Print Version \(free Acrobat Reader\)](#)

### Preface

#### The Microscopic Metropolis Inside You

By Alisa Zapp Machalek

At this very moment, electricity is zapping through your brain, voracious killers are coursing through your veins, and corrosive chemicals sizzle in bubbles from your head to your toes. In fact, your entire body is like an electrical company, chemical factory, transportation grid, communications network, detoxification facility, hospital, and battlefield all rolled into one. The workers in each of these industries are your cells.

Cells are the smallest form of life—the functional and structural units of all living things. Your body contains trillions of cells, organized into more than 200 major types.

At any given time, each cell is doing thousands of jobs. Some of these tasks are so essential for life that they are carried out by virtually all cells. Others are done only by cells that are highly skilled for the work, whether it is covering up your insides (skin cells), preventing you from sloshing around like a pile of goo (bone cells), purging your body of toxic chemicals (liver cells), or enabling you to learn and remember (brain cells). Cells also must make the products your body needs, such as sweat, saliva, enzymes, hormones, and antibodies.

In [Chapter 1, "An Owner's Guide to the Cell,"](#) we'll explore some of the basic structures that allow cells to accomplish their tasks and some of the ways scientists study cells. In [Chapter 2, "Cells 101: Business Basics,"](#) we'll focus on the functions shared by virtually all cells: making fuel and proteins, transporting materials, and disposing of wastes. In [Chapter 3, "On the Job: Cellular Specialties,"](#) we'll learn how cells specialize to get their unique jobs done. In [Chapters 4, "Cellular Reproduction:](#)

## References

Nielsen, Jacob. "Avoid PDF for Onscreen reading." *Useit.com*, 2001, <<http://www.useit.com/alertbox/20010610.html>> [February 26, 2008].

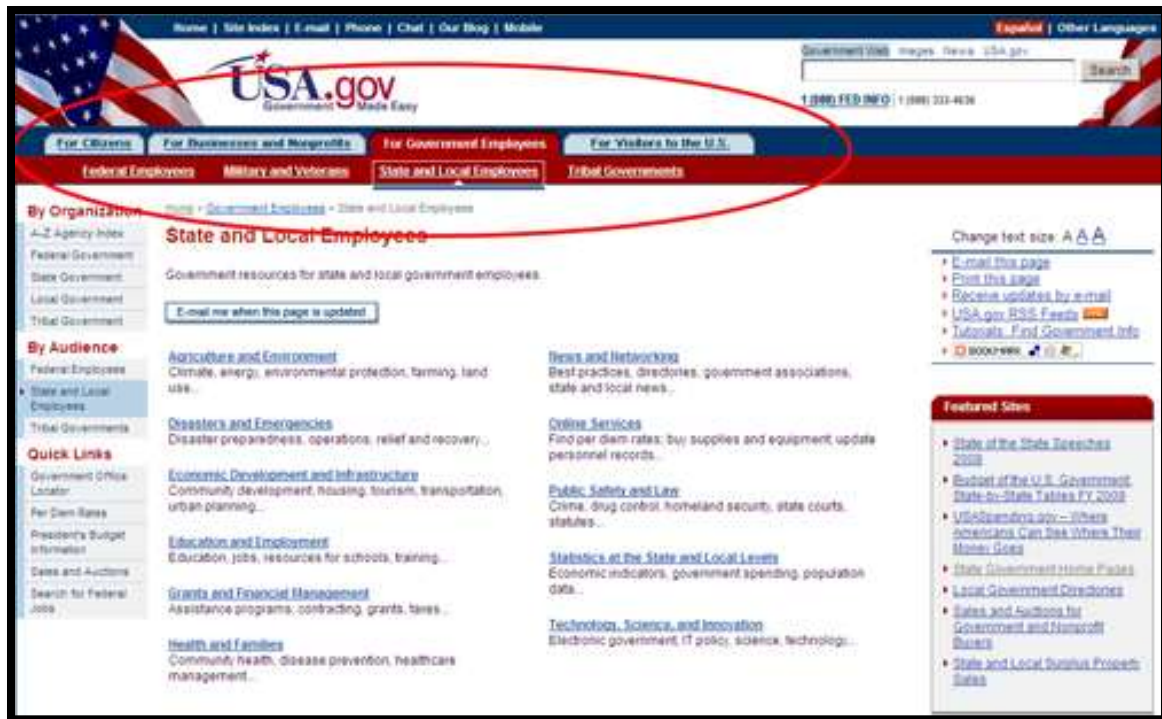
## Page layout and presentation

The way page elements are arranged and presented on the page will affect the user's ability to access information.

### Placement of page elements

- Place important items toward the top and center of the page.
- Users generally look first at the top center of a page, then left, then right.

### Example



## Web conventions

Use familiar Web conventions for placement of elements such as search functions and navigation bars.

### *What should I do?*

Use familiar Web conventions for placement and appearance of major elements as follows:

Place primary navigation menus on the left side of the page.

Locate the search function near the top of the page.

### *Why should I do it?*

Following Web conventions saves the user time in navigating the site and finding information. Diverging from the standard way of doing things slows down and frustrates the user.

### *Example*



## Eliminate horizontal scrolling

Set the width of your content section proportionally rather than fixed to eliminate the need for users to scroll horizontally

### References

*Research-Based Web Design & Usability Guidelines*. Version 2. Washington, DC: U.S. Department of Health and Human Services, and U.S. General Services Administration; 2004.

Nielsen J. *Designing Web Usability*. Indianapolis, IN: Hew Riders Publishing; 2000.

## Accessibility

Accessible Web design involves developing Web pages and other Web-based media in ways that are accessible to people with a wide range of disabilities who use a variety of different assistive devices.

Guidance for accessible Web design can be found in two primary places.

[Section 508 of the Rehabilitation Act Amendments of 1998](#) defines a minimum level of Web accessibility for Web sites developed or used by the federal government. Projects funded by grants from the federal government (including Model Systems) are encouraged, but not required to meet Section 508.

The [Web Content Accessibility Guidelines 1.0 \(WCAG\)](#) are the official recommendations of the [World Wide Web Consortium \(W3C\)](#), and international organization that addresses a wide range of issues



related to the Web. Although WCAG 1.0 are the official recommendations, it should be noted that WCAG 2.0 guidelines have been in development for many years and, although not formally adopted by the W3C, are being used by many Web developers.

The Section 508 standards and the WCAG 1.0 guidelines overlap to a great extent, but not completely. Jim Thatcher, sponsored by the Association of Tech Act Projects conducted a [side-by-side comparison](#) that is available online.

### **Learn More**

The [Web Accessibility in Mind \(WebAIM\)](#) project has developed an excellent [Introduction to Web Accessibility](#) that presents a rationale and principles for accessible Web design. They also have developed a [Section 508 Checklist](#) that provides guidelines for compliance with the standards.

## **Credibility and professionalism**

Determines the user's ability to *judge the quality and reliability of information* on your site.

Web site credibility derives from multiple factors, including overall design and functionality as well as page content and organization. Readers are more likely to continue reading and return to a site if they feel the information is up-to-date and credible.

### **Guidelines**

- Keep information current—outdated information and incorrect or nonworking internal links suggest carelessness and unreliability.
- Clearly identify who owns/operates the site.
- Provide contact information (email, phone and mailing address).
- Provide a helpful set of frequently asked questions and answers (FAQ).
- Cite evidence whenever possible, either by providing references to relevant publications or by stating that information is based on professional judgment or best practice.
- Provide author names and credentials.