Course Overview

- Introduction
- Understanding Users and Their Tasks
- Principles and Guidelines
- Interacting with Devices
- Interaction Styles
- UI Design Elements
- **Visual Design Guidelines**
- UI Development Tools
- Iterative Design and Usability Testing
- Project Presentations and Selected Topics
- Case Studies
- Recent Developments in HCID
- Conclusions

Chapter Overview Visual Design Guidelines

- Motivation
- Objectives
- Screen Layout and Design
  - General Layout
  - Text
  - Numbers
  - Coding Techniques
  - Color
- Implications for Design
  - Windows
  - Web Pages
- Important Concepts and Terms
- Chapter Summary

Slides Feedback

- I would like to get some feedback from you about the visual design of the PowerPoint Slides I'm using. Please write down your impressions (positive or negative) on the following aspects:
  - General layout
    - Usage of screen space, arrangements of items, connections between related slides, ...
  - Text
    - Font size, type, use of attributes like bold, italics
  - Colors
    - Background color, text colors, overall color scheme
  - Coding techniques
    - Getting attention through blinking, highlighting, underlining, colors, ...

Important UI Design Elements

- Which of the UI Design elements discussed in that section are especially relevant for screen layout and design?
  -
  -
  -

Motivation

- Most of the interaction between user and computer is guided by the visual presentation of the output on the screen, and it is very important to present the information in a suitable and convenient way.
- The screen layout strongly influences the buildup of a mental model in the user.
- Good screen layout can reduce the effort required by the user to solve a task, e.g. by using recognition over recall, by providing clues to legal or expected inputs, or by signaling the importance of output items through color or other attributes.

Objectives

- to know about design guidelines for screen layout and design
- to be able to apply these guidelines to the screen design for specific tasks
- to effectively use design techniques for text, numbers, graphics, and other visual elements
- to be able to translate task or user requirements into appropriate and effective screen layouts
- to coordinate the visual output with other output and input modes

Evaluation Criteria

- recognition of relevant visual design methods
- recall of the most important visual design methods
- evaluation of screen layout for specific tasks
- design of individual screens for specific functions, and of groups of screens for complete tasks or applications

Visual Design

Screen Layout and Design

- principles of screen design apply equally to any kind of interface
  - menus, fill-in forms, displays of database records, GUIs, Web pages, etc.
- designers must work within the constraints imposed by the hardware and software of a system
  - *screen size*
    - number of pixels, pixel resolution, screen orientation (horizontal or vertical)
  - *display capabilities*
    - highlighting, reverse video, bit-mapped graphics, color, sound

Screen Layout Categories

- five main categories
  - general layout
  - text
  - numbers
  - coding techniques
  - color

General Layout Principles

- scope of information
- arrangement of items
- formatting standards
- fonts and styles

Scope of information

- include only information essential to decision making
  - avoid putting too much information on the screen
  - never put more on the screen that absolutely necessary
  - be brief and concise, but be careful to match the level of detail to the user's knowledge and experience
    - e.g. displaying on-screen instructions vs. type of user (expert vs. novice)

Scope of Information (cont.)

- include all information essential to decision making
  - each screen should stand alone
    - containing one idea or one task
  - users should never have to
    - refer to another screen to accomplish a task on the current screen
    - remember information on one screen to complete another
  - error messages should be complete, and not require reference to manuals to decipher or understand
    - poor: "file name too long"
    - better: "file name should not exceed 8 characters"

Arrangement of Items

- start in the upper-left corner of the display
  - eye-tracking studies show that the eye tends to go to the upper-left corner of a display
  - English language is written left to right
    - many other languages do not
    - eye also tends to move in a clock-wise manner
  - the human brain tends to seek order and patterns in a display, and follow them if they are apparent
    - Gestalt principles
      - proximity
      - similarity
      - closure
      - continuity
      - symmetry

Arrangement of Items (cont.)

- group items logically
  - keep group size manageable
    - roughly 12-14 characters wide by 6-7 lines high yields approximately 5 deg. of visual angle
  - minimize the number of groups
    - number of groups affects search time, even when group size is small
- provide symmetry and balance
  - through the use of blank spaces
    - but don't imbed blank spaces to stretch out a word
      - e.g. use "close," not "c l o s e"
  - center words if appropriate

Formatting Standards

- design formatting standards, and follow them consistently in all screens within a system
  - related screens in a system should always have standard types of information located in the same part of the screen
    - e.g. screen titles, status messages, input fields, command input lines, and error messages should consistently appear in the same area of the screen throughout the system
- Tip
  - design one or more screen templates that follow rules of screen layout
  - follow the templates

Fonts and Styles

- minimize font changes
  - two different fonts per screen is plenty
  - fonts that look good on paper may not necessarily look good when displayed, and vice versa
  - for text to be viewed from a distance, avoid the use of serifs
    - use fonts like Helvetica or Arial
- minimize style changes
  - styles are changes within a font
    - *italics*, **bold**, and underlining
    - they also include different character sizes
      - 12 point, 14 point, 16 point, 18 point, 20 point, 24 point, 28 point

CAPITALS

- minimize the use of words in ALL UPPER-CASE (CAPITAL)
  - text in all uppercase is more difficult to read than text in mixed cases
    - studies have shown that reading mixed text is about 13% faster than reading uppercase text
  - use uppercase letters to designate titles, main categories, etc.
  - consider the use of SmallCaps instead
    - if available

Captions and Fields

- distinguish and segregate captions and fields
  - a fill-in or display field should be easily distinguishable from its caption, label, or title
  - consider the use of contrasting features to make captions and fields stand out
    - color, case, intensity, font, or reverse video

Screen Design Examples

COURSE OFFERINGS

QUARTER UNIVERSITY
SPRING 96 ALL

SEQUENCE 02 PROFESSOR ALL

COURSE NUMBER	COURSE NAME	NUMBER CREDITS	PROFESSOR
COMP535	DATASTRUC	03	SMITH
PSYC101	INTRO	03	ADAMS
BIOL201	GENETICS	03	PAPERMAN
COMP675	HCI	03	MUSTILLO

Screen Design Examples

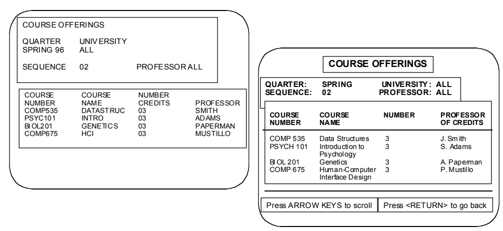
COURSE OFFERINGS

QUARTER: SPRING UNIVERSITY: ALL
SEQUENCE: 02 PROFESSOR: ALL

COURSE NUMBER	**COURSE NAME**	**NUMBER OF CREDITS**	**PROFESSOR**
COMP 535	Data Structures	3	J. Smith
PSYCH 101	Introduction to Psychology	3	S. Adams
BIOL 201	Genetics	3	A. Paperman
COMP 675	Human-Computer Interface Design	3	P. Mustillo

Press ARROW KEYS to scroll <RETURN> to go back

Screen Design Examples



Text Layout

- labels
  - descriptions of icons, functions, commands, ...
- messages
  - information from the system to the user
- prompts
  - expect a response from the user
- instructions
  - tell the user what to do
  - usually longer than messages or prompts
  - may be interactive
  - often used in help or documentation features

Labels

- labels should be self explanatory
- avoid acronyms on labels
  - if you can, display the entire word
- place labels to the left in a table
- left justify labels if you have more than one
- do not right align labels
  - right-aligned labels produce a ragged margin
    - hard to scan
- avoid placing labels on top of text fields or areas

Example Labels

Phone Numbers	
Home	(514) 488-8848
Work	(514) 765-7743
Fax	(514) 761-8503

Messages

- desirable properties of messages
  - brief and concise
  - affirmative; avoid negative messages
  - constructive, not critical
  - specific and comprehensible
  - imply that the user is in control
- use words consistent with a required action
  - (a) poor: "landing gear is not down"
    (b) better: "landing gear is up"
    (c) best: "put the landing gear down"
- design the level of detail according to the user's knowledge and experience

Examples Messages

Poor	Better
The processing of the text editor yielded 23 pages of output	Output 23 pages
Error in SHIRT SIZE field	Error: SHIRT SIZE range is 14-18
Cannot exit before saving file	Save file before exiting
Bad/illegal/invalid field name	Maximum file name length is 8 characters
Syntax error 1542	Unmatched left parenthesis in line 210

Prompts

- arrangement of prompts
  - when and where they will be needed
  - order prompts chronologically or sequentially
  - format prompts using blank spaces, justification, and visual cues for easy scanning
- design the level of detail according to the user's knowledge and experience

Prompts (cont.)

- phrasing information
  - use the active tense
    - say "Push the button"
      not "The button is to be pushed by the user"
  - phrase prompts as affirmative statements
    - avoid negatives
      "Do x" vs. "Do not do y"
  - use consistent terminology
    - use the word "type" when instructing a user to type something
    - use "Press" for pressing a button or function key
      - user does not type the word "Return" when instructed to "Press Return"
    - references on labels should be exact
      - if a key is labeled "RTN", don't say, "Press Return", say "Press RTN"
      - difficult to achieve since different users may have different keyboards

Examples Prompts

Poor	Better
Position cursor and press return	Position cursor, Press return to accept
SIZE:___	SIZE:___ (14-18)
The message is sent by pressing TRANSMIT	To send message, Press TRANSMIT
Do not return to menu before completing entry	Complete entry before returning to menu
Page forward after entering address	Enter address, then page forward
Press backtab to go up, tab to go down	To go up, Press BACKTAB To do down, Press TAB
Press U for up Hit D for down	For up, Press U For down, Press D

Instructions

- arrangement
  - keep paragraphs short
  - separate them by at least one empty line
  - limit lines to 50-55 characters per line
    - or use double columns, 30-35 characters per column
  - avoid right justification with unequal spacing
  - space between lines should be equal to or slightly greater than character height
    - approx. double spaced
  - avoid line lengths of less than 26 characters

    TO AVOID
    THAT THEY
    LOOK LIKE
    COLUMNS

Instructions (cont.)

- phrasing instructions
  - keep text simple and clear
  - use short sentences, and simple and familiar words
  - avoid hyphenation
  - avoid acronyms
    - unless you are sure that all users will understand them

Layout of Numbers

- right justify integers
- align decimals in real numbers
- avoid leading zeros when they are unnecessary and non standard
- break up long numbers into groups of three or four digits
  - use standard separators when they apply
  - otherwise, use spaces

Examples Numbers

Poor	Better
10 100 1,000 10,000	10 100 1,000 10,000
100.00 25.2563 5,432.48 1.45491	100.00 25.2563 5,432.48 1.45491
10:1 p.m. 02/07/96	10:01 p.m. 2/7/96
002 100 013	2 100 13
5148483038 8003648756	(514) 838-3038 1-800-364-8756
6173954686 02840555	617-395-4686 028-40-555

Coding Techniques

- use attention-getting techniques appropriately
  - know your screen device and what it is capable of displaying
  - use these techniques sparingly
    - blinking, reverse video, color
    - **bold**, *italics*, shadow, underline, emboss, outline
    - CAPITALS and SmallCaps
    - font, size, shape, special characters and icons
    - proximity, borders, depth
    - sound, animation and motion

Coding Techniques (cont.)

- blinking
  - use to get the user's attention. example: critical error messages
  - recommended blink rate of 2-5 Hz, with longer "on" period than "off" period
    - minimum "on" period of 50%
- reverse video
  - dark foreground on light background or light foreground on dark background
  - may reduce legibility, so should not be overused
  - very powerful search cue
  - may be used to indicate that an item has been selected or to indicate an error field

Coding Techniques (cont.)

- size
  - can be used as a cue for relative quantity or importance
  - limit to 5 or less levels, because users have difficulty distinguishing more than five
- font
  - can be used to draw attention
    - uppercase characters, double-sized characters, italics, and other different fonts
  - limit to 2 different character types per screen
  - same limit applies to the use of different font sizes

Coding Techniques (cont.)

- bold
  - use to make things stand out, but avoid using more than three different levels of boldness
    - users don't remember the difference
- underlining
  - can be used to make an object or character stand out, especially key words
  - may reduce legibility, so it should be used sparingly

Coding Techniques (cont.)

- shape
  - may be used to impart different connotations, or imply some meaning
    - red octagon shape in north America is usually associated with stop signs
- special characters and icons
  - tags such as asterisks, arrows, and other graphical symbols, such as a small pointing hand can be used to draw attention to items on the screen

Coding Techniques (cont.)

- proximity
  - proximity implies association, and leads the eye to consider items as part of a whole
- borders
  - very effective in identifying meaningful groups, creating a sense of closure, and focusing attention

Coding Techniques (cont.)

- sound
  - very effective in drawing attention
  - different sounds can convey closeness, magnitude, weight, etc.
  - should be unique when used in noisy environments
- animation and motion
  - not much known about the use of animation and motion as a screen design technique, although it would seem to be a good attention-getting or alert mechanism
    - the human eye is very sensitive to motion in the periphery
      - e.g. insect on the wall

Coding Techniques (cont.)

- depth
  - depth is a powerful cue in nature
    - monocular depth cues include: (a), size, (b) interposition, (c) contrast, clarity, and brightness, (d) shadow, (e) texture
  - motion parallax is a another powerful depth cue
    - observer moving relative to the environment in a train watching the outside world
  - technology not yet capable of rendering true stereoscopic depth on a display, although significant progress has been made
    - areas of wire-frame modeling, solid-object modeling, and volumetric rendering
    - some displays now support stereoscopic viewing

Coding Techniques (cont.)

- color
  - very powerful and salient coding technique that can be used in designing screens
    - to draw attention
    - to communicate organization
    - to indicate status
    - to establish relationships
    - to express similarity
    - as a search cue

Color (cont.)

- must be chosen and used with great care
  - there are physiological as well as cultural differences in how we perceive colors
  - we perceive colors differently, depending on age, cognitive preferences, exposure to color (adaptation)
  - color perception is subject to contextual effects, in which adjacent colors influence one another. for example, a gray square on a dark background appears lighter and brighter than the same color on a light background
  - color perception is subject to cognitive stereotypes
    - red -> danger
    - green -> go
    - yellow - warning, attention

Colors and Cultures

	Chinese		American	
Concept	**Color**	**%**	**Color**	**%**
Safe	Green	62.2	Green	61.4
Cold	White	71.5	Blue	96.1
Caution	Yellow	44.8	Yellow	81.1
Go	Green	44.7	Green	99.2
On	Green	22.3	Red	50.4
Hot	Red	31.1	Red	94.5
Danger	Red	64.7	Red	89.8
Off	Black	53.5	Blue	31.5
Stop	Red	48.5	Red	100.0

SOURCE: Courtney, A.J. (1986). Chinese population stereotypes: Color associations. *Human Factors, 28*(1), 97-100.

Color

- use color sparingly
- design first in monochrome
  - optimize other aspects of the screen layout design
  - add color only where it adds value
  - don't use color just because you have a color monitor
- use color to draw attention, to communicate organization, to indicate status, and to establish relationships
- use color to support search tasks
  - color is a more salient cue for search tasks and symbol identification tasks than other cues, such as shape, size, or brightness
  - example: counting the number of red objects vs. the number of horizontal bars, of small objects, or bright objects
- avoid using color in non-task-related ways
- allow users to control color coding

Color (cont.)

- do not use color without some other redundant cue
  - not all users may have color displayed
  - redundant coding allows the interface to be ported to a monochrome workstation without losing important information
  - approx. 8% of males and 0.4% of females have some sort of color deficiency
  - redundant coding enhances performance.
    - e.g. It is faster, easier, and less prone to error to search for a red square than to search for objects that are just red or just squares

Color (cont.)

- ensure that colors differ in lightness and brightness as well as in hue
  - brightness refers to the dimension of dull to bright
  - hue is the visual sensation that varies according to wavelength
  - most common types of color deficiencies
    - the inability to discriminate red from green and blue from yellow
  - all sighted people can discriminate differences in lightness
    - lightness refers to the range of achromatic colors ranging from white through gray to black
  - edges may not be clear for colors on a colored background
    - colors must contrast in brightness as well as hue
  - brightness is mediated by red and green photoreceptors
    - colors differing only in blue will not produce sharp edges

Color (cont.)

- be consistent with color associations that users have in their jobs and in their culture
  - in Western cultures, the following associations are typically reinforced in traffic signals and consumer products.
    - Green: Go, on, safe
    - Red: Stop, hot, danger, on, emergency
    - Yellow: Caution, warning, warm
    - Blue: Cold, off
  - Tip: Use
    - **red** for error messages
    - **yellow** for warning messages

Color (cont.)

- limit coding to 8 distinct colors
  - preferably less than four
  - make them as distinctive as possible
    - spaced as far away as possible on the visible color spectrum
- If you use more than 6 or 8 colors, provide a legend
  - to assist users in learning and remembering color codes
- avoid using saturated blues for text lines
  - visual acuity is very poor for detailed, sharp, short-wavelength targets
  - he human eye is not good at focusing on blue
    - the fovea (central area of the eye) is insensitive to blue
  - insensitivity to blues increases with age
  - the lens becomes yellow with age

Color (cont.)

- choose symbol and background colors carefully
  - display color images on an achromatic background (black, gray, or white), or achromatic images on a color background
    - improves color contrast and color discrimination
  - ensure greatest amount of contrast between foreground and background under different lighting conditions
    - a light background could result in increased flicker and glare sensitivity
  - use dark backgrounds for colored text, light backgrounds
    - especially when presenting large graphical symbols

Color (cont.)

- consider viewing angle and distance in assigning symbol colors
  - viewing angle and distance influence color perception
  - ISO 9241 recommends the following:
    - avoid red and green beyond 40 deg. of viewing angle
    - avoid yellow beyond 50 deg. of viewing angle
    - avoid blue beyond 60 deg. of viewing angle
    - use highly saturated colors and colors with high luminance contrast for viewing distances beyond 60 cm
    - avoid saturated colors on dark backgrounds for viewing distances beyond 60 cm

Color (cont.)

- color sensitivity changes under different lighting conditions
  - reds and blues are more difficult to distinguish in dim lighting than greens and yellows
    - the eye is most sensitive to middle wavelengths
    - e.g. a red rose seen at dusk looks black
- older users need higher brightness levels to distinguish colors
  - the overall sensitivity of the eye diminishes with age
  - the lens becomes less transparent

Color (cont.)

- avoid red and green in the periphery of large displays
  - the human eye is insensitive to red and green in the periphery
    - especially when these colors are highly saturated, and when the displayed targets or shapes are small
    - saturation refers to the number of different wavelengths present or contributing to the sensation of color
- for the periphery of large displays, use yellow or blue
  - avoid the simultaneous display of highly saturated, spectrally extreme colors
    - e.g. red vs. blue, or yellow vs. purple
    - requires constant re-focusing

Color (cont.)

- avoid the use of red and blue together
  - particularly for text
  - the eye cannot focus on both colors simultaneously.
    - the use of both colors results in a perceptual phenomenon known as chromostereopsis
    - i.e., red and blue text appears to lie in different depth planes

 [Mustillo]

Chromostereoscopic Effect

Red text appears to lie in one depth plane
and blue text appears to lie in a different plane
Red text appears to lie in one depth plane
and blue text appears to lie in a different plane
Red text appears to lie in one depth plane
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and blue text appears to lie in a different plane

 [Mustillo]

Summary Screen Layout and Design

The format and content of information displayed on the screen is very important in determining the success of a user`s interaction with a system.

Three aspects to consider in screen design:

•Amount of Information Presented (*Density*)
•Presentation of Information (*Spatial Relationships*)
•Complexity of Information Presented

Summary Screen Layout and Design

- density
  - minimize the amount of information by presenting only what is absolutely necessary to the user
    - concise wording, familiar data formats
    - avoidance of unnecessary detail
- spatial relationships
  - grouping similar items in a display for readability
    - can highlight relationships between different groups of data
      - color coding, graphic borders, highlighting, reverse video, brightness differences
- complexity of information presented
  - keep the layout of your screens as simple as possible
  - applies equally for all types of screen-based interfaces
    - including Web pages

 [Mustillo]

Implications for Windows Design

- organizational and visual/graphics principles and guidelines for the design of screen-based UIs apply equally to the design of window systems
- guidelines are available on various aspects of windows design

 [Mustillo]

Buttons

- use sufficiently large buttons
  - as the size of a button increases, so does the speed needed to traverse to and select that button
  - as the distance of the mouse movement decreases, speed also increases
    - known as Fitt's Law
    - keep buttons large and mouse movement distance short
- keep button size consistent
  - make all of the buttons in a dialog box the same size
    - unless you have a very good reason for different sizes

Buttons (cont.)

- group buttons together
  - similar functions
  - to leave the window (OK, Cancel)
  - destructive actions (Delete)
- use heading style capitalization for button labels
  - capitalize the first letter in each word of the button label
- label and order buttons consistently
  - clear and concise button labels
  - affirmative buttons to leave a window (OK)
  - canceling actions to leave the window (Cancel)
- assign a nondestructive default button
- gray out or (dim) a button if it is unavailable

Menus

- maintain a consistent relationship with defined terms and concepts
- use ellipsis (…) in items to indicate additional user input
  - Open …, Save as …, Print …
- disable inactive menu items
  - e.g., by dimming them out
- use check boxes to enable and disable attributes
- use radio buttons to select one item among attributes or commands

Menus (cont.)

- do not use more than two levels of cascading menus
  - they add complexity to the interface
  - they hide choices by adding a layer to menus
  - are physically more difficult to use
  - should only be used to minimize screen real estate
- organize cascading menus with a logical relationship to the menu items they contain
- minimize the use of pop-up windows

Implications for Web Design

- navigation
- design elements
- user interface consistency

Importance of the Web

- the Web is developing at an astonishing pace
  - one new Web user every 2 seconds (Forrester Research)
  - more than 150 million Web users worldwide today
- guidelines for Web interfaces are beginning to emerge
  - e.g., Apple, IBM, Microsoft, Sun, … (see below)
- the Web is about:
  - content
    - high-quality content is a major driver for attracting repeat visitors
  - reach (extensibility)
  - navigation
- web design is an evolutionary step in the development of UI design

Navigation

- Web sites or browsers should provide the following navigational aids
  - active table of contents
  - backtracking and history lists
  - site maps
  - bookmarks (Netscape) or favorites (Internet Explorer)
  - timestamps
    - don't date information unless it is updated frequently.
    - users will immediately leave a site if they see that the information is not current
    - tell users how often information will be updated
    - update information automatically

Design Elements

- frames
  - splitting a page into frames can be confusing for users
  - frames may break the fundamental model of the Web page
    - printouts become more complicated
    - predictability of user actions may be violated
- graphics
  - not all Web designers are good graphic designers
  - users have a short attention span
    - if downloading a page takes longer than 10 sec., they may leave
- scrolling text, marquees, animated sequences
  - do not include page elements that move all of the time
    - overwhelming to many users, annoying to others
    - users are very sensitive to motion in the periphery
      - may distract from real task

Design Elements (cont.)

- complex URLs
  - users try to infer the structure of Web sites from the URL
  - should contain a human-readable directory and file names
    - reflect the nature of the information space
    - every page should have a link to the home page and an indication of where it will fit within the structure of the information space
- orphan pages
  - make sure that all pages include a clear indication of what Web site they belong to
    - users may access pages without going through the home page
- outdated information
  - information on the Web can get out of date very quickly

Navigation

- navigational support
  - users don't know as much about your site as you do
  - users get lost very easily
    - provide a site map
    - let your users know where they are and where they can go
  - provide a good search mechanism
    - sometimes even the best navigation mechanism is not enough
    - some users want to jump directly to the page they need
- non-standard link colors
  - links to pages that users have not seen are typically blue
  - links to previously visited pages are typically purple (magenta) or red
    - be consistent; don't mess around with color standards

Text

- users don't read Web pages; they scan them
  - reading speeds are >25% slower from computer screen
  - use scannable text
    - highlighted words and descriptive links
    - meaningful sub-headings
    - bulleted lists
    - one idea per paragraph
    - inverted pyramid style - present conclusion first
    - cut down on the number of words
- users don't like to scroll.
  - only 10% of users scroll beyond the information that is visible on the screen when a page comes up
  - all critical information should be on the top part of the page

Users

- try to determine who your users are, and what they want to do
  - new or returning visitor
  - browsing, seeking support, want to purchase, download, contact?
  - label all linked graphics
  - do not leave orphan links, where users must back up
    - always provide at least a way to get back to the home page
  - keep links updated
    - check to see if all links are still valid
  - regularly check your links in your documents
    - make sure they go to the right place
  - standard text link colors and highlighting

Navigation Support

- help users navigate and search
  - clear and intuitive site info
    - table of contents, index, site map, "What's New?"
  - understandable and obvious visual navigation scheme
    - e.g. buttons, text, site maps
  - search for topics, keywords, names, etc. within a site
  - topics keywords, and names into Web search engines
  - provide navigational aids on every page
    - make it possible for users to jump right to any page from a Web search engine
  - let users know where a navigation link will take them

Tasks

- help users perform tasks quickly
  - reduce search time, time to load pages and images, scrolling within a page
  - limit number of choices at a level
  - group important choices together
  - organize information and pages to anticipate frequent tasks
  - provide an overview of the site
  - don't use bleeding-edge technology without a good reason
    - e.g. use VRML only if you have information that maps naturally to 3D space

Content

- keep content simple
  - address only one topic per page
- get to the content quickly
  - place important content at the top of Web hierarchy and at the top of the Web page
- provide printable versions of Web pages

Consistency

- establish user interface consistency
  - corporate identity
    - graphics, images, colors, fonts, and layout
    - use the corporate identity consistently throughout the Web interface
  - consistent link and navigation schemes throughout the Web interface
  - consistent headings and terminology
  - display background info
    - URL, copyrights, e-mail addresses, etc.
  - design the interface to be easily accessible and usable
    - different browsers, platforms, screen resolutions

Web Resources

- Apple Web Design Guide
  - http://www.cybertech.apple.com/hi/web_design/web_design.html
- IBM Human-Computer Interaction
  - http://www.ibm.com/ibm/hci/designer/uides/webdesign.html
- Sun Microsystems
  - http://www.sun.com/styleguide
- Yale Center for Advanced Instructional Media
  - http://info.med.yale.edu/caim/StyleManual_Top.HTML
- Jakob Nielsen, Alertbox
  - http://www.useit.com/alertbox
- Susan Weinshenk
  - http://www.weinshenk.com

Important Concepts and Terms

- ergonomics
- graphical user interface (GUI)
- human factors engineering
- input/output devices
- knowledge management
- usability
- user interface design
- What You See Is What You Get" (WYSIWYG)
- window

Chapter Summary

- the visual channel has the highest information transfer capacity from computer to user, and is used very extensively
- visual aspects have a strong influence the usability and acceptance of user interfaces
- the arrangement of design elements, text, numbers, and graphics determine the appearance of the visual display
- color and coding techniques can be used to guide the attention of the user