

# User Interface Design Principles

CS 470

## User Interface Design

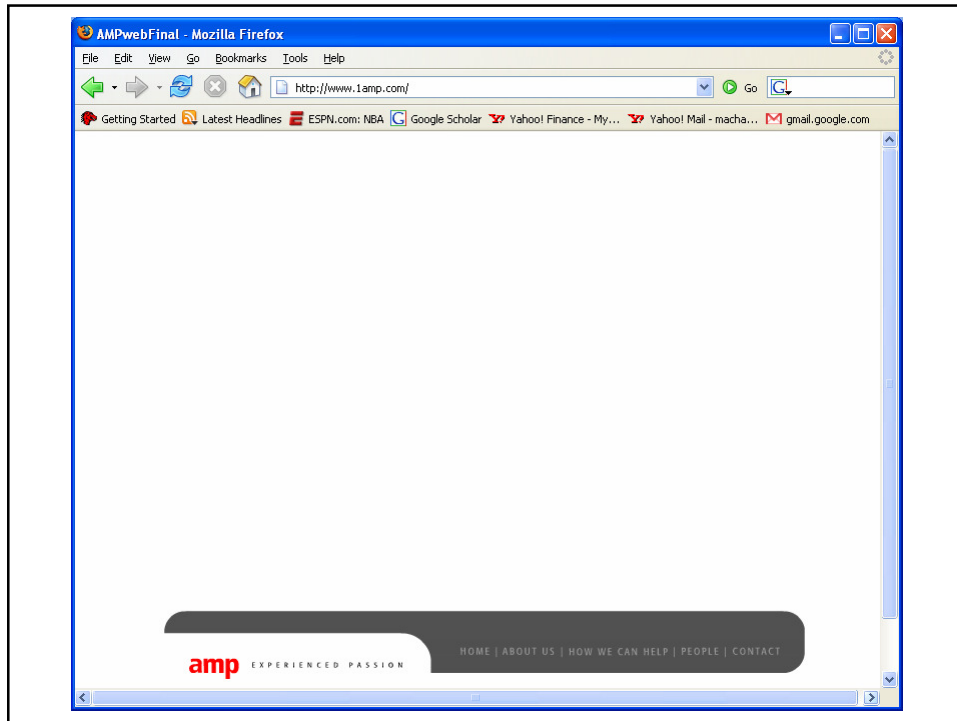
- At first we'll focus on website design, but most of the same concepts apply to standalone applications too
- What makes a good web site?
  - Similar to, but differences from printed medium
  - Hyperlinks!
  - Attempt to make web page “Free Standing”
    - Someone may link to it, or print it

## Same Questions as Print

- Who is talking? Is it an individual or an institution?
- What is the content about?
  - Titles, Headers
  - Consider bookmarks
- When?
  - Our CS page is an offender
- Where on your site are you currently located?
  - Navigational aids or pointers to the main page may be appropriate.
  - Button Bars

## Every page should have

- Informative title
- Creator's identity / contact link
- Creation or revision date
- At least one link back to home
  
- These basic elements will get you 90% of the way to an understandable interface
  
- Example of missing information:
  - <http://www.1amp.com> (see [www.webpagethatsuck.com](http://www.webpagethatsuck.com))



## Fundamentals of Page Design

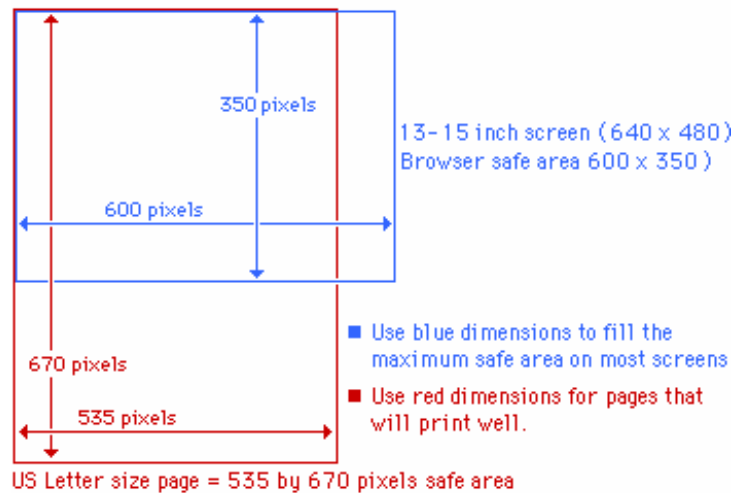
- What should be on an individual page or screen?
- Don't dumb-down the readers -- just design to their needs
  - short, fast, easy access
- Guide the user
  - Left to right, top to bottom
  - design appropriately to guide user to the next element
  - Headlines at the top
  - Don't forget whitespace

## Page Design

- Avoid too-fancy graphics (unless experienced)
- Label icons
- Combine navigation bar with logo/graphics, use consistently!
- Remember that the screen is small
- Graphics or Forms too large: Layout more than 600 pixels wide may not properly render on a single page. (800x600 probably safe assumption today, unless for an ultraportable... or cell phone...)

## Image Guidelines

### Safe dimensions for Web page graphics



# Page Design Guidelines

Poor page layout

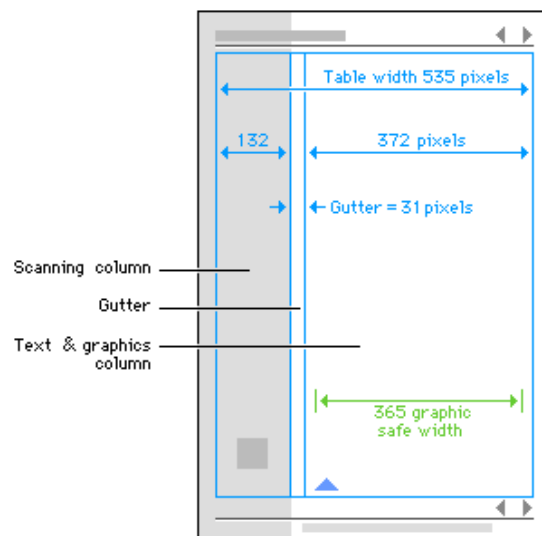


Better page layout



Grid  
Layout

# Page Template



## Fonts Different on Platforms

### Relative sizes of TrueType font display

Windows95, 12 pt type

Arial  
**Arial Black**  
Arial Narrow  
**Arial Rounded MT Bold**  
Book Antiqua  
Bookman Old Style  
Century Gothic  
Century Schoolbook  
Courier New  
Garamond  
MS LineDraw  
Times New Roman  
Verdana

Macintosh, 12 pt type

Arial  
**Arial Black**  
Arial Narrow  
**Arial Rounded MT Bold**  
Book Antiqua  
Bookman Old Style  
Century Gothic  
Century Schoolbook  
Courier New  
Garamond  
MS LineDraw  
Times New Roman  
Verdana

## Page Guidelines

- Consider tables without borders to control text layout
- Caution with frames!
  - Opening new pages in frames
  - Search engines don't track frame context
  - Problems with back button

# Graphics

- Guidelines
  - 28.8kbps modem sends about 3.5Kb/second
  - 35Kb graphic could take 10 seconds alone
  - 10 seconds is the magic number to shoot for
- Formats
  - GIF
    - Consider interlaced to show progress
    - Caution on animated GIF's
  - JPEG
    - Generally better for photography
    - Designer can choose quantization and hence image size/quality

# Optimizing Graphics

- Consider a custom palette. You can have a finer palette of colors at your disposal than the general palette.
- To reduce the size of your graphics, consider reducing the number of colors. You can experiment with smaller color palettes and see the results.

## Technical Considerations

- Plug-Ins
  - PDF, Flash, RealAudio, etc.
  - Don't use unless necessary or if you know that almost all of your targeted users will have the plug-in application already installed
- Animation
  - Appropriate for a very limited number of web sites
  - Can be distracting and generally not appropriate on information or e-commerce web sites
  - Appropriate for children, entertainment, perhaps ads
  - Example: <http://www.webpagesthatsuck.com/topic59.htm>
  - Example: <http://www.aurigamusic.com/>
  - Example: <http://www.qualitycollisionsservices.com/>
  - Example: <http://www.ridertown.com/>

## Color

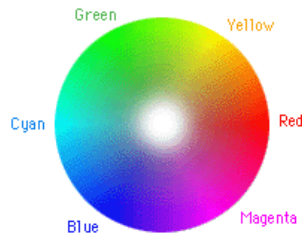
- Technical characteristics of color
  - Hue : Frequency / Wavelength
  - Value : Intensity of the hue
  - Saturation : Purity of the color from gray/vivid
- Use the color wheel

Choose:

Opposite, nearly opposite

Varying degree of value for hue

Equidistant hues





## Uses of Color

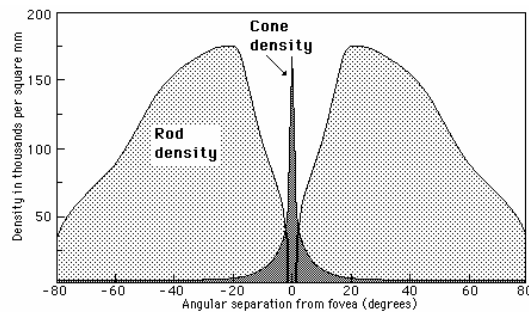
- Call attention to specific data or information
- Identify elements of structure and processes
- Portray natural objects realistically
- Depict the logical structure of ideas and processes
- Portray time and progress
- Increase appeal, memorability, and comprehensibility
- Reduce errors of legibility or interpretation
- Increase the number of dimensions for coding data

## Pitfalls of Color

- May cause problems for color deficient vision (8% of Caucasian males)
- May cause visual fatigue with strong colors
- May contribute to visual confusion if too complex
- May have negative cultural or historical associations
  - E.g., using black in master/slave controller diagram
- May exhibit confusing cross-disciplinary or cultural connotations
  - E.g., Red in Chinese = Warm/Happy, America = Hot/Flashy

## The 10 Commandments of Color

1. Use five +/- two colors
2. Use foveal and peripheral colors appropriately
  - Blue for background, not for center
  - Black, white, yellow for periphery, no red or green
  - No blue for text or diagrams



## The 10 Commandments of Color

3. Minimum shift in color/size
  - Light text on dark background for dark environment
  - Dark text on light background for light environment
4. High-chroma, spectrally extreme colors may create illusions of shadows/after-images
  - Bright blue/green
5. Use familiar, consistent color coding
  - Red – stop, danger, hot, fire. Yellow – Caution, slow
  - Green – go, okay, safe. Blue – Cold, water, death
  - Warm colors – Action, response
  - Cool colors – stats, background, distance
  - Gray, white – neutral
  - Context-dependent

## The 10 Commandments of Color

6. Use the same color for grouping related elements.
7. Color to your audience
  - Men prefer blue to red, women red to blue
  - Men prefer orange to yellow, women yellow to orange
  - Young prefer bright, old prefer sober/restrained colors
8. Use high-value, high-chroma colors to attract attention.
  - Bright red better / faster than yellow, orange
  - Older viewers have easier time with bright

## The 10 Commandments of Color

9. Use redundant coding of shape, as well as color, if possible. The more cues to remember an object, the better.
10. Use color to enhance black-and-white information.
  - People remember better with color
  - Different emotional reaction



# Color Contrast

- Hard to read colors:
  - <http://www2.cajun.net/~hugh/tradewar.html>
- Watch out for default colors!
  - Some browsers default to a white background and others to gray. Specify a background color in your body tag to ensure all browsers use the same color.

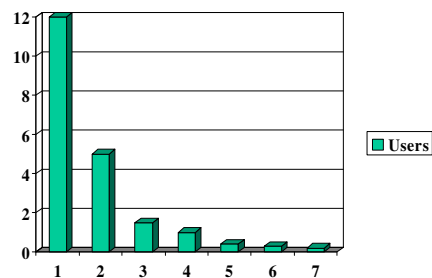


## User Behavior on the Web

- Reduce clicking
  - Users prefer menus with at least 5-7 links
  - Prefer dense screen with many choices over deep path with few choices
  - Chunking of data vs. hundreds of individual menu choices

## Clicks per User

- Study by Huberman, et. al 1998
- Users clicking on a given number of links within a site
  - Most click once!
  - Average is three clicks
- One of Huberman's "Laws of the Web"



## Organizing Information

- Divide your content into logical units to minimize the number of clicks
- Establish a hierarchy of importance among the units
- Use the hierarchy to structure relations among units
- Build a site that closely follows your information structure
- Analyze the functional and aesthetic success of your system

## Chunk your Info

- **Chunking**
  - Short chunks of information that fit on a screen
  - Few users read long passages of text on screen
  - Discrete chunks lend themselves to a link
  - Supports a uniform format
- **Text Length**
  - Yale Style Guide suggests a max of four screens of information in most cases

# Site Design

- “Chunk” your information

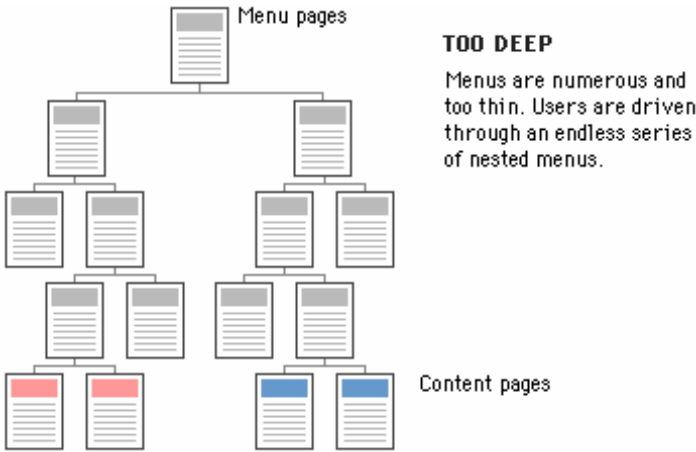


# Site Organization

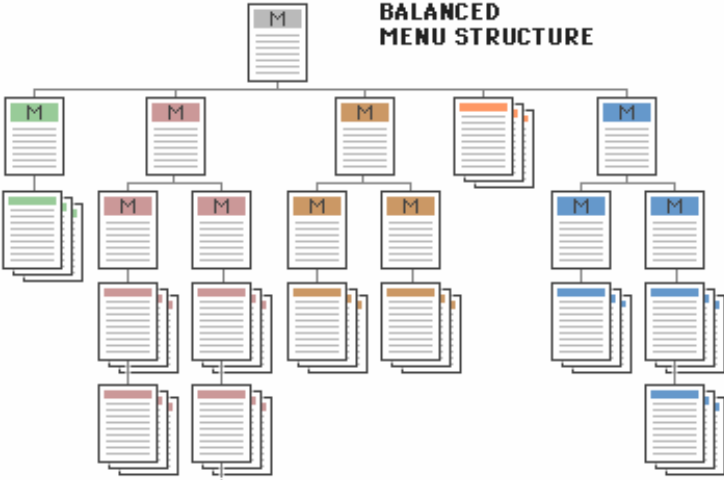




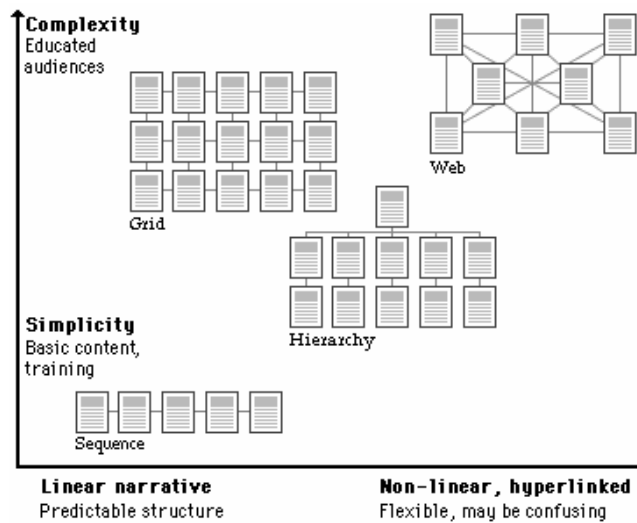
# Site Organization



# Balanced Site Organization



## Range of Choices



## Case Study

- Time is Money -- redesign at Sun
- Average employee views 12 intranet pages per day
- Could save 5 minutes per week per employee by redesigning the site
- \$10 million/year in “lost” time



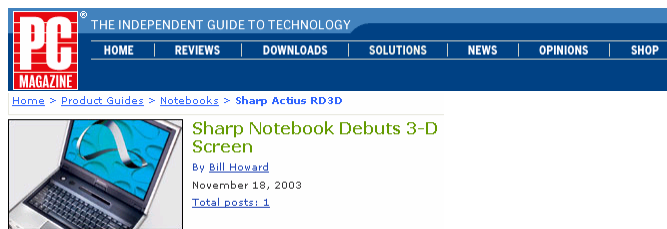
# Navigation Techniques

- Topical Sections
  - Most common technique
  - Problem if user picks wrong topic
  - Some pages in multiple topics
- Path Analysis
  - Provide user the path that was used to reach the current page
  - Requires hierarchical organization



# Navigation Techniques

- Can combine path and topic navigation



Path  
and Tree

# Technology

- Java, Javascript, Flash?

In Lynx:



```
Road runner sports - The world's Largest running store! (p1 of 5)
[INLINE]
[INLINE]
[INLINE]
[LINK]
[LINK]
[LINK]
[LINK]
[LINK]
[LINK]
[LINK]
```

# Technology

- Compare to Yahoo!



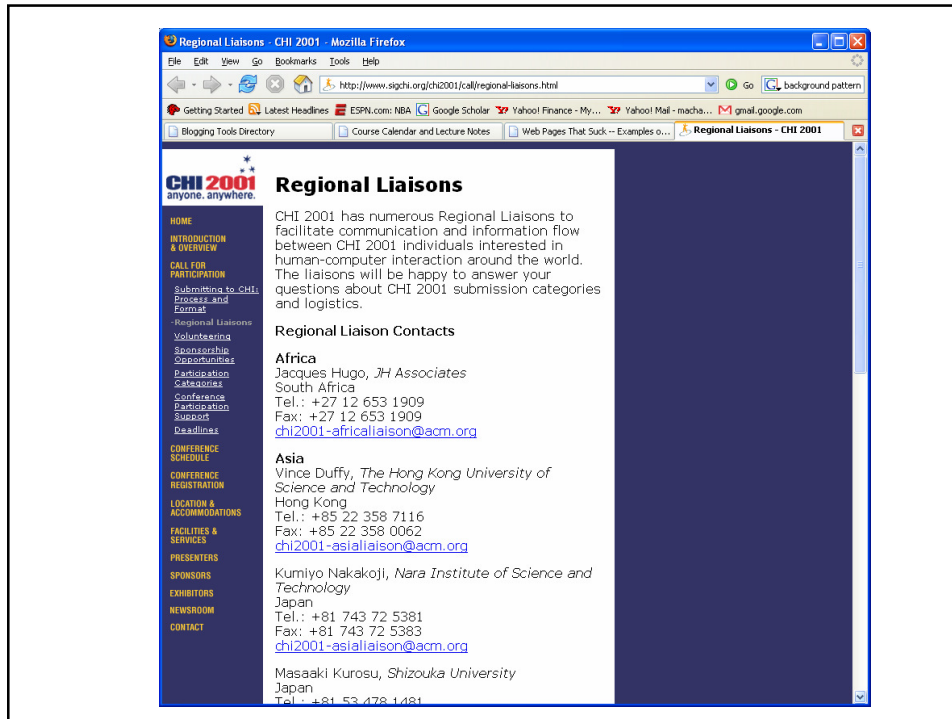
```
Yahoo! (p1 of 9)
Yahoo!
Pepsi and iTunes 100 Million Free Songs. 1 in 3 wins. Play Today.
Search for: _____ [on the web _____]
Yahoo! Search
o Advanced
o Preferences
New! Yahoo! Games Downloads: Polar Bowler
Shop Auctions, Autos, Classifieds, Real Estate, Shopping, Travel
Find HotJobs, Maps, People Search, Personals, Yellow Pages
Connect Chat, GeoCities, Greetings, Groups, Mail, Messenger, Mobile
Organize Addresses, Briefcase, Calendar, My Yahoo!, PayDirect, Photos
Fun Games, Horoscopes, Kids, Movies, Music, Radio, TV
Info Finance, Health, News, sports, weather More Yahoo!....
Happy HotJobs User arc divider
Yahoo! HotJobs
```

## Navigation Location

- Navigation should always be present
- Consider location on the screen in relation to:
  - Monitor sizes
  - Screen resolutions
  - Window size

## Screen Size and Good Navigation

- Caution with right-hand menus
  - <http://www.gravis.com>
- Can address programmatically:
  - <http://www.google.com>
- Good navigation: Show user where they are in the context menu
  - <http://www.acm.org/sigs/sigchi/chi2001/call/regional-liaisons.html>



## Summary of Interface Design Tips

- Build Navigational aids.
  - Navigation bars, frames
  - Critical for giving user a sense of where they are
  - Must provide context, e.g. bar with page headers
  - User shouldn't have to go "back" to figure this out
- Avoid dead-end pages
- Keep download time short
  - Frustration after 10 seconds
- Consistency!
  - E.g., keep "home" button in the same place, don't change link colors
  - Simplicity often appreciated
- Offer feedback
- Design for the disabled
  - ALT tags
    - E.g., modem user might disable graphics
  - Use elements as designed
    - E.g. don't use blank GIF as a spacer

## Design Considerations

- Graphics vs. Text menus, both desirable
- Animations (e.g. Flash), older browsers, web TV won't view them
- "Whats New" feature - must be maintained, can help repeat visitors
- FAQ page
- Site Cover - splashy graphics or animation to draw users in. For others, an annoying click that needs to be bypassed.

## Top Ten Mistakes

- Jakob Nielsen's top design mistakes
  1. Using Frames
  2. Gratuitous use of bleeding-edge technology
  3. Scrolling text, marquees, and constantly running animations
  4. Complex URLs
  5. Orphan pages
  6. Long, scrolling pages
  7. Lack of navigation support
  8. Non-standard link colors
  9. Outdated information
  10. Overly long download times



## Evaluating Your UI

- Don't forget User Centered Design
- User Testing
  - Focus Group
  - Ask users to perform a task, watch sequence of steps taken
  - Time users on specific tasks
    - E.g., shopping for a specific item
- Build from your users and work your way up!
  - Readjustment to meet user needs