CSCI 1320
Creating Modern Web Applications
Lectures 21: HCI I
In-Class Work

• Look at a CS department web site
  • See what is good and bad
  • From a user’s perspective
  • Using a scenario
• With your neighbor
User Friendly

• Everyone says this is what is needed
  • What does this mean?
  • Examples?
• Is this what you meant with your good/bad points?
What Does User Friendly Mean

• Easy to use
  • For whom
• Nice to look at
  • For whom
• Other Criteria
  • Resilient to mistakes
  • Easy to learn
  • Easy to understand
  • Does what the user expects
PUT THE USER FIRST

• This is the Basic Principle
  • The app is written for the user
• Problems
  • Easy to say
  • Difficult to do
  • Even when you are the user
  • Especially when you are the user
• Don’t Make Me Think
How to Put The User First

• **Principles**
  • Learnability, flexibility, robustness

• **Listen** to users throughout the process
  • **UI design is an iterative process**
  • Should be centered around the user
  • The implementer is a poor example of a user

• **Work in terms of realistic scenarios**
  • Covering the major uses of your application
User (Usability) Testing

- Test the effectiveness of the user interface
  - What is liked or disliked (subjective)
  - Speed and ease of use
  - What errors are made (and the error rate)
- How understandable is the interface
  - What instructions/help is required, what is obvious
- Is the content logical and easy to follow
  - Consistency of navigation and presentation
  - Spelling errors, colors and fonts, English
- Universal usability testing
  - Accessibility testing
  - Internationalization testing
Doing Usability Testing

• **User studies**
  • Watching users use the site (video taping for analysis)
  • Surveys or polls after use
  • Determining what information is needed

• **Log studies**
  • What are the navigation paths? What are the common operations? How are key pages reached?
  • Detecting errors from the logs
  • Timings
  • Using Google Analytics and similar tools

• **Tools and External Sources**
  • [http://www.youtube.com/watch?v=uLyWxXNDNbl](http://www.youtube.com/watch?v=uLyWxXNDNbl)
  • [http://www.youtube.com/watch?v=xLIBe6VVmrY](http://www.youtube.com/watch?v=xLIBe6VVmrY)
Usability Testing Tools

• UserTesting
  • http://info.usertesting.com/EduDemo.html
• Usage
  • Develop a well-thought out test first
    • What you want the user to do
    • What questions you want to ask
    • What questions you want answered
  • Sign up: https://www.usertesting.com/users/sign_up?client=true
  • Choose ORDER a TEST
  • Select no more than 3 participants
  • Use code U-BU9 in lieu of payment
HCI In Web Applications

- Look and feel of the Web Page (Visual)
  - Is it pleasant
  - Does the user focus on the appropriate things
- How the user interacts with the Page (Interactive)
  - Is interaction easy and natural
  - Effort minimization
  - Is interaction safe
- How the user interacts with the overall site
  - Web site navigation
- How the user interacts with the Site (Navigation)
Question

Web site navigation or control flow is not concerned with
A. How users go between pages to accomplish a task
B. The time it takes to complete a multiple-page operation
C. Handling the BACK and FORWARD buttons on a client-heavy application
D. Errors users make in clinking on links on the application’s pages
E. Web site navigation is concerned with all the above
Web Site Navigation

- Navigation is essential to web application
  - It can make or break your application
- Many types of navigation are possible
  - Link to new page
  - Form submission to new page
  - JavaScript-created new page (using AJAX)
  - Frames (iframes) within a page
  - Forward and Back browser buttons
  - Links within a page
  - Shift/Control click on a link
Understanding User Navigation

• How the user will navigate your site
  • For specific tasks
  • For specific pages
  • Based on scenarios
• What is the navigation model provided
  • Where can one go from a page
  • How can one get to a page
  • How are links dependent on history
  • How does this fit with the browser’s capabilities
• This is a central part of web application design
Navigation is Integral

- It controls how the site is used
- It controls what the user can / can’t do
- It ensures that the prerequisites for a page are satisfied
  - Before the page is used
- It ensures that users access your site in a logical way
- It directly affects user satisfaction
- It can easily introduce errors
  - Either actual ones
  - Or ones based on incorrect user expectations
Navigation Link Strategies

- Different navigation strategies
  - All options and sub-options on the left
  - Options link to another page with sub-options
  - Options on top with pull-down menus
  - Options on left with roll-over menus
  - Options on the left as a tree, one node expanded at a time
  - Options on left as a tree, user-defined expand/contract

- Which works best?
Other Navigation Methods

- Filtering
- Search
- Site map
- A-Z index
- Image maps
Designing For Navigation

- **User interface design criteria**
  - Common sense (do what is logical or expected)
  - Consistency
  - Minimize the possibility for errors
  - Keep the user informed (bread crumbs)

- **Don’t make me think**
  - Navigation should be obvious
  - Clicking on an object should do the logical thing

- **Don’t make me work**
  - Minimize the amount of navigation needed
  - Make common operations simple
Other Navigation Guidelines

• Do not create or direct the user to pages with no navigational options
• Clearly differentiate navigational elements from one another
• Group and place them in a consistent and easy to find place on each page
• On long pages, provide a ‘list of contents’ with links that take users to the corresponding content
• Provide feedback to let users know where they are (breadcrumbs)
• Ensure that tab labels are clearly descriptive
• Ensure tabs are located at the top of the page and look clickable
• Do not require users to scroll purely navigational pages
• Use site maps where there are many pages
• Provide ‘glosses’ to help users select correct links
• Do not expect users to use breadcrumbs effectively
Representing Navigation

- How might you describe navigation
  - For a typical web site
  - For your project?
- Typically done as a graph
  - Nodes = pages
  - Links = navigations between pages
    - Labeled with what link does what
- Complications
  - Multiple ways of getting to a page
  - Might go back to referring page
  - Links might be conditional
Navigation Example
Representing Navigation

• How complex is the resultant diagram?
  • Is it something you can or want to draw
  • How do you represent user actions (back/forward)
  • How do you represent possible concurrency

• What are the alternatives
  • Draw diagrams for common uses of the application
  • Should have a set of graphs covering all navigations
    • This will tell you what to do in managing links
    • And what links need to be available on each page
  • Represent the graph in another form
    • List of links for each page
    • Harder to get an overview
  • Simplified FSA notations (e.g. StateCharts)
Using Navigation Diagrams

- **For design purposes**
  - What links have to be available
  - What should happen if the user clicks here?
  - What are the common navigation paths
    - Based on scenarios
    - Can we simplify these

- **For implementation purposes**
  - What should happen if the user clicks here
  - What is fixed/variable on each page
  - What should the back/forward button do
Client-Side Navigation

- What does the user see if your web app uses AJAX or web sockets?
  - What does forward mean?
  - What does backward mean?
  - What does right-click on a link mean?
- This is a key difficulty with client-side applications
  - Don’t meet the user’s expectations
  - Don’t work well with browsers
  - Encode in the # part of URL
    - Calls to set history, calls to load page
Controlling Navigation

• Control flow is not explicit in HTML or web applications
  • It is implicitly controlled by links
  • Same requests to the server for a particular URL can result in different pages
• Control flow is implicitly controlled by the user
  • Back and forward buttons
  • Multiple copies of a page visible at once
  • Explicit typing of internal URLs
• Client-heavy applications
  • Application has more control, but need to meet expectations
  • Be sure to handle Back and Forward buttons explicitly
  • Need to keep your own history
Navigation Problems

• Causes “bugs” in web applications
  • Remember last action, but user clicks on prior page
  • Explicit session id can create security problems
  • Page preconditions might not be met
• Causes user errors or misconceptions
  • Multiple shopping carts
Handling Navigation Problems

• Defensive Programming
  • Each page should check the preconditions
  • Ensure you have the necessary information
• Keep the user informed
  • The page should inform the user what the server thinks
  • Make explicit what will happen on a link
• Keep the client and server in sync
  • Automatically update the shopping cart
Next Time

- HCI II : DESIGN
Evaluation of Navigation

• What does it mean to have good navigation
  • What are the criteria
  • What might you evaluate

• Criteria
  • Performance (time per task)
  • User satisfaction
  • Error rate

• Results
  • Time per task: no significant differences
  • User satisfaction: no significant differences
  • Error rates: some significantly better
    • All options/sub-options on left; drop downs
Control Flow History

- Problem: dealing with AJAX, Web Sockets
  - Browser only knows that URL changes
  - Page stays the same however
- What can change in the URL without changing page?
- Encode the control flow in #tag part of the URL
  - Set this on AJAX/Socket based changed
  - Handle this when set by browser
Problem

• Suppose we have data about tweets involving the flu
  • Each has a given geolocation
  • Each has a given time
• How would you display them?
  • What should the display look like
  • What should the interaction look like
  • How would the user get there
• How do you start?