Today’s Lecture

- Models / Metaphors
  - Guides -> Larger Design Considerations

Reminders
- Blog Post (Week)
- Project 3
- Alpha Submission
Models

☐ Conceptual model
  ■ Choose
  ■ Teach it to a user

☐ Model of a system = how it works
  ■ Visio / Powerpoint
  ■ Photoshop / Gimp
  ■ Objects vs. Pixels
  ■ Text as lines vs. single string

☐ Books
  ■ Design of Everyday Things, 1988
  ■ How Things Work
Three modes in practice

- System model
- Interface model
- User model

Technical aspects
Presentation
How the user thinks it works

C  I  H
Interface Model

- Should hide the system model
- Interface model should be:
  - Simple
  - Appropriate: reflect user’s model of the task (learned from task analysis)
  - Well-communicated

Example: Cell phones
User Model

- Sometimes wrong
  - Sometimes harmless
    - Electricity as water
  - Sometimes misleading
    - Thermostat as a valve
Interaction Styles

- Command language
- Menus & forms
- Direct manipulation
User types in commands in an artificial language

Examples

- Unix shell ("ls -l *.java")
- Search engine query language ("AND, OR, site:www.nd.edu")
- URLs ("http://netscale.cse.nd.edu/")

Command syntax is important

- Syntactic sugar anyone?
Menus and Forms

☐ User is prompted to choose from menus and fill in forms

☐ Examples
  ■ Virtually all web sites
  ■ Dialog boxes

☐ Navigation structure is important
  ■ Menu trees (Yahoo!)
  ■ Wizard: linear sequence of forms
Direct Manipulation

- User interacts with visual representation of data objects
  - Continuous visual representation
  - Physical actions or labeled button presses
  - Rapid, incremental, reversible, immediately visible effects

- Examples
  - Files and folders on a desktop
  - Scrollbar
  - Dragging to resize a rectangle
  - Selecting text

- Visual representation and physical interaction are important
Comparison of each

- Knowledge in the head vs. world
- Error messages
- Efficiency
- User experience
- Synchrony
- Programming difficulty
- Accessibility
Direct Manipulation

- Affordances
- Constraints
- Natural mapping
- Visibility
- Feedback
Affordances

- Perceived and actual properties of a thing that determine how the thing could be used
  - Chair is for sitting
  - Knob is for turning
  - Button is for pushing
  - Listbox is for selection
  - Scrollbar is for continuous scrolling or panning

- Perceived vs. actual
Natural Mapping

- Physical arrangement of controls should match arrangement of function
- Best mapping is direct, but natural mappings don’t have to be direct
  - Light switches
  - Stove burners
  - Turn signals
  - Audio mixer

Implicit and explicit
Visibility

- Relevant parts of system should be visible
  - Not usually a problem in the real world
  - But takes extra effort in computer interfaces
Feedback

Actions should have immediate, visible effects
- Push buttons
- Scrollbars
- Drag & drop

Kinds of feedback
- Visual
- Audio
- Haptic
Human Error

- Description error
- Capture error
- Mode error
Description Errors

- Intended action is replaced by another action with many features in common
  - Pouring orange juice into your cereal
  - Putting the wrong lid on a bowl
  - Throwing shirt into toilet instead of hamper
  - Going to Kendall Square instead of Kenmore Square

- Avoid actions with very similar descriptions
  - Long rows of identical switches
  - Adjacent menu items that look similar
Capture Errors

☐ A sequence of actions is replaced by another sequence that starts the same way

■ Leave your house and find yourself walking to school instead of where you meant to go

■ Vi :wq command

☐ Avoid habitual action sequences with common prefixes
Mode Errors

- Modes: states in which actions have different meanings
  - Vi’s insert mode vs. command mode
  - Caps Lock
  - Drawing palette

- Avoiding mode errors
  - Eliminate modes
  - Visibility of mode
  - Spring-loaded or temporary modes
  - Disjoint action sets in different modes
Metaphors

- Another way to address the model problem
- Examples
  - Desktop
  - Trashcan
Danger of Metaphor

- Hard to find
- Deceptive
- Constraining
- Breaking the metaphor
- Use of a metaphor doesn’t excuse bad communication of the model
Questions?

- Weekly Blog
- Project 3
- Alpha Submission