User Interface

Three Mile Island

How do we avoid bad UI?

• Learn from past mistakes

• Build prototypes

Big questions

• What's the point of prototyping? Should I do it?  
  -- If so, when should I?

• Should I make my prototype on paper or digitally?

• How do I know whether my UI is good or bad?  
  -- What are the ways in which a UI quality can be quantified?  
  -- What are some examples of software you use that have an especially good/bad UI?  
  What do you think makes them good/bad?

Usability and software design

• **usability**: the effectiveness of users achieving tasks  
  -- Human-Computer Interaction (HCI).
  -- Usability and good UI design are closely related.
  -- A bad UI can have serious results...

Florida, 2018 (Broward County)

Florida 2018 Undervote  
The Share of Voters Who Cast Ballots for Both Senate and Governor

- 5.7% of Senate Ballots Blank
- 1% or Less of Senate Ballots Blank
- More Votes for Senate than Governor
Achieving usability

- User testing and field studies
  - having users use the product and gathering data
- Evaluations and reviews by UI experts
- Prototyping
  - Paper prototyping
  - Code prototyping
- Good UI design focuses on the user
  not on the developer, not on the system environment

Prototyping

- **prototyping**: Creating a scaled-down or incomplete version of a system to demonstrate or test its aspects.
- Reasons to do prototyping:
  - aids UI design
  - provides basis for testing
  - team-building
  - allows interaction with user to ensure satisfaction

Some prototyping methods

1. UI builders (Visual Studio, ...)
   draw a GUI visually by dragging/dropping UI
   controls on screen
2. implementation by hand
   writing a quick version of your code
3. **paper prototyping**: a paper version of a UI

Why do paper prototypes?

- much faster to create than code
- can change faster than code
- more visual bandwidth (can see more at once)
- more conducive to working in teams
- can be done by non-technical people
- feels less permanent or final

Where does paper prototyping fit?

When in the software lifecycle is it most useful to do (paper) prototyping?

- Requirements are the **what** and design is the **how**.
  Which is paper prototyping?

- Prototyping
  - helps uncover requirements and upcoming design
  issues
  - during or after requirements but before design
  - shows us **what** is in the UI, but also shows us details of
  **how** the user can achieve goals in the UI

Paper prototyping usability session

- user gets tasks to perform on a paper prototype
- observed by people and/or recorded
- a developer can "play computer"
Schneiderman’s 8 Golden Rules

1. Strive for consistency.
2. Give shortcuts to the user.
3. Offer informative feedback.
4. Make each interaction with the user yield a result.
5. Offer simple error handling.
6. Permit easy undo of actions.
7. Let the user be in control.
8. Reduce short-term memory load on the user.

(from Designing the User Interface, by Ben Schneiderman of UMD, noted HCI and UI design expert)

UI design examples

UI design, components

- When should we use:
  - A button?
  - A check box?
  - A radio button?
  - A text field?
  - A list?
  - A combo box?
  - A menu?
  - A dialog box?
  - Other...

UI Hall of Shame

http://interfacehalloffame.eu (sadly now defunct)

Layout and color

Bad error messages
UI design – buttons, menus

- Use **buttons** for single independent actions that are relevant to the current screen. 
  - Try to use button text with verb phrases such as "Save" or "Cancel", not generic: "OK", "Yes", "No". 
- Use **toolbars** for common actions. 
- Use **menus** for infrequent actions that may be applicable to many or all screens. 
  - *Users hate menus!* Try not to rely too much on menus. Provide another way to access the same functionality (toolbar, hotkey, etc.).

UI design – checkboxes, radio buttons

- Use **check boxes** for independent on/off switches. 
- Use **radio buttons** for related choices, when only one choice can be activated at a time.

UI design – lists, combo boxes

- Use **text fields** (usually with a label) when the user may type in anything they want.
- Use **lists** when there are many fixed choices (too many for radio buttons); all choices visible on screen at once.
- Use **combo boxes** when there are many fixed choices; don’t take up screen real estate by showing them all at once.
- Use a **slider** or **spinner** for a numeric value.

UI design – multiple screens

- Use a **tabbed pane** when there are many screens that the user may want to switch between at any moment.
- Use **dialog boxes** or **option panes** to present temporary screens or options.

An example UI

- Good UI dialog? 
  Did the designer choose the right components? 
  Assume there are 20 collections and 3 ways to search.

Creating a paper prototype

- **Gather materials** 
  - paper, pencils/pens
  - tape, scissors
  - highlighters, transparencies

- Identify the screens in your UI 
  - consider use cases, inputs and outputs to user

- Think about how to get from one screen to next 
  - this will help choose between tabs, dialogs, etc.
Application backgrounds
• draw the app background (parts that matter for the prototyping) on its own, then lay the various subscreens on top of it

Representing interactive widgets
• buttons / check boxes: tape
• tabs, dialog boxes: index cards
• text fields: removable tape
• combo boxes: put the choices on a separate piece of paper that pops up when they click
• selections: a highlighted piece of tape or transparency
• disabled widgets: make a gray version that can sit on top of the normal enabled version
• computer beeps: say "beep"

Example paper prototype screen

Prototyping exercise
• In your project groups, draw a rough prototype for a music player (e.g., WinAmp or iTunes).
  – Assume that the program lets you store, organize, and play songs and music videos.
  – Draw the main player UI and whatever widgets are required to do a search for a song or video.
  – After the prototypes are done, we’ll try walking through each UI together.

• Things to think about:
  – How many clicks are needed? What controls to use?
  – Could your parents figure it out without guidance?