Lecture 8-2: Graphical User Interfaces

- **Elements of GUI Interaction Style**
  - Menus
    - Depth versus Breath
  - Icons
  - Windowing Systems
  - Direct Manipulation
    - Cognitive Account of Direction Manipulation
      - Gulf of Execution / Gulf of Evaluation

Graphical User Interfaces

Definitions
Classifications by Display Technique

- Command Language
  - Direct instructions to computer using words, function keys, single characters, abbreviations.
  - Defined semantics and syntax
  - Examples:

  ```
  XCOPY /F /D /E "D:\Web Sites\www.hblanchard.com\" F:\www.hblanchard.com\
          nohup find / -name "lost_file" -print >found 2> find.err
                                  F1
  ```

- Character User Interface (CUI)
  - Character-based screen display, but cursor-addressable
  - Examples: Nielsen and Molich toy application, MS-DOS only applications such as Lotus 123, etc.

- Graphical User Interface (GUI)
  - Bitmapped graphical displays

Dialog Techniques

- Commands
- Menus
  - "A set of options displayed on the screen where the selection and execution of one (or more) of the options results in a change in the state of the interface." (Paap & Roske-Hofstrand, 1988 via Preece et al.)
- Question and Answer Dialogs
  - "Reversed" menu system, simple questions presented in sequence
  - Related to contemporary "Wizard" interface
- Forms
  - Information entered in labeled fields or elements like check boxes
- Direct Manipulation
  - Shneiderman definition quoted by Preece et al:
    - Visibility of objects of interest
    - Rapid, reversible, incremental actions
    - Replacement of complex command language syntax by direct manipulation of the object of interest

Defining Elements of GUIs

- Menus
- Icons
  - Pictorial representations of objects, commands, processes, programs, options, etc. -- replacing or supplementing words
- Windows
  - Overlapping Windows
  - Tiled Windows
- Direct Manipulation
  - Pointing Device
  - Objects selected and moved on-screen to execute tasks
- Displays using pictures, diagrams, graphics, font techniques
- Metaphor
  - Desktop

Brief History of the GUI

- Doug Engelbart (1960s) - Stanford Research Institute

  – Invention of Mouse and Windows

- Alan Kay (1970s) - Xerox PARC - Smalltalk, Dynabook

  – Overlapping Windows

    - Patent also owned by Bell Labs for Unix terminals

- Xerox PARC - Xerox Star and Alto workstations

  – Never commercially successful

- Steve Jobs (Apple) works out deal for detailed tour and briefing of Xerox PARC technology (1979)

- Apple Lisa (1980s) - precursor of Mac fails miserably

- Apple Macintosh (1984) - first commercially successful window system

- MIT X-window system opens door to Unix workstation window systems

- MS Windows introduced as MS-DOS application

  – Prompts famous Apple look-and-feel lawsuits which ultimately fail

- MS Windows 3.X becomes commercially accepted and successful

Xerox Star Interface and Alto Workstation

Guiding Principles of the Apple Lisa

1980 Apple Marketing Requirements (From Perkins, 1990)

- Fun to use, friendly, rewarding
- Minimal user training
- One standard method of interacting with a user in handling text, numbers, and graphics
- Gradual learning: user can do important tasks easily with minimal instruction, sophistical features will be unobtrusive until they are needed
- Errors will be handled consistently in a friendly manner
- User will be protected from obvious errors
- personalization
- Allow the user to put computer on hold to attend to other tasks
- Graphics and "intuitive icons"

Lisa Prototype Screens

- http://home.san.rr.com/deans/prototypes.html

NOTE: this link is no longer active – If you'd like to view these pages, find the pdf print-out versions on the lecture page of this course.