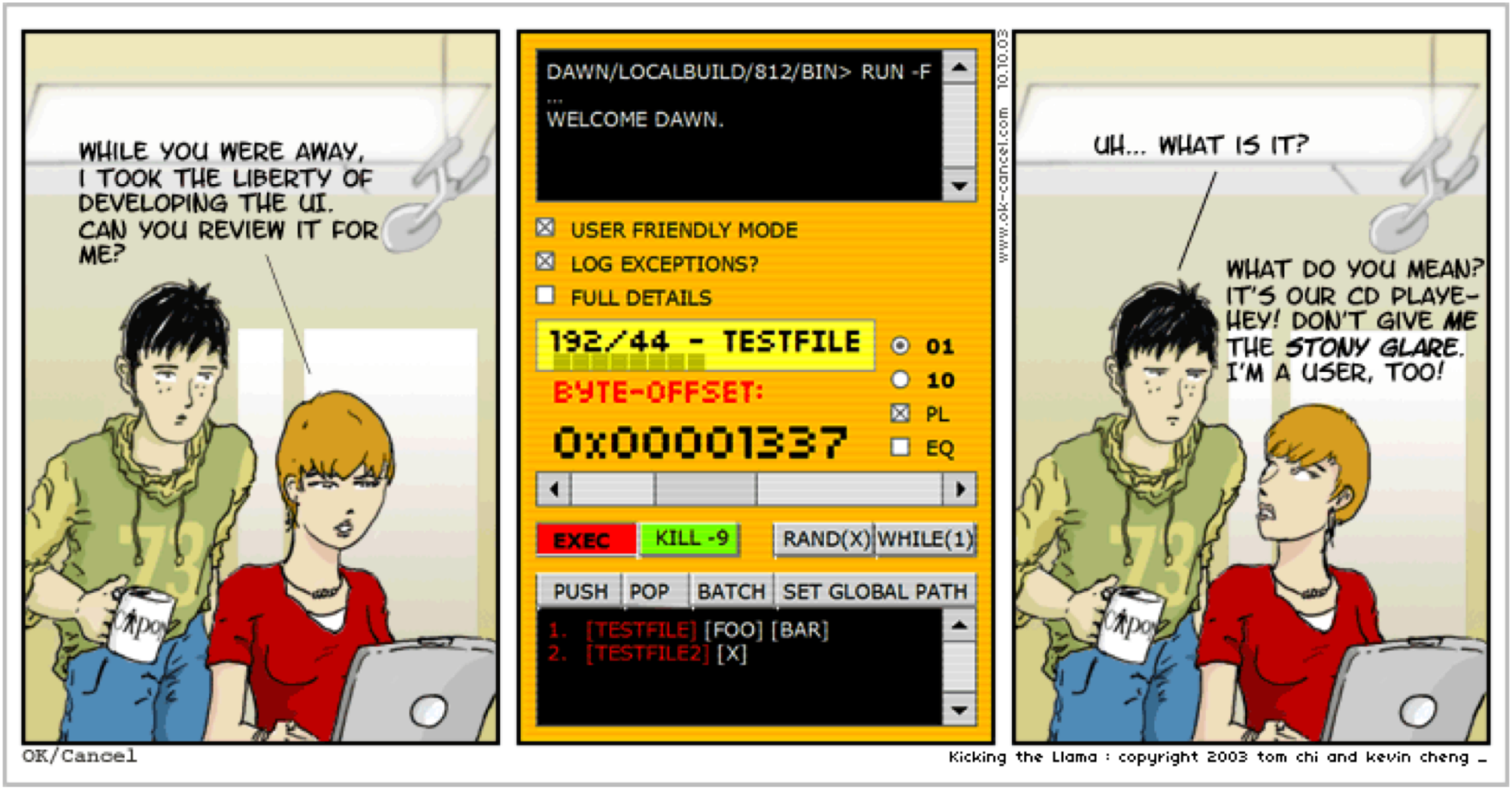
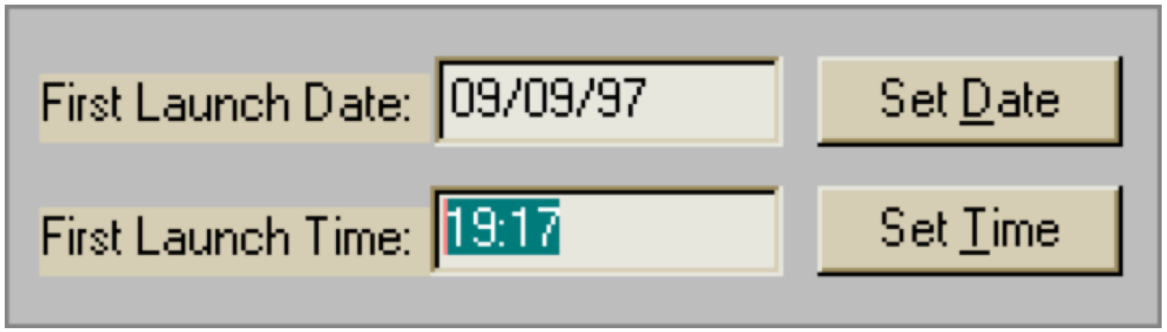
Human Factors / User Interface Design Guidelines

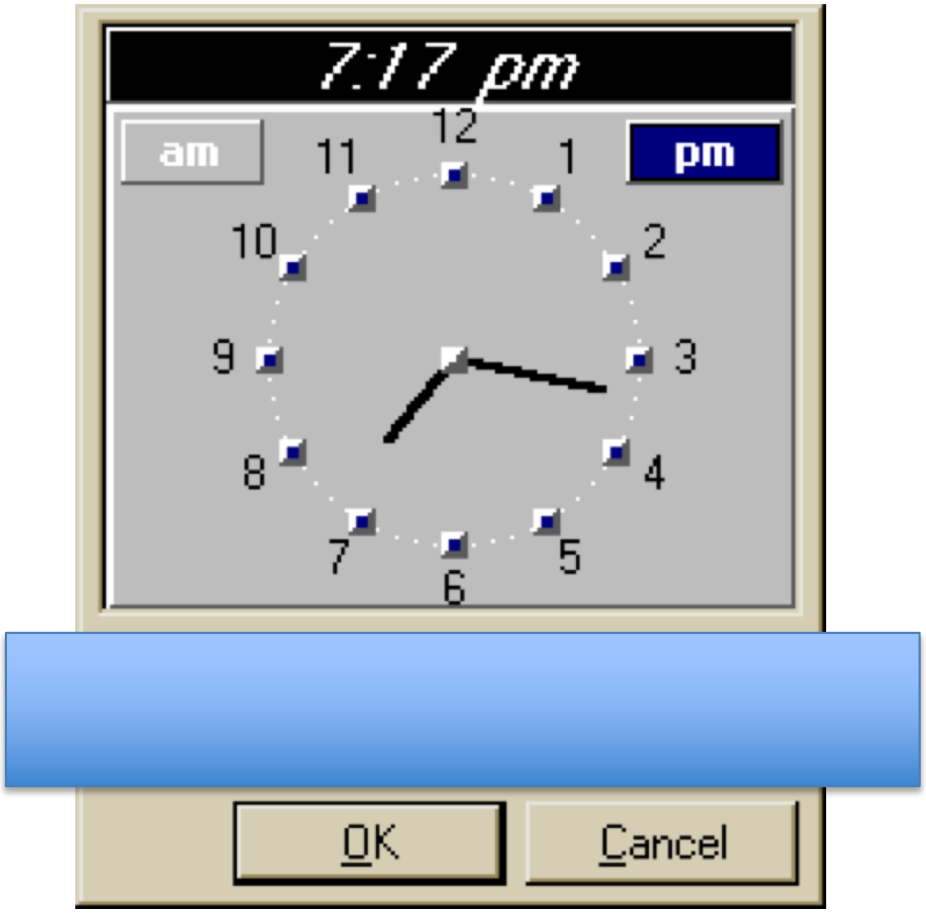
Slides adapted from Craig Zilles


WHILE YOU WERE AWAY, I TOOK THE LIBERTY OF DEVELOPING THE UI. CAN YOU REVIEW IT FOR ME?
DAWN/LOCALBUILD/812/BIN> RUN -F
...
WELCOME DAWN.
USER FRIENDLY MODE
LOG EXCEPTIONS?
FULL DETAILS
192/44 - TESTFILE
BYTE-OFFSET:
0x00001337
01
10
PL
EQ
EXEC
KILL -9
RAND(X)
WHILE(1)
PUSH
POP
BATCH
SET GLOBAL PATH
1. [TESTFILE] [FOO] [BAR]
2. [TESTFILE2] [X]
www.ok-cancel.com 10.10.03
UH... WHAT IS IT?
WHAT DO YOU MEAN? IT'S OUR CD PLAYE- HEY! DON'T GIVE ME THE STONY GLARE. I'M A USER, TOO!
OK/Cancel
Kicking the Llama : copyright 2003 tom chi and kevin cheng _

How would you interact with this?



How about this?



Design Terminology: Affordances

- An affordance is a relation between an object/environment and an organism that affords the opportunity for that organism to perform an action.
- For example, a knob affords twisting, and perhaps pushing, while a cord affords pulling.
- An affordance enables the possibility of some action.

Design Terminology: Signifiers

- A "signifier" is some sort of indicator, some signal in the physical or social world that can be interpreted meaningfully

User Experience design in a nutshell

1. **Provide the affordances desired by users**

2. **Organize those affordances appropriately**
   - "Information Architecture"

3. **Make your affordances obvious through correct use of signifiers**

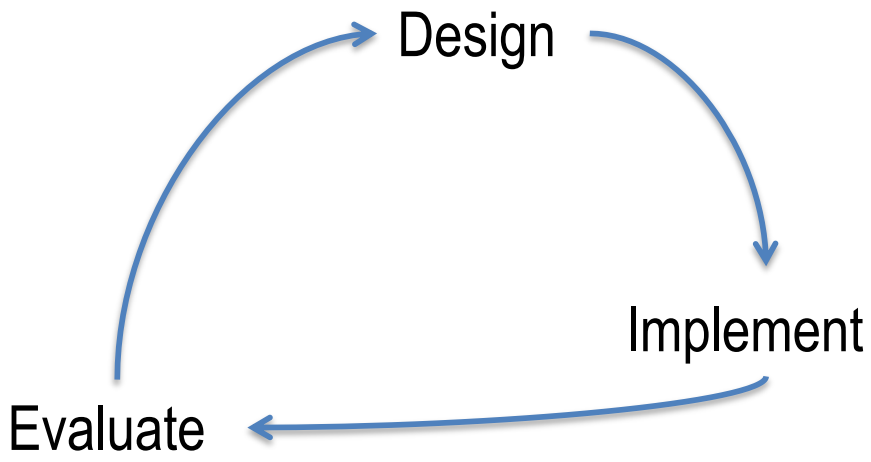
Sounds pretty easy…

User Experience Design is Hard

- **Most users are not like you**
- **Users can’t always tell you what they want**
- **But, they can sure tell you what is wrong.**
  - Consistent problems are the system’s fault

You won't get it right the first time:

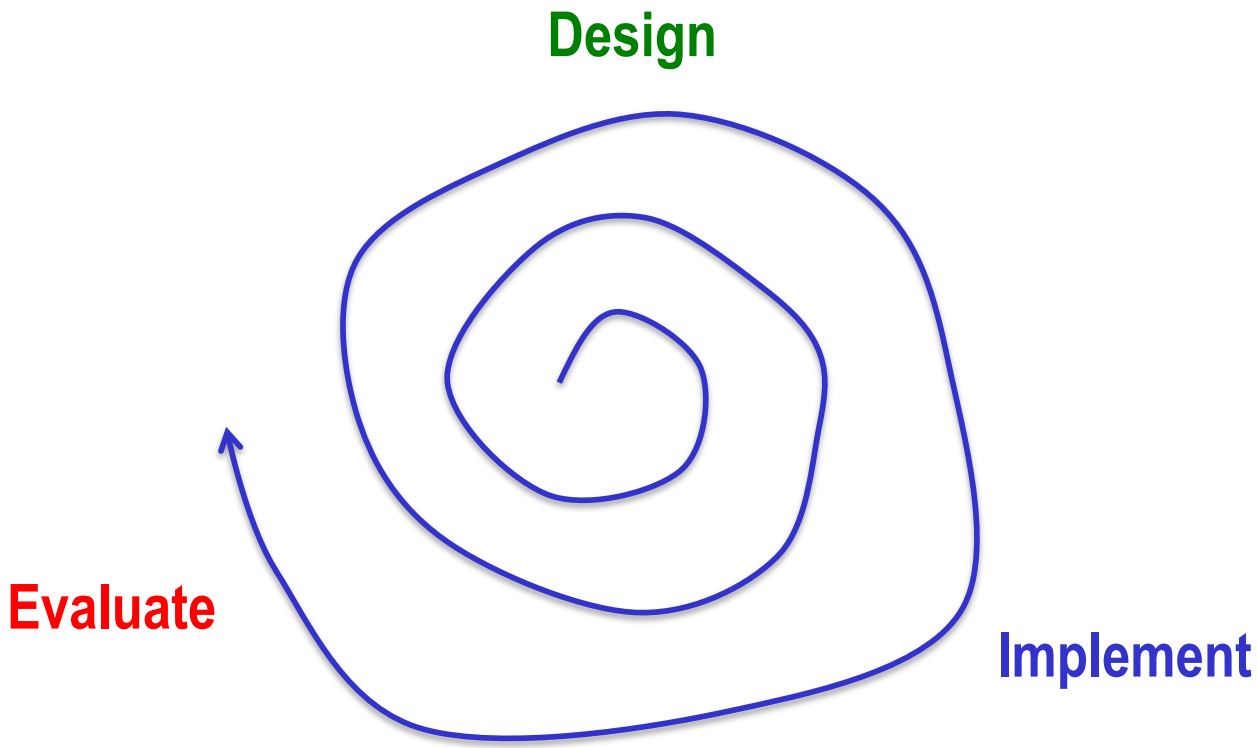
UX Design is an Iterative Process



- **Iteration can be costly**
  - Might have to re-write a lot of your code

Spiral Model of Design

- Use throwaway prototypes and cheap evaluation early in the cycle.



Usability

- **How well users can use the system.**

- **Dimensions of Usability:**
  - Learnability: Easy to learn?
  - Visibility: Is the state of the system clear?
  - Efficiency: Once learned, is it fast to use?
  - Errors: are errors few and recoverable?
  - Satisfaction: is it enjoyable to use?

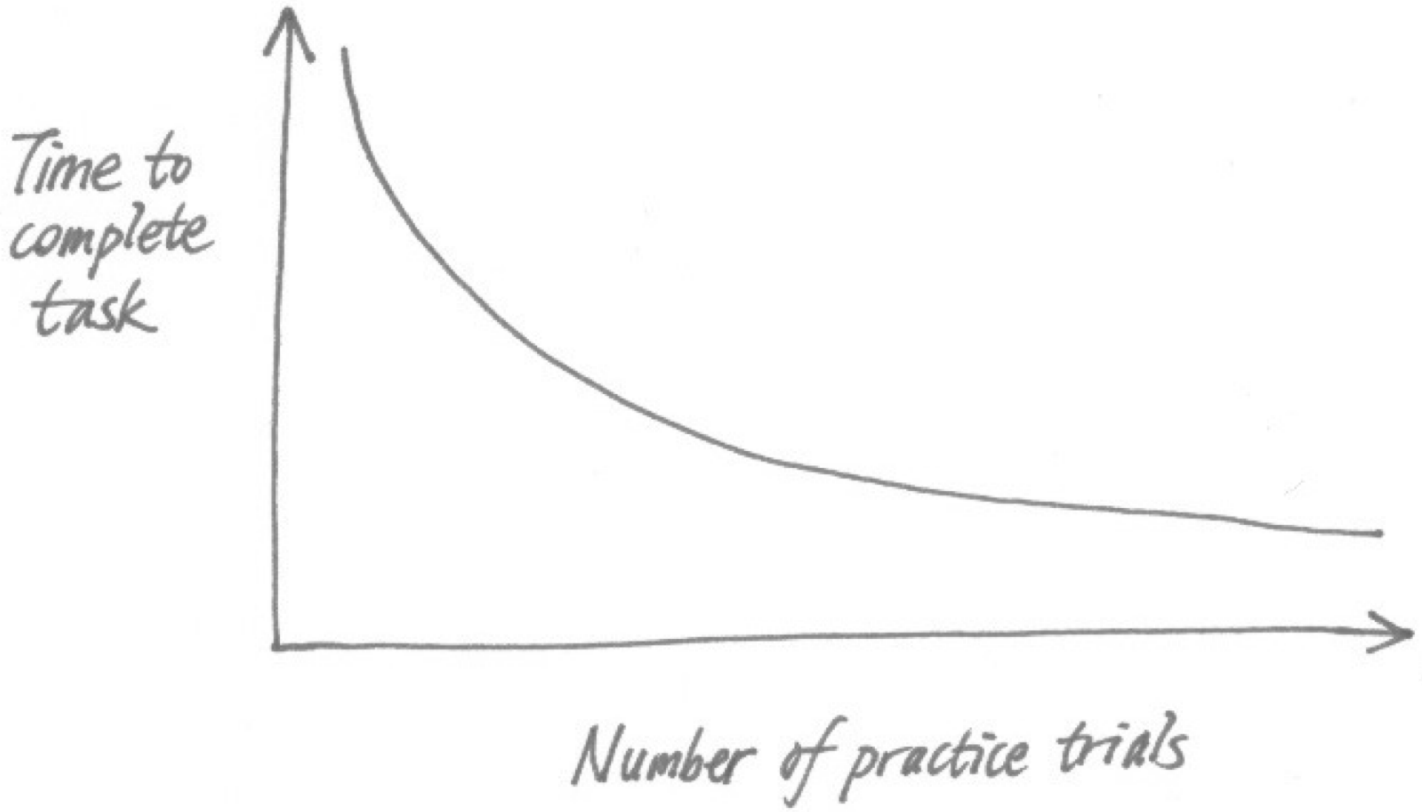
- **Design Principles guide building usable systems**
  - Guided by findings in Ergonomics / Human Factors

Ergonomics / Human Factors

- the scientific discipline concerned with the understanding of interactions among humans and other elements of a system
- applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance
- Characterizes the capabilities and limitations of humans

Human Factors: Power Law of Practice

- **The log time to complete a task decreases linearly with of # practice trials.**



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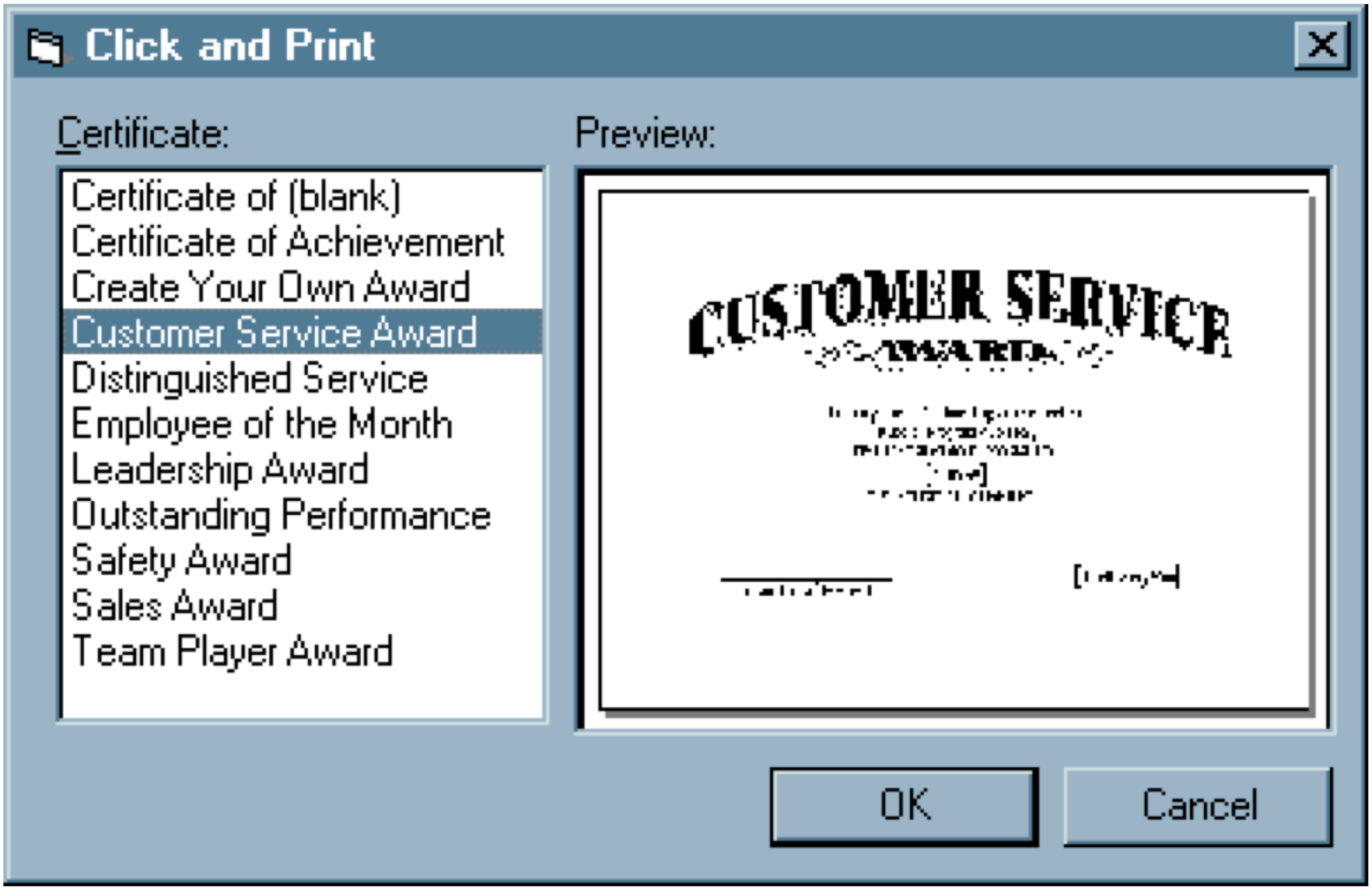
What is wrong with this?

Alternative Design



Design Principles for Learnability

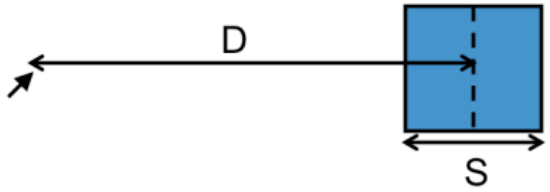
- **Consistency (in design and metaphors)**
  - Similar looking things act similarly
  - Different looking things act differently
  - In wording, location, color, ordering
- **Use common words not jargon**
- **Recognition, not recall**
  - Labeled buttons rather than command languages
- **2 kinds of users: Beginners & Experts**

Visibility

- **Avoid affordances w/o signifiers**
  - E.g., pop-up menus by clicking on open space
- **Avoid hidden modes**
- **Perceptual Fusion:**
  - Stimuli <100ms apart seems fused to humans
  - 10 frames/second appears as moving picture

Efficiency: Hand motion tasks

- **Moving mouse on screen**
- **Finger on keyboard/touchscreen**
- **Hand from keyboard to mouse**



- **Fitts's Law**
  - Time = a + b*log(D/S)
  - log(D/S) = index of difficulty

- **Bigger, closer = easier**
- **For mousing, S is infinite on edge of screen (good!)**

Efficiency: Path Steering Tasks

- Fitts's law only for unconstrained movements
- Task much harder if constrained to tunnel

$$T = a + b\,(D/S)$$

Design for Efficiency

- **Fitt's Law & Steering Law**
  - Important targets: big, nearby, or at screen edges
  - Avoid steering tasks

- **Provide shortcuts**
  - Keyboard accelerators (for expert users)
  - Bookmarks
  - History

Reminder: Using the internet/citing sources

- It must be publicly available
- It must be a minority (<25%) of the code that you submit
- You must understand what the code does.
- Cite any distinctive or substantial code snippets (e.g., more than 2-3 lines) immediately preceding the code

```
// code below derived from:
// https://stackoverflow.com/questions/21626439/how-to-implement-the-java-comparable-interface
public int compareTo(LineItem other) {
    return Integer.compare(this.position, other.position);
}
```

How hard was Snake Linked List?

A. Easy

B. Moderate

C. Challenging

D. Unreasonable

How long did it take to complete Snake Linked List?

A. Less than 3 hours

B. 3 to 6 hours

C. 6 to 9 hours

D. 9 to 12 hours

E. More than 12 hours

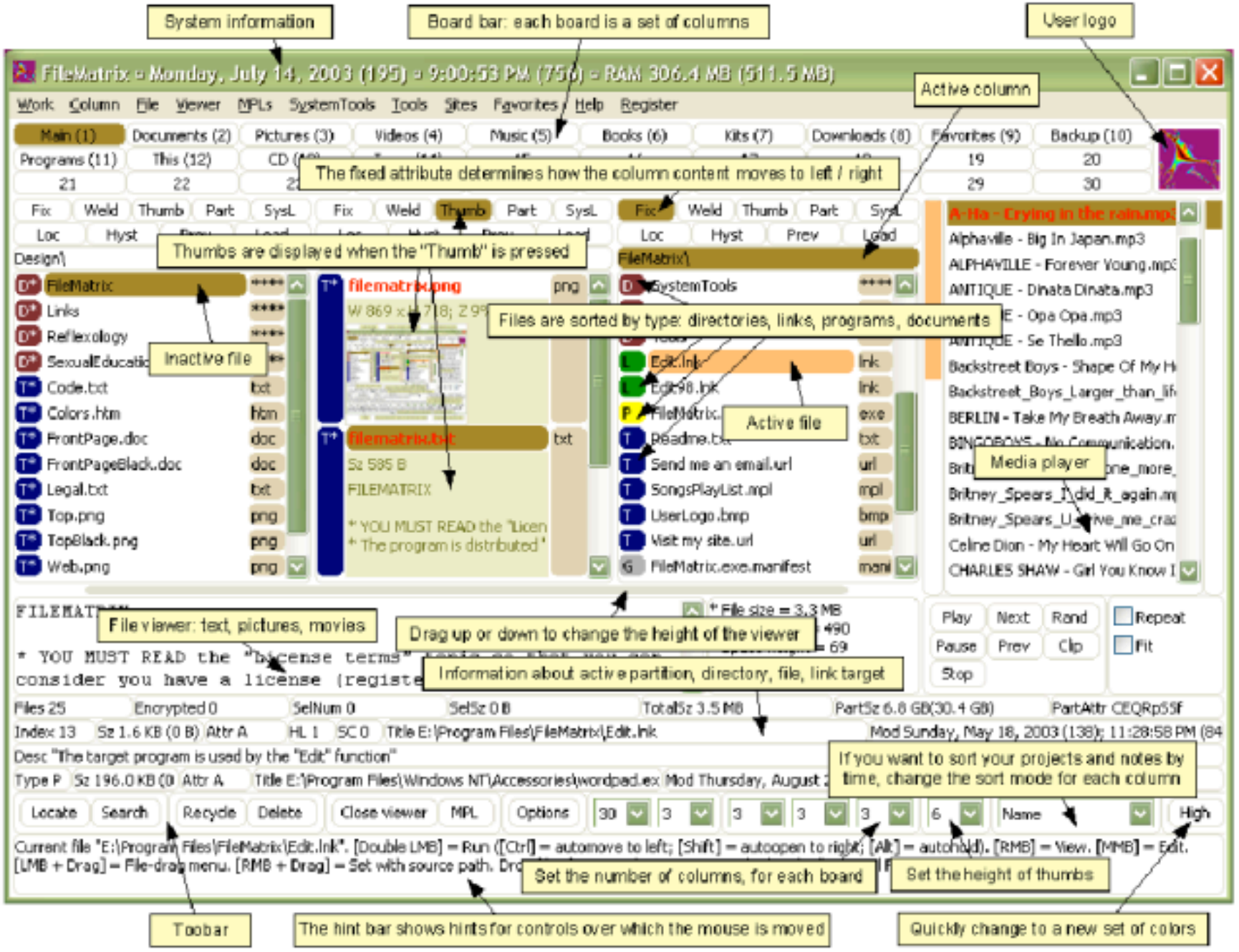

Delete All Records
Are you sure you want to delete all records from the database?
Yes
No

Errors

- **Principle: Protect User's Work**

- **Prevent Errors as much as possible:**
  - Selection rather than typing (within reason)
  - Constrain user input
  - Separate risky commands from common ones

- **Undo (design pattern)**
- **Confirmation Dialogs (when appropriate)**
- **Understandable error messages**


System information
Board bar: each board is a set of columns
User logo
Active column
The fixed attribute determines how the column content moves to left / right
Thumbs are displayed when the "Thumb" is pressed
Files are sorted by type: directories, links, programs, documents
Inactive file
Active file
Media player
File viewer: text, pictures, movies
Drag up or down to change the height of the viewer
Information about active partition, directory, file, link target
If you want to sort your projects and notes by time, change the sort mode for each column
Set the number of columns, for each board
Set the height of thumbs
Toolbar
The hint bar shows hints for controls over which the mouse is moved
Quickly change to a new set of colors

Simplicity

- **Less is More**
  - Omit extraneous information, graphics, features

- **Hick's Law:**
  - time to make a decision is proportional to log(# choices)

Google Search I'm Feeling Lucky

Whenever your local SMS Administrator sends you an actual software Package, the SMS Package Command Manager will appear (usually at network logon time) displaying the available Package(s). The following screenshots display screens similar to what you will see when you receive an actual SMS Package.

To start the demonstration, click the "CLICK HERE" button at the bottom of the screen.

Simplicity, cont.

- **Good graphic design**
  - Few, well-chose colors and fonts
  - Group with whitespace
- **Use concise language**
  - Choose labels carefully

How not to design

https://www.uxpin.com/studio/blog/10-worst-design-failures-of-all-times/

How do users hold phones

- http://www.uxmatters.com/mt/archives/2013/02/how-do-users-really-hold-mobile-devices.php

- http://scotthurff.com/posts/how-to-design-for-thumbs-in-the-era-of-huge-screens