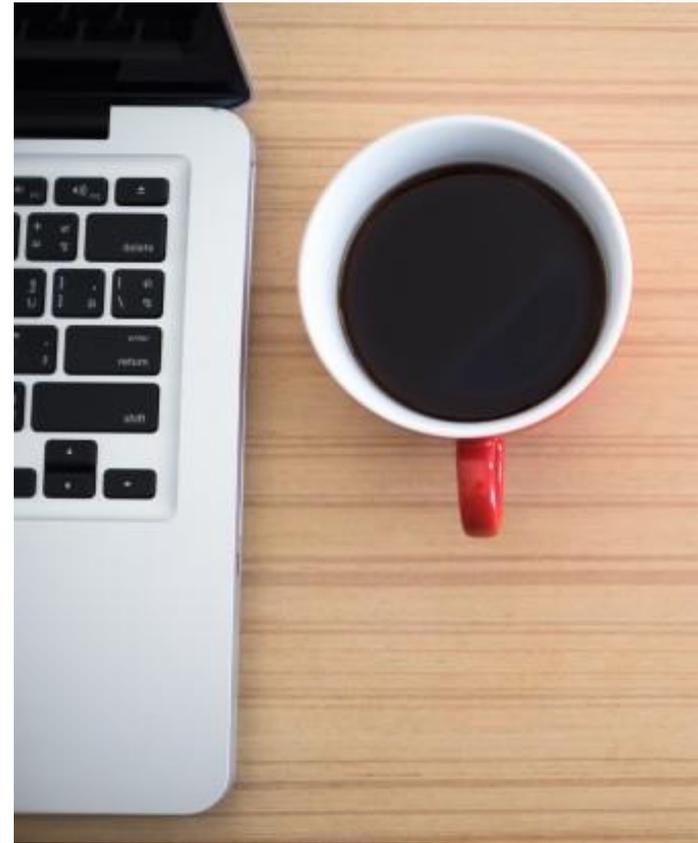


Lecture Objectives

- ✓ To suggest some general design principles for user interface design
- ✓ To explain different interaction styles and their use
- ✓ To introduce usability attributes and approaches to system evaluation



The User Interface

- ▶ User interfaces should be designed to match the skills, experience and expectations of its anticipated users.
- ▶ System users often judge a system by its *interface* rather than its *functionality*.
- ▶ A poorly designed interface can cause a user to make catastrophic errors.
- ▶ Poor user interface design is the reason why so many software systems are never used.

Human Factors in Interface Design

- ▶ **Limited short-term memory**
 - ▶ People can instantaneously remember about 7 items of information. If you present more than this, they are more liable to make mistakes.
- ▶ **People make mistakes**
 - ▶ When people make mistakes and systems go wrong, inappropriate alarms and messages can increase stress and hence the likelihood of more mistakes.
- ▶ **People are different**
 - ▶ People have a wide range of physical capabilities. Designers should not just design for their own capabilities.
- ▶ **People have different interaction preferences**
 - ▶ Some like pictures, some like text.

Design Principles (1/2)

- ▶ **User familiarity**
 - ▶ The interface should be based on user-oriented terms and concepts rather than computer concepts. For example, an office system should use concepts such as letters, documents, folders etc. rather than directories, file identifiers, etc.
- ▶ **Consistency**
 - ▶ The system should display an appropriate level of consistency. Commands and menus should have the same format, command punctuation should be similar, etc.
- ▶ **Minimal surprise**
 - ▶ If a command operates in a known way, the user should be able to predict the operation of comparable commands

Design Principles (2/2)

▶ Recoverability

- ▶ The system should provide some resilience to user errors and allow the user to recover from errors. This might include an undo facility, confirmation of destructive actions, 'soft' deletes, etc.

▶ User guidance

- ▶ Some user guidance such as help systems, on-line manuals, etc. should be supplied

▶ User diversity

- ▶ Interaction facilities for different types of user should be supported. For example, some users have seeing difficulties and so larger text should be available

Interaction Styles (1 / 2)

- ▶ Direct manipulation
- ▶ Menu selection
- ▶ Form fill-in
- ▶ Command language
- ▶ Natural language

Interaction Styles (2/2)

Interaction style	Main advantages	Main disadvantages	Application examples
Direct manipulation	Fast and intuitive interaction Easy to learn	May be hard to implement. Only suitable where there is a visual metaphor for tasks and objects.	Video games CAD systems
Menu selection	Avoids user error Little typing required	Slow for experienced users. Can become complex if many menu options.	Most general-purpose systems
Form fill-in	Simple data entry Easy to learn Checkable	Takes up a lot of screen space. Causes problems where user options do not match the form fields.	Stock control, Personal loan processing
Command language	Powerful and flexible	Hard to learn. Poor error management.	Operating systems, Command and control systems
Natural language	Accessible to casual users Easily extended	Requires more typing. Natural language understanding systems are unreliable.	Information retrieval systems

Guidelines on Color Use

- ▶ Limit the number of colors used and be conservative in their use.
- ▶ Use color change to show a change in system status.
- ▶ Use color coding in a thoughtful and consistent way.
- ▶ Be careful about color pairings.

Guidelines for Designing Forms

- ▶ **Form layout**
 - ▶ Existing paper form
 - ▶ Alternatively, use multiple windows to avoid cluttering
 - ▶ Required and frequently entered information on top
 - ▶ Align the fields. Arrange controls in the sequence user expects to enter data.
 - ▶ Put similar or related information together and put visual effects to emphasize grouping.

Guidelines for Designing Forms...

- ▶ **Command Buttons:**
 - ▶ Command buttons should be stacked along the upper right border of the screen or lined up across bottom of the screen.
 - ▶ Group the related command buttons together (e.g. OK and Cancel)
 - ▶ Make buttons of consistent length
 - ▶ Default command button
 - ▶ Use active verb as command text
- ▶ Use proper tab-sequence
- ▶ Automatic completion

Guidelines for Menu Design

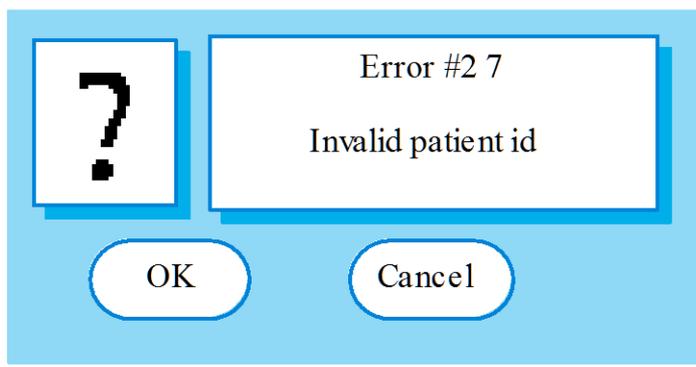
- ▶ Menu organization
- ▶ Keyboard shortcuts
- ▶ Toolbar for most frequent operations
- ▶ Pop-up menus for contextual operations and efficiency

Guidelines on Error Messages

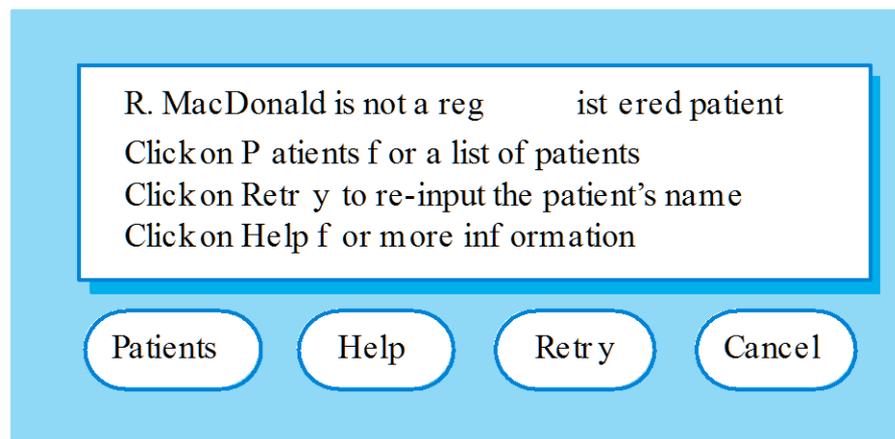
- ▶ Error message design is critically important. Poor error messages can mean that a user rejects rather than accepts a system.
- ▶ Messages should be polite, concise, consistent and constructive.
- ▶ The background and experience of users should be the determining factor in message design.

Good and Bad Message Design

System-oriented error message



User-oriented error message



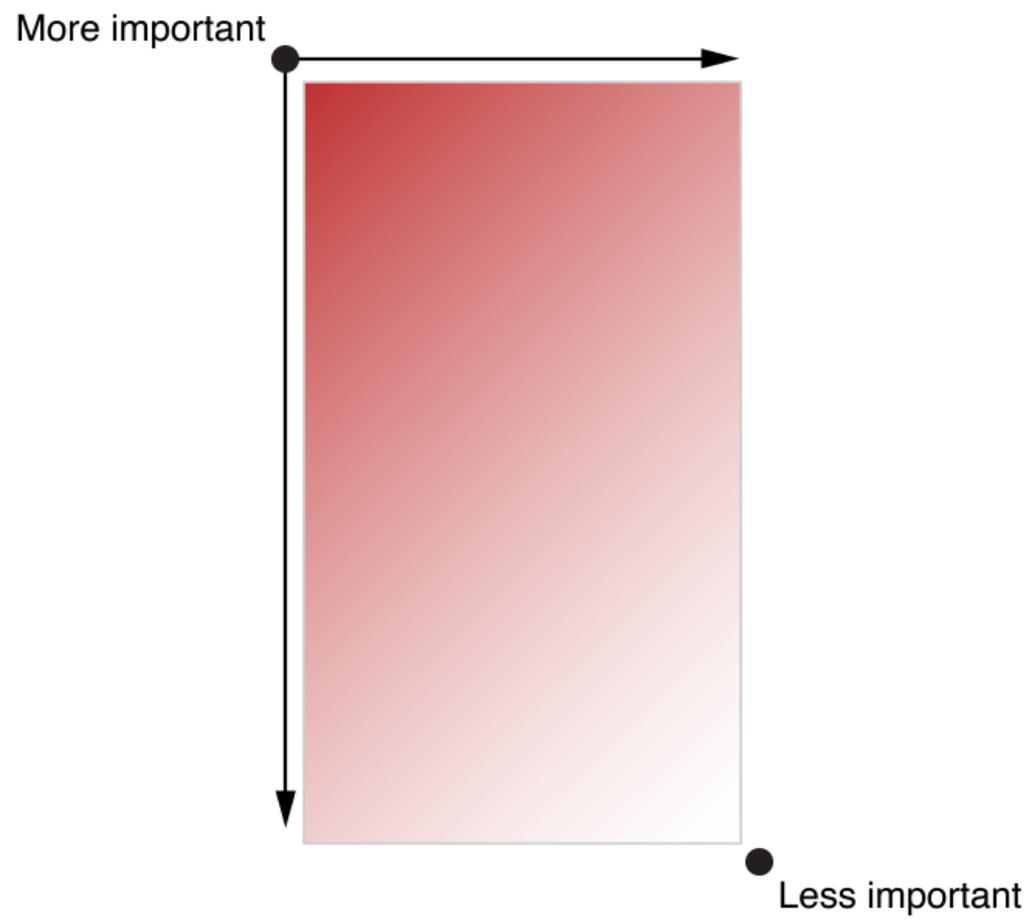
Poor	Better
Run-Time error '-2147469 (800405): Method 'Private Profile String' of object 'System' failed.	Virtual memory space consumed. Close some programs and retry.
Resource Conflict Bus: 00 Device: 03 Function: 01	Remove your compact flash card and restart
Network connection refused.	Your password was not recognized. Please retype.
Bad date.	Drop-off date must come after pickup date.

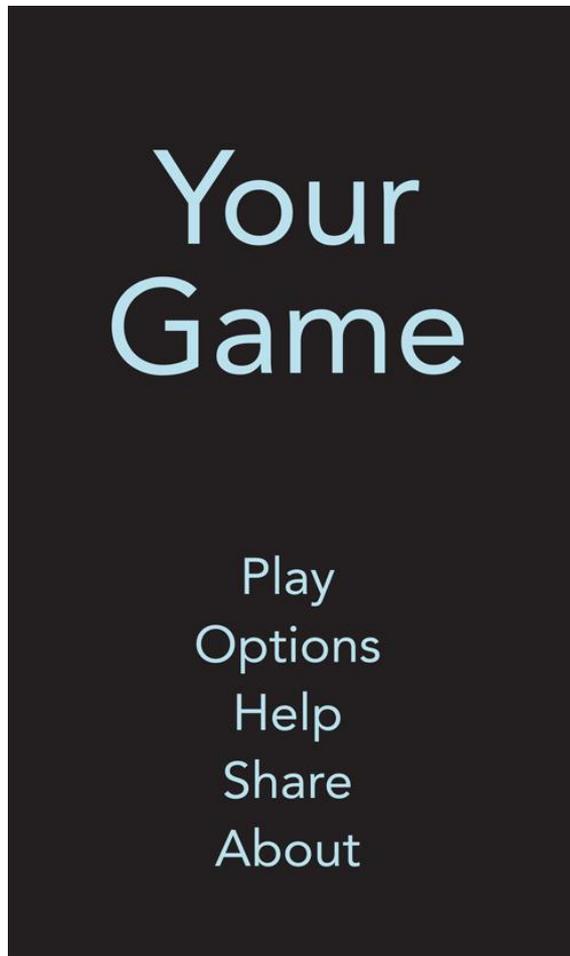
Guidelines on Webpage design

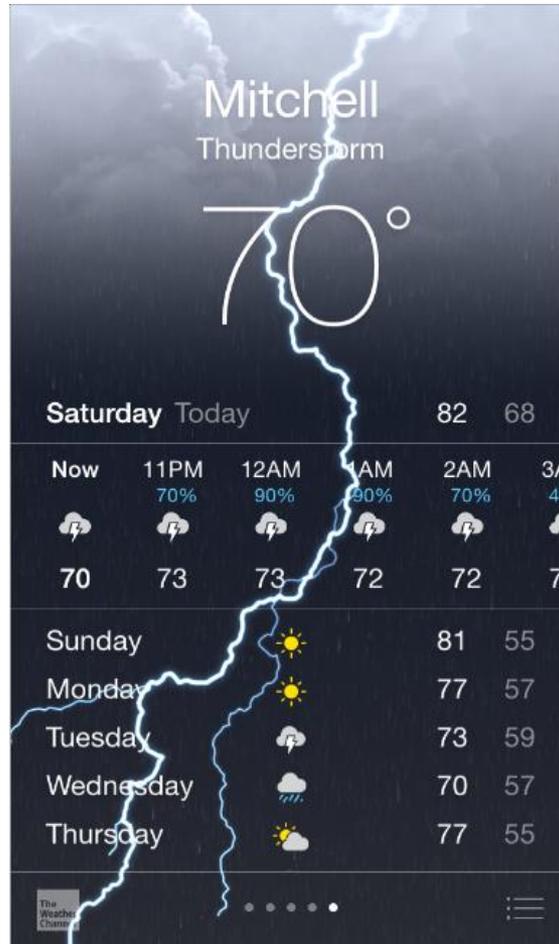
- ▶ Minimize page download time
- ▶ Warn of 'time outs'
- ▶ Provide feedback when users must wait
- ▶ Provide text equivalents for non-text elements
- ▶ Check for broken/dead links
- ▶ Portability requirement:
 - ▶ Design for common browsers
 - ▶ Design for popular operating systems
 - ▶ Design for commonly used screen resolutions

Guidelines on User Interface for Mobile Device

- ▶ Take advantage of the whole screen
- ▶ Thumb-face size buttons
- ▶ Ensure legibility by using the system fonts
- ▶ Make sure that users can understand primary content at its default size
- ▶ Avoid asking users to rate your app too soon.
- ▶ When your app restarts, restore its state so users can continue where they left off
- ▶ In general, use a single font throughout your app







More Guidelines...

User Manuals, Online Help, and Tutorials

- ▶ Paper vs online manuals
- ▶ Content of the manual
- ▶ Context sensitive and interactive helps
- ▶ Tutorials and demonstrations
- ▶ FAQ and Customer care

Usability Attributes

Attribute	Description
Learnability	How long does it take a new user to become productive with the system?
Speed of operation	How well does the system response match the user's work practice?
Robustness	How tolerant is the system of user error?
Recoverability	How good is the system at recovering from user errors?

References



1. Ben Shneiderman, and Catherine Plaisant, Designing the user interface, 5th Edition, Pearson Addison-Wesley, 2010
 2. iOS Human Interface Guidelines
 - <https://developer.apple.com/library/ios/documentation/UserExperience/Conceptual/MobileHIG/>
 3. User Interface | Android Developer
 - <https://developer.android.com/guide/topics/ui/index.html>
 4. Usability Guidelines
 - <http://guidelines.usability.gov/>
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