CHARACTERISTICS OF A WELL DESIGNED UI

- Affordances – each operation is visible
- Mapping – the relationship between the actual action of the device and the action of the user is made obvious
- Feedback – user's actions are acknowledged

CHARACTERISTICS OF A WELL DESIGNED UI

- Conceptual model – describes the behaviour of the device
- Forcing functions – prevents users from making errors
- Automatic learning – provides consistencies and practice to support user interface skills

AFFORDANCES

- The design must in some way describe what the user is supposed to do with the item.
- What operations are available to the user?
- Two types: cognitive and physical
  - Cognitive (thinking about an item)
  - Physical (looking at the item)

AFFORDANCES

- Quite possible most important usability concept
- High percentage of usability problems are affordance problems
- Good cognitive affordance reduces need for training, user manuals, help, support
- Cognitive affordances help users:
  - Know what to do next
  - Know how to do it
  - Steer away from doing wrong things (errors)
  - Be aware of alternatives, short cuts
  - Be aware of modes (edit mode vs command mode)

AFFORDANCES

- Use effective visual cues to show what's available
- Consistency in design supports learning
- Use precise word choices for labels and menus
- Menus, buttons, icons, and Tool Tips are where users will look for affordances to commands

MAPPING

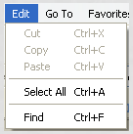
- The design indicates a relationship between the use of the tool and the action of the technology.
- What will happen when the tool is used?
- Good mapping: car steering wheel
- Poor mapping: shutdown computer

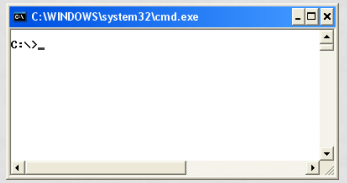
CONCEPTUAL MODELS

- An understanding that a user will have about how a device or technology works
- If you perform action A, then result B will occur.
- "WYSIWYG"
- Drag and Drop

FORCING FUNCTIONS

- Designs that prevent the user from taking actions that are not appropriate and lead to errors.
- What prevents the user from performing action X?





FEEDBACK

- A form of visual, auditory or other response is given immediately after the user action to indicate the action has been received
- sometimes called "causality"

UI SLOGANS

- Make it hard for the user to make errors.
- Make it easy for a beginner to become an expert.
- Involve the user in the UI design.
- Things that look the same should act the same.
- Testing, testing, testing.
- The best interface is one the user doesn't notice.

EIGHT GOLDEN RULES OF UI DESIGN

1. Strive for consistency
2. Cater to universal usability
3. Offer informative feedback
4. Design dialogs to yield closure
5. Offer error prevention and simple error handling.
6. Permit easy reversal of actions.
7. Support internal locus of control
8. Reduce short-term memory load.

Schneiderman, Ben Designing the User Interface, 3rd Ed

1. STRIVE FOR CONSISTENCY

- One of the goals of usability is : make it easy for users to learn and remember how to do tasks "*learnability*"
- Principle of Least Surprise
  - Similar things should look and act the same
  - Different things should look different

1. STRIVE FOR CONSISTENCY

- Terminology, use of words – e.g. a "folder" or a "directory"; is "quit" same action as "logout" ?
- Prompts – dialogue window icons
- Menu design – layout, location, shortcuts
- Help screens - location
- Colours – consistent meaning
- Layout – content, navigation areas
- Capitalization /Fonts - aesthetics

1. STRIVE FOR CONSISTENCY

Enforcing consistency can lead to problems

First letter in a menu is the shortcut letter (alt-F for File, alt-E for Edit, alt-H for Help)

What should happen if more than menu entry share the same first letter? (e.g. Save, Save As, Spell, Style)

Break the consistency rule? Increase learning burden on user – potential increase of error-prone usage.

2. CATER TO UNIVERSAL USABILITY

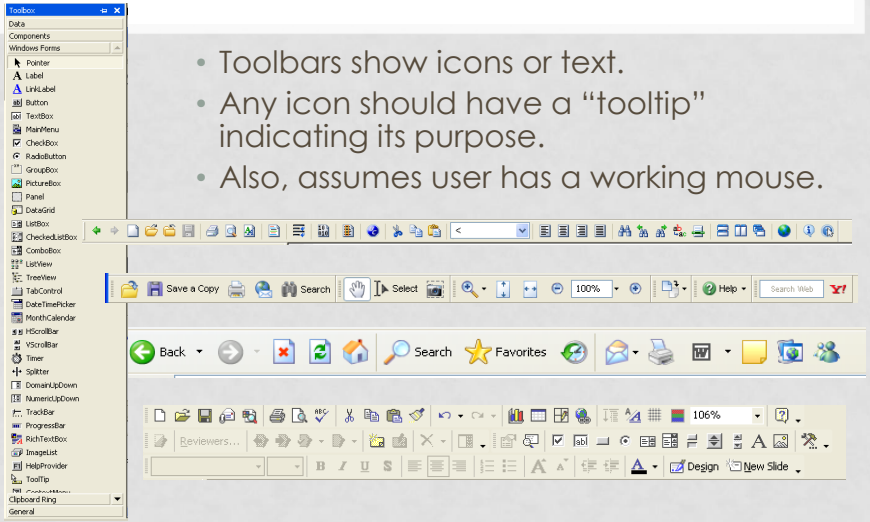
You design one interface yet it must be usable by many users from a spectrum of capabilities and proficiencies.

Cater to the novice and the expert.

2. CATER TO UNIVERSAL USABILITY

- Abbreviations
  - Ctrl-C for copy, Ctrl-V for paste, Ctrl-X for cut
  - Alt-key menu shortcuts
- Function keys for experts
- Macro facilities
- Add features for novices, such as explanations, tooltips
- Context-sensitive help (right click on icon and select "?")

2. CATER TO UNIVERSAL USABILITY



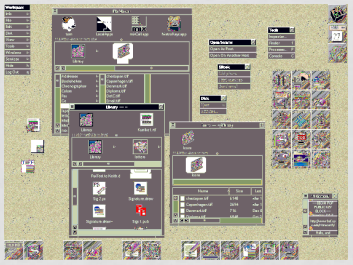
- Toolbars show icons or text.
- Any icon should have a "tooltip" indicating its purpose.
- Also, assumes user has a working mouse.

2. CATER TO UNIVERSAL USABILITY

- Microsoft introduced "BOB" in early 1995
- It was supposed to replace Windows 3.1 and Windows 95 for novice users.
- It was "too cute" for average users at that time.
- Most people who wanted ease of use opted for a Mac instead.
- Many of the objects in the room started applications – some were just decoration.
- Wasn't considered worth the extra $100 cost.

2. CATER TO UNIVERSAL USABILITY

Toward the end of 1989 Steve Jobs shipped his NeXT computer. At $6000 – twice the price of a PC or a Mac then.



A sophisticated interface at that time didn't translate into big sales – only 50,000 units were built. It was at this time that Tim Berners-Lee was developing a new language for enabling point and click between computers – HTML – on his NeXT computer.

3. OFFER INFORMATIVE FEEDBACK

- User should never have to guess what to do next
- Always show the progress of any ongoing process – good use of animation
- For every user action, there should be some system feedback – e.g. MS Word displays a moving icon in status bar as you type
- Response time:
  - < 0.1 sec – instantaneous
  - 0.1 – 1 sec – user notices, but no feedback needed
  - 1.0 – 5.0 sec – display busy cursor
  - > 1.0-5.0 sec – display progress bar

3. OFFER INFORMATIVE FEEDBACK

Avoid using these terms in your error messages:

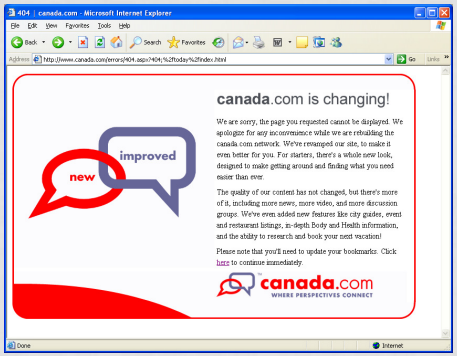
- Syntax error
- Invalid data
- Invalid filename
- Application has terminated unexpectedly due to system error 459A23-1039.
- Network error
- Access denied
- Forbidden
- Bad User

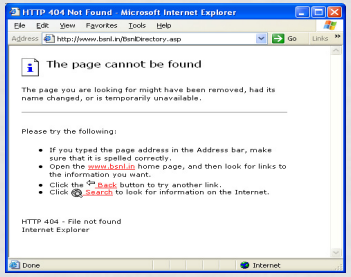
3. OFFER INFORMATIVE FEEDBACK

Guidelines for Error Messages:

- Don't condemn – indicate what users need to do next
- Avoid terms like FATAL, ERROR, INVALID, BAD, and ILLEGAL
- Avoid long code numbers and uppercase letters
- Audio warnings should be under the user's control
- Messages should be precise
- Provide context-sensitive help
- Use multiple levels to avoid too much text

3. OFFER INFORMATIVE FEEDBACK





Wrong URL entered in canada.com – redirects to home page after 5 seconds.

4. DESIGN DIALOGS TO YIELD CLOSURE

- sequences of actions should be organized into groups with beginning, middle and end
  - e.g. installing new software
  - E-commerce : select the product to the checkout, confirm to complete transaction

5. OFFER ERROR PREVENTION AND SIMPLE ERROR HANDLING

- Design the interface to limit choices, e.g. entering a province – use a drop down list of existing province names not a text box
- Gray out menu items not appropriate
- Make error messages meaningful to the novice user
- Good error messages are (a) precise, (b) speak the user's language avoiding terms and details, (c) give constructive help, and (d) be polite

6. PERMIT EASY REVERSAL OF ACTIONS

- Let the user know which actions can be undone
- If any action cannot be undone, user should be provided with a warning message
- Minimize anxiety for novice users
- All dialog boxes should have a Cancel button
- User should never feel "trapped" by the interface

7. SUPPORT "INTERNAL LOCUS OF CONTROL"

Background

- People with an *internal* locus of control believe that they control their own destiny. They also believe that their own experiences are controlled by their own skill or efforts.
- "The more I study, the better grades I get" (Gershaw, 1989).

7. SUPPORT "INTERNAL LOCUS OF CONTROL"

People who tend to have an *external* locus of control tend to attribute their experiences to fate, chance, or luck.

- E*xternal locus of control:* If a student attributes either their successes or failures to having a bad day, unfair grading procedures on their teacher's part, or even God's will, they can be said to have a more external locus of control.

  These students might say, "It doesn't matter how hard I study. The teacher just doesn't like me, so I know I won't get a good grade." These students generally don't learn from previous experience. Since they attribute both their successes and failures to luck or chance, they tend to lack persistence and not have very high levels of expectation.

6.7 SUPPORT "INTERNAL LOCUS OF CONTROL"

Personal online test:
http://www.wilderdom.com/psychology/loc/LocusOfControlWhatIs.html

7. SUPPORT "INTERNAL LOCUS OF CONTROL"

- Reinforce impression user is in control not the system
- Were any system actions a "surprise"?
- Data entry made tedious?
- Difficulty in obtaining necessary information?
- Ability to produce the desired action
- User can customize appearance of the application

8. REDUCE SHORT-TERM MEMORY LOAD

- Use of graphics images
- Animation sequences
- Abbreviations
- Mnemonics
- Simplify the menu design
- Use the "7 plus or minus 2" rule
- Strive for "recognition" not "recall"
- Shortcuts on desktop, bookmarks in browser

8. REDUCE SHORT-TERM MEMORY LOAD

- Norman (in The Design of Everyday Things) makes the distinction between knowledge in the head, which is hard to get in there and still harder to retrieve, and knowledge in the world, which is far more accessible
- Knowledge in the world – documentation, button labels, menus and signs
- Knowledge in the head – command languages

ONE MORE DESIGN HEURISTIC

"Less is More"

- Leave out any extraneous details, graphics, features
- Simplicity rules
- If a feature is never used, there's no reason for it to clutter up your interface
- Use only a few, well-chosen colours and lots of white space
- See Dropbox

EIGHT GOLDEN RULES OF USER INTERFACE DESIGN

Where are the UI design errors ?

CONCLUSION

- HCI is a growing discipline
- UI design is a **science** and **art**
- Software development is not the same as UI design
- Good UI designers are in demand – they are not necessarily programmers!

UI SLOGANS

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REFERENCES

- User-Centered Website Development by Daniel D. McCracken, Rosalee J. Wolfe
- MIT Open CourseWare on User Interface Design and Implementation
- Human-Computer Interaction by Jenny Preece
- Designing the User Interface by Ben Schneiderman and C. Plaisant