

Interface Design

Graphicsl User Interface: Into Windows World from Green Screen World

- User Control
- Responsiveness
- Customization
- Directness
- Consistency
- Clarity

User Control

- Users are more free, they have more control: remember 1, 2, 3, 4 menu items?
- It should clearly indicate when system seizes control away from the user: example?

Responsiveness

- Users get bored much more quickly and do anything fast.
- Add some distraction.
- Tangible and immediate and understandable feedback.

Customization

- Not every user has the same needs: data entry person, management, etc
- the programmer can leave many of the personalization tasks to the users
- Ex: reorder or resize columns in grid display - careful: some users may eliminate critical columns
- Color customization?

Directness

- Old times: command + object declaration
- Currenttime: find object, then action or drag and drop
- Object action paradigm, point and shoot
- User can retrieve a list of objects and apply actions from a button bar or menu
- Different definition of directness
 - speed of input for the frequent user
 - ease of learning for casual user
 - flexibility of information manipulation for “what if” user

Consistency

- Consistent with the world in which users live and work
 - terminology in information modeling
- Consistent within the application
 - standard look and feel, menu names, button names and placement
- To achieve consistency:
 - Thou shalt beg
 - Thou shalt borrow,
 - Thou shalt steal,
 - Thou shalt covet thy neighbor's application

Clarity

- We didn't care about the clarity. Remember cryptic codes, abbreviations and mnemonics
 - INV_CD, STORE_NBR, PMT_TRM, CRR_CDE, DISC_CD
 - The new system must include the 4250 report or weekly sales by manager report?
- Now, we have capability, example
 - typing order number or customer number to retrieve their record - old way, why?
 - allow partial string match for more common data elements such as name and return a list of candidates - new way, why?

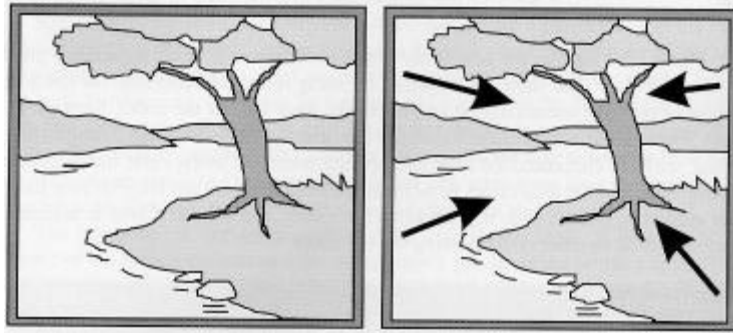
Clarity continues

- getting rid of cryptic codes: what are the tradeoffs?
- Rules when eliminating control tables from a old system
 - The data values must be invariant
 - The data values must not be too long
 - The data values must have no other attributes
 - Any code dependent on the code or the values?
 - Communicating with other systems?
- Numeric coding: User have to remember and awkward gaps in sequence

Aesthetics

- Draw the eye toward the most important info
- Start from the upper left center of the screen and quickly scan in a clockwise direction
- Pleasing aesthetics for Western cultures
 - a sense of balance, use of regularly spaced and aligned elements,
 - symmetry, sense of proportion, predictable patterns
 - economy of styles, colors and techniques,
 - sequential arrangement of elements to guide the eye
 - unity of related ideas, grouping

White Space or Negative Space



Ill defined negative space, poor balance, poor alignment

Sales Representative Maintenance

Name: Fenwick Hull Cycle: ☒ Monthly ☐ Quarterly ☐ Annually

Address: 2463 NW Harrison Avenue
Suite 100 Payment Method: ☐ Payroll ☒ Check ☐ Wire Transfer

City: Bellevue State: WA Zip: 98008

Phone: 206-555-5678

Bank: Galactic Savings & Loan

Address: Universe Tower
2500 First Avenue

City: Seattle State: WA

Phone: 206-555-5432 Zip: 98101

Account #: 79841-456716

Comment:
Commission is paid on fully-cleared
invoices only

Product Lines	Commission
The Bee	3.0%
Jones & Jones	2.5%
Wacko	3.0%

Save Close

Better?

The screenshot shows a 'Sales Representative Maintenance' window with the following sections:

- Sales Representative:**
 - Name: Ferwick Hut
 - Address: 2463 NW Harrison Avenue, Suite 100
 - City: Bellevue, State: WA
 - Phone: 206-555-5678, Zip: 98008
- Bank:**
 - Name: Galactic Savings & Loan
 - Address: Universe Tower, 2500 First Avenue
 - City: Seattle, State: WA
 - Phone: 206-555-5432, Zip: 98101
 - Account #: 79841-456716
- Payment Terms:**
 - Cycle: ☒ Monthly, ☐ Quarterly, ☐ Annually
 - Method: ☒ Check, ☐ Payroll, ☐ Wire Transfer
- Comment:** Commission is paid on fully-cleared invoices only.
- Product Lines:**

Product Lines	Commission
The Best	3.0%
Jones & Jones	2.5%
Wacko	3.0%

Buttons: Save, Close

Tips and Tricks for cluttering windows

- Look at the data model for split
- How many business events on the screen?
- Normal transaction and exception event
- Two overlapping windows?
- Reduce number of elements at first sight
- Use colors sparingly

Forgiveness

- Encourage exploration and forgive their mistake, provide way to cop out
 - undo
 - cancel
 - confirm changes
 - confirm deletion
 - explicit save (especially in mission critical database update)

The Human

- Information received and responses given via input-output channels
- Information stored in memory
- Information processed and applied in various ways
- ➔ Limitations on human should be considered in interface design

Reasons for Unfriendly User Interface

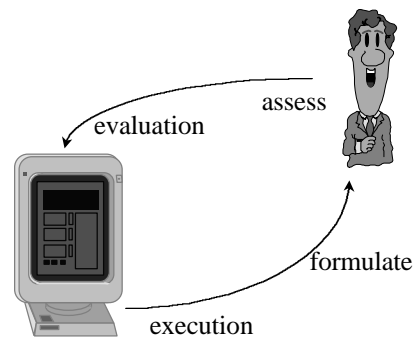
- We think logically, not visually
- We design based upon our own experience
- We evaluate (judge) our users actions
- We want our programs to take control
- We think in terms of generalities
- We structure for the machine, not the mind of the user

Avoiding These Pitfalls

- Involve Client/Users
- Understand Requirements
- Prototype your Design
- Demonstrate, Test, and Retest

Norman's Interaction Framework

- User establishes a goal
- Formulates intention
- Determines actions for interface
- Executes action at interface
- Perceives change in system
- Interprets system state
- Assesses compared goal



Gulf of Interaction

- Why are some systems harder to use than others?
 - Gulf of Execution
 - difficult to translate intention into action at interface
 - Gulf of Evaluation
 - difficult to interpret state of interface in terms of the expected outcome

Bridging the Gulf

- User - task language
 - psychologically significant attributes found in a person's mental model.
 - balance checkbook
 - System - design language
 - computationally significant attributes found in the computational model
 - sum all check, subtract from previous balance, ...
- ? At a “high-level”, can these languages be similar?

Designing Friendly Systems

Software as a communication medium.

- Who are you talking to?
- What do you want to say and ask?

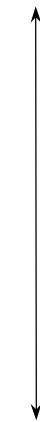
Is Interface design engineering or craft.

- Software Engineer
- Systems Developers
- Interface Designer

Evolution of Interface Design

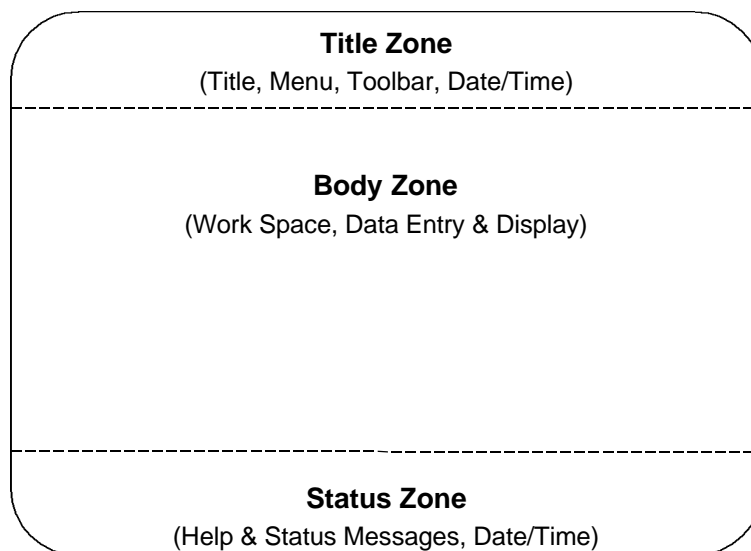
- Mainframe/minicomputers
 - command-oriented, cryptic abbreviations
 - maximizes machine efficiency
- Visicalc/Lotus/Excel
 - spreadsheet metaphor
 - text instructions plus visual arrangement
- XeroxStar/Macintosh/Windows/Motif
 - added graphic interface, standardization
- Next/WWW/multimedia
 - adds voice and video

Sparse

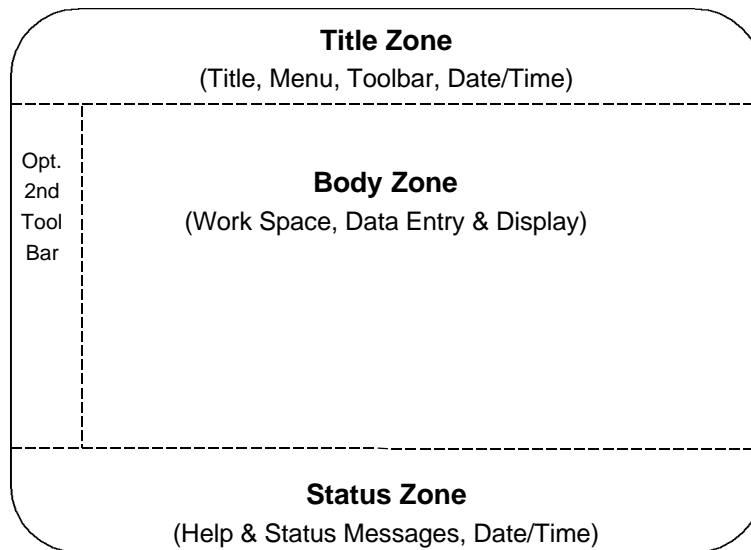


Rich

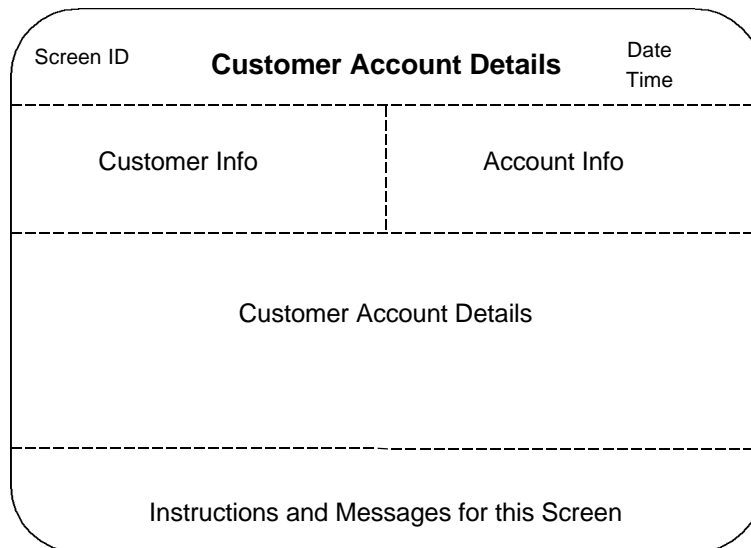
Windows Standard Layout



Windows Standard Layout

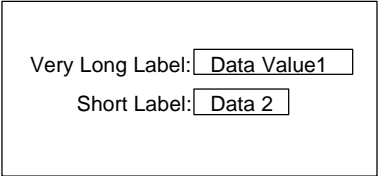


Example of Standard Layout



Design Notes

- Screen Layout
 - group related elements (with box or color)
 - maintain consistent positioning
 - use blank space effectively
- Data Elements
 - right justify labels
 - left justify data
 - use boxes for related data



Very Long Label:

Short Label:

Design Notes

Tone and terminology (style)

- use simple grammatically correct sentences
- don't try to be funny
- don't be condescending
- use clear terminology
 - avoid computer jargon
 - avoid abbreviations
 - use simple terms
 - use consistent terms

Design Notes

- make user aware of what to do next
- use consistent location
- limit to one idea per zone or page
- display messages long enough be read
- use display attributes sparingly
- use F-key shortcuts for common functions
- specify default values where applicable
- anticipate common errors

Interaction Styles

- command language (instruction set)
- question/answer dialogue
- menu selection
- natural language/virtual reality
- WIMP

Command language (instruction set)

Strengths:

- fast for expert
- flexible
- machine efficient

Weaknesses:

- requires human recall
- can be cryptic
- poor for novice

Natural language / virtual reality

Strengths:

- very rich
- uses additional senses
- immersive, "interface"
can disappear

Weaknesses:

- processor intensive
- cumbersome devices
- tech not mature

Question/answer dialogue

Strengths:

- easy for novice
- minimal info load
- handles complex input sequences

Weaknesses:

- users loose control
- slow method
- can be tedious

Menu selection

Strengths:

- easy for novice
- minimal info load
- compromise between command language and question/answer dialogue

Weaknesses:

- slow for expert
- too many choices or levels can be confusing

Notes on Menu

- all menu items have corresponding alpha code
 - e.g... File Edit Draw **C**ustomer **S**upplier
- selection by alpha code for experts
 - e.g..., <alt>FS = file save
- selection by pointer or cursor for novices
 - e.g... point with mouse, arrow key, etc...
- supports incremental learning

Note on Menu

Menu item presentation guidelines

- use concise, familiar, consistent terminology
 - e.g..., menu item name becomes title of next screen
- sequence items carefully
 - e.g... by frequency of use, grouped by function, etc...
- balance breadth Vs.. depth
 - e.g.. 7 ± 2 human limitations (but beware of depth)

WIMP

- **W**indows, **I**cons, **M**ouse, **P**ointer

Strengths:

- easy for novice
- minimal info load
- improved recognition
- visually appealing

Weaknesses:

- may be slow for experts
- not natural to some
- machine intensive

Notes on WIMP

- Icons

- offers shortcut in graphic mode
- adapt external standard if available
- test on users



- Command (Push) Buttons

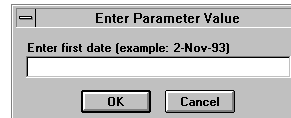
- trigger a process
- graphic or with concise label
- use consistent size, location, label



Notes on WIMP

- Dialog Boxes

- “pop up” as necessary
- provide appropriate options
- ask for details about current operation



- List and Combo Boxes

- useful for showing limited number of choices
- combo boxes also allow entry of items not on list
- may stay open or drop down if space is limited



Notes on WIMP

- Spin Button

- to select digital value from finite sequence



- Slider Bar

- to select analog value from finite range



- Radio Button

- to select one mutually exclusive choice



- Check Box

- to select multiple binary choices



Summarizing Dialogue Design

- strive for consistency
- offer shortcuts for frequent users
- offer informative feedback, closure
- simplify error handling, reversal
- support user control
- minimize memory load

Summarizing Interface Design

- Know your user
- Know your user's requirements
- Let user try interface with prototype
- Keep it simple
- Use clear layout
- Keep it consistent
- Provide helpful messages
- Tailor for dominant type of user

Prototyping

- Identify user requirements
- Develop a prototype
- Use prototype
- Revise

Prototyping or Pilot?

- An iterative process of quickly and inexpensively creating a real, working, demonstration system
- Build economically and quickly with the intention of being modified
- Simulation and experimentation