

User Interface, Input and Output Design

Peter Lo

User Interface Design

- User interface design requires an understanding of Human-Computer Interaction (HCI) and user-centered design principles.

8 User-centered Design Principles

1. Understand the Underlying Business Functions
2. Maximize Graphical Effectiveness
3. Profile the System's Users
4. Think like a User
5. Use Prototyping
6. Design a Comprehensive Interface
7. Continue the Feedback Process
8. Document the Interface Design

Good User Interface Design

- Good user interface design is based on a combination of Ergonomics (人類工作學), Aesthetics (知覺), and Interface Technology.
 - ◆ Ergonomics – How people work, learn and interact with computer.
 - ◆ Aesthetics – How an interface attractive and easy to use.
 - ◆ Interface Technology – Provide the operational structure for design objective.

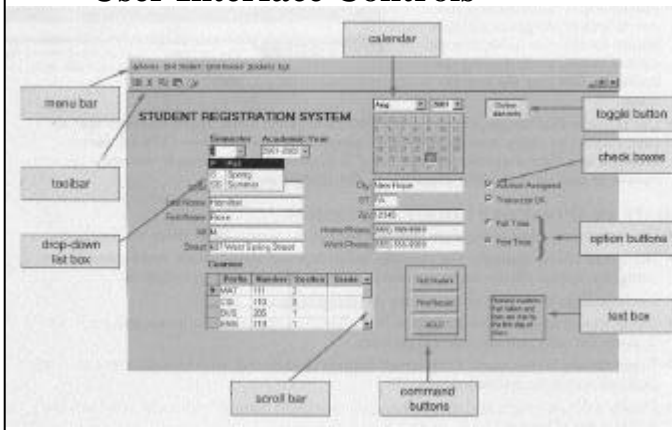
User Interface Design Guidelines

- Focus on Basic Objectives
- Build an Interface that is Easy to Learn and Use
- Provide Features that Promote Efficiency
- Make it Easy for Users to Obtain Help or Correct Errors
- Minimize Input Data Problems
- Provide Feedback to Users
- Create an Attractive Layout and Design
- Use Familiar Terms and Images

User Interface Controls

- The designer can include many control features, such as Menu Bars, Toolbars, Dialog Boxes, Text Boxes, Toggle Buttons, List Boxes, Scroll Bars, Drop-down List Boxes, Option Buttons, Check Boxes, Command Buttons, Spin Bars, and Calendars among others.

User Interface Controls



Input Design Issues

- **Data Capture** is the identification and recording of source data.
- **Data Entry** is the process of converting source data into computer-readable form and entering it into the information system.

6 Main Input Design Objectives

1. Select a suitable input and data entry method
2. Reduce input volume
3. Design attractive data entry screens
4. Use validation checks to reduce input errors
5. Design required source documents
6. Develop effective input controls

Input and Data Entry Methods

- Input processes should be efficient, timely and logical.
- Two major input methods:
 - ◆ Batch Input
 - ◆ Data entry is performed on a specified time schedule, such as daily, weekly, monthly, or longer.
 - ◆ Online Input
 - ◆ Offers major advantages, including the immediate validation and availability of data.

Input Volume

- To reduce input volume, you must reduce the number of data items required for each transaction.
- Guidelines:
 - ◆ Input necessary data only.
 - ◆ Do not input data that the user can retrieve from system files or calculate from other data.
 - ◆ Do not input constant data.
 - ◆ Use codes.

Data Entry Screens Design

- Restrict user access.
- Provide a descriptive caption.
- Display a sample format
- Require ending keystroke for every field.
- Do not require users to type leading zeroes for numeric fields.
- Do not require users to type trailing zeroes for numbers that include decimals.
- Display default values.
- Use a default value when a field value will be constant.

Data Entry Screens Design

- Display list of acceptable values.
- Provide a way to leave the data entry screen at any time.
- Provide users with an opportunity to confirm the accuracy of input data before entering it
- Provide a means for users to move among fields on the form in a standard order or in any order they choose.
- Design the screen form layout to match the layout of the source document.
- Allow users to add, change, delete, and view records.
- Provide a method to allow users to search for specific information.

Input Errors Validation

- Reducing the number of input errors improves data quality.
- Some data validation checks:
 - ◆ Sequence checks.
 - ◆ Existence checks.
 - ◆ Data type checks.
 - ◆ Range checks.
 - ◆ Reasonableness checks.
 - ◆ Validity checks.
 - ◆ Combination checks.
 - ◆ Batch controls.

Source Documents Design

- A source document is a form used to request and collect input data, trigger or authorize an input action, and provide a record of the original transaction.

Input Control

- Input control includes the necessary measures to ensure that input data is correct, completed and secure.
 - ◆ Audit trail
 - ◆ Records the source of each data item and when it entered the system. Show how and when data is accessed or changed, and by whom.
 - ◆ Data security
 - ◆ Protects data from lost or damage and recovers data when it is lost or damaged.

Output Design Issues

- Some questions to consider before designing output:
 - ◆ What is the purpose of the output?
 - ◆ Who wants the information, why it is needed, and how will it be used?
 - ◆ What specific information will be included?
 - ◆ Will the output be printed, viewed on-screen, or both?
 - ◆ When will the information be provided, and how often must it be updated?
 - ◆ Do security or confidentiality issues exist?

Types of Output

- Internet-Based Information Delivery.
- E-Mail.
- Audio Output.
- Automated Facsimile Systems.
- Computer Output Microfilm (COM).

Specialized Forms Of Output

- Retail point-of-sale terminals
- Automated teller machines (ATM)
- Special-purpose printers
- Plotters
- Digitized photos
- Programmable devices

Printed Output

- Detail Report
 - ◆ A detail report produces one or more lines of output for each record processed. Each line of output printed is called a detail line.
- Exception Report
 - ◆ An exception report displays only those records that meet a specific condition or conditions.
- Summary Report
 - ◆ Upper-level managers often want to see total figure and do not need supporting details.

Detailed Report

- Lists one record per line

DETAILED ORDER REPORT for May 21, 2003

Part Number	Part Description	Customer	Quantity Purchased
1788	stapler	Starlight Foods	15
		Wilson Automotive	40
		Victor Lighting	13
2372	postage scale	Regal Camera	1
		Wilson Automotive	4
3029	letter opener	AAA Rentals	25
		Starlight Foods	10
8942	bulletin board	Wilson Automotive	8

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Exception Report

- Identifies data outside of normal condition
- Conditions, called exception criteria, define normal activity or status range

INVENTORY EXCEPTION REPORT for May 21, 2003

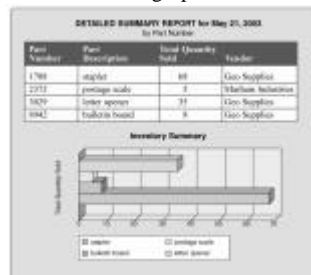
Part Number	Part Description	Total Quantity on Hand	Reorder Point
8942	bulletin board	228	240
3029	letter opener	558	560

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Summary Report

- Consolidates data, so you can review it quickly and easily
- Usually has totals, tables, or graphs



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User Involvement

- When designing a report, you should prepare a mock-up, or prototype, for users to review.

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Report Design Principles

- Printed reports must be attractive, professional, and easy to read.
- Good report design, like any other aspect of the user interface, requires effort and attention to detail.
- To produce a well-designed report, the analyst must consider several topics, including Report Headers and Footers, Page Headers and Footers, Column Headings and Alignment, Column Spacing, Field Order, and grouping of detail lines.

SHOP NUMBER	EMPLOYEE NAME	POSITION	REGULAR HOURS	OVERTIME HOURS	TOTAL HOURS
8	Andres, Margarita	Clerk	28.0	0.0	28.0
8	Bojarski, Michelle	Clerk	12.5	0.0	12.5
8	Chavesport, Kim	Asst Mgr	40.0	0.0	40.0
8	Gamba, Susan	Clerk	32.7	0.0	32.7
8	Hammes, Rudy	Manager	40.0	0.5	40.5
8	O'Leary, Ruth	Clerk	23.0	0.0	23.0
SHOP 8 TOTALS:			186.2	13.5	199.7
17	De Martini, Jennifer	Clerk	40.0	0.4	40.4
17	Hoff, Lisa	Manager	40.0	0.0	40.0
17	Wittamberry, Sandra	Clerk	40.0	11.4	51.4
17	Wyer, Elizabeth	Clerk	35.0	0.0	35.0
17	Ziegler, Cecilia	Clerk	32.0	0.0	32.0
SHOP 17 TOTALS:			187.0	11.4	198.4
GRAND TOTALS:			373.2	24.9	398.1

Printing Volume and Time Requirements

- Efficient printing operations, timely delivery of finished reports, and accurate forecasts of paper and storage needs all depend on accurate estimates of print volumes and times.

Measurement

- Length Calculations
 - After completing a report design, it is important to estimate the length of the printed output.
- Time Calculations
 - You also can estimate the time required to print the report.

CALCULATING THE LENGTH OF THE REPORT

	66	total lines available per page of stock paper
+	6	lines reserved for top and bottom margins
+	6	lines per page for 2 title lines, 1 blank line, 2 column heading lines, and 1 hyphen line
<hr/>		
	54	available detail lines per page
	3	lines per shop for 1 line with hyphens, 1 line of shop totals, and 1 blank line
X	6	shops
<hr/>		
	18	shop footing lines
+	3	lines per report for 2 lines with hyphens and 1 line of grand totals
<hr/>		
	21	footing lines
+	380	detail lines
<hr/>		
	401	report lines
+	54	lines per page
<hr/>		
	7.4	printed pages

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CALCULATING THE LENGTH OF THE REPORT

	66	total lines available per page of stock paper
-	6	lines reserved for top and bottom margins
-	6	lines per page for 2 page heading lines, 1 blank line, 2 column heading lines, and 1 blank line
<hr/>		
	54	available detail lines per page
2,100,000		detail lines
÷	54	detail lines per page
<hr/>		
	38,889	printed pages

CALCULATING THE TIME TO PRINT THE REPORT

		+	printed heading lines per page
x	38,889		pages
<hr/>			
	165,956		printed heading lines
+	2,100,000		printed detail lines
<hr/>			
	2,265,956		printed lines
+	2,000		lines printed per minute
<hr/>			
	1,128		minutes = 18.8 hours of printer usage

LASER PRINTER AT 16 PPM

	38,889	pages
÷	16	pages per minute
<hr/>		
	2,431	minutes = 40.5 hours of printer usage

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Output Control and Security

- Output must be accurate, complete, current, and secure. Companies use various output control methods to maintain output integrity and security.

Output Security Control

- Limit the number printed copies.
- Use a tracking procedure to account for each copy.
- Output is delivered to authorized recipients only.
- All sensitive reports should be stored in secure areas.
- All pages of confidential reports should be labeled appropriately.