Chapter 11
Designing Interfaces and Dialogues

Learning Objectives

✓ Explain the process of designing interfaces and dialogues and the deliverables for their creation.
✓ Contrast and apply several methods for interacting with a system.
✓ List and describe various input devices and discuss usability issues for each in relation to performing different tasks.
✓ Describe and apply the general guidelines for designing interfaces and specific guidelines for layout design, structuring data entry fields, providing feedback, and system help.
Learning Objectives (Cont.)

- Design human-computer dialogues and understand how dialogue diagramming can be used to design dialogues.
- Design graphical user interfaces.
- Discuss guidelines for the design of interfaces and dialogues for Internet-based electronic commerce systems.

Designing Interfaces and Dialogues

- User-focused activity
- Prototyping methodology of iteratively:
  - Collecting information
  - Constructing a prototype
  - Assessing usability
  - Making refinements
- Must answer the who, what, where, and how questions
Designing Interfaces and Dialogues (Cont.)

![SDLC diagram](https://example.com/sdclDiagram.png)

**FIGURE 11-1**
Systems development life cycle (SDLC)

Deliverables and Outcomes

- Creation of a design specification
  - A typical interface/dialogue design specification is similar to form design, but includes multiple forms and dialogue sequence specifications.
Deliverables and Outcomes (Cont.)

- The specification includes:
  - Narrative overview
  - Sample design
  - Testing and usability assessment
  - Dialogue sequence

*Dialogue sequence* is the ways a user can move from one display to another.

Interaction Methods and Devices

- **Interface**: a method by which users interact with an information system
- All human-computer interfaces must:
  - have an interaction style, and
  - use some hardware device(s) for supporting this interaction.
Methods of Interacting

- Command line
  - Includes keyboard shortcuts and function keys
- Menu
- Form
- Object-based
- Natural language

Command Language Interaction

- **Command language interaction**: a human-computer interaction method whereby users enter explicit statements into a system to invoke operations

- Example from MS DOS:
  - `COPY C:PAPER.DOC A:PAPER.DOC`
  - Command copies a file from C: drive to A: drive
Menu Interaction

- **Menu interaction**: a human-computer interaction method in which a list of system options is provided and a specific command is invoked by user selection of a menu option.

- **Pop-up menu**: a menu-positioning method that places a menu near the current cursor position.

Menu Interaction (Cont.)

- **Drop-down menu** is a menu-positioning method that places the access point of the menu near the top line of the display.
  - When accessed, menus open by dropping down onto the display.
  - Visual editing tools help designers construct menus.
Menu Interaction (Cont.)

Guidelines for Menu Design

- **Wording** — meaningful titles, clear command verbs, mixed upper/lower case
- **Organization** — consistent organizing principle
- **Length** — all choices fit within screen length
- **Selection** — consistent, clear and easy selection methods
- **Highlighting** — only for selected options or unavailable options

**FIGURE 11-8**
Menu building with Microsoft Visual Basic .NET
Form Interaction

- Form interaction: a highly intuitive human-computer interaction method whereby data fields are formatted in a manner similar to paper-based forms
  - Allows users to fill in the blanks when working with a system.

Figure 11-9
Example of form interaction from the Google Advanced Search Engine
(Source: Google.)
Object-Based Interaction

- **Object-based interaction**: a human-computer interaction method in which symbols are used to represent commands or functions
- **Icons**: graphical pictures that represent specific functions within a system
  - Use little screen space and are easily understood by users

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**FIGURE 11-10**
Object-based (icon) interface from Microsoft Visual Basic .NET
Natural Language Interaction

- **Natural language interaction**: a human-computer interaction method whereby inputs to and outputs from a computer-based application are in a conventional spoken language such as English.
- Based on research in artificial intelligence.
- Current implementations are tedious and difficult to work with, not as viable as other interaction methods.

Usability Problems with Hardware Devices

- **Visual Blocking**
  - touch screen, light pen
- **User Fatigue**
  - touch screen, light pen
- **Movement Scaling**
  - keyboard, mouse, joystick, trackball, graphics tablet, voice
- **Durability**
  - trackball, touch screen
- **Adequate Feedback**
  - keyboard, mouse, joystick, trackball, graphics tablet, voice
- **Speed**
  - keyboard
- **Pointing Accuracy**
  - joystick, touch screen, light pen, voice
Natural Language Interaction (Cont.)

- Usability problems with hardware devices:
  - Visual Blocking
    - touch screen, light pen
  - User Fatigue
    - touch screen, light pen

- Movement Scaling
  - keyboard, mouse, joystick, trackball, graphics tablet, voice

- Durability
  - trackball, touch screen
Natural Language Interaction (Cont.)

- Adequate Feedback
  - keyboard, mouse, joystick, trackball, graphics tablet, voice

- Speed
  - keyboard

- Pointing Accuracy
  - joystick, touch screen, light pen, voice

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**TABLE 11-4** Summary of General Conclusions from Experimental Comparisons of Input Devices in Relation to Specific Task Activities

<table>
<thead>
<tr>
<th>Task</th>
<th>Most Accurate</th>
<th>Shortest Positioning</th>
<th>Most Preferred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Selection</td>
<td>trackball, graphics tablet, mouse, joystick</td>
<td>touch screen, light pen, mouse, graphics tablet, trackball</td>
<td>touch screen, light pen</td>
</tr>
<tr>
<td>Text Selection</td>
<td>mouse</td>
<td>light pen</td>
<td>—</td>
</tr>
<tr>
<td>Data Entry</td>
<td>light pen</td>
<td>light pen</td>
<td>—</td>
</tr>
<tr>
<td>Cursor Positioning</td>
<td>—</td>
<td>light pen</td>
<td>—</td>
</tr>
<tr>
<td>Text Correction</td>
<td>light pen, cursor keys</td>
<td>light pen</td>
<td>light pen</td>
</tr>
<tr>
<td>Menu Selection</td>
<td>touch screen</td>
<td>touch screen</td>
<td>keyboard, touch screen</td>
</tr>
</tbody>
</table>

(Source: Based on Blattner & Schultz, 1988.)

Key:
- Target Selection = moving the cursor to select a figure or item
- Text Selection = moving the cursor to select a block of text
- Data Entry = entering information of any type into a system
- Cursor Positioning = moving the cursor to a specific position
- Text Correction = moving the cursor to a location to make a text correction
- Menu Selection = activating a menu item
- — = no clear conclusion from the research
Designing Interfaces

- Forms have several general areas in common:
  - Header information
  - Sequence and time-related information
  - Instruction or formatting information
  - Body or data details
  - Totals or data summary
  - Authorization or signatures
  - Comments

Designing Interfaces (Cont.)

- Use standard formats similar to paper-based forms and reports.
- Use left-to-right, top-to-bottom navigation.
Designing Interfaces (Cont.)

- Flexibility and consistency:
  - Free movement between fields
  - No permanent data storage until the user requests
  - Each key and command assigned to one function

Structuring Data Entry

<table>
<thead>
<tr>
<th>Entry</th>
<th>Never require data that are already online or that can be computed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defaults</td>
<td>Always provide default values when appropriate</td>
</tr>
<tr>
<td>Units</td>
<td>Make clear the type of data units requested for entry</td>
</tr>
<tr>
<td>Replacement</td>
<td>Use character replacement when appropriate</td>
</tr>
<tr>
<td>Captioning</td>
<td>Always place a caption adjacent to fields</td>
</tr>
<tr>
<td>Format</td>
<td>Provide formatting examples</td>
</tr>
<tr>
<td>Justify</td>
<td>Automatically justify data entries</td>
</tr>
<tr>
<td>Help</td>
<td>Provide context-sensitive help when appropriate</td>
</tr>
</tbody>
</table>
Controlling Data Input

- **Objective:** Reduce data entry errors
- **Common sources data entry errors in a field:**
  - Appending: adding additional characters
  - Truncating: losing characters
  - Transcripting: entering invalid data
  - Transposing: reversing sequence of characters

Providing Feedback

- **Three types of system feedback:**
  - **Status information:** keep user informed of what’s going on, helpful when user has to wait for response
  - **Prompting cues:** tell user when input is needed, and how to provide the input
  - **Error or warning messages:** inform user that something is wrong, either with data entry or system operation
Providing Help

- Place yourself in user’s place when designing help.

Guidelines for designing usable help:

- **Simplicity** — Help messages should be short and to the point.
- **Organize** — Information in help messages should be easily absorbed by users.
- **Show** — It is useful to explicitly show users how to perform an operation.

Designing Dialogues

- **Dialogues**: the sequence of interaction between a user and a system

Dialogue design involves:

- Designing a dialogue sequence.
- Building a prototype.
- Assessing usability.
Designing the Dialogue Sequence

- Typical dialogue between user and Customer Information System:
  - Request to view individual customer information.
  - Specify the customer of interest.
  - Select the year-to-date transaction summary display.
  - Review the customer information.
  - Leave system.

Designing the Dialogue Sequence (Cont.)

- Three sections of the box are used as:
  - *Top* contains a unique display reference number used by other displays for referencing it.
  - *Middle* contains the name or description of the display.
  - *Bottom* contains display reference numbers that can be accessed from the current display.

**FIGURE 11-17**
Sections of a dialogue diagramming box
Designing the Dialogue Sequence (Cont.)

- Dialogue diagrams depict the sequence, conditional branching, and repetition of dialogues.

**FIGURE 11-18**
Dialogue diagram illustrating sequence, selection, and iteration
Building Prototypes and Assessing Usability

- Optional activities
  - Building prototypes displays using a graphical development environment
    - Microsoft’s Visual Studio .NET
    - Borland’s Enterprise Studio
    - Easy-to-use input and output (form, report, or window) design utilities

Graphical Interface Design Issues

- Become an expert user of the GUI environment.
  - Understand how other applications have been designed.
  - Understand standards.
- Gain an understanding of the available resources and how they can be used.
  - Become familiar with standards for menus and forms.
Graphical Interface Design Issues (Cont.)

Electronic Commerce Application: Designing Interfaces and Dialogues for Pine Valley Furniture WebStore

- Central and critical design activity
- Where customer interacts with the company
  - Care must be put it design!
- Prototyping design process is most appropriate to design the human interface.
- Several general design guidelines have emerged.
General Guidelines

- Web’s single “click-to-act” method of loading static hypertext documents (i.e. most buttons on the Web do not provide click feedback).
- Limited capabilities of most Web browsers to support finely grained user interactivity.

General Guidelines

- Limited agreed-upon standards for encoding Web content and control mechanisms
- Lack of maturity of Web scripting and programming languages as well as limitations in commonly used Web GUI component libraries
Designing Interfaces and Dialogues for Pine Valley Furniture

- Key feature PVF wants for their WebStore is:
  - To incorporate into design an interface with “menu-driven navigation with cookie crumbs”.

Menu-Driven Navigation with Cookie Crumbs

- Cookie crumbs: the technique of placing “tabs” on a Web page that show a user where he or she is on a site and where he or she has been
  - Allow users to navigate to a point previously visited and will assure they are not lost
  - Clearly show users where they have been and how far they have gone from home
Summary

In this chapter you learned how to:

✓ Explain the process of designing interfaces and dialogues and the deliverables for their creation.
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✓ List and describe various input devices and discuss usability issues for each in relation to performing different tasks.
✓ Describe and apply the general guidelines for designing interfaces and specific guidelines for layout design, structuring data entry fields, providing feedback, and system help.

Summary (Cont.)

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✓ Design graphical user interfaces.
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