Modern Systems Analysis and Design

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Chapter 12
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.

- Answer the who, what, where, and how questions.
Designing Interfaces and Dialogues (Cont.)

Figure 12-1 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.
Chapter 12

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`
  - This 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**: 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.
Menu Interaction (Cont.)

Figure 12-8  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.
Form Interaction (Cont.)

Figure 12-9 Example of form interaction from the Google Advanced Search Engine
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.
Figure 12-10  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.
Natural Language Interaction (Cont.)

- **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.
Natural Language Interaction (Cont.)

Table 12-4  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>mouse</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>—</td>
<td>keyboard, touch screen</td>
</tr>
</tbody>
</table>

(Source: Adapted from 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 has several general areas common to most forms:
  - Header information.
  - Sequence and time-related information.
  - Instruction or formatting information.
  - Body or data details.
Designing Interfaces (Cont.)

- Totals or data summary.
- Authorization or signatures.
- Comments.

- Use standard formats similar to paper-based forms and reports.
- 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>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never require data that are already online or that can be computed</td>
<td></td>
</tr>
<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.
Designing the Dialogue Sequence (Cont.)

- Review the customer information.
- Leave system.

**Dialogue diagramming**: a formal method for designing and representing human-computer dialogues using box and line diagrams.
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.
Designing the Dialogue Sequence (Cont.)

**Figure 12-17** Sections of a dialogue diagramming box

- **Top**: Unique Reference Number of Display
- **Middle**: Name or Description of Display
- **Bottom**: Reference Numbers of Return Displays
Designing the Dialogue Sequence (Cont.)

- Dialogue diagrams depict the sequence, conditional branching, and repetition of dialogues.
Designing the Dialogue Sequence (Cont.)

Figure 12-18 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.
Figure 12-20  Highlighting graphical user interface design standards

- File menu item is always first item (if present)
- Edit menu item is always second item (if present)
- Window menu item is always second from last item (if present)
- Help menu item is always last item (if present)
- Check mark shows that an item is selected or mode is turned on
- Right arrow (↑) shows that an item leads to a submenu
- Ellipses (…) show that a pop-up menu will appear if selected
- No checkmarks indicate that a command will be executed if selected
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 into 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 want for their WebStore is:

- To incorporate into design was an interface with “menu-driven navigation with cookie crumbs”.

Chapter 12
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.

✓ 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.
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