Software Engineering

Chapter 12 User Interface Design

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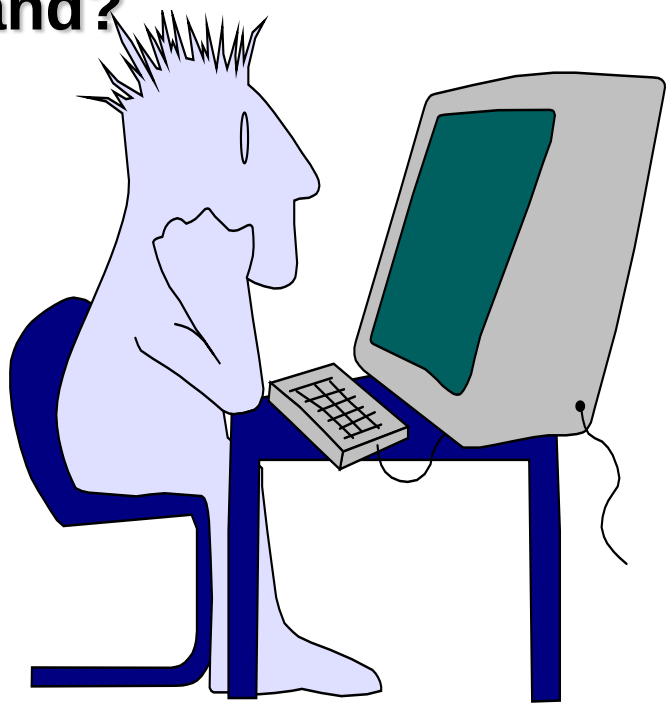
Interface Design

Easy to learn?

Easy to use?

Easy to understand?



Interface Design

Typical Design Errors

lack of consistency
too much memorization
no guidance / help
no context sensitivity
poor response
Arcane/unfriendly

Golden Rules

- Place the user in control
- Reduce the user's memory load
- Make the interface consistent

Place the User in Control

- Define interaction modes in a way that does not force a user into unnecessary or undesired actions.
- Provide for flexible interaction.
- Allow user interaction to be interruptible and undoable.
- Streamline interaction as skill levels advance and allow the interaction to be customized.
- Hide technical internals from the casual user.
- Design for direct interaction with objects that appear on the screen.

Reduce the User's Memory Load

- Reduce demand on short-term memory.
- Establish meaningful defaults.
- Define shortcuts that are intuitive.
- The visual layout of the interface should be based on a real world metaphor.
- Disclose information in a progressive fashion.

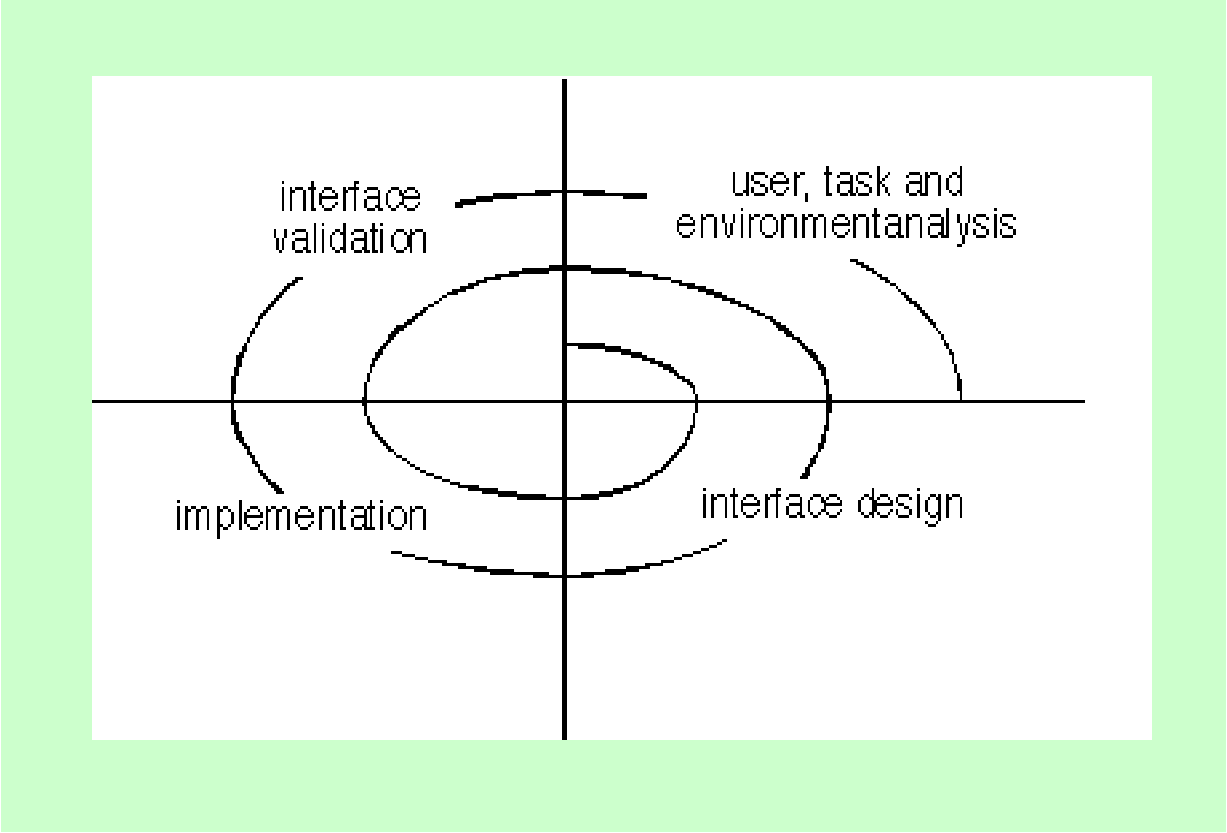
Make the Interface Consistent

- Allow the user to put the current task into a meaningful context.
- Maintain consistency across a family of applications.
- If past interactive models have created user expectations, do not make changes unless there is a compelling reason to do so.

User Interface Design Models

- User model — a profile of all end users of the system
- Design model — a design realization of the user model
- Mental model (system perception) — the user's mental image of what the interface is
- Implementation model — the interface "look and feel" coupled with supporting information that describe interface syntax and semantics

User Interface Design Process



Interface Analysis

- Interface analysis means understanding
  (1) the people (end-users) who will interact with the system through the interface;
  (2) the tasks that end-users must perform to do their work,
  (3) the content that is presented as part of the interface
  (4) the environment in which these tasks will be conducted.

User Analysis

- Are users trained professionals, technician, clerical, or manufacturing workers?
- What level of formal education does the average user have?
- Are the users capable of learning from written materials or have they expressed a desire for classroom training?
- Are users expert typists or keyboard phobic?
- What is the age range of the user community?
- Will the users be represented predominately by one gender?
- How are users compensated for the work they perform?
- Do users work normal office hours or do they work until the job is done?
- Is the software to be an integral part of the work users do or will it be used only occasionally?
- What is the primary spoken language among users?
- What are the consequences if a user makes a mistake using the system?
- Are users experts in the subject matter that is addressed by the system?
- Do users want to know about the technology that sits behind the interface?

Task Analysis and Modeling

- Answers the following questions …
  - What work will the user perform in specific circumstances?
  - What tasks and subtasks will be performed as the user does the work?
  - What specific problem domain objects will the user manipulate as work is performed?
  - What is the sequence of work tasks—the workflow?
  - What is the hierarchy of tasks?
- Use-cases define basic interaction
- Task elaboration refines interactive tasks
- Object elaboration identifies interface objects (classes)
- Workflow analysis defines how a work process is completed when several people (and roles) are involved

Swimlane Diagram

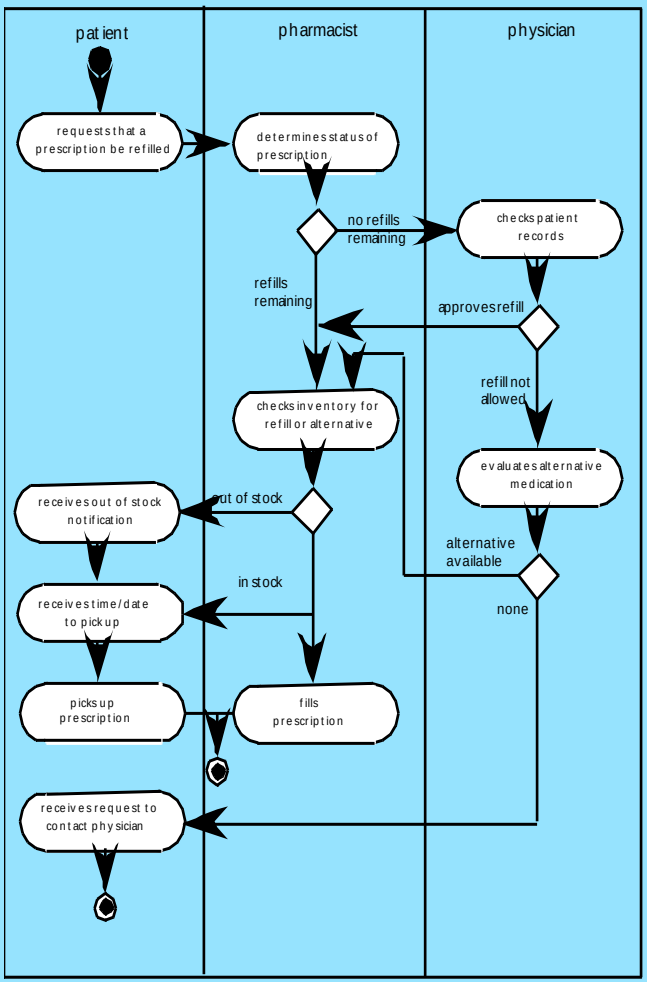


Figure 12.2 Swimlane diagram for prescription refill function

Analysis of Display Content

- Are different types of data assigned to consistent geographic locations on the screen (e.g., photos always appear in the upper right hand corner)?
- Can the user customize the screen location for content?
- Is proper on-screen identification assigned to all content?
- If a large report is to be presented, how should it be partitioned for ease of understanding?
- Will mechanisms be available for moving directly to summary information for large collections of data.
- Will graphical output be scaled to fit within the bounds of the display device that is used?
- How will color to be used to enhance understanding?
- How will error messages and warning be presented to the user?

Interface Design Steps

- Using information developed during interface analysis (Section 12.3), define interface objects and actions (operations).
- Define events (user actions) that will cause the state of the user interface to change. Model this behavior.
- Depict each interface state as it will actually look to the end-user.
- Indicate how the user interprets the state of the system from information provided through the interface.

Interface Design Patterns

- Patterns are available for
  - The complete UI
  - Page layout
  - Forms and input
  - Tables
  - Direct data manipulation
  - Navigation
  - Searching
  - Page elements
  - e-Commerce

Design Issues

- Response time
- Help facilities
- Error handling
- Menu and command labeling
- Application accessibility
- Internationalization

Design Evaluation Cycle