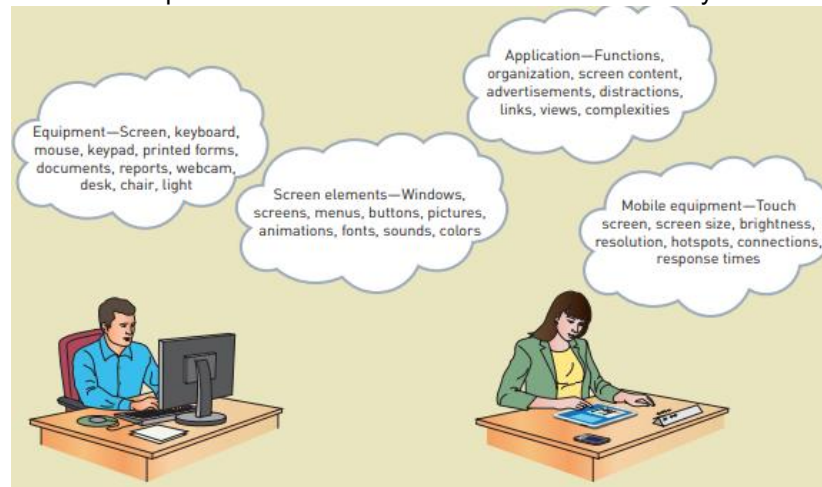


## Designing the User Interface

### Understanding the User Experience and the User Interface

- The **user experience (UX)** is a broad concept that applies to all aspects of a person's interaction with a product or service. When the product is a software application, UX includes actions, responses, perceptions, and feelings that a person has when he uses or anticipates using the software application
- Designers need to think about the overall user experience as they consider the design of the new system and particularly the user interface.
- The **user interface (UI)** is the set of inputs and outputs that directly involve an application user. It is the part of the system that the user sees and interacts with
- UI design varies widely depending on such factors as interface purpose, user characteristics, and characteristics of a specific interface device
- Developers must be aware that everything that the end-user sees or does while using the system is part of the user interface and affects the user experience. **Figure 1** illustrates the complex nature of the user's interaction with the system.



**Figure 1.** Elements affecting User Experience

- From a user perspective, the user interface is the entire system. The programs, scripts, databases, and hardware behind the interface are almost irrelevant to the user.
- Good system design makes all these elements transparent to the user. Design techniques that embody this point of view are collectively called **user-centered design**, which emphasizes three important principles:
  - Focus early and throughout the project on the users and their work
  - Evaluate all designs to ensure usability
  - Use iterative development.
- **User-centered design** is a design technique that embodies the view that the user interface appears to be the entire system
- The first principle of user-centered design is to evaluate designs to ensure usability
- **Usability** refers to how easy a system is to learn and use.
- The second principle of user-centered design is **iterative development**—that is, doing some analysis, then some design, then some implementation, and then repeating the processes
- Iterative development keeps the focus on the user by continually returning to the user requirements during each iteration and by evaluating the system after each iteration.

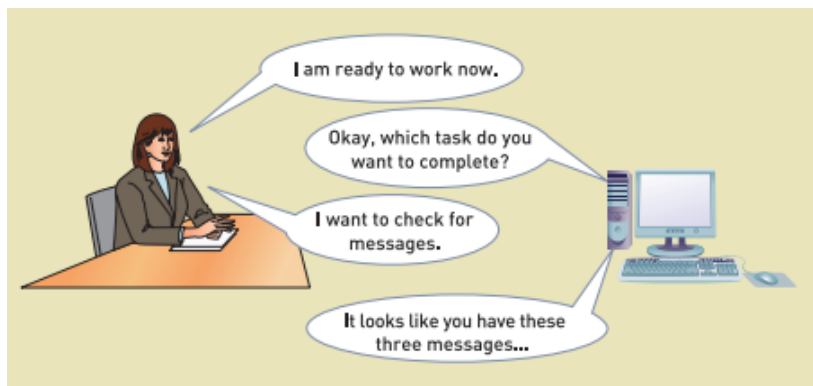
### Metaphors for Human-Computer Interaction

- To make computers easier to use and learn, designers of early visually-oriented interfaces adopted **metaphors**, which are analogies between features of the user interface and aspects of physical reality that users are familiar with. Metaphors are still widely applied to user-interface design, as described in *Figure 2*.
- The **dialogue metaphor** emphasizes the communication that occurs between a user and a computer, conceptualized as a conversation
- The dialogue metaphor is another way of thinking about human-computer interaction because the computer “listens to” and “responds” to user questions or comments, and the user “listens to” and “responds” to the computer’s questions

and comments. *Figure 3* illustrates a conceptual dialogue between user and computer.

Metaphor	Description	Example
Direct manipulation	Manipulating objects on a display that look like physical objects (pictures) or that represent them (icons)	The user drags a folder icon to an image of a recycle bin or trash can to delete a collection of files.
Desktop	Organizing visual display into distinct regions, with a large empty workspace in the middle and a collection of tool icons around the perimeter	At computer startup, a Windows user sees a desktop, with icons for a clock, calendar, notepad, inbox and sticky notes (the computer interface version of a physical Post-It note).
Document	Visually representing the data in files as paper pages or forms; these pages can be linked together by references (hyperlinks)	The user fills in a form field for a product he or she owns, and the manufacturer's Web site finds and displays the product's manual as an Adobe Acrobat file, which contains a hyperlinked table of contents and embedded links to related documents.
Dialog	The user and computer accomplishing a task by engaging in a conversation or dialog by using text, voice, or tools, such as labeled buttons	The user clicks a button labeled "troubleshoot" because the printer isn't working. The computer prints questions on the display, and the user responds by typing answers or selecting responses from a printed list.

**Figure 2.** Commonly used metaphors for user-interface design



**Figure 3.** The dialogue metaphor for user-computer interaction

### Fundamental Principles of User-Interface Design

- **Human-interface objects (HIOs)** are those objects that appear on a screen that the user can manipulate. Included are such things as documents, buttons, menus, folders, and icons.
- The use of HIOs is very common in almost all of today's applications. In new versions of the Microsoft Office Suite, the ribbons of icons at the top of the page are a good example of useful HIOs whose appearance reflects their function. The technical term for this characteristic is called affordance.
- **Affordance** means that the appearance of a specific control suggests its function—that is, the purpose for which the control is used. For example, a control that looks like a steering wheel suggests that it is used for turning.
- A second and related characteristic is that HIOs should provide immediate feedback when activated or receiving focus.
- **Visibility** means that a control is visible, so users know it is available; it also means that the control provides immediate feedback to indicate that it is responding.
- Visibility and affordance are relatively easy to achieve when the design target is a commonly used platform, such as an iPad, a cell phone running the Android operating system, or a PC running Windows.
- **Feedback** is some visual or audio response by the system in response to some user action
- Feedback provides the user with a sense of confirmation and the feeling that a system is responsive and functioning correctly. Lack of feedback leaves the user wondering whether a command or input was recognized or whether the system is malfunctioning.
- **Consistency** can be applied to many different aspects of the user interface, as well as to the application itself. The effectiveness of the user experience is highly dependent on consistency. Users not only expect consistency across the various screens of an application but now also anticipate consistency across applications.

- **Readability and navigation** concept are particularly important today yet can be difficult to support. Though large desktop screens usually are quite readable, readability with small mobile devices is often a serious problem, as shown in *Figure 4*. Large desktop screens also have a lot of space for clues about navigating through various screens of an application. The small screens on mobile devices often require that the navigation tools be hidden or partially hidden.



**Figure 4.** Sample fonts with readability problems

## Transitioning from Analysis to User-Interface Design

### Dialogues and Storyboards

- After identifying all required dialogues, the designers must document the dialogues. Designers can also document dialogue designs by writing out how the user and system might interact if they were two people engaged in conversation. Sometimes, the designer can go right from building a dialogue to sketching a series of screens that make the design more understandable.
- Consider the *Check out shopping cart* use case for the RMO CSMS. A dialogue between the system and user might follow this pattern, as shown in *Figure 5*

SYSTEM: What would you like to do?  
 USER: I'd like to check out.  
 SYSTEM: Okay. What is your e-mail address or account number?  
 USER: My e-mail address nwells22@gmail.com.  
 SYSTEM: Fine. You are Nancy Wells at 1122 Silicon Avenue. Correct?  
 USER: Yes.  
 SYSTEM: All items in your cart are in stock and can be shipped today. Because your order subtotal is over \$100, you qualify for free UPS ground shipping (3–5 days). Other shipping options include next day (\$35.00), two day (\$20.00), and USPS parcel post (\$11.70, 5–7 days). How would you like your items to be shipped?  
 USER: Free UPS ground shipping.  
 SYSTEM: We have a shipping address on file for you (1122 Silicon Avenue). Do you want your order shipped to that address?  
 USER: No.  
 SYSTEM: To what address would you like the order shipped?  
 USER: John Wells, 1612 Jefferson Street NE, Albuquerque, NM 87123.  
 SYSTEM: Okay, the total charge is \$125.56 (\$117.90 item subtotal plus \$7.66 sales tax). Shall I charge that amount to your credit card on file (a Visa with an account number ending in 0899)?  
 USER: Yes.  
 SYSTEM: Your payment has been approved, and your order is being prepared for shipment. A confirmation e-mail has been sent to you, and another will be sent with a shipment tracking number when the order is shipped later today. Can I help you with anything else?  
 USER: No.

**Figure 5.** Dialogue between the system and the user

- There are many possible implementations of this scenario. Before deciding on a specific implementation, an analyst often uses a technique called **storyboarding**—that is, showing a sequence of sketches of the display screen during a dialogue.
- The sketches don't have to be very detailed to show the basic design concept. Designers can implement a storyboard with a visual programming tool, such as Visual Basic, or with a presentation program such as PowerPoint.

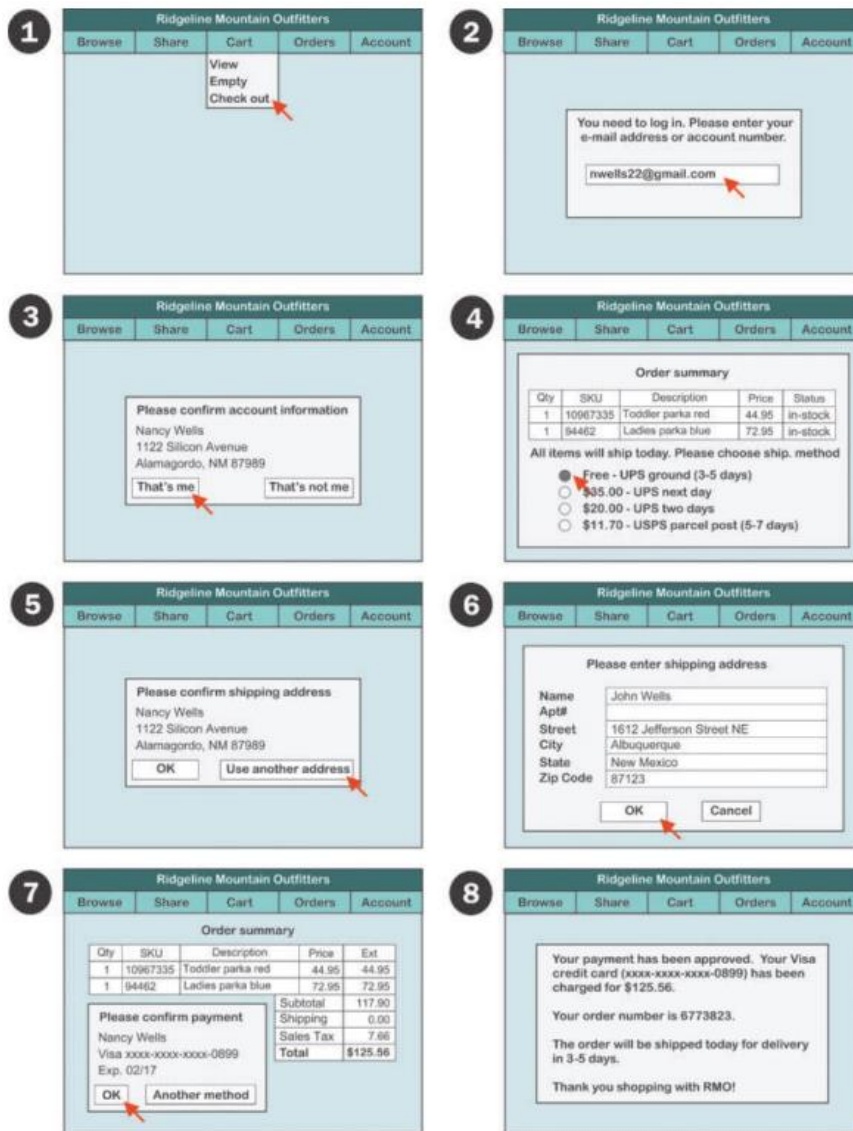


Figure 6. Storyboard

## User Interface Design

- There are three major considerations that will affect your approach as you begin the design of the user interface.
- The **first decision** is whether the application will be built as a custom, stand-alone software application or whether it will be browser-based.
- If the software is a stand-alone application, it will utilize the controls and human-interface objects available in development libraries for that platform. If it is a browser-based application, it will need to conform to the controls and configurations provided by the browsers.
- The **second decision** applies to the type of device the application is designed for. Some applications are designed to run only on desktops and laptops. Others execute on tablets, while others are designed exclusively to execute on small devices such as smartphones.
- The **third decision** applies to the operating system platform. This decision affects the design because the human-interface objects that are available are different for each platform, especially for stand-alone applications.

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