



Chapter 8 : Designing the User Interface

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Outline

- Understanding the User Experience and the User Interface
- Fundamental Principles of User-Interface Design
- Transitioning from Analysis to User-Interface Design
- User-Interface Design
- Designing Reports, Statements, and Turnaround Documents

Overview

- Information systems interact with people and other systems
- Poorly designed user interfaces are a source of errors and inefficiency
- User interface design must consider the entire user experience
- Good user interfaces are based on good design principles – visibility, affordance, feedback, etc.
- Poorly designed user interface can make the information system unusable
- Story boards are a powerful tool for UI design

System and User Interfaces

- System interface _ the inputs and outputs that require minimal human intervention
 - Inputs capture automatically
 - Outputs direct to other systems
 - Printed and distributed outputs (Statements, reports)
- User Interface – inputs and outputs that directly involve a human user/actor
 - A dialog goes on between actor and system

User Centered Design

- Design techniques that embody the view that the user interface is the system to the user
 - Dates back to 1980s (more for Mac)
- Principles of User Centered Design
 - Focus early on users and their work
 - Evaluate designs to ensure usability
 - Use iterative development
- Usability is the objective

Note that contemporary A&D finally incorporates these principles.

User Interface Design Concepts

- Human – Computer Interaction (HCI)
 - A field of study concerned with the efficiency and effectiveness of user interaction with computer systems, human –oriented input and output technology, and psychological aspects of user interfaces

Components of the User Interface (Physical, Perceptual and conceptual)

Equipment—Screen, keyboard, mouse, keypad, printed forms, documents, reports, webcam, desk, chair, light

Screen elements—Windows, screens, menus, buttons, pictures, animations, fonts, sounds, colors

Application—Functions, organization, screen content, advertisements, distractions, links, views, complexities

Mobile equipment—Touch screen, screen size, brightness, resolution, hotspots, connections, response times



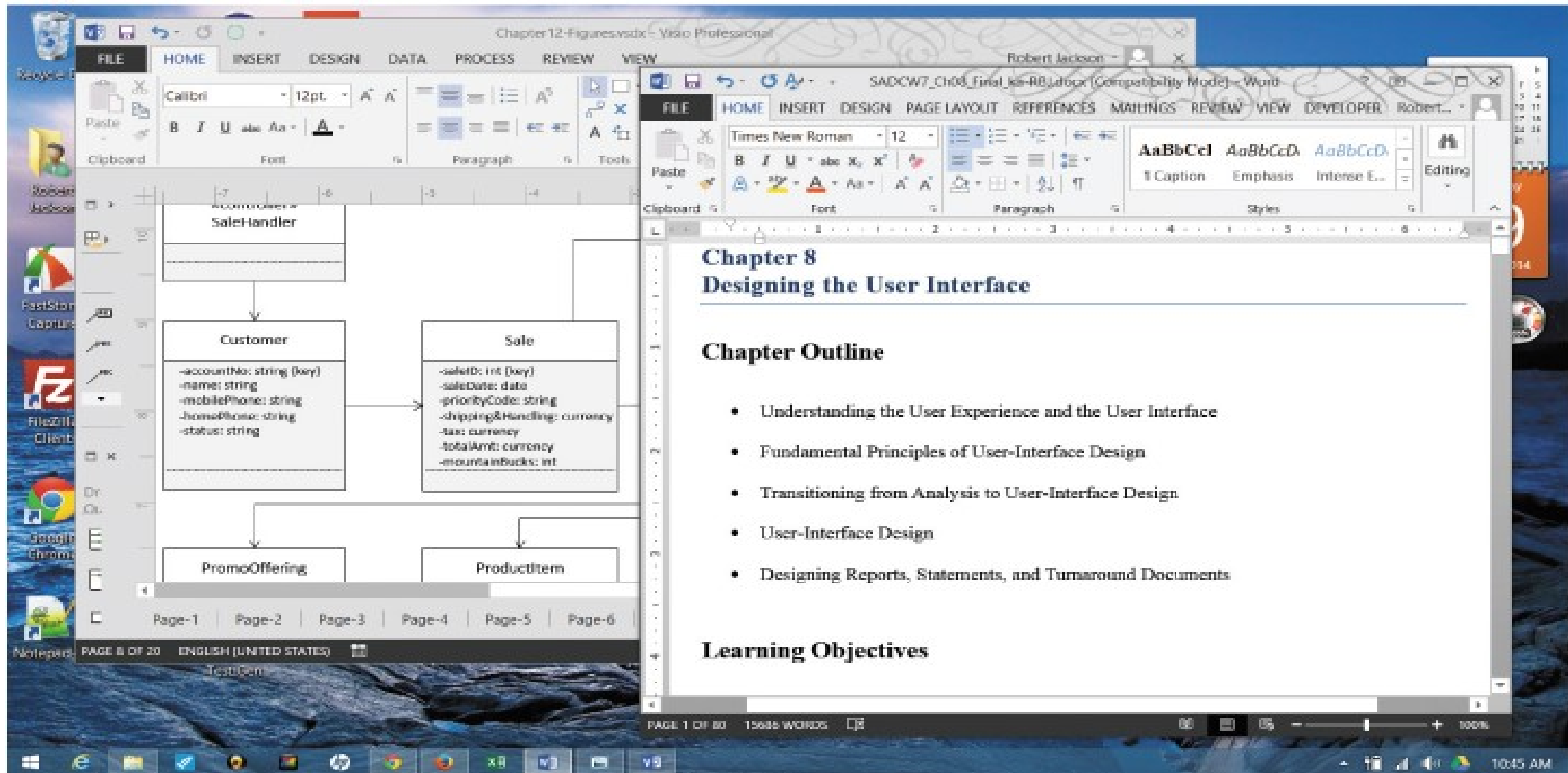
Metaphor of Human Computer Interaction

- Direct manipulation metaphor
 - metaphor in which objects on a display are manipulated to look like physical objects (pictures) or graphic symbols that represent them (icons)
 - Recycling bin,
- Desktop metaphor
 - metaphor in which the visual display is organized into distinct regions, with a large empty workspace in the middle and a collection of tool icons around the perimeter
- Document metaphor
 - metaphor in which data is visually represented as paper pages or forms
- Dialog metaphor
 - metaphor in which user and computer accomplish a task by engaging in a conversation or dialog via text, voice, or tools such as labeled buttons

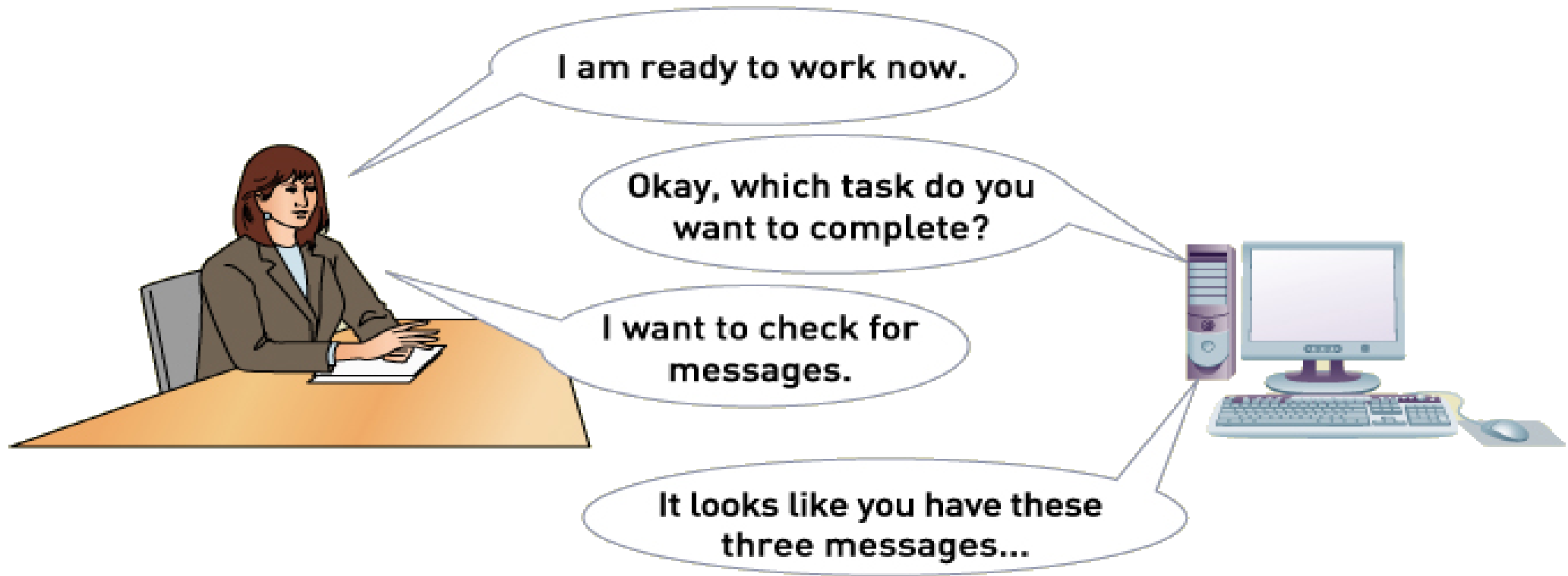
Metaphor Details

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.

Direct Manipulation, Desktop, and Document Metaphors on One Screen

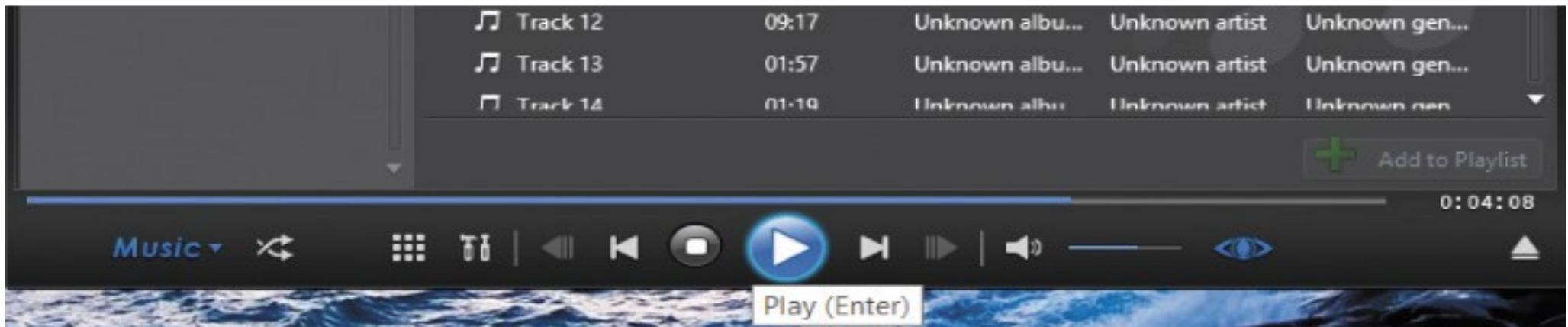


Dialog Metaphor



Principle of User-Interface Design

- Human-Interface Objects
 - Visibility and Affordance
 - To be usable, a control must be visible to the user and its appearance should suggest its functionality.
 - Media player controls, buttons, scroll bars.
 - Visible with Feedback
 - Both visible on the display and provides a response to a user action (feedback)



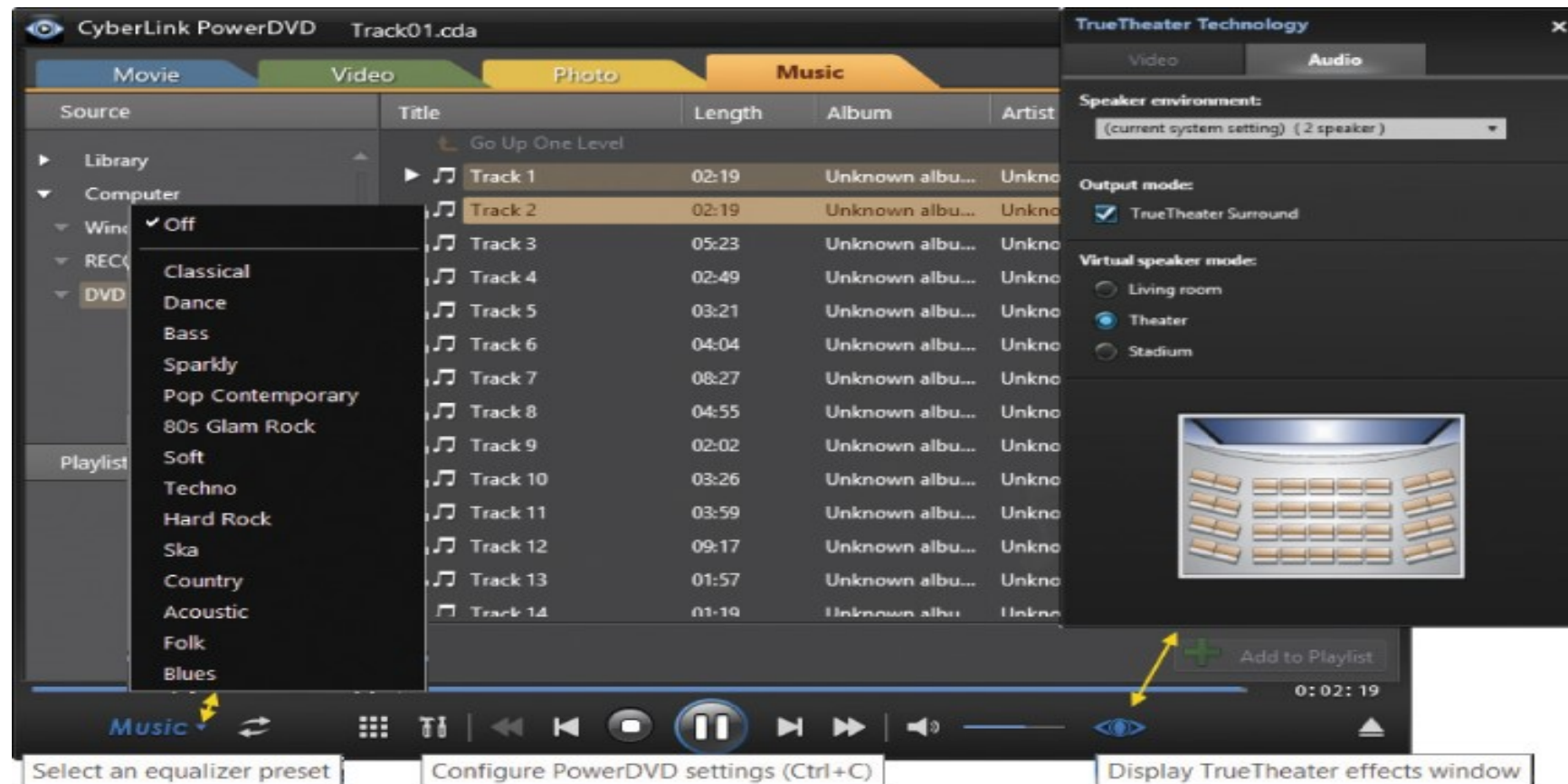
Principle of User-Interface Design

- Consistency
 - Across platforms
 - Within a suite of applications
 - Within a particular application
- Continuity
 - Consistency across releases over time
 - Example : Windows 7&8



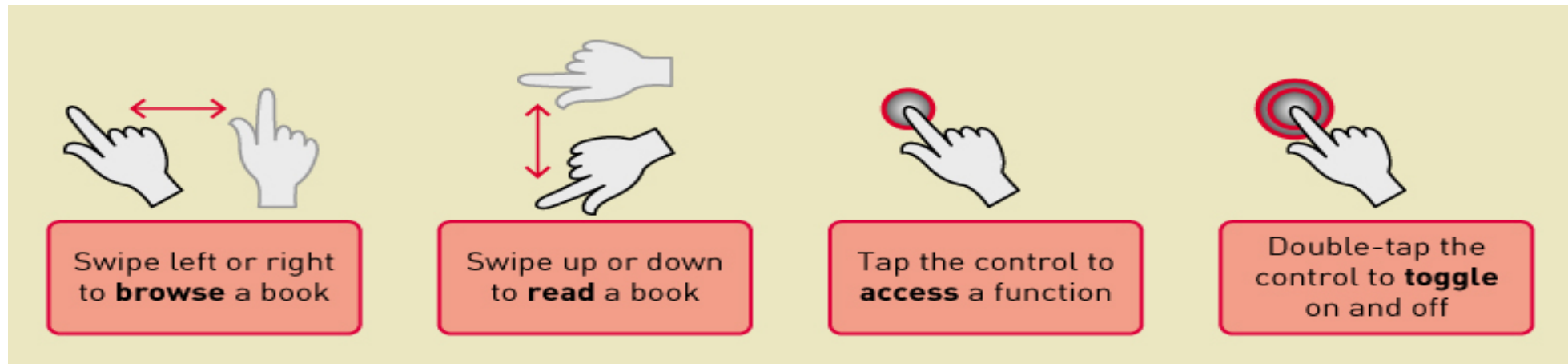
Principle of User-Interface Design

- Discoverability
 - To help users discover “hidden” features or objects
 - Active discovery – mouse hovers, pop-ups, tool tips



Principle of User-Interface Design (Cont'd)

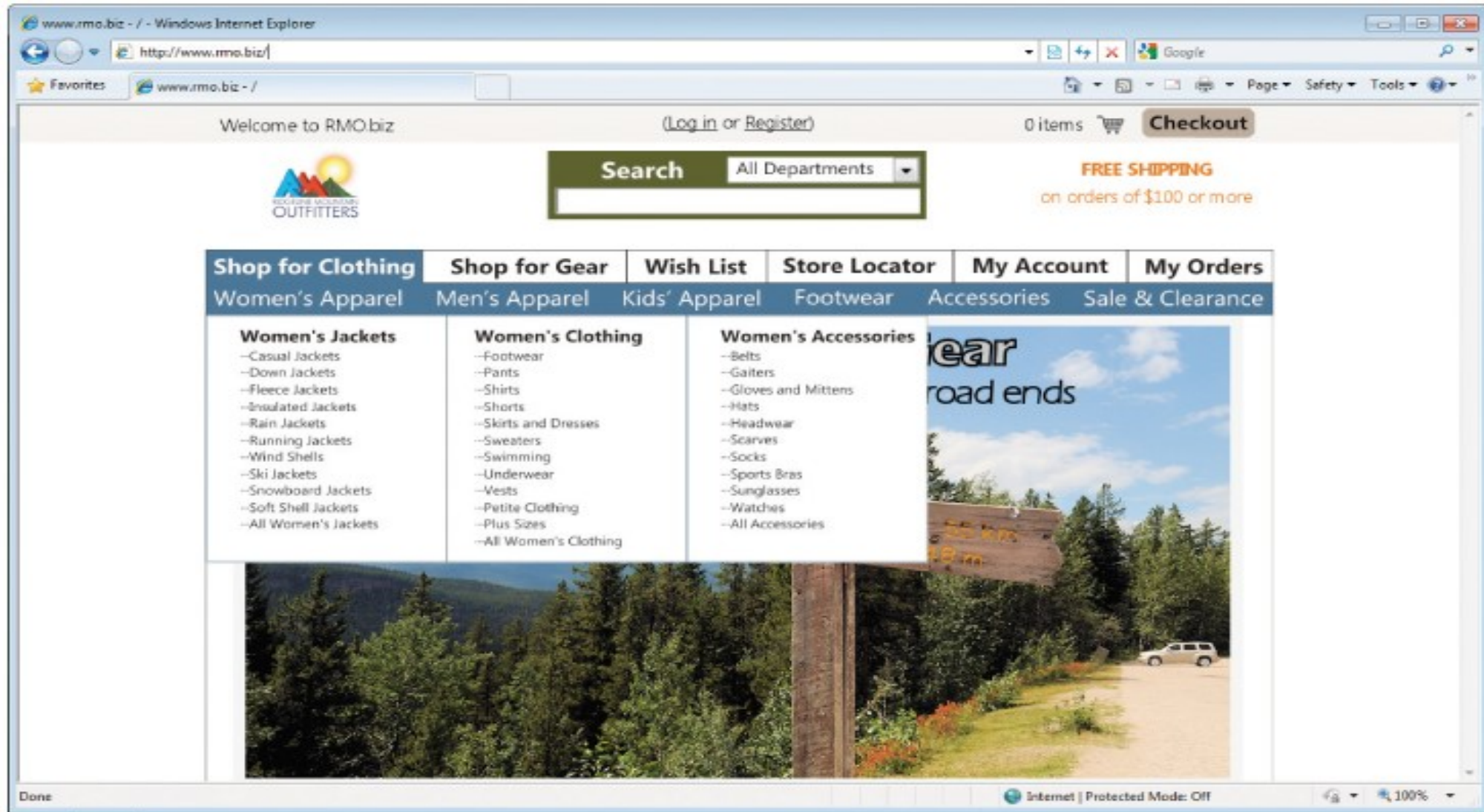
- Discoverability
 - Visual Diagrams to guide users



Principle of User-Interface Design

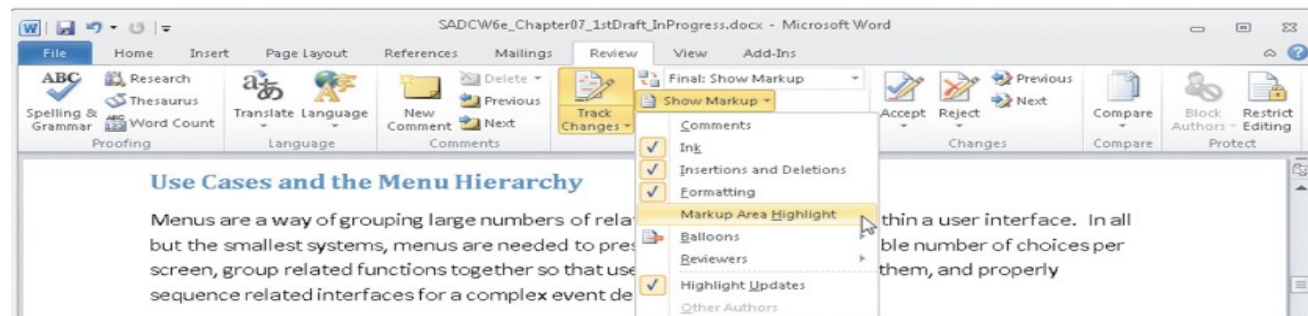
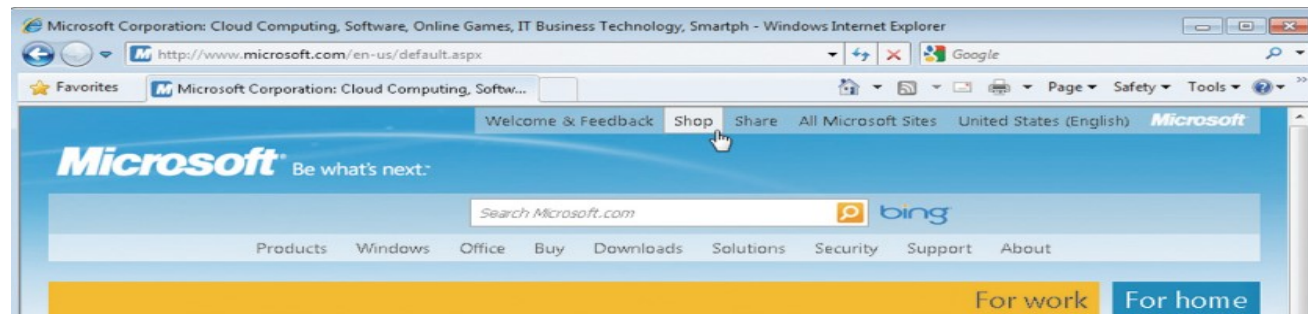
- Closure
 - Closure on Dialogues – End of a series of actions
 - Protect user's work – at end and for partially complete work
 - Provide undo to reverse actions
- Readability and Navigation
 - Readable text for all users (type, size, color)
 - Clear navigation
 - Reverse navigation – a way out – breadcrumbs navigation
- Usability and Efficiency
 - Shortcut keys for experienced users
 - Meaningful error messages
 - Simplicity – KISS

RMO Homepage – Clean and Simple



Transition from Analysis to UI Design

- Use Cases and the Menu Hierarchy
 - We design use case by use case
 - Menus are a typical way to organize access to use case functionality
 - Different types of users might have different menus
 - Useful to design an overall menu hierarchy and then subsets for different users
 - Once the hierarchy is established, menus can be implemented in a variety of ways



Two different Menu Styles

Some RMO Use Cases

- Grouped by Actor and Subsystem

Subsystem	Use case	Users/actors
Sales	Search for item	Customer, customer service representative, store sales representative
Sales	View product comments and ratings	Customer, customer service representative, store sales representative
Sales	View accessory combinations	Customer, customer service representative, store sales representative
Sales	Fill shopping cart	Customer
Sales	Empty shopping cart	Customer
Sales	Check out shopping cart	Customer
Sales	Fill reserve cart	Customer
Sales	Empty reserve cart	Customer
Sales	Convert reserve cart	Customer
Sales	Create phone sale	Customer service representative
Sales	Create store sale	Store sales representative
Order fulfillment	Ship items	Shipping
Order fulfillment	Manage shippers	Shipping
Order fulfillment	Create backorder	Shipping
Order fulfillment	Create item return	Shipping, customer
Order fulfillment	Look up order status	Shipping, customer, management
Order fulfillment	Track shipment	Shipping, customer, marketing
Order fulfillment	Rate and comment on product	Customer
Order fulfillment	Provide suggestion	Customer

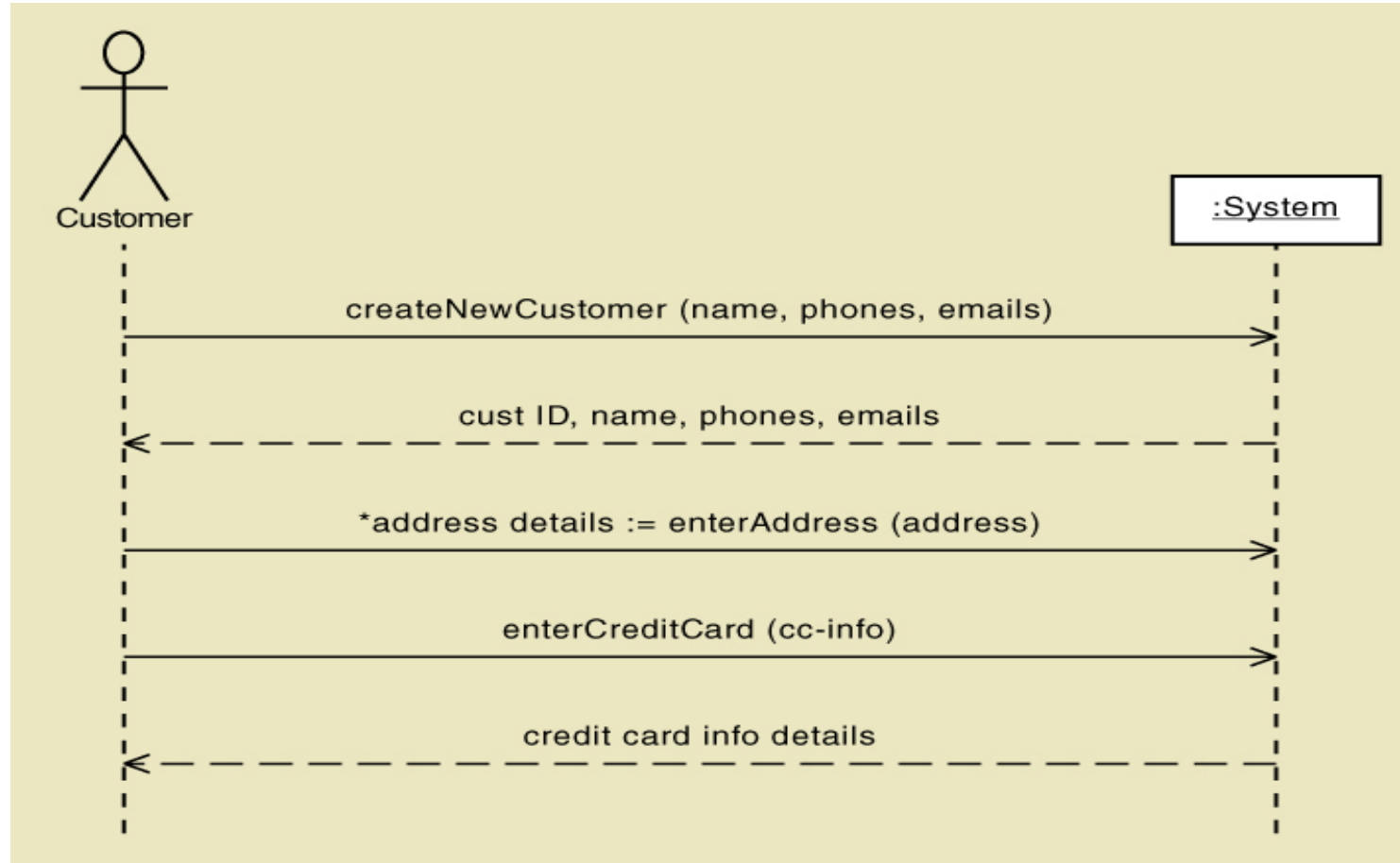
RMO Use Cases

- Grouped into First Cut Menu Hierarchy

Menu description	Menu choices (use cases)	Intended user(s)
Shopping cart functions (primary or reserve)	Search for item View product comments and ratings View accessory combinations Switch carts (primary to reserve or vice versa) Fill shopping cart Empty shopping cart Check out shopping cart	Customer
Sale creation	Search for item View product comments and ratings View accessory combinations Create sale	Customer service and store sales representatives
Order shipment	Ship items Manage shippers Create backorder Create item return Look up order status Track shipment	Customer service and store sales representatives
Customer order control	Look up order status Track shipment Create item return Rate and comment on product Provide suggestion	Customer

Analysis Models and Input Forms

- SSD defines input messages, which indicates what forms



Sample Customers Form

- First draft of RMO Customer Form from SSD information

Customer Form



Customer ID:

Customer Name:

Mobile Phone:

Home Phone:

Email Address:

Navigation icons: Previous, Next, Home, Print

Record: 1 of 3 | No Filter | Search

Dialogs and Storyboards

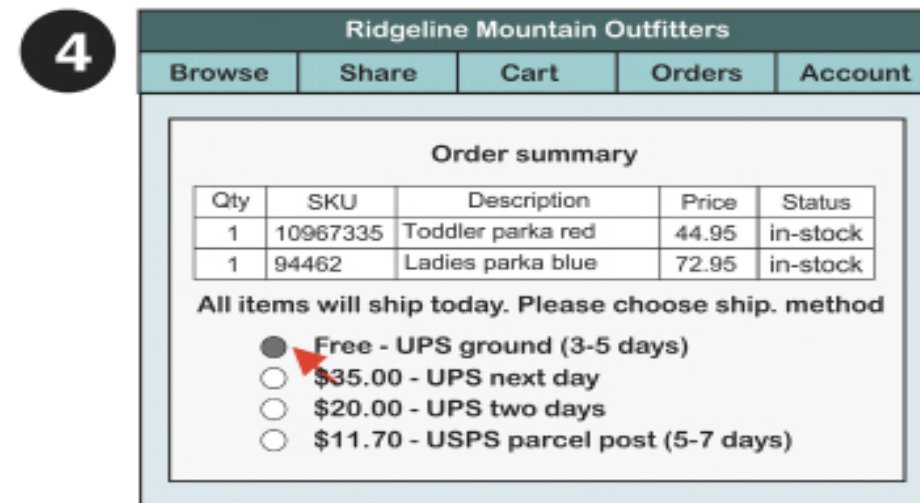
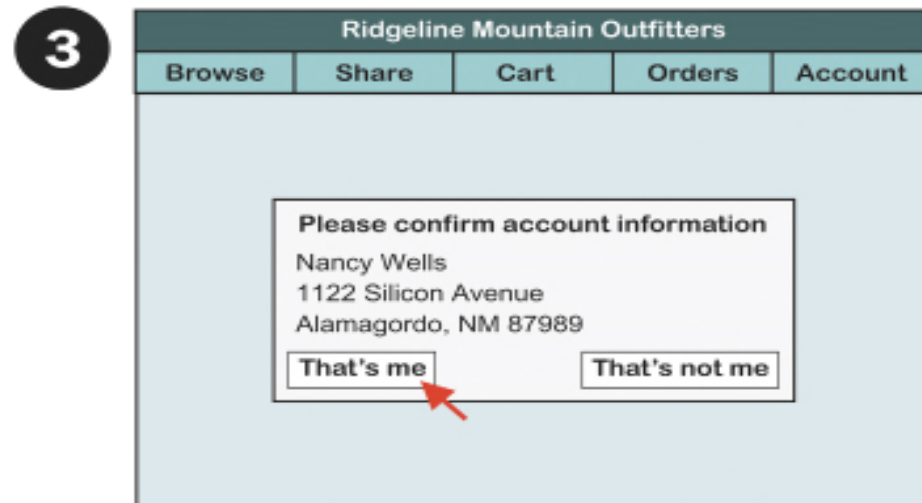
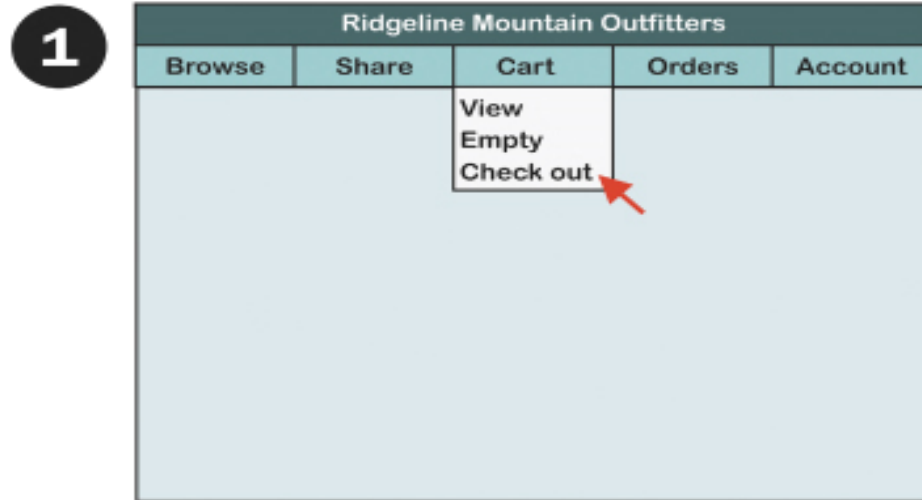
- For each use case, think of the natural flow of a dialog between user and computer
 - Based on the flow of activities in use case description and/or the system sequence diagram
 - Use natural language to emphasize feedback to user
 - Create a storyboard of the dialog, showing the sequence of sketches of the screen each step of the dialog. (storyboarding)
 - Review the storyboard with users

From Dialog to Storyboard – Example

RMO “*check out shopping cart*” use case

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?

From Dialog to Storyboard – Example



In- Class Activity #1

RMO “checkout shopping cart” use case.

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.

In- Class Activity #1 – Possible Storyboard

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Ridgeline Mountain Outfitters

Browse Share Cart Orders Account

Please confirm shipping address

Nancy Wells
1122 Silicon Avenue
Alamagordo, NM 87989

OK Use another address



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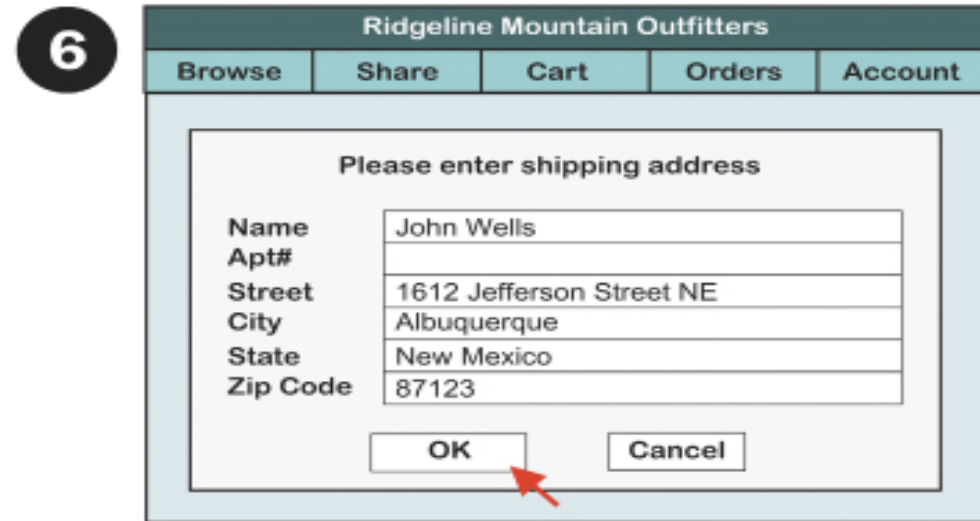
Ridgeline Mountain Outfitters

Browse Share Cart Orders Account

Please enter shipping address

Name John Wells
Apt#
Street 1612 Jefferson Street NE
City Albuquerque
State New Mexico
Zip Code 87123

OK Cancel



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Ridgeline Mountain Outfitters

Browse Share Cart Orders Account

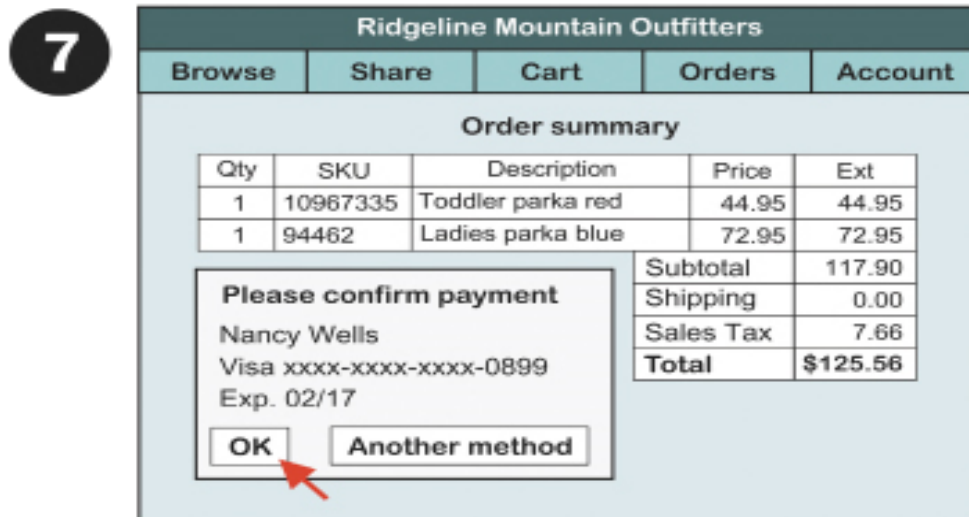
Order summary

Qty	SKU	Description	Price	Ext
1	10967335	Toddler parka red	44.95	44.95
1	94462	Ladies parka blue	72.95	72.95
Subtotal				117.90
Shipping				0.00
Sales Tax				7.66
Total				\$125.56

Please confirm payment

Nancy Wells
Visa xxxx-xxxx-xxxx-0899
Exp. 02/17

OK Another method



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Ridgeline Mountain Outfitters

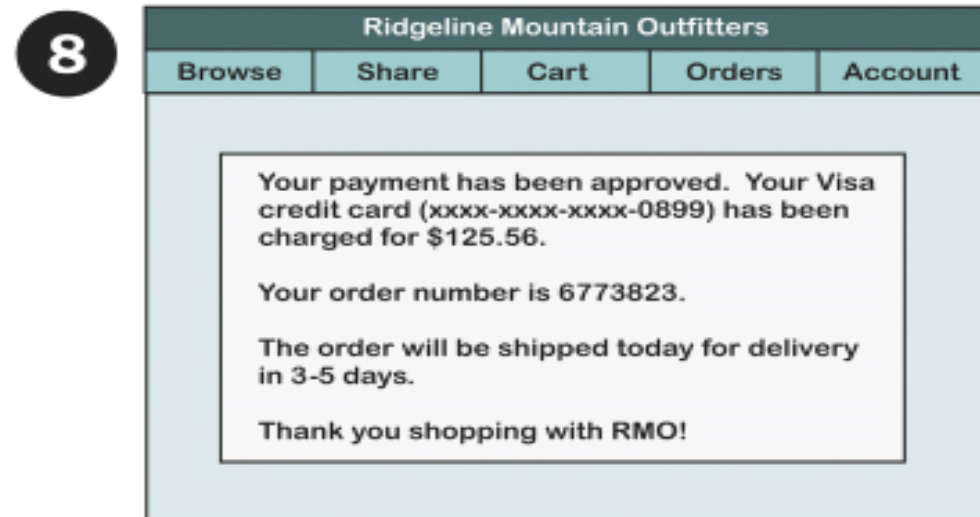
Browse Share Cart Orders Account

Your payment has been approved. Your Visa credit card (xxxx-xxxx-xxxx-0899) has been charged for \$125.56.

Your order number is 6773823.

The order will be shipped today for delivery in 3-5 days.

Thank you shopping with RMO!



User Interface Design

- Is the system a custom application or browser based?
- What kinds of devices will the user-interface need to support?
- What operating systems will the user-interface run on?

User Interface Design (Cont'd)

- Desktop and Laptop UIs
 - Layout and Formatting
 - Purposeful designs, location and grouping, no sloppiness or errors
 - Poorly designed form

Payment Options

☒ Pay by Credit Card CardType: Visa Number: ExpDate:

☐ Pay by Debit Card Debit Card: Mastercard Number:

☐ I want to pay by check

☐ Paypal Paypal email:

☐ Send me a bill


Address: City: State: Zip:

User Interface Design (Cont'd)

- Data Entry
 - Text box, list box, combo box, radio buttons, check boxes
 - Include online editing to minimize errors
- Navigation and Visibility
 - Minimize, maximize, close, scroll bars, resize

RMO Windows Form

RMO Customer Support System - Product Detail



RIDGELINE MOUNTAIN
OUTFITTERS


Product Information

Product ID:

Size:

Color:

Product Picture



Next/Previous Picture

Product Description

Toddlers medium-weight parka. Fleece lined. Hood with velcro closure. Elastic sleeve openings with glove/mitten hooks. One interior and two exterior pockets with velcro closures. Machine wash and dry. Nylon/polyester shell. Cotton lining.

Regular Price:

Sale Price:

Inventory

ID:

In Stock:

On Order:

Due Date:

Search Criteria

Key Words:

Catalog:

Gender:

Product Type:

Price: Min
Max

Search Matches Next/Previous

Consideration for Web-Based Applications UIs

- **Consistency**
 - Cascading style sheets (CSS)- Web page encoding standard that enables a website designer to specify parts of a page that will always look the same and parts that will vary by tasks or audience.
- **Performance consideration**
 - Sensitive to network connection, amount of information transmitted, type of information transmitted
- **Pictures, video, and sound**
 - Powerful , but compatibility issues arise
- **Users with Disabilities**
 - Assistive technologies – software (such as text-to- speech and voice recognition utilities) that adopts user interfaces to the special needs of persons with disabilities.

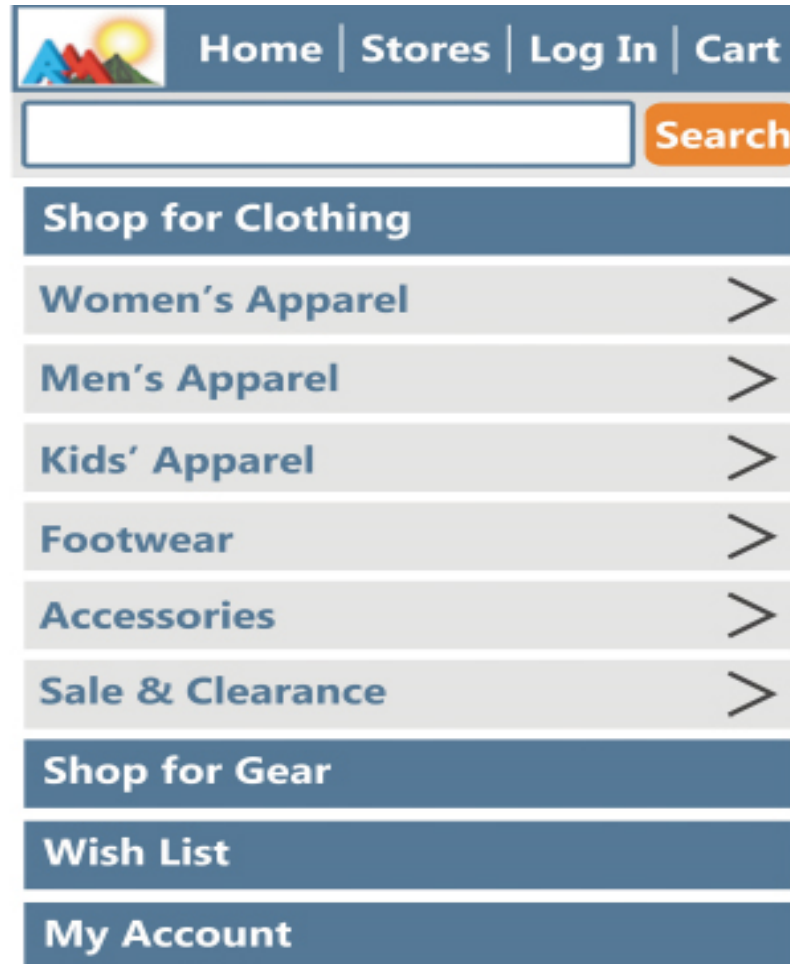
Smartphones and Small Mobile Devices

- Challenges
 - Small screen size, small keyboards and touch screens, limited network capacity, app design guidelines and toolkits
- Layout and formatting
 - Rotating view, resizing, visible navigation, scrolling
- Data entry and user actions
 - Fat finger and accidental touches
- Navigation and visibility
 - Show site map
 - Use action bar
 - Visual clues
 - Back button



Smartphones and Small Mobile Devices - Example

- Sample prototype for RMO home page display



UI for Tablets

- Similar to smartphones, except more real estate to display




Designing Reports, Statements, and Turnaround Documents

- Report Types
 - Detailed reports -- reports that contain specific information on business transactions
 - Summary reports -- reports that summarize detail or recap periodic activity
 - Exception reports -- reports that provide details or summary information about transactions or operating results that fall outside a predefined normal range of values
 - Executive reports -- reports used by high level managers to assess overall organizational health and performance
- Electronic Reports
 - Drill down – to view additional detail related to an item
 - Linking reports to other reports
 - View data grouped various categories
- Graphical and Multimedia Reports
 - Charting and graphing of data

RMO Reports - Example

– Shopping cart order report



Ridgeline Mountain Outfitters—Shopping Cart Order

Customer Name: Fred Westing
Customer Number: 6747222

Shipping Address:

936 N Swivel Street
Hillville, Ohio 59222

Order Number: 4673064
Today's Date: May 18, 2015

Billing Address:

936 N Swivel Street
Hillville, Ohio 59222

Qty	Product ID	Description	Size	Color	Price	Extended Price
1	458238WL	Jordan Men's Jumpman Team J	12	White/ Light Blue	\$119.99	\$119.99
1	347827OP	Woolrich Men's Backpacker Shirt	XL	Oatmeal Plaid	\$41.99	\$41.99
2	8759425SH	Nike D.R.I. – Fit Shirt	M	Black	\$30.00	\$60.00
1	5858642OR	Puma Hiking Shorts	L	Tan	\$15.00	\$15.00
Subtotal						\$236.98
Shipping						\$8.50
Tax						\$11.25
Total						\$256.73

Shipping Information:
Shipping Method: Normal 7–10 day
Shipping Company: UPS
Tracking Number: To be sent via email
Email Address: FredW253@aol.com

Payment Information:
American Express ☐ MasterCard ☐ VISA ☒ Discover ☐
Account Number
X X X X – X X X X – X X X X – 5 7 8 4 **MO YR**
Expiration Date 05 / 17

Thank you for your order. It is a pleasure to serve you.
Check back next week for new weekly specials!!

RMO Reports - Example

– Inventory Report

Ridgeline Mountain Outfitters — Products and Items						
ID	Season	Category	Supplier	Unit Price	Special Price	Discontinued
RMO12587	Spr/Fall	Mens C	8201	\$39.00	\$34.95	No
Description Outdoor Nylon Jacket with Lining						
Size	Color	Style	Units in Stock	Reorder Level	Units on Order	
Small	Blue		691	150		
	Green		723	150		
	Red		569	150		
	Yellow		827	150		
Medium	Blue		722	150		
	Green		756	150		
	Red		698	150		
	Yellow		590	150		
Large	Blue		1289	150		
	Green		1455	150		
	Red		1329	150		
	Yellow		1370	150		
Xlarge	Blue		1498	150		
	Green		1248	150		
	Red		1266	150		
	Yellow		1322	150		
ID	Season	Category	Supplier	Unit Price	Special Price	Discontinued
RMO28497	All	Footwear	7993	\$49.95	\$44.89	No
Description Hiking Walkers with Patterned Tread Durable Uppers						
Size	Color	Style	Units in Stock	Reorder Level	Units on Order	
7	Brown		389	100		
	Tan		422	100		
8	Brown		597	100		
	Tan		521	100		
9	Brown		633	100		
	Tan		654	100		
10	Brown		836	100		
	Tan		954	100		
11	Brown		862	100		
	Tan		792	100		
12	Brown		754	100		
	Tan		788	100		
13	Brown		830	100		
	Tan		921	100		

RMO Reports, Electronic Reports - Example

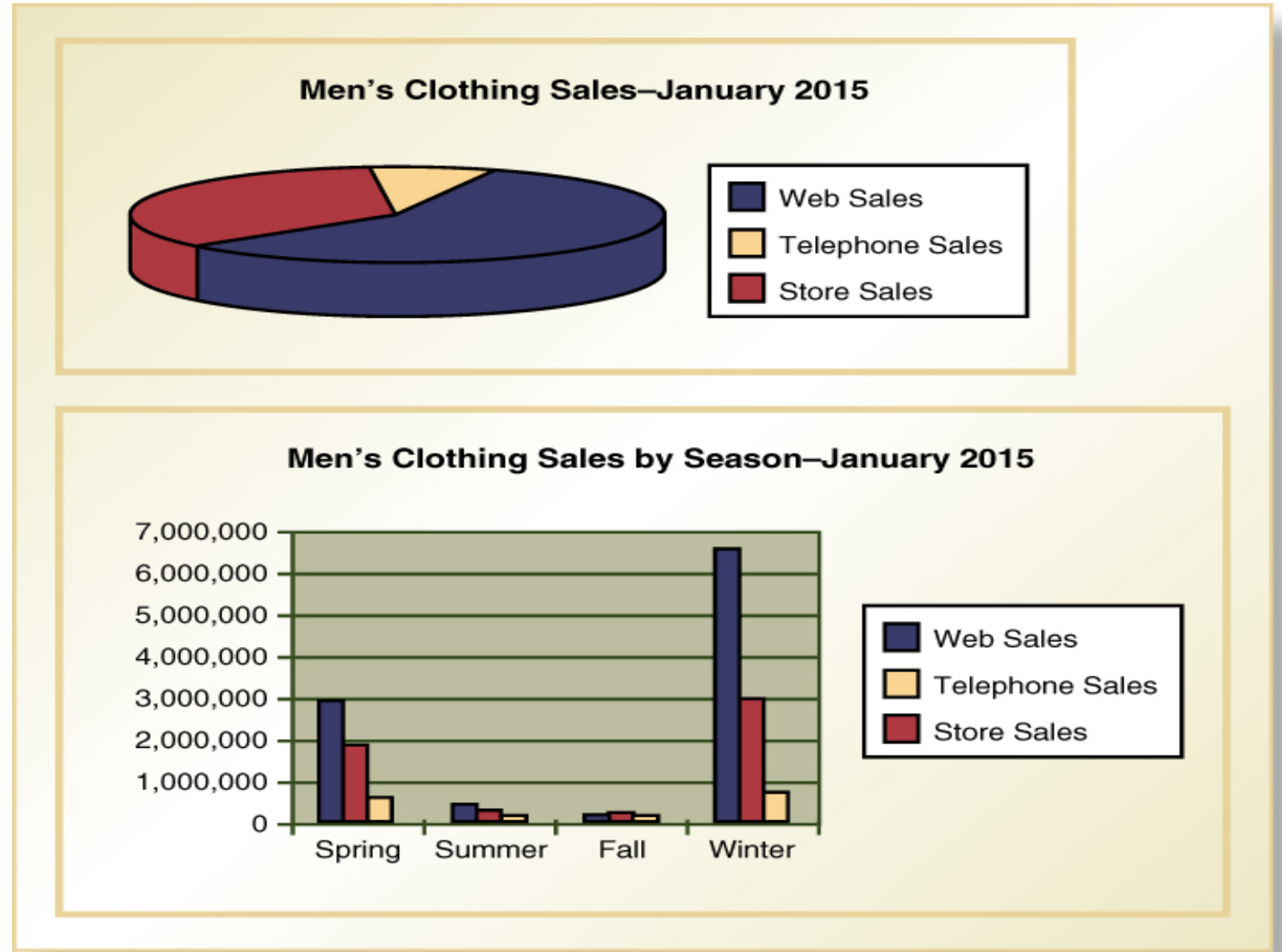
– Drill down

Monthly Sales Summary						
Year	2015	Month	January			
Category	Season Code	Web Sales	Telephone Sales	Mail Sales	Total Sales	
Footwear	All	\$ 289,323	\$ 1,347,878	\$ 540,883	\$ 2,178,084	
Men's Clothing	Spring	\$ 1,768,454	\$ 2,879,243	\$ 437,874	\$ 4,691,484	
	Summer	213,938	387,121	123,590	724,649	
	Fall	142,823	129,873	112,234	384,930	
	Winter	2,980,489	6,453,896	675,290	10,109,675	
	All	4,839,729	10,471,368	1,698,222	\$ 23,391,023	
Totals					\$ 23,391,023	
Women's Clothing	Spring				\$ 965,610	
	Summer					
	Fall					
	Winter					
	All					
Totals						

Monthly Sales Detail						
Year	2015	Month	January	Category	Men's Clothing	Season
Product ID	Product Description		Web Sales	Telephone Sales	Mail Sales	Total Sales
RMO12987	Winter Parka		\$ 1,490,245	\$ 3,226,948	\$ 337,640	\$ 5,054,833
RMO13788	Fur-Lined Gloves		149,022	322,695	33,765	505,482
RMO23788	Wool Sweater		596,097	1,290,775	135,058	2,021,930
RMO12980	Long Underwear		298,050	645,339	68,556	1,003,005
RMO32998	Fleece-Lined Jacket		447,075	1,258,079	100,271	1,805,425
Total			\$ 2,980,489	\$ 6,743,836	\$ 675,290	\$ 10,394,615

RMO Reports, Electronic Reports - Example

- Charts and graphs



Summary

- User interfaces involve direct user interaction with the system.
- The design of the user interface has a long history as human computer interaction (HCI) and relies on user-centered design, which focuses early on users, evaluates designs to ensure usability, and uses iterative development
- Metaphors are used to think about the nature of the user interface, and they include direct manipulation, desktop, document, and dialog metaphors.
- Key user interface concepts include affordance and visibility for controls
- Other key principles include consistency, shortcuts, feedback, dialog closure, error handling, and reversal of actions
- Use cases are organized into one or more menu hierarchies to arrange functionality for users
- Dialogs and storyboards are used to design the interaction for each use case based on use case flow of activates and system sequence diagrams
- Guidelines are available for designing for Windows, Web browsers, and Handheld devices
- Designing inputs involves identifying devices and mechanisms, identifying inputs and the data content, and determining the controls necessary
- Designing outputs includes designing detailed reports, summary report, exception reports, and executive reports
- Electronic reports and other outputs can include drill down, graphics, and multimedia