



Human-Computer Interaction IS4300

1



Quiz

3

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due next class

- Your mission in this exercise is to implement a very simple Java painting applet. The applet must support the following functions:
- Draw curves, specified by a mouse drag.
- Draw filled rectangles or ovals, specified by a mouse drag (don't worry about dynamically drawing the shape during the drag - just draw the final shape indicated).
- Shape selection (line, rectangle or oval) selected by radio buttons.
- Color selection using a combo box.
- Line thickness using a group of radio buttons.
- A CLEAR button.

4



Projects

due today

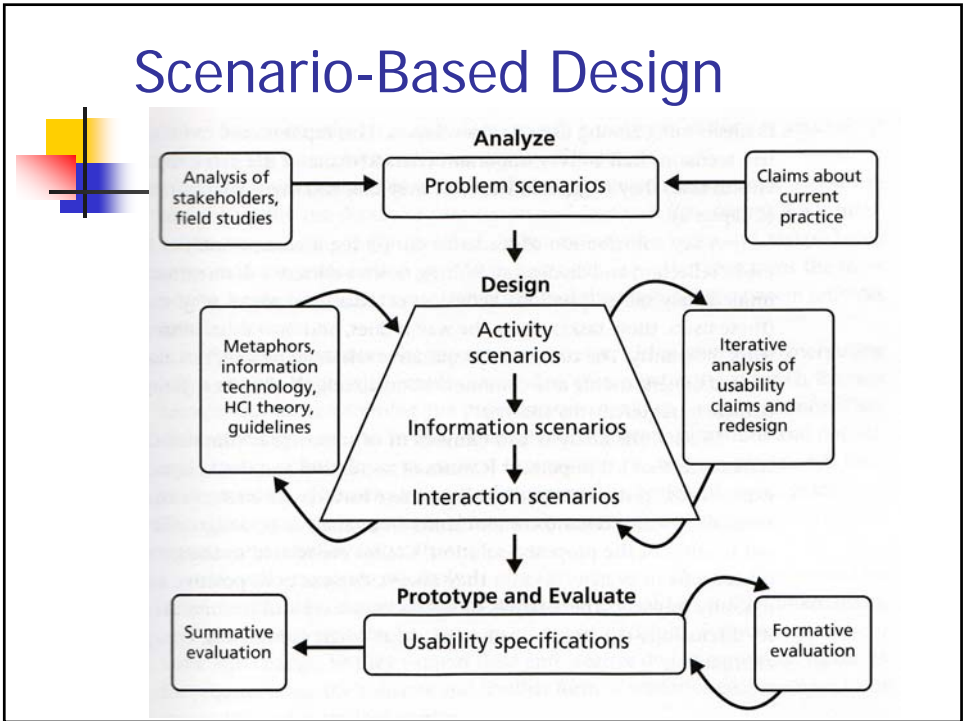
P3

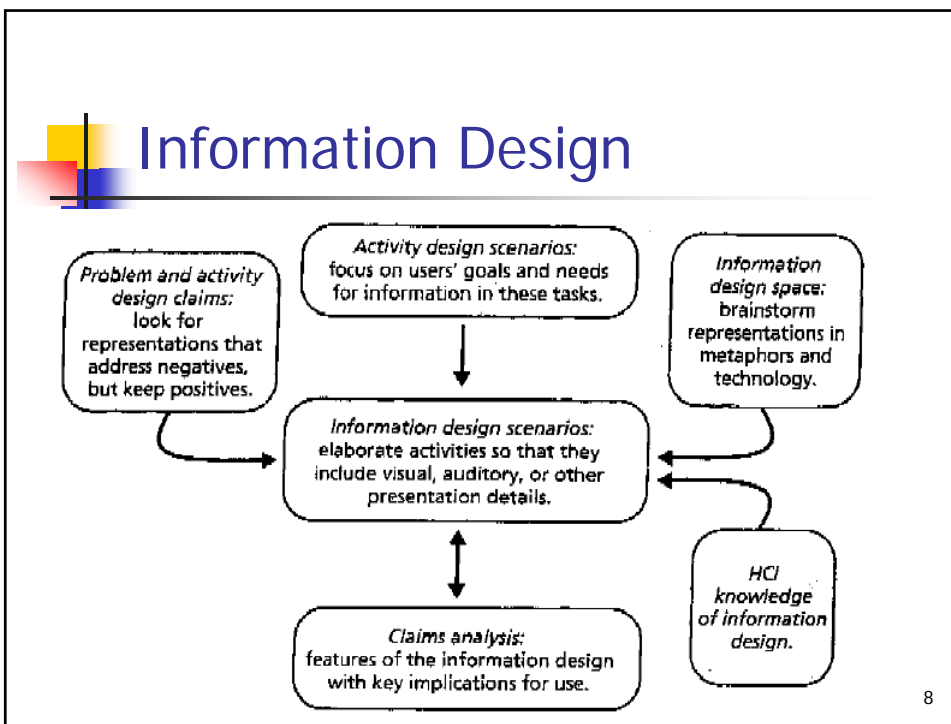
- Convert task scenarios and hierarchical task analyses into a conceptual design.
- Metaphors.
 - Make a list of possible interaction metaphors for your interface (per the examples in class). For each of your task scenarios list at least two options for interaction metaphors and some of the implications of your choice.
- Activity Scenarios
 - Transform each of your problem scenarios into an activity design scenario, documenting analyses of design features
- What to Post
 - three detailed activity scenarios and a list of the metaphors you considered. If you have updated your task models during this exercise please provide them as well.

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P4 – Moving to screen design

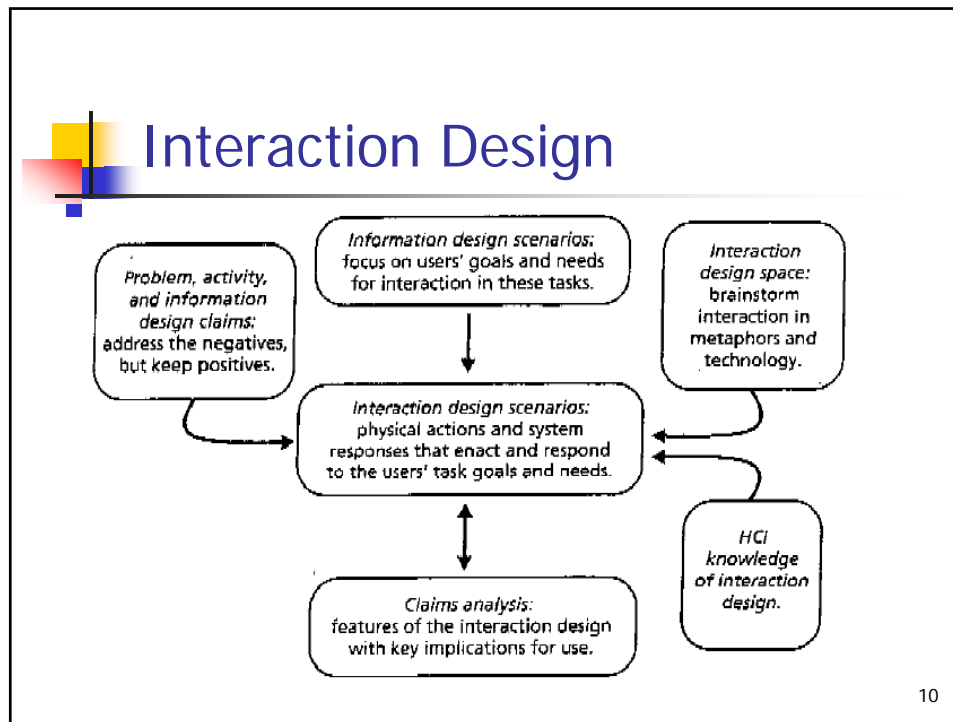
6





Example Activity Design Scenario	Transformed into Information Design Scenario
<p>3) <i>Alicia and Delia go to the science fair.</i></p> <p>Background on Alicia, Delia, and their motivations, . . .</p> <p>When Delia shows Alicia an email invitation to a virtual science fair (VSF), the two of them decide to follow the link right then and there. They are curious about how this will be different from a regular fair.</p> <p>When they arrive at the VSF, they are able to get an overview of what and who is there and the current activities taking place. They can see that some exhibits are still "under construction," so they figure that one difference may be that this fair is ongoing. A welcome note confirms this, indicating that all virtual exhibits will be complete by next Thursday, when the judging will take place.</p> <p>They decide to look around anyway since they have time, and Delia suggests that they visit the exhibit that already has several people viewing it, thinking it must be</p>	<p>3) <i>Alicia and Delia go to the science fair.</i></p> <p>The email includes a string that Delia recognizes as a URL in MOOsburg.</p> <p>At the VSF they recognize the standard MOOsburg layout—panorama view of the fair, brief list of objects to work with, chat tool, and interactive map.</p> <p>Alicia recognizes the map as a high-school floor plan. She shows Delia where she worked in the office as a peer counselor. They see a green dot in the gym, blue dots in other rooms. Alicia infers they are "in" the gym; she plans to check out the rest later.</p> <p>The main view is crowded. At the back is a large Welcome sign, with thanks to organizers, and other announcements.</p> <p>Exhibits are arrayed around the room, each with a student name attached. Some are covered with a black and yellow banner; Delia suggests that these must be "under construction."</p>

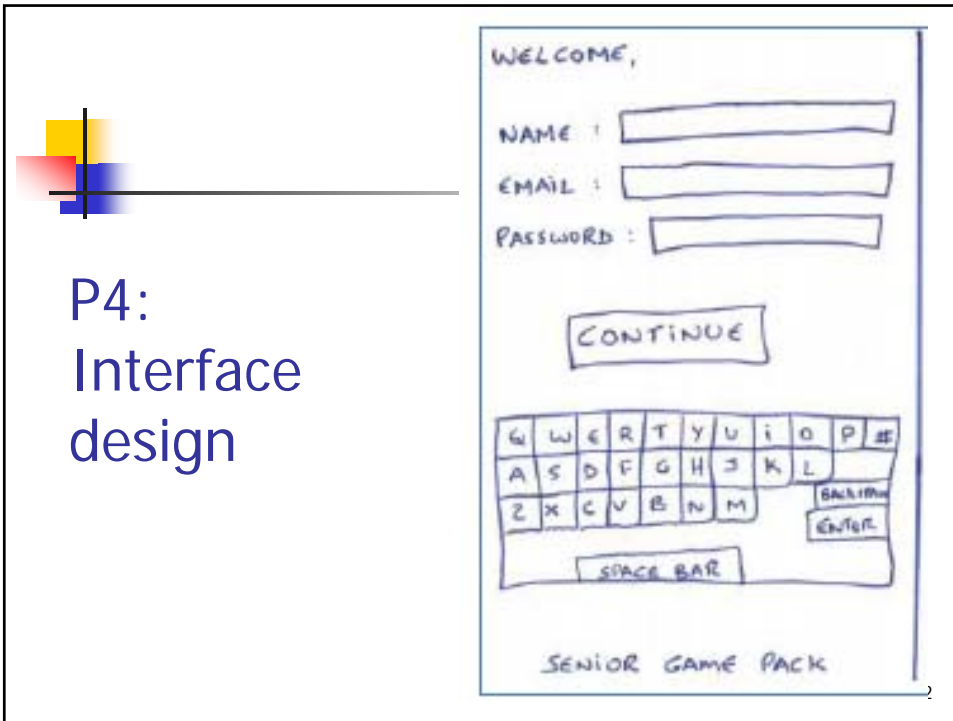
9



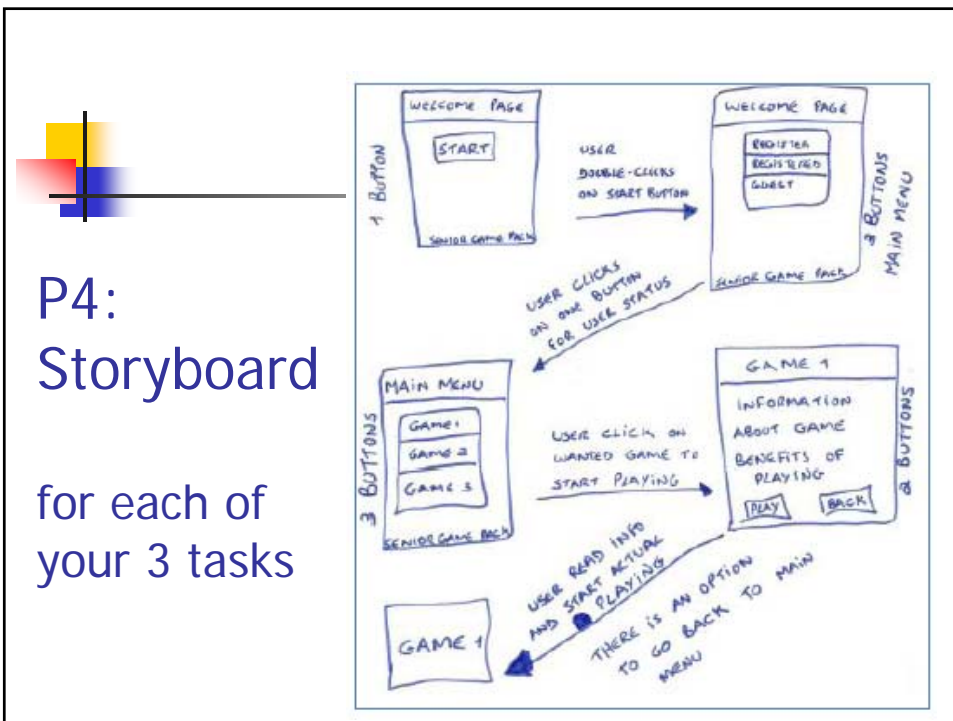
Interaction Scenario

Mr. King can see that Sally is already there when he arrives: The Current Visitors list shows her name. When he arrives, his name is added and flashes briefly in red, so Sally notices him arrive and greets him with a chat message. He quickly notes that she has already added several new items—a title page (which is displayed by default in the main view) and a slide show. He selects her name in the Visitors list, and then uses Control+I to see what she is viewing. The miniature window titled Slide Show flashes in red, so he figures she must be working on her slides. Leaving her name selected in the list, he uses Control+F to synchronize his view with hers. His main viewing area updates to display the message, “Slide show being modified.” PowerPoint then opens to the side, positioned at the slide she is working on. Mr. King’s view of the slides is now controlled by Sally; when she moves to a new slide, so does he. He watches and makes suggestions as she refines the slides, using the text chat.

Sally tells Mr. King that several elements in the template are still empty, but that she has developed most of her material and is about to upload it. Because he is still synchronized with her, he is able to watch this process. She selects a template icon, then selects Get File from the Construction menu. A familiar file-browsing dialog box appears, and he watches as she selects the files from her PC and then presses the Upload button. After each upload, the miniaturized window updates and flashes in red briefly.




P4:
Interface
design



P4:
Storyboard

for each of
your 3 tasks



Screen Layout

What do we know so far?

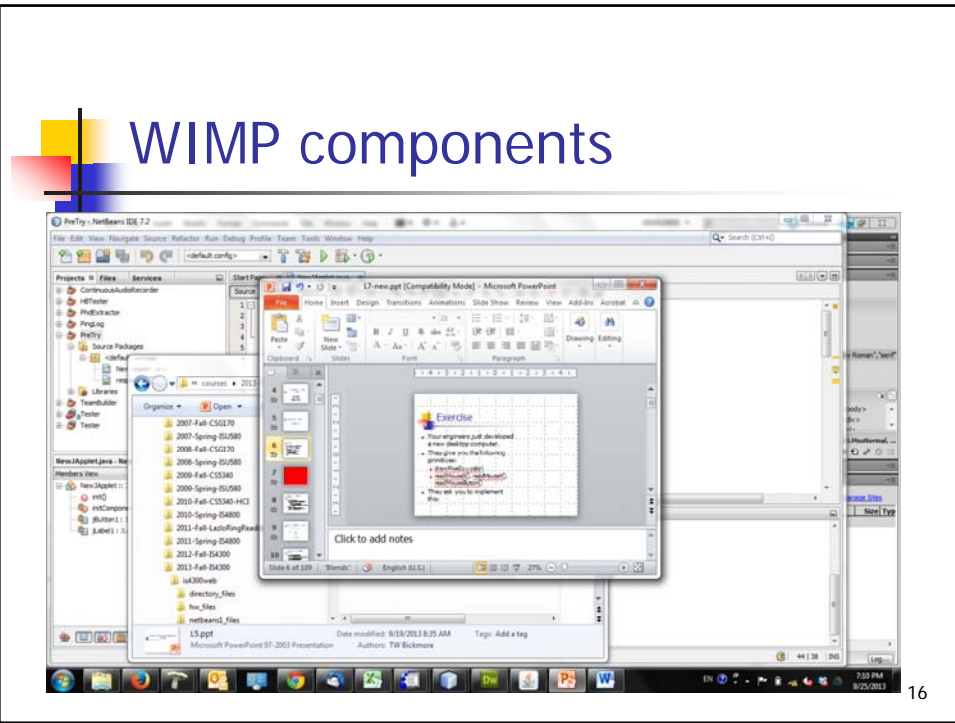
14



Nielsen's Heuristics

How do we implement them?

1. Simple and Natural Dialogue
2. Speak the User's Language
3. Minimize User Memory Load
4. Consistency
5. Feedback
6. Clearly Marked Exits
7. Shortcuts
8. Good Error Messages
9. Prevent Errors
10. Help and Documentation



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Dix 5.7

Laying out columns

<table> <tr><td>sherbert</td><td>75</td></tr> <tr><td>toffee</td><td>120</td></tr> <tr><td>chocolate</td><td>35</td></tr> <tr><td>fruit gums</td><td>27</td></tr> <tr><td>coconut dreams</td><td>85</td></tr> </table> <p>(i)</p>	sherbert	75	toffee	120	chocolate	35	fruit gums	27	coconut dreams	85	<table> <tr><td>sherbert</td><td>75</td></tr> <tr><td>toffee</td><td>120</td></tr> <tr><td>chocolate</td><td>35</td></tr> <tr><td>fruit gums</td><td>27</td></tr> <tr><td>coconut dreams</td><td>85</td></tr> </table> <p>(ii)</p>	sherbert	75	toffee	120	chocolate	35	fruit gums	27	coconut dreams	85
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Text

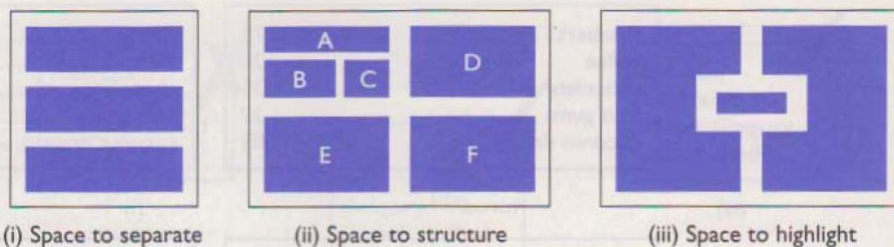
Some heuristics

- Line length ~60 chars / 8-12 words
- Left-justified
- Lines with distinct thoughts, or that end on grammatical boundaries are best

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Dix 5.7

Using whitespace



(i) Space to separate

(ii) Space to structure

(iii) Space to highlight

Figure 5.12 Using white space in layout

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Color

Use sparingly.

Don't rely on it:
Remember 5-8% of users are likely to be color blind.

Keep contrast in mind.

(a)

This text is difficult to read

This text is easy to read

(b)

Red on blue

Blue on red

Green on pink

Pink on green

Dark blue on yellow

Yellow on dark blue

Images

- Can be very difficult to describe in words

Images: Graphs

The image displays a grid of eight different graph types, each with a small icon and a label:

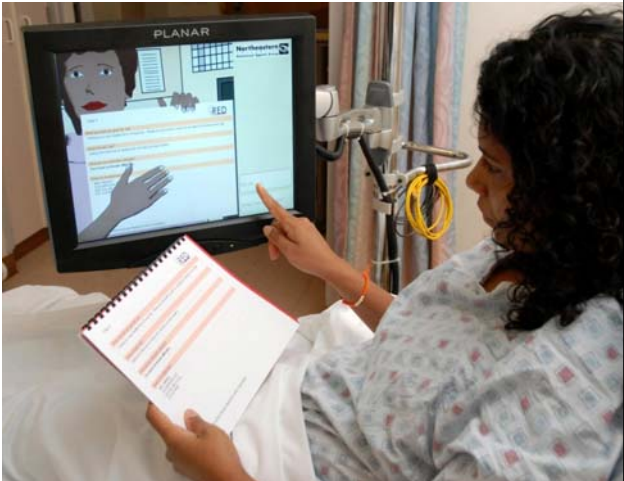
- Scatterplots:** A grid of purple dots on a white background.
- Pie charts:** A circle divided into three colored segments (purple, brown, and white).
- Line graphs or curves:** A line graph with a jagged line on a white background.
- Radar:** A radar chart with a purple shaded area and multiple axes.
- Area, band, strata or surface charts:** A chart with a purple area under a curve on a white background.
- Star, circular or pattern charts:** A circular chart with a star-like pattern and a clock face.
- Bar graphs, column charts or histograms:** A bar chart with several vertical bars of varying heights.

Sound *when to use?*

- Different Types of Sound
 - Ambient, [sound effects](#), music, speech
- Making Good Use of Sound Effects
 - Reinforcement, completion of an operation, attract attention.
- Using Music Effectively
 - Signature, evocative, atmosphere
- Using Speech Effectively
 - Tone, pace, accent
- Problems with the Use of Sound
 - [Concatenation](#) is [artificial](#), intrusive, not good for detailed information alone.

Generated Speech

- demo



GUI Design Heuristics

Stone, et al, User Interface Design and Evaluation

- Primary windows
 - Driven by main tasks & task objects
- Tabs
 - Information on different tabs should be independent.
 - Should not be used for sequential steps.
- Menus
 - Names should indicate purpose

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GUI Design Heuristics

Stone, et al, User Interface Design and Evaluation

- **Toolbars**
 - ToolTips can help users learn the meanings of icons.
- **Icons**
 - Design icons that are visually simple but informative, represent concrete objects.
- **Buttons**
 - Label indicates the action the button does
 - Place along bottom dialog boxes
 - Should be same size and shape. Different widths OK for row of buttons.

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GUI Design Heuristics

Stone, et al, User Interface Design and Evaluation

- **List (combo) boxes**
 - Use when there are a large number of options, OR if the list is likely to change
- **Text box**
 - If you cannot anticipate user input
 - Size of the box should indicate amount of info required

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Interface Layout

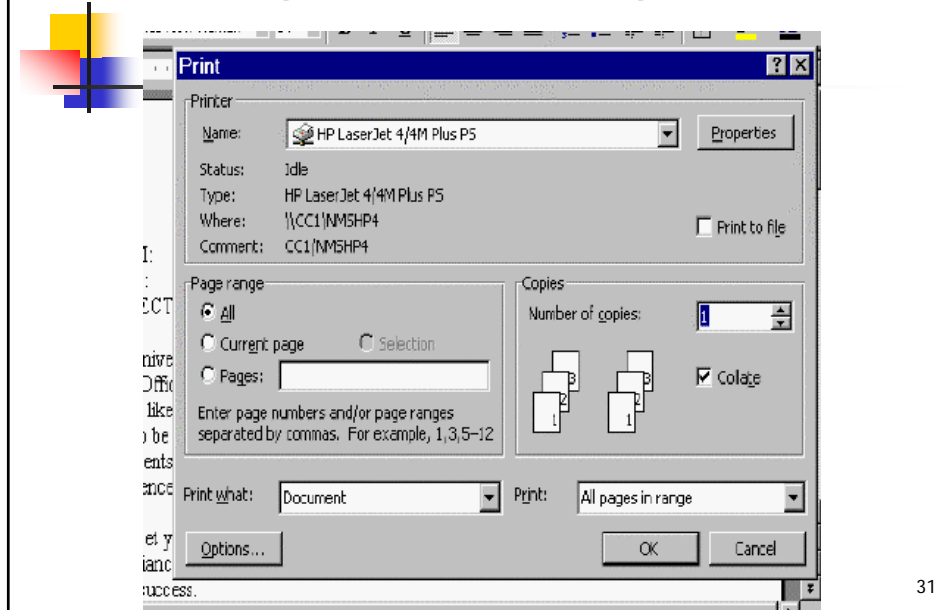
- Simplicity is the key



Principles of Good Layout

- Separate the Currently Active Components
- Emphasize Important Components
 - Color, type size, positioning, animation
- Use White Space Effectively
 - Spaces and gaps are important
- Make the Controls Visible
 - Function of controls must be obvious
- Balance Aesthetics and Usability
- Create Natural Groupings

Example: Word 97 print



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How to create "natural groupings"?

- Card sort!



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Designing Menus



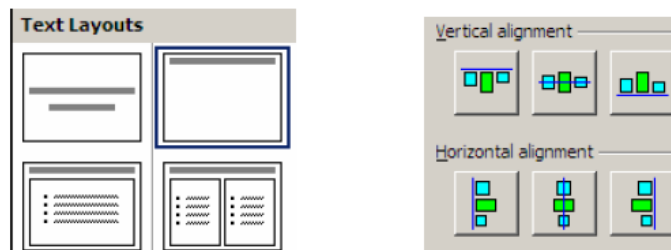
Guidelines for Graphic Design

Designing Visual Interfaces, Mullet '95

- Simplicity
- Contrast
- White space
- Alignment

Simplicity

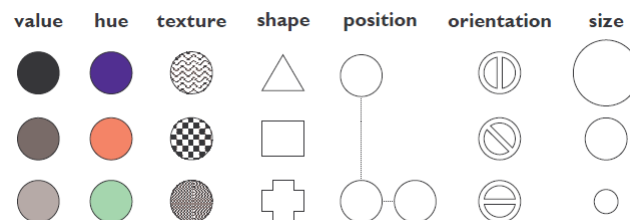
- Remove unnecessary widgets
- Use regularity in design (fonts, lines, colors)



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Contrast

- The irregularity in a design that communicates information
- Dimensions that afford low effort contrast



- Use the "squint test"

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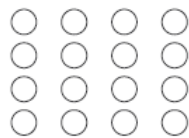
White space

- Use to group controls instead of lines
- Use margins (faster to scan)
- Don't crowd controls together

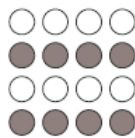
37

Gestalt principles of grouping

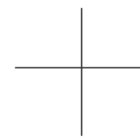
proximity



similarity



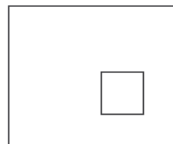
continuity



closure



area

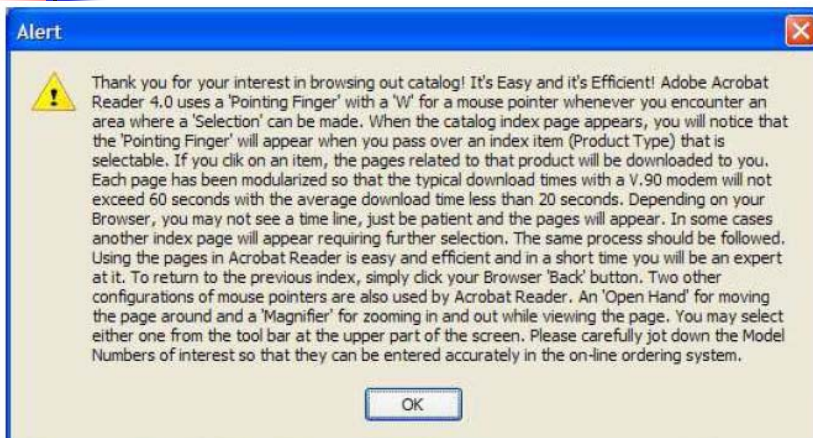


symmetry



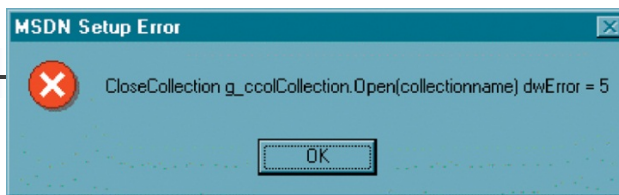
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Critique?



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Critique?



```

usCallback(TRUE));

ction(strServerName, nPort):
CHttpConnection::HTTP_VERB_GET,
(NULL, dwHttpR
aders):
Microsoft Visual C++
No error occurred
OK

Ret);
pt the user fo
ED)

g(NULL, ERROR_INTERNET_INCORRECT_PASSWORD,
GENERATE_DATA | FLAGS_ERROR_UI_FLAGS_CHANGE_O
the dialog, bail out
    
```

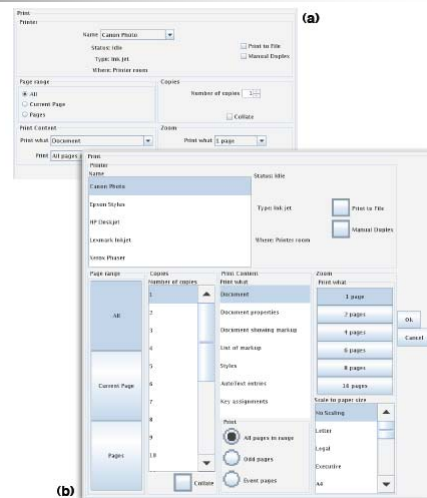


Exercise

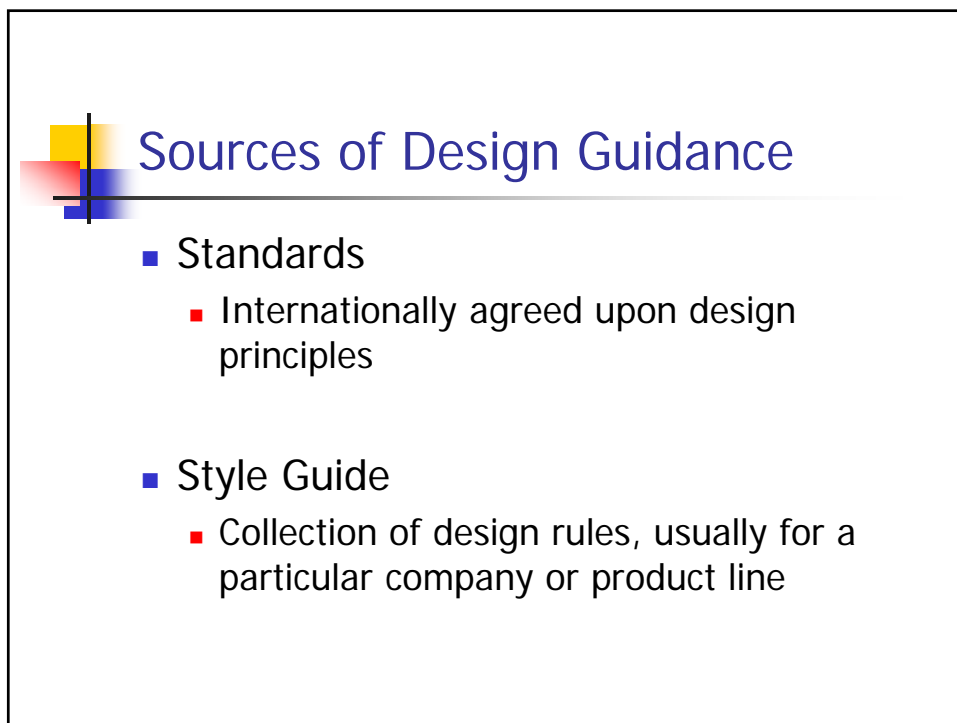
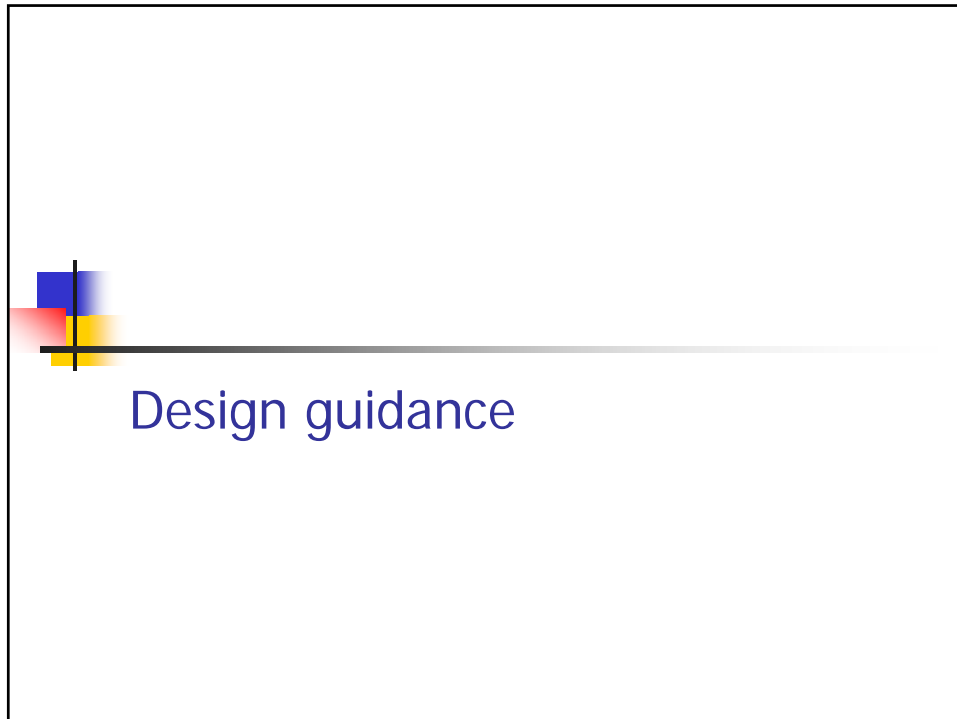
- Design the main screen and menus for the optometrist glass frame sales app
- Tasks?

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Research: SUPPLE Krzysztof Gajos (now Harvard)



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User Interface Standards

- Official, publicly available documents that define standards for user interface design
 - ISO 9241 – *Ergonomic requirements for office work with visual display terminals*
 - ISO 14914 – *Software ergonomics*
 - ISO 13407 – *Human-centered design process (now ISO 9241-210)*
 - ISO 20282 – *Operation of everyday products*




Style Guides

- A typical guide includes:
 - Description of required interaction styles and user interface controls
 - Guidance on when and how to use the various styles or controls
 - Illustrations of styles and controls
 - Screen templates



Commercial Style Guides

- [Apple Interface Guidelines](#)
- [Microsoft Windows UI Guidelines](#)
- [IBM's Common User Access](#)
- [Motif Style Guide](#)
- [Sun Microsystems' Java Look and Feel](#)
- [K Desktop Environment](#)

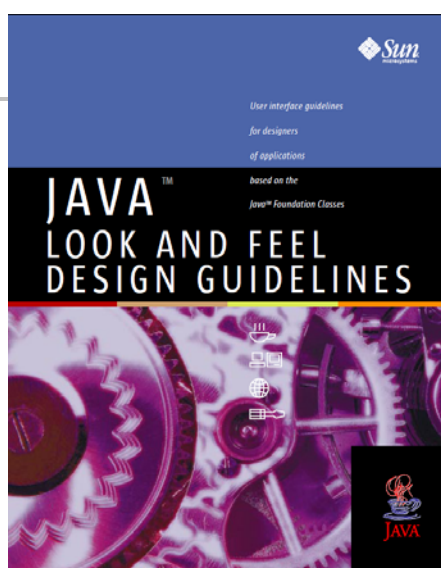


1999!

Fundamentals

The Java look and feel is the default interface for applications built with Java. The Java look and feel is designed for cross-platform use and can provide:

- Consistency in the appearance and behavior of common design elements
- Compatibility with industry-standard components and interaction styles
- Aesthetic appeal that does not distract from application content



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Java Look and Feel

- Accessibility
- Internationalization
- Colors, Fonts, Capitalization
- Layout and Spacing of Widgets
- Icon design
- etc

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Mouse Pointers

TABLE 7 Pointer Types Available in JDK 1.1 and the Java 2 SDK (200%)

Pointer	Macintosh	Windows 95	CDE	Usage In Java Look and Feel Applications
Default				Pointing, selecting, or moving
Crosshair				Interacting with graphic objects
Hand				Panning objects by direct manipulation
Move				Moving objects
Text				Selecting or inserting text
Wait				Indicating that an operation is in progress and the user cannot do other tasks
S Resize				Adjusting the lower (southern) border of an object
N Resize				Adjusting the upper (northern) border of an object
E Resize				Adjusting the right (eastern) border of an object



Customized Style Guides

- Create your own! For your specific project or product line...
- Helps focus on design issues early
- Enables use of principles and guidelines
- Steer decision making and serve as record
- Ensures internal consistency



Style Guides Bottom Line

- If you are building internal tools or one-off projects, using a GUI-builder will ensure most relevant design rules are followed.
- If you are building commercial UIs, your company will provide you with the style guidelines to use.
- You should not be worrying too much about this now in your team project, but may provide guidance for design decisions.

P4 – Design Sketches

Due in 1 week

- You will explore possible design options, and sketching what your interface will look like.
- **Interaction Scenarios**
 - Expand each of your activity design scenarios into full interaction scenarios, thinking about what the user perceives and the actions he/she performs at each major step in the scenario, following the methods outlined in Rosson & Carroll Ch 4 & 5.
- **Preliminary interface design.**
 - One or more sketched windows or dialog boxes, along with the menus and controls that the user manipulates. Take a little time to brainstorm a variety of different interface designs, sketching them by hand on paper or a whiteboard. Then choose one that seems the most promising, or a combination of them, to hand in. Hand-drawn sketches are encouraged.

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P4 – Design Sketches

Due in 1 week

- **Storyboards.** For each of your tasks/scenarios, describe how your preliminary interface would be used to perform the task. Use rough sketches to illustrate how the interface would look at important points in the task.
- **What to Post.** Include the following parts in your report:
 - **Overall design.** Describe your preliminary design by presenting sketches of important windows, dialog boxes, and menu trees, and briefly explaining the function of each item.
 - **Scenario storyboards.** Present each of your scenarios in story form, including sketches to illustrate how your interface would look at important points in the task.

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16 – Swing Layout Managers

- **You have two choices for requirements:**
 - 1) try to duplicate the functionality of an existing applet; or,
 - 2) create your own (ideally project-related) applet with the following minimum requirements:
 - A JFrame and a modal JDialog.
 - A JTabbedPane and JScrollPane.
 - Nested JPanels including the following layout managers: GridLayout, FlowLayout, BorderLayout
 - Some interaction widgets (JButton, etc.) on every JPanel and tab.
 - Reasonable behavior when the JFrame is resized.
- You may not use GridBagLayout or absolute layout anywhere in the project.

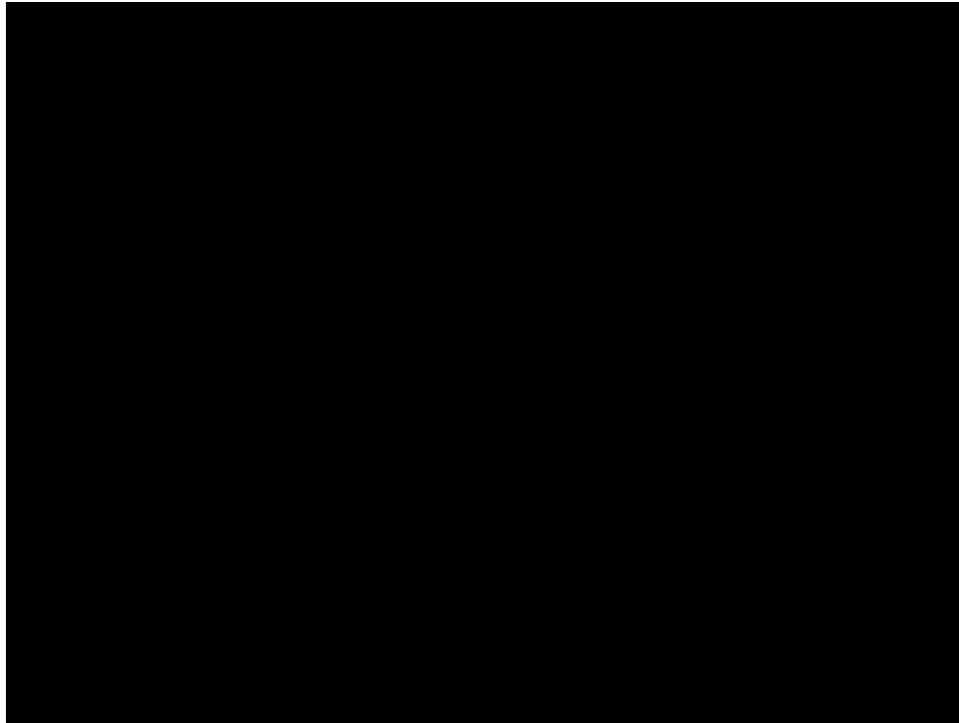
55



To Do

- **Read**
 - Evaluation (Dix Ch 9).
 - Swing layout managers.
- **Finish by Next class**
 - I5 – Painting applet
- **Start**
 - P4 – Design Sketches

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Modal (vs. Modeless) Dialog

The screenshot shows a modal dialog box titled "Print - KOffice Workspace". The dialog is used for configuring a print job. It includes the following elements:

- Printer:**
 - Name: Print to File (PDF)
 - State: Idle (accepting jobs)
 - Type: Write PDF/Acrobat file
 - Location: Local file
 - Comment:
 - Output file: /root/print.pdf
- Print system currently used:** Generic UNIX LPD Print System (default)
- Message:** No plugin information available
- Buttons:** Expand, System Options..., Help, Print, Cancel


Tabs

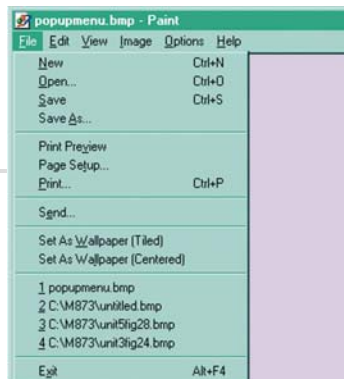
- Useful for classifying the properties of a task object

Modem-2	F-Macros	F-Macros-2	AutoMacros	AutoMacros-2	Buttons		
Buttons -2	AutoReply	AutoReply-2	Window	Window-2	Safety		
Device	Device-2	Terminal	Logging	Emulation	Transfer	Transfer-2	Modem

Menus

- Drop-down
- Cascading
- Roll-up
- Pop-up

A Menu	Another Menu
A text-only menu item Alt-1	
 Both text and icon	
<input checked="" type="radio"/> A radio button menu item	
<input type="checkbox"/> A check box menu item	
A submenu ▶	



Tool Bars

- Good for efficiency of expert users




Icons (e.g., Tool Bars)

- Difficult to select (very difficult to design)
 - Distinguishable
 - Recognizable
 - Visually simple
 - Informative
 - Represent concrete objects
 - Easy to perceive



Command Buttons

- Labels are important
- Most important at left and top
- Same size, but adjusted for label length OK



Exercise

- Design menus for the Optometrist Sales GUI

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Exercise

- Design the primary glass frame search window for the Optometrist GUI