

User Interface Design

Instructor:

Agenda

- Prototype
 - Screen Flow Diagram
 - Interaction Flow Modeling Language (IFML)
- User Interface Design by Problems

Prototype

- Concrete but partial implementation of a system design
- To explore usability issues
 - To refine user requirements
 - To explore design ideas
 - Share or co-develop designs with user participants
 - Make a precise test of specific open issues
 - Collect usability test data

Prototype Screen Flow Diagram (Storyboard)

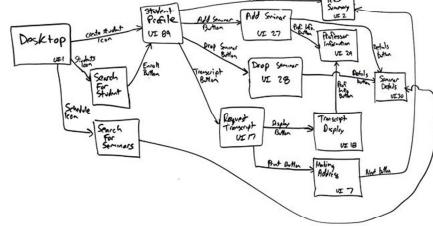


Image: <http://www.agilemodeling.com>

- Screen Flow Diagrams (storyboards, user Interface diagram, interface-flow diagrams, windows navigation diagrams, context-navigation maps) is used to model the high-level relationships between major UI elements and thereby ask fundamental usability questions.

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[1] <http://www.agilemodeling.com/artifacts/uiFlowDiagram.htm>

Prototype - Screen Flow Diagram Sketch Screenshot

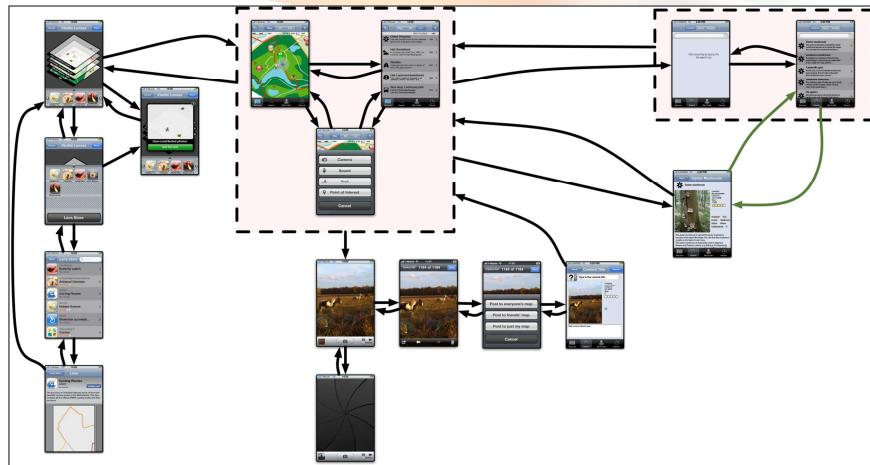


Image: <http://micheljansen.org>

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[1] <http://micheljansen.org/projects/discoverijssel/screen-flow-diagram>

Prototype – Screen Flow Diagram State Machine Diagram

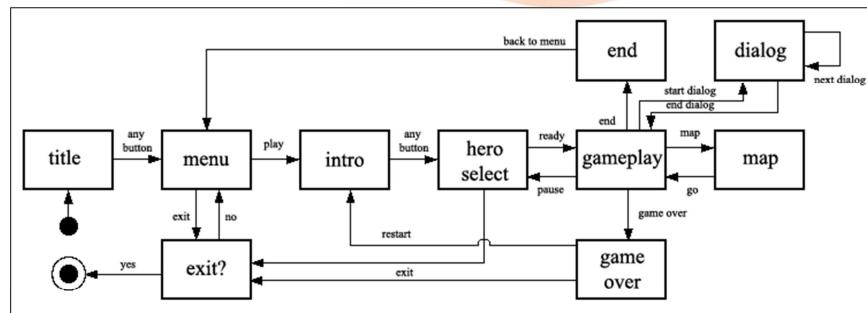


Image: <http://emr.deviantart.com>

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[1] <http://emr.deviantart.com/art/screen-flow-diagram-174903222>

Prototype – IFML

The Interaction Flow Modeling Language

- The Interaction Flow Modeling Language has been adopted as a standard by OMG in March 2013.
- Notations:

Concept	Meaning	IFML Notation	PSM Example
View Container	An element of the interface that comprises elements displaying content and supporting interaction and/or other ViewContainers.	MailBox	Web page Window Pane.
View Component	An element of the interface that displays content or accepts input	Message List	An HTML list. A JavaScript image gallery. An input form.
Event	An occurrence that affects the state of the application	○ Name	



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[1] <http://www.ifml.org/>

Prototype – IFML

The Interaction Flow Modeling Language

- Notations:

Action	A piece of business logic triggered by an event		A database update The sending of an email.
Navigation Flow	An input-output dependency. The source of the link has some output that is associated with the input of the target of the link		Sending and receiving of parameters in the HTTP request
Data Flow	Data passing between ViewComponents or Action as consequence of a previous user interaction.		
Parameter Binding Group	Set of ParameterBindings associated to an InteractionFlow (being it navigation or data flow)		

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[1] <http://www.ifml.org/>

Prototype – IFML Sample: Online payment system

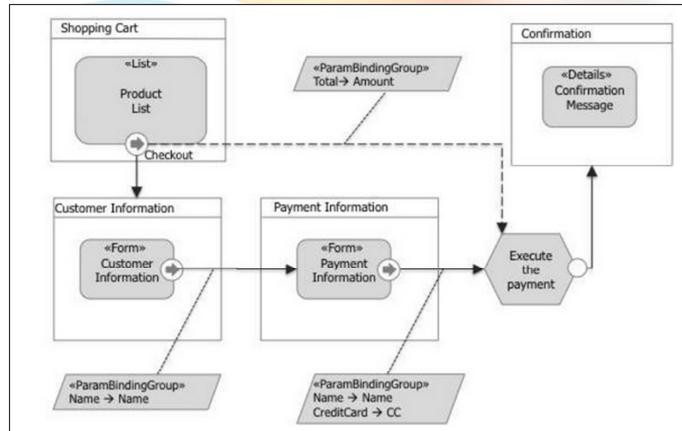
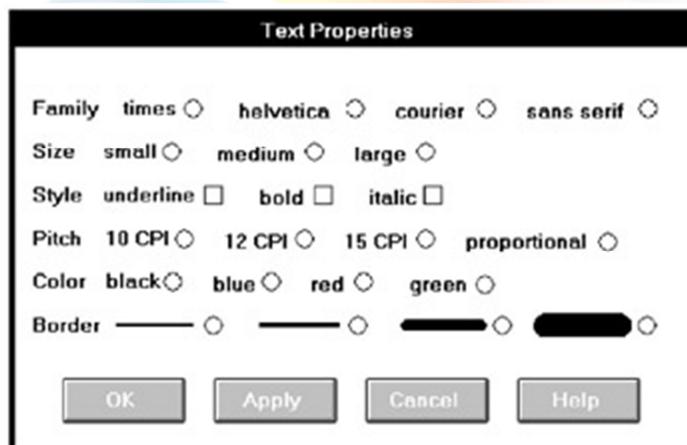


Image: <http://webratio.com>

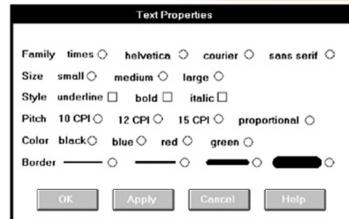
User Interface Design Problem 1



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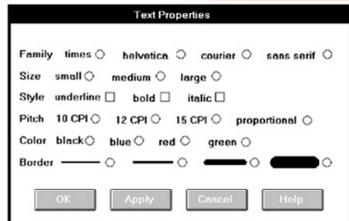
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User Interface Design Problem 1 – Analysis 1/2



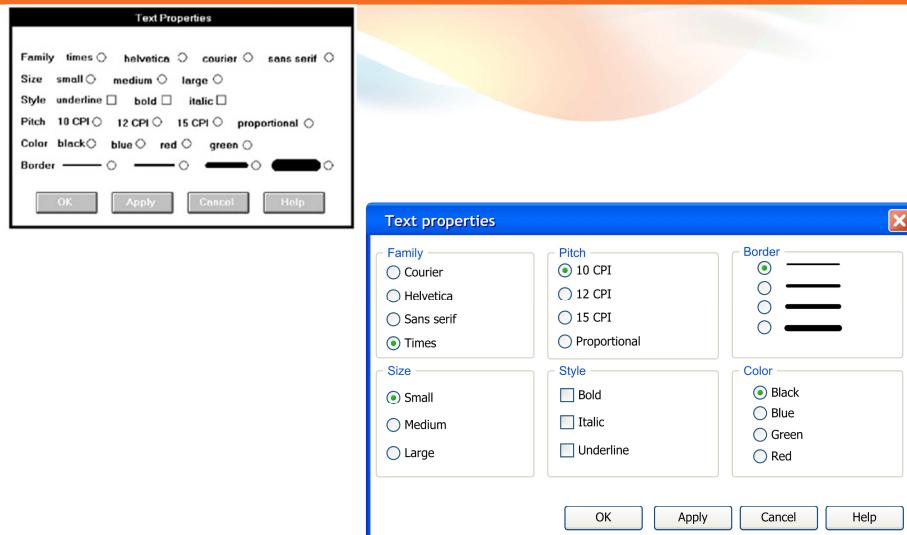
- Captions are not discernible [không thấy rõ] from choice descriptions, and the initial choice descriptions are not left-aligned
- *The radio buttons and check boxes are not strongly associated with their respective descriptions* → certainly causing selection confusion
- The horizontal orientation of choices is not efficient for human scanning

User Interface Design Problem 1 – Analysis 2/2



- No perception of groupings exists → Hard to use/ Uncomfortable
- The ordering scheme of Family, Style, and Color is questionable (Alphabetic ordering would seem to be more appropriate) → Hard to use/ Uncomfortable

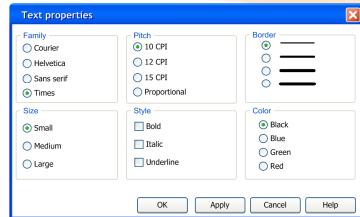
User Interface Design Problem 1 - Solution



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User Interface Design Problem 1 - Solution Analysis



- The title is capitalized to set it off from the remainder of the screen.
- The radio buttons and check boxes are arrayed vertically to facilitate scanning and comparison of alternatives
- All controls are enclosed in borders to focus the viewer's attention to them
- The screen can be effectively used from left to right or from top to bottom
- Family, Style, and Color are alphabetized

User Interface Design Problem 2

PIF EDITOR

Program Filename:

Window Title:

Optional Parameters:

Start up Directory:

Video Memory: Text Low Graphics High Graphics

Memory Requirements: KB Required KB Desired

EMS Memory: KB Required KB Limit

XMS Memory: KB Required KB Limit

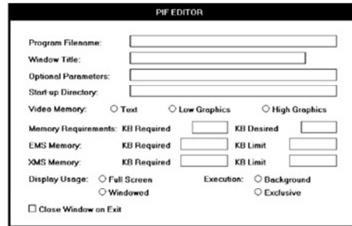
Display Usage: Full Screen Execution: Background
 Windowed Exclusive

Close Window on Exit

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User Interface Design Problem 2 - Analysis



- The word “memory” **repeated four times** in succession seems redundant, indicating the potential for a heading
- One radio button field (Video Memory) is arrayed horizontally, the others (Display Usage and Execution) are arrayed vertically → non-unique
- The control “Close Window on Exit” seems lost[lạc lõng]

User Interface Design Problem 2 – Solution #1

PIF EDITOR

Program Filename: [] Window Title: [] Optional Parameters: [] Start-up Directory: []

Video Memory: 1 MB Low Graphics High Graphics

Memory Requirements: EMS Required: KB Limit: KB

EMS Memory: EMS Required: KB Limit: KB

XMS Memory: XMS Required: KB Limit: KB

Display Usage: Full Screen Windowed Executor: Background Exclusive

Close Window on Exit

APPLICATION

Program Filename: [] Window Title: [] Optional Parameters: [] Start-up Directory: []

MEMORY

REAL > Required: [] KB Desired: [] KB

EMS > Required: [] KB Limit: [] KB

XMS > Required: [] KB Limit: [] KB

VIDEO > Type: Text Low Graphics High Graphics

Display Usage: Full Screen Windowed

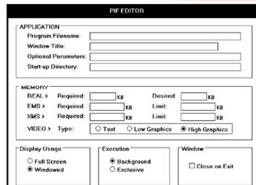
Execution: Background Exclusive

Window: Close on Exit

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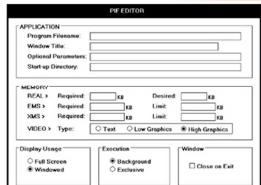
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User Interface Design - Problem 2 Solution #1 Analysis 1/2



- The radio buttons/check boxes at the bottom of the screen are arrayed horizontally to provide screen balance
- “Close Window on Exit” control field is given an caption to allow a control border consistent with its neighbors and to create screen balance
- The Video (Memory) control remains, arrayed horizontally. It would have been desirable to organize its choices vertically, but the best overall fit within the screen is achieved by horizontal orientation

User Interface Design - Problem 2 Solution #1 Analysis 2/2



- This redesigned version of the screen is actually 4 percent more complex than the original. The addition of headings and subheadings added to its complexity measure.
- Additional information added to a screen to aid understanding can sometimes increase its complexity. So, use the complexity measure as a guide, not as an absolute and final measure of a screen's effectiveness.

User Interface Design Problem 2 - Solution #2

PIF EDITOR

APPLICATION
Program Filename:
Window Title:
Optional Parameters:
Start-up Directory:

MEMORY
PFA/ > Required: KB Desired: KB
EMS > Required: KB Limit: KB
XMS > Required: KB Limit: KB
VIDEO > Type: Text Low Graphics High Graphics

Display Usage: Full Screen Windowed
Execution: Background Exclusive
Window: Close on Exit

PIF EDITOR

APPLICATION
Program Filename:
Window Title:
Optional Parameters:
Start-up Directory:

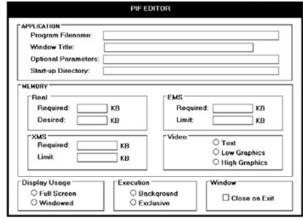
MEMORY
Real
Required: KB
Desired: KB
EMS
Required: KB
Limit: KB
XMS
Required: KB
Limit: KB
Video
 Text
 Low Graphics
 High Graphics

Display Usage: Full Screen Windowed
Execution: Background Exclusive
Window: Close on Exit

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User Interface Design - Problem 2 Solution #2 Analysis



- The Memory section has been restructured to maintain a top-to-bottom flow.
- The trade-off is that two columns are now required to present the information

User Interface Design Problem 3

Personal Details Customer

1st Given Name	2nd Given Name (if any)	Surname	OK
<input type="text"/>			Apply
Courtesy Title: <input type="text"/> <input type="button" value="▼"/>			Cancel
Sex:	<input type="radio"/> Male	<input type="radio"/> Female	<input type="radio"/> Unknown
Marital Status:	<input type="radio"/> Married	<input type="radio"/> Single	<input type="radio"/> All Others
Date of Birth (dd/mm/yyyy):	<input type="text"/>		
Daytime Phone No:	<input type="text"/>		
Home Address:	<input type="text"/>		
City/Town/Suburb:	<input type="text"/>	Postcode:	<input type="text"/>

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User Interface Design Problem 3 – Analysis 1/2

Personal Details Customer

1st Given Name	2nd Given Name (if any)	Surname	OK
Courtesy Title:			Apply
Sex:	<input checked="" type="radio"/> Male	<input type="radio"/> Female	<input type="radio"/> Unknown
Marital Status:	<input type="radio"/> Married	<input type="radio"/> Single	<input type="radio"/> All Others
Date of Birth (dd/mm/yyyy):			
Daytime Phone No:			
Home Address:			
City/Town/Suburb:	Postcode:	Cancel	
Help			

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User Interface Design Problem 3 – Analysis 2/2

The screenshot shows a Windows-style dialog box titled "Personal Details Customer". It contains several input fields and radio buttons. At the top, there are three text boxes labeled "1st Given Name", "2nd Given Name (if any)", and "Surname". Below these are radio buttons for "Sex" (Male, Female, Unknown) and "Marital Status" (Married, Single, All Others). A date input field "Date of Birth (dd/mm/yyyy)" is followed by a phone number input field "Daytime Phone No.". There are two address input fields: "Home Address" and "City/Town/Suburb", which are grouped together. A "Postcode" input field is located to the right of the "City/Town/Suburb" field. At the bottom of the dialog are four buttons: "OK", "Apply", "Cancel", and "Help".

- There are no groupings
- Are the labels above the Name text box intended as captions? Are they intended as prompts? This is not clear.
- Is *the prompt (dd/mm/yyyy) in the proper location? In its current position*, it is set up as an aid to a *novice or casual user* of the system. For an *expert user* of the system, who does not need the prompt, it is positioned where it is visual noise. For the expert it should be to the right side of the text box.

User Interface Design Problem 3 – Solution #1

Personal Details Customer

1st Given Name:	2nd Given Name (if any):	Surname:	
Courtesy Title: <input type="text"/>			
Sex:	<input type="radio"/> Male	<input type="radio"/> Female	<input type="radio"/> Unknown
Marital Status:	<input type="radio"/> Married	<input type="radio"/> Single	<input type="radio"/> All Others
Date of Birth (dd/mm/yyyy):	<input type="text"/>		
Daytime Phone No:	<input type="text"/>		
Home Address:	<input type="text"/>		
City/Town/Suburb:	<input type="text"/>	Postcode:	<input type="text"/>

OK Apply Cancel Help

PERSONAL DETAILS - CUSTOMER

Name:	<input type="text"/> (1st)	<input type="text"/> (2nd - if any)	<input type="text"/> (Surname)
Courtesy Title:	<input type="text"/>		
Sex:	<input type="radio"/> Male	<input type="radio"/> Female	<input type="radio"/> Unknown
Marital Status:	<input type="radio"/> Married	<input type="radio"/> Single	<input type="radio"/> All Others
Date of Birth:	<input type="text"/> / <input type="text"/> / <input type="text"/> (dd/mm/yyyy)		
Daytime Phone No:	<input type="text"/>		
Home Address:	<input type="text"/>		
City/Town/Suburb:	<input type="text"/>	Postcode:	<input type="text"/>

OK Apply Cancel Help

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Problem 3 Solution #1 Analysis 1/2

PERSONAL DETAILS - CUSTOMER

Name: (First, Last, Middle)

Country Title:

Sex: Male Female Unknown

Marital Status: Married Single All Others

Date of Birth: / / (dd/mm/yyyy)

Daytime Phone No.:

Home Address:

City/Town/Suburb: Postcode:

OK Apply Cancel Help

- The **Name field is given a caption** and a single alignment point is established for both captions and data. Captions and data are now much more readable
- Name format instructions (1st, 2nd, and so on) are established as prompts. This prompt designation is signaled by placing them in italics to subdue [làm giảm] them visually.

User Interface Design - Problem 3 Solution #1 Analysis 2/2

A screenshot of a Windows-style dialog box titled "PERSONAL DETAILS - CUSTOMER". The dialog contains the following fields:

- Name: [Text Box]
- Courtesy Title: [Text Box] (with dropdown arrow)
- Sex: [Radio Buttons] (Male, Female, Unknown)
- Marital Status: [Radio Buttons] (Married, Single, All Others)
- Date of Birth: [Text Box] (dd/mm/yyyy) (with dropdown arrow)
- Daytime Phone No.: [Text Box]
- Home Address: [Text Box]
- City/Town/Suburb: [Text Box]
- Postcode: [Text Box]

At the bottom are four command buttons: OK, Apply, Cancel, and Help.

- The prompt for Date of Birth is placed to the right of its text box, out of the way but still easily viewable. This also permits the alignment point for the text boxes to be moved closer to the captions
- Date is also segmented into its component pieces.
- The command buttons are positioned at the bottom

User Interface Design Problem 3 - Solution #2

The image displays two versions of a 'PERSONAL DETAILS - CUSTOMER' form. Both forms are identical in layout and content, showing fields for Name, Courtesy Title, Sex, Marital Status, Date of Birth, Daytime Phone No., Home Address, City/Town/Suburb, Postcode, and buttons for OK, Apply, Cancel, and Help.

PERSONAL DETAILS - CUSTOMER		
(Title)	(First - if any)	(Surname)
Name:	(Title) (First - if any) (Surname)	
Courtesy Title:	<input type="text"/>	
Sex:	<input type="radio"/> Male <input type="radio"/> Female <input type="radio"/> Unknown	
Marital Status:	<input type="radio"/> Married <input type="radio"/> Single <input type="radio"/> All Others	
Date of Birth:	<input type="text"/> / <input type="text"/> / <input type="text"/> (dd/mm/yyyy)	
Daytime Phone No:	<input type="text"/>	
Home Address:	<input type="text"/>	
City/Town/Suburb:	<input type="text"/>	Postcode: <input type="text"/>
<input type="button"/> OK <input type="button"/> Apply <input type="button"/> Cancel <input type="button"/> Help		

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User Interface Design - Problem 3 Solution #2 Analysis

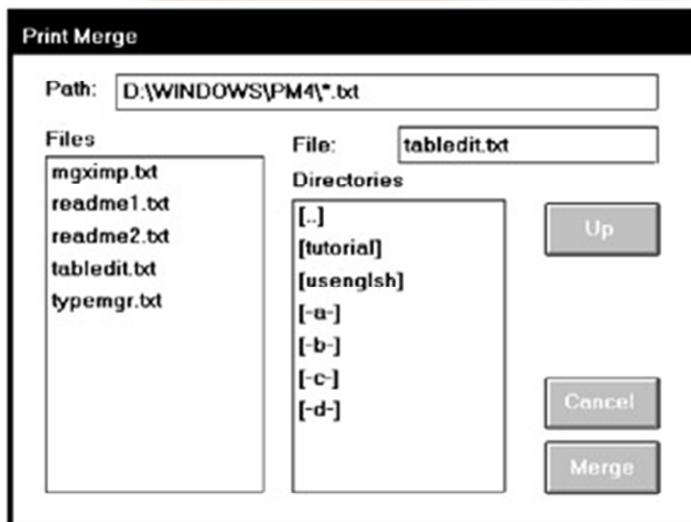
The screenshot shows a Windows-style dialog box titled "PERSONAL DETAILS - CUSTOMER". It contains the following fields:

- Name: [Text input field]
- Courtesy Title: [Text input field]
- Sex:
 - Male
 - Female
 - Unknown
- Marital Status:
 - Married
 - Single
 - All Others
- Date of Birth: [Text input field] / [Text input field] / [Text input field] (dd/mm/yyyy)
- Daytime Phone No.: [Text input field]
- Home Address: [Text input field]
- City/Town/Suburb: [Text input field]
- Postcode: [Text input field]

At the bottom are four buttons: "OK", "Apply", "Cancel", and "Help".

- This screen is identical to the above version except that Sex and Marital Status are arrayed vertically.

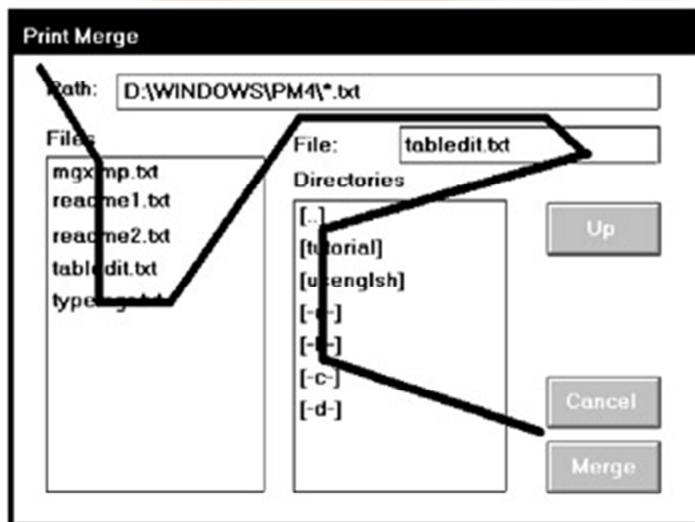
User Interface Design Problem 4



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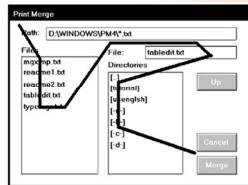
User Interface Design Problem 4 – Analysis 1/2



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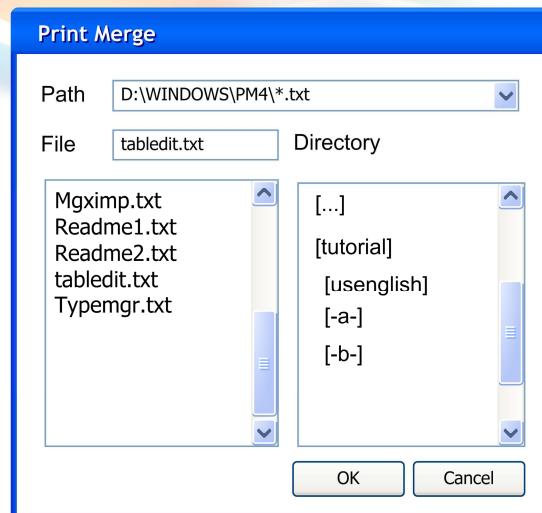
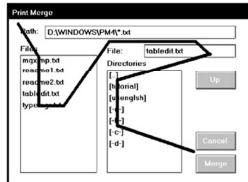
31

User Interface Design Problem 4 – Analysis 2/2



- The controls on the Print Merge screen are very poorly aligned. The File text box is located quite far from its associated list box
- **What does the Up button do?** It is actually related to the Directories list box. This is certainly not clear.
- Look at the required sequence of eye movements through this screen, as illustrated by the line drawn between successive controls. This is very inefficient.

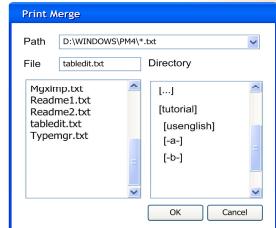
User Interface Design Problem 4 - Solution



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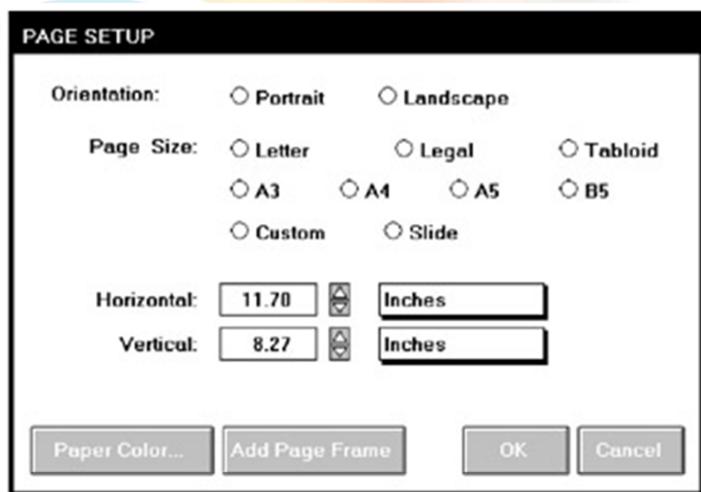
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User Interface Design Problem 4 - Solution Analysis



- Elements are aligned and the File text box is positioned by its related list box.
- The Up command is placed “...” (or in the proper contingent relationship to the Directories list box)
- The command buttons are moved to the bottom of the screen and Merge is changed to OK for consistency with the other screens.

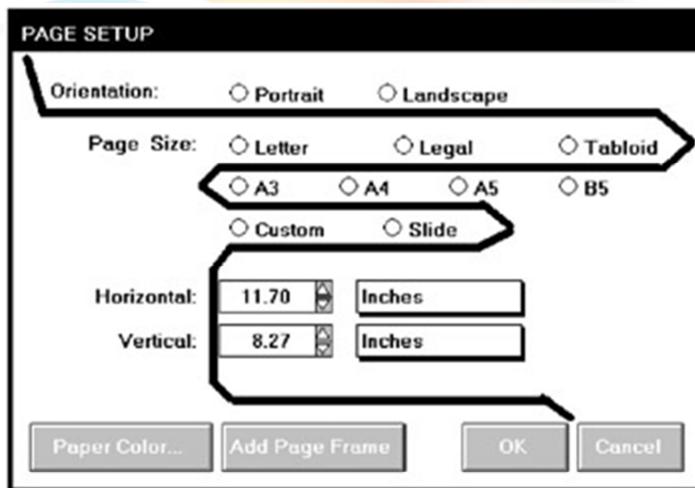
User Interface Design Problem 5



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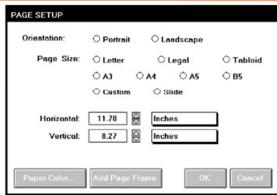
User Interface Design Problem 5 – Analysis 1/3



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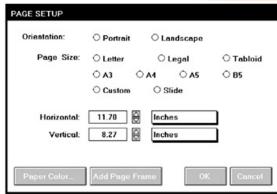
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User Interface Design Problem 5 - Analysis 2/3



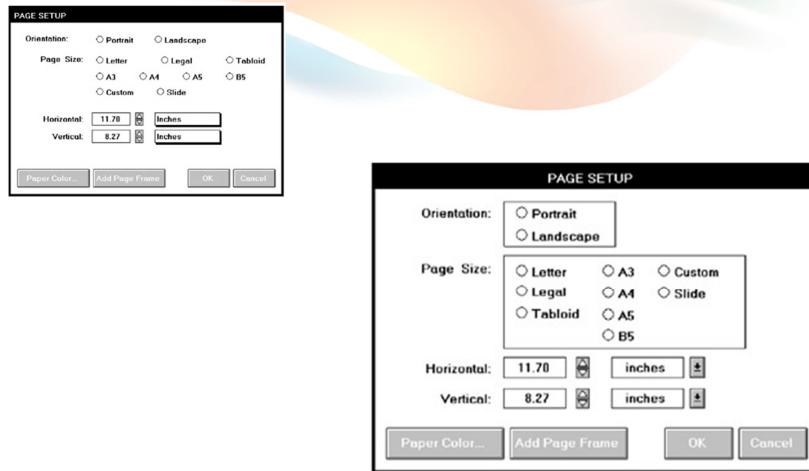
- The controls on the Page Setup screen are very poorly grouped. Are the nine radio buttons beginning at the Page Size caption one or three groupings?
- The horizontal orientation of the radio buttons necessitates a less efficient horizontal scanning and makes visual comparison of the alternatives more difficult.

User Interface Design Problem 5 - Analysis 3/3

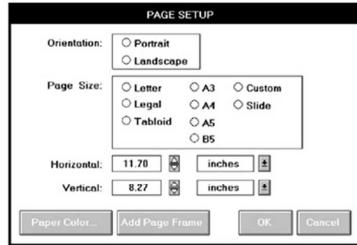


- Why is the Orientation caption not right-aligned with the other captions?
- What are the controls inscribed with Inches?
- Nonstandard controls increase learning requirements and add to the complexity of the interface

User Interface Design Problem 5 - Solution

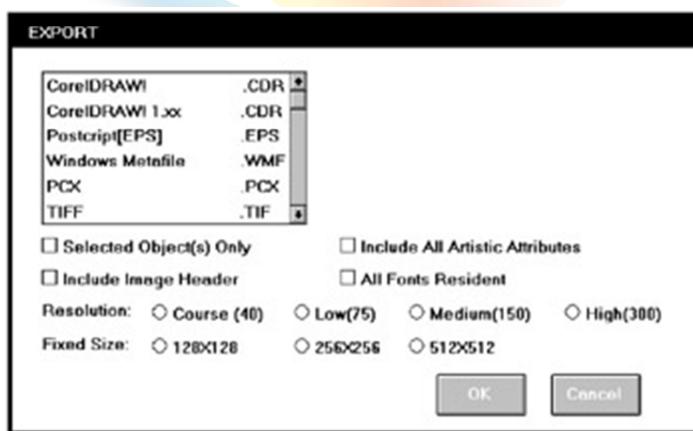


User Interface Design Problem 5 - Solution Analysis



- The radio buttons are aligned for vertical scanning and placed within borders
- The “inches” control is changed to a standard drop-down/pop-up list box.

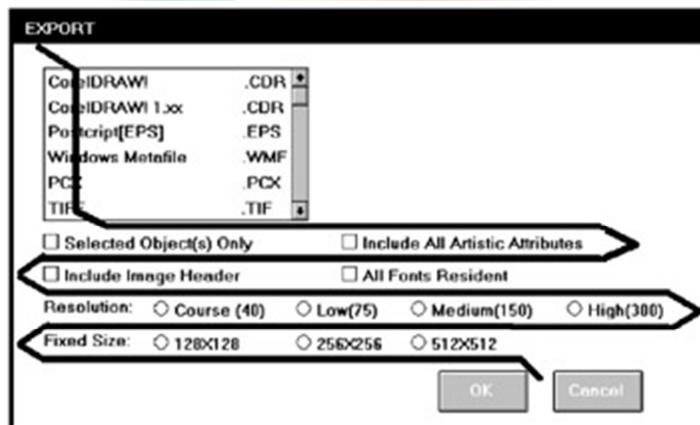
User Interface Design Problem 6



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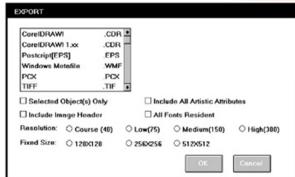
User Interface Design Problem 6 – Analysis 1/2



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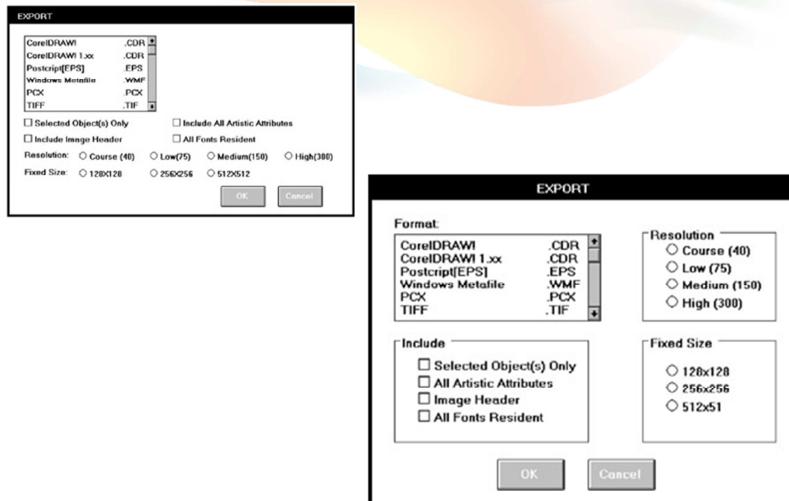
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User Interface Design Problem 6 - Analysis



- The check boxes and radio buttons on the Export screen are again very poorly grouped
- Can the check boxes be grouped?
- The list box has no caption with it.
- Screen balance is also poor, with the large open area in the upper-right part of the screen. Again, look at the required eye scan through this screen.

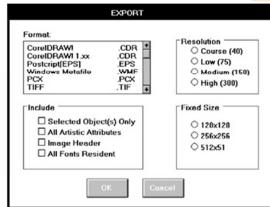
User Interface Design Problem 6 - Solution



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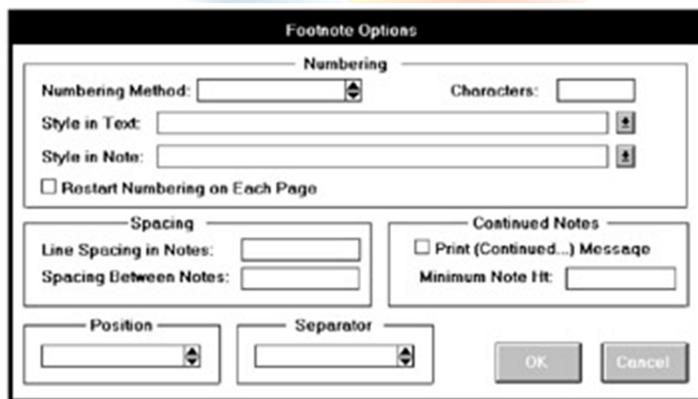
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User Interface Design Problem 6 - Solution Analysis



- The radio buttons and check boxes are aligned for vertical scanning and placed within borders.
- The check boxes are given a caption, as is the list box.
- For balance purposes, the controls are arrayed in two columns.

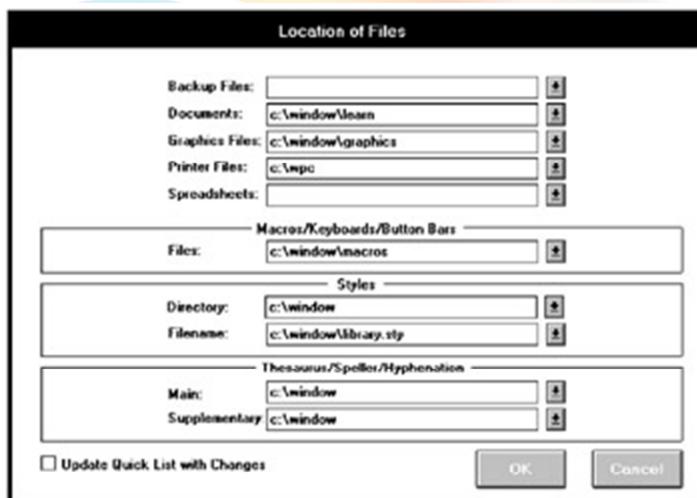
User Interface Design - Problem 7 Self Analyze & Suggest Solution



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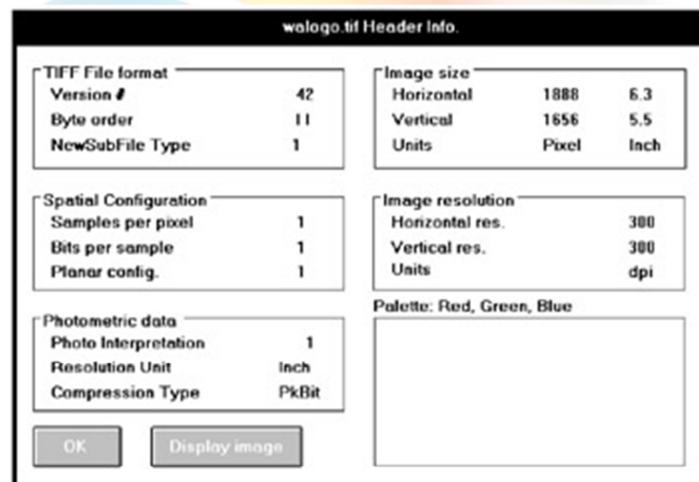
User Interface Design - Problem 8 Self Analyze & Suggest Solution



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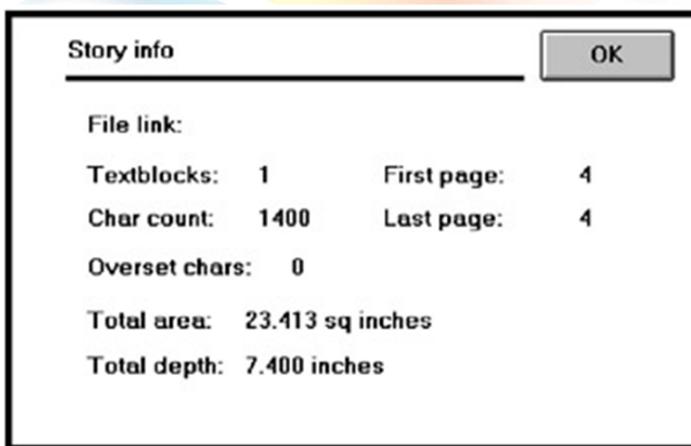
User Interface Design - Problem 9 Self Analyze & Suggest Solution



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User Interface Design - Problem 10 Self Analyze & Suggest Solution



User Interface Design Screen Design Experience

- Alignment: left, right priority
- Association
- Orientation: vertical, horizontal priority
- Grouping
- Title order: if we have no require in task ordering then use most nature ordering
- Component order: left right, top bottom
- Capital, Format
- Screen Balance
- Standalone check boxes: to get lost

