

USER INTERFACE DESIGN

Lecture 3

Sri Lanka Institute of Information Technology
B. Sc. Special Honors Degree In Information Technology
Year 2 – Semester 2

-
- Have you ever walked into a room and fumbled with the light switches, often turning on the wrong ones?
 - Visibility: light switches should be obvious
 - Mapping: position of switches should correspond to model of room



The User Interface

- “The user interface is the most important part of any computer system.” (Galitz, 2002, p. 1)

It can be seen,

it can be heard and

It can be touched



“The best interface is the one that is not noticed, one that permits the user to focus on the information and task at hand, not the mechanisms used to present the information and perform the task.” (Galitz, 2002, p. 4)

Source: *The Essential Guide to User Interface Design* by Galitz

What Comprises Good Design?

- Understanding of:
 - people, how we see, understand, and think
 - how information must be visually presented to enhance human acceptance and comprehension
 - how eye and hand movements must flow to minimize the potential for fatigue and injury

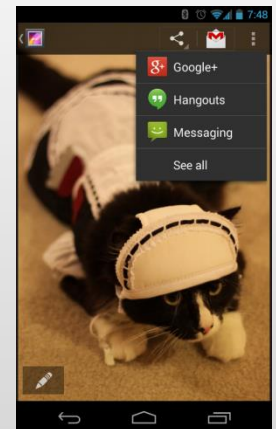


Benefits of Good Design

- ☐ Higher task completion rates
- ☐ More efficient task completion rates
- ☐ Reduced training costs
- ☐ Improved customer service

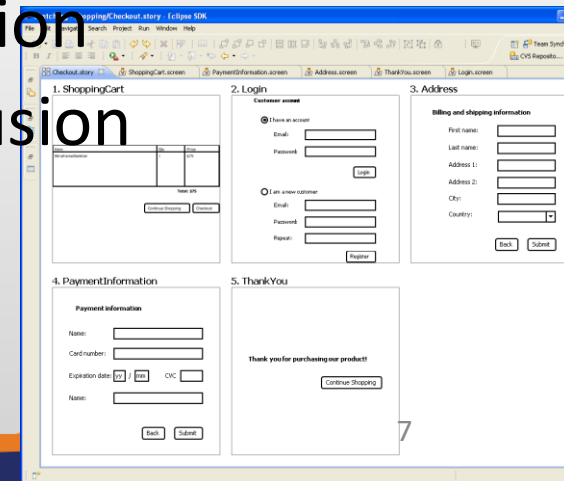
Advantages of GUI

- Symbols recognized faster than text
- Faster learning
- Easier remembering
- More natural
- Exploits visual/spatial cues
- Increased feeling of control
- Immediate feedback
- Predictable system responses
- Low typing requirements
- Fewer errors



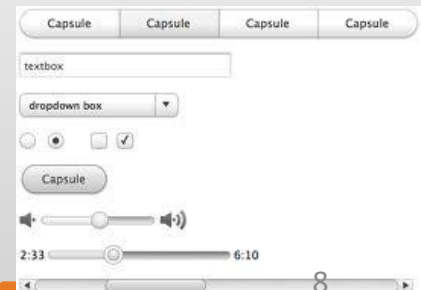
Disadvantages

- Greater design complexity
- Learning still necessary
- Lack of experimentally-derived design guidelines
- Inconsistencies in technique and terminology
- Not always familiar
- Not always the preferred style of interaction
- Not always the fastest style of interaction
- Increased chances of clutter and confusion
- May consume more screen space



Guidelines for the Interface Design

1. Know your user or client. UIs should be designed to match the skills, experience and expectations of its anticipated users.
2. Understand the basic business function
3. Understand the principles of good screen design
4. Develop system menus and navigation schemes
5. Select the proper kind of windows
6. Select the proper device-based controls



Source: *The Essential Guide to User Interface Design* by Galitz

Guidelines for the Interface Design (cont)

7. Choose the proper screen-based controls
8. Write clear text and messages
9. Provide effective feedback and guidance and assistance
10. Provide effective internationalization and accessibility
12. Create meaningful graphics, icons, and images
13. Choose the proper colors
14. Organize and layout windows and pages



Human Factors In Interface Design

- Limited short-term memory
 - People can instantaneously remember about 7 items of information. If you present more than this, they are more liable to make mistakes.
- People make mistakes
 - When people make mistakes and systems go wrong, inappropriate alarms and messages can increase stress and hence the likelihood of more mistakes.
- People are different
 - People have a wide range of physical capabilities. Designers should not just design for their own capabilities.
- People have different interaction preferences
 - Some like pictures, some like text.

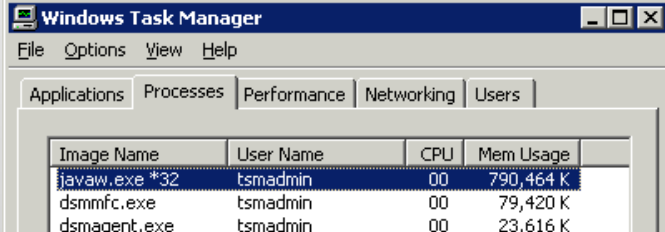


Image Name	User Name	CPU	Mem Usage
javaw.exe *32	tsmadmin	00	790,464 K
dsmmfc.exe	tsmadmin	00	79,420 K
dsmagent.exe	tsmadmin	00	23,616 K

User Interface Design Principles

Principle	Description
User familiarity	The interface should use terms and concepts which are drawn from the experience of the people who will make most use of the system.
Consistency	The interface should be consistent in that, wherever possible, comparable operations should be activated in the same way.
Minimal surprise	Users should never be surprised by the behaviour of a system.
Recoverability	The interface should include mechanisms to allow users to recover from errors.
User guidance	The interface should provide meaningful feedback when errors occur and provide context-sensitive user help facilities.
User diversity	The interface should provide appropriate interaction facilities for different types of system user.

UI Design principles contd.

✓ User familiarity

The interface should be based on user-oriented terms and concepts rather than computer concepts

E.g., an office system should use concepts such as letters, documents, folders etc. rather than directories, file identifiers, etc.

✓ Ease of learning

✓ Ease of use

✓ Ease of remembering

Telephone Number:

Credit Card Number

Date:

ISBN Number

Date: , : (24 hour time)

Subject:

UI Design Principles Contd.

Consistency

- A system should look, act, and operate the same throughout.
Similar components should:
 - Have a similar look
 - Have similar uses
 - Operate similarly
- Commands and menus should have same
 - Format / appearance
 - Command punctuation
 - Layout
 - Abbreviations / keyboard shortcuts
- Error-messages
 - Same styles / formats from place to place
 - Same location on screen when they appear

UI Design Principles Contd.

✓ Minimal surprise

- If a command operates in a known way, the user should be able to predict the operation of comparable commands



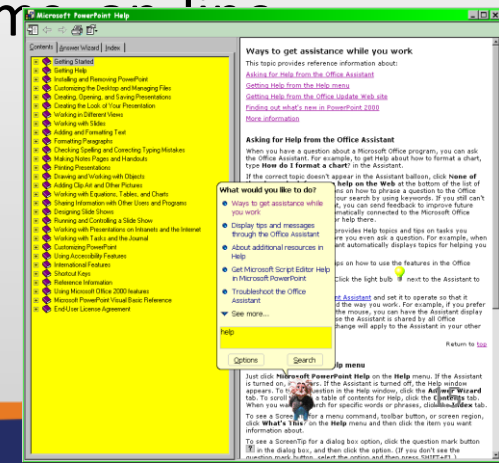
UI Design Principles Contd.

✓ Recoverability

- The system should provide some resilience to user errors and allow the user to recover from errors. This might include an undo facility, confirmation of destructive actions, 'soft' deletes, etc.

✓ User guidance

- Some user guidance such as help system manuals, etc. should be supplied



UI Design Principles Contd.

User diversity

- Interaction facilities for different types of user should be supported.

E.g some users have seeing difficulties and so larger text should be available

Interaction Styles

- Direct manipulation
- Menu selection
- Form fill-in
- Command language
- Natural language



NEW BOOK	
Title <input type="text"/>	ISBN <input type="text"/>
Author <input type="text"/>	Price <input type="text"/>
Publisher <input type="text"/>	Publication date <input type="text"/>
Edition <input type="text"/>	Number of copies <input type="text"/>
Classification <input type="text"/>	Loan status <input type="text"/>
Date of purchase <input type="text"/>	Order status <input type="text"/>



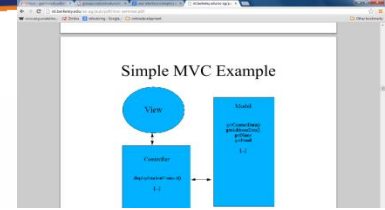
Advantages & Disadvantages

Interaction style	Main advantages	Main disadvantages	Application examples
Direct manipulation	Fast and intuitive interaction Easy to learn	May be hard to implement Only suitable where there is a visual metaphor for tasks and objects	Video games CAD systems
Menu selection	Avoids user error Little typing required	Slow for experienced users Can become complex if many menu options	Most general-purpose systems
Form fill-in	Simple data entry Easy to learn	Takes up a lot of screen space	Stock control, Personal loan processing
Command language	Powerful and flexible	Hard to learn Poor error management	Operating systems, Library information retrieval systems
Natural language	Accessible to casual users Easily extended	Requires more typing Natural language understanding systems are unreliable	Timetable systems WWW information retrieval systems

User-system Interaction

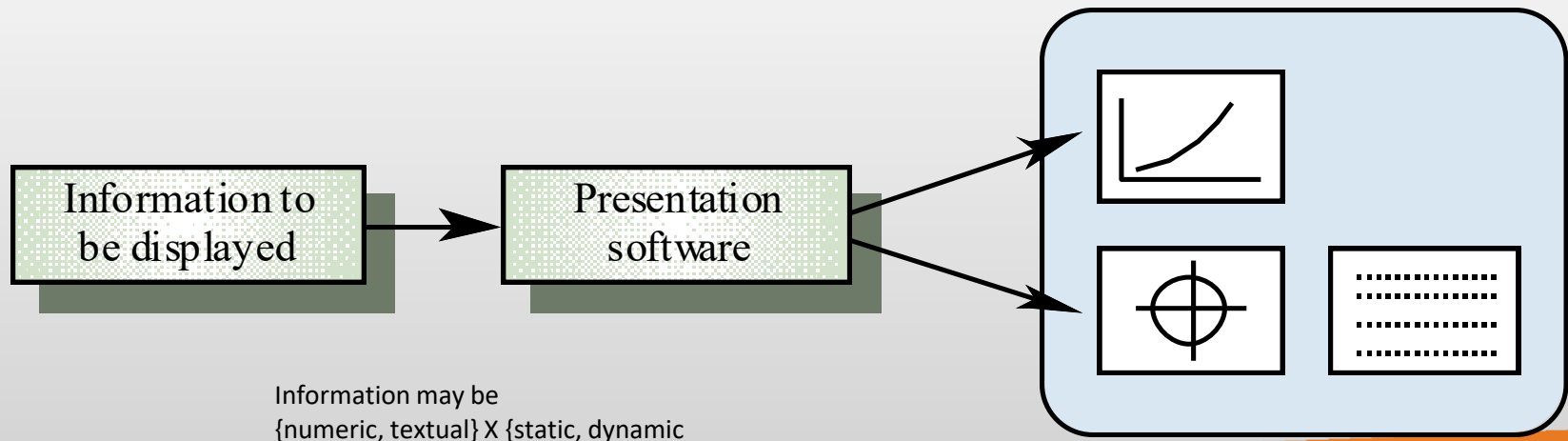
- Two problems must be addressed in interactive systems design
 - How should information from the user be provided to the computer system?
 - How should information from the computer system be presented to the user?
- User interaction and information presentation may be integrated through a coherent framework such as a user interface metaphor.



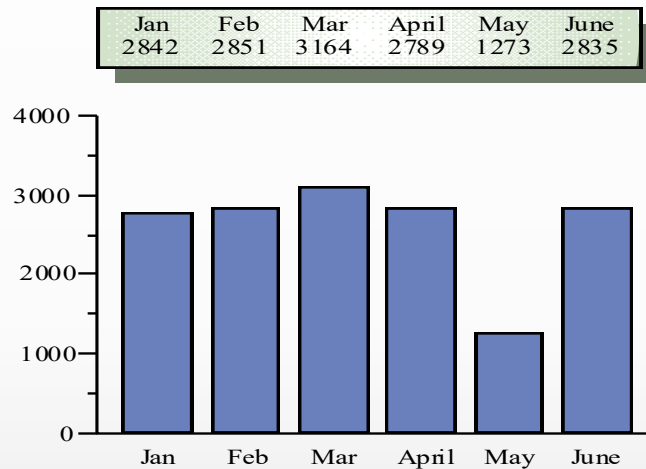


Information Presentation

- Information presentation is concerned with presenting system information to system users
- The information may be presented directly or may be transformed in some way for presentation
- The Model-View-Controller approach is a way of supporting multiple presentations of data

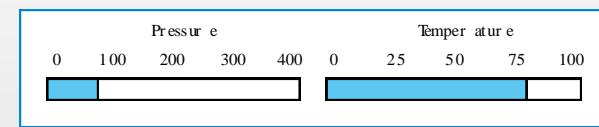
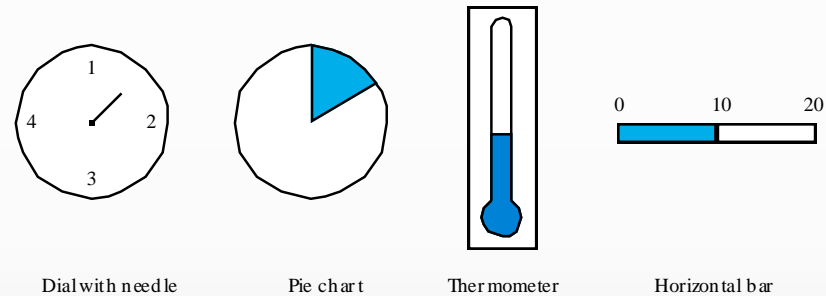


Information Presentation



Digital presentation

Compact - takes up little screen space;
Precise values can be communicated

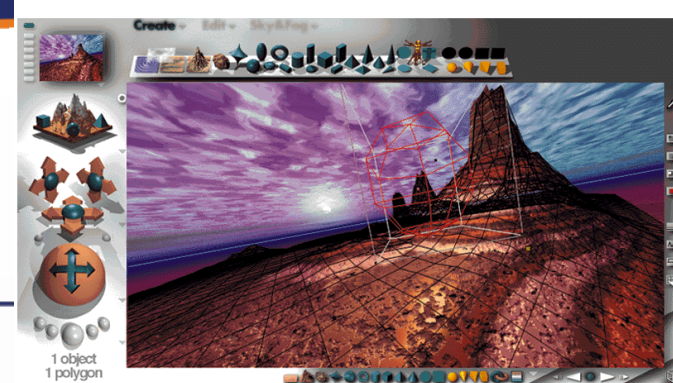


Displaying relative values

Analogue presentation

Easier to get an 'at a glance' impression of a value;
Possible to show relative values;
Easier to see exceptional data values.

Data Visualisation



The GUI Created a Revolution

GUIs allow the most imaginative interfaces to be created; witness this Bryce 3-D modeling program. All the symbols are working tools. For example, the ones on the left side with crosses are camera controls. The large symbol at the bottom is the camera trackball, while the other three control the x, y and z axes. On top are primitive graphic elements, including an "organic rock generator," fourth from left. (Screen shot courtesy of MetaCreations Corporation.)

- Concerned with techniques for displaying large amounts of information.
- Possible data visualisations are:
 - Weather information collected from a number of sources;
 - The state of a telephone network as a linked set of nodes;
 - Chemical plant visualised by showing pressures and temperatures in a linked set of tanks and pipes;
 - A model of a molecule displayed in 3 dimensions;
 - Web pages displayed as a hyperbolic tree.

Colours

Colors are not just for decorative purposes; colors sell ideas, products, and, services.

Color Theory actually covers a number of things, but at the most basic level it is the interaction of colors in a design through

- complementation
- contrast
- vibrancy.

Complementation

Complementation refers to the way we see colors in terms of their relationships with other colors. When colors occupy opposite ends of the color spectrum, they lead people to consider a design visually appealing by establishing a happy medium the eye can reside in. Rather than straining to accommodate for a particular area of the color spectrum, the eye is provided a balance.

Contrast

Contrast reduces eyestrain and focuses user attention by clearly dividing elements on a page. The most apparent example of contrast is an effective selection of background and text color, as shown below:

By choosing stark, complementary colors, text becomes easily readable.

Sometimes, choosing a color scheme in which the text is the brightest element of the design reduces eyestrain by focusing the User's attention.

A lack of contrast between text and its background will drive your users insane. Their eyes don't know which color to focus on, which will almost instantly strain their eyes.

A complementary color scheme does not necessarily mean the contrast between text and background is strong enough. Sometimes, one of your colors will be too bright in comparison to the other, which will lead to eventual eyestrain.

Contrast

- Best practice is usually to choose a very light color for the background, and a very dark color for the text itself. This is one area where color theory is crucial to the usability of a web design; In most projects, large text areas aren't a place to try to be really creative - so keep it simple and legible.
- Along with establishing readable text, contrast can also draw the viewer's attention towards specific elements of a page. **Using a variety of contrasting colors can help focus the viewer's attention on specific page elements.**

Vibrancy

Vibrancy dictates the emotion of your design. Brighter colors lead the user to feel more energetic as a result of your design, which is particularly effective when you are trying to advertise a product or invoke an emotional response.

Darker shades relax the user, allowing their mind to focus on other things.



CNN's website features a stark red banner across the top, which leads to heightened emotions from users as they are stimulated by the vibrancy of the design (and the contrast between red, white, and black- the primary color scheme of the website).

Color Scheme

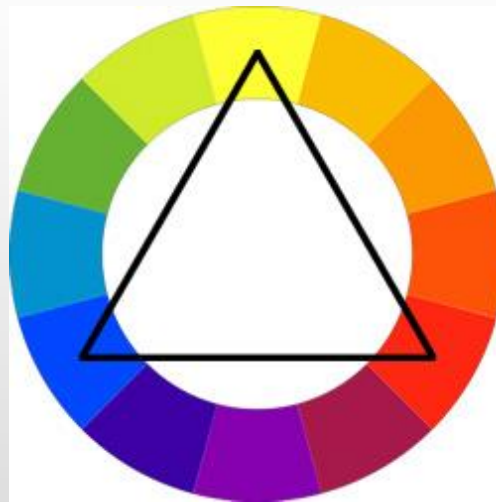
The commonly accepted color schemes:

- ☐ triadic,
- ☐ compound
- ☐ analogous

Triadic Color Scheme

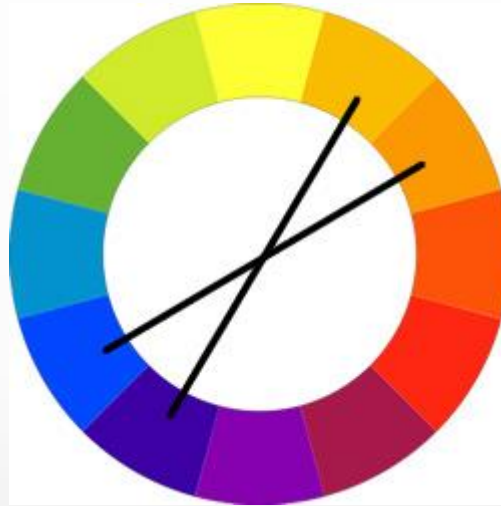
Composed of 3 colors on separate ends of the color spectrum. There is a very easy way to create a Triadic color scheme:

1. Take a color wheel, and choose your base color.
2. Draw an Equilateral Triangle from this point.
3. The three points of the triangle will form your tri-color scheme.



By using an Equilateral Triangle, you can ensure the colors have equal vibrancy and compliment each other properly.

Compound Color Scheme (aka Split Complimentary)



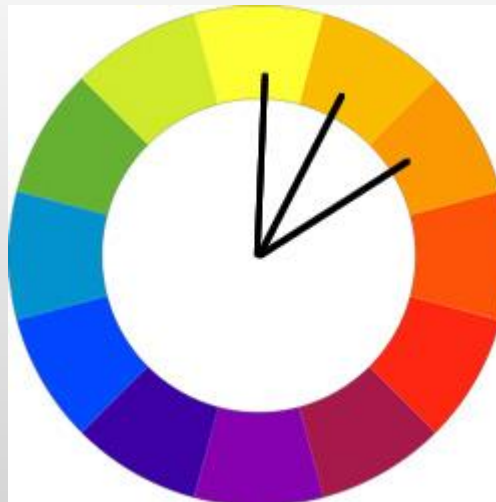
The Compound color scheme is based on providing a range of Complementary Colors: two colors are chosen from opposite ends of the color spectrum. By doing so, the designer is allowed more freedom in their design while also benefiting from the visual appeal of complementary colors.

Analogous

Analogous color scheme is based on a careful selection of colors in the same area of the color spectrum. Usually the colors are differentiated by their vibrancy, and their contrast when compared to each other.

Two examples of an Analogous color scheme are:

1. Shades Yellow and Orange
2. A Monochromatic Selection (**Shades of a base color**)



Colour display

- Colour adds an extra dimension to an interface and can help the user understand complex information structures.
- Colour can be used to highlight exceptional events.
- Common mistakes in the use of colour in interface design include:
 - The use of colour to communicate meaning;
 - The over-use of colour in the display.

Colour Use Guidelines

- Limit the number of colours used and be conservative in their use.
- Use colour change to show a change in system status.
- Use colour coding to support the task that users are trying to perform.
- Use colour coding in a thoughtful and consistent way.
- Be careful about colour pairings.

Error Messages

- Error message design is critically important. Poor error messages can mean that a user rejects rather than accepts a system.
- Messages should be polite, concise, consistent and constructive.
- The background and experience of users should be the determining factor in message design.

System and User-Oriented Error Messages

- System-oriented message
 - Useful for technical staff
 - Detail internal states of system
 - Good for diagnostics and repair
 - Usually complete gibberish for users
- User-oriented message
 - Useful for user to fix a problem
 - Reassuring
 - Give instructions on whom to contact if appropriate



A Friendly, Helpful Message System

- If possible, show what can be done to fix problem
- Explain WHO can do WHAT to help user in trouble
- Include telephone numbers

OUT OF DISC SPACE (FSERR 46).

VS

OUT OF DISC SPACE (FSERR 46).

Check :FREE for free space

Verify :BUILD or :FILE commands for typing error;

use 32 extents if possible; check device class;

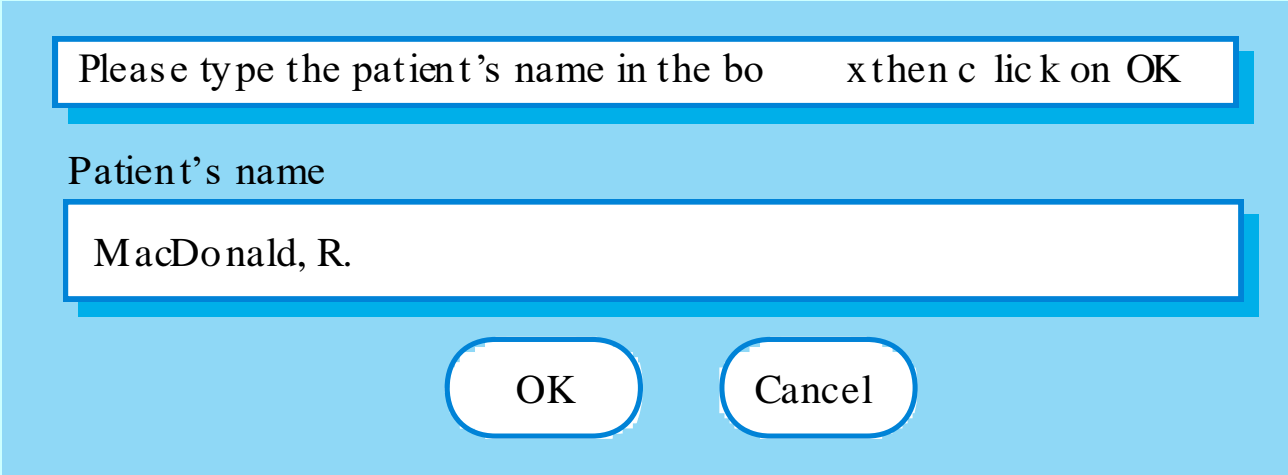
call Ramesh @ (514) 234-5678 X.216 for help

Design factors in message wording

Factor	Description
Context	Wherever possible, the messages generated by the system should reflect the current user context. As far as is possible, the system should be aware of what the user is doing and should generate messages that are relevant to their current activity.
Experience	As users become familiar with a system they become irritated by long, One meaningful messages. However, beginners find it difficult to understand short terse statements of a problem. You should provide both types of message and allow the user to control message conciseness.
Skill level	Messages should be tailored to the user's skills as well as their experience. Messages for the different classes of user may be expressed in different ways depending on the terminology that is familiar to the reader.
Style	Messages should be positive rather than negative. They should use the active rather than the passive mode of address. They should never be insulting or try to be funny.
Culture	Wherever possible, the designer of messages should be familiar with the culture of the country where the system is sold. There are distinct cultural differences between Europe, Asia and America. A suitable message for one culture might be unacceptable in another.

User error

- Assume that a nurse misspells the name of a patient whose records he is trying to retrieve.



Please type the patient's name in the box then click on OK

Patient's name

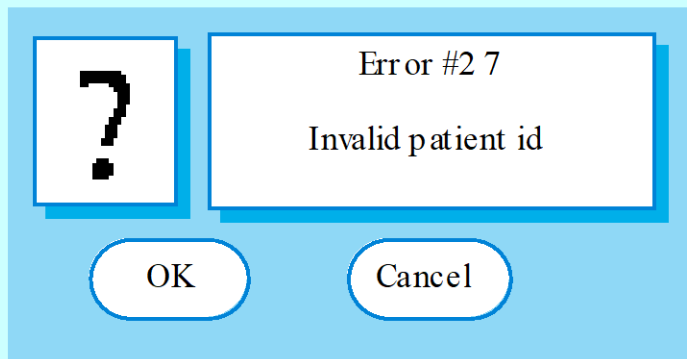
MacDonald, R.

OK Cancel

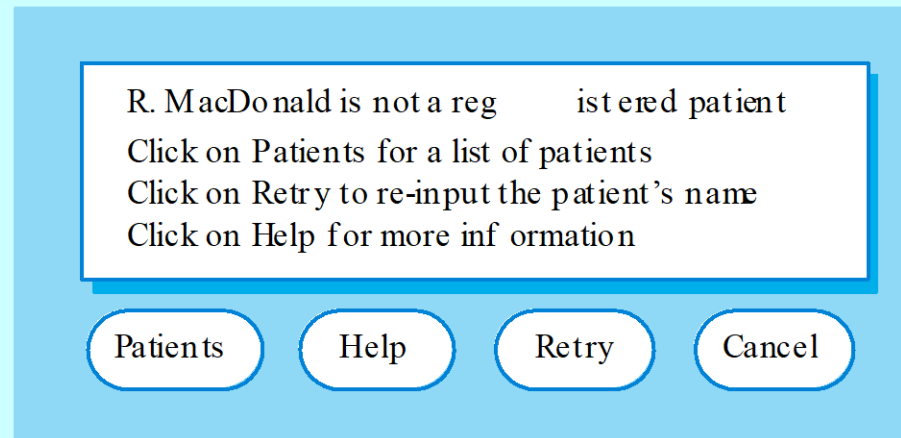
The image shows a light blue dialog box with a white text input field. The input field contains the text 'MacDonald, R.'. Below the input field are two buttons: 'OK' and 'Cancel'.

Good and bad message design

System-oriented error message



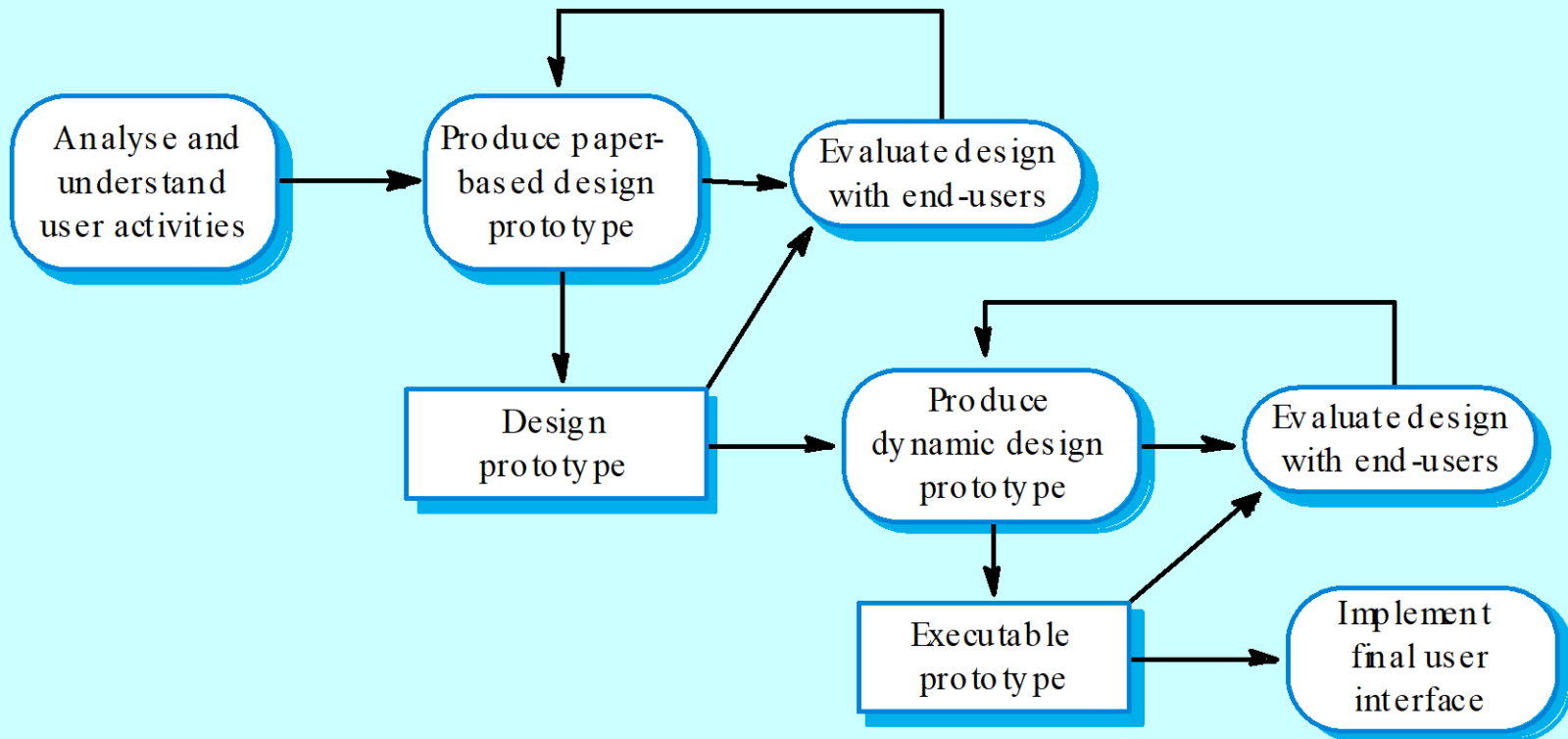
User-oriented error message



The UI design process

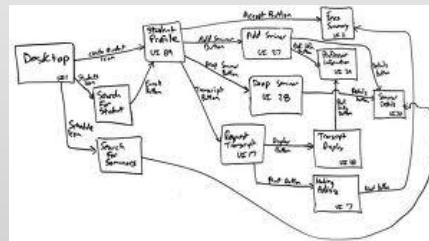
- UI design is an iterative process involving close liaisons between users and designers.
- The 3 core activities in this process are:
 - **User analysis**: Understand what the users will do with the system;
 - **System prototyping**: Develop a series of prototypes for experiment;
 - **Interface evaluation**: Experiment with these prototypes with users.

The Design Process

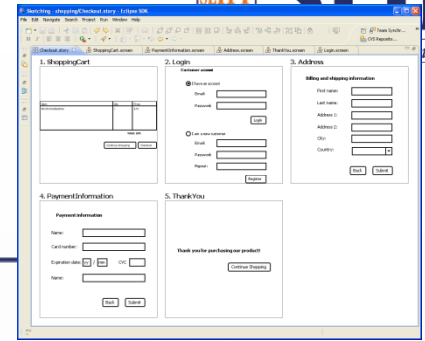


User Interface Prototyping

- The aim of prototyping is to allow users to gain direct experience with the interface.
- Without such direct experience, it is impossible to judge the usability of an interface.
- Prototyping may be a two-stage process:
 - Early in the process, paper prototypes may be used;
 - The design is then refined and increasingly sophisticated automated prototypes are then developed.



Prototyping Techniques



❑ Script-driven prototyping

- Develop a set of scripts and screens using a tool such as Macromedia Director. When the user interacts with these, the screen changes to the next display.

❑ Visual programming

- Use a language designed for rapid development such as Visual Basic.

❑ Internet-based prototyping

- Use a web browser and associated scripts.

Visio/HTML/

User Interface Evaluation

- ☐ Some evaluation of a user interface design should be carried out to assess its suitability.
- ☐ Full scale evaluation is very expensive and impractical for most systems.
- ☐ Ideally, an interface should be evaluated against a usability specification. However, it is rare for such specifications to be produced.

Usability Attributes

Attribute	Description
Learnability	How long does it take a new user to become productive with the system?
Speed of operation	How well does the system response match the user's work practice?
Robustness	How tolerant is the system of user error?
Recoverability	How good is the system at recovering from user errors?
Adaptability	How closely is the system tied to a single model of work?

Simple Evaluation Techniques

- Questionnaires for user feedback.
- Video recording of system use and subsequent tape evaluation.
- Tools to collect information about facility use and user errors.
- The provision of code in the software to collect on-line user feedback.

Key Points

- User interface design principles should help guide the design of user interfaces.
- Interaction styles include direct manipulation, menu systems form fill-in, command languages and natural language.
- Graphical displays should be used to present trends and approximate values. Digital displays when precision is required.
- Colour should be used sparingly and consistently.

Key Points

- The user interface design process involves user analysis, system prototyping and prototype evaluation.
- The aim of user analysis is to sensitise designers to the ways in which users actually work.
- The goals of UI evaluation are to obtain feedback on how to improve the interface design and to assess if the interface meets its usability requirements.

Any Questions ???

