ANALISIS DAN PERANCANGAN SISTEM (APS)

Perancangan UI
Tujuan perkuliahan

- Memahami pengertian UI
- Memahami faktor manusia dalam perancangan UI
- Memahami prinsip-prinsip dan proses perancangan UI
- Memahami konsep penyajian informasi, pewarnaan dan pesan dalam UI
Pengertian UI

- All aspects of a system that are relevant to the user
  - A system can have more than one UVM, one for each set of tasks or roles
  - An individual may also have more than one user interface to the same application

- Everything in a device with which a human being interacts → not necessarily associated with computers
  - Home: doors, window, switches
  - Car: pedals, steering wheel, gearshift
  - MS Windows: mouse, keyboard, start button
Pengertian UI (1)

Computer UI is a set of commands or menus through which a user communicates with a program

– A command-driven interface is one in which you enter commands
– A menu-driven interface is one in which you select command choices from various menus displayed on the screen
The user interface

- User interfaces should be designed to match the skills, experience and expectations of its anticipated users.
- System users often judge a system by its interface rather than its functionality.
- A poorly designed interface can cause a user to make catastrophic errors.
- Poor user interface design is the reason why so many software systems are never used.
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.
UI design principles

UI design must take account of the needs, experience and capabilities of the system users.

Designers should be aware of people’s physical and mental limitations (e.g. limited short-term memory) and should recognise that people make mistakes.

UI design principles underlie interface designs although not all principles are applicable to all designs.
UI design principles (1)

- **User familiarity**
  - The interface should be based on user-oriented terms and concepts rather than computer concepts. For example, an office system should use concepts such as letters, documents, folders etc. rather than directories, file identifiers, etc.

- **Consistency**
  - The system should display an appropriate level of consistency. Commands and menus should have the same format, command punctuation should be similar, etc.

- **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 (2)

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 systems, on-line manuals, etc. should be supplied
- When errors occur, provide meaningful feedbacks

User diversity
- Interaction facilities for different types of user should be supported. For example, some users have seeing difficulties and so larger text should be available
# Interaction styles

<table>
<thead>
<tr>
<th>Interaction style</th>
<th>Main advantages</th>
<th>Main disadvantages</th>
<th>Application examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct manipulation</td>
<td>Fast and intuitive interaction</td>
<td>May be hard to implement. Only suitable where there is a visual metaphor for tasks and objects.</td>
<td>Video games, CAD systems</td>
</tr>
<tr>
<td>Menu selection</td>
<td>Avoids user error, Little typing required</td>
<td>Slow for experienced users, Can become complex if many menu options.</td>
<td>Most general-purpose systems</td>
</tr>
<tr>
<td>Form fill-in</td>
<td>Simple data entry, Easy to learn, Checkable</td>
<td>Takes up a lot of screen space, Causes problems where user options do not match the form fields.</td>
<td>Stock control, Personal loan processing</td>
</tr>
<tr>
<td>Command language</td>
<td>Powerful and flexible</td>
<td>Hard to learn, Poor error management.</td>
<td>Operating systems, Command and control systems</td>
</tr>
<tr>
<td>Natural language</td>
<td>Accessible to casual users, Easily extended</td>
<td>Requires more typing, Natural language understanding systems are unreliable.</td>
<td>Information retrieval systems</td>
</tr>
</tbody>
</table>
Web-based interfaces

- Many web-based systems have interfaces based on web forms.
- Form field can be menus, free text input, radio buttons, etc.
- In the LIBSYS example, users make a choice of where to search from a menu and type the search phrase into a free text field.
LIBSYS interaction – example

- Document search
  - Users need to be able to use the search facilities to find the documents that they need

- Document request
  - Users request that a document be delivered to their machine or to a server for printing
LIBSYS search form – example

LIBSYS: Search

Choose collection  

Keyword or phrase

Search using  

Adjacent words  

Search  Reset  Cancel
Interactive systems design – problems

- How should information from the user be provided to the computer system?
- How should information from the computer system be presented to the user?
Information presentation

- Information presentation is concerned with presenting system information to system users.
- The information may be presented directly (e.g. text in a word processor) or may be transformed in some way for presentation (e.g. in some graphical form).
- The Model-View-Controller (MVC) approach is a way of supporting multiple presentations of data.
Information presentation (1)

Information to be displayed → Presentation software → Display
Information presentation (2)

Static information
- Initialised at the beginning of a session. It does not change during the session
- May be either numeric or textual

Dynamic information
- Changes during a session and the changes must be communicated to the system user
- May be either numeric or textual
Information display factors

- Is the user interested in precise information or data relationships?
- How quickly do information values change? Must the change be indicated immediately?
- Must the user take some action in response to a change?
- Is there a direct manipulation interface?
- Is the information textual or numeric? Are relative values important?
Alternative information presentations

<table>
<thead>
<tr>
<th></th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>April</th>
<th>May</th>
<th>June</th>
</tr>
</thead>
<tbody>
<tr>
<td>Values</td>
<td>2842</td>
<td>2851</td>
<td>3164</td>
<td>2789</td>
<td>1273</td>
<td>2835</td>
</tr>
</tbody>
</table>
Analogue or digital presentation?

Digital presentation
- Compact – takes up little screen space
- Precise values can be communicated

Analogue presentation
- Easier to get an 'at a glance' impression of a value
- Possible to show relative values
- Easier to see exceptional data values
Presentation methods

- Dial with needle
- Pie chart
- Thermometer
- Horizontal bar
Displaying relative values

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>100</td>
<td>25</td>
</tr>
<tr>
<td>200</td>
<td>50</td>
</tr>
<tr>
<td>300</td>
<td>75</td>
</tr>
<tr>
<td>400</td>
<td>100</td>
</tr>
</tbody>
</table>
Colour displays

- 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.
**Design factors in message wording**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context</td>
<td>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.</td>
</tr>
<tr>
<td>Experience</td>
<td>As users become familiar with a system they become irritated by long, ‘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.</td>
</tr>
<tr>
<td>Skill level</td>
<td>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.</td>
</tr>
<tr>
<td>Style</td>
<td>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.</td>
</tr>
<tr>
<td>Culture</td>
<td>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.</td>
</tr>
</tbody>
</table>
User error – example

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
Good and bad message design – example

System-oriented error message

Error #27
Invalid patient id

User-oriented error message

R. MacDonald is not a registered patient
Click on Patients for a list of patients
Click on Retry to re-input the patient’s name
Click on Help for more information

OK Cancel

Patients Help Retry Cancel
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
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.
Summary (1)

- 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.
- UI prototyping should be a staged process with early paper prototypes used as a basis for automated prototypes of the interface.
- 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.