

Analysis techniques

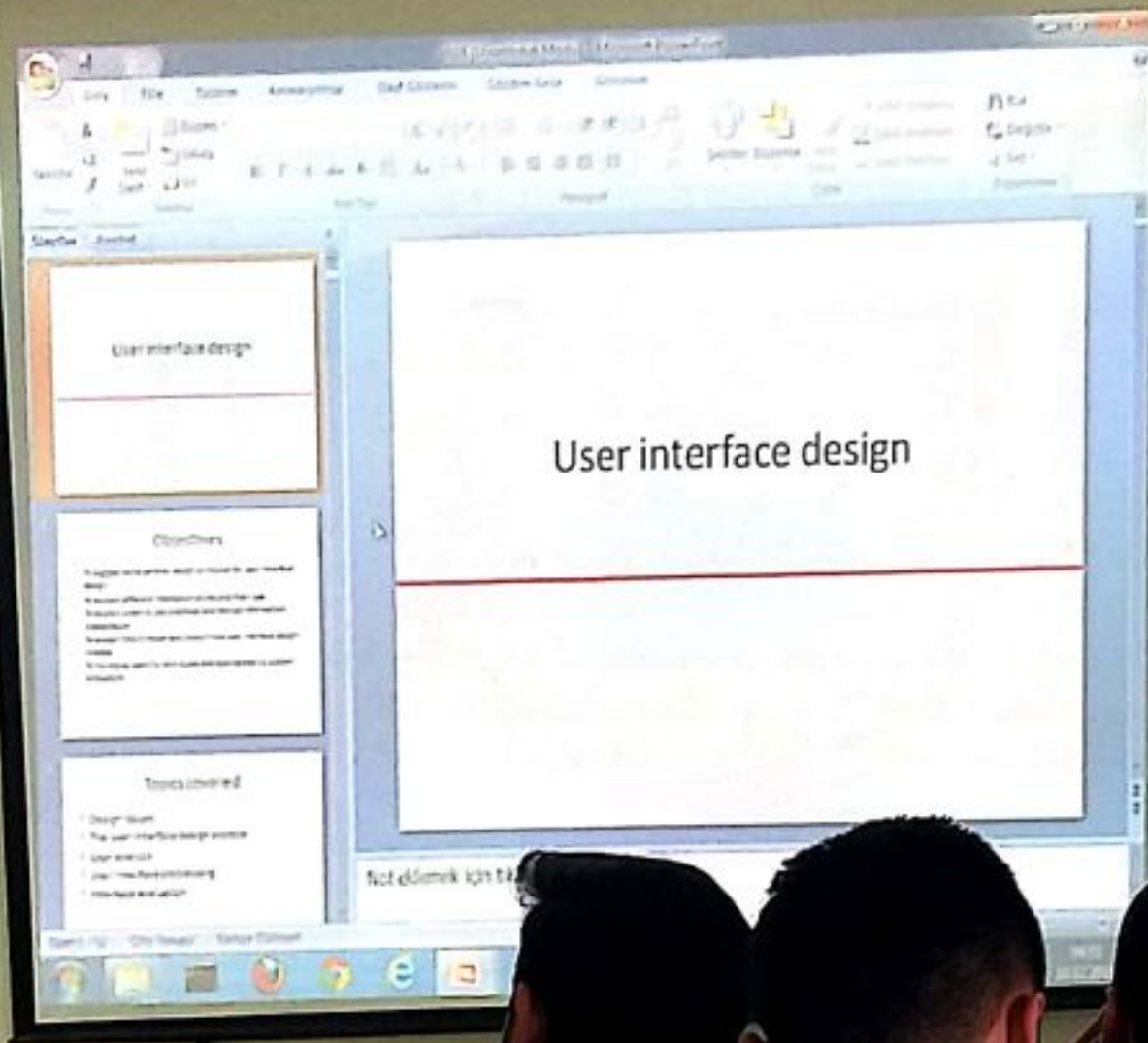
- Task analysis
 - Models the steps involved in completing a task.
- Interviewing and questionnaires
 - Asks the users about the work they do.
- Ethnography
 - Observes the user at work.

Design principles

- 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

Some encoding techniques

- Text and fonts
- Icons
- Photographs
- Diagrams and abstract graphics
- Colours
- Grouping and bordering
- Spoken words
- Music
- Other sounds
- Animations and video
- Flashing



User interface design

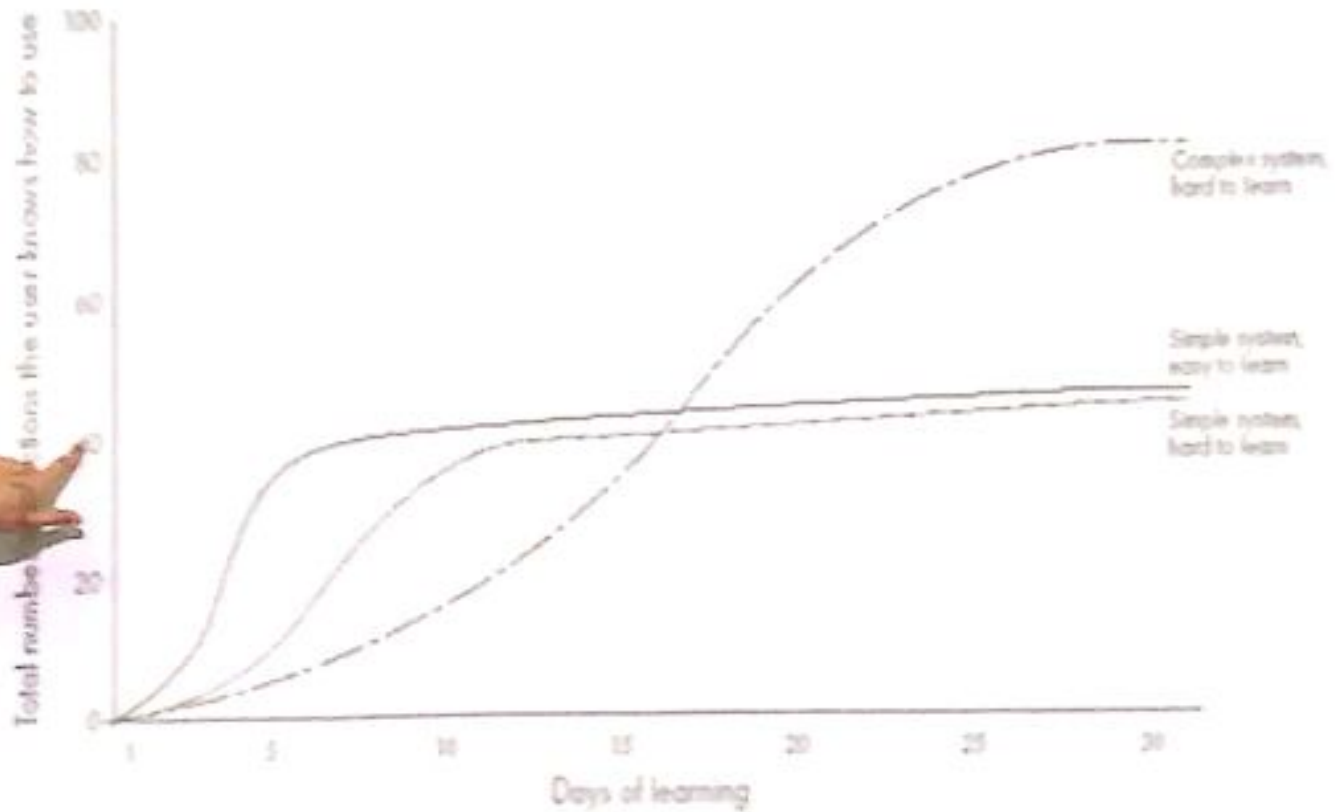
Objectives

- To explain the general design of user interface design
- To explain the different types of user interface design
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Topics covered

- Design team
- The user interface design process
- User interface
- User interface design
- User interface design

Different learning curves



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.

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.

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, '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 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.

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.

User analysis

- If you don't understand what the users want to do with a system, you have no realistic prospect of designing an effective interface.
- User analyses have to be described in terms that users and other designers can understand.
- Scenarios where you describe typical episodes of use, are one way of describing these analyses.

Interaction styles

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 Checkable	Takes up a lot of screen space. Causes problems where user options do not match the form fields.	Stock control, Personal loan processing
Comm and language	Powerful and flexible	Hard to learn. Poor error management.	Operating systems, Comm and control systems
Natural language	Accessible to casual users Easily extended	Requires more typing. Natural language understanding systems are unreliable.	Information retrieval systems

Aspects of usability

Usability can be divided into separate aspects:

- Learnability
 - The speed with which a new user can become proficient with the system.
- Efficiency of use
 - How fast an expert user can do their work.
- Error handling
 - The extent to which it prevents the user from making errors, detects errors, and helps to correct errors.
- Acceptability.
 - The extent to which users *like* the system.



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.

7.2 Characteristics of Users

Software engineers must develop an understanding of the users

- Goals for using the system
- Potential patterns of use
- Demographics
- Knowledge of the domain and of computers
- Physical ability
- Psychological traits and emotional feelings

Interaction styles

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