

MODULE 4: DESIGN OF USER AND SYSTEM INTERFACES

UNIT 1: DESIGN OF USER INTERFACE CONCEPTS

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1.0 INTRODUCTION

This unit offers guidelines for design of user interface software in six functional areas: data entry, data display, sequence control, user guidance, data transmission, and data protection.

The guidelines are proposed here as a potential tool for designers of user interface software.

Guidelines can help establish rules for coordinating individual design contributions and can also help to make design decisions just once rather than leaving them to be made over and over again by individual designers. They can help define detailed design requirements and to evaluate user interface software in comparison with those requirements.

The design of user interface software will often involve a considerable investment of time and effort. Design guidelines can help ensure the value of that investment.

In designing computer-based information systems, special attention must be given to software supporting the user interface.

2.0 OBJECTIVES

By the end of this unit, you should be able to:

- Explain the concept of User Interface Design
- Understand User System Interface
- Know the significance of User Interface

- Explain the function of User Interface Software
- Describe the interaction design phases
- Understand the concept of formative evaluation

3.0 MAIN CONTENT

3.1 USER INTERFACE DESIGN OF INFORMATION SYSTEMS

Computers today are used for a broad range of applications. User interface design guidelines cannot be applied usefully in every case. Some computers may be embedded as components in larger systems, so that they communicate only with other computers and not directly with human users. When there is no user interface, then no user interface design guidelines are needed.

To the extent that information systems support human users performing defined tasks, careful design of the user-system interface will be needed to ensure effective system operation. The guidelines are intended to improve user interface design for such information systems.

Users of information systems interact with a computer in order to accomplish information handling tasks necessary to get their jobs done. They differ in ability, training and job experience. They may be keenly concerned with task performance, but may have little knowledge of (or interest in) the computers themselves. Design of the user-system interface must take account of those human factors.

3.1.1 USER-SYSTEM INTERFACE

User-system interface is broadly defined to include all aspects of system design that affect system use. Hence we are concerned with the user interface to computer-based information systems, i.e., with those aspects of system design that influence a user's participation in information handling tasks.

It focuses on those design features of the user interface that are implemented via software (i.e., the design of computer program logic) rather than hardware (the design of equipment). The guidelines are worded in

terms of the functions that a user must perform, and the functional capabilities that a designer should provide, rather than the particular physical devices that might be used to implement those functions. Thus a particular guideline might deal with "pointing" as a function, with no necessary recommendation whether pointing should be accomplished via touch display or light pen or any other physical device. Software is not the only significant factor influencing user performance.

Other aspects of user interface design are important, including workstation design, physical display characteristics, keyboard layout, environmental factors such as illumination and noise, and the design of paper forms and written documentation, user training courses, etc. To achieve a good user interface design, all of those factors must be designed with care.

3.1.2 USER INTERFACE SOFTWARE

What sets data processing systems apart as a special breed is the function of each switch button, the functional arrangement among the buttons. The size and distribution of elements within a display are established not in the design of the equipment but in how the computer is programmed. The 'design' in the programs equally establishes the contents of processed data available to the operator and the visual relationships among the data. In combination with or in place of hardware, it

can also establish the sequence of actions which the operator must use and the feedback to the operator concerning those actions.

User interface design cannot be the concern only of the psychologist or the human factors specialist. It is a significant part of information system design that must engage the attention of system developers, designers, and ultimately system users as well.

In designing computer-based information systems, special attention must be given to software supporting the user interface.

A comprehensive set of guidelines for design of user interface software in computer-based information systems exist in another unit of this study pack. Also, the general problems of user interface design and the particular need for guidelines to design user interface software are identified,.

3.1. 3 INFORMATION SYSTEMS AND INTERFACE USERS

Computers today are used for a broad range of applications. User interface design guidelines cannot be applied usefully in every case. Some computers may be embedded as components in larger systems, so that they communicate only with other computers and not directly with human users. When there is no user interface, then no user interface design guidelines are needed.

The particular tasks for which a general-purpose computer might be used are not defined in advance by the designer. Instead, a user must provide exact instructions to program the computer to perform any task at hand. The designer may try to ensure that the computer can process appropriate programming languages, but otherwise is not concerned with explicit design of a user interface.

To the extent that information systems support human users performing defined tasks, careful design of the user-system interface will be needed to ensure effective system operation.

Users of information systems interact with a computer in order to accomplish information handling tasks necessary to get their jobs done. They differ in ability, training and job experience. They may be keenly concerned with task performance, but may have little knowledge of (or interest in) the computers themselves. Design of the user-system interface must take account of those human factors.

3.2 SIGNIFICANCE OF THE USER INTERFACE

The design of user interface software is not only expensive and time-consuming, but it is also critical for effective system performance.

In a constrained environment, such as that of many military and commercial information systems, users may have little choice but to make do with whatever interface design is provided. There the symptoms of poor user interface design may appear in degraded performance. Frequent and/or serious errors in data handling may result from confusing user interface design. Tedious user procedures may slow data processing, resulting in longer queues at the checkout counter, the bank cashier window, the visa office, a company's security check out point, or any other workplace where the potential benefits of computer support are outweighed by an unintended increase in human effort.

In situations where degradation in system performance is not so easily measured, symptoms of poor user interface design may appear as user complaints. The system may be described as hard to learn, or clumsy, tiring and slow to use. The users' view of a system is conditioned chiefly by

experience with its interface. If the user interface is unsatisfactory, the users' view of the system will be negative regardless of any niceties of internal computer processing.

A data entry application in which relatively simple improvements to user interface software -- including selection and formatting of displayed data, consistency in wording and procedures, on-line user guidance, explicit error messages, re-entry rather than overtyping for data change, elimination of abbreviations, etc. -- resulted in significantly improved system performance. Data entry was accomplished 25 percent faster, and with 25 percent fewer errors. How can that kind of design improvement be achieved in general practice?

1. 3 INTERFACE DESIGN PRACTICE

User interface software design can be regarded as art rather than science.

As an art, user interface design is best practiced by experts, by specialists experienced in the human engineering of computer systems. Most established information systems, call for a system development sequence starting with requirements analysis, functional specification and verification before any software design begins. The actual course of user interface software development will sometimes depart from that desired sequence. There may be no explicit attempt to determine user interface requirements.

Specifications may include only rudimentary references to user interface design, with general statements that the system must be "easy to use". In the absence of effective guidance, both the design and implementation of user interface software may become the responsibility of programmers unfamiliar with operational requirements. Detection and correction of design flaws may occur only after system prototyping, when software changes are difficult to make.

3.4 THE INTERACTION DESIGN PHASES

In this phase, the user interface is specified, sketched, developed, and tested. The goal is to support the identified issues during context, task and user analyses and to meet the HCI evaluation metrics requirements. Design is also based on accepted conventions and experience.

The main activities are interface specification and formative evaluations. Interface specification includes semantic understanding of the information needs to support systems requirements and HCI analysis results.

The syntactical and lexical decisions include metaphors, media, dialogue, and presentation designs. Details of these are given below.

3.4.1 METAPHOR AND VISUALIZATION DESIGN

Metaphor and visualization design helps the user develop a mental model of the system. It is concerned with finding or inventing metaphors or analogies that are appropriate for users to understand the entire system or part of it. Well accepted metaphors include a shopping cart for holding items before checking out in E- Commerce context, and light bulbs for online helps or daily tips in productivity software packages.

3.4.2 MEDIA DESIGN

Media design is concerned with selecting appropriate media types for meeting the specific information presentation needs and human experience needs. Popular media types include text, static images (e.g., painting, drawing or photos), dynamic images (e.g., video clips and animations),

and sound. The bandwidth needed for transmitting information depends on the media type. In addition, some media types contain affective qualities that can make presentations more interesting and stimulating, or annoying and distasteful.

3.4.3 DIALOGUE DESIGN

Dialogue design focuses on how information is provided to and captured from users during a specific task. Dialogues are analogous to a conversation between two people. Many existing interaction styles can be used such as menus, forms, natural languages, dialog boxes, and direct manipulation.

3.4.3 PRESENTATION DESIGN

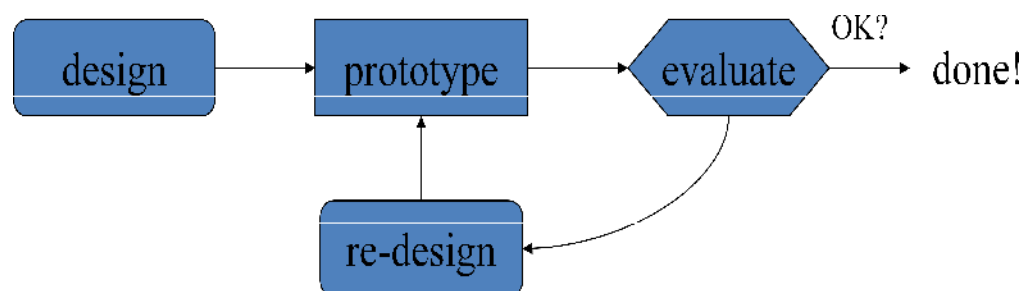
Presentation design concerns the design of metaphors, media, and dialogue design. Commonly established user interface design decisions on information architecture and display layout incorporating designs with the rest of the displays.

Design principles and guidelines may be applied during the design. For example, the following presentation

1. Maximize visibility — this means all
2. Minimize search time with minimum
3. Provide structure and sequence of design principles were suggested by Sutcliffe 1997:
 - information should be immediately available. in keystrokes
4. Focus on user attention on key data easily comprehended
5. Provide only relevant information and
6. No overloading of user's working memory.

3.4 FORMATIVE EVALUATION

Formative evaluations identify defects in designs thus inform design iterations and refinements. A variety of different formative evaluations can occur several times during the design stage to form final design decisions. In fact, we propose that formative evaluations occur during the entire HCI development life cycle, as depicted below.



4.0 CONCLUSION

Current user interfaces and their underlying systems are just too frustrating for software developers should be to increase the reliability and usability of ever system reboots, application crashes, and incompatible file formats that stop user Most users. A major effort system. The frequency of sin the middle of their tasks must be reduced. Then the inc mprehensible instructions, ambiguous men us, and troubling dialog boxes need to be revised to enable users to complete their work promptly and confidently. Long download times of web pages, dropped sessions for networked applications, and the disruption caused by unsolicited email (spam), and destructive viruse. As the number of users has grown, all these problems have become more serious. Novice users want the benefits of email or web services, but they are the poorly equipped and motivated to overcome the problems that high-tech early adopters proudly conquered. Improved ns training can help, but improved desiare an important component of making the next generation of ers interfaces more appealing and the u more satisfied.

5.0 SUMMARY

User-system interface includes all aspects of system design that affect system use particularly on those design features of the user interface that are implemented via software.

Special attention must be given to software supporting the user interface and other physical and human factors influencing user performance.

The users' view of a system is conditioned chiefly by experience with its interface.

User interface design is best practiced by experts, by specialists experienced in the human engineering of computer systems.

The interaction design phase is made up of Metaphor and Visualization Design, Media Design, Dialogue Design, Presentation Design, and the Formative Evaluation of the designs.

6.0 Tutor Marked Assignment

1. What do you understand as the user- system interface?
2. 'User interface design cannot be the concern only of the psychologist or the human factors specialist'. What is the significance of this statement?
3. What do you understand as the design formative evaluation?
4. Differentiate between information systems and user interface
5. What is the significance of the user interface to the user and other stakeholders in an organization?
6. What are the implications of the absence of an effective guidance to user interface design?
7. Mention and explain briefly, the four syntactical/lexical phases of interaction design.

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