

HCI Standards in the United States

Standards

In my last column I discussed ISO 9241, the International Organization for Standardization standard in progress on the ergonomics of visual display terminals, and specifically on the last eight parts of that standard, which covers human-computer interaction (HCI). ISO 9241 was not created in isolation: related documents appear in several places, and we will explore some of those relationships here.

In the United States, the American National Standards Institute, or ANSI, dominates the country in private sector standards. ANSI provides management and organization of voluntary standards and

certifies professional organizations and industry consortia as Standards Developing Organizations (SDOs). For human computer interaction, and other standards covering the ergonomics of software and computer systems, ANSI has certified several groups to develop HCI and related standards: the X3 organization for information technology standards, committees of T1 developing telecommunications standards, and formerly the IEEE. I will cover some of this activity in future columns.

Prominent in this domain, however, is the Human Factors and Ergonomics Society (HFES), an international professional society, but with membership largely resident in the U.S. As a result, HFES has been active in developing ergonomics standards for the U.S. The first standard, ANSI/HFES 100, covered the design of visual display terminal hardware and workstation furniture and layout (roughly analogous to the first 9 parts of ISO 9241). That stan-

dards has been in existence, and successful, since 1988 and is currently undergoing modernization and revision.

ANSI/HFES 200

The HFES Human Computer Interaction Standards Committee has been working on human computer interaction standards since 1995. The charter of HFES-HCI as publicized in a bulletin in 1986 is to advise the Society and direct its technical resources to influence the content of human-computer interaction standards. From the start, there was an intention to produce guidelines from the committee, but in the process, working documents passed along from this committee to ISO, which formed a notable input into the ISO 9241 standards. Providing input to ISO became a major output of this committee for some years.

In 1993, the HFES HCI Committee began a formal plan to issue an ANSI document of their own, analogous to the ANSI/HFES 100 hardware standards. This document has been officially designated as ANSI/HFES 200, and the committee has taken on this second name as well. The plan is to adopt the normative software sections of ISO 9241 as the core sections of a new U.S. standards (such use of ISO material is evidently legal and accepted practice for ISO). The sections will be essentially the same as the ISO documents, except for some alterations for clarity and readability. In addition, if the committee deemed some parts of the ISO sections as ill-advised, those parts would be deleted. Additional material to the ISO sections may also be added (e.g. a section on hypertext help in user guidance for example), provided such material can be satisfactorily created and reviewed within the ambitious schedule.

In addition, three sections of brand new material will be added in ANSI/HFES 200: sections on Color, Accessibility, and Voice Input and Output. The

ambitious schedule will have this document ready for review in the first half of 1997. Under ANSI, HFES produces standards under the canvass procedure. The standards is sent out for review to a Canvass Committee consisting of parties having a substantial interest in the content of the standard, including people and groups in the corporate, professional, and academic sectors. Any member of the society itself may also be on the Canvass Committee.

Individuals or companies wishing to be on this Canvass committee may contact the HFES Executive Director, Lynn Strother at the Human Factors and Ergonomics Society, PO Box 1369, Santa Monica, CA 90406-1369, USA, phone +1-310-394-1811, by fax at +1-310-394-2410, or by Internet email at 70732.2420@compuserve.com.

The Table below is the table of contents for the new ANSI/HFES 200 document (as yet unnamed). Sections corresponding to ISO documents are nearly complete (since only minor revisions are contemplated), all other sections are still in draft stage.

ISO Sections on Dialog Techniques

ANSI/HFES 200 will contain those parts of ISO 9241 which cover specific recommendations for dialog techniques (these are Parts 12-17). These also are the software sections of ISO 9241 which are normative. Two other non-normative sections of ISO 9241 also cover the ergonomics of computer software, Parts 10 and 11, these will not appear in the ANSI document.

Listed below are the ANSI/HFES 200 sections based upon ISO 9241 followed by the corresponding section number of 9241 (along with the name of the ISO section, if it differs). Only a brief description is given, as more detailed descriptions appeared in my previous column on the work of the ISO Software Ergonomics group.

Section and Title		Status
1	Introduction	Draft
2	Accessibility	Draft
3	Presentation of Information	ISO document
4	User Guidance	ISO document
5	Direct Manipulation	ISO document
6	Color	Draft
7	Forms Fill-In	ISO document
8	Command Languages	ISO document
9	Voice Input/Output	
	Voice Recognition	Draft
	Non-speech Auditory Output	Draft
	Interactive Voice Response	Draft
10	Visually Displayed Menus	Re-drafted ISO document

Table 1: ANSI/HFES 200 Current Outline and Status

Part 3: Presentation of Information (ISO 9241 Part 12). Organization and coding of visual displays (e.g. groups, lists, table, fields, cursors, etc.)

Part 4: User Guidance (ISO 9241 Part 13). On-line help systems, feedback information, error messages and error-related dialogs.

Part 5: Direct Manipulation. (ISO 9241 Part 16 "Direct Manipulation Dialog"). Design of direct manipulation interaction, including metaphors, objects, input devices, and manipulatory actions such as pointing, selecting, dragging, sizing, scaling, and rotating.

Part 7: Forms Fill-in (ISO 9241 Part 17 "Form-filling Dialogs"). Forms and dialog boxes, including layout, fields and labels, input, controls, and navigation.

Part 8: Command Languages (ISO 9241 Part 15 "Command Dialogs"). Command language design and related concepts: function keys, and command hot keys.

Part 10: Visually Displayed Menus. (ISO 9241 Part 14 "Menu Dialogs"). Menus and similar options lists: pull-down menus, pop-up menus, full-screen menus, panels, buttons, fields, etc., and how to structure them, group and order options, navigate among them, and so on. Material related to voice has been omitted.

Although the bulk of the text of these parallel ISO sections remain unchanged, there will be alterations in some clauses. In addition, any clause presenting a requirement (in ISO style, such statements contain the word "shall") will be converted to a recommendation (using the word "should"). (Nevertheless, the vast majority of clauses in the ISO document are recommendations as well.)

The presence of deviations from the ISO text presents a honest concern for some observers. It is imperative, particularly to ANSI, that U.S. standards do not conflict with international standards (except where necessary). Many information technology corporations with facilities in the U.S. are international, and many companies outside the U.S. sell their products in the U.S. market. The presence of an international and a U.S. standard covering software which are nearly identical—but not quite identical—to each other could cause endless headaches and unnecessary cost to companies.

The ANSI/HFES 200 has tried to mitigate these concerns by keeping a detailed record of even the most minor alterations made to the ISO source documents. The corresponding ANSI documents will be clearly marked and documented at every point where ISO-ANSI differences occur.

Color

Part 6 of ANSI/HFES 200 covers the use of color in the user interface. This section should not be confused with the sections of ISO 9241 which cover the ergonomics of color rendering on display monitors. ANSI/HFES 100 also covers color from the hardware perspective as well. In contrast, this section provides recommendations for the use of color as a coding mechanism or mean of presentation in information display. General guidelines will cover redundancy to color coding, limits to the number of colors used in certain circumstances, use of color for highlighting, rules for color choice and positioning when colors must be identified or objects must be identified by their color. Further specific guidelines will cover the selection of colors for text and objects in the user interface, user customization of colors, and recommended assignments for certain meanings or alarms.

Accessibility

Part 1 is a set of recommendations for making computer systems more readily accessible for people with various classes of disabilities (e.g. various degrees of hearing loss, vision loss, mobility or dexterity limitations, etc.). The emphasis here is not on special applications or devices which supplement an interface, but how to design a user interface for general use which will be usable by the maximum number of people, including

people with disabilities (for example, a recommendation might be to allow users to change the size of type on a computer screen). In addition, recommendations will be present which will aid in making an application or operating system ready for, and easy to use with, various assisting devices (such as text readers).

Voice Input and Output

Part 9 is composed of three substantial subsections, on Voice Recognition, Non-speech Auditory Output, and Interactive Voice Response.

The section on Voice Recognition (i.e. computer understanding of human spoken commands and/or phrases, also known as automatic speech recognition) covers two topics. The first is use of voice recognition technology as a command and control interface to computers. That is, for example, the use of voice commands to open and close files, manipulate window functions, etc. The second topic is voice dictation, which is the use of voice recognition to transform the computer into a "listening typewriter" (or, in other words, use of voice recognition as input into the body of a document in a word processor). This section is oriented toward the use of computerized speech recognition in devices like office and home personal computers, devices with a visual display.

However, some attempt is also being made to provide recommendations which equally cover the user of voice recognition for other types of computer control, the main example being use of voice recognition over a telephone system.

Non-speech Auditory Output presents recommendations on the uses of sound as a display in computer systems. Mainly, these are recommendations on when to use sound clips, or "earcons," in a user-computer dialog, and how to design them (how many to use, physical characteristics which assist memorability, etc.)

The section on Interactive Voice Response is a major departure from the rest of the sections in ANSI/HFES 200, and ISO 9241 for that matter. This section pertains entirely to the design of systems used over telephones, often called Interactive Voice Response (IVR) systems or touch-tone user interfaces. Despite the focus on visual user interfaces on office and home computer screens, the act of picking up a telephone and interacting with a computer through pressing the touch tone buttons on a phone (or by speech recognition) is an extremely common way for users to interact with computers. The IVR section will present recommendations for designing the menu structure and

prompts for telephone interfaces, with emphasis on aspects of IVR design which are different than designing, for example, visual menus. In this sense, this section provides a supplement to the dialog design sections, in qualifying recommendations for user interface design in this particular medium.

For Further Information

On the World Wide Web, you can find out more about the Human Factors and Ergonomics Society and its activities (including standards) at <http://hfes.org> and ANSI has its own web site at <http://www.ansi.org/home.html>.

Thanks to all the members of ANSI/HFES 200 for contributing information used in this column.

Opinions expressed in this column are not necessarily those of AT&T, ACM, or SIGCHI.

Please contribute information, corrections, and thoughts to this column by sending Internet email to heb@acm.org, or call my office at +1 908 949-9745, or fax +1 908 949-8569.