

Human Computer Interaction : Pros and Cons

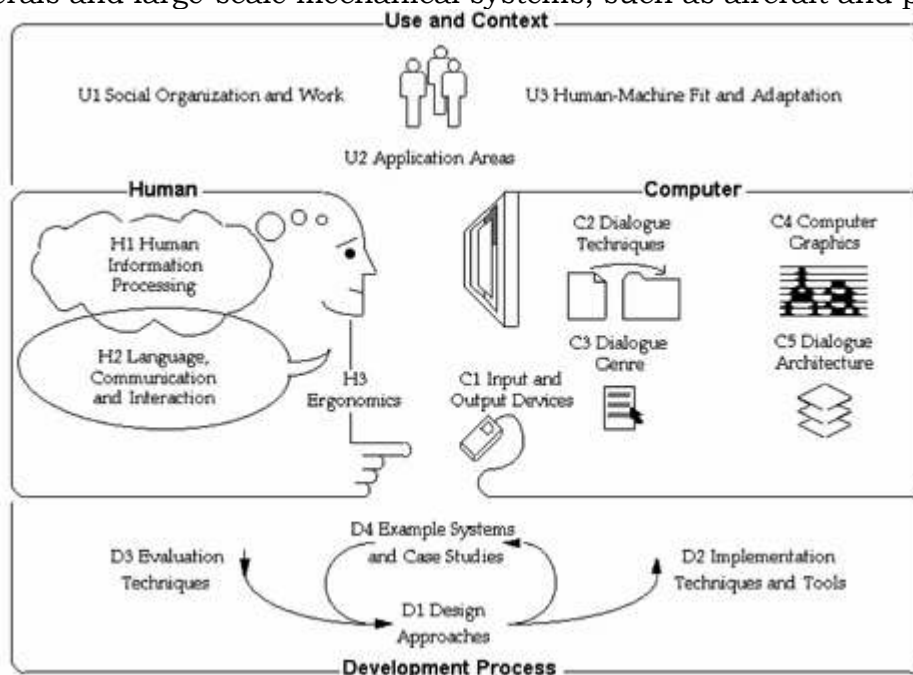
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Abstract

Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use Human-computer interaction (HCI), alternatively man-machine interaction (MMI) or computer-human interaction (CHI) is the study of interaction between people(users) and computers.Here we are dealing with the history, the future scope of HCI computer system and effect of HCI in our day to day life.

Introduction

Human-Computer interaction is often regarded as the intersection of computer science, behavioral sciences, design and several other fields of study. Interaction between users and computers occurs at the user interface, which includes both software and hardware, for example, general purpose computer peripherals and large-scale mechanical systems, such as aircraft and power



plants

The above figure shows how the humans interact with the computers. From a computer science perspective, the focus is on interaction and specifically on interaction between one or more humans and one or more computational machines. The classical situation that comes to mind is a person using an interactive graphics program on a workstation. Because human-computer interaction studies a human and a machine in communication, it draws from supporting knowledge on both the machine and the human side. On the

machine side, techniques in computer graphics, operating systems, programming languages, and development environments are relevant. On the human side, communication theory, graphic and industrial design disciplines, linguistics, social sciences, cognitive psychology, and human performance are relevant. And, of course, engineering and design methods are relevant.

History of HCI

Human-computer interaction arose as a field from intertwined roots in computer graphics, operating systems, human factors, ergonomics, industrial engineering, cognitive psychology, and the systems part of computer science. Computer graphics was born from the use of CRT and pen devices very early in the history of computers. This led to the development of several human-computer interaction techniques. Computer graphics has a natural interest in HCI as "interactive graphics" (e.g., how to manipulate solid models in a CAD/CAM system).

Out of this line of development came a number of important building blocks for human-computer interaction. Some of these building blocks include the mouse, bitmapped displays, personal computers, windows, the desktop metaphor, and point-and-click editors. Some of the technical construction of devices for mediating between humans and machines are mentioned below:-

- Input devices: survey, mechanics of particular devices, performance characteristics (human and system), devices for the disabled, handwriting and gestures, speech input, eye tracking, exotic devices (e.g., EEG and other biological signals)
- Output devices: survey, mechanics of particular devices, vector devices, raster devices, frame buffers and image stores, canvases, event handling, performance characteristics, devices for the disabled, sound and speech output, 3D displays, motion (e.g., flight simulators), exotic devices
- Characteristics of input/output devices (e.g., weight, portability, bandwidth, sensory modality)
- Virtual devices

The origin of the Application types in human computer interaction are as follows

1. **Drawing programs**: Much of the current technology was demonstrated in Sutherland's 1963 Sketchpad system. The use of a mouse for graphics was demonstrated in NLS (1965). In 1968 Ken Pulfer and Grant Bechthold at the National Research Council of Canada built a mouse out of wood patterned after Engelbart's and used it with a key-frame animation system to draw all the frames of a movie.
2. **Text Editing**: In 1962 at the Stanford Research Lab, Engelbart proposed, and later implemented, a word processor with automatic word wrap, search and replace, user-definable macros, scrolling text, and commands to move, copy, and delete characters, words, or blocks of text. Stanford's TVEdit (1965) was one of the first CRT-based display editors that was widely used. The first commercial WYSIWYG editors were the Star, LisaWrite and then MacWrite.

3. **Spreadsheets:** The initial spreadsheet was VisiCalc which was developed by Frankston and Bricklin (1977-8) for the Apple II while they were students at MIT and the Harvard Business School.
4. **HyperText:** The idea for hypertext (where documents are linked to related documents) is credited to Vannevar Bush's famous MEMEX idea from 1945 . Ted Nelson coined the term "hypertext" in 1965 . The "NLS Journal" was one of the first on-line journals, and it included full linking of articles (1970). Tim Berners-Lee used the hypertext idea to create the World Wide Web in 1990 at the government-funded European Particle Physics Laboratory (CERN). Mosaic, the first popular hypertext browser for the World-Wide Web was developed at the Univ. of Illinois' National Center for Supercomputer Applications (NCSA).
5. **Computer Aided Design (CAD):** The same 1963 IFIPS conference at which Sketchpad was presented also contained a number of CAD systems, including Doug Ross's Computer-Aided Design Project at MIT in the Electronic Systems Lab and Coons' work at MIT with SketchPad . Timothy Johnson's pioneering work on the interactive 3D CAD system Sketchpad 3 was his 1963 MIT MS thesis (funded by the Air Force). The first CAD/CAM system in industry was probably General Motor's DAC-1 (about 1963).
6. **Video Games:** The first graphical video game was probably SpaceWar by Slug Russel of MIT in 1962 for the PDP-1 [19, p. 49] including the first computer joysticks. The early computer Adventure game was created by Will Crowther at BBN, and Don Woods developed this into a more sophisticated Adventure game at Stanford in 1966 The first popular commercial game was Pong (about 1976).

Future of Human Computer Interaction

HCI is growing tremendously in every walk of our life. The "Unconscious Human Computer Interfaces", (the intelligent refrigerator that orders groceries) will evolve in a Charles Darwin fashion. The design innovations that are most useful and least troublesome to the human user will survive.

The "Conscious Human Computer Interfaces" will develop in a revolutionary fashion with breakthroughs in the technology of making connections with human sensory experience at the neural level. The ultimate "virtual reality" experience is one that rides into our brain on the same nerves that bring it sense experiences. Connection to visual and auditory nerves will be the next generation of Conscious Human Computer Interface. Several interests drive development of his technology.

The other non-mental interaction, service mode of Human Computer Interface is found in our current medical devices, our car computers, our homes, all are increasingly controlled by computers we interface by "programming buttons" or, if next-generation, by voice command. Automobile GPS does that now. There will be a slow and incremental

improvement of this "button" interface for many years. The typewriter keyboard (written language) will remain intact even if altered for cell phones and hand-held computers) until language recognition technology sufficiently improves to push aside the cumbersome keyboard entry.

A Next Generation Human Computer Interface will recognize the owner's voice and later computers will recognize their owner's thoughts (as the technology for connection to human nerves develops), and, later still, computers will supplement human thinking. When this occurs the Human Computer Interface becomes one of partnership or companionship.

Future Characteristics of HCI

Since human-computer interaction involves transducers between humans and machines and because humans are sensitive to response times, viable human interfaces are more technology-sensitive than many parts of computer science. For instance, the development of the mouse gave rise to the point-and-click style of editor interface and the mouse-based graphics program. Partially based on the above trends, we expect a future for HCI with some of the following characteristics:

1. Ubiquitous communication.
Computers will communicate through high speed local networks, nationally over wide-area networks, and portably via infrared, ultrasonic, cellular, and other technologies. Data and computational services will be portably accessible from many if not most locations to which a user travels.
2. High functionality systems.
Systems will have large numbers of functions associated with them. There will be so many systems that most users, technical or non-technical, will not have time to learn them in the traditional way (e.g., through thick manuals).
3. Mass availability of computer graphics.
Computer graphics capabilities such as image processing, graphics transformations, rendering, and interactive animation will become widespread as inexpensive chips become available for inclusion in general workstations.
4. Mixed media.
Systems will handle images, voice, sounds, video, text, formatted data. These will be exchangeable over communication links among users. The separate worlds of consumer electronics (e.g., stereo sets, VCRs, televisions) and computers will partially merge. Computer and print worlds will continue to cross assimilate each other.
5. Large and thin displays.
New display technologies will finally mature enabling very large displays and also displays that are thin, light weight, and have low power consumption. This will have large effects on portability and will enable the development of paper-like, pen-based computer interaction systems very different in feel from desktop workstations of the present.
6. Embedded computation.
Computation will pass beyond desktop computers into every object for which uses can be found. The environment will be alive with little computations from computerized cooking appliances to lighting and plumbing fixtures to window blinds to automobile braking systems to greeting cards. To some extent, this development is already taking place. The difference in the future is the addition of networked communications

that will allow many of these embedded computations to coordinate with each other and with the user. Human interfaces to these embedded devices will in many cases be very different from those appropriate to workstations.

7. Information Utilities.

Public information utilities (such as CompuServe, Prodigy, home banking and shopping, etc.) and specialized industry services (e.g., weather for pilots) will continue to proliferate. The rate of proliferation will accelerate with the introduction of high-bandwidth interaction and the improvement in quality of interfaces.

Of course, personal computers in some form will continue to exist (although many might take the form of electronic notebooks) and there will still be the problem of designing interfaces so that users can operate them.

Human-computer interaction is, in the first instance, affected by the forces shaping the nature of future computing. These forces include:

- Decreasing hardware costs leading to larger memories and faster systems.
- Miniaturization of hardware leading to portability.
- Reduction in power requirements leading to portability.
- New display technologies leading to the packaging of computational devices in new forms.
- Assimilation of computation into the environment (e.g., VCRs, microwave ovens, televisions).
- Specialized hardware leading to new functions (e.g., rapid text search).
- Increased development of network communication and distributed computing.
- Increasingly widespread use of computers, especially by people who are outside of the computing profession.
- Increasing innovation in input techniques (e.g., voice, gesture, pen), combined with lowering cost, leading to rapid computerization by people previously left out of the "computer revolution."
- Wider social concerns leading to improved access to computers by currently disadvantaged groups (e.g., young children, the physically/visually disabled, etc.).

Effect of HCI in our Day to Day life.

I believe that the challenges that face HCI will not be radically different from those that we find today. These motivations are often summarised as "life, liberty and the pursuit of happiness". It is important to contrast Jefferson's view with the economic and political imperatives that dominate the daily lives of most of the world's population. However, this view can help to structure a cursory analysis of what might lie ahead for HCI in the next decade.

Life...

It is possible to identify a number of ways in which technological innovation affects an individual's "inalienable right" to life. In particular, it seems clear that

technological literacy will continue to affect personal income and economic prosperity. If we can design devices that are "easier to use" and therefore reduce the burdens of technological literacy then we may both widen access to individual rewards and improve our economic competitiveness. On the other hand, it seems unrealistic to expect that access to technology through improved interface design will really reduce the social and economic distinctions that exist in Western society. It is ironic that so much attention is placed on technological literacy at a time when many societies are facing increases in more conventional forms of illiteracy. In a more cynical view, improved interface design will reinforce existing economic and social distinctions. Access to the Internet is no longer restricted to a technological elite but is widely available to those who can afford the associated costs. The growing "myth of free Internet access" has done little to hide the economic correlation of Internet access with domestic income.

Liberty...

Jefferson's second imperative, the promotion of individual liberty, has a clear resonance with the immediate problems facing the future of human computer interaction. Many people have focussed on the threats that context aware devices and electronic monitoring tools pose for civil liberties. For example, the cost savings that can be obtained over the web have convinced many consumers to accept the risks associated with disclosing personal information, such as credit card details and records of previous purchases, over the Internet. HCI plays an interesting role in all of this. By reducing the technological barriers to the exploitation and use of information technology, we may actually be making people more likely to accept the risks imposed by modern surveillance techniques. Arguably, we are helping people to obtain the benefits of information technology without necessarily educating them about the associated risks.

...and the pursuit of happiness

The final component of Jefferson's view is the "pursuit of happiness". HCI has had relatively little to say about this most fundamental of human motivations. Relatively little has been said about the ways in which people have used computers for "fun" since their inception. The creation of new devices and markets is steadily changing this previous bias. Recent years have seen a growing interest in interface design for entertainment and leisure systems. This work had largely been driven by digital television and by the games industry. It makes use of social and contextual observations but often ignores many of the interpretive processes and guards that are stressed by ethnography and anthropology.

Conclusion

The field of human computer interaction deals with the study, design, and evaluation of human-machine systems with an emphasis on human capabilities and limitations as they impact system operation. The goal of HCI and the human factors methodology is to optimize system performance while maximizing human safety and operational effectiveness. HCI expertise on a

design team can improve the design process and lower the overall cost of a product. A product can be designed through trial and error, which is a lengthy and costly process, through the expert opinions of the designer, which is hampered by their own personal preferences, or by the application of human factors principles to the design. Finally as per my perspective, the future of HCI will be determined more by our social motivations than by technological innovation. We can make the final decision that how much HCI will interfere in our day to day life.

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