



HUMAN COMPUTER INTERACTION IN DIGITAL INFRASTRUCTURE

* **DR. V. RANGANATHAN**, Assistant Professor, Department of Commerce, Arignar Anna Govt Arts College, Cheyyar. TN INDIA

****K. MANGAIYARKKARASI**, Asst. Professor and Asst. Controller of Examinations, PG and Research Department of Commerce with Computer Applications, Hindusthan College of Arts and Science, Coimbatore. TN INDIA

Abstract

Major changes have occurred within the computer revolution; changes which encompass all aspects of its role. These are not just quantitative in nature, such as exponential increases in processing power and storage capacity, but are more fundamental, pointing not only to the function of computer technology, but its emerging diversity both in terms of its form and place in the world. Computers are now embedded within a huge range of materials and artifacts, and take on roles in almost all aspects of life. People and lifestyles are altering. These changes are sometimes spurred on by technology, but other times work in parallel or provoke technological innovation. There is a global scale of change which is taking place hand in hand with new technologies. This gives rise to tensions between individuals and governments, and between globalization and cultural diversity. This paper extends existing Information Systems perspectives towards Human-Computer Interaction (HCI) to consider HCI within Digital Infrastructures (DI) – heterogeneous and evolving systems comprising both IT and its design and user communities.

Keywords- Computer Revolution, Technology, Digital Infrastructure, Information Systems

Introduction

Human-Computer Interaction, often called HCI, is a socio-technological discipline whose goal is to bring the power of computers and communications systems to people in ways and forms that are both accessible and useful in our working, learning, communicating, and recreational lives. It researches the design and use of computer technology, focused on the interfaces between people (users) and computers. Researchers in the field of HCI both observe the ways in which humans interact with computers and design technologies that let humans interact with computers in novel ways.

Origin of HCI

Until the late 1970s, the only humans who interacted with computers were information technology professionals and dedicated hobbyists. This changed disruptively with the emergence of personal computing in the later 1970s. Personal computing, including both



personal software (productivity applications, such as text editors and spreadsheets, and interactive computer games) and personal computer platforms (operating systems, programming languages, and hardware), made everyone in the world a potential computer user, and vividly highlighted the deficiencies of computers with respect to usability for those who wanted to use computers as tools.

Importance of HCI

In the early days of computing only highly trained specialists could use computers, and these were massive expensive machines really only found in industry and research. Today, computers are everywhere, and the range of knowledge and experience of different users is very broad. Unlike 30 years ago, the majority of computer users nowadays have not received intensive specialized training. HCI is extremely important when designing clear intuitive systems which will be usable for people with a varied range of abilities and expertise, and who have not completed any formal training. HCI takes advantage of our everyday knowledge of the world to make software and devices more understandable and usable for everyone. For example, using a graphic of a miniature folder in a computer's interface helps the user understand the purpose of the folder, as everyone has experience with real paper folders in their everyday lives. Ultimately, if a system is well designed with HCI techniques, the user should not even have to think about the intricacies of how to use the system. Interaction should be clear, intuitive, and natural.

1. Daily Life

Today computers permeate every aspect of our daily lives. Even if a person does not directly own or use a computer, their life is affected in some way by computing. ATM machines, train ticket vending machines, and hot drinks dispensing machines are just a few examples of computer interfaces a person can come into contact with daily without needing to own a personal computer. HCI is an important factor when designing any of these systems or interfaces. Regardless if an interface is for an ATM or a desktop computer, HCI principles should be consulted and considered to ensure the creation of a safe, usable, and efficient interface.

2. Business and Industry

HCI is an important consideration for any business that uses computers in their everyday operation. Well designed usable systems ensure that staff are not frustrated during their work and as a result are more content and productive. HCI is especially important in the design of safety critical systems, such as, for example, those found in power plants, or air traffic control



centers. Design errors in these situations can have serious results, possibly resulting in the death of many people.

3. Accessibility

HCI is a key consideration when designing systems that are not only usable, but also accessible to people with disabilities. The core philosophy of HCI is to provide safe, usable, and efficient systems to everyone, and this includes those with different sets of abilities and different ranges of expertise and knowledge. Any system properly designed with HCI user-centered techniques and principles will also be maximally accessible to those with disabilities.

4. Software Success

Good use of HCI principles and techniques is not only important for the end user, but also is a very high priority for software development companies. If a software product is unusable and causes frustration, no person will use the program by choice, and as a result sales will be negatively affected.

5. Untrained users

Today, very few computer users actually read the manual accompanying the software, if one exists. Only very specialized and advanced programs require training and an extensive manual. Computer users expect to understand the main functionality of an average program within a few minutes of interacting with it. HCI provides designers with the principles, techniques, and tools necessary to design effective interfaces that are obvious and easy to use, and do not require training.

Human Computer Interaction Research

Improvements in human-computer interaction have resulted from research on new hardware and software technologies as well as new ways of thinking about interactions between people and computers and about interactions between people that are mediated by computers. As computers become ubiquitous and play an increasing role in our lives, the importance of human-computer interaction research is highlighted. The development of novel kinds of work materials, electronic communities, and new computationally-based media has begun. Still, most current user interfaces employ computation primarily to mimic mechanisms of older media. While there are important cognitive, cultural, and engineering reasons to exploit earlier successful representations, imitating the mechanisms of an old medium strains and



underutilizes the new. Fundamental research is required to effectively exploit computation and ensure that it plays a productive role in our lives.

Much of the research in the field of human-computer interaction takes an interest in:

- Methods for designing novel computer interfaces, thereby optimizing a design for a desired property such as, e.g., learn ability or efficiency of use.
- Methods for implementing interfaces, e.g., by means of software libraries.
- Methods for evaluating and comparing interfaces with respect to their usability and other desirable properties.
- Methods for studying human computer use and its socio-cultural implications more broadly.
- Models and theories of human computer use as well as conceptual frameworks for the design of computer interfaces, such as, e.g., cognitive user models, Activity Theory or ethno methodological accounts of human computer use.^[12]
- Perspectives that critically reflect upon the values that underlie computational design, computer use and HCI research practice.

Excellence in HCI

The world is in revolution. The only point of disagreement is the name used to describe the revolution: the computer/communications revolution, the information technology revolution, or convergence. Whatever the name, the revolution is fueled by the low cost of mass-produced computer processor and memory chips and by the inexpensive, high-bandwidth digital communications capabilities of the emerging national information infrastructure (NII). The computer/communications revolution in which we are all participating both *enables* and *requires* advances in human-computer interaction.

- **Quality of life.** Important applications of computers in medicine are possible only if they are both useful and easy to use by doctors, nurses, and aides; similarly, use of computers in education requires that they be both useful and easy to use by students and teachers. Computers can assist disabled individuals; at the same time, special techniques are needed to allow computers to be used by some who are disabled.
- **National competitiveness.** Information technology is one of the drivers for increased productivity. As more and more workers use computers in their jobs, training time and ease-of-use issues become economically more and more important.
- **Growth of the computer and communications industries.** Powerful, interesting, and usable applications are the fuel for continuing growth of these industries. The current



growth cycle is the direct consequence of the graphical user interface developed by Xerox and commercialized by Apple and Microsoft, and of the lower computer costs made possible by the microprocessor. The resulting mass market supports commodity pricing for both hardware and software. Future growth cycles will in part be driven by current HCI research, which will lead to new applications that are increasingly easy to use.

- **National Security.** Computer-based command, control, communications, and intelligence systems are at the heart of our military infrastructure. Interfaces between operators and computers are found in cockpits, on the bridge, and in the field. To be effective, these systems must have high-quality human-computer interfaces.

HCI Challenges

The development of the silicon chip has changed the way humans work, play, and communicate. Although it may sound like a cliché, computers are literally everywhere, and they are advancing at an astonishing rate. The invention of new hardware, software, and interaction styles are opening up new possibilities for computing every day. One of the biggest challenges faced by HCI is keeping one step ahead of new technologies and new methods of interaction. HCI research must match the evolution of technology if the usability and efficiency of future devices and software is to be ensured. The fundamental challenge is guaranteeing new designs offer good HCI as well as harnessing the potential functionality of the new technology. Very few other disciplines receive contributions from so many different fields of study as does HCI and this poses unique challenges for those working in the area. As it would be impossible for one person to be an expert in every area that contributes to HCI as a whole, it is critical that experts from various fields work closely together sharing their expertise. Although this co-operation is often achieved successfully and with great results, communication problems can arise due to the very different areas of expertise of the individuals involved.

How to Break New Grounds towards Digital Era?

Unlike human-computer interaction in business and many other applications where the human can take a work break at his or her own discretion, in applications such as manufacturing, process industries, tele-robotics, and transportation, there is a dynamic system that is ongoing and cannot arbitrarily be stopped to take a break. All such systems are becoming more automated, and the human operator is being relegated to the role of programmer, on-line monitor and supervisor, and after-the-fact, off-line evaluator. This change in the human role makes large changes in the human-computer relationship, requiring much more of artificial sensors, actuators, and the computer, reducing the sensory-motor load



on the operator, and also increasing the cognitive demands on the operator. Other Changes include:

- ✓ Our Changing World
- ✓ Changing Computers
- ✓ Changing Lives
- ✓ Changing Societies
- ✓ Transformations in Interaction
- ✓ Human Values in the Face of Change
- ✓ The End of Interface Stability
- ✓ The Growth of Techno-Dependency
- ✓ The Growth of Hyper-Connectivity
- ✓ The End of the Ephemeral
- ✓ The Growth of Creative Engagement

Conclusion

Computers have played a massive role in changing the way we live over the last couple of decades. They are no longer possessions of the privileged but are rapidly becoming inexpensive, everyday commodities. They have evolved from being isolated machines to globally interconnected devices. Not only has access to computers vastly increased, but the ways we interact with them and materials used for computer devices have changed too. All of this means that computers can now be interwoven with almost every aspect of our lives. As we move towards 2020, so the extent of these changes will increase. By 2020, it may not be possible to realize all of our goals, ambitions and aspirations without using a computer or computing in one way or another. This binding of computing to our daily activities will in turn affect our values, goals and aspirations.

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