ICT 325 Human-Computer Interaction

Topic 1 Introduction to HCI

Topics

- Topic 1 Introduction to HCI
- Topic 2 Usability Evaluation
- Topic 3 Physical Aspects and Stress
- Topic 4 Psychology
- Topic 5 Interaction Styles
- Topic 6 User-Centred Design
- Topic 7 UI Design Methods
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- Topic 10 Culture & Accessibility
Overview

- Learning objectives
- Reading
- 1.1 General HCI Concepts
- 1.2 History of HCI
- 1.3 Design for Usability
- 1.4 Examples of HCI Jobs

Learning Objectives

Be able to:

1. Identify at least 2 different definitions of HCI and justify their selection.
2. List and explain the main phases in the history of HCI.
3. List the different disciplines that contribute to HCI and to identify different activities for each discipline.
4. Name the basic processes in interaction design.
5. List the key rationale for the return on an usability investment.
6. List and explain the user rights.
7. Define ‘usability’ and ‘organisational usability’.
8. List and explain usability goals and user experience goals and how they relate to each other.
Reading

• Textbook
  • Chapter 1

• Recommended reading
  • History
    • IBM Archives
      http://www-03.ibm.com/ibm/history/index.html
    • Brad A. Myers. "A Brief History of Human Computer Interaction Technology"
      http://www-2.cs.cmu.edu/~amulet/papers/uhistory.tr.html
    • Vannemar Bush (1945)
      http://www.theatlantic.com/doc/194507/bush
    • Ronald M. Baecker (1995)
      A Historical and Intellectual Perspective
    • History of the GUI, Jeremy Reimer
      http://arstechnica.com/articles/paed/a/gui.ars

Reading

• Recommended reading
  • User rights
    • IBM website
      www-3.ibm.com/ibm/easy/eou_ext.nsf/publish/12
  • Return on Investment
    • Jakob Nielsen's Alertbox
      http://www.useit.com/alertbox/20030107.html

• Further reading
  • Websites listed for topic 1
  • General websites
1.1. General HCI Concepts

- Design
- Definitions of HCI
- Definition of interaction
- HCI taxonomy
- Disciplines that contribute to HCI
- Roles in a team
- User rights

Design

- Poor design vs. good design
- What are the costs of poor design?
Examples

• Doors

Definitions of HCI

“Human-computer interaction (HCI) is the study of the interaction between people, computers and tasks.”

    Johnson (1992)

“particular people use particular computer systems to perform particular tasks in a particular context.”

    Hill (1995)
Definition of interaction design

“Designing interactive products to support people in their everyday and working lives”
Preece, Rogers, Sharp (2002)

“The design of spaces for human communication and interaction”
Winograd (1997)
1. Human information processing (Cognition, perception, psychology)
2. Language, communication, interaction
3. Ergonomics (Physical)
Computer

1. Input/ Output devices
2. Dialogue techniques
3. Dialogue genre
4. Computer graphics
5. Dialogue architecture

Use and context

1. Social organisation and work
2. Application areas
3. Human-machine fit and adaption
Development process

1. Design approaches
2. Implementation techniques and tools
3. Evaluation techniques
4. Example systems and case studies

Activity

• How many different disciplines does it take to design a lecture theatre?

• Example of a discipline: Architecture, Interior Design

• Of these group them into, (1) designers (planners) and (2) implementers
Activity – possible answers

- Designers/Planners
  - Architect
  - Audio – sound engineers
  - Textile design – recommend seat cloth
  - Psychology – Colours, type of artwork

- Implementers
  - Electricians
  - Painters
  - Builders
  - Sound engineers
  - Network engineers

Overview - Project Management

Disciplines that contribute to HCI

- Ergonomics
- Psychology, Cognitive Science
- Informatics
- Engineering
- Computer Science
- Social Sciences
  - Sociology, Anthropology, Philosophy, Linguistics
Multidisciplinary team

- List the different people on a software system development team

- Where do the interaction designers fit?

Roles

- **Interaction designers.** Involved in the design of all the interactive aspects of a product

- **Usability engineers.** Focus on evaluating products, using usability methods and principles

- **Web designers.** Develop and create the visual design of websites, such as layouts

- **Information architects.** Come up with ideas of how to plan and structure interactive products

- **User experience designers.** People who do all the above but who may also carry out field studies to inform the design of products
User rights

1. **Perspective**: The user is always right. If there is a problem with the use of the system, the system is the problem, not the user.
2. **Installation**: The user has the right to easily install and uninstall software and hardware systems without negative consequences.
3. **Compliance**: The user has the right to a system that performs exactly as promised.
4. **Instruction**: The user has the right to easy-to-use instructions (user guides, online or contextual help, error messages) for understanding and utilizing a system to achieve desired goals and recover efficiently and gracefully from problem situations.
5. **Control**: The user has the right to be in control of the system and to be able to get the system to respond to a request for attention.

6. **Feedback**: The user has the right to a system that provides clear, understandable, and accurate information regarding the task it is performing and the progress toward completion.
7. **Dependencies**: The user has the right to be clearly informed about all systems requirements for successfully using software or hardware.
8. **Scope**: The user has the right to know the limits of the system’s capabilities.
9. **Assistance**: The user has the right to communicate with the technology provider and receive a thoughtful and helpful response when raising concerns.
10. **Usability**: The user should be the master of software and hardware technology, not vice-versa. Products should be natural and intuitive to use.
1.2 History of HCI

Reading

- Vannemar Bush (1945)
- Ronald M. Baecker (1995)
  - A Historical and Intellectual Perspective
- IBM Archives
  - [http://www-03.ibm.com/ibm/history/index.html](http://www-03.ibm.com/ibm/history/index.html)
- History of the GUI, Jeremy Reimer
  - [http://arstechnica.com/articles/paedia/gui.ars](http://arstechnica.com/articles/paedia/gui.ars)

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1. Development of the Ideas
   - 1945 Vannemar Bush “As we may think”
     - Envisioned storing & retrieving research material
     - Linking (hypertext)
   - 1960 Licklider

2. Development of the technology
   - Abacas to iPod

3. Development of human-computer interaction awareness
History

- 1930-40s
  - Industrial Revolution (World War II)
  - Time & Motion studies (Taylor)
  - Physical ergonomics
- 1950’s
  - papers on human factors and computer use
  - Time-sharing computers available
  - More interest in human factors
- 1960’s
  - 1962 Sketchpad (move from numbers, text to pictures)
  - 1968 Englebart Demo of a PC with mouse pointer

Paper tape readers (1944)
Electronic Numerical Integrator and Computer (ENIAC) (1946)

Sketchpad (1963)

Light pen to input

Ivan Sutherland Ph.D

http://accad.osu.edu/~wayneC/history/images/ivan-sutherland.jpg
Sketchpad interface

New ideas:
e.g.
1. Hierarchic internal structure of pictures
2. Master picture with subpictures (OO)

History

- 1970's
  - More papers and conferences
- 1980's
  - Personal computer with Graphical user interface
    - 1981 Xerox Star (GUI)
    - 1984 Apple Macintosh (GUI)
- 1990's
  - Personal computer takes hold
  - Computer supported collaborative work
  - Multi-media and web
  - Ubiquitous computing
### History

- Late 1990’s-2000+
  - Interactive digital TV
  - Social Informatics
  - Mobile technologies
    - Rise and rise of the mobile telephone
- Recently
  - Convergence of technology
  - Podcasting

### 1.3 Design for Usability

- Goals of interaction design
- Definition of usability
- Interaction design
- Return on Investment (value of usability)
What is usability?

• “Allowing the user to complete all that they set out to do without the technology getting in the way.”

• ‘Interfaces get in the way. I don’t want to focus my energies on an interface, I want to focus on the job.’”

Donald Norman

What is usability?

• “An ability to be used”

Diana Adorno
Goals of interaction design

- Usability goals
  - Effective to use
  - Efficient to use
  - Safe to use
  - Have good utility
  - Easy to learn
  - Easy to remember to use

Dimensions of usability

Satisfaction - how happy?
Successful or not
Efficient - how well
Effective - Reached goal or not?

Goal

Goal
Goals of interaction design

- User Experience goals
  - Satisfying
  - Enjoyable
  - Fun
  - Entertaining
  - Helpful
  - Motivating
  - Aesthetically pleasing
  - Supportive of creativity
  - Rewarding
  - Emotionally fulfilling

Preece et al. (2002) p 19
Designing for usability

Interaction design process
1. Identify needs and establish requirements
2. Develop alternative designs to meet those requirements
3. Build interactive versions so that they can be communicated and assessed
4. Evaluate what is being built throughout the process

Preece, Rogers, Sharp (2002), p 12

Return on investment

• Why is usability important?

• Read: Jakob Nielsen’s Alertbox
http://www.useit.com/alertbox/20030107.html

Suggests spending 10% of budget on usability for 135% usability improvement.
Example for website usability Improvements

- Some facts:
  - 79% of users always scan; only 16% read word-by-word
  - Reading from computer screens is 25% slower than from paper
  - Web content should be 50% the size (length) of its paper equivalent

- Improvements (by following these guidelines)
  - Task time: 180% faster
  - User Error: 809% fewer
  - Memory: 100% more
  - Subjective satisfaction: 37% higher
  - Overall usability: 159% better


Usability savings

- Development
  - Reduce development time & cost to produce a product
  - Fewer late changes to meet user needs
  - Reduced cost of future redesign to make more usable

- Sales
  - Increase revenue – more sales by meeting customers expectation of ease of use.
  - More satisfied customers, more repeat sales.
Usability Savings

- Use
  - Reduce task time and increase productivity.
  - Fewer user errors (no corrections required)
  - Fewer errors, that lead to improved quality of service.
- Support
  - Reduced costs of producing training materials
  - Reduced training times for trainers and users
  - Reduced support time (few user difficulties)
  - Reduced help line support
  - Reduced user documentation development time

Question

- If you are selling the idea of usability, which of these savings would be helpful?
- That is, which of these would be important to upper management?
Question

• How would you measure these savings?

• Choose one and suggest ways it could be measured.

What is organisational usability?

• An approach which helps organisations to achieve their business goals by improving the usability of their computer systems, and the way those systems are developed.
1.4 Examples of HCI Jobs

- Seek.com – type in ‘usability’ as a keyword
  - www.seek.com.au
- Usability Professionals
  - http://www.usabilityprofessionals.org/usability_resources/jobs/
- Human Computer Interaction Resource Network
  - http://www.hcirn.com/jobs/
- Human Computer Interaction Resource Network (HCIRN)
- The Usability Group: A usability consultancy
  - http://www.usability.com/

Australia

1. Information Architect / Usability Consultant
   Frontier Group
   Canberra, Australia
   27-Jun-05
2. HCI Internship
   CSIRO
   Canberra, Australia
   22-Jun-05
3. User Interface Designer / Interaction Designer
   Honeywell Software Centre
   Sydney, Australia
   17-Jun-05
4. Senior Usability Consultant
   Telstra
   Sydney or Canberra, Australia
   19-Apr-05

HCIRN
User Interface Designer / Interaction Designer

(Honeywell Software Centre, Sydney)

• The duties of this role will include:
  • Conducting user needs analysis;
  • Translating business requirements into successful user interface designs;
  • Designing innovative user interfaces based on user research and design standards;
  • Building low fidelity and functional user interface prototypes;
  • Developing user interface design specifications and assisting in the development of design guidelines and standards;
  • Expert-reviewing graphical user interfaces and UI specifications; and
  • Participating in the product usability testing process by collaborating on test plans, attending test sessions, and developing design solutions.

User Interface Designer / Interaction Designer

• To be successful in the role you will need:
  • A solid understanding of user-centred design principles;
  • Be familiar with usability engineering and research methodologies;
  • Experience with effectively executing the iterative design process through the complete product development cycle;
  • Excellent analytical and conceptual design skills;
  • The ability to develop innovative approaches for complex design problems;
  • The ability to work collaboratively in a team environment;
  • The ability to successfully plan and organise your own work;
  • Good verbal and written communication skills;
  • Strong attention to detail;
  • Be able to manage competing interests and conflicting demands;
  • High level of initiative;
  • The ability to translate customer needs into designs; and
  • Excellent computer skills,
Summary

1. Interaction Design (ID) is concerned with designing interactive products to support people in their everyday and working lives
2. ID is multidisciplinary, involving many inputs from wide-reaching disciplines and fields
3. ID involves taking into account a number of interdependent factors including context of use, type of task and kind of user
4. Need to strive for usability and user experience goals
5. Design and usability principles are useful heuristics for analyzing and evaluating interactive products