



COMP10060

Human Computer Interaction (HCI) & User Experience Design (UXD)

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Lecture Content

- Module content
 - 2 coursework and class test – Note: examination has now been removed
 - Reading list
 - Overview of module content

Reading List

- Dix A, et al., 2003, “Human Computer Interaction,” Prentice Hall, ISBN: 0130461091
- Preece, J. et al., 2002, “Interaction Design: Beyond Human-computer Interaction” Wiley and sons, ISBN: 0471492787
- Shneiderman, B. and Plaisant, C., 2003, “Designing the User Interface,” fourth ed. Addison Wesley, ISBN: 0321200586
- Lecture slides/tutorials and other information available on Blackboard

Courseworks/Class Test

- Coursework - 90%
 - Coursework 1: Written Report (30%)
 - approx week 5 submission
 - Coursework 2: Interface Design (60%)
 - approx week 12 submission
- Class test (10%) Multiple choice
 - Approx week 10 - 11

Human Computer Systems

■ Aims

- develop ability to produce integrated solutions to the problems of interfacing people to the technology
- learn about processes & techniques used in Human Computer Interaction (HCI)



Human Computer Systems

■ Syllabus

- Human Computer Interaction (HCI) and User Experience Design (UXD) basic concepts, tools & techniques
- Input / Output *styles and devices*
- evaluation
- guidelines: principles, rules, standards, metrics
- HCI research & other topics

Human Computer Interaction (HCI) definitions

■ **ACM SIGCHI Curricula for Human-Computer Interaction**

- Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them.

Overview of HCI

■ Understand:

- how to make a case for the importance of HCI in systems development
- how its multidisciplinary nature makes HCI different
- how HCI contributes to design
- HCI evolution

What is Human Computer Interaction?

- “processes, dialogues and actions that a user employs to interact with a computer in a given environment” Jenny Preece et al
- **Human Computer Communication:** Is more than the user interface -- successful communication relies on shared knowledge and management of trouble.

HCI is multidisciplinary

- HCI draws from:
 - computer science
 - psychology
 - sociology
 - anthropology
 - industrial design
 - Etc....

HCI

- Technology will always lead the way! - dramatic advances in technology have revolutionised the way people now interact with computers
 - Better & faster machines, comms, satellites, combined video, live images, text, graphics & sound - the internet!
 - Virtual reality, intelligent agents etc blur reality and science in now almost like science fiction

Overview of HCI

- Technology has advanced over the past 20 years to such an extent that almost everyone comes into contact with computers in one way or another.
- Understanding of HCI has advanced significantly over the last 10 years
- this understanding has a practical use in the design and evaluation of products.
- In the early years only highly trained, technical people used computers -
Nowadays, the range of knowledge & experience of different users is very broad



Overview of HCI

- Hence, important that the way in which people interact with computers is as intuitive and clear as possible
- Good HCI design can increase efficiency and save time etc
- Can also save lives eg medical systems

Visibility & Affordance

- Donald Norman, author of “The Psychology of Everyday Things” identifies two key principles that help make good HCI
- Visibility
- Affordance
- ie. Controls need to be visible, with good mapping with their effects, and their design needs to suggest (afford) their functionality

Visibility & Affordance

- Example:
- a CAR generally has controls which are visible and have good feedback eg switch lights on and headlights illuminate
- affordance refers to the properties of an object - what sort of operations it performs
- eg door affords opening, chair affords sitting etc - beware “perceived affordance” - eg push or pull the door

Affordance Example

- British Rail wanted to create a partition on a platform and could either use toughened glass or thin Plywood (same cost)
- Choose glass because more attractive
- However, vandals smashed it 3 times before BR replaced it with plywood
- moral - although not stronger the plywood remained intact - what actions did glass afford? plywood?
 - Within short time plywood covered in graffiti, but not smashed, the glass afforded smashing, plywood afforded drawing & writing

User Interface

- Developing computer systems that are straightforward to use means that system designers have to think beyond merely what capabilities the system should have. They also need to consider the interaction that goes on between users and a computer system (user interface - also known as Man-Machine interface)

User Interface

■ Definition

- those aspects of the system that the user comes in contact with - an input language for the user, an output language for the machine, and a protocol for the interaction.

- “user friendly” - often meant simply tidying up the screen - not making full use of HCI research

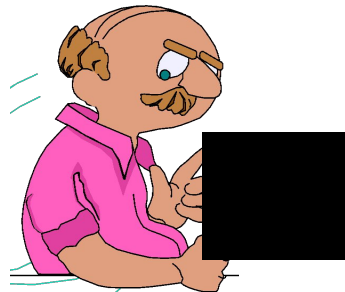


HCI

- The term HCI was first adopted in the mid-1980s
- acknowledged the focus of interest was broader than just the design of the interface and was concerned with all those aspects that relate to the interaction between humans and computers

Interface example : Telephone

| USER ACTIONS | TELEPHONE INTERFACE | SYSTEM FEEDBACK |
|--------------|------------------------|--------------------|
|--------------|------------------------|--------------------|



Lift receiver

Listen

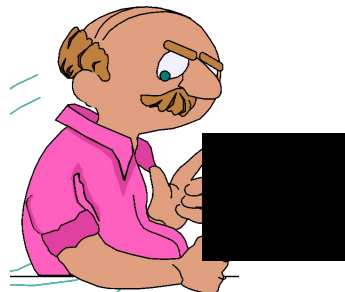
no dial tone



Dial

dial tone

nothing



Listen

clicks, beeps

nothing

rapid tones

ringing sound

Listen

keeps ringing

person answers

machine answers

Interface example : Telephone

- This series of user interactions & system feedback is an example of a simple user interface whereby information is passed between a person and a system
- Physical level - on the machine side there is a keypad (or dial) and a receiver
- Person side - ears, eyes and fingers
- Information passed from :
 - human to machine - dialing/keying number
 - machine to human - tones etc

Interface example : Telephone

- Basic interface causes few problems for most people who are familiar with its use
 - operating parts are visible
 - implications of how to use it are relatively clear
 - assume for now that the design of buttons or holes means that the way they are used is obvious
 - pressing button marked “1” maps directly on to the task of ringing a number that begins with 1
 - tones give intuitive meaning about connection success

Interface example : Telephone

- Consider 2 scenarios:
- You are a visitor from USA where phones look similar but have different dialing tones
 - may get momentarily confused - familiarity has gone - feedback caused confusion
- You are using a modern phone interface with added facilities - eg 3-way conversations, callback, auto redial etc
 - existing phone interface maps poorly onto phone's increased functionality

Example:

Functionality of modern phone

- Think about the functionality of modern phones
- Try to identify what tasks someone would like to perform using the phone
- make a note of the controls and sorts of feedback provided by the phone when controls are activated
- How do these map on to your initial list of user actions? What are the weaknesses?



Example:

Functionality of modern phone

- Typical Tasks
 - forward calls to another extension
 - accept calls forwarded from another extension
 - redial a number
 - remember a list of commonly called numbers and substitute shortened codes for them



Example:

Functionality of modern phone

- How would you break first task into a series of actions?
- No button on phone labelled “forward”
- might start with “look up instructions on how to forward calls in telephone handbook”
- 5 additional buttons labelled *, #, S, SL, R but what do they mean? Eg R doesn't mean redirect as you might guess

Example:

Functionality of modern phone

- To forward (or redirect calls) I have to press * 8 followed by the extension to redirect to
- If this is done correctly there is an intermittent plain tone - if done incorrectly someone else will get my calls unintentionally
- mapping between redirecting calls, procedure for doing so, and the feedback is very poor
- conflict between ease of use and functionality designers wanted to provide



Example:

Functionality of modern phone

- Could some of the conflicts be resolved eg a special tone or dialog for each extension
- what about video phones?
 - Privacy - eg you might like to chat to friends while in the bath - will you need to change your habits? Or will designers cater for this in their designs?



Example:

Functionality of modern devices

- Take a minute to think about another household device that often causes problems for users because of the the way the user actions map on to the design of the gadget

Example: new car

- common for new cars to have over 100 controls
e.g.
 - 10 for radio
 - 5 - 10 for heating & ventilation
 - 5 or more for windows
 - 10 for wipers, washers, etc etc
- most people can master these very quickly

Example: new car

- why is it that the car with many more controls so much easier to use than the video recorder?
- What makes the car interface so good and the video so bad? **Feedback !!!!!**
 - feedback in cars is usually immediate and more obvious
 - people who have driven another car before know what to expect - although cars differ, the position of many controls is the same or similar, similar symbols etc



Goals of HCI

- Produce usable and safe systems, as well as functional systems
- usability is a key concept in HCI and is concerned with making systems easy to learn and easy to use
- poorly designed computer systems can be extremely annoying to users

Goals of HCI

- Providing lots of different kinds of functions does not necessarily lead to good usability
- eg banking system had 36 different ways of extracting customer information
 - examined usage logs and found that 4 codes accounted for 75% of usage - many codes virtually unused
 - as often happens, the full flexibility of the system was not being exploited because users did not invest in effort /time to learn new searching strategies unless absolutely necessary

Goals of HCI

■ HCI specialists strive to:

- understand the factors (psychological, ergonomic, organisational and social) that determine how people operate and make use of computer technology effectively. Translate into:
- development of tools & techniques to help designers ensure systems are suited to the activity in hand in order to :
- achieve efficient, effective and safe interaction both in terms of HCI and group interaction

Key Issues

- Computers are used by a wide variety of different kinds of people, not just specialists, so it is important to design HCI that supports the needs, knowledge and skills of intended users
- a user interface is those aspects of a system that the user comes in contact with
- usability is a key concept in HCI



Key Issues

- HCI is concerned with understanding, designing, evaluating and implementing interactive computing systems for human use
- Organisational issues that need to be taken into account include the way different people's activities interrelate within an organisation and how technology impacts on this

What makes a system “usable”?

- **Effective = goal reached**
 - user and system work together to achieve a goal
- **Efficient = without wasting time, resources**
 - time to learn, time to use, Minimise errors
- **Safe = without damaging users**
 - physical and mental effort of interaction
 - user confidence in results
- **Appealing = inviting interaction**
 - Not tiring, irritating, cause of RSI, Engaging
- **To achieve this, we first need to get the requirements right!**

Some interesting areas in HCI

- Intelligent environments eg houses
- New devices e.g. Eye tracking movements
- Virtual reality interfaces
- Psychology of Cyberspace
- Wearable computing & devices
- Group working & psychology
- Importance of context
- Security/privacy e.g biometrics eg fingerprint/retina scans
- Accessibility eg disabled users and many more ...

Warm-up Exercise (optional):

- Oracle Totem Truths
 - **Choose the animal that best describes you. See**
http://sd271.k12.id.us/lchs/faculty/bkeylon/Oracle/database_design/section13/dd_totem_truths_team_building_activity.pdf
- Write your name on the paper provided describing yourself by a label beginning with the same 1st letter as your name eg. Lovely Linda.....

For Week2.....

- Everyone should investigate HCI/UXD items relevant to the module that are in the news, or innovative/have lots of potential . Write 2 or 3 sentences, include an image/picture if relevant and add to the **Discussion Board** before the class on week 2. ***You can either do this in class time or in your own time before class