IT3405: User Interface design (UID)

Introduction to Human-Computer Interaction (HCI)

(4 hrs.)

Prof. K. P. Hewagamage

Intended Learning outcomes

- Identify the importance of human-computer interaction for the success of a software product

- Recognize components of HCI and describe its underline model

- Describe the evolution of HCI from past to present

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Sub Topics

1.1. Importance of Human-Computer Interaction

1.2. Components of HCI Model

1.3. What is Interface?

1.4. Risk of Poor User Interface

1.5. Developing Interaction

1.6. HCI as a discipline and its short history

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1.1.
IMPORTANCE OF HUMAN COMPUTER INTERACTION

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What is Human Computer Interaction (HCI)?

<u>User definition:</u>

HCI, also known as man-machine interaction, is a discipline that organizes interaction between man and computing devices to make it more successful

<u>Developer Definition:</u>

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.

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HCI: A subject of multidisciplinary

HCI is a subject which is directed to many disciplines of other study streams.

HCI is a sub-field of computer studies

HCI consultants should have good knowledge or understanding of those disciplines

What are these other study streams?

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Related study areas to HCI

Psychology and cognitive science
- to give someone knowledge of the user's perceptual, Cognitive and problem-solving skill

Ergonomics
- for the user's physical capabilities

Sociology
- to help her understand wider context of the interaction

Computer Science and Engineering
- to be able to build the necessary technology

Business/Management
- to be able to market it

Arts
- Graphic designer's to produce effective interaction

Writing
- Technical writing to produce the manuals

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Why we need to consider many disciplines?

A beautifully designed graphic display may be unstable if it ignores dialog constraints or the psychological limitations of the user

Do you agree?

What are your experiences?

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Is HCI a Science or a Craft?

Theoretically, it is a marriage of art and science

- But it is not always true,
  [a beautiful woman + a wise man] ->
  handsome and intelligent child

- Beautiful and/or novel interfaces are artistically pleasing and motivate fulfilling the tasks required

- Scientific view/reasoning: why certain things are successful whilst others are not? Then allow creative nature to feed off this information

HCI is required to be both a craft and a science in order to be successful

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- **Some users not only cannot work but also cannot live without their computers in everyday life):-**
- **E.g. emails, Facebook, ...**

What are type of tasks for which people could use computers?

Computers now affect every person in society

    ICT literacy – fundamental right in a society "*Product success may depend on ease of use, not necessarily power of machine*" – find reasons to justify this

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Challenge of developing products for everyone

HCI takes advantage of our everyday knowledge of the world to make software and devices more understandable and usable for everyone.

e.g. Desktop Computers – Consider introducing a computer for a very beginner

Designing **interactive systems** is concerned with many different aspects of a product.

e.g. ask a question from visiting foreigner in your village

aspects : language, understanding, interpretation, finding answer(solution), …..

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What are Interactive systems?

Consider crying at a dead person. He cannot answer your questions

Two way communication

in the same language,

a dialog

ability to understand or interpret

………

What are current – very popular – interactive systems?

- Second Life
- Facebook

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Fills the gap between human and computing

Human users and their contexts are major components of the design problems that cannot be neglected since they are complex.

In fact, the largest part of program code in an interactive system deals with the user interaction. what is the percentage of core system ?– 30-40%

what is the rest of the system

Inadequate attention to users and task context not only lead to bad user interfaces, it puts entire system at risk.

People will definitely refuse to use poor/difficult products

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1.2.
COMPONENTS OF HCI MODEL

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- Human User
- Computer
- Interaction

The user is interacting with the computer in order to accomplish something (he has a goal !)

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Describe Human Users

An individual

A group of users working together

A sequence of users in an organization (each dealing with some parts of task)

? Give examples for each type of users.

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- Physical abilities
- Personality differences
- Skill differences
- Cultural diversity
- Motivation
- Special needs

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Different types of computers

PC
- Desktop, laptop(*), PDA, …….

A large scale computer system
- Examples?

A process control system (computing devices)

An embedded system
- **Examples?**

Mobile computing devices

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What is Interaction?

A communication between a user and computer be it direct and indirect

Two types of interaction:

Direct: a dialog with feedback and control throughout the performance of the task

Indirect: Batch processing or intelligent sensors controlling the environment

Identify direct and indirect interaction in MS Office.

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Goals of Interaction Design

Allow users to carry out tasks

- **Safely**
- **Effectively**
- **Efficiently**
- **Enjoyably**

Lets Watch a video about
interaction design

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Two types of interaction design

User-centered design

- In order to optimize the system functionality and resources, human user is considered main stakeholders to satisfy

Task-centered design

- "Tasks are what the user is carrying out in a way he/she wants.

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1.3.
WHAT IS INTERFACE?

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What is interface?

Interaction happens through the interface

Interface facilitates the communication between the user and system

How?

The interface needs to provide some mechanisms for

- people to provide instructions and enter data into the system: 'input'.
- the system to tell people what is happening: 'feedback'
- the system to display the content (i.e. information, pictures, movies, animations) : 'output'.

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1.terfac Interactive interfaces

The interface to an interactive system is all those parts of the system with which people come into contact,

- physically (by pressing buttons or moving levers)
- Perceptually (by displaying things on a screen, or making noises)
- Conceptually (by providing messages and other displays)

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Ways to extend the interface of a device

The device can be handled in different ways to do the same (**multiple ways**)

Use the devices to increase the productivity (**simplify** the **interface**)

Single device to multiple tasks (**multitasking**)

Change the device to use it easily to do the task (**Customization**)

Some people like to do in a specific way (**personalized**)

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1.4.
RISK OF POOR USER INTERFACE

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Good and bad interfaces

Poor user interfaces

- Can cripple a system that is outstanding in all other respects
- Can be very irritating for the user
- Can be hard to learn or remember
- Can loose productivity
- Could literally become a life or death situation

## Good user interfaces (User Friendly ...)

- Find features of good user interfaces
- Find examples of good user interfaces

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Examples of poor UI design
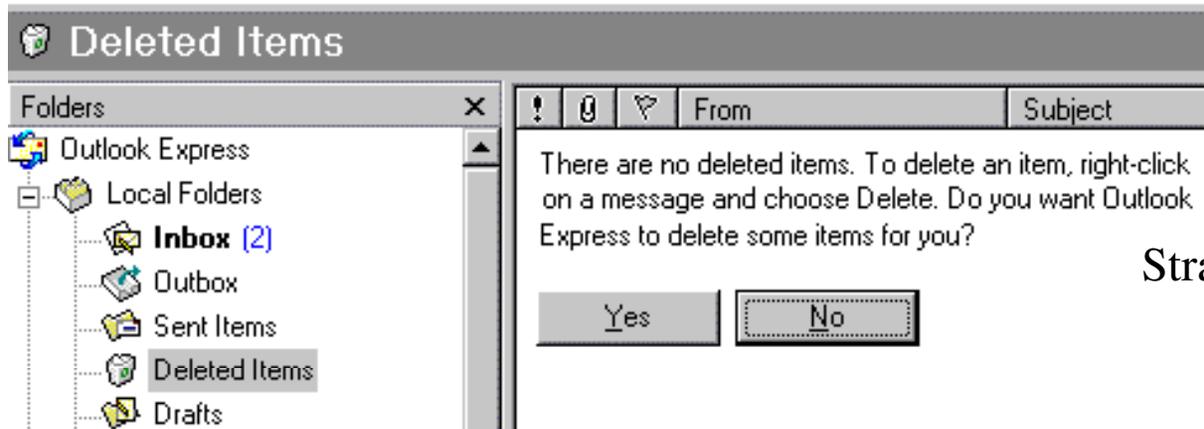
Strange message???

Too many tabs???
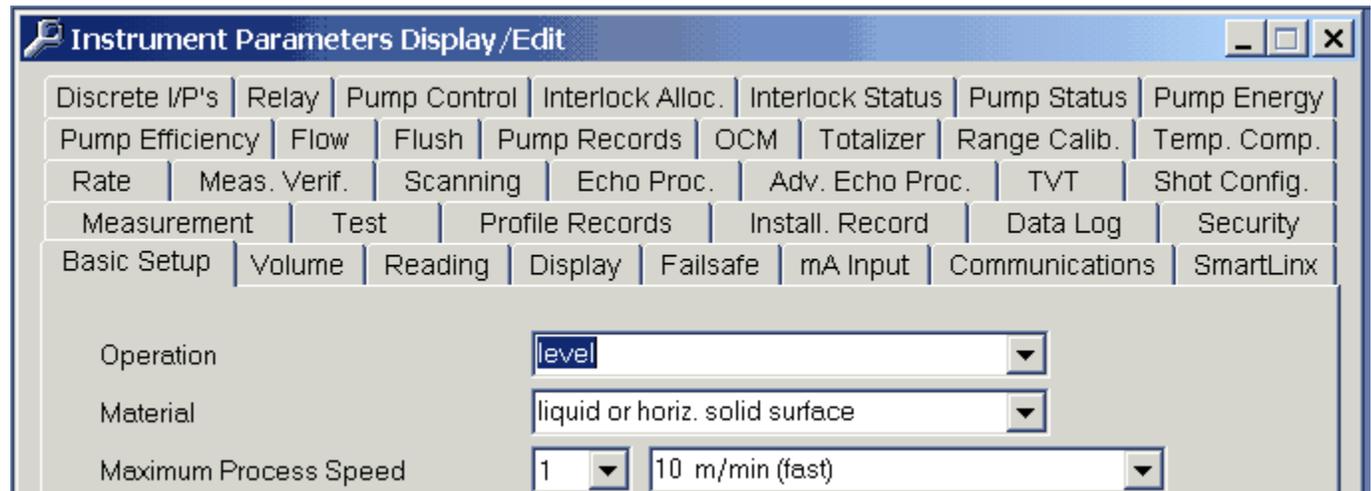
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1.5.
DEVELOPING INTERACTION

When developing interactions in a system, the designer should

- understand the human capacities of the user
- understand the consequences of using information technology as a tool for solving work related tasks
- develop and evaluate the system by putting the user at the center of the design process.

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Computing devices are used for specific tasks by users (People)

Interfaces should be designed to support these tasks by designers (People)

- People = People
  - User = Designer -> trivial job
  - User != Designer -> not so difficult

- What is the main reason for this complexity?

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Developing Interfaces for good interaction

Interface is not the last thing to do
- Should be developed integrally with the rest of the system
- Iterative work that goes with evaluation

Good interfaces
- Suitable for the task
- Easy to use (appropriate, adaptable to the user's knowledge and experience)
- Feedback on performance
- Display information to useful for the user
- Confirms to the "Principles of Software Ergonomics"

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References for Readings

Human-computer interaction (HCI) is an area of research and practice that emerged in the early 1980s, initially as a specialty area in computer science embracing cognitive science and human factors engineering ....

http://www.interaction-design.org/encyclopedia/human_computer_interaction_hci.html

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1.6.
HCi AS A DISCIPLINE AND ITS SHORT HISTORY

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Vannevar Bush

Postulated Memex device

- Can store all records/articles/communications
- Large memory
- Items retrieved by indexing, keywords, cross references
- Can make a trail of links through material
- etc.

Envisioned as microfilm, not computer

Read "As we may think" at http://www.theatlantic.com/magazine/archive/1945/07/as-we-may-think/303881/
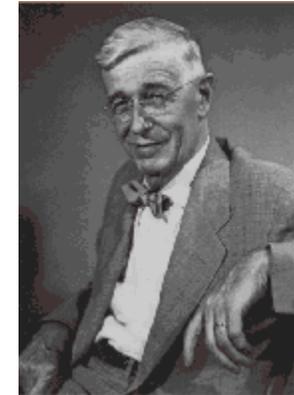
Vannevar Bush established the U.S. military / university research partnership that later developed the *ARPANET (The First Internet)*, and wrote the first visionary description of the potential use for information technology, inspiring many of the *Internet*'s creators.

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J.R. Licklider

1960 - Postulated "man-computer symbiosis"

- Couple human brains and computing machines tightly to revolutionize information handling

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History of HCI

Mid 1960's

Computers too expensive for individuals

And those were timesharing

- increased accessibility
- interactive systems, not jobs
- text processing, editing
- email, shared file system

Need for HCI
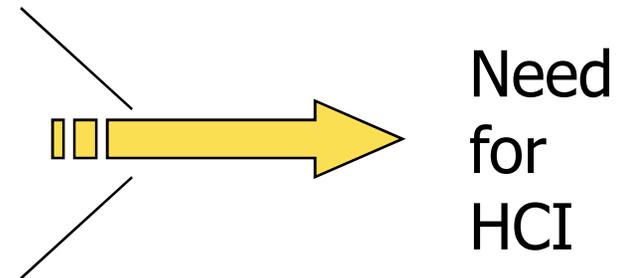
- **Read**

http://grouplab.cpsc.ucalgary.ca/saul/hci_topics/pdf_files/history.pdf

http://www.cs.cmu.edu/~amulet/papers/uihistory.tr.html

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Ivan Sutherland

SketchPad - '63 PhD thesis at MIT

- Hierarchy - pictures & subpictures
- Master picture with instances (ie, OOP)
- Constraints
- Icons
- Copying
- Light pen as input device
- Recursive operations

Watch at:
https://www.youtube.com/watch?feature=player_embedded&v=USyoT_Ha_bA

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History of HCI

- **Land mark developments affected HCI**

New paradigm

Video Display Units (VDU)
- More suitable medium than paper
- Sutherland's Sketchpad as landmark system
- Computers used for visualizing and manipulating data

- Who developed VDU?
- Discuss the Evolution of display units from CRT to LED
-

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Douglas Engelbart

Landmark system/demo:

- hierarchical hypertext, multimedia, mouse, high-res display, windows, shared files, electronic messaging, CSCW, teleconferencing, …
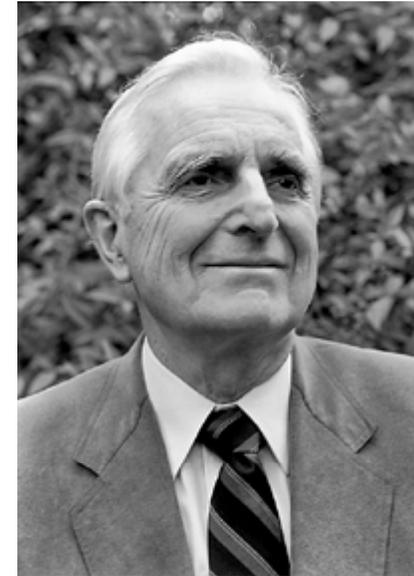

**Inventor
of mouse device**

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Alan Kay

Dynabook - Notebook sized
computer loaded with multimedia
and can store everything
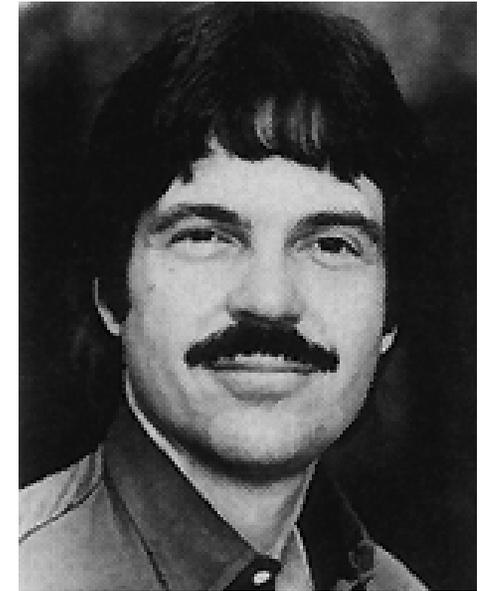
Personal Computing

- System is more powerful if it's easier to use
- Small, powerful machines dedicated to individual
- Importance of networks and time-sharing
- Kay's Dynabook, IBM PC

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History of HCI

- **Personal computing and GUI development**

Personal Computers

- Text and command-based
- Sold lots

PCs with GUIs

Xerox PARC - mid 1970's

- local processor, bitmap display, mouse
- Precursor to modern GUI, windows, menus, scrollbars
- LAN - ethernet

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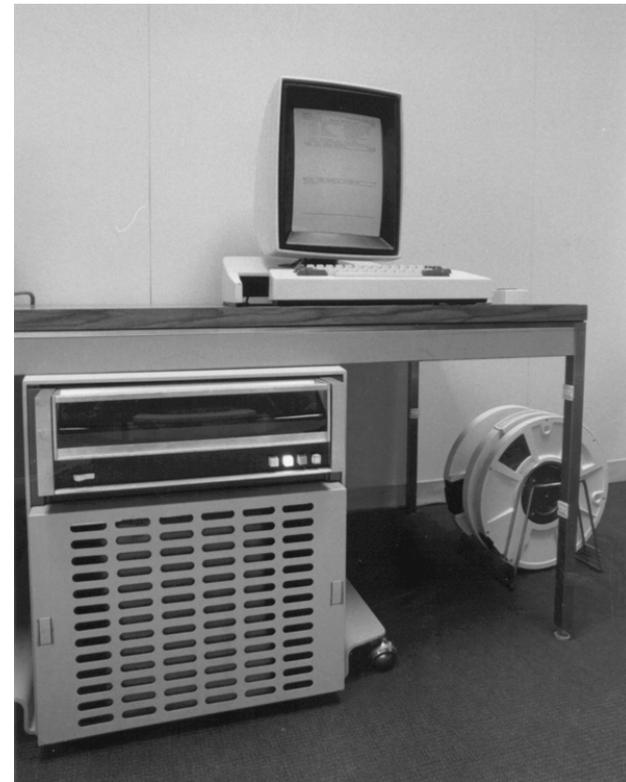
History of HCI

- **Development of GUI for common people**

Lisa

- Apple Inc. reinvented more user friendly devices with graphic interface

  - **Apple Lisa -1983**
  - **Apple Macintosh -1984**

Macintosh

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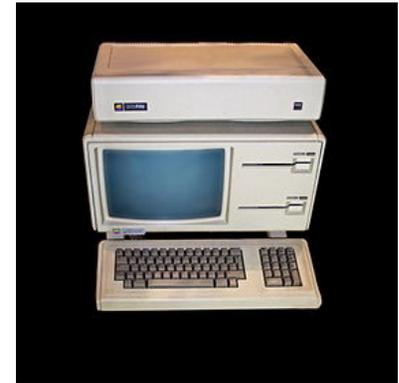
Tim Berners-Lee

World Wide Web

- a system of globally unique identifiers for resources (URL/URI)
- the publishing language HyperText Markup Language (HTML);
- the Hypertext Transfer Protocol (HTTP).

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History of HCI

Main characteristics of HCI – Past

- Function/process centered
- Not much use of graphics
- Early PC and mouse
- High learning curve

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History of HCI

- 2000- present
  - XBOX 360 – Video Game Console- 2005
  - Nintendo Wii – 7th generation Console
  - Android – Linux based phone OS -2007
  - iPhone – Apple's smartphone- 2007
  - Windows 8 – Popular Microsoft's OS - 2012
  - HMZ-T1- Sony HD and 3D viewer 2012

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History of HCI

Main characteristics of HCI – Present

- User centered
- OS development
- New technologies aimed at
  - Natural feel
  - motion capture
  - Touch screen
  - Multi-touch

HCI Future?

http://www.informit.com/articles/article.aspx?p=24103

http://www.networkworld.com/article/2217838/virtualization/the-future-of-human-computer-interaction.html

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Continue the discussion of
History of HCI in forums

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Additional resources – HCI Seminars

http://www.academicearth.org/courses/human-computer-interaction-seminar

https://www.coursera.org/course/hciucsd

http://videolectures.net/Top/Computer_Science/Human_Computer_Interaction/

http://www.hci-international.org/

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