Human Computer Interaction(HCI)
COMP 341

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Introduction

- Emerged in the early 1980s
- Until the late 1970s - information technology professionals
- concept of *usability*
- "easy to learn, easy to use"

Humans (aka Homo Sapiens)

- Complex
- Intelligent
- Animate
- Free will
- Range of emotions
- Make mistakes

Computer Specie

- Dumb
- Unintelligent
- Inanimate
- Only do what they are told to do
- Don’t make mistakes

COMPUTERS are EVERYWHERE

- Toaster
- Phone
- Medical Equipments
- Satellites

Traditional Notion Of Computer

Contd…

- Have expanded from desktop office applications
  - Mobile Computing
  - Geo-spatial information systems
  - In-vehicle systems
  - Community Informatics
  - Distributed Systems

Pros of Computer Technology

- Enable new discoveries
- Lead to efficiencies
- Make our life easy and convenient

Cons of Computer Technology

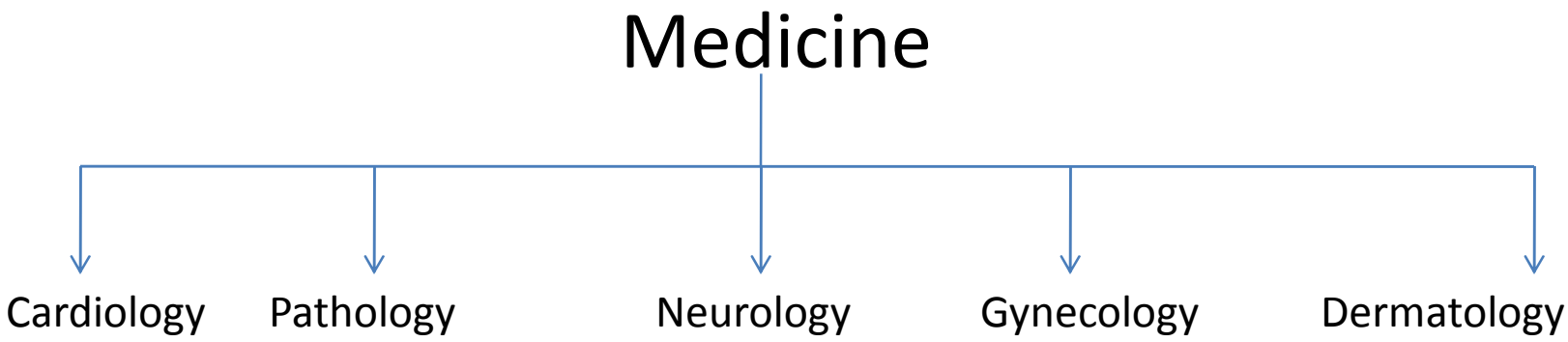
- They will

  -Annoy us

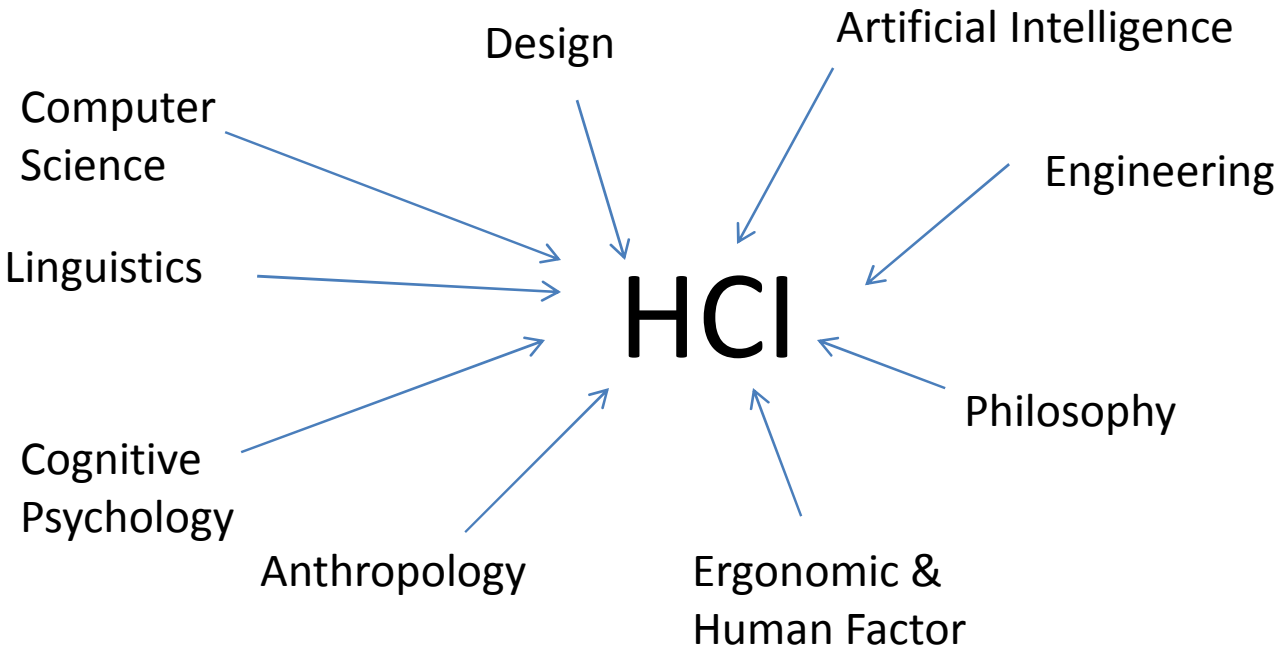
  -Infuriate us

  -… and even kill us

Evolution Example



Evolution of HCI



What is HCI?

- Computer science (application design and engineering of human interfaces)

- Psychology (the application of theories of cognitive processes and the empirical analysis of user behavior)

Contd…

- Sociology and anthropology (interactions between technology, work, and organization)

- Industrial design (interactive products)

What is HCI

- HCI concerned with:

- Joint performance of tasks by humans and machines

- Structure of communication between human and machine

- Human capabilities to use machines

Contd…

- Algorithms and programming of interfaces
- Engineering concerns in designing and building interfaces
- Process of design, specification and implementation

Contd…

Various aspects

- Science

-Human capabilities to use machines

- Engineering

-Building interfaces

- Design

-Design tradeoffs

Usability Goals and Measures

Measureable Usability Goals

- A measurable usability goal is the definition of successful usability on your site for a specific set of users doing a specific task.

Example

You are building a Web application for owners of small businesses to pay state withholding tax online. This will allow a business owner who has been paying withholding tax by mailing in a check and slip every month will now pay that tax online. On the first attempt, the business owner will:

- successfully complete the transaction in five minutes or less
- submit the right amount from the right bank and bank account
- make no more than one error while using the application and recover from any error in one minute or less
- rate the experience a four or five on a one to five scale where five is the best
- indicate a desire to use the application for future tax payments

Usability Goals and Measure Contd…

- Typical usability goals include time, accuracy, overall success, and satisfaction measures.
- Time
  - You can set a usability goal for the overall time the user will take to carry out a task (scenario) on the site. You can also break down that time and set measurable usability goals for:
    - time to get to the application or to the right Web information page
    - time to use the application or to understand the information
    - time to recover from an error

Contd…

- Accuracy
  - Similarly, you can set a usability goal for the accuracy with which the user carries out the task (scenario) or you can break it down into separate goals for:
    - number of unproductive navigation choices
    - number of unproductive searches
    - number of errors in using an application
    - number of misunderstandings of information

Contd…

- Overall success
  - Obviously, the usability goal must be that users will be successful. If users ***cannot do their tasks*** or ***cannot get answers to their questions*** on your Web site, your Web site is failing those specific users for those specific tasks and questions.
  - You may also set measurable usability goals for how users will get to that ***success***. For example, you might set a measurable usability goal for a Web application that new users will go to the help if they need it, will find what they need in the help, and will be back doing their original task within two minutes. You might set a measurable usability goal that a user who has done the task in your Web application before will do it successfully a second time without using the help.

Contd…

- Satisfaction
  - Your measurable usability goal must be that users are happy. You can measure overall satisfaction. You can also break down satisfaction and set separate measurable usability goals for ***navigation, search, level of detail in the content, language of the content, and other specific factors***.

Contd…

- Relying on Measures
  - When you test the Web site against your measurable usability goals, ***consider performance (time, accuracy, success) as more important than satisfaction ratings***. If users give the site low ratings, the site needs to be fixed. If users give the site high ratings, you may not be getting a true picture. In usability testing, we often find that users give high satisfaction ratings even when they have had serious performance problems. They may be blaming themselves for the problems. They may not want to hurt your feelings. They may be being polite rather than saying what they really think.

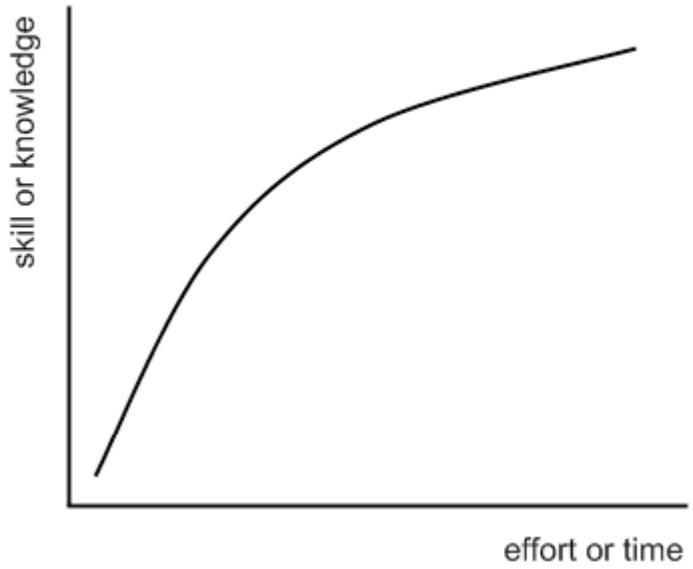
Contd…

- Examples of Measuring Usability Testing
  - Website level
    - 95% of customers will be able to find and order a product.
    - 95% of physicians will be able to find, read, and understand the latest information on lung cancer treatments.
    - 95% of travelers will be able to make their own airline reservations.
    - All trained "service representatives" will be able to handle an average of 25 customer calls per hour.

Contd…

- Scenario level
  - Scenario level usually refers to two or more page and addresses issues related to one major type of user interaction). For example:
  - 90% of users will be able to find a specific article on thyroid cancer within three minutes.
  - 90% of users will be able to read an "update" article on skin cancer in less than five minutes.
  - 90% of users will be able to make an airline reservation in less than five minutes.
- Page level
  - Page level is always within a page and is usually the homepage. For example:
  - 90% of users will be able to find and click on a specified link within 15 seconds.
  - 90% of users will be able to find and click on a specified graphic within two seconds.
  - The page will download in five seconds or less on systems using a broadband connection.

GOALS OF UI DESIGN



LEARNING CURVE

How much does it take to understand the system?

USAGES EFFICIENCY

How long does it take to carry the tasks?

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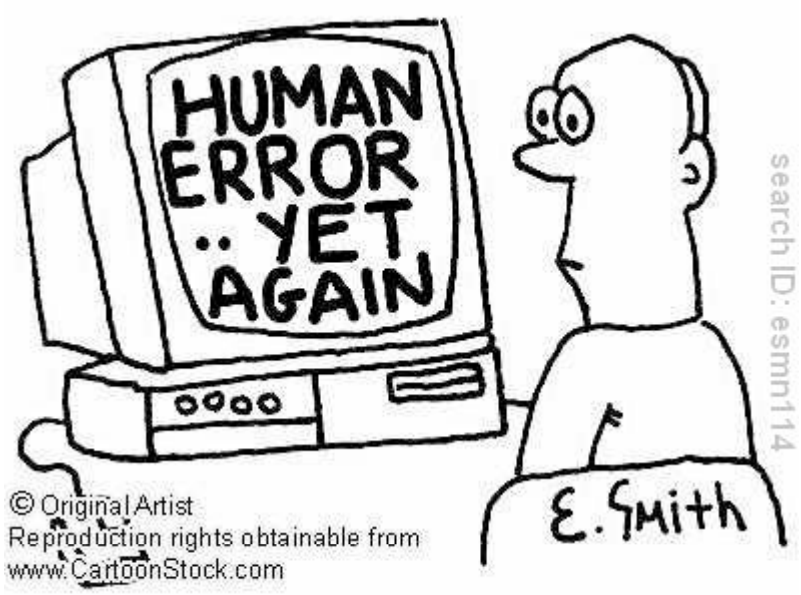

ERRORS

What errors user make while doing tasks?

RETENTION

Do user remember what and how they did the task?

SATISFACTION

Do user like the system?

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Usability Motivation

- Life-critical systems
- Industrial and commercial uses
- Home and entertainment applications
- Exploratory, creative, and collaborative interface
- Sociotechnical systems

Life-critical systems

- Air traffic, nuclear reactors, military operations, police or fire dispatch, etc…
- High cost are expected
- High reliability and effectiveness
- Lengthy training period
- Error-free performance
- Subjective satisfaction is less of an issue

Industrial and commercial uses

- Interface for banking, production management, airline and hotel reservation
- Costs
- Operating training time
- Easy of learning is important
- Adaptations to local cultures are necessary

Home and entertainment applications

- E-mail clients, search engine, cellphones, digital cameras etc…
- Ease of learning
- Low error rates
- Subjective satisfaction

Exploratory, creative, and collaborative interface

- World Wide Web browser, search engines, music-composition tools, and video-editing systems
- Users may be knowledgeable in the task domain but novices in the underlying computer concept
- *It is difficult to design and evaluate these systems*

Sociotechnical systems

- Health support, identity verification, disaster response, and crime reporting
- Government organization – trust, privacy, responsibility, malicious tampering, deception, and incorrect information
- Feedback
- Diverse levels of expertise of users

Flight 965 from Miami to Cali

- Needed to select radio navigation fix named ‘ROZO’
- Pilot entered ‘R’
- Computer returned fixes with R
- Pilot selected ‘ROMEO’ instead (132 miles in NE)

Contd…

- Plane slams into a *Granite peat* at *10,000* feet
- 132 Passengers and 8 Crew Member die
- Only 4 Passengers survived with serious injury

"After more than 50,000 reports of problems with pumps used to deliver drugs, including 710 deaths"

Ref: http://www.hcibook.com/e3/online/why-study-hci/

Ref: http://www.reuters.com/article/2010/04/23/us-drugpump-idUSTRE63M3VA20100423

BMW 7 Series with iDrive

- L745i

- All Electronic Controls in one Knob

- Climate, entertainment, navigation, car information etc

Contd…

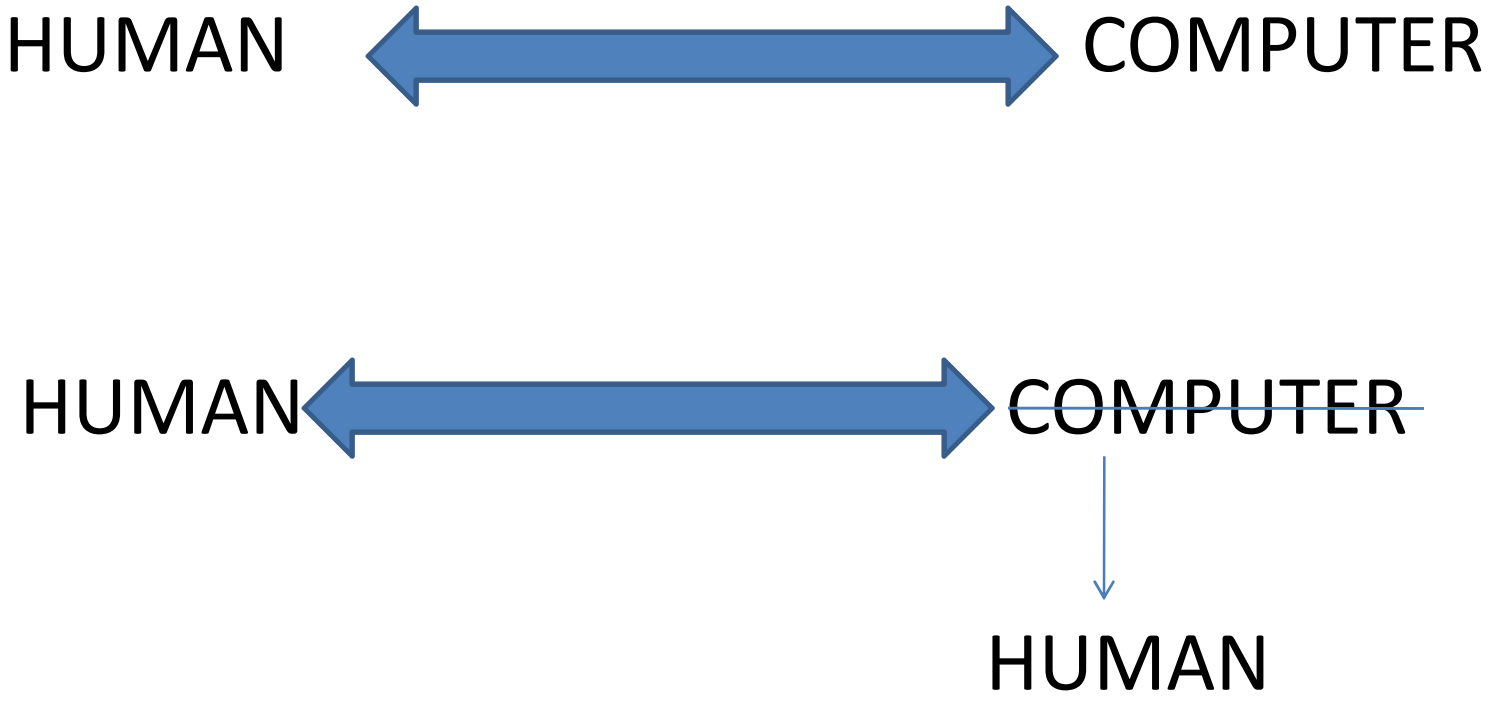
- You are driving a Car
- Want to listen radio
- Takes 15 mins to change a Radio Channel
- “Feature Shock”

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"

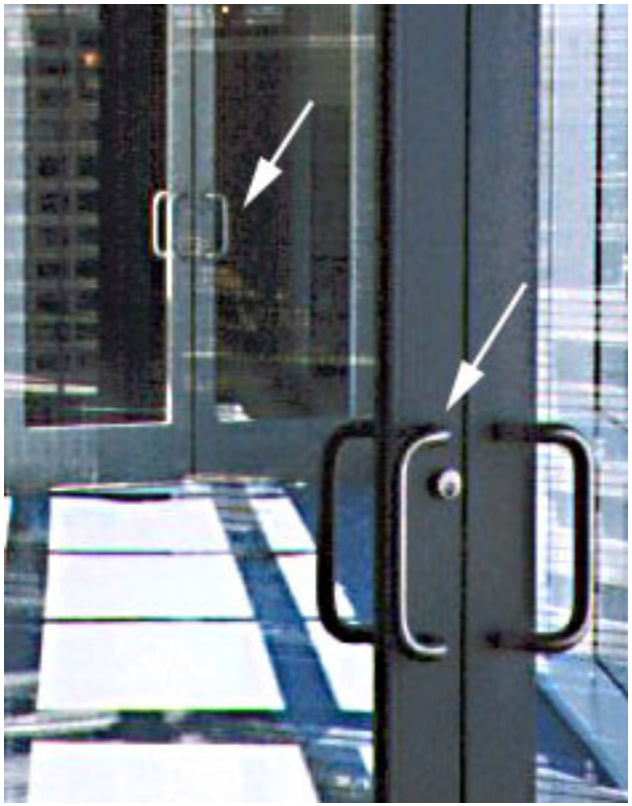
-ACM/IEEE

Why Study HCI



Why Study HCI

- Bad usability is pain



Ref:
http://www.baddesigns.com/doors.html

Contd…

Shampoo and Conditioner

Ref: http://www.baddesigns.com/shampoo.html

Fundamental Truths about Computers

- Computer are ubiquitous

-Everything we use is equipped with computer technology

- And so is their characteristically poor way of communicating and behaving

- Concern with internal working

- They tell but do not inform

- They may guide us with precision but they do not guide us where we want to go

Reality Check

- Computers are everywhere
- Is all computer-aided equipment inherently hard to use?

Scope of HCI

- Sales person (Intelligent)
- E-commerce system (Computer → Dump)
- Here comes the role of HCI

Software Engineers & Quality

Acceptable levels of quality for software engineers are far lower than are those for traditional engineering disciplines

Reality Check

Computer based products system are not inheritably hard to use but are made hard to use

Wrong development process

Facts

- 1 in every 4 computers has been physically attacked by its owner – Novatech (British PC Manufacturer)

- Almost 1/3 of people have physically attacked a computer – National Opinion Poll/Symantec

Contd…

- 67% experienced frustration exasperation and anger – National Opinion Poll/Symantec

- 70% swore at their machines- National Opinion Poll/Symantec

Contd…

- Hopefully as technology improves and computers become ever more user-friendly, these attacks will become less frequent

What is the Relationship between Software Engineers and Apartheid

- Apartheid?
- Nelson Mandela
- South Africa

Software Apartheid??

Common Problems with Web

- Scenario: A web site that is

-Aesthetically beautiful

-Technically perfect

-Wonderful content

-But users can’t find information?

Findability

Users can only find information 42% of the time

-Jared Spool

Findability

62% of web shoppers give up looking for the item they want to buy online

-Zona Research

Findability

50% of the potential sales from a site are lost because people cannot find the item they are looking for

-Forrester Research

The Result

40% of the users who do not return to a site do so because their first visit resulted in a negative experience

-Forrester Research

Software Maintenance Costs

80% of software lifecycle costs occur after the product is released, in the maintenance phase- of that work, 80% is due to unmet or unforeseen user requirements; only 20% is due to bugs or reliability problems.

-IEEE Software

Project Cost Estimation

- Around 63% of software projects exceed their cost estimations. The top four reasons for this are:

- Frequent requests for changes from users

- Overlooked tasks

Contd…

- Users' lack of understanding of their own requirements

- Insufficient user-analyst communication and understanding

HCI and Software Engineers

- Software engineering focus on internal workings of software
- In HCI we are concerned with external working of software

THANK YOU!!!