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## \* Introduction of HCI

The process to communicate between user/human and computer/machine by using design & computer technology.

### 1) User

we may mean an individual user or a group of user working together.

An appreciation of the way people's sensory systems (sight, hear & touch) relay information vital

### 2) Computer

When we talk about the computer we are referring to any technology ranging from desktop computers to large scale of computer systems;  
for example - if we are discussing the design of a website then the website would be referred to as the "computer".  
Devices such as VCRs can also be considered to be computers.

Works, working

(semi transparent - standard (5  
with windows) interfaces)

### 3) Interaction

There are obvious differences between humans & machines. Inspite of this, HCI attempts to ensure that they both get on with each other and interact successfully.

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#### \* Goals of HCI

- To improve Interaction
- To increase usability of computer/system

#### \* Long Term Goal

- Minimize the barrier barriers
- To understand the user's task

#### \* To Achieve HCI goals we have some factors

- 1) Task Factors - easy, language related problem, skills
- 2) Constraints - time scale, cost issues, equipment/ building issue

### 3) System Functionality -

Hardware, Software & Application

### 4) Productivity Factor

Increase output, increase quality,  
decrease cost, decrease errors,  
increase innovation

## ★ Discipline Contribution to HCI

### i) Computer Science

- Technology
- Software, Hardware maintenance
- Graphics
- VI / UX
- Development Environment

### ii) Cognitive & Psychology

- information processing
- capabilities
- limitations
- Cooperative Working
- performance prediction

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### iii) Social & Psychology

→ social & organizational structure

### iv) Ergonomics (usable) / Human factors \*imp

→ Hardware design

→ Display readability

### v) Artificial Intelligence

→ Intelligent s/w engg & design

### \* Usability in HCI

- It is one of the key concept in HCI
- It is concerned with making design system easy to learn & use
- A usable system is -
  - easy to learn
  - easy to remember how to use
  - effective to use
  - efficient to use
  - safe to use
  - enjoyable to use

introduction ←  
methodology ←  
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and their application ←  
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## \* Input/Output Channels in HCI

### \* Input Channels :-

→ Sight

→ Hearing

→ Touch

→ Smell

→ Taste

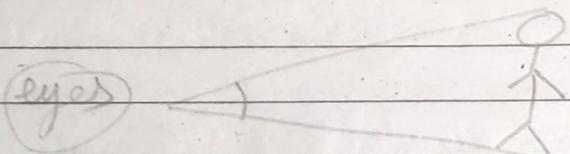
A person's interaction with the outside world occurs through info being received and send, i.e. input & output. There are 5 major sense. (Taboo)

Of these first 3 are most important to HCI. Taste & smell don't currently play a significant role in HCI.

There are a no. of effectors, including fingers, eyes, head & vocal system.

## # Visual Perception / Sight

To understand this we must consider how the image appears on retina. Reflected light from the object form an upside down image on the retina. The size of that image is specified as a sight angle / visual angle.



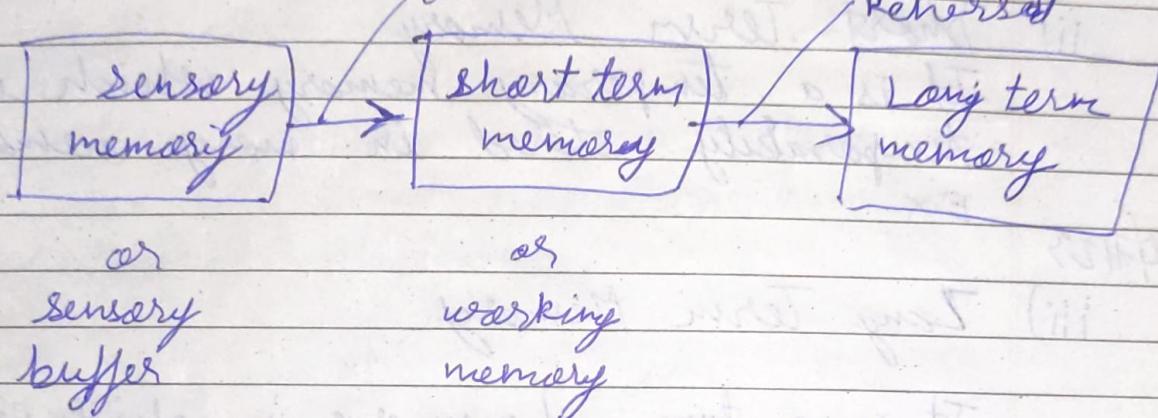
## # Hearing

The sense of hearing is considered secondary to sight, but we tend to underestimate the amount of info that we receive through our ears. Hearing begins with vibration in air and sound waves. The ear comprises of 3 section, commonly known as outer ear, middle ear and inner ear.

## # Human Memory

A model of the structure of the memory

Attention



Sensory memory includes

- sight
- hearing
- touch

These stimulus acting as a buffer for the stimuli from the sensors of the human.

Exist a sensory memory for every sensory channel.

These sensory memories are

- 1) Sight - echoic sensory
- 2) Hearing - Echoic sensory
- 3) Touch - Haptic sensory

i) Light → Sensory Memory drives  
When you see an object (a car) then  
the visual sensor stimuli for the attention.

### ii) Short Term Memory

It is a temporary memory which is temporarily stored in memory

Ex

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### iii) Long Term Memory

It is a type of memory in which we store info for long term.

There are two types of long term memory

#### i) Episodic memory

It represents a memory of events and experiences in serial form. It is from this memory that we can reconstruct the actual events that took place at a given point in our lives.

#### ii) Semantic memory

On the other hand structured record of facts, concepts and skills that we have acquired.

Example - English  
famous writer - William  
famous writer - Jane

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# Thinking, Reasoning & Problem Solving

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- Thinking can require different amount of knowledge. Some thinking activities are much directed and the knowledge required is constraint.  
For ex. - when we have calculation, requires a small amount of knowledge or constraint domains.

- Reasoning is the process by which we use the knowledge we have to infer something new about the domain of interest.

## → Types of Reasoning

- i) Deductive Reasoning
- ii) Inductive Reasoning
- iii) Abductive Reasoning

### i) Deductive

Derives the logically necessary conclusions from the given premise

→ Ex. → If it is Sunday then he/she will watch the movie

→ It is Sunday

Therefore, he/she will watch movie

### ii) Inductive

Ex - It is generalizing from cases we have seen to infer info about cases we have not seen.

For ex - we can never see all the elephant that have ever lived or will live.

But we have certain knowledge about elephants which we are prepared to trust for all practical purposes, which has largely been inferred by induction.

Even If we saw an elephant without a trunk , we would be unlikely to move from our position that all elephants have trunks.

Since we are better using +ve than -ve hints/reasons

### iii) Abductive

Abduction reasons from a fact to the action or step that caused it.

This <sup>time</sup> method we used to derive the explanations for the event that observe.

↳ <sup>which is KC</sup>  
known facts → what is, what

For ex - suppose we know that Sam always drives too fast when she has been drinking. If we see Sam driving too fast we may infer that she has been drinking.

Of course, this too is unreliable.

Since there may be another reason why she is driving fast, she may have been called a emergency.

Top level in KC - driving target  
yesterday I probably & forgot test

## The Computer

The main component of computer

Monitor  
Keyboard  
Mouse

The variation of computers are

- PC / desktop
- Laptop
- PDA

These devices decides the style of interaction.

If we use different devices then the interface will support a different style of interaction.

A computer system is various element each these element affects the interaction.

Input devices - It is used for text typing & clicking & pointing

Output devices - it is used for screen display & printing paper.

- Virtual reality by display devices special interaction devices
- Physical Interaction by haptics with sound.
- Paper - In HCI for output - print input - scan
- Memory - in computer is RAM, permanent media, capacity & access
- processing - in HCI processing speed through network

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## ★ Norman's Model of Interaction

The requirement for completing the goal by following model of interaction are

- i) Entities
- ii) Goal
- iii) Phases

We sub divided these phases into 7 part

- i)
- ii) Forming the intention
- iii) Specifying the action sequence
- iv) Perceiving the system state
- v) Interpreting the system state
- vi) Evaluating the system state w.r.t to the goal

## \* Interaction Style

Interaction can be seen as a dialogue between the computer and user. The choice of interface style can have a profound effect on the nature of this dialogue.

There are a no. of common interface style including

### → CLT - Command Line Interface

It is a first interactive dialogue style to be commonly used and inspite of the availability of menu driven interface, it is still widely used.

It provides a means of expressing instructions to the computer directly, using Function keys, single characters, abbreviations, or whole word command.

### → Menus

The set of options operations available to the user is displayed on the screen by selecting using the mouse, any numeric or alphabetic keys

- Natural Language
- Question/answer & query dialog
- Form-fills & spreadsheets
- WIMP -
  - ⇒ windows, icons, menus, pointers.
- Point and click Interfaces
- 3D Interfaces

## Design & S/W Process

### \* Design

To define term design in HCI  
"achieving goals within constraints,  
and these goals & constraints are  
implemented together is very  
difficult because there are  
many or various conflicts.  
To deal with these conflicts we have  
trades off

### \* S/W Process

It is simply defined as again  
"It is a collection of activity,  
action & task that are needed  
to be performed in order to  
create a product."

#### \* Activity

It strives to achieve a broad  
objective.

#### \* Action

It encompasses a set of task that  
produce a major work product.

### \* Task

It focuses on a small but well objective that produces a tangible output

### \* Process Framework

It establish a foundation for a complete S/W engineering process.

### \* Usability Engineering

1. Task

2. Percent

3. Ratio of success to failure

4. Time spent in errors

5. Percent or no. of errors

6. Percentage or no. of computers better than it

7. Number of command used.

8. Frequency of ~~help~~ and documentation used.

9. Percentage of favorable / unfavorable users comments.

10. Number of Repetitions of failed command

11. Number of runs of success & failure.

12. Number of times interface misleads misleads the user.

13. Number of good and bad features by the user.

14. Number of available command not invoked.
15. Number of users preferring your system.
16. Number of times user need to work around the problem.
17. Number of times the user is disturbed from a ~~work~~ task.
18. Number of time user losses control of the system.
19. Number of times user expresses frustration or satisfaction.

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## ★ Prototyping in HCI

It is the concrete representation of all interactive systems. A prototype is tangible artifact or model, not a detailed description of product.

Every stakeholder like designer, developer, manager, customer and users can use these model.

\* Drawing  
Pencil

### Low Fidelity (paper prototype)

- \* Brainstorm difficult representation
- rough out interface style
- \* Took centered walk through & design

### Medium Fidelity (screen prototype)

- \* Fine tune interface, screen design
- Heuristic evaluation & redesign

### High Fidelity restricted system or working systems

- \* Usability testing and redesign
- limited fidelity testing

### Late Design

- i) Low Prototyping are experimental and incomplete design which is cheaply and fast developed.  
The main purpose of prototyping is to involve the user in testing design ideas and their feedback in early stages of development thus to reduce the time and cost.

It can be divided into

- i) Low Fidelity (Lo-Fi)
- ii) Medium Fidelity
- iii) High Fidelity (Hi-Fi)

i) Lo-Fi

It is mainly about paper based prototyping markup, <sup>there</sup> they are quickly constructed to depict concept design and screen layout. It provides no functionality. It just demonstrate the general look of interface but no detail of its operation.

Tools used in LOFI are paper and pen

ii) Me-Fi

It is mainly about fine interface and screen design to evaluate the design of prototype.

iii)

It is mainly about computer based simulation. It is fully functional and fully attractive. Here user can operate the prototype or even perform some real task.

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with it than are not really easy  
to create as we do a low fidelity

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## Socio

\* Organisational Issues & Stakeholders Requirement.

points

\* Socio Organisational Issues

# Socio Organization - It includes orga

- It includes organizational issues affect acceptance in which conflicts & power are determined, benefits and encouraging uses included.
- It Stake holders - It defines / identifies their requirement in organizations context.
- Socio Technical Models in which human and technical requirements are defined.
- Soft System Methodology - In this broader view of system, human & organization views are described.
- Participatory Design - It includes the user directly in the design process.
- Ethnographic Methods - In this we study users in context and unbiased perspective

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Stakeholders

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- \* Mobile Information Architecture (MIA)
- \* Information Architecture (IA)

It plays a vital role in creating well structured navigation, content flow and structure of a SW, internet, intranet and other mobile application.

⇒ Two main components

→ Identification & Definition of app content & or functionality

The underlying organization & structure that defines the relationship between an app, content or functionality.

Id - The IA is documented in spreadsheets and diagrams usually not in wireframes, comprehensive layout or prototypes.

Def - typically the activities undertaken in defining info each involved

1) content Inventory

examination of an existing app/website to locate and identify existing apps and site content

## 2) Content Audit

It defines evaluation of content hierarchy, relevance, priority, usefulness, accuracy and overall effectiveness.

## 3) Info grouping

In this definition of user centered relationship between content & its type

## 4) Taxonomy development

In this definition of its standardizes too naming convention to apply  
To all side content

## 5) Description/info creation

meta

In definition of useful data that can be used to generate related links list or other navigation components that aid discovery

## \* MIA

As we live in smart phone's era and mobile apps & websites are overtaking conventional software & websites, understanding how the info & navigation flows in mobile app scenarios are becoming more and more crucial.

As a designer / developer & UX expert put their efforts into creating successful & better mobile app & websites

For these they have faces the following challenges

- 1) What will be the right interface?  
responsive, adaptive, native apps, etc
- 2) How do I design better navigation?
- 3) How do I maximize the use of screen real estate?
- 4) What type of patterns & screen elements shall I use?

- 5) How do I build prototype & conduct the usability test?
- 6) What type of UI & UX design approach shall I adopt?

## ★ Mobile Ecosystem

Mobile is an entirely unique ecosystem and like the internet. It is made up of many diff parts that work together.

Services  
Application  
Application Framework  
Operating System  
Platform  
Device  
Aggregator  
Network  
Operators

- i) Operators - the base layers. It can be referred to as mobile network operator (MNOs)

- ii) Network - operators operate wireless network, wifi, bt, NFC, radio. Remember that cellular tech just a radio that receives a signal from an antenna. the type of radio and antenna determines the capability of the network and the service you can enable on it.
- iii) Aggregator - provides access to the device
- iv) Device - as next gen devices becomes a reality the distinction between feature phone & smart phone.
- v) Platform - a mobile platform primary is to provide access to the device

These are split into 3 categories

- ① Licesnes ② Proprietary ③ open source

- vi) Operating System - It is used to be that if a mobile device ran on OS it was most likely considered a smart phone. Most common os used in smart phones are

- Linux (power smart phones)
- Symbian (open source)
- Windows Mobile (W1 Platform)
- Palm OS (lower end mobile phones)
- Android (open source)

vii) App FW - It often runs on top of OS sharing core services such as comm, graphics, location, security, auth, etc, sharing, messages, etc

viii) Application - It uses a layer of all app fw.

ix) Services - last layer, It is include task such as internet, messaging, locate anything the user is trying to do.