

## Unit –I - FOUNDATIONS OF HCI

### 1. What is HCI?(Understanding)

HCI (human-computer interaction) is the study of how people interact with computers and to what extent computers are or are not developed for successful interaction with human beings.

Human–computer interaction researches the design and use of computer technology, focused on the interfaces between people (users) and computers. Researchers in the field of HCI both observe the ways in which humans interact with computers and design technologies that let humans interact with computers in novel ways.

### 2. List the fields involved in HCI ? (Understanding)

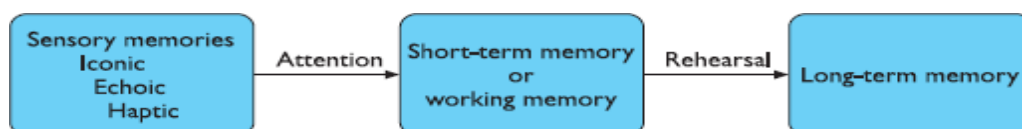


### 3. Write the 2 stages of vision and give the human hearing frequency range(Understanding)

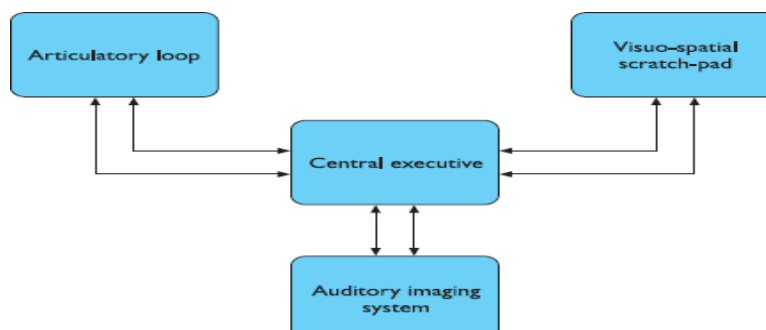
1. Physical reception of stimulus
2. Processing and interpretation of stimulus

Humans can hear frequencies from 20Hz to 15kHz

### 4. Give the model of the structure of the memory(Understanding)



### 5. Give the model of short-term memory(Understanding)



**6. List the factors involved in processing and applying the Information ? (Understanding)**

- reasoning
- problem solving
- skill acquisition
- Error

**7. What is reasoning and give its type ? (Apr/May '17) (Understanding)**

Reasoning is the process by which we use the knowledge we have to draw conclusions or infer something new about the domain of interest. There are a number of different .types of reasoning:

- a. deductive
- b. inductive
- c. abductive.

**8. Give example for deductive, inductive, abductive – reasoning (Analyze)**

- a. Deductive - derive logically necessary conclusion from given premises.

e.g. If it is Friday then she will go to work  
It is Friday  
Therefore she will go to work

- b. Inductive - generalize from cases seen to cases unseen

e.g. All elephants we have seen have trunks  
therefore all elephants have trunks.

- c. Abductive. – reasoning from event to cause

ex: Sam drives fast when drunk  
if I see sam driving fast , assuming drunk

**9. Define Problem Solving& list the theories involved in problem solving (Understanding)**

Problem solving is the process of finding a solution to an unfamiliar task, using the knowledge we have. Human problem solving is characterized by the ability to adapt the information we have to deal with new situations.

Theories involved in problem solving

1. Gestalt theory
2. Problem space theory
3. Analogy – mapping knowledge relating to a similar known domain to the new problem – called analogical mapping.

**10. Give the uses of input device(Understanding)**

Input devices for interactive use, allowing text entry, drawing and selection from the screen:

- Text entry: traditional keyboard, phone text entry, speech and

handwriting

- Pointing: principally the mouse, but also touchpad, stylus and others
- 3D interaction devices.

**11. Give the capacities of different storage media (Understanding)**

	STM small/fast	LTM large/slower
Media	RAM	Hard disk
Capacity	256 Mbytes	100 Gbytes
Access time	10 ns	7 ms
Transfer rate	100 Mbyte/s	30 Mbyte/s

**12. Limitations on interactive performance(Understanding)**

Computation bound

- Computation takes ages, causing frustration for the user

Storage channel bound

- Bottleneck in transference of data from disk to memory

Graphics bound

- Common bottleneck: updating displays requires a lot of effort
  - sometimes helped by adding a graphics co-processor optimised to take on the burden

Network capacity

- Many computers networked - shared resources and files, access to printers etc. - but interactive performance can be reduced by slow network speed

e.g. create a solid red triangle

- Task
- how you go about doing it
  - ultimately in terms of operations or actions
- e.g. ... select fill tool, click over triangle

**13. List the steps involved execution/evaluation loop(Understanding)**



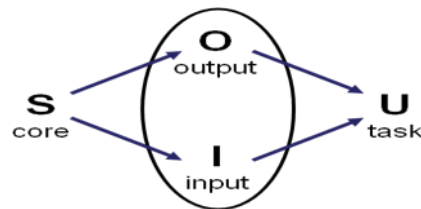
- User establishes the goal
- Formulates intention
- Specifies actions at interface
- Executes action
- Perceives system state

- Interprets system state
- Evaluates system state with respect to goal

**14. What are the 4 parts of Abowd and Beale framework(Understanding)**

It is the extension of model, it has 4 parts

- user
- input
- system
- output



Norman

**15. Define Ergonomics with example (Apr/May '17) (Understanding)**

- Study of the physical characteristics of interaction
- Ergonomics good at defining standards and guidelines for constraining the way we design certain aspects of systems

Ex 1: arrangement of controls and displays

e.g. controls grouped according to function or frequency of use, or sequentially

Ex 2: surrounding environment

e.g. seating arrangements adaptable to cope with all sizes of user

**16. What are the Common interaction styles (Understanding)**

- Command line interface
- Menus
- Natural language
- Question/answer and query dialogue
- Form-fills and spreadsheets
- WIMP
- Point and click
- Three-dimensional interfaces

**17. What is WIMP Interface(Understanding)**

Windows , Icons , Menus , Pointers. It is the default style for majority of interactive computer systems, especially PCs and desktop machines

**18. What are Paradigms? (Understanding)**

Predominant theoretical frameworks or scientific world views

e.g., Aristotelian, Newtonian, Einsteinian (relativistic) paradigms in physics

**19. Give example for Paradigm Shifts(Remember)**

- Batch processing
- Timesharing

- Networking
- Graphical display
- Microprocessor
- WWW
- Ubiquitous Computing

**20. What are mental models and why are they important in interface design?**

**(Remember)(April/May 2018)**

They are the beliefs that a user holds about any given system or interaction. This is important because users will plan and predict future actions within a system based on their mental models. Designers can tap into users mental models so that their products communicate their function through their form.

**21. List out the text entry devices. (Remember) Keyboard.**

- Image scanner.
- Microphone.
- Pointing device. Graphics tablet. Joystick. Light pen.
- Mouse. Optical. Pointing stick. Touchpad. Touchscreen.
- Trackball.
- Refreshable braille display.
- Sound card.
- Webcam. Softcam.
- Video card.

## UNIT II - DESIGN & SOFTWARE PROCESS

### 1. Define Interaction Design(Understanding)

Interaction design is about understanding and choosing how that is going to affect the way people work.

### 2. What is the golden rule of design? (Understanding)

The golden rule of design is to “**understand your materials**”. In case of Human–Computer Interaction the obvious materials are the human and the computer. In other words, it is

- **understand computers** – limitations, capacities, tools, platforms
- **understand people** – psychological, social aspects, human error.

### 3. Define Scenarios(Understanding)

Scenarios are the simplest design representation, but one of the most flexible and powerful. Some scenarios are quite short and others are focused more on describing the situation or **context**.

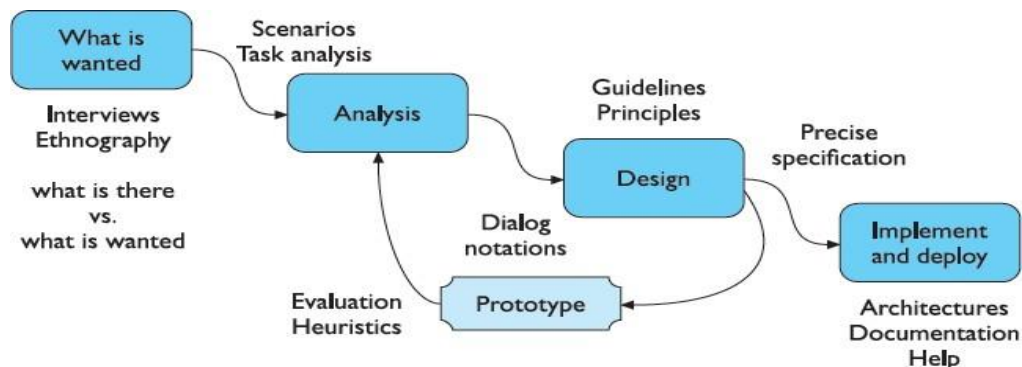
### 4. What are Story boards? (Understanding)

Scenarios can be augmented by sketches, simulated screen shots, etc. These sketches and pictures are called storyboards and are similar to the techniques used in film making to visualize plot-lines.

### 5. Explain the Process of Design(Remember)

The Various stages of the design process are

1. Requirements
2. Analysis
3. Design
4. Iteration and prototyping
5. Implementation and deployment



**6. List the situations where scenarios can be used? (Understanding)**

Scenarios can be used to:

**Communicate with others** – other designers, clients or users.

**Validate other models** A detailed scenario can be ‘played’ against various more formal representations such as task models or dialog and navigation models.

**Express dynamics** Individual screen shots and pictures give you a sense of what a system would look like, but not how it behaves.

**7. What are the two issues in structure with respect to Navigation design? (Understanding)**

The two issues in structure are:

- Local structure : looking from one screen or page out
- Global structure : structure of site, movement between screens

**8. List out the various levels of interaction in Navigation design? (Understanding)**

PC application	Website	Physical device
Widgets	Form elements, tags and links	Buttons, dials, lights, displays
Screen design	Page design	Physical layout
Navigation design	Site structure	Main modes of device
Other apps and operating system	The web, browser, external links	The real world

**9. What are bread crumbs? (Understanding)**

A “**breadcrumb**” (or “**breadcrumb trail**”) is a type of secondary **navigation** scheme that reveals the user's location in a **website** or **Web** application.

**10. List out the tools for screen layout? (Understanding)**

There are number of visual tools available to help the user appropriate ways to read and interact with a screen or device

- Grouping and structure
- Order of groups and items
- Decoration
- Alignment
- White space

**11. How software engineering plays a role in interactive system design? (Understanding)**

Software engineering provides a means of understanding the structure of the design process, and that process can be assessed for its effectiveness in interactive system design

**12. Define software life cycle? (Understanding)**

Software life cycle, which describes the activities that take place from the initial concept formation for a software system up until its eventual phasing out and

replacement

**13.What are the activities in the software life cycle? (Understanding)**

The activities in the software life cycle are

1. Requirements specification
2. Architectural design
3. Detailed design
4. Verification & Validation
5. Management and contractual issues

**14.List some of the specifications in Usability engineering(Understanding)**

Some of the usability specifications are

- usability attribute/principle
- measuring concept
- measuring method
- now level/ worst case/ planned level/ best case

**15.What are the problems in Usability engineering? (Understanding)**

The problems in Usability engineering

- usability specification requires level of detail that may not be
- possible early in design satisfying a usability specification
- does not necessarily satisfy usability

**16.What are the three main approaches to prototyping? (Understanding)**

The three main approaches to prototyping are

- **Throw-away:** The prototype is built and tested.
- **Incremental:** The final product is built as separate components.
- **Evolutionary:** It serves as the basis for the next iteration of design.

**17.Define design rationale and its benefits? (Understanding)**

Design rationale is information that explains why a computer system is the way it is, including its structural or architectural description and its functional or behavioral description.

**Benefits** of design rationale

- communication throughout life cycle
- reuse of design knowledge across products
- enforces design discipline
- presents arguments for design trade-offs
- organizes potentially large design space
- capturing contextual information

**18.List some of the goals of Evaluation? (Understanding)**

The goals of Evaluation are

- Assess extent of system functionality
- Assess effect of interface on user
- Identify specific problems

**19.What are the four approaches to expert analysis(Understanding)**

The four approaches to expert analysis are cognitive walkthrough, heuristic evaluation, the use of models and use of previous work.



**20. What is Cognitive walkthrough (Understanding)**

Cognitive walkthrough is an attempt to introduce psychological theory into the informal and subjective walkthrough technique. The origin of the cognitive walkthrough approach to evaluation is the code walkthrough in software engineering.

**21. What is heuristic evaluation (Understanding)**

A heuristic is a guideline or general principle or rule of thumb that can guide a design decision or be used to critique a decision that has already been made. Heuristic evaluation is a method for structuring the critique of a system using a set of relatively simple and general heuristics. Heuristic evaluation can be performed on a design specification so it is useful for evaluating early design.

**22. What is Experimental evaluation (Understanding)**

It is one of the most powerful methods of evaluating a design is to use a controlled experiment. This provides empirical evidence to support a particular claim or hypothesis.

**23. What is universal design? (Apr/May '17) (Understanding)**

Universal design is about designing systems so that they can be used by anyone in any circumstance. Universal design means designing for diversity, including:

- people with sensory, physical or cognitive impairment
- people of different ages
- people from different cultures and backgrounds

**24. Define prototyping (Apr/May '17) (Understand)**

Prototypes are experimental and incomplete designs which are cheaply and fast developed. Prototyping is the process of developing prototypes, is an integral part of iterative user-centered design because it enables designers to try out their ideas with users and to gather feedback.

**25. Do you think that prototyping will solve all problems associated with user interface design? Give reasons for your answer. (Nov/Dec '17) (Understanding)**

Yes, prototyping will solve all problems associated with user interface design. Creating prototypes allows to improve a design concept quickly. It can iteratively revise and refine the idea in a few minutes.

**26. Comment on the usage of colours in emergency response panels.**

(Nov/Dec '17) (Understanding)

COLOR	MEANING	APPLICATION
Red	Danger	Safety cans and signs.
	Stop	Emergency stop bar or button on machinery. Identification of fire equipment.

Fluorescent Orange, Orange-Red	Biosafety	Labels and containers for blood and infectious waste. (Warning labels must be fluorescent orange or orange-red with the biosafety symbol in a contrasting color.)
Yellow	Caution	Tripping, falling and striking hazards. "Flammable, Keep Fire Away" labels on cabinets. Safety cans and containers for explosives, corrosives or unstable materials.
Orange	Warning	Parts of machinery or energized equipment that may cut, crush or otherwise injure. Inside of transmission guards for pulleys, gears, etc.
Green	Safety	Location of first aid equipment. Location of safety equipment, respirators, safety showers, etc.
Blue	Information	Signs and bulletin boards. Specific railroad warnings against starting, using or moving equipment being repaired.
Black, White, Yellow or Combination of Black with White or Yellow	Boundaries	Traffic or housekeeping markings. Stairways, directions and borders.
Magenta or Purple on Yellow	Radiation Caution	X-ray, alpha, beta, gamma, neutron and proton radiation.

**27. What is multithreading? (Understand)(April/May 2018)**

A technique by which a single set of code can be used by several processors at different stages of execution.

**28. Write down the three categories of principles to support usability. (Understand)(April/May 2018).**

ISO defines usability as "The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use." The word "usability" also refers to methods for improving ease-of-use during the design process.

**29. What are the steps for Interaction design process?(Remember) (Nov/Dec 2018)**

- Requirements
- Analysis
- Design
- Iteration and prototyping
- Implementation and deployment

**30. Write down the techniques used for prototyping? (Remember) (Nov/Dec 2018)**

The Techniques for prototyping

- a. Storyboards
- b. Limited functionality simulations
- c. High-level programming support

**31. What are the two things needed for prototyping methods to work? (Remember) (Apr/May 2019)**

There are two things you need in order for prototyping methods to work:

1. To understand what is wrong and how to improve.
2. A good start point.

**32. Define principles, standards, guidelines and rules(Remember) (Apr/May 2019)**

- a. **Principles** are derived from knowledge of the psychological, computational and sociological aspects of the problem domains and are largely independent of the technology.
- b. **Guidelines** are less abstract and often more technology oriented, but as they are also general, it is important for a designer to know what theoretical evidence there is to support them
- c. **Standards** carry a much higher level of authority, it is more important that the theory underlying them be correct or sound.
- d. **Rules** are mechanisms for restricting the space of design options, preventing a designer from pursuing design options that would be likely to lead to an unusable system

## UNIT III - MODELS AND THEORIES

**1. What is Competence models and Performance models. (Understanding)** Competence models, represent the kinds of behavior expected of a user, but they provide little help in analyzing that behavior to determine its demands on the user. Performance models provide analytical power mainly by focusing on routine behavior in very limited applications.

**2. Define GOMS (Understanding)**

The *GOMS* model is an acronym for Goals, Operators, Methods and Selection. A GOMS description consists of these four elements:

**Goals** These are the user's goals, describing what the user wants to achieve.

**Operators** These are the lowest level of analysis. They are the basic actions that the user must perform in order to use the system.

**Methods:** It is decomposition of a goal into subgoals/operators. For instance, in a certain window manager a currently selected window can be closed to an icon either by selecting the 'CLOSE' option from a pop-up menu, or by hitting the 'L7' function key

**Selection:** It is means of choosing between competing methods

**3. What is CCT? (Understanding)**

CCT (Cognitive complexity theory,) has two parallel descriptions: one of the user's goals and the other of the computer system (called the *device* in CCT). The description of the user's goals is based on a GOMS-like goal hierarchy, but is expressed primarily using *production rules*. For the system grammar, CCT uses *generalized transition networks*, a form of *state transition network*.

**4. What is BNF ? (Understanding)**

BNF (Backus–Naur Form) views the dialog at a purely syntactic level, ignoring the semantics of the language. BNF has been used widely to specify the syntax of computer programming languages, and many system dialogs can be described easily using BNF rules.

**5. What are the two types of description in BNF? (Understanding)**

The names in the description are of two types: *non-terminals*, shown in lower case, and *terminals*, shown in upper case. Terminals represent the lowest level of user behavior, such as pressing a key, clicking a mouse button or moving the mouse. Non-terminals are higher-level abstractions and it is defined in terms of other non-terminals and terminals by a definition of the form

**name ::= expression**

**6. What is Task-action Grammar (TAG) (Understand) (Nov-Dec 2018)** *Task-action grammar (TAG)* attempts to deal with the consistency in the language's structure and in its use of command names and letters by including elements such as parameterized grammar rules.

**7. What is KLM? (Understand)**

KLM (Keystroke-Level Model ) uses the human-motor understanding as a basis for detailed predictions about user performance. It is aimed at unit tasks within interaction – the execution of simple command sequences.

**8. How the task of KLM is split? (Understanding)**

The task is split into two phases:

**Acquisition** of the task, when the user builds a mental representation of the task.

**Execution** of the task using the system's facilities.

**9. List the various operators in the execution phase of KLM? (Understanding)**

The model decomposes the execution phase into five different physical motor operators, a mental operator and a system response operator:

**K** -Keystroking, actually striking keys, including shifts and other modifier keys.

**B** -Pressing a mouse button.

**P** -Pointing, moving the mouse (or similar device) at a target

**H** -Homing, switching the hand between mouse and keyboard.

**D** -Drawing lines using the mouse.

**M** -Mentally preparing for a physical action.

**R** -System response which may be ignored if the user does not have to wait for it, as in copy typing.

**10. List the several organizational issues? (Understanding)**

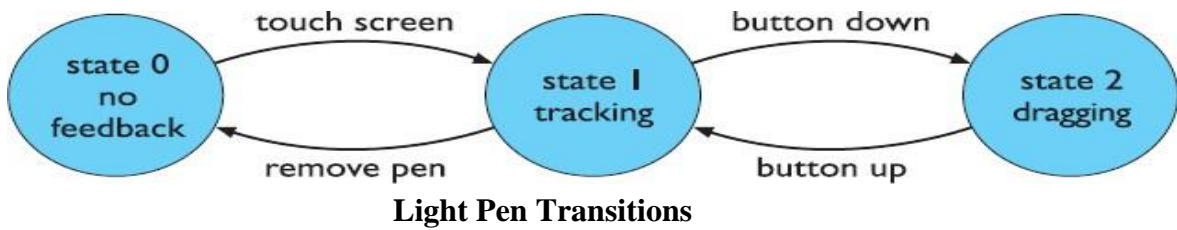
There are several organizational issues that affect the acceptance of technology by users and that must therefore be considered in system design:

- systems may not take into account conflict and power relationships
- those who benefit may not do the work
- not everyone may use systems

**11. What is Three-state model(Understanding)**

The three state model contains three states – State 0, State 1, State 2. The devices like mouse, trackball, light pen though they are similar from the application's viewpoint, they have very different sensory-motor characteristics. The *three-state model*, captures some of these crucial distinctions.

For example for a light pen, when its button is not depressed, it is in state 1, and when its button is down, state 2. The light pen has a third state, when it is not touching the screen. In this state the system cannot track the light pen's position. This is called state 0.



**12. Who are stakeholders? (Understanding)**

A stakeholder can be defined as anyone who is affected by the success or failure of the system.

**13. Who are stakeholders? Mention the types? (Understand) (Apr/May 2019)**

**Primary** stakeholders are people who actually use the system – the end-users.

**Secondary** stakeholders are people who do not directly use the system, but receive output from it or provide input to it (for example, someone who receives a report produced by the system).

**Tertiary** stakeholders are people who do not fall into either of the first two categories but who are directly affected by the success or failure of the system (for example, a director whose profits increase or decrease depending on the success of the system).

**14. Define Custom Methodology? (Understanding)**

CUSTOM focuses on establishing stakeholder requirements (all stakeholders are considered, not just the end-users). It is applied at the initial stage of design when a *product opportunity* has been identified, so the emphasis is on capturing requirements. It is a forms-based methodology, providing a set of questions to apply at each of its stages.

**15. List the six stages of Custom analysis? (Remember)**

There are six key stages to carry out in a CUSTOM analysis

- ✓ Describe organizational context, including primary goals, physical characteristics, political and economic background
- ✓ Identify and describe stakeholders including personal issues, role in the organization and job
- ✓ Identify and describe work-groups whether formally constituted or not
- ✓ Identify and describe task-object pairs i.e. tasks to be performed and objects used
- ✓ Identify stakeholder needs: stages 2–4 described in terms of both current and proposed system - stakeholder needs are identified from the differences between the two

- ✓ Consolidate and check stakeholder requirements against earlier criteria

**16. What is Open System Task Analysis (OSTA)? (Understanding)**

OSTA is a socio-technical approach, which attempts to describe what happens when a technical system is introduced into an organizational work environment. Like CUSTOM, OSTA specifies both social and technical aspects of the system.

**17. List the eight stages of Open System Task Analysis?(Analyze)**

There are eight stages to carry out OSTA

- a. Primary task identified in terms of users' goals
- b. Task inputs to system identified
- c. External environment into which the system will be introduced is described, including physical, economic and political aspects
- d. Transformation processes within the system are described in terms of actions performed on or with objects
- e. Social system is analyzed, considering existing internal and external work-groups and relationships
- f. Technical system is described in terms of configuration and integration with other systems
- g. Performance satisfaction criteria are established, indicating social and technical requirements of system
- h. New technical system is specified

**18. Define Soft Systems Methodology (SSM) (Understanding)**

Soft systems methodology (SSM) arises from the same tradition but takes a view of the organization as a system of which technology and people are components.

**19. List the seven stages of Soft Systems Methodology(Analyze)**

The seven stages of Soft Systems Methodology

- recognition of problem and initiation of analysis
- detailed description of problem situation
  - rich picture
- generate root definitions of system
  - CATWOE
- conceptual model - identifying transformations
- compare real world to conceptual model
- identify necessary changes
- determine actions to effect changes

**20. List the elements of root definitions? (Understanding)**

Root definitions are described in terms of specific elements, summarized using the acronym, CATWOE:

**Clients** – those who receive output or benefit from the system.

**Actors** – those who perform activities within the system.

**Transformations** – the changes that are effected by the system. This is a critical part of the root definition as it leads to the activities that need to be included in the next stage. These ‘transform’ the inputs of the system into the required outputs.

**Weltanschauung** – (from the German) meaning world view. This is how the system is perceived in a particular root definition.

**Owner** – those to whom the system belongs, to whom it is answerable and who can authorize changes to it.

**Environment** – the world in which the system operates and by which it is influenced

**21. What is participatory design? (Understanding)**

*Participatory design* is a philosophy that encompasses the whole design cycle. It is design in the workplace, where the user is involved not only as an experimental subject or as someone to be consulted when necessary but as a member of the design team. Users are therefore active collaborators in the design process, rather than passive participants whose involvement is entirely governed by the designer

**22. What are the three levels of participation in Effective Technical and Human Implementation of Computer-based Systems (ETHICS)(Analyze)**

**Consultative** – the weakest form of participation where participants are asked for their opinions but are not decision makers.

**Representative** – a representative of the participant group is involved in the decision making process.

**Consensus** – all stakeholders are included in the decision-making process

**23. Define Ethnography? (Understanding)**

Ethnography is based on very detailed recording of the interactions between people and between people and their environment. It has a special focus on social relationships and how they affect the nature of work.

**24. List the various levels of communication? (Understanding)**

The various levels of communication are

- a. Face-to-face communication
- b. Conversation
- c. Text based communication
- d. Group working

**25. What is back channel in face-to-face communication? (Understanding)**

A back channel is a sound or gesture like nods, grimaces, shrugs of the shoulder and small noises made to give continuity to a conversation by a person who is listening to another.



**26. What are the uses for theories of conversation in CSCW (computer-supported cooperative work)? (Understanding)**

There are three uses for theories of conversation in CSCW.

1. They can be used to analyze transcripts, for example from an electronic conference. This can help us to understand how well the participants are coping with electronic communication.
2. They can be used as a guide for design decisions – an understanding of normal human–human conversation can help avoid blunders in the design of electronic media.
3. They can be used to drive design – structuring the system around the theory

**27. What is meant by utterances and adjacency pairs? (Understanding)** The speech within each turn is called an utterance. The utterances of the conversation can be grouped into pairs: a question and an answer, a statement and an agreement. The answer or response will normally follow directly after the question or statement and so these are called adjacency pairs

**28. What are the two types of context within conversation? (Understanding)**

The two types of context within conversation are

**Internal context** – Dependence on earlier utterances. For example, when Brian says ‘masses’ in the last transcript, this is meaningful in the light of Alison’s question ‘and lots of chocolate?’. This in turn is interpreted in the context of Brian’s original offer of gateau (a rich cake).

**External context** – Dependence on the environment. For example, if Brian had said simply ‘do you want one?’, this could have meant a slice of gateau, or, if he had been holding a bottle, a glass of wine, or, if accompanied by a clenched fist, a punch on the nose.

**29. How utterances are classified based on task related conversation (Understanding)**

Based on task-related conversation, the utterances can be classified into three kinds:

1. **Substantive** directly relevant to the development of the topic.
2. **Annotative** points of clarification, elaborations, etc.
3. **Procedural** talking about the process of collaboration itself

**30. List out the types of textual communication? (Apr/May '17) (Analyze)**

There are four types of textual communication in current groupware:

1. **Discrete** – directed message as in email. There is no explicit connection between different messages, except in so far as the text of the message refers to a previous one.
2. **Linear** – participants messages are added in (usually temporal) order to the end of a single transcript.
3. **Non-linear** – when messages are linked to one another in a hypertext fashion.
4. **Spatial** – where messages are arranged on a two-dimensional surface

**31. What are properties of grounding constraints? (Understanding)**

The grounding process is linked strongly with the types of channels through which the conversant communicate. The properties of these channels in terms of *grounding constraints* are

- **Co temporality** – an utterance is heard as soon as it is said (or typed).
- **Simultaneity** – the participants can send and receive at the same time.
- **Sequence** – the utterances are ordered

**32. What are the two coping strategies in text based conversation? (Understanding)**

The two coping strategies to increase the chunk size of messages in order to reduce the number of interactions required to complete a task are

**Multiplexing-** The conversant hold several conversations in parallel, each message referring to several topics. In terms of the conversation tree, this corresponds to going down several branches at once.

**Eagerness** - The participants can foresee the possible course of the interaction and frame communications which encompass many of the possibilities: for example, 'If you don't pay within seven days we will take you to court'. Eagerness is a sort of depth-first strategy. The participant explores a branch of the tree guessing the other participant's responses

**33. Define hypertext, Multimedia and WWW? (Understanding)**

Hypertext allows documents to be linked in a nonlinear fashion. Multimedia incorporates different media: sound, images, video. The world wide web is a global hypermedia system.

**34. Highlight the application of hypermedia? (Apr/May '17)**

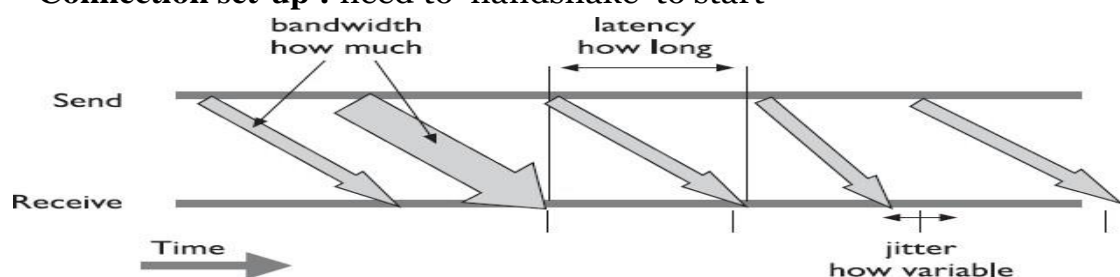
(Understanding)

- Rapid prototyping
- Help and documentation
- Education and e-learning
- Collaboration and community
- E-commerce

**35. What are the network issues in web technology(Understanding)**

The network issues are

- **Bandwidth** : how much information per second.
- **Latency**: how long it takes (delay)
- **Jitter** : how consistent is the delay
- **Reliability**: some messages are lost , ... need to be resent ... increases jitter
- **Connection set-up** : need to 'handshake' to start



**36. How are groups categorized based in their geographical and temporal location?**

**(Nov/Dec '17) (Understanding)**

**Geographical Base:**

When the data are classified by geographical regions or location, like states, provinces, cities, countries etc...

**Chronological or Temporal Base:**

When the data are classified or arranged by their time of occurrence, such as years, months, weeks, days etc...

**For Example:** Time series data.

**37. What are the characteristics of Computer Support Cooperative Work systems? (Nov/Dec '17) (Understanding)**

The computer-supported cooperative work combines the cooperative work of individuals through networking, hardware, software, etc. The purpose is to provide identical improvements for multiple individuals working on the same or different production processes. CSCW adopts either a technology-centric or work-centric viewpoint. A technology-centric viewpoint emphasizes designing computer technology to support groups working together. A work-centric viewpoint emphasizes designing computer systems to support group work.

There are 10 main dimensions inherent in CSCW:

1. Time
2. Space
3. Interaction style
4. Group size
5. Infrastructure
6. Context
7. Privacy
8. Collaborator mobility
9. Extensibility
10. Participant selection

These dimensions provide a rich design space through which the developers of a CSCW navigate.

**38. Write down the four elements of GOMS.(Remember)(April/May 2018)** GOMS is a family of predictive models of human performance that can be used to improve the efficiency of human-machine interaction by identifying and eliminating unnecessary user actions. GOMS stands for (Goals, Operators, Methods, and Selection)

**39. Define CUSTOM methodology.(Remember) (April/May 2018)**

CUSTOM model is a socio-technical methodology designed to be practical to use in small organizations. It is based on the User Skills and Task Match (USTM) approach, developed to allow design teams to understand and fully document user requirements.

**40. Compare the primary and secondary stakeholders? (Understand) (Nov/Dec 2018)**

**Primary** stakeholders are people who actually use the system – the end-users.

**Secondary** stakeholders are people who do not directly use the system, but

receive output from it or provide input to it (for example, someone who receives a report produced by the system).

**41. Create a GOMS description of the task of photocopying an article from a journal**  
**(Analyse) (Apr/May 2019)**

**Goal:** PHOTOCOPY-PAPER

**Goal:** LOCATE-ARTICLE

**Goal:** PHOTOCOPY-PAGE repeat until no more pages

[**Select**        **Goal:** SELECT-PAGE --> CHOOSE-PAGE-TO-COPY]

**Goal:** ORIENT-PAGE

OPEN -COVER

POSITION-PAGE

CLOSE-COVER

PRESS-BUTTON

**Goal:** VERIFY-COPY

LOCATE-OUT-TRAY

EXAMINE-COPY

**Goal:** COLLECT-COPY

LOCATE-OUT-TRAY

REMOVE-COPY (*outer goal satisfied!*)

**Goal:** RETRIEVE-JOURNAL

OPEN-COVER

REMOVE-JOURNAL

CLOSE-COVER

## **UNIT IV –MOBILE HCI**

### **PART –A**

#### **1. What is mobile eco system? (Understanding)**

Mobile Ecosystem is collection of multiple devices (mobile phones, Tablet etc), software (operating system, development tools, testing tools etc.), companies (device manufacturers, carrier, apps stores, development/testing companies, etc.) etc., and the process by which data (sms, bank transactions etc.), is transferred /shared by a user from one device to another device or by the device itself based on some programs (Birth day , Wedding Messages , Calendar )

#### **2. What are the layers of mobile eco system ? (Nov/Dec '17)** (Understanding)

<b>Services</b>
<b>Applications</b>
<b>Application frameworks</b>
<b>Operating systems</b>
<b>Platforms</b>
<b>Devices</b>
<b>Aggregators</b>
<b>Networks</b>
<b>Operators</b>

#### **3. Define mobile platform & its types? (or) Identify the categories of mobile platforms? (Apr/May '17) (Understanding)**

A mobile platform

- provide access to the devices.
  - run software and services on each of these devices
  - is a core programming language in which all of your software is written.
- three types : 1) licensed, 2) proprietary, 3) open source.

#### **4. Define & List the licensed platforms(Understanding)**

Licensed platforms are sold to device makers for nonexclusive distribution on devices.

The goal is to create a common platform of development Application Programming Interfaces (APIs) that work similarly across multiple devices with the least possible effort required to adapt for device differences. List of licensed platforms are

- Java Micro Edition (Java ME)
- Binary Runtime Environment for Wireless (BREW)
- Windows Mobile
- LiMo

**5. Define & List the proprietary platforms ? (Understanding)**

Proprietary platforms are designed and developed by device makers for use on their devices. They are not available for use by competing device makers.

List of proprietary platforms

- Palm
- BlackBerry
- iPhone

**6. Define open source platform and give example ? (Understanding)**

Open source platforms are mobile platforms that are freely available for users to download, alter, and edit.

Ex: Android is one of these platforms. It is developed by the Open Handset Alliance, which is spearheaded by Google. The Alliance seeks to develop an open source mobile platform based on the Java programming language.

**7. What is Application framework ? (Understanding)**

Application frameworks run on top of operating systems, sharing core services such as communications, messaging, graphics, location, security, authentication, and many others. Application frameworks are used to create applications, such as a game, a web browser, a camera, or media player

**8. What is mobile medium type ? (Understanding)**

The mobile medium type is the type of application framework or mobile technology that presents content or information to the user. It is a technical approach regarding which type of medium to use.

**9. What are the mobile application type? (Understanding)**

- SMS
- Mobile Website
- Mobile Web widgets
- Mobile Web application
- Native Applications
- Games

**10. Write the pros and cons of game applications(Analyze) Pros**

- They provide a simple and easy way to create an immersive experience.
- They can be ported to multiple devices relatively easily.

**Cons**

- They can be costly to develop as an original game title.
- They cannot easily be ported to the mobile web.

**11. Define application context(Understanding)**

The application context deals with the user experience; context is the surroundings in which information is processed.

**12. What Is Information Architecture? (Understanding)**

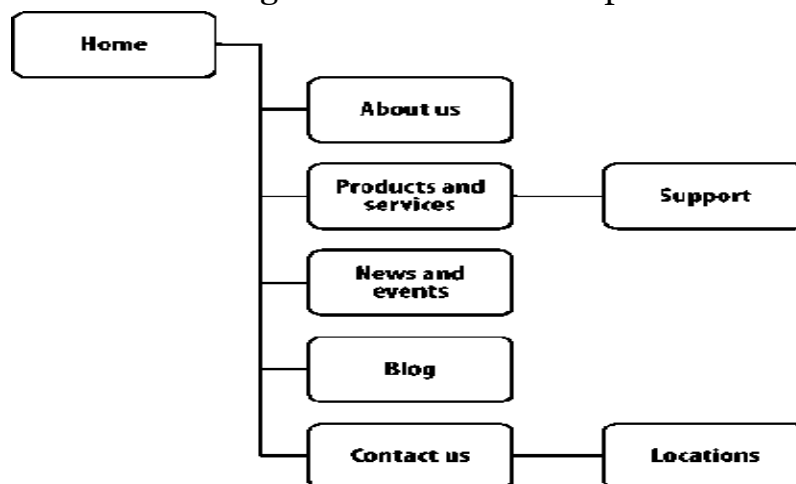
- The structural design of shared information environments
- The combination of organizations, labeling, search, and navigation systems within websites and intranets.
- The art and science of shaping information products and experiences to support usability and find ability
- An emerging discipline and community of practice focused on bringing principles of design and architecture to the digital landscape

**13. List the disciplines of information architecture(Understanding)**

- Information architecture
- Interaction design
- Information design
- Navigation design
- Interface design

**14. What is site map and give example ? (Understanding)**

Site maps are a classic information architecture deliverable. They visually represent the relationship of content to other content and provide a map for how the user will travel through the informational space.



**15. Define Click stream(Understanding)**

Click stream is a term used for showing the behavior on websites, displaying the order in which users travel through a site's information architecture, usually based on data gathered from server logs.

**16. What are Wireframes ? (Understanding)**

- Wireframes are a way to lay out information on the page, also referred to as information design.
- Site maps show how our content is organized in our informational space; wireframes show how the user will directly interact with it.
- wireframes lack the capability to communicate more complex, often in-place, interactions of mobile experiences.
- 

**17. List the mobile prototyping ?(Understanding)**

- Paper prototypes
- Context prototype

- HTML prototypes

**18. List the Elements of Mobile Design (Understanding)**

1. Context - core to the mobile experience
2. Message - the overall mental impression you create explicitly through visual design
3. Look and Feel – is used to evoke action ,how the user will use an interface
4. Layout – informs how the user will visually process the page
5. Color –
6. Typography- the style and appearance of printed matte
7. Graphics- the images that are used to establish or aid a visual experience.

**19. What are the two distinct types of navigation layouts for mobile devices? (Understanding)**

The two distinct types of navigation layouts for mobile device touch and scroll.

**20. Define Iconography (Understanding)**

Iconography is useful to communicate ideas and actions to users in a constrained visual space. The challenge is making sure that the meaning of the icon is clear to the user.

**21. List the Design tools and interface tool kits or Give examples of Mobile design tools (Apr/May '17) (Remember)**

Mobile framework	Design tool	Interface toolkits
Java ME	Photoshop, NetBeans	JavaFX, Capuchin
BREW	Photoshop, Flash	BREW UI Toolkit, uiOne, Flash
Flash Lite	Flash	Flash Lite
iPhone	Photoshop, Interface Builder	iPhone SDK

Mobile framework	Design tool	Interface toolkits
Android	Photoshop, XML-based themes	Android SDK
Palm webOS	Photoshop, HTML, CSS, and JavaScript	Mojo SDK
Mobile web	Photoshop, HTML, CSS, and JavaScript	W3C Mobile Web Best Practices
Mobile widgets	Photoshop, HTML, CSS, and JavaScript	Opera Widget SDK, Nokia Web Runtime
Mobile web apps	Photoshop, HTML, CSS, and JavaScript	iUI, jQTouch, W3C Mobile Web App Best Practices



**22. Describe the pros and cons of mobile web sites. (Nov/Dec '17)**

**(Analyze)**

**The Pros:**

1. **A single website.** It's easier to administer just one website for all devices.
2. **A single URL.** This makes sure your users will find you on mobile devices without having to wait for redirects, especially helpful on slower connections.
3. **Easy SEO.** There is no need to create specific content for mobile devices, while you still enjoy the benefits of your desktop website SEO on mobile devices.
4. **Easy marketing.** No extra work for the marketing department is required to promote your website on mobile.
5. **Low cost.** Simple math — one website is cheaper than two.

**The Cons:**

1. **A single website.** Having just one website for all devices may be easy for you, but not always for your users. You will often need to put different emphasis on the same page in order to maximize conversions using the advantages of the platform.
2. **Technical.** As responsive web design is a relatively new technology, there are still some outdated devices with old browsers that will load the website too slowly or even not fully.
3. **User Experience.** Mobile is a completely different experience than desktop, so having a single, even responsive website, may harm your overall UX on both platforms. If you try to satisfy both mobile and desktop users with the same user interface, you may end up satisfying no one.

**23. What is Cocoa Touch ? (Remember)(April/May 2018)**

Cocoa Touch is a user interface framework provided by Apple for building software applications for products like iPhone, iPad and iPod Touch. It is primarily written in Objective C language and is based on Mac OS X.

**24. Highlight the importance of mobile applications (Remember) (April/May 2018)**

- Improves Efficiency.
- Offers High Scalability.
- Secures Your App Data.
- Integrates With Existing Software.
- Easy to Maintain.
- Improves Customer Relationship.
- Facilitates New Client Data Retrieval.
- Provides Real-time Project Access.

**25. Give some examples of world largest mobile operators? (Remember) (Nov/Dec 2018)**

- Airtel
- Vodafone

- Reliance jio
- BSNL

**26. Define Color palettes? (Remember) (Nov/Dec 2018)**

Defining color palettes can be useful for maintaining a consistent use of color in your mobile design. Color palettes typically consist of a predefined number of colors to use throughout the design.

**27. Why JavaScript and Ajax have been ignored for web application on the mobile phones (Remember) (Apr/May 2019)**

- Java script consumes more processor power and therefore more battery life.
- Ajax applications more data from the network and therefore uses more radio and battery life

**28. List the pros and cons of mobile game application (Remember) (Apr/May 2019)**

Pros:

- Full access to the device, in software and hardware
- Enhanced user experience
- Vision from app stores, and integration with wearables

Cons:

- Different programming languages and skills depending on operating system.

## UNIT V- WEB INTERFACE DESIGN

### 1. List the events for cueing the user during a drag and drop?

(Understanding)

There are at least 15 events available for cueing the user during a drag and drop interaction.

1. Page Load
2. Mouse Hover
3. Mouse Down
4. Drag Initiated
5. Drag Leaves Original Location
6. Drag Re-Enters Original Location
7. Drag Enters Valid Target
8. Drag Exits Valid Target
9. Drag Enters Specific Invalid Target
10. Drag Is Over No Specific Target
11. Drag Hovers Over Valid Target
12. Drag Hovers Over Invalid Target
13. Drop Accepted
14. Drop Rejected
15. Drop on Parent Container

### 2. List few actors in drag and drop? (Understanding)

During each event we can visually manipulate a number of *actors*. The page elements available include:

- Page (e.g., static messaging on the page)
- Cursor
- Tool Tip
- Drag Object (or some portion of the drag object, e.g., title area of a module)
- Drag Object's Parent Container
- Drop Target

### 3. What are the various approaches for Drag and Drop

Modules(Understanding)(April/May 2018)

The various approaches for Drag and Drop Modules are:

**Placeholder targeting** - Most explicit way to preview the effect.

**Midpoint boundary** - Requires the least drag effort to move modules around.

**Full-sized module dragging** - Coupled with placeholder targeting and midpoint boundary detection, it means drag distances to complete a move are shorter.

**Ghost rendering** - Emphasizes the page rather than the dragged object. Keeps the preview clear.

### 4. Write the various selection patterns?(Analyze) Toggle

Selection : Checkbox or control-based selection. Collected

Selection : Selection that spans multiple pages. Object

Selection : Direct object selection.

Hybrid Selection : Combination of Toggle Selection and Object Selection

**5. What are contextual tools? (Understanding)**

Contextual Tools are the Web's version of the desktop's right-click menus. Instead of having to right-click to reveal a menu, we can reveal tools in context with the content

**6. State the ways to reveal contextual tools? (Understanding)**

The various ways to reveal contextual tools

**Always-Visible Tools** :Place Contextual Tools directly in the content.

**Hover-Reveal Tools** :Show Contextual Tools on mouse hover.

**Toggle-Reveal Tools** :A master switch to toggle on/off Contextual Tools for the page.

**Multi-Level Tools** :Progressively reveal actions based on user interaction. **Secondary**

**Menus** :Show a secondary menu (usually by right-clicking on an object).

**8. What is a mutton in contextual tools? (Understanding)**

A variation on Multi-Level Tools is the "mutton" (menu + button = mutton). Muttons are useful when there are multiple actions and we want one of the actions to be the default. Yahoo! Mail uses a mutton for its "Reply" button

**9. Mention the ways in which contextual tools can be used? (Understand) (Apr/May 2019)**

Contextual Tools are useful for reducing the user's path to completing a task. By placing tools near the point of focus and making these tools easy to activate, you can create a lightweight interaction

**10. What are overlays, inlays, virtual pages and process flow? (Understanding)**

Overlays - Instead of going to a new page, a mini-page can be displayed in a lightweight layer over the page.

Inlays - Instead of going to a new page, information or actions can be inlaid within the page.

Virtual Pages - By revealing dynamic content and using animation, we can extend the virtual space of the page.

Process Flow - Instead of moving from page to page, sometimes we can create a flow within a page itself.

**11. What are the types of overlays? (Apr/May '17) (Understanding)**

The three specific types of overlays are Dialog Overlays, Detail Overlays, and Input Overlays

**12. What is Light box effect? (Understanding)**

It is one technique employed in dialog overlays. In photography a lightbox provides a backlit area to view slides. On the Web, this technique has come to mean bringing something into view by making it brighter than the background. In practice, this is done by dimming down the background

**13. What is Modal and Non-Modal(Understanding)**

A modal dialog box must be closed (hidden or unloaded) before you can continue working with the rest of the application. For example, a dialog box is modal if it requires you to click OK or Cancel before you can switch to another form or dialog box.

Non-Modal dialog boxes allows to shift the focus between the dialog box and another form without having to close the dialog box.

**14. What is List Inlay? (Understanding)**

Lists are a great place to use Inlays. Instead of requiring the user to navigate to a new page for an item's detail or popping up the information in an Overlay, the information can be shown with a List Inlay in context.

**15. What is Accordion? (Understanding)**

The Accordion is an interface element that employs the List Inlay pattern to show only one open panel in a list at a time.

**16. Give some guidelines for use of inlays and overlays?(Remember)**

- Use an overlay when there may be more than one place a dialog can be activated from (the exception may be showing details for items in a list).
- Use an overlay to interrupt the process.
- Use an overlay if there is a multi-step process.
- Use an inlay when you are trying to avoid covering information on the page needed in the dialog.
- Use an inlay for contextual information or details about one of many items (as in a list): a typical example is expanding list items to show detail.

**17. Mention the patterns that supports Virtual pages?(Remember) (Apr/May 2019)**

Patterns that support virtual pages include:

- Virtual Scrolling
- Inline Paging
- Scrolled Paging
- Panning
- Zoomable User Interface

**18. Give examples for virtual Scrolling to manage the virtual space(Understanding)**

Virtual Scrolling demonstrate three different ways to manage the virtual space:

- Yahoo! Mail creates the illusion that all data has been loaded up-front by having the scrollbar reflect the total virtual space.
- Microsoft Live Search creates the virtual illusion as the user moves down through the search results.
- And PicLens does the same with the caveat that it shows a virtual window in the larger virtual space (by only providing a scroller control for where the user is and some before and after context).

**19. What is Carousel ? (Understanding)**

A Carousel provides a way to page-in more data by scrolling it into view. On one hand it is a variation on the Virtual Scrolling pattern. In other ways it is like Virtual Paging since most carousels have paging controls. The additional effect is to animate the scrolled content into view.

**20. List some issues in Virtual panning(Understanding)**

Issues in Virtual Panning are 1) Natural Visual Construct 2) Gestures

**21. What is the main difference between Flicking and virtual panning(Understanding)**

*Flicking* is similar to panning yet has some differences. With Virtual Panning the canvas only moves while the mouse is dragging it around. With flicking, if the user starts the dragging operation and releases, the canvas will continue moving with some momentum. The canvas slows in such a way as to mimic real-world forces.

**22. What is Zoomable User Interface? (Understanding)**

A Zoomable User Interface (ZUI) is another way to create a virtual canvas. Unlike panning or flicking through a flat, two-dimensional space, a ZUI allows the user to also zoom in to elements on the page. This freedom of motion in both 2D and 3D supports the concept of an infinite interface.

**23. What is a Google Blogger(Understanding)**

The site Google Blogger generally makes easy to create and publish blogs. One thing it does not make easy, though, is deleting comments that others may leave on your blog. This is especially difficult when you are the victim of hundreds of spam comments left by nefarious companies hoping to increase their search ranking.

**24. How to delete the comment in a Blogger? (Understanding)**

Blogger forces you to delete these comments through a three-step process. Each step is an individual page, all punctuated with a page refresh

**25. List the various patterns of process flow? (Understanding)**

The various Process Flow patterns are

- Interactive Single-Page Process
- Inline Assistant Process
- Configuration Process
  - Overlay Process
  - Static Single-Page Process

**26. List some of the Best Practices for Static Single-Page Process? (Understanding)**

- Use a multi-page process when the process is complex.
- Use a multi-page process when you want to hide the previous context (and the next) and bring the focus to a single task in the steps.
- Use a Static Single-Page Process when you only have a few steps and want to avoid taking the chance that a user will quit while moving from page to page.
- Use visual treatments to make the number of steps seem fewer.
- Provide clues as to where the user is and how much is left in a multi-step operation.
- Gather as many defaults as possible to simplify a flow.
- Use engagement, color visuals, interactivity, and simple visual styles to make the steps seem fewer.
- Put lightweight tasks up front in a multi-step operation

**27. What is auto complete pattern? (Apr/May '17) (Remember)**

The auto complete pattern is used in combination with a standard input text box that is labeled to match the user's expectation of what field will be searched against. As the user types in data, a list of suggested items that match the inputted data is displayed.

**28. Differentiate between modal and non-modal overlays. (Nov/Dec '17)**

**(Analyze)**

**Modal Windows**

When a window is modal it remains active and focused until the user has finished with it and dismisses it. While it is active no other windows of the same application can be activated. A modal window is therefore normally a child window. The user needs to interact with it before control can be returned to the parent application. In effect the parent application is locked and nothing proceeds until the modal window is closed.

## **Non-Modal Windows**

So a non-modal window is the opposite. While it is active you can still activate other windows. The user can switch between windows of the same application. The window being active does not prevent the rest of the application from continuing.

### **29. Suggest some of the best practices to keep in mind during the design of input overlay. (Nov/Dec '17) (Remember)**

1. Use overlays very sparingly
2. Don't suddenly open overlays
3. Darken the page behind the overlay
4. Allow users to click (or tap) away (most of the time)
5. Always provide a clear close option
6. Don't include multiple steps
7. Don't cram in too much
8. Include important information
9. Try to avoid using overlays for mobile designs
10. Ensure that overlays are accessible

### **30. Define object selection.(Remember)(April/May 2018)**

Object–action interface, also abbreviated as OAI, is an extension to the graphical user interface, especially related to direct manipulation user interface and it can help to create better human-computer interfaces and increase the usability of a product.

### **31. List any four principles of designing rich web interface? (Remember) (Nov/Dec 2018)**

Some of the principles of designing rich web interface are

- The structure principle
- The simplicity principle
- The tolerance principle
- The feedback principle
- 

### **32. What do you mean by Inlay? (Remember) (Nov/Dec 2018)**

Inlays - Instead of going to a new page, information or actions can be inlaid within the page.



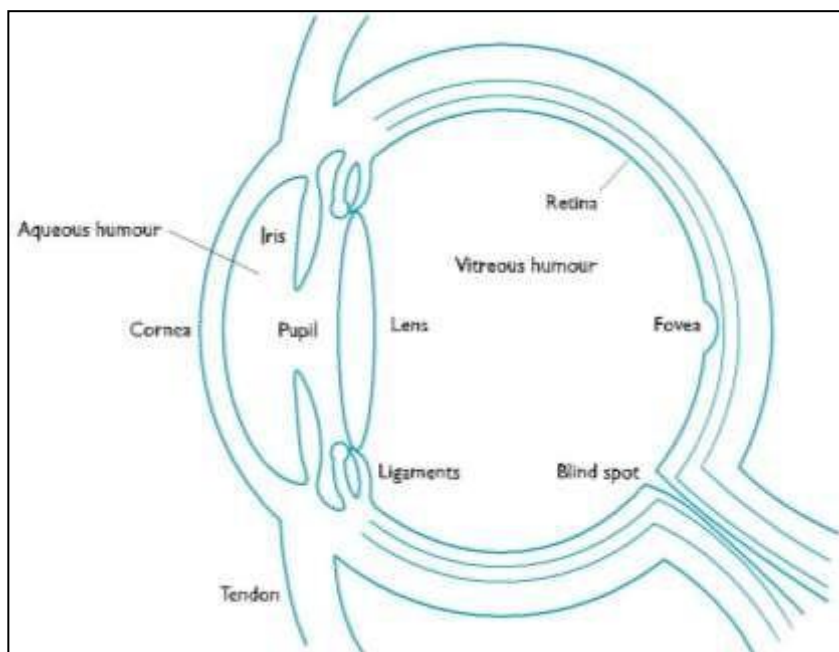
## PART B

### 1. Describe about input– output channels(13)

- A person's interaction with the outside world occurs through information
  - being received and sent: input and output.
  - the user receives information that is output by the computer,
  - and responds by providing input to the computer –
  - the user's output becomes the computer's input and vice versa.
    - Input in the human occurs mainly through the senses
    - output through the motor control of the effectors.
    - There are five major senses:
      - sight, hearing, touch, taste and smell.
      - Vision
      - Human vision is a highly complex activity

#### The human eye

- The eye is a mechanism for receiving light and transforming it into electrical energy.
- Light is reflected from objects in the world and their image is focused upside down on the back of the eye.
- The receptors in the eye transform it into electrical signals which are passed to the brain.
- The eye has a number of important components
- The *cornea* and *lens* at the front of the eye focus the light into a sharp image on the back of the eye, the *retina*.
- The retina is light sensitive and contains two types of *photoreceptor*: *rods* and *cones*.
- Rods are highly sensitive to light
- Cones are the second type of receptor in the eye.
- They are less sensitive to light than the rods and can therefore tolerate more light.
  - the retina is mainly covered with photoreceptors



there is one *blind spot* where the optic nerve enters the eye.

The blind spot has no rods or cones

### Visual perception

- The information received by the visual apparatus
- the design of effective visual interfaces are how we perceive size and depth, brightness and color.

### Perceiving brightness:

*luminance* which is the amount of light emitted by an object.

The luminance of an object is dependent on the amount of light falling on the object's surface and its reflective properties.

### Perceiving color :

**three** components: **hue, intensity and saturation.**

Hue is determined by the spectral wavelength of the light.

Blues have short wavelengths,  
greens medium reds long.

Intensity is the brightness of the color,

saturation is the amount of whiteness in the color.

### Figure: Ambiguous shape?



### Figure: The Muller–Lyer illusion – which line is longer?

#### Hearing

The sense of hearing is often considered secondary to sight.

### The human ear

Hearing begins with vibrations in the air or *sound waves*.

The ear comprises three sections, commonly known as the

outer ear, middle ear *and* inner ear

- The **outer ear** is the visible part of the ear.
- It has two parts: the *pinna*, *auditory canal*,
- The **middle ear** is a small cavity connected to the outer ear by the *tympanic membrane*, or ear drum, and to the inner ear by the *cochlea*.

### • Processing Sound

Sound is changes or vibrations in air pressure.

It has a number of characteristics

**Pitch** is the frequency of the sound.

**Loudness** is proportional to the amplitude of the sound; the frequency remains constant.

**Timbre** relates to the type of the sound:

#### Touch

- Touch provides us with vital information about our environment.
- hot or cold
  - We receive stimuli through the skin.
  - The skin contains three types of sensory receptor:
  - *thermoreceptors* respond to heat and cold,
  - *nociceptors* respond to intense pressure, heat and pain,
  - *mechanoreceptors* respond to pressure.
  - There are two kinds of mechanoreceptor,

- **Rapidly adapting mechanoreceptors** respond to immediate pressure as the skin is indented.
- **Slowly adapting mechanoreceptors** respond to continuously applied pressure.

### Movement

Movement time is dependent largely on the physical characteristics of the subjects: their age and fitness,

A second measure of motor skill is accuracy.

Movement time =  $a + b \log_2(\text{distance/size} + 1)$

where  $a$  and  $b$  are empirically determined constants.

### 2. Explain in detail about human memory(13)

there are three types of memory or memory function:

sensory buffers,

short-term memory or working memory,

long-term memory.

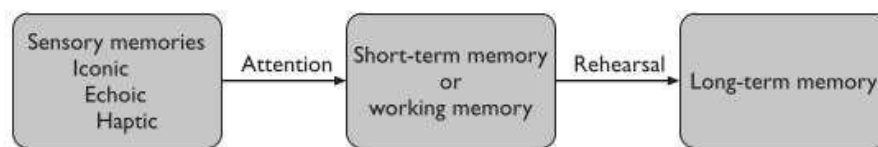


Figure 1.9: A model of the structure of memory

#### a. Sensory memory:

- The sensory memories act as buffers for stimuli received through the senses.
- A sensory memory exists for each sensory channel: iconic memory for visual stimuli,
- echoic memory for aural stimuli
- haptic memory for touch.

#### Short-term memory:

- a 'scratch-pad' for temporary recall of information.
- It is used to store information which is only required fleetingly
- Short-term memory can be accessed rapidly, in the order of 70 ms.
- methods for measuring memory capacity.
- determining the length of a sequence which can be remembered in order.
- The second allows items to be freely recalled in any order..
- chunking information can increase the short-term memory capacity.

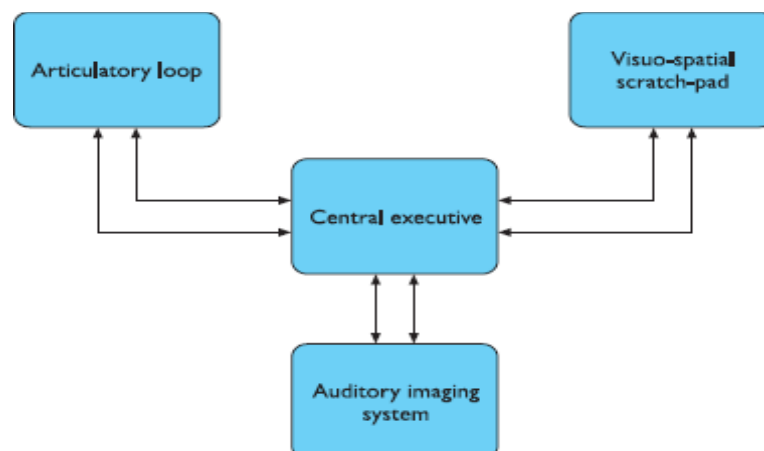
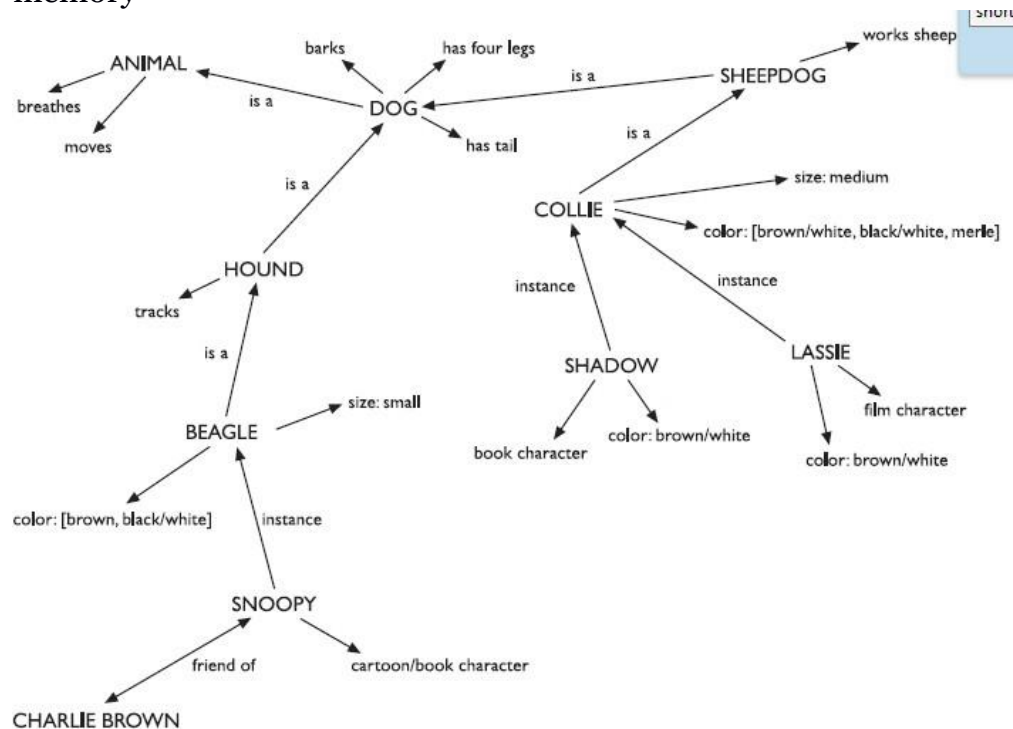


Fig 1.10 : A more detailed model of short-term memory

#### b. Long-term memory:

- Short-term memory is our working memory or 'scratch-pad',
- long-term memory is our main resource.
- unlimited, capacity.
- slow access time

- Long-term memory is intended for the long-term storage of information.
- There are two types of long-term memory:
  - episodic memory and semantic memory.
  - Episodic memory represents our memory of events and experiences in a serial form.
  - Semantic memory,
    - The information in semantic memory is derived from episodic memory



**Fig: Long-term memory may store information in a semantic network**

- Semantic to allow access to information,
- Specific breed attributes may be stored with each given breed,
- Semantic networks represent the associations and relationships between single items in memory.
- A frame is instantiated when the slots are filled with appropriate values.
- Frames and scripts can be linked together in networks to represent hierarchical structured knowledge.

#### **Long-term memory processes:**

- storage or remembering of information, forgetting and information retrieval.
- Information from short-term memory is stored in long-term memory by rehearsal.
- Sentences are easier still to memorize.
- Stories were effectively translated into the subject's own culture.
- information is lost from memory through interference.
- change telephone numbers,

### **3. Explain in detail about reasoning and problem solving(13)**

#### **Reasoning:**

use the knowledge we have to draw conclusions or infer something new about the domain of interest.

There are a number of different types of reasoning: deductive, inductive and abductive.

#### **Deductive reasoning:**

Deductive reasoning derives the logically necessary conclusion from the given

premises.

**Inductive reasoning:**

Induction is generalizing from cases we have seen to infer information about cases we have not seen.

**Abductive reasoning:**

The third type of reasoning is abduction.

Abduction reasons from a fact to the action or state that caused it. derive explanations for the events we observe.

**Problem solving:**

- problem solving is the process of finding a solution to an unfamiliar task, using the knowledge we have.
- Human problem solving is characterized by the ability to adapt the information we have to deal with new situations.

**Gestalt theory:**

- Gestalt psychologists were answering the claim,
- they claimed, problem solving is both productive and reproductive.
- Reproductive problem solving draws on previous experience as the
  - behaviorists claimed,
  - productive problem solving involves insight and restructuring of the problem.
  - reproductive problem solving could be a hindrance to finding a solution, Gestalt psychologists backed up their claims with experimental evidence.
  - Problem space theory Newell and Simon proposed that problem solving centers on the problem space.
  - The problem space comprises
  - problem states, and problem solving involves generating these states using legal state transition operators.
  - The problem has an initial state and a goal state and people use the operators to move from the former to the latter.

**Analogy in problem solving:**

- A third element of problem solving is the use of analogy. interested in how
  - analogical mapping.
- Similarities between the known domain and the new one are noted and operators

**Skill acquisition:**

- acquire skill in a particular domain area.

**Errors and mental models:**

- interpreting and manipulating information is quite impressive.
- There are several different types of error.
- People build their own theories to understand the causal behavior of systems.

**4. discuss the various types of the computer devices(13)**

- ☐ There is the computer 'box' itself, a keyboard, a mouse and a color screen.
- ☐ Input devices for interactive use, allowing text entry, drawing and selection from the screen:
  - a. text entry: traditional keyboard, phone text entry, speech and handwriting
  - b. pointing: principally the mouse, but also touchpad, stylus, and others
  - c. 3D interaction devices
- ☐ Output display devices for interactive use:
  - a. different types of screen mostly using some form of bitmap display

- b. large displays and situated displays for shared and public use
- c. digital paper may be usable in the near future

- Virtual reality systems and 3D visualization have special interaction and display devices. Various devices in the physical world:
  - physical controls and dedicated displays
  - sound, smell and haptic feedback
  - sensors for nearly everything including movement, temperature, bio-signs
- Paper output and input: the paperless office and the less-paper office:
  - different types of printers and their characteristics, character styles and fonts
  - scanners and optical character recognition
- Memory:
  - short-term memory: RAM
  - long-term memory: magnetic and optical disks
  - capacity limitations related to document and video storage
  - access methods as they limit or help the user
- Processing:
  - the effects when systems run too slow or too fast, the myth of the infinitely fast machine
  - limitations on processing speed
  - networks and their impact on system performance.

**TEXT ENTRY DEVICES: The alphanumeric keyboard:**

- It is used for entering textual data and commands.
- The layout of the digits and letters on a QWERTY keyboard is fixed, but non-alphanumeric keys vary between keyboards.
- Ease of learning – alphabetic keyboard: One of the most obvious layouts to be produced is the alphabetic keyboard, in which the letters are arranged alphabetically across the keyboard.

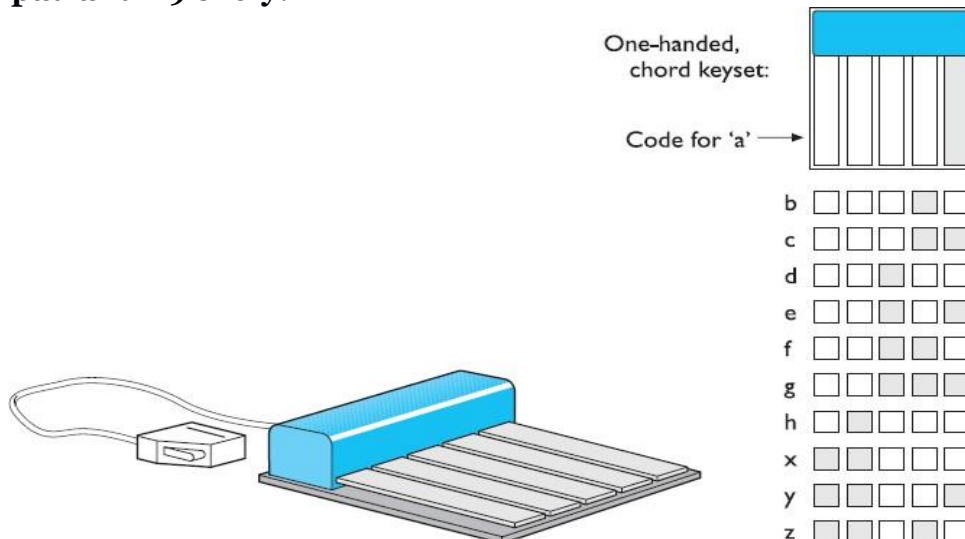


### Chord keyboards:

- Only a few keys, four or five, are used and letters are produced by pressing one or more of the keys at once.
  - For example, in the Microwriter, the pattern of multiple keypresses is chosen to reflect the actual letter shape.
- ☐ simply reducing the size of a conventional keyboard makes the keys too small

**Fig: A very early chord keyboard (left) and its lettercodes (right)**

### Phone pad and T9 entry:



- With mobile phones being used for SMS text messaging and WAP

- ☐ The main number-to-letter mapping is standard, but punctuation and accented letters differ between phones.

- ☐ two modes for the numeric buttons:

- ☐ one where the keys mean the digits and one where they mean letters.

### Handwriting recognition:

- method of text entry.

- ☐ input and converting it to text

- ☐ **Speech recognition:**

- Speech recognition is a promising area of text entry,
  - ☐ Successful recognition rates of over 97% have been reported
- keyboard-entered natural language.

### Positioning, Pointing And Drawing The mouse:

- a major component of the majority of desktop computer systems
  - little box with the tail connecting it to the machine in our basic computer system.
  - It is a small, palm-sized box housing a weighted ball – the ball is rolled by the table
- The potentiometers are aligned in different directions  
The relative motion information is passed to the computer

### Touchpad:

- Touchpads are touch-sensitive tablets usually around 2–3 inches (50–75 mm) square.
- They are operated by stroking a finger over their surface, rather like using a simulated trackball.

### Trackball and thumbwheel:

- The trackball is really just an upside-down mouse!

- ☐ the trackball requires no additional space

### Joystick and keyboard nipple:



- The joystick is an indirect input device the joystick is a simple device.
- movements of the stick cause a corresponding movement of the screen cursor.
- There are two types of joystick:
- the absolute and the isometric.

#### **Touch-sensitive screens (touchscreens):**

- the user to point and select objects on the screen,
- They work in one of a number of different ways:

- by the finger (or stylus) interrupting a matrix of light beams,

#### **Stylus and light pen:**

- For more accurate positioning (and to avoid greasy screens), systems with touch- sensitive surfaces often employ a stylus.

- Instead of pointing at the screen directly a small pen-like plastic stick is used to point and draw on the screen.

#### □ **Digitizing tablet:**

- used for freehand drawing, mouse substitute.
- digitizing information for maps.
- The resistive tablet detects point contact between two separated conducting sheets.

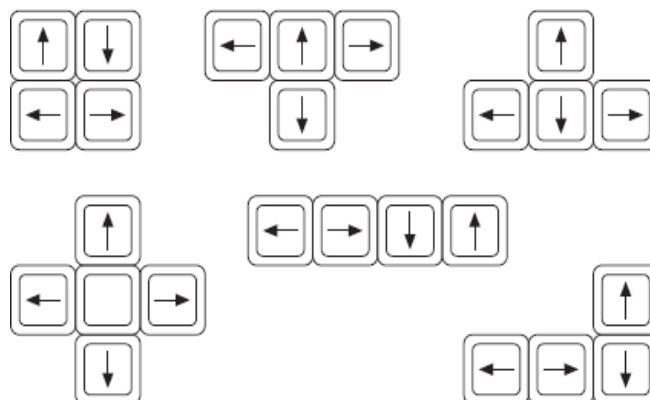
#### **Eyegaze:**

- Eyegaze systems allow you to control the computer by simply looking at it!
- A low-power laser is shone into the eye and is reflected off the retina.
- The system needs to be calibrated, typically by staring at a series of dots on the screen,

Eyegaze is a very fast and accurate device

#### □ **Cursor keys and discrete positioning:**

- menu or 2D cells as in a spreadsheet.
- Four keys on the keyboard are used to control the cursor, one each for up, down, left and right.



**Fig.: Various cursor key layouts**

#### **Display Devices:**

- Bitmap displays – resolution and color:
- Virtually all computer displays are based on some sort of bitmap.
- black and white (for example, the small display on many TV remote controls), in grayscale, or full color.
- The color or, for monochrome screens, the intensity at each pixel is held by

the computer's video card.

- One bit per pixel can store on/off information, and hence only black and white (the term 'bitmap' dates from such displays).

More bits per pixel give rise to more color or intensity possibilities.

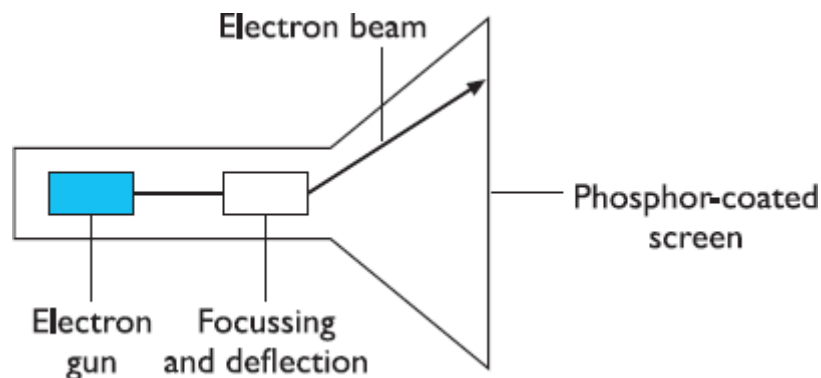
#### **Cathode ray tube:**

- LCD screens.
- It works in a similar way to a standard television screen.
- A stream of electrons is emitted from an electron gun, which is then focussed and directed by magnetic fields.
- the beam hits the phosphor-coated screen, the phosphor is excited by the electrons and glows

The electron beam is scanned from left to right, and then flicked back to rescan the next line, from top to bottom.

#### **Liquid crystal display:**

- lighter and consume far less power than traditional CRTs.
- flat-panel displays.



- They have no radiation problems

**Fig.: CRT screen**

#### **Special displays:**

- gas plasma display, which is used in large screens.
- The random scan display, also known as the directed beam refresh,
- vector display, works differently from the bitmap display, also known as raster scan.
- scanning the whole screen sequentially and horizontally,
- the random scan draws the lines to be displayed directly.
- beam penetration technology, removing items has to be done by redrawing the new image on a completely erased screen.

#### **Large displays and situated displays:**

- gas plasma technology to create large flat bitmap displays. LCD or CRT, to display the artists or video images during the performance.
- scan light across the screen to build a full color image.
- The light from the projector passes through the tiny screen and is then focussed by the lens onto the screen.

#### **Digital paper:**

- thin flexible materials

#### **Devices for Virtual Reality And 3d Interaction:**

These require you to navigate and interact in a three-dimensional space.

#### **Positioning in 3D space:**

- Virtual reality systems present a 3D virtual world.

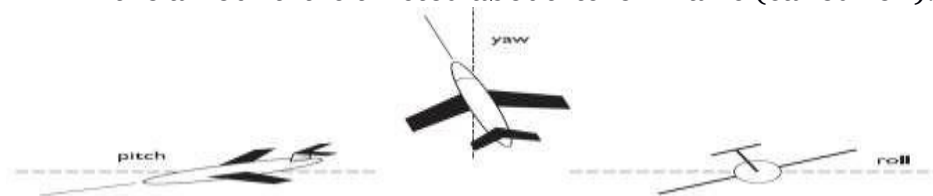
choosing a particular orientation.

### **Cockpit and virtual controls:**

- Helicopter and aircraft pilots
  - arcade games
- up/down left/right buttons.

### **The 3D mouse:**

- The 3D mouse has a full six degrees of freedom as its position can be tracked (three degrees),
- up/down angle (called pitch),
- its left/right orientation (called yaw)
- the amount it is twisted about its own axis (called roll).



**Fig.: Pitch, yaw and roll**

### **Dataglove:**

- the dataglove is a 3D input device
  - two sensors that use ultrasound to determine 3D positional information
- encourage the development of more complex systems

### **Virtual reality helmets:**

- The helmets or goggles worn in some VR systems have two purposes:
- (i) they display the 3D world to each eye and
- (ii) they allow the user's head position to be tracked.

### **Whole-body tracking:**

- to walk without looking in the direction you are going.

### **3D displays:**

- the 3D images used in VR have led to new forms of input device,

### **Seeing in 3D:**

- Our eyes use many cues to perceive depth in the real world.
- stereoscopic vision (or simply stereo vision).

- slightly different angle each sees a different image and our brain **VR motion sickness:**

- the effects of poor display performance
- the feeling becomes disorienting.

### **Simulators and VR caves:**

- 3D environment via head-mounted displays,
- large flight simulators

### **Physical Controls, Sensors And Special Devices**

#### **Special displays:**

- dials, gauges

. Flashing light-emitting diodes (LEDs) are used **Sound output:**

- Another mode of output that we should consider is that of auditory signals. Often designed to be used in conjunction with screen displays, auditory outputs are poorly understood: we do not yet know how to utilize sound in a sensible way to achieve maximum effect and information transference. We have discussed speech previously, but other sounds such as beeps, bongs, clanks, whistles and whirrs are all used to varying effect. As well as conveying system

### **Touch, feel and smell:**

physical senses are called haptic devices.

- Haptic devices are not limited to virtual environments, but are used in specialist interfaces in the real world too.

### **Physical controls:**

- A desktop computer system has to serve many functions
- Environment and bio-sensing:

The washbasin is controlled by a small infrared sensor

### **5 Explain about the computer memory(7)**

- short-term and long-term memories (STM and LTM).
- RAM and short-term memory (STM):
- At the lowest level of computer memory are the registers on the computer chip
- silicon-chip random access memory (RAM).  
100 Mbytes (million bytes) per second.
- Most RAM is volatile,
- **a. Disks and long-term memory (LTM):**
- magnetic disks and optical disks.
- floppy disks and hard (or fixed) disks,
- Hard disks may store from under 40 Mbytes to several gigabytes (Gbytes),
- Optical disks use laser light to read and (sometimes) write the information on the disk
- CD-ROMs have a capacity of around 650 megabytes

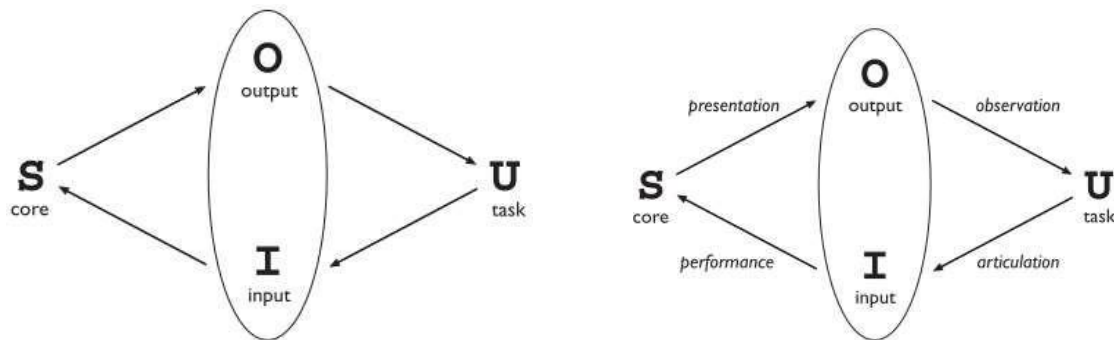
### **6.Explain the framework of human computer interaction(13)**

- There are a number of ways in which the user can communicate with the system.
- batch input, in which the user provides all the information to the computer at once and leaves the machine to perform the task.
- an interaction between the user and computer
- Here the user is constantly providing instruction and receiving feedback. The interface must therefore effectively translate between them to allow the interaction to be successful.
- This translation can fail at a number of points and for a number of reasons. **The terms of interaction:**
- A goal is the desired output from a performed task.
- An intention is a specific action required to meet the goal.  
The System's language refer to as the core language  
the User's language we will refer to as the task language.
- The core language describes computational attributes of the domain relevant to the System state,

### **The execution–evaluation cycle:**

- Norman's model of interaction which is then executed at the computer interface.  
The interactive cycle can be divided into two major phases:  
execution and evaluation.  
These can then be subdivided into further stages, seven in all. The stages in Norman's model of interaction are as follows:
  - a. Establishing the goal.
  - b. Forming the intention.
  - c. Specifying the action sequence.
  - d. Executing the action.
  - e. Perceiving the system state.
  - f. Interpreting the system state.
- Evaluating the system state with respect to the goals and intentions. First the user forms a goal.
- it can be executed by the user.

- The nodes represent the four major components in an interactive system –
  - the System, the User, the Input and the Output.
  - Each component has its own language.
    - the User's task language and the System's core language,
  - The User begins the interactive cycle with the formulation of a goal and a task to achieve that goal.
- There are four main translations involved in the interaction: articulation, performance, presentation and observation



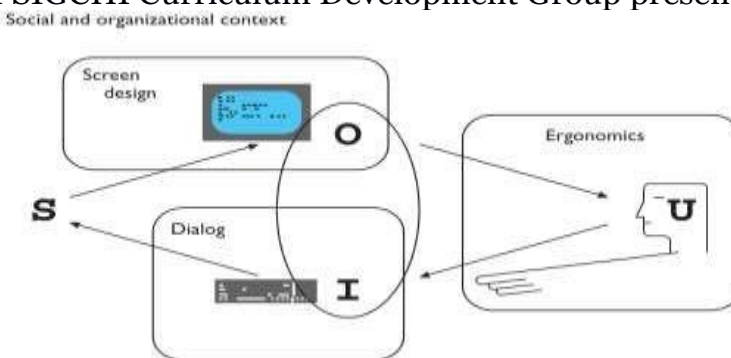
**Fig.a.General Interaction Framework**

**b.Translations between components**

- the responses of the Input are translated to stimuli for the System.
- The response from the Output is translated to stimuli for the User which trigger assessment.
- The observation translation will address the ease and coverage of this final translation.

### FRAMEWORKS

- The ACM SIGCHI Curriculum Development Group presents a framework



### A framework for human-computer interaction

- Presentation and screen design relates to the output branch of the framework.
- A framework for human-computer interaction.

### 7.Explain in detail about ergonomics(13)

- how the controls are designed
- the physical environment in which the interaction takes place

#### • Arrangement of controls and displays:

- Sets of controls and parts of the display should be grouped
- users are under pressure and are faced with a huge range of displays and controls.
- frequency controls and displays are organized according to how frequently they are used

### The physical environment of the interaction:

- ergonomics is concerned with the design of the work environment itself.
- reach all the controls
- All users should be comfortably able to see critical displays.

**Health issues:**

aircraft crashing, nuclear plant leaks and worse

**Physical position:**

- ☐ if sitting, should be provided with back support.
- ☐ for example, in typing support should be provided to allow rest.

**Temperature:**

- hot or cold will affect performance
- high or low temperatures

**Lighting:**

- ☐ The light source should also be positioned to avoid glare affecting the display.

**Noise:**

- Excessive noise can be harmful to health,
- causing the user pain
- acute cases
- loss of hearing.

**Time:**

- The time users spend using the system should also be controlled.
- CRT displays can be harmful to users

**The use of color:**

- ☐ the use of color in displays is an ergonomics issue.
- ☐ low blue acuity

**8.Outline the common interface styles used in interactive system(13)**

- ☐ The choice of interface style can have a profound effect on the nature.

There are a number of common interface styles including

- command line interface
- menus
- natural language
- question/answer and query dialog
- form-fills and spreadsheets
- WIMP
- point and click
- three-dimensional interfaces.

As the WIMP interface is the most common and complex.

**Command line interface:**

- Command line interfaces are powerful in that they offer direct access to system functionality
- Commands must be remembered
- Typical example: the Unix system

**Menus:**

- In a menu-driven interface, the set of options available to the user is displayed on the screen,
- selected using the mouse,
- numeric or alphabetic keys.
- Often menus are hierarchically ordered
- by entering the associated number, or
- by moving around the menu with the arrow keys.

```

PAYMENT DETAILS                                P3-7

please select payment method:
1. cash
2. check
3. credit card
4. invoice

9. abort transaction
  
```

**Fig.: Menu-driven interface**

**Natural language:**

- Natural language understanding, both of speech and written input
- The use of natural language in restricted domains is relatively successful
  - Language is by nature vague and imprecise:
- flexibility and allows creativity in expression
- **Question/answer and query dialog:**
  - Question and answer dialog is a simple mechanism for providing input to an application in a specific domain.
  - The user is asked a series of questions (mainly with yes/no responses, multiple choice, or codes)
  - These interfaces are easy to learn and use, but are limited in functionality and power.
  - Query languages, are used to construct queries to retrieve information from a database.

**Form-fills and spreadsheets:**

- ☐ Form-filling interfaces are used primarily for data entry
- ☐ data retrieval applications
- ☐ The user works through the form, filling in appropriate values.
  - The data are then entered into the application in the correct place.
- ☐ require correction facilities
- Spreadsheets are a sophisticated variation of form filling.
- ☐ The user can enter and alter values and formulae in any order
- Spreadsheets are an attractive medium for interaction **WIMP:**
  - ☐ WIMP stands for windows, icons, menus and pointers (sometimes windows, icons, mice and pull-down menus), and is the default interface style for the majority of interactive computer systems in use today, especially in the PC and desktop workstation arena.
  - ☐ Examples of WIMP interfaces include Microsoft Windows for IBM PC compatibles, MacOS for Apple Macintosh compatibles and various X Windows-based systems for UNIX.

**Point and click:**

- single click of the mouse button.
- point a city on a map
- click a window opens, showing you tourist information about the city.
- use of buttons

**Three-dimensional interfaces:**

- ☐ The simplest technique is where ordinary WIMP elements, buttons, scroll bars
- ☐ text area, border and menu.

A more complex technique uses interfaces with 3D workspaces



## 9.Explain the elements of wimp interface(13)

- ☐ WIMP stands for windows, icons, menus and pointers
  - elements of the WIMP interfaces are called widgets,

- **Windows:**

- Windows are areas of the screen
- A window can usually contain text or graphics, and can be moved or resized.
- More than one window can be on a screen at once
- If one window overlaps the other, the back window is partially obscured, and then refreshed when exposed again.
- Overlapping windows can cause problems
- it can be selected by the user..
  - Scrollbars, allowing the user to move the contents of the window up and down,

- **Icons:**

- ☐ A small picture is used to represent a closed window
- ☐ many windows can be available on the screen at the same time,
- ☐ The icon saves space on the screen

**Pointers:**

- The pointer is an important component of the WIMP interface
- joysticks and trackballs
  - different shapes of cursor are often used to distinguish modes

for example the normal pointer cursor may be an arrow,

**Menus:**

- ☐ A menu is an interaction technique
- ☐ The pointing device is used to indicate the desired option.
- ☐ As the pointer moves to the position of a menu item, the item is usually highlighted
- pressing a button on the mouse that controls the pointer cursor on the screen or
- pressing some special key on the keyboard.
- ☐ Menus are inefficient when they have too many items,
- ☐ cascading menus are utilized,
- ☐ Menu bars are often placed at the top of the screen or at the top of each window.





**Fig.: Elements of the WIMP interface**

**Buttons:**

- Buttons are individual and isolated regions within a display that can be selected by the user to invoke specific operations.
- ‘Pushing’ the button invokes a command, the meaning of which is usually indicated by a textual label or a small icon.
- Buttons can also be used to toggle between two states, displaying status information or selecting options on a web form.
- toggle buttons can be grouped together to allow a user to select one
  - feature
  - a set of toggle buttons can be used to indicate the on/off status of the options.

**Toolbars:**

- Many systems have a collection of small buttons, each with icons, placed at the top or side of the window and offering commonly used functions.
- The function of this toolbar is similar to a menu bar

**Palettes:**

- ☐ interaction can enter one of several modes.
- ☐ Palettes are a mechanism for making the set of possible modes and the active mode visible to the user.
- A palette is usually a collection of icons that are reminiscent of the purpose of the various modes.
- **Dialog boxes:**
  - ☐ Dialog boxes are information windows used by the system to bring the user’s attention to some important information
  - ☐ used to invoke a subdialog between user and system for a very specific task
  - ☐ When the user or system wants to save the file, a dialog box can be used to allow the user to name the file
  - ☐ When the save subdialog is complete, the dialog box will disappear.

**10 Explain the paradigms for interaction(13)**

- ☐ Paradigms is
  - Predominant theoretical frameworks or scientific world views
    - e.g., Aristotelian, Newtonian, Einsteinian (relativistic) paradigms in physics
  - Understanding HCI history is largely about understanding a series of paradigm shifts
    - Not all listed here are necessarily “paradigm” shifts, but are at least candidates
    - History will judge which are true shifts

**Paradigms of interaction**

- Batch processing
- Time-sharing
- Networking
- Graphical displays
- Microprocessor
- WWW
- Ubiquitous Computing

**Time-sharing**

- 1940s and 1950s – explosive technological growth
- 1960s – need to channel the power
- J.C.R. Licklider at ARPA

- single computer supporting multiple users

#### Video Display Units

- more suitable medium than paper
- 1962 – Sutherland's Sketchpad
- computers for visualizing and manipulating data
- one person's contribution could drastically change the history of computing

#### Programming toolkits

- Engelbart at Stanford Research Institute
- 1963 – augmenting man's intellect
- 1968 NLS/Augment system demonstration
- the right programming toolkit provides building blocks to producing complex interactive systems

#### Personal computing

- 1970s – Papert's LOGO language for simple graphics programming by children
- A system is more powerful as it becomes easier to user
- Future of computing in small, powerful machines dedicated to the individual
- Kay at Xerox PARC – the Dynabook as the ultimate personal computer

#### Window systems and the WIMP interface

- humans can pursue more than one task at a time
- windows used for dialogue partitioning, to “change the topic”
- 1981 – Xerox Star first commercial windowing system
- windows, icons, menus and pointers now familiar interaction mechanisms

#### Metaphor

- relating computing to other real-world activity is effective teaching technique
  - LOGO's turtle dragging its tail
  - file management on an office desktop
  - word processing as typing
  - financial analysis on spreadsheets
  - virtual reality – user inside the metaphor
- Problems
  - some tasks do not fit into a given metaphor
  - cultural bias

#### Direct manipulation

- 1982 – Shneiderman describes appeal of graphically-based interaction
  - visibility of objects
  - incremental action and rapid feedback
  - reversibility encourages exploration
  - syntactic correctness of all actions
  - replace language with action
  - 1984 – Apple Macintosh
- the model-world metaphor
- What You See Is What You Get (WYSIWYG)

#### Language versus Action

- actions do not always speak louder than words!
- DM – interface replaces underlying system
- language paradigm
- interface as mediator
- interface acts as intelligent agent
- programming by example is both action and language

#### Hypertext

- 1945 – Vannevar Bush and the memex
- key to success in managing explosion of information

- mid 1960s – Nelson describes hypertext as non-linear browsing structure
- hypermedia and multimedia
- Nelson's Xanadu project still a dream today

#### Multimodality

- a mode is a human communication channel
- emphasis on simultaneous use of multiple channels for input and output

#### Computer Supported Cooperative Work (CSCW)

- CSCW removes bias of single user / single computer system
- Can no longer neglect the social aspects
- Electronic mail is most prominent success

#### The World Wide Web

- Hypertext, as originally realized, was a closed system
- Simple, universal protocols (e.g. HTTP) and mark-up languages (e.g. HTML) made publishing and accessing easy
- Critical mass of users lead to a complete transformation of our information economy.

#### Agent-based Interfaces

- Original interfaces
  - Commands given to computer
  - Language-based
- Direct Manipulation/WIMP
  - Commands performed on “world” representation
  - Action based
- Agents - return to language by instilling proactivity and “intelligence” in command processor
  - Avatars, natural language processing

#### Ubiquitous Computing

“The most profound technologies are those that disappear.”

Mark Weiser, 1991

Late 1980's: computer was very apparent

How to make it disappear?

- Shrink and embed/distribute it in the physical world
- Design interactions that don't demand our intention

#### Sensor-based and Context-aware Interaction

- Humans are good at recognizing the “context” of a situation and reacting appropriately
- Automatically sensing physical phenomena (e.g., light, temp, location, identity) becoming easier

## UNIT 2 - DESIGN & SOFTWARE PROCESS

### 1.Explain in detail the interactive design pocess(13)

**A simple definition of design is: achieving goals within constraints**

- goals - purpose
  - who is it for, why do they want it
- constraints
  - materials, platforms used
- trade-offs

### **The golden rule of design**

- understand computers
  - limitations, capacities, tools, platforms
- understand people
  - psychological, social aspects, human error.

### **To err is human**

- People make mistakes.
- strengthen the constructionunderstand the way human failures occur and build the rest of the interface accordingly

## **THE PROCESS OF DESIGN**

- A system has been designed
- four main phases plus an iteration loop, focused on the design of interaction.
  - **Requirements: what is wanted**
    - first stage is establishing what exactly is needed.
  - **Analysis:** The results of observation and interview need to be ordered in some way to bring out key issues and communicate with later stages of design.
  - **Design:** There are numerous rules, guidelines and design principles that can be used to help.
  - **Iteration and prototyping:** to evaluate a design to see how well it is working and where there can be improvements
  - **Implementation and deployment:** writing code, perhaps making hardware, writing documentation and Fig: Interface Design Process

## **USER FOCUS**

### **Know your user**

know your user

- The start of any interaction design exercise must be the intended user or users.
  - **Who are they?:**
  - **Probably not like you!:**
  - **Talk to them:**
  - **Watch them:**

### **Persona**

- description of an 'example' user
  - not necessarily a real person
- use as substitute user

### **Cultural probes**

Cultural probes are small packs of items designed to provoke and record comments in various ways.

## 2 Explain in detail about scenarios(6)

- Scenarios are stories for design: rich stories of interaction. This gives answers for the following questions
  - what will users want to do?
  - step-by-step walkthrough
    - what can they see (sketches, screen shots)
    - what do they do (keyboard, mouse etc.)
    - what are they thinking?
  - use and reuse throughout design

Scenarios can be used to:

- i) Communicate with others** – other designers, clients or users.
- ii) Validate other models** A detailed scenario can be ‘played’ against various more formal representations such as task models or dialog and navigation models.
- iii) Express dynamics** Individual screen shots and pictures
- iv) Time is linear** Our lives are linear as we live in time and so we find it easier to understand simple linear narratives.
- v) But no alternatives** Real interactions have choices, some made by people, some by systems.

## 3. Explain in detail navigation(13)

- The object of design is not just a computer system or device, but the socio-technical intervention as a whole.
- a. Widgets** The appropriate choice of widgets and wording in menus and buttons will help you know how to use them for a particular selection or action.
- b. Screens or windows** You need to find things on the screen, understand the logical grouping of buttons.
- c. Navigation within the application** You need to be able to understand what will happen when a button is pressed, to understand where you are in the interaction.

PC application	Website	Physical device
Widgets	Form elements, tags and links	Buttons, dials, lights, displays
Screen design	Page design	Physical layout
Navigation design	Site structure	Main modes of device
Other apps and operating system	The web, browser, external links	The real world!

**d. Environment** The word processor has to read documents from disk, perhaps some are on remote networks.

**e.** two main kinds of issue:

- local structure
  - looking from one screen or page out
- global structure

- structure of site, movement between screens.

### Local Structure

- Much of interaction involves goal-seeking behavior.
  - each state of the system or each screen needs to give the user enough knowledge of what to do to get closer to their goal.
  - knowing where you are
  - knowing what you can do
  - knowing where you are going – or what will happen
  - knowing where you've been – or what you've done.

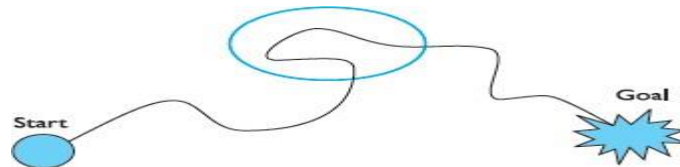
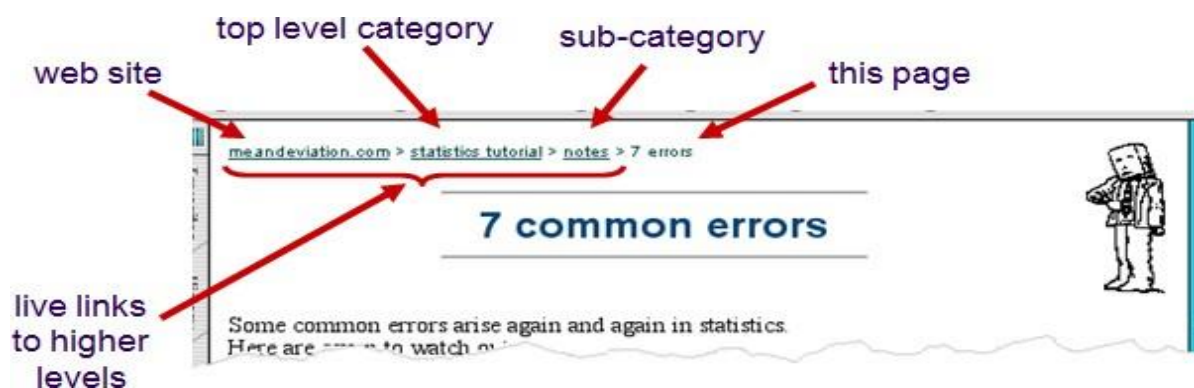


Fig. Local Structure

### Four golden rules

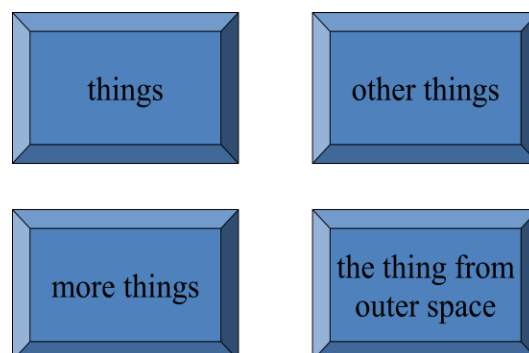
- knowing where you are
- knowing what you can do
- knowing where you are going
  - or what will happen
- knowing where you've been
  - or what you've done

### Where you are



navigation system that shows a user's location in a site or web app.

### beware the big button trap



Public information systems often have touch screens and so have large buttons.

### Modes

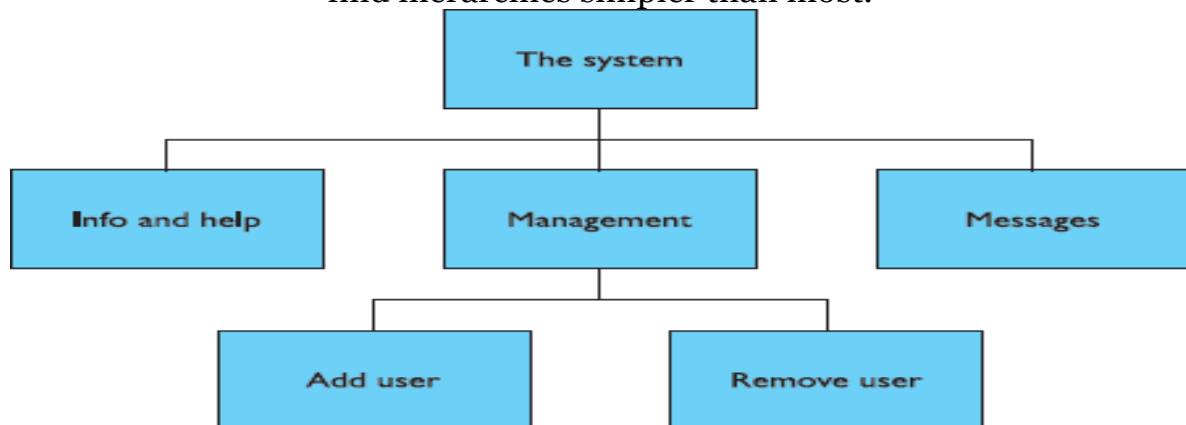
- lock to prevent accidental use ...
  - remove lock - 'c' + 'yes' to confirm

- frequent practiced action
- if lock forgotten
  - in pocket ‘yes’ gets pressed
  - goes to phone book
  - in phone book ...
    - ‘c’ – delete entry
    - ‘yes’ – confirm
    - ... oops !



### Global Structure – Hierarchical Organization

- This is the way the various screens, pages or device states link to one another.
- One way to organize a system is in some form of hierarchy.
- The hierarchy links screens, pages or states in logical groupings.
- Any sort of information structuring is difficult, but there is evidence that people find hierarchies simpler than most.

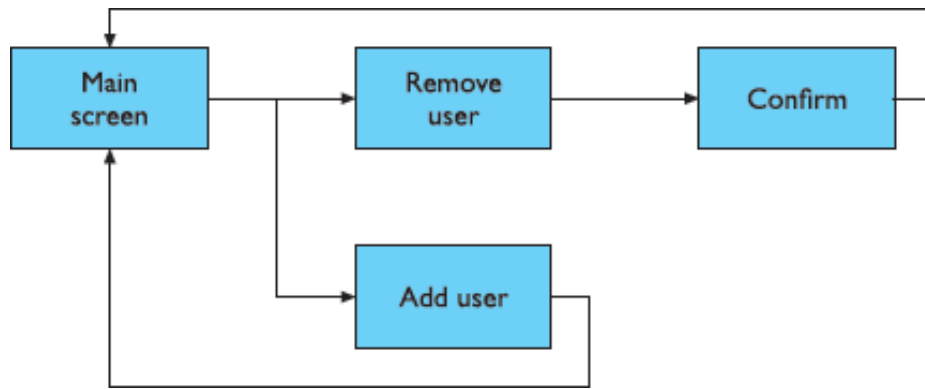


**Fig: Application Functional Hierarchy**

### Global structure – dialog

- A pure information system or static website
- there are ways of getting more quickly from place to place.
- These cross-links in hierarchies, when you get down to detailed interactions, such as editing or deleting a record, there is obviously a flow of screens and commands that is not about hierarchy.
- Consider the following fragment from a marriage service:
  - Minister: Do you name take this woman . . .
  - Man: I do
  - Minister: Do you name take this man . . .
  - Woman: I do
  - Minister: I now pronounce you man and wife





**Fig: Network of screens/states**

- It shows a network diagram illustrating the main screens for adding or deleting a user from the messaging system
- The arrows show the general flow between the states.

**Wider still**

Donne said 'No man is an Iland, intire of it selfe'

- **Style issues**

positions for menus on a PC application, to ensure consistency between applications.

- **Functional issues** interact with files, read standard formats and be able to handle cut and paste.
- **Navigation issues** to support linkages between applications,

#### 4. Discuss the screen design and layout(13)

A single screen image often has to present information clearly and also act as the locus for interacting with the system.

**Ask:** What is the user doing?

**Think** What information is required? What comparisons may the user need to make? In what order are things likely to be needed?

**Design** Form follows function: let the required interactions drive the layout.

#### Tools for layout

- number of visual tools available to Available tools
  - **Grouping of items**
  - **Order of items**
  - **Decoration - fonts, boxes etc.**
  - **Alignment of items**
  - **White space between items**

#### a. Grouping and structure

- If things logically belong together, then we should normally physically group them together.



- details for billing and delivery are grouped together
- 

<b>Billing details:</b>		<b>Delivery details:</b>	
Name:		Name:	
Address: ...		Address: ...	
Credit card no:		Delivery time:	
<hr/>			
<b>Order details:</b>			
item	quantity	cost/item	cost
size 10 screws (boxes)	7	3.71	25.97
... ..	...	...	...

- Fig:rouping Related Items in an order screen

This reflects the following logical structure:

Order:

Administrative information

Billing details

Delivery details

Order information

Order line 1

Order line 2

...

#### b. Order of groups and items

- reading or filling in the billing details first, followed by the delivery details, followed by the individual order items

#### c. Decoration

- decorative features like font style, and text or background colors can be used to emphasize groupings.
- use boxes to group logical items
- use fonts for emphasis, headings

<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; width: 30px; height: 20px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px;"></div> </div> <div style="border: 1px solid black; width: 100%; height: 20px;"></div> </div>					
<b>A B C D E F G H I J K L M</b> <b>N O P Q R S T U V W X Y Z</b>					

#### d. Alignment

Alan Dix  
 Janet Finlay  
 Gregory Abowd  
 Russell Beale

(i)

Alan	Dix
Janet	Finlay
Gregory	Abowd
Russell	Beale

(ii)

Dix, Alan  
 Finlay, Janet  
 Abowd, Gregory  
 Beale, Russell

(iii)

**Fig: Looking up surnames**

## Alignment - numbers

Difficult to identify the biggest number because of unaligned numbers.

visually:  
long number = big number

align decimal points  
or right align integers

627.865
1.005763
382.583
2502.56
432.935
2.0175
652.87
56.34

- Alignment of lists is also very important.
- Items like names are particularly difficult. Multiple column lists require more care.

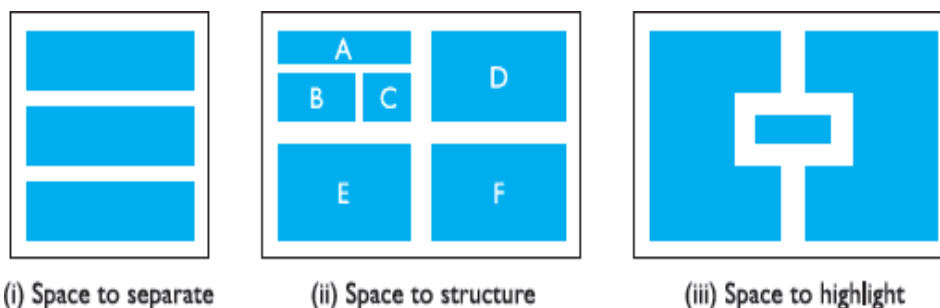
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fruit gums	27																				
coconut dreams	85																				
(iii)	(iv)																				

- Text columns have to be wide enough for the largest item,

**Fig: Managing Multiple Columns**

## e. White space

- The space between the letters is called the counter.
- focus the space between the foreground elements such as figures and buildings as on the elements themselves.
- If one ignores the 'content' of a screen and instead concentrates on the counter – the space between the elements – one can get an overall feel for the layout
- Space can be used in several ways.
- We can see space used to separate blocks as you often see in gaps between paragraphs or space between sections in a report.
- Space can also be used to create more complex structures.



**Fig: Using white space in layout**

(ii) There are clearly four main areas: ABC, D, E and F. Within one of these are three further areas, A, B and C, which themselves are grouped as A on its own, followed by B and C together.

(iii) We can see space used to highlight. This is a technique used frequently in magazines to highlight a quote or graphic.

**Example : physical controls in Microwave control panel**

**grouping of items**

defrost settings

type of food

time to cook



• grouping of items

• order of items

- 1) type of heating
- 2) temperature
- 3) time to cook
- 4) start



- grouping of items
- order of items
- decoration

different colours for  
different functions

lines around related  
buttons (temp up/down)



## physical controls

- grouping of items
- order of items
- decoration
- alignment

centred text in buttons  
? easy to scan ?



## User Action And Control

### a. Entering information

- places for the user to enter information or select options.
  - o Alignment is still important.

### b. Knowing what to do

- passive, simply giving you information;
- active, expecting you to fill them in, or do something to them.

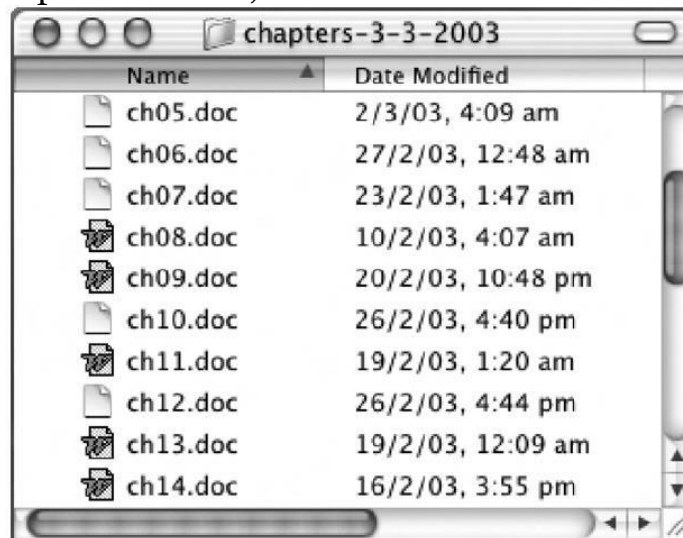
### c. Affordances

- : a handle affords pulling or lifting; a button affords pushing.
- These affordances can be used when designing novel interaction elements.

#### Appropriate appearance

### a. Presenting information

- The way of presenting information on screen depends on the kind of information:
- text, numbers, maps, tables; on the technology available to present it: character display, line drawing, graphics, virtual reality;
- For more complex numerical data,
  - it is easy to allow the user to choose among several representations,



Alphabetic file listing.

### b. Aesthetics and utility

- excessively complex and strong backgrounds because they look good.

### c. Making a mess of it: color and 3D

- appalling use of color.
- a limited range of primary colors users.
- color should be used sparingly and not relied upon to give information, but rather to reinforce other attributes.

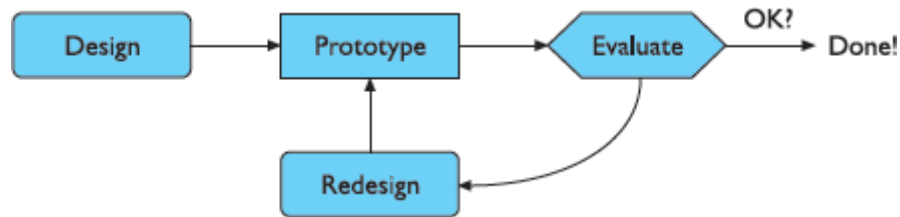
### d. Localization / internationalization

- The process of making software suitable for different languages and cultures is called localization or internationalization.

## 5. Illustrate the iteration and prototyping in interaction design(7)

- paper designs and storyboards being demonstrated to colleagues and potential users.
- paper-based or running software
- This is in contrast to summative evaluation, which is performed at the end to verify whether the product is good enough
- The result of evaluating the system will usually be a list of faults or problems.

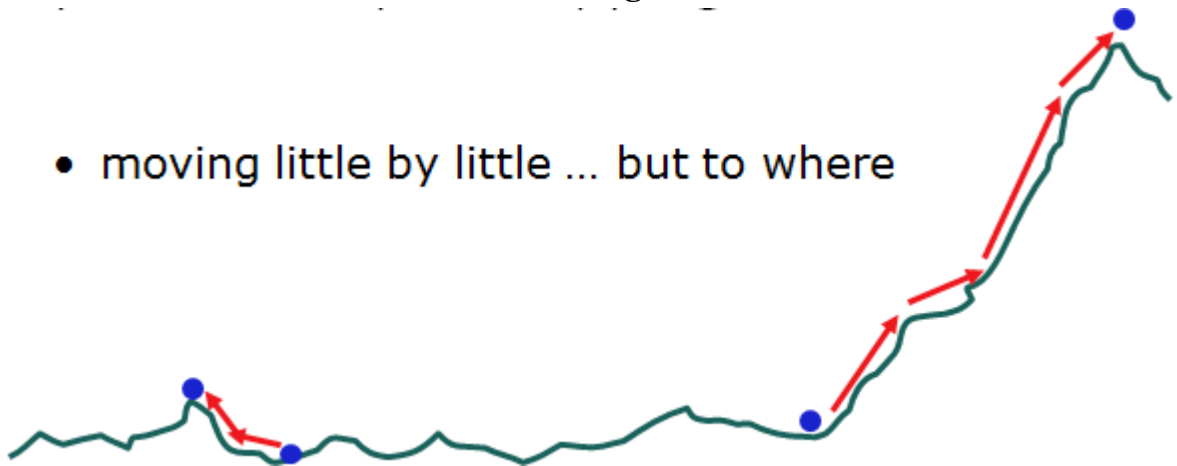
- The end point is when there are no more problems that can economically be fixed.
- iteration and prototyping are the universally accepted 'best practice' approach for interaction design.
- Prototyping is an example of what is known as a hill- climbing approach.



**Fig: Role of Prototyping**

- there are two things you need in order for prototyping methods to work:
  1. To understand what is wrong and how to improve.
  2. A good start point.
- The first is obvious;
- The second, to avoid local maxima.
- pitfalls of prototyping
  - 1. need a good start point
  - 2. need to understand what is wrong

- moving little by little ... but to where



## 6. Explain in detail about software life cycle(13)

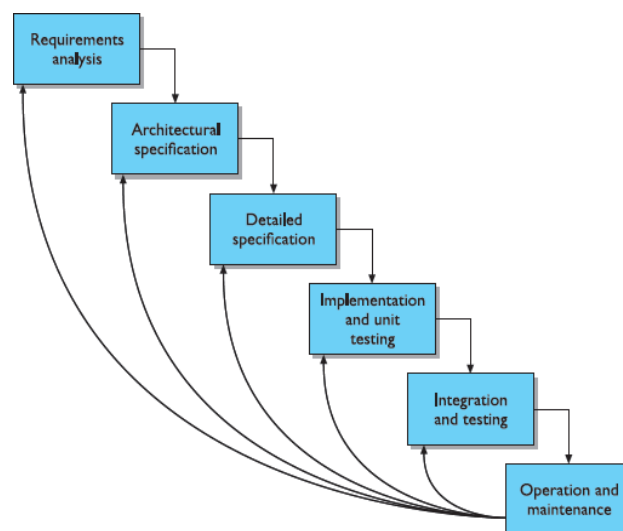
- it provides the structure for applying techniques to develop software systems.
- The software life cycle is an attempt to identify the activities that occur in software development.
- These activities must then be ordered in time in any development project and appropriate techniques must be adopted to carry them through.
- In the development of a software product, we consider two main parties:
- the customer who requires the use of the product and
- the designer who must provide the product
- ☐ These two roles of customer can be played by different people. Activities in the life cycle
- The graphical representation is reminiscent of a waterfall, in which each activity naturally leads into the next.
- The analogy of the waterfall is not completely faithful to the real relationship between these activities, but it provides a good starting point.

### Requirements specification

- It involves eliciting information from the customer about the work environment.
- the requirements are from the customer's perspective,
- Requirements are usually initially expressed in the native language of the customer.

### Architectural design

- The next activities concentrate on how the system provides the services expected from it.
- An architectural design performs this decomposition.



- There are many structured techniques

### Fig: Feedback from maintenance activity to other design activity Detailed design

- The detailed design is a refinement of the component description provided by the architectural design.
- Choosing the best refinement
- After coding, the component can be tested to verify that it performs correctly, according to some test criteria.

### Integration and testing

- Enough components have been implemented and individually tested, they must be integrated



- time to perform some acceptance testing with the customers Maintenance
- Category of maintenance.

### Validation and verification

- the design must be checked to ensure that it both satisfies the high-level requirements agreed with the customer

These checks are referred to as validation and verification.

Verification of a design will most often occur within a single life-cycle activity or between two adjacent activities.

- The detailed description will introduce more information in refining the general specification.
- Validation of a design demonstrates that within the various activities the customer's requirements are satisfied.
- Proofs that are for verification of a design can frequently occur within one language or between two languages which both have a precise mathematical semantics.
- ty gap.

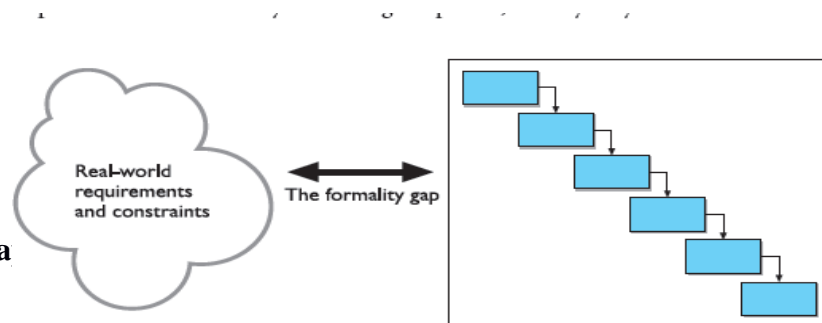


Fig: The formality gap

### Interactive systems and the software life cycle

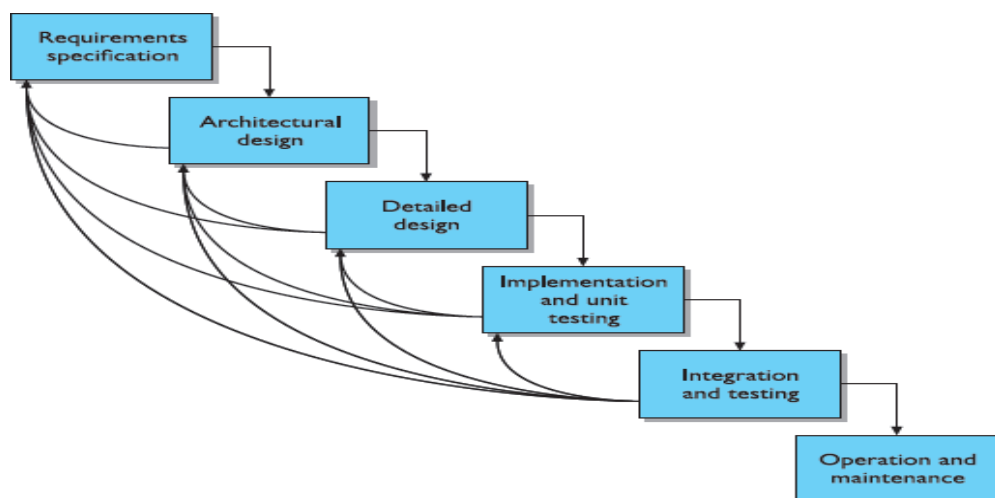


Fig: Representing Iteration in the Waterfall Model

- to design in order to attain the goal.
- evaluated in order to determine how to make them more usable.



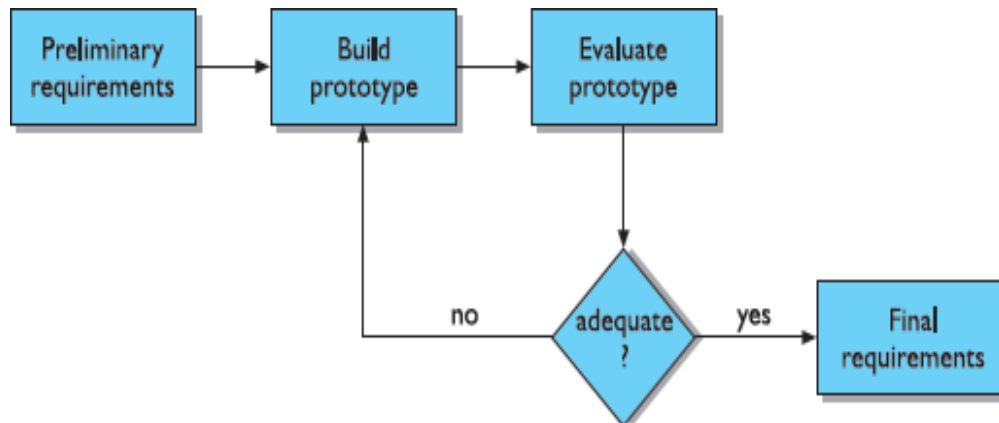
## PROTOTYPING IN PRACTICE

- simulate or animate
  - throw-away
  - incremental
  - Evolutionary

### a. Throw-away :

The prototype is built and tested.

The design knowledge gained from this exercise is used to build the final



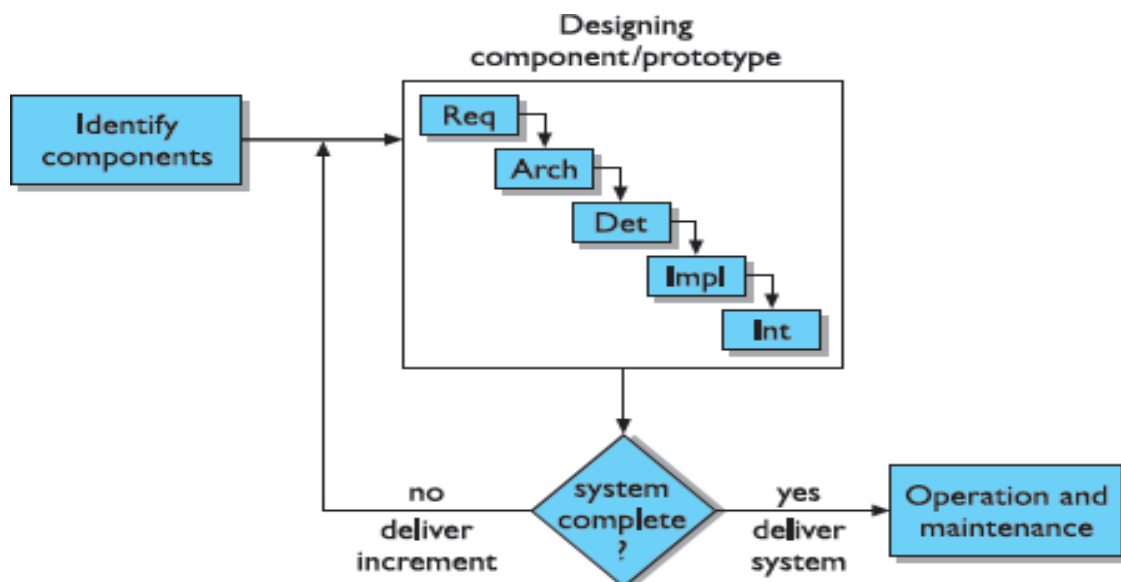
product, but the actual prototype is discarded.

**Fig: Throw-away prototyping with requirement specification**

### a. Incremental:

The final product is built as separate components, one at a time.

There is one overall design for the final system, but it is partitioned into independent and smaller components.



**Fig: Incremental prototyping within the life cycle**

- **Evolutionary:**

- Evolutionary prototyping also fits in well with the modifications which must be made to the system that arise during the operation and maintenance activity in the life cycle.
- Prototypes differ according to the amount of functionality and performance

- The prototype of an interactive system is used to test requirements by evaluating their impact with real users..

**a. Time** Building prototypes takes time

**b. Planning** The project managers do not have the experience necessary for adequately planning and costing a design process which involves prototyping.

**c. Non-functional features**

safety and reliability

**Contracts** The design process is often governed by contractual agreements between customer and designer

Techniques for prototyping

**a. Storyboards:** Storyboards do not require much in terms of computing power to construct;

**b. Limited functionality simulations:** The functionality must be built into the prototype

to demonstrate the work that the application will accomplish.

**High-level programming support:** HyperTalk was an example of a special purpose high-level programming language

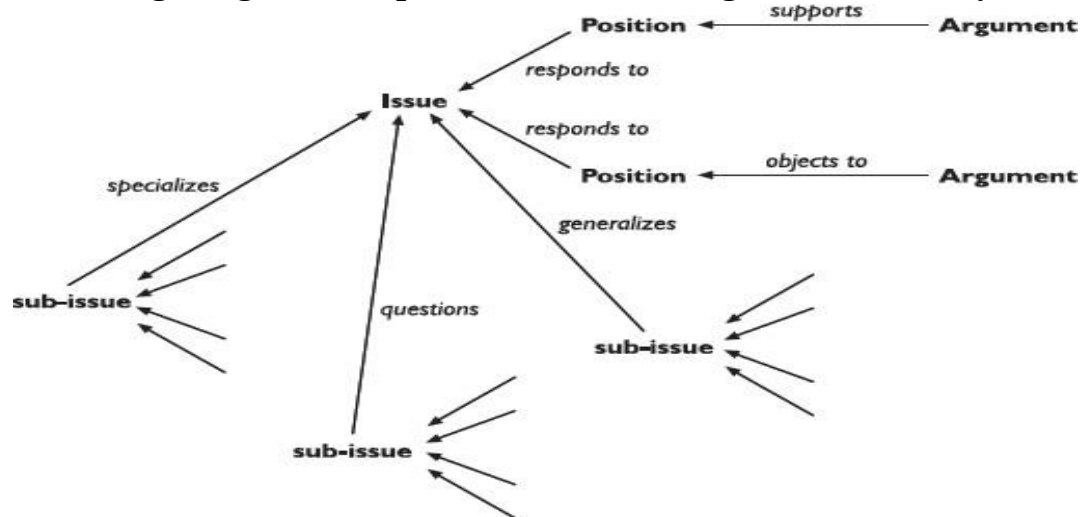
**Warning about iterative design**

- The ideal model of iterative design, in which a rapid prototype is designed with two problems.
  - i) First, it is often the case that design decisions made at the very beginning of the prototyping process
  - ii) Second problem is slightly more subtle, and serious.

**7. Discuss in detail about design rationale(13)**

- ❖ Design rationale is the information that explains why a computer system is the way it is,
- ❖ no single best design alternative.
- ❖ Even if an optimal solution did exist for a given design decision,
- The usability of an interactive system is very dependent on the context of its use. There are some issues
- One issue is the degree to which the technique impinges on the design process.
- Another issue is the cost of using the technique,
- In IBIS (pronounced 'ibbiss'), a hierarchical structure to a design rationale is created.
- A root issue is identified which represents the main problem or question that the argument is addressing.
- Each position is then supported or refuted by arguments, which modify the relationship between issue and position.
- The hierarchy grows as secondary issues are raised which modify the root issue in some way.

- Each of these secondary issues is in turn expanded by positions and arguments, further sub-issues, and so on
  - A graphical version of IBIS has been defined by Conklin and Yakemovic [77], called gIBIS (pronounced 'gibbiss'), Fig 2.16: Structure of a gIBIS rationale
- The above Figure gives a representation of the gIBIS vocabulary. Issues,

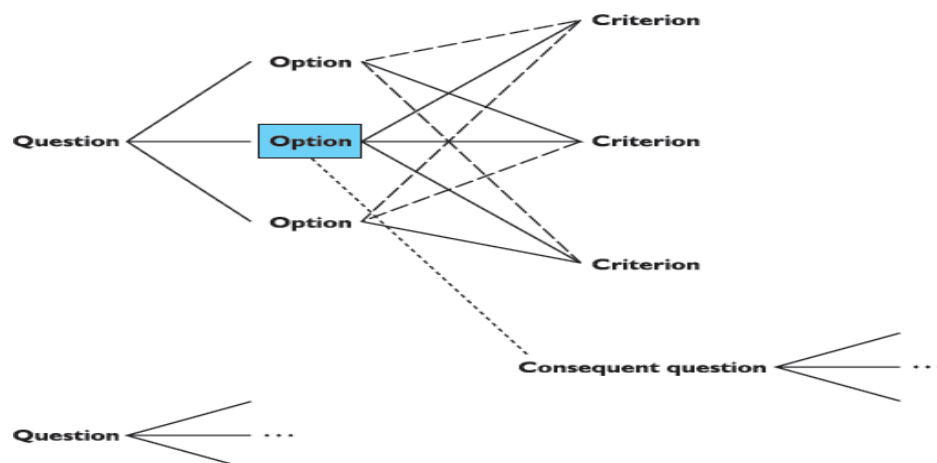


positions and arguments are nodes in the graph

- the connections between them are labeled to clarify the relationship between adjacent nodes.

### Design space analysis

- MacLean and colleagues have proposed
- Questions, Options and Criteria (QOC) notation, is characterized as design space analysis.



**Fig: QOC notation**

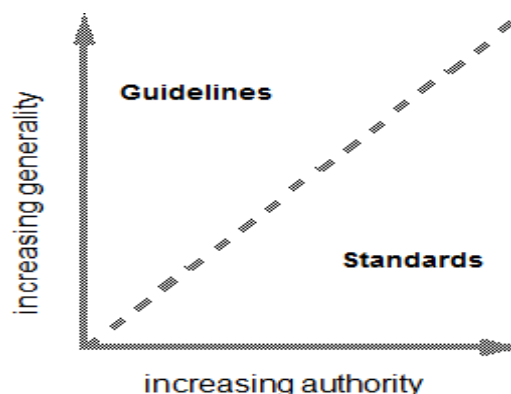
- The design space is initially structured by a set of questions representing the major issues of the design..
- the right questions to use to structure the space and the correct criteria to judge the options.
- Another structure- oriented technique, called Decision Representation Language (DRL), developed by Lee and Lai,
- The questions, options and criteria in DRL are given the names: decision problem, alternatives and goals.

## Psychological design rationale

- The psychological design rationale has been introduced by Carroll and Rosson,
- This task identification serves as part of the requirements for the new system
- Carroll refers to this real-life phenomenon as the task–artifact cycle.
- The purpose of psychological design rationale is to support this natural task artifact cycle of design activity.

8. Discuss in detail about design rules and principles (13)

- **Design** – the goal driven problem solving process
- **Design rules** – a designer can follow in order to increase the usability of the eventual software product.
- **authority** 7 mean an indication of whether or not the rule must be followed in design or whether it is only suggested.
- **Generality** 7 mean whether the rule can be applied to many situations
- We will consider a number of different types of design rules.
  - a) **Principles** are abstract design rules, with high generality and low authority.
  - b) **Standards** are specific design rules, high in authority and limited in application.
  - c) **Guidelines** tend to be lower in authority and more general in application.
- Design rules for interactive systems can be supported by psychological, cognitive, ergonomic, sociological, economic or computational theory, which may or may not have roots in empirical evidence.



- Principles are derived from knowledge of the psychological, computational
- Guidelines are less abstract

## PRINCIPLES

1. **Learnability** – the ease with which new users can begin effective interaction and achieve maximal performance.
2. **Flexibility** – the multiplicity of ways in which the user and system exchange information.
3. **Robustness** – the level of support provided to the user in determining successful achievement and assessment of goals.

### 9. Discuss the Shneiderman's Eight Golden Rules of Interface Design(7)

1. Strive for consistency in action sequences, layout, terminology, command use and so on.
2. Enable frequent users to use shortcuts,
3. Offer informative feedback for every user action, at a level appropriate to the magnitude of the action.
4. Design dialogs to yield closure so that the user knows when they have completed a task.
5. Offer error prevention and simple error handling
6. Permit easy reversal of actions
7. Support internal locus of control so that the user is in control of the system,
  - Reduce short-term memory load by keeping displays simple,

### 10. Discuss the Norman's Seven Principles for Transforming Difficult Tasks into Simple Ones(7)

1. Use both knowledge in the world and knowledge in the head.
2. Simplify the structure of tasks.
3. Make things visible:
4. Get the mappings right.
5. Exploit the power of constraints, both natural and artificial.
6. Design for error.
7. When all else fails, standardize.

### 11. Discuss the Nielsen's ten heuristics ( 13 )

- 1. Visibility of system status** Always keep users informed about what is going on, through appropriate feedback within reasonable time.
- 2. Match between system and the real world** The system should speak the user's language, with words, phrases and concepts familiar to the user,
- 3. User control and freedom** Support undo and redo.
- 4. Consistency and standards** Follow platform conventions and accepted standards.
- 5. Error prevention** Make it difficult to make errors.
- 6. Recognition rather than recall** Make objects, actions and options visible.
- 7. Flexibility and efficiency of use** Allow users to tailor frequent actions.
- 8. Aesthetic and minimalist design** Dialogs should not contain information that is irrelevant or rarely needed.
- 9. Help users recognize, diagnose and recover from errors** Error messages should be expressed in plain language
- 10. Help and documentation** Few systems can be used with no instructions so it may be necessary to provide help and documentation.

HCI design patterns

An approach to reusing knowledge about successful design solutions

- Originated in architecture: Alexander
- A pattern is an invariant solution to a recurrent problem within a specific context.
- Examples
  - Light on Two Sides of Every Room (architecture)
  - Go back to a safe place (HCI)
- Patterns do not exist in isolation but are linked to other patterns in *languages* which enable complete designs to be generated
- Characteristics of patterns
  - capture design practice not theory

- capture the essential common properties of good examples of design
- represent design knowledge at varying levels: social, organisational, conceptual, detailed
- are intuitive and readable and can therefore be used for communication between all stakeholders
- a pattern language should be generative and assist in the development of complete designs.

## 12. Discuss about the evaluation techniques (13)

- tests usability and functionality of system
  - occurs in laboratory, field and/or in collaboration with users
  - evaluates both design and implementation
  - should be considered at all stages in the design life cycle
- Evaluation should not be thought of as a single phase in the design process
  - Such techniques help to ensure that the design is assessed continually. This has the advantage that problems can be ironed out before considerable effort and resources have been expended on the implementation itself: it is much easier to change a design in the early stages of development than in the later stages.
  - Evaluation has three main goals:
    - a) To assess the extent and accessibility of the system's functionality
    - b) To assess users' experience of the interaction
    - c) To identify any specific problems with the system.

### Evaluation Techniques

1. Evaluating Designs through Expert Analysis
2. Evaluating Designs through user participation
3. Evaluating Implementations
  - Empirical or experimental methods
  - Observational methods
  - Query techniques
  - Methods that use physiological monitoring

### Evaluation Through Expert Analysis

We will consider four approaches to expert analysis:

- Cognitive Walkthrough
- Heuristic Evaluation
- Model based Evaluation
- Review-based evaluation

#### a. Cognitive walkthrough

**Cognitive** -Psychological processes involved in acquisition and understanding of knowledge, formation of beliefs and attitudes, and decision making and problem solving.

**Cognitive Walkthrough**-usability evaluation method in which one or more evaluators work through a series of tasks and ask a set of questions from the perspective of the user.

Cognitive walkthrough was originally proposed and later revised by Polson and colleagues.

- Walkthroughs require a detailed review of a sequence of actions. need four things:

1. A specification or prototype of the system.

2. A description of the task the user is to perform on the system.

3. An indication of who the users are and what kind of experience and knowledge the evaluators can assume about them.

#### **b. Heuristic evaluation**

**Heuristic** -enabling a person to discover or learn something for themselves

**Heuristic Evaluation**-helps to identify usability problems in the user interface (UI) design. Example heuristics

- system behaviour is predictable
  - system behaviour is consistent
  - feedback is provided
- The evaluator assesses the severity of each usability problem, based on four factors:
    - How common is the problem
    - How easy is it for the user to overcome
    - Will it be a one-off problem or a persistent one
    - How seriously will the problem be perceived

These can be combined into an overall severity rating on a scale of 0–4:

0 = I don't agree that this is a usability problem at all

1 = Cosmetic problem only: need not be fixed unless extra time is available on project

2 = Minor usability problem: fixing this should be given low priority

3 = Major usability problem: important to fix, so should be given high priority

4 = Usability catastrophe: imperative to fix this before product can be released

#### **Model Based Evaluation**

- This evaluation is done with the use of models
- The GOMS (goals, operators, methods and selection) model predicts user performance with a particular interface and can be used to filter particular design options
- Dialog models can also be used to evaluate dialog sequences for problems, such as unreachable states, complexity.
- Models such as state transition networks are useful for evaluating dialog designs prior to implementation

#### **Review-based evaluation**

- Results from the literature used to support or refute parts of design.
- Care needed to ensure results are transferable to new design.
- *Expert review: expertise in the area is required to ensure that correct assumptions are made*

#### **Evaluating through user Participation**

Two distinct evaluation styles

- Laboratory studies
- Field Studies

#### **Laboratory studies**

Advantages:



- specialist equipment available
- uninterrupted environment

Disadvantages:

- lack of context
- difficult to observe several users cooperating

Appropriate

- if system location is dangerous or impractical for constrained single user systems to allow controlled manipulation of use

## Field Studies

Advantages:

- natural environment
- context retained (though observation may alter it)
- longitudinal studies possible

Disadvantages:

- distractions
- noise

Appropriate

- where context is crucial for longitudinal studies

## Evaluating Implementations

It has 4 types.

- Empirical or experimental methods
- Observational methods
- Query techniques
- Methods that use physiological monitoring

### a) Empirical or experimental methods

- Controlled evaluation of specific aspects of interactive behaviour
- Evaluator chooses hypothesis to be tested
- Number of experimental conditions are considered which differ only in the value of some controlled variable.
- Changes in behavioural measure are attributed to different conditions

### Experimental factors

- Participants
  - participants should be chosen to match the expected user population as closely as possible
  - Sample Size chosen
- Variables
  - things to modify and measure
  - **Independent variable (IV)**
  - characteristic changed to produce different conditions
  - e.g. interface style, number of menu items
  - **Dependent variable (DV)**
  - characteristics measured in the experiment
  - e.g. time taken, number of errors
- Hypothesis
  - Prediction of the outcome of an experiment
  - To show that this prediction is correct
- Experimental design



- First phase is to choose the hypothesis: to decide exactly what it is you are trying to demonstrate.
- Next step is to decide on the *experimental method*.
- Two main methods:
  - ***between-subjects***-each participant is assigned to a different condition. At least two conditions: the experimental condition and the control
  - ***within-subjects*** - each user performs under each different condition

#### b) Observational methods

It has the following methods

- Think Aloud & Cooperative evaluation
- Protocol analysis
- Automated analysis
- Post-task walkthroughs

#### Think Aloud &

- User observed performing task
- User asked to describe what he is doing and why, what he thinks is happening etc.
- Advantages
  - simplicity - requires little expertise
  - can provide useful insight
  - can show how system is actually use
- Disadvantages
  - subjective
  - selective
  - act of describing may alter task performance

#### Cooperative evaluation

- variation on think aloud
- user collaborates in evaluation
- both user and evaluator can ask each other questions throughout
- Additional advantages
  - less constrained and easier to use
  - user is encouraged to criticize system
  - clarification possible

#### Protocol analysis

- Paper and pencil – cheap, limited to writing speed
- Audio – good for think aloud, difficult to match with other protocols
- Video – accurate and realistic, needs special equipment
- Computer logging – automatic and modest, large amounts of data difficult to analyze
- User notebooks – coarse and subjective, useful insights, good for longitudinal studies
- Mixed use in practice.
- audio/video transcription difficult and requires skill.
- Some automatic support tools available

### **Automated analysis – EVA(*Experimental Video Annotator*)**

- Workplace project - multimedia workstation with a direct link to a video recorder
- Post task walkthrough
  - user reacts on action after the event
  - used to fill in intention
- Advantages
  - analyst has time to focus on relevant incidents
  - avoid excessive interruption of task
- Disadvantages
  - lack of freshness
  - may be post-hoc interpretation of events

### **Post-task walkthroughs**

- The transcript, whether written or recorded, is replayed to the participant who is invited to comment, or is directly questioned by the analyst.
- In some circumstances the participant cannot be expected to talk during the actual observation.
- Necessary in cases where think aloud is not possible

### **c) Query techniques (Interviews , Questionnaires)**

#### **Interviews**

- Analyst questions user on one-to-one basis usually based on prepared questions
- Informal, subjective and relatively cheap
  - Advantages
    - can be varied to suit context
    - issues can be explored more fully
    - can elicit user views and identify unanticipated problems
- Disadvantages
  - very subjective
  - time consuming

#### **Questionnaires**

- Set of fixed questions given to users
- Advantages
  - quick and reaches large user group
  - can be analyzed more rigorously
- Disadvantages
  - less flexible
  - less probing
- Need careful design
  - what information is required?
  - how are answers to be analyzed?
- Styles of question
  - general
  - open-ended
  - scalar
  - multi-choice
  - ranked

#### **d) Methods that use physiological monitoring**

It has 2 methods

Eye tracking

Physiological measurement

#### **Eye tracking**

- Head or desk mounted equipment tracks the position of the eye
- Eye movement reflects the amount of cognitive processing a display requires
- Measurements include
  - Fixations: eye maintains stable position. Number and duration indicate level of difficulty with display
  - Scan paths: moving straight to a target with a short fixation at the target is optimal

#### **physiological measurements**

- Emotional response linked to physical changes
- These may help determine a user's reaction to an interface
- Measurements include:
  - heart activity, including blood pressure, volume and pulse.
  - activity of sweat glands: Galvanic Skin Response (GSR)
  - electrical activity in muscle: electromyogram (EMG)
  - electrical activity in brain: electroencephalogram (EEG)
- some difficulty in interpreting these physiological responses - more research needed

Data Lab Psychophysiology equipment showing some of the sensors

#### **CHOOSING AN EVALUATION METHOD - Factors distinguishing evaluation techniques**

- the stage in the cycle at which the evaluation is carried out
- the style of evaluation
- the level of subjectivity or objectivity of the technique
- the type of measures provided
- the information provided
- the immediacy of the response
- the level of interference implied
- the resources required.

## UNIT III MODELS AND THEORIES

### 1. Write in detail about the cognitive models(13)

- One way to classify the models is in respect to how well they describe features of the competence and performance of the user
  - a) hierarchical representation of the user's task and goal structure
  - b) linguistic and grammatical models
  - c) physical and device-level models.
    - The first category deals directly with the issue of formulation of goals and tasks.
    - The second deals with the grammar of the articulation translation and how it is understood by the user.
    - The third category again deals with articulation, but at the human motor level instead of at a higher level of human understanding.

### Goal and Task Hierarchies

- To achieve this goal we divide it into several subgoals, say gathering the data together, producing the tables and histograms, and writing the descriptive material.
  - produce report
  - gather data
    - . find book names
    - . . do keywords search of names database
      - <<further subgoals>>
      - . . sift through names and abstracts by hand
        - <<further subgoals>>
    - . search sales database
      - <<further subgoals>>
  - layout tables and histograms
    - <<further subgoals>>
  - write description
    - <<further subgoals>>

### 1. GOMS

- The GOMS model of Card, Moran and Newell is an acronym for Goals, Operators, Methods and Selection [56]. A GOMS description consists of these four elements:
  - a. **Goals:** These are the user's goals, describing what the user wants to achieve.
  - b. **Operators:** These are the lowest level of analysis.
  - c. **Methods :** In GOMS these two goal decompositions are referred to as methods, so we have the **CLOSE-METHOD** and the **L7-METHOD**:
    - GOAL: ICONIZE-WINDOW
    - . [select GOAL: USE-CLOSE-METHOD
    - . . MOVE-MOUSE-TO-WINDOW-HEADER
    - . . POP-UP-MENU
    - . . CLICK-OVER-CLOSE-OPTION
    - GOAL: USE-L7-METHOD
    - . . PRESS-L7-KEY]The dots are used to indicate the hierarchical level of goals.
- **Selection** For instance, a user, Sam, never uses the L7-METHOD, except for one game, 'blocks', where the mouse needs to be used in the game until the very moment the key is pressed. GOMS captures this in a selection rule for Sam:  
User Sam:

- ✓ Rule 1: Use the CLOSE-METHOD unless another rule applies.
- ✓ Rule 2: If the application is 'blocks' use the L7-METHOD.

## 2. Write in detail about the Cognitive complexity theory(7)

- CCT has two parallel descriptions: one of the user's goals and the other of the computer system (called the device in CCT).
  - The description of the user's goals is based on a GOMS-like goal hierarchy
  - *if condition then action*

where condition is a statement about the contents of working memory.

- production rules to obtain the goal tree:
  - GOAL: insert space
  - . GOAL: move cursor – if not at right position
  - . PRESS-KEY-I
  - . PRESS-SPACE
  - . PRESS-ESCAPE

## 3. Write in detail about the Linguistic Models(13)

BNF grammars are frequently used to specify dialogs.

### BNF

- BNF has been used widely to specify the syntax of computer programming languages, and many system dialogs can be described easily using BNF rules.
- For example.
  - draw-line ::= select-line + choose-points+ last-point
  - select-line ::= position-mouse + CLICK-MOUSE
  - choose-points ::= choose-one| choose-one + choose-points
  - choose-one ::= position-mouse + CLICK-MOUSE
  - last-point ::= position-mouse + DOUBLE-CLICK-MOUSE
  - position-mouse ::= empty | MOVE-MOUSE + position-mouse
- The names in the description are of two types: non-terminals, and terminals,
- Non-terminals are higher-level abstractions.
- The non-terminals are defined in terms of other non-terminals and terminals by a definition of the form name ::= expression
- The '::=' symbol is read as 'is defined as'.
- Only non-terminals may appear on the left of a definition.
- The right-hand side is built up using two operators '+' (sequence) and '|' (choice).
  - choose-points ::= position-mouse + CLICK-MOUSE| position-mouse + CLICK-MOUSE + choose-points

### b. Task–action grammar

- Task–action grammar (TAG) attempts to deal with some of these problems by including elements such as parameterized grammar rules to emphasize
  - cp (for copying files), mv (for moving files) and ln (for linking files). copy ::= 'cp' + filename + filename | 'cp' + filenames + directory
  - move ::= 'mv' + filename + filename | 'mv' + filenames + directory
  - link ::= 'ln' + filename + filename | 'ln' + filenames + directory

- Measures based upon BNF could not distinguish between these consistent

commands and an inconsistent alternative consistency.

- Its description of the UNIX commands would be  
file-op[Op] := command[Op] + filename + filename  
| command[Op] + filenames + directory  
command[Op=copy] := 'cp'  
command[Op=move] := 'mv'  
command[Op=link] := 'ln'

#### 4.Explain about the various physical models(13)

##### a. Keystroke-level model

- KLM (Keystroke-Level Model [55]) uses this understanding as a basis for detailed predictions about user performance.
- It does not extend to complex actions such as producing a diagram. The task is split into two phases:
  - acquisition of the task, when the user builds a mental representation of the task;
  - execution of the task using the system's facilities.
- KLM only gives predictions for the latter stage of activity.
  - a. KLM is related to the GOMS model, and can be thought of as a very low level GOMS model where the method is given. K Keystroking, actually striking keys, including shifts and other modifier keys.
  - b. B Pressing a mouse button.
  - c. P Pointing, moving the mouse (or similar device) at a target.
  - d. H Homing, switching the hand between mouse and keyboard.
  - e. D Drawing lines using the mouse.
  - f. M Mentally preparing for a physical action.
  - g. R System response which may be ignored if the user does not have to wait for it, as in copy typing.

The execution of a task will involve interleaved occurrences of the various operators.

- Move hand to mouse H[mouse]
- Position mouse after bad character PB[LEFT]
- Return to keyboard H[keyboard]
- Delete character MK[DELETE]
- Type correction K[char]
- Reposition insertion point H[mouse]MPB[LEFT]

Operator	Remarks	Time (s)
K	Press key	
	good typist (90 wpm)	0.12
	poor typist (40 wpm)	0.28
	non-typist	1.20
B	Mouse button press	
	down or up	0.10
	click	0.20
P	Point with mouse	
	Fitts' law	$0.1 \log_2(D/S + 0.5)$
	average movement	1.10
H	Home hands to and from keyboard	0.40
D	Drawing – domain dependent	–
M	Mentally prepare	1.35
R	Response from system – measure	–

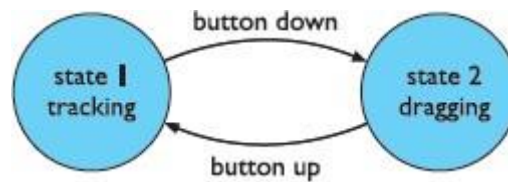
wpm = words per minute

#### Times for various operators in the keystroke level model

##### b. Three-state model

- These different devices – mouse, trackball, light pen – feel very different.
- This tracking behavior is termed state 1. Depressing a button over an icon and

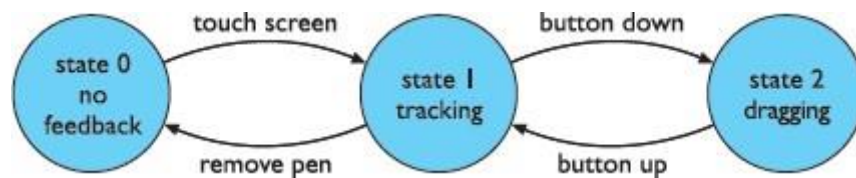
then moving the mouse will often result in an object being dragged about. This he calls state 2.



**: Mouse Transitions : states 1 and 2**

there is no difference between a state 0–2 and a state 0–1 device, there are only the three possibilities we have seen.

- The only additional complexity is if the device has several buttons, in which case we would have one state for each button: 2left, 2middle, 2right.
- 



**Light pen transitions: three states**

- There is a similar difference in tension between state 0 and state 1.
- The constants a and b depend on the particular pointing device used and the skill of the user with that device.

	Device	a (ms)	b (ms/bit)
<i>Pointing (state 1)</i>	Mouse	–107	223
	Trackball	75	300
<i>Dragging (state 2)</i>	Mouse	135	249
	Trackball	–349	688

**Fitt's law coefficients**

## Cognitive Architectures

### a. Problem space model

- a system exhibiting rational behavior is referred to as a knowledge-level system
- the machine does not have the ability to formulate the problem space
- A problem space consists of a set of states and a set of operations
- a sequence of operations that form a path.

### b. Interacting cognitive subsystems

- ICS provides a model of perception, cognition and action, but unlike other cognitive architectures,
- is not intended to produce a description of the user
- ICS provides a more holistic view of the user as an information-processing machine.
- ICS attempts to incorporate two separate psychological traditions within one cognitive architecture.
- computational and representational approach
- five peripheral subsystems are in contact with the physical world and four are central, dealing with mental processes.



## 5. Discuss about the socio-organizational issues and stake holder requirements(13)

### Organizational Issues

1. Cooperation or conflict?
2. Changing power structures
3. The invisible worker
4. Who benefits?
5. Free rider problem
6. Critical mass
7. Automating processes – workflow and BPR
8. Evaluating the benefits

### Capturing Requirements

need to take account of

- stakeholders
  - work groups and practices
  - organisational context
- We consider several approaches:
    - socio-technical modeling
    - soft systems methodology
    - participatory design
    - ethnographic methods and contextual inquiry.
1. Who are the stakeholders? Primary stakeholders are people who actually use the system – the end-users.
  2. Secondary stakeholders are people who do not directly use the system,
  3. Tertiary stakeholders are people who do not fall into either of the first two categories
  4. Facilitating stakeholders are people who are involved with the design, development and maintenance of the system.

#### **Example: Classifying stakeholders – an airline booking system**

**Primary stakeholders:** travel agency staff, airline booking staff

**Secondary stakeholders:** customers, airline management

**Tertiary stakeholders:** competitors, civil aviation authorities, customers' travelling companions, airline shareholders

**Facilitating stakeholders:** design team, IT department staff

### 1. Socio-technical models

- to counter this technology-centric position, by stressing that work systems were composed of both human and machine elements



- Socio-technical models for interactive systems are therefore concerned with technical, social, organizational and human aspects of design.
  - The problem being addressed: there is a need to understand why the technology is being proposed and what problem it is intended to solve.
  - The stakeholders affected, including primary, secondary, tertiary and facilitating, together with their objectives, goals and tasks.
  - The workgroups within the organization, both formal and informal.
  - The changes or transformations that will be supported.
  - The proposed technology and how it will work within the organization.
  - External constraints and influences and performance measures.
- Information is gathered using methods

## **2. CUSTOM methodology**

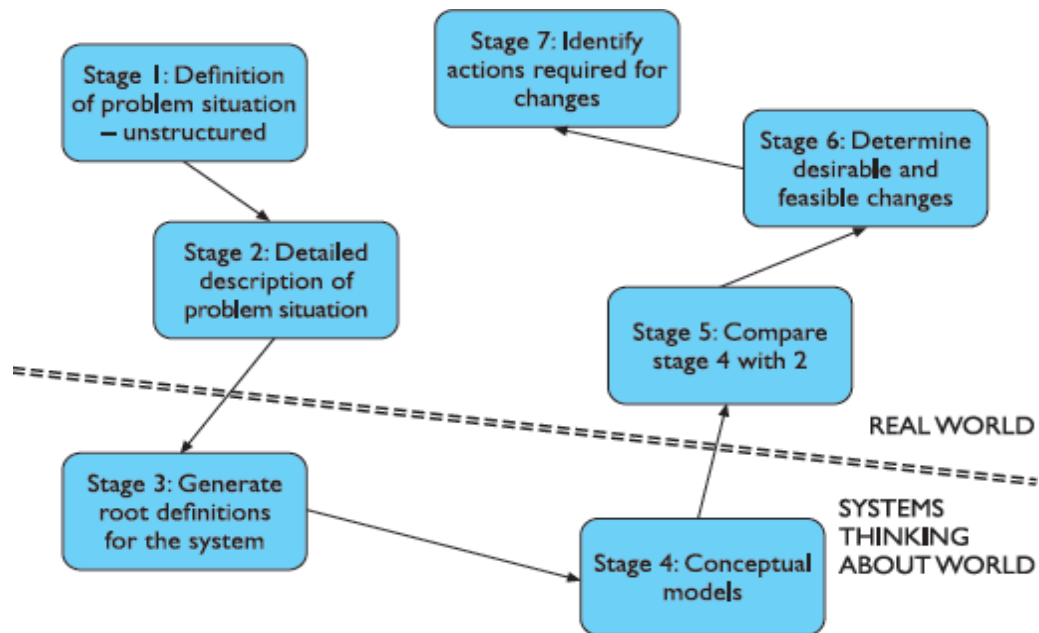
- CUSTOM is a socio-technical methodology designed to be practical to use in small organizations .
- CUSTOM focuses on establishing stakeholder requirements
- It is a forms-based methodology, providing a set of questions to apply at each of its stages. There are six key stages to carry out in a CUSTOM analysis:
  - a. Describe the organizational context
  - b. Identify and describe stakeholders.
  - c. Identify and describe work-groups.
  - d. Identify and describe task–object pairs.
  - e. Consolidate and check stakeholder requirements.

## **3. Open System Task Analysis (OSTA)**

- what happens when a technical system is introduced into an organizational work environment.
  - Like CUSTOM, OSTA specifies both social and technical aspects of the system. OSTA has eight main stages:
    1. The primary task which the technology must support is identified in terms of users' goals.
    2. Task inputs to the system are identified. These may have different sources and forms that may constrain the design.
    3. The external environment into which the system will be introduced is described, including physical, economic and political aspects.
    4. The transformation processes within the system are described in terms of actions performed on or with objects.
    5. The social system is analyzed, considering existing work-groups and relationships within and external to the organization.
    6. The technical system is described in terms of its configuration and integration with other systems.
    7. Performance satisfaction criteria are established, indicating the social and technical requirements of the system.
    8. The new technical system is specified.
- OSTA uses notations familiar to designers, such as data flow diagrams and textual descriptions.

### **Soft systems methodology**

- focus on identifying requirements from both human and technical perspectives, but they assume a technological solution is being proposed.
- There is no assumption of a particular solution:
- SSM has seven stages.
- A distinction is made between the 'real-world' stages (1– 2, 5–7) and the systems stages (3–4).
- The first stage of SSM is the recognition of the problem and initiation of analysis.



### Seven stages of soft systems methodology

- Root definitions are described in terms of specific elements, summarized using the acronym, CATWOE:
  - Clients – those who receive output or benefit from the system.
  - Actors – those who perform activities within the system.
  - Transformations – the changes that are effected by the system.
  - Weltanschauung – (from the German) meaning world view.
  - Owner – those to whom the system belongs, to whom it is answerable and who can authorize changes to it.
  - Environment – the world in which the system operates and by which it is influenced.

### Participatory design

**In participatory design:**  
workers enter into design context  
**In ethnography (as used for design):**  
designer enters into work context

- Participatory design is a philosophy that encompasses the whole design cycle.
- Participatory design has three specific characteristics.
- It aims to improve the work environment and task by the introduction of the design.
- Secondly, it is characterized by collaboration:
  - Finally, the approach is iterative: the design is subject to evaluation and revision at each stage.
- Brainstorming** This involves all participants in the design pooling ideas.
- Storyboarding** Storyboards can be used as a means of describing the user's day-to-day activities
- Workshops** to fill in the missing knowledge of both user and designer and provide a more focussed view of the design.
- Pencil and paper exercises** These allow designs to be talked through and evaluated with very little commitment in terms of resources. Example:

### Effective Technical and Human Implementation of Computer-based systems (ETHICS)

- ETHICS is a method developed by Enid Mumford within the socio- technical

tradition

- ETHICS considers the process of system development as one of managing change:
- Mumford recognizes three levels of participation:
  - Consultative – the weakest form of participation where participants are asked for their opinions but are not decision makers.
  - Representative – a representative of the participant group is involved in the decision making process.
  - Consensus – all stakeholders are included in the decision-making process.
- The usual practice is that design groups are set up to include representatives from each stakeholder group

The design groups then address the following issues and activities:

- 1. Make the case for change.** Change for its own sake is inappropriate
- 2. Identify system boundaries.** This focuses on the context of the current system and its interactions with other systems
- 3. Describe the existing system,** including a full analysis of inputs
- 4. Define key objectives,** identifying the purpose and function of each area of the organization.
- 5. Define key tasks:** what tasks need to be performed to meet these objectives?
- 6. Define key information needs,** including those identified by analysis of the existing system and those highlighted by definition of key tasks.
- 7. Diagnose efficiency needs,** elements in the system that cause it to underperform or perform incorrectly.
- 8. Diagnose job satisfaction needs,** with a view to increasing job satisfaction where it is low.
- 9. Analyze likely future changes,** This is necessary to ensure that the system is flexible enough to cope with change.
  - **Specify and prioritize objectives based on efficiency,** job satisfaction and future needs.

### **Ethnographic methods**

- Real action is situated action;
- Many branches of sociology and anthropology have long recognized
  - Ethnography is based on very detailed recording of the interactions between people and between people and their environment.
- ☐ The ethnographer does not enter actively into the situation,

### **Contextual inquiry**

Approach developed by Holtzblatt

- in ethnographic tradition but acknowledges and challenges investigator focus
- model of investigator being apprenticed to user to learn about work
- investigation takes place in workplace - detailed interviews, observation, analysis of communications, physical workplace, artefacts
- number of models created:
  - sequence, physical, flow, cultural, artefact
  - models consolidated across users
- output indicates task sequences, artefacts and communication channels needed and physical and cultural constraints

## COMMUNICATION AND COLLABORATION MODELS

- single-user or multi-user
- We need to understand normal human–human communication:
- face-to-face communication involves eyes, face and body
- conversation can be analyzed to establish its detailed structure.

Look at several levels – minutiae to large scale context:

- face-to-face communication
- conversation
- text based communication
- group working

### 6.Explain in detail about face-to-face communication(13)

- a. Face-to-face contact is the most primitive form of communication primitive,  
**Transfer effects and personal space**

☐ to use computer-mediated forms of communication,

☐ Personal space also differs across cultures:

☐ **Eye contact and gaze**

- Our eyes tell us whether our colleague is listening or not; they can convey interest, confusion or boredom.
- ☐ The relative frequency of eye contact and who ‘gives way’ from direct eye contact is closely linked to authority and power.

**b. Gestures and body language**

☐ hands to indicate items of interest.

**Back channels, confirmation and interruption**

Alison: Do you fancy that film . . . *er* . . . ‘  
The Green’ *um* . . .  
it starts at eight.  
Brian: Great!

☐ It is easy to think of conversation as a sequence of utterances

☐ The nods, grimaces, shrugs of the shoulder and small noises are called *backchannels*.

- Back channels -media effects

Restricting media restricts back channels

video – loss of body language

audio – loss of facial expression

half duplex – lose most voice back-channel responses

text based – nothing left!

**c. Turn-taking**

- *Turn-taking* is the process by which the roles of speaker and listener are exchanged.

## Conversation

- It focuses on two-person conversations,
  - There are three uses for theories of conversation in CSCW.
1. First, they can be used to analyze transcripts, for example from an electronic conference.
  2. Secondly, they can be used as a guide for design decisions
  3. Thirdly, they can be used to drive design structuring the system around the theory.

## Basic conversational structure

Alison: Do you fancy that film?  
Brian: The *uh* (500 ms) with the black cat – ‘  
The Green whatsit’?  
Alison: Yeah, go at *uh* . . . (looks at watch - 1.2 s) . . . 20 to?  
Brian: Sure.

- alternating pattern: Alison says something, then Brian, then Alison again.
- ☐ The speech within each turn is called an *utterance*.
  - ☐ The requirement of adjacency can be broken if the pair is interposed with other pairs for clarification, etc.:

Brian: Do you want some gateau?  
Alison: Is it very fattening?  
Brian: Yes, very.  
Alison: And lots of chocolate?  
Brian: Masses.  
Alison: I'll have a big slice then.

- This conversation can be denoted: B-x, A-y, B-y, A-z, B-z, A-x.
- ☐ Adjacency pair ‘x’ (‘Do you want some gateau?’–‘I’ll have a big slice then’) is split by two other pairs ‘y’ and ‘z’.

## Context

- Take a single utterance from a conversation,
- ‘the *uh* with the black cat – “The Green whatsit”’.
- . We can identify two types of context within conversation:  
**internal context** – dependence on earlier utterances.  
**external context** – dependence on the environment.

## Example

**Brian:** (*points*) that post is leaning a bit  
**Alison:** that's the one you put in

## Two types of context:

- **external context** – reference to the environment  
e.g., Brian's '*that*' – the thing pointed to ← *deictic reference*
- **internal context** – reference to previous conversation  
e.g., Alison's '*that*' – the last thing spoken of

## Common Ground

Resolving context **depends on meaning**  
⇒ participants must share meaning  
so must have shared knowledge

Conversation constantly negotiates meaning  
... a process called **grounding**:

**Alison:** So, you turn right beside the river.  
**Brian:** past the pub.  
**Alison:** yeah ...

Each utterance is assumed to be:  
*relevant* – furthers the current topic  
*helpful* – comprehensible to listener

### Topics, focus and forms of utterance

Alison: Oh, look at your roses . . .  
Brian: Mmm, but I've had trouble with greenfly.  
Alison: They're the symbol of the English summer.  
Brian: Greenfly?  
Alison: No roses silly!

Tracing topics is one way to analyse conversation.

- Alison begins – *topic* is roses
- Brian shifts topic to greenfly
- Alison misses shift in focus ... *breakdown in communication*

- Alison began the conversation with the *topic* of roses.
- Brian shifts to the related, but distinct, topic of greenfly
- The utterances can be classified into three kinds:
  1. **substantive** directly relevant to the development of the topic;
  2. **annotative** points of clarification, elaborations, etc.;
  3. **procedural** talking about the process of collaboration itself.

### Breakdown and repair

- Redundancy, frequency of turn-taking and back channels

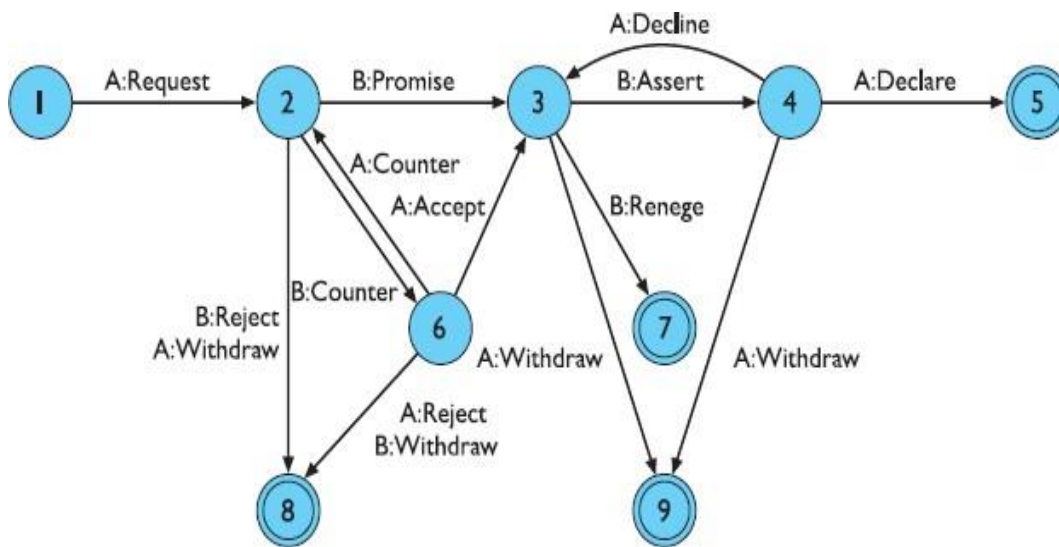
### Constructing a shared understanding

- The major difference between a book and conversation is that the latter is interactive.
- When participants come to a conversation, they may come from different backgrounds and bring different knowledge.
- The participants do not try to unify their knowledge and background indeed,
- Establishing this common ground will involve negotiating the meanings of words

### Speech act theory

- A particular form of conversational analysis, *speech act theory*,
- Speech act theory concerns itself with the way utterances interact with the actions of the participants.
- One example of such a generic structure is a *conversation for action (CfA)*.
- It represents the stages two participants go through in initiating an external action that one of them should perform
- simplest route through the diagram is through states 1–5.
- The network has some nodes marked with a double circle.





**Conversation for action**  
**Circles represent 'states' in the conversation**  
**Arcs represent utterances (speech acts)**

### Stages between Conversations

- Request , • Promise , • Assert , • Decline , • Reject , • Withdraw , • Counter , • Accept , • Reneg , • Declare

There are other generic conversation forms as well as CfA. These include:

1. **conversation for clarification** usually embedded within a CfA to clarify the required action (different from countering a request);
2. **conversation for possibilities** looking toward future actions;
3. **conversation for orientation** building up a shared understanding.

CfA in action

- Simplest route 1-5:

<b>Alison:</b>	have you got the market survey on chocolate mousse?	<i>request</i>
<b>Brian:</b>	sure	<i>promise</i>
<b>Brian:</b>	there you are	<i>assert</i>
<b>Alison:</b>	thanks	<i>declare</i>

- More complex routes possible, e.g., 1-2-6-3 ...

<b>Alison:</b>	have you got ...	<i>request</i>
<b>Brian:</b>	I've only got the summary figures	<i>counter</i>
<b>Alison:</b>	that'll do	<i>accept</i>

### 7. Explain in detail about text-based communication(13)

- For *asynchronous* groupware (and even some synchronous systems), the major form of direct communication is text based.
- for instance voice messaging systems and answer phones, and other media may be used in addition to text such as graphics, voice annotation or even video clips.
- Types of electronic text:

- discrete directed messages, no structure (email)
- linear messages added (in temporal order)
- non-linear hypertext linkages
- spatial two dimensional arrangement

Text-based communication is familiar

- discrete** – directed message as in email. There is no explicit connection between different messages, except in so far as the text of the message refers to a previous one.
- linear** – participants' messages are added in (usually temporal) order to the end of a single transcript.
- non-linear** – when messages are linked to one another in a hypertext fashion.
- spatial** – where messages are arranged on a two-dimensional surface.

### Back channels and affective state

- Email users have developed explicit tokens of their affective state by the use of 'flaming' and 'smilies', using punctuation and acronyms; for example:
  - :-) – smiling face, happy
  - :-(- sad face, upset or angry
  - ;-) – winking face, humorous
  - LOL – laughing out loud.

## Problems with text

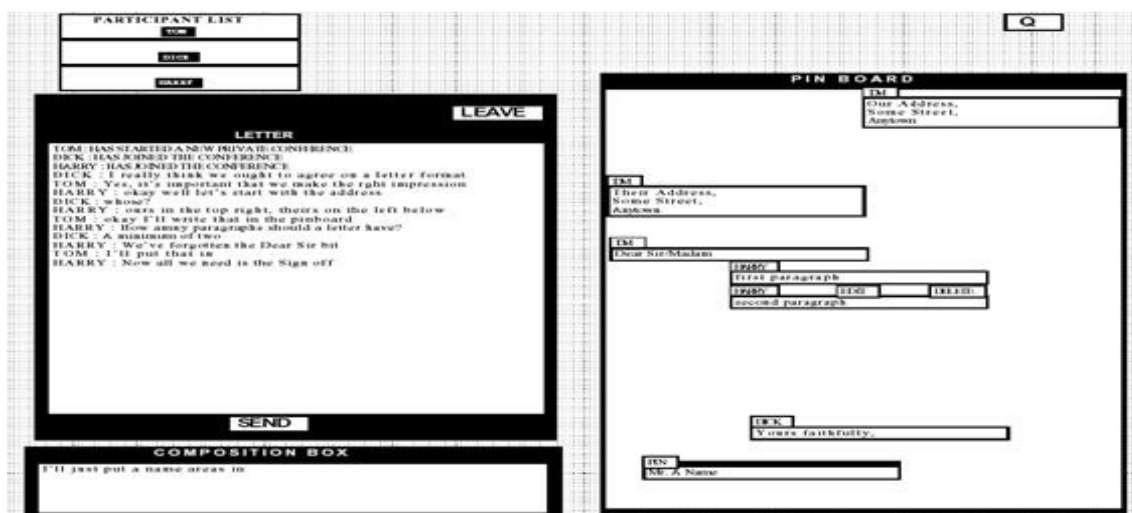
No facial expression or body language  
 ⇒ *weak back channels*

So, difficult to convey:  
*affective state* – happy, sad, ...  
*illocutionary force* – urgent, important, ...

Participants compensate:  
 'flaming' and smilies  
 ;-) :-(- 😊 :-)

### Grounding constraints

## example - 'Conferencer'



linear conversation area – LHS    RHS – spatial simulated pinboard

**cotemporality** – an utterance is heard as soon as it is said (or typed);

**simultaneity** – the participants can send and receive at the same time;



**sequence** – the utterances are ordered.

- Consider this typical interchange during the use of the York Conferencer system:

1. Bethan: How many should be in the group?
2. Rowena: Maybe this could be one of the four strongest reasons?
3. Rowena: Please clarify what you mean.
4. Bethan: I agree.
5. Rowena: Hang on.
6. Rowena: Bethan what did you mean?

- In a spoken conversation, Rowena and Bethan would have quickly corrected themselves if they began to speak at once, the messages in a different order:

Rowena: 2 1 3 4 5 6

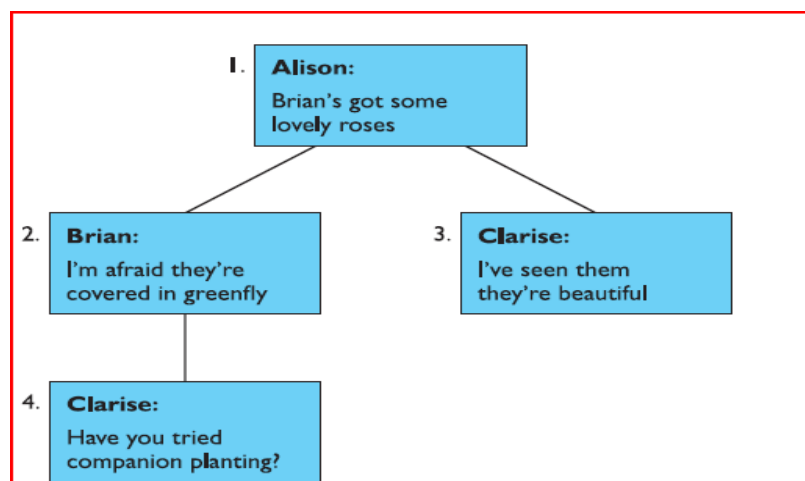
Bethan: 1 2 4 3 5 6

### Turn-taking

- The fundamental structures of conversation was *turn-taking*.
- The last transcript was an example of a breakdown in turn-taking.
- Breakdowns are quite rare in two-party electronic conversations and are quickly corrected.
- In a pair of participants, turn-taking is simple; first one person says something, then the other.
- First, the conversation may, for a period, be focused on two of the parties, in which case normal two-party turn-taking holds.
- Secondly, the speaker may specifically address another participant as the utterance is finished,
- Finally, the next speaker may be left open, but the cotemporality of the audio channel allows the other participants to negotiate the turn.

### Context and deixis

- Utterances are highly ambiguous
- direct communication, remote participants have difficulty in using deictic reference.



### Hypertext Conversation Structure

- In speech, the context is intimately connected to linear sequence and

1. Alison: Brian's got some lovely roses.
2. Brian: I'm afraid they're covered in greenfly.
3. Clarise: I've seen them, they're beautiful.

adjacency.

- Hypertext-based systems avoid the implied sequentiality of a linear transcript.

### **Pace and granularity**

Pace of conversation – the rate of turn taking

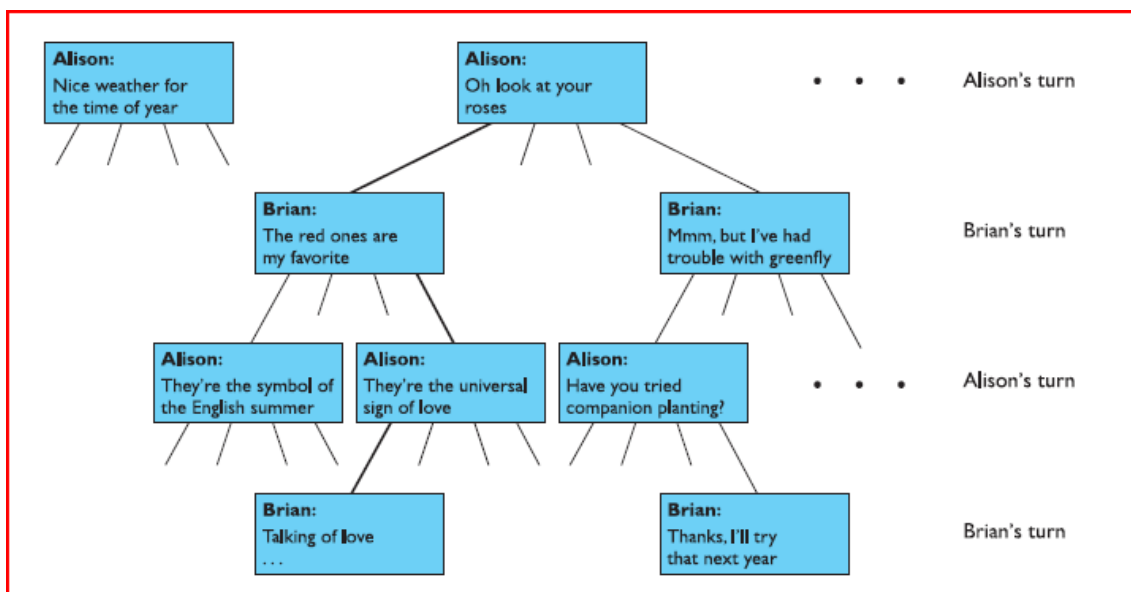
face-to-face – every few seconds

telephone – half a minute

email – hours or days

**as the pace of a conversation reduces, there is a tendency for the *granularity* to increase**

- The term *pace* is being used in a precise sense above.



### **Conversation Game**

- Reducing the pace of a conversation reduces its *interactivity*.
- At each turn of the conversation, Alison or Brian can choose to say one thing which continues the discussion.
- to avoid conversation.
- reduces communication by reducing collaboration.

### **Linear text vs. hypertext**

- text-based communication medium.
- Multiplexed messages can be represented as updates to several parts of the hypertext,
- static hypertexts, which have been carefully crafted by their authors, can be difficult to navigate.

A hypertext that is created 'on the fly' is unlikely to be comprehensible to any but those involved in its creation.

### **8. Explain in detail about group working(6)**

- the properties of direct communication and largely two-party conversations.
- Group behavior is more complex

### Group dynamics

- organizational relationships such as supervisor/supervisee are relatively stable,
- Even the naming of roles can cause problems.

A co-authoring system such as Quilt would call the non-writing author a 'commentator' or a 'reviewer', but *not* an 'author'. A member leaving or a new member joining can cause dramatic changes in the behavior of the group.

### □ Physical layout

- The physical layout of a room has a profound effect upon the working relationship of those in it.
- If we wish to encourage conversation, as we do in a meeting room, the participants must be encouraged to look toward one another.
- Meeting rooms have a natural focus toward the screen at the front of the room,
- At first sight, the electronic meeting room is not unlike a normal conference room.

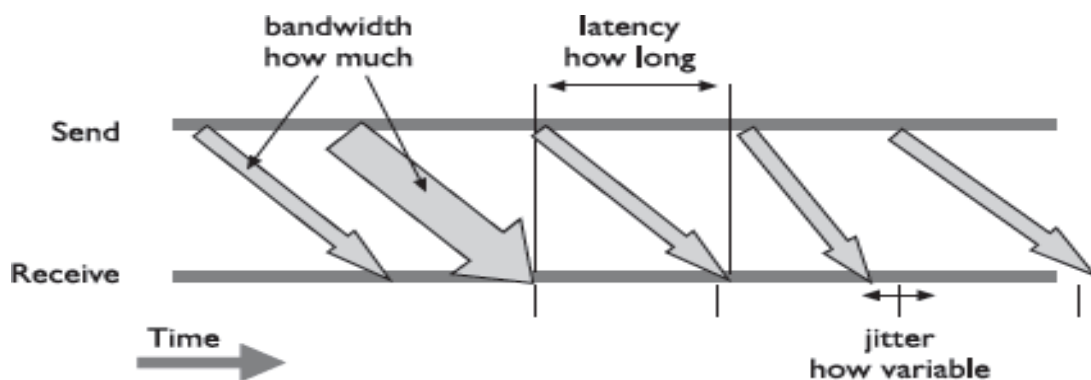
.

## 9.Explain in detail about Web Technology And Issues Basics(13)

- The web consists of a set of protocols
- The web supports hypertext, graphics, sound and movies, and, to structure and describe the information, uses a language called HTML (hypertext markup language) or in some cases, XML (extensible markup language).
- HTML is a markup language that allows hypertext links, images, sounds and movies to be embedded into text,
- HTML documents are interpreted by a viewer, known as a browser,
- **Web servers and web clients**
  - the web is distributed.
- The pages are stored on web servers that may be on a company's own premises

### Network issues

- The fact that the web is networked raises a series of issues that can impact on usability.
- Network capacity is called bandwidth.
- For example, a typical modem speed is 56 kbs –
- Latency
- Variability in the latency is called jitter.



**Fig.: Bandwidth, Latency and Jitter**

### Text

- web pages are displayed on many different machines
- Comic Sans are available on most web platforms.
- Cascading style sheets (CSS) allow you to specify fonts, line spacing, size, etc.,

## Graphics

### Obtaining graphics

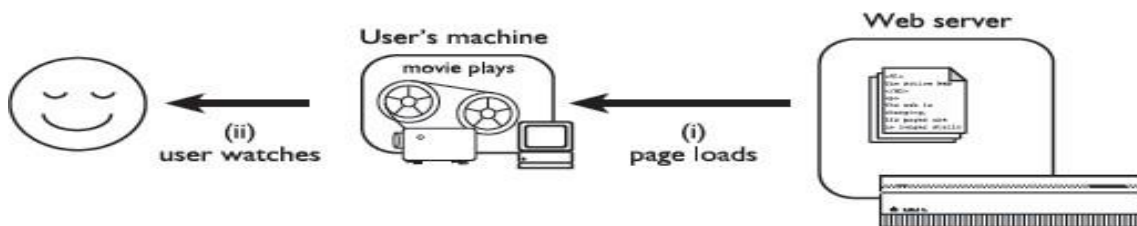
- There are a number of sites on the web that contain archives of graphical images, icons, backgrounds
- There are also paint and image manipulation packages
- computer systems, and scanners and digital cameras, where available, enable the input of photographs and diagrams.

### Using graphics

- graphics and icons tend to play a significant role in web page design
- Graphical images take longer to load than text, and this may become a problem.
- Text uses 8 bits to represent a character
- **Icons**
  - Icons often appear on web pages
  - some pages have icon-sized characters that appear next to instructions).
- WIMP interface to represent aspects of the functionality of the underlying pages.

### Movies and sound

- Movies and sound are both available to users of the web, and hence to page designers.
- to be able to digitize sound and capture and digitize video.
- it can take extremely large amounts of time for a video segment to download.
- The use of sound and video moves page design further away from the typesetter and toward the sound engineer and cinematographer;
- Streaming media over the internet, such as RealVideo, RealAudio and CuSeeMe, allow potentially unlimited sources.



**Animated GIF or movie needs to download completely**

## UNIT-IV

### 1. Describe the following

(a) Mobile eco system (6)

(b) Platforms (7)

#### Mobile Ecosystem

- Mobile is an entirely unique ecosystem
- devices to access the Internet,
- need to understand the mobile ecosystem.

Services
Applications
Application frameworks
Operating Systems
Platforms
Devices
Aggregators
Networks
Operators

**Figure. The layers of the mobile ecosystem**

All phones sold today fall into one of three categories: feature phones, smart phones, or touch phones.

- **Feature Phones:**

- Features phones get their name from the various features that come with the devices.
- These phones generally have camera, a handful of applications
- cell phones only made calls and sent and received text messages.

- **Smart phones:**

run more applications and an operating system,  
have a larger screen size  
utilize a QWERTY keyboard input (standard keyboard format).

- **Touch phones:**

- Touchphones can be thought of as the next generation of smartphones
- they have larger screens, more robust web browsers applications.
- touchphone users are also the mobile web's power users.

- **Other mobile devices**

- iPads & tablets are also entering the mobile space

### Operators

- Operators are also referred as Mobile Network Operators (MNOs); mobile service providers, wireless carriers, or simply carriers; mobile phone operators; or cellular companies
- Essentially make the entire mobile ecosystem work (Gate keepers)
- Operator's role in the ecosystem is to create and maintain a specific set of wireless services over a reliable cellular network
- to create and maintain wireless services over a reliable cellular network
- Operators operate wireless networks

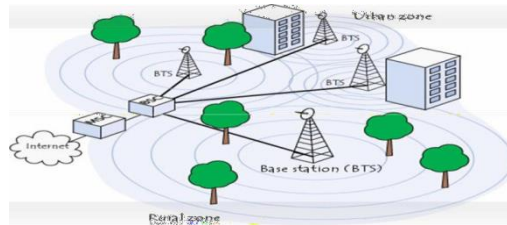


Table 2-1. World's largest mobile operators

Rank	Operator	Markets	Technology	Subscribers (in millions)
1.	China Mobile	China (including Hong Kong) and Pakistan	GSM, GPRS, EDGE, TD-SCDMA	436.12
2.	Vodafone	United Kingdom, Germany, Italy, France, Spain, Romania, Greece, Portugal, Netherlands, Czech Republic, Hungary, Ireland, Albania, Malta, Northern Cyprus, Faroe Islands, India, United States, South Africa, Australia, New Zealand, Turkey, Egypt, Ghana, Fiji, Lesotho, and Mozambique	GSM, GPRS, EDGE, UMTS, HSDPA	260.5
3.	Telefónica	Spain, Argentina, Brazil, Chile, Colombia, Ecuador, El Salvador, Guatemala, Mexico, Nicaragua, Panama, Peru, Uruguay, Venezuela, Ireland, Germany, United Kingdom, Czech Republic, Morocco, and Slovakia	CDMA, CDMA2000 1x, EV-DO, GSM, GPRS, EDGE, UMTS, HSDPA	188.9
4.	América Móvil	United States, Argentina, Chile, Colombia, Paraguay, Uruguay, Mexico, Puerto Rico, Ecuador, Jamaica, Peru, Brazil, Dominican Republic, Guatemala, Honduras, Nicaragua, Ecuador, and El Salvador	CDMA, CDMA2000 1x, EV-DO, GSM, GPRS, EDGE, UMTS, HSDPA	172.5

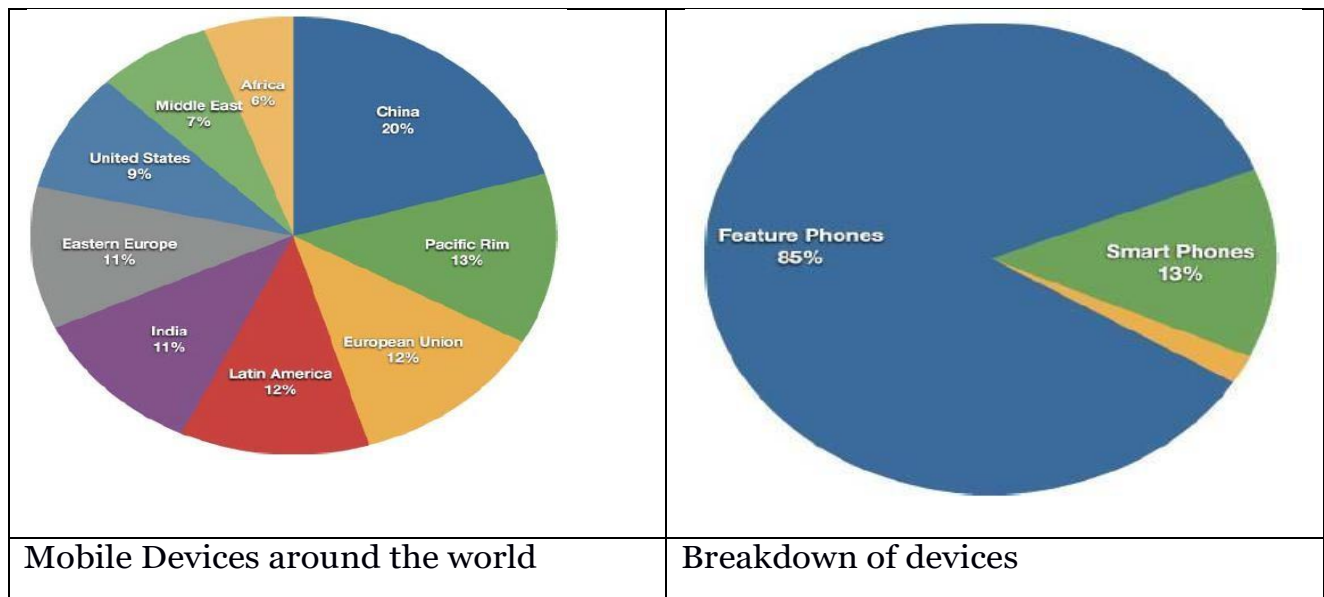
### NETWORKS

Mobile networks communicate through electromagnetic radio waves with a cell site base station, the antennas of which are usually mounted on a tower.



## DEVICES

devices such as tablets, ebook readers...



**Other mobile devices** - iPads & tablets.

### (b) PLATFORMS

A mobile platform's primary duty is to provide access to the devices.  
three categories:

1. Open Source: free to use and modify
  - Android
2. Proprietary: by device makers
  - iPhone, BlackBerry, Palm
3. Licensed: sold to device makers
  - JavaME, BREW, Windows Mobile

#### 1) Licensed:

Licensed platforms are sold to device makers for nonexclusive distribution on devices.

Following are the licensed platforms:

#### **Java Micro Edition (Java ME):**

It is a licensed subset of the Java platform and provides a collection of Java APIs for the development of software for resource constrained devices such as phones.

#### **Binary Runtime Environment for Wireless (BREW):**

BREW is a licensed platform created by Qualcomm for mobile devices



**Windows Mobile:**

Windows Mobile is a licensable and compact version of the Windows operating system.

**LiMo:**

LiMo is a licensed mobile platform used for mobile devices.

LiMo includes SDKs for creating Java, native, or mobile web applications using the WebKit browser framework.

**2) Proprietary**

Proprietary platforms are designed and developed by device makers for use on their devices.

**Palm:**

Palm OS platform based on the C/C++ programming language.

**BlackBerry:**

Research in Motion maintains their own proprietary Java-based platform, used exclusively by their BlackBerry devices.

**iPhone:**

Apple uses a proprietary version of Mac OS X as a platform for their iPhone and iPod touch line of devices, which is based on Unix.

**3) Open Source**

Open source platforms are mobile platforms that are freely available for users to download, alter, and edit.

Open source mobile platforms are newer and slightly controversial

**Operating Systems**

It used to be that if a mobile device ran an operating system

Operating systems often have core services

Mobile devices without operating systems typically run “walled”

**Symbian:**

Symbian OS is an open source operating system designed for mobile devices

**Windows Mobile:**

Windows Mobile is the mobile operating system that runs on top of the Windows Mobile platform.

**Palm OS:**

Palm OS is the operating system used in Palm’s lower-end Centro line of mobile phones.

**Linux:**

The open source Linux is being increasingly used as an operating system to power smartphones, including Motorola’s RAZR2.

**Mac OS X:**

A specialized version of Mac OS X is the operating system used in Apple’s iPhone and iPod touch.

**Android:**

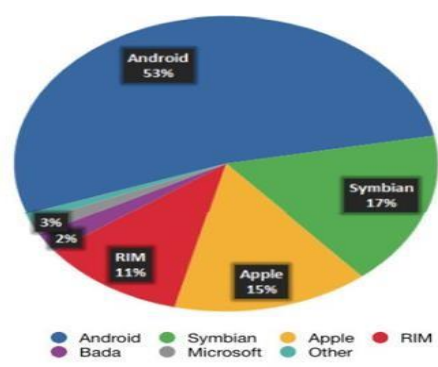
Android runs its own open source operating system, which can be customized by operators and device manufacturers.

**OPERATING SYSTEM**

OS have core services or toolkits that enable apps to talk to each other and share data or services.



OSs are common in Smart Phones, but rare in Feature phones.



## 2. What are Application Framework and explain in detail.(13)

### **Application Frameworks**

the first layer the developer can access is the application framework or API

Application frameworks often run on top of operating systems, sharing core services such as communications, messaging, graphics, location, security, authentication, and many others.

#### **Java:**

Java ME framework can often be deployed across the majority of Java-based devices

#### **S60:**

The S60 platform, formerly known as Series 60

#### **BREW:**

Applications written in the BREW application framework can be deployed across the majority of BREW-based devices

#### **Flash Lite:**

Adobe Flash Lite is an application framework that uses the Flash Lite and ActionScript frameworks

to create vector-based applications.

Flash Lite applications can be run within the Flash Lite Player

#### **Windows Mobile:**

Java, Windows Mobile applications can be downloaded

#### **Cocoa Touch:**

Cocoa Touch is the API used to create native applications for the iPhone and iPod touch.

**Android SDK:** The Android SDK allows developers to create native applications for any device that runs the Android platform.

#### **Web Runtimes (WRTs):**

Nokia, Opera, and Yahoo! provide various Web Runtimes, or WRTs.

Opera's and Nokia's WRTs meet the W3C-recommended specifications for mobile widgets.

#### **WebKit:**

Applications can be run and tested in any WebKit browser, desktop, or mobile device.

#### **The Web:**

The Web is the only application framework that works across virtually all devices and all platforms.

to support more devices in shorter development cycles

### 3. Appraise the types of mobile applications with example. (13)

#### APPLICATIONS

usually refers to a computer program that runs on a website (Google Apps), a small computing device (iPad App) or a cell phone (Android App).

- Apps live between the device and the user
- They must fit with their usage context
- They must know the specific device attributes and capabilities

#### SERVICES

Services are “everything the user is trying to do”

They are often available at different levels:

- Application
- Application Framework
- OS

Example services may include:

- the Internet
- sending a text message
- being able to get a location

All of these layers must be passed through before you get to the content

#### 7<sup>th</sup> Mass MEDIA - MOBILE

<b>1)</b>	Printing Press
<b>2)</b>	Recordings
<b>3)</b>	Cinema
<b>4)</b>	Radio
<b>5)</b>	Television
<b>6)</b>	Internet
<b>7)</b>	MOBILE

#### TYPES OF MOBILE APPLICATIONS

The mobile medium type is the type of application framework or mobile technology that presents content or information to the user.

**Figure. Multiple mobile application medium types MOBILE**

## **APPLICATION MEDIUM TYPES**

### **1.SMS**

#### **2. mobile websites**

#### **3. mobile web widgets**

#### **4. mobile web applications**

#### **5. native applications, and**

#### **6. Games.**

### **SMS:**

the user sends a single keyword to a five-digit short code in order to return information or a link to premium content.

For example, sending the keyword “freebie” to a hypothetical short code “12345” might return a text message with a coupon code

SMS applications can be both “free,” meaning that there is no additional charge beyond the text message fees an operator charges,

example Twitter, where users can receive SMS alerts from their friends and post to their timeline from any mobile device.

Pros : The pros of SMS applications include:

- They work on any mobile device nearly instantaneously.
- They’re useful for sending timely alerts to the user.
- They can be incorporated into any web or mobile application.
- They can be simple to set up and manage.

Cons : The cons of SMS applications include:

- They’re limited to 160 characters.
- They provide a limited text-based experience.
- They can be very expensive.

### **Mobile Websites:**

a mobile website is a website designed specifically for mobile devices

Mobile websites are characterized by their simple “drill-down” architecture

Mobile websites often have a simple design

mobile websites are fairly easy to create

Pros : The pros of mobile websites are:

- They are easy to create, maintain, and publish.
- They can use all the same tools and techniques you might already use for desktop sites.
- Nearly all mobile devices can view mobile websites.

Cons : The cons of mobile websites are:

- They can be difficult to support across multiple devices.
- They offer users a limited experience.

- Most mobile websites are simply desktop content reformatted for mobile devices.
- They can load pages slowly, due to network latency.

### **Mobile Web WIDGETS**

A component of a user interface that operates in a particular way.

A portable chunk of code that can be installed and executed within any separate additional compilation.

A mobile web widget is a standalone chunk of HTML-based code that is executed by the end user in a particular way.

mobile web widgets are small web applications that can't run by themselves

Pros: The pros of mobile web widgets are:

- They are easy to create, using basic HTML, CSS, and JavaScript knowledge.
- They can be simple to deploy across multiple handsets.
- They offer an improved user experience and a richer design, tapping into device features and offline use.

Cons : The cons of mobile web widgets are:

- They typically require a compatible widget platform to be installed on the device.
- They cannot run in any mobile web browser.
- They require learning additional proprietary, non-web-standard techniques.

### **Mobile web APPLICATIONS**

installed or compiled on the target device.

Using XHTML, CSS, and JavaScript,

they are able to provide an application-like experience to the end user while running in any mobile web browser.

The Web 2.0 movement brought user-centered design principles to the desktop web

Pros : The pros of mobile web applications are:

- They are easy to create, using basic HTML, CSS, and JavaScript knowledge.
- They are simple to deploy across multiple handsets.
- They offer a better user experience and a rich design, tapping into device features and offline use.
- Content is accessible on any mobile web browser.

Cons : The cons of mobile web applications are:

- The optimal experience might not be available on all handsets.
- They can be challenging (but not impossible) to support across multiple devices.
- They don't always support native application features, like offline mode, location lookup, file system access, camera, and so on.

### **NATIVE APPLICATIONS**

- called "platform applications,"
- have to be developed and compiled for each mobile platform.

- native or platform applications are built specifically for devices that run the platform
- most common of all platforms is Java ME (formerly J2ME)
- In addition to Java, other smartphone programming languages include versions of C, C++, and Objective-C
- working online or offline, accessing the location and the filesystem
- the majority (70 % ) of native applications in use today could be created with a little bit of XHTML, CSS, and JavaScript

## Difference

### Web apps

- need an active internet connection in order to run,
- will update themselves

### Mobile Native apps

- may work offline.
- faster and more efficient, but they do require the user to regularly download updates.

## Pros

The pros of native applications include:

- They offer a best-in-class user experience, offering a rich design and tapping into device features and offline use.
- They are relatively simple to develop for a single platform.
- You can charge for applications.

## Cons

The cons of native applications include:

- They cannot be easily ported to other mobile platforms.
- Developing, testing, and supporting multiple device platforms is incredibly costly.
- They require certification and distribution from a third party that you have no control over.
- They require you to share revenue with the one or more third parties.

## GAMES

- the most popular of all media available to mobile devices.
- Technically games are really just native applications that use the similar platform SDKs to create immersive experiences
- they cannot be easily duplicated with web technologies
- porting them to multiple mobile platforms is a bit easier than typical platform-based applications.

**Pros:** The pros of game applications are:

- They provide a simple and easy way to create an immersive experience.
- They can be ported to multiple devices relatively easily.

**Cons :** The cons of game applications are:

- They can be costly to develop as an original game title.
- They cannot easily be ported to the mobile web.

## 4.Explain the various mobile information architecture(13)

- information architecture has become a common discipline in the web
- industry
- the mobile industry has only a handful of specialized mobile information architects.
- For example, if we look at the front page of <http://www.nytimes.com> as seen from a desktop web browser compared to how it may render in a mobile or where the mobile browser, the text is far too small to be useful.

**Figure: Comparing the New York Times website in desktop &mobile browsers**



**Figure: The many mobile experiences of the New York Times**

The role of a mobile information architect would be to interpret this content to the mobile context.

Do you use the same structure, or sections?

Do you present the same information above the fold?

If so, how should that be prioritized?

How does the user navigate to other areas?

## Keeping It Simple

When thinking about your mobile information architecture, you want to keep it as simple as possible.

### Support your defined goals:

- If something doesn't support the defined goals, lose it.
- Go back to the user goals and needs, and identify the tasks that map to them. Find those needs and fill them.

### Clear, simple labels:

Good trigger labels, the words used to describe each link or action, are crucial in Mobile.

Words like "products" or "services" aren't good trigger labels

Mobile performs short, to-the-point, get-it-quick, and get-out types of tasks.

### Site Map:

Site maps are a classic information architecture deliverable.

They visually represent the relationship of content to other content

Mobile site maps aren't that dissimilar from site maps we might use on the Web.

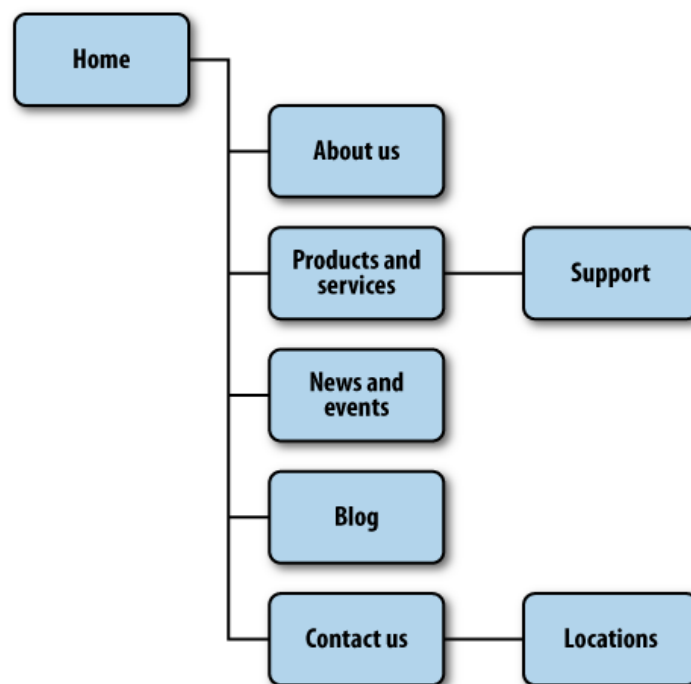
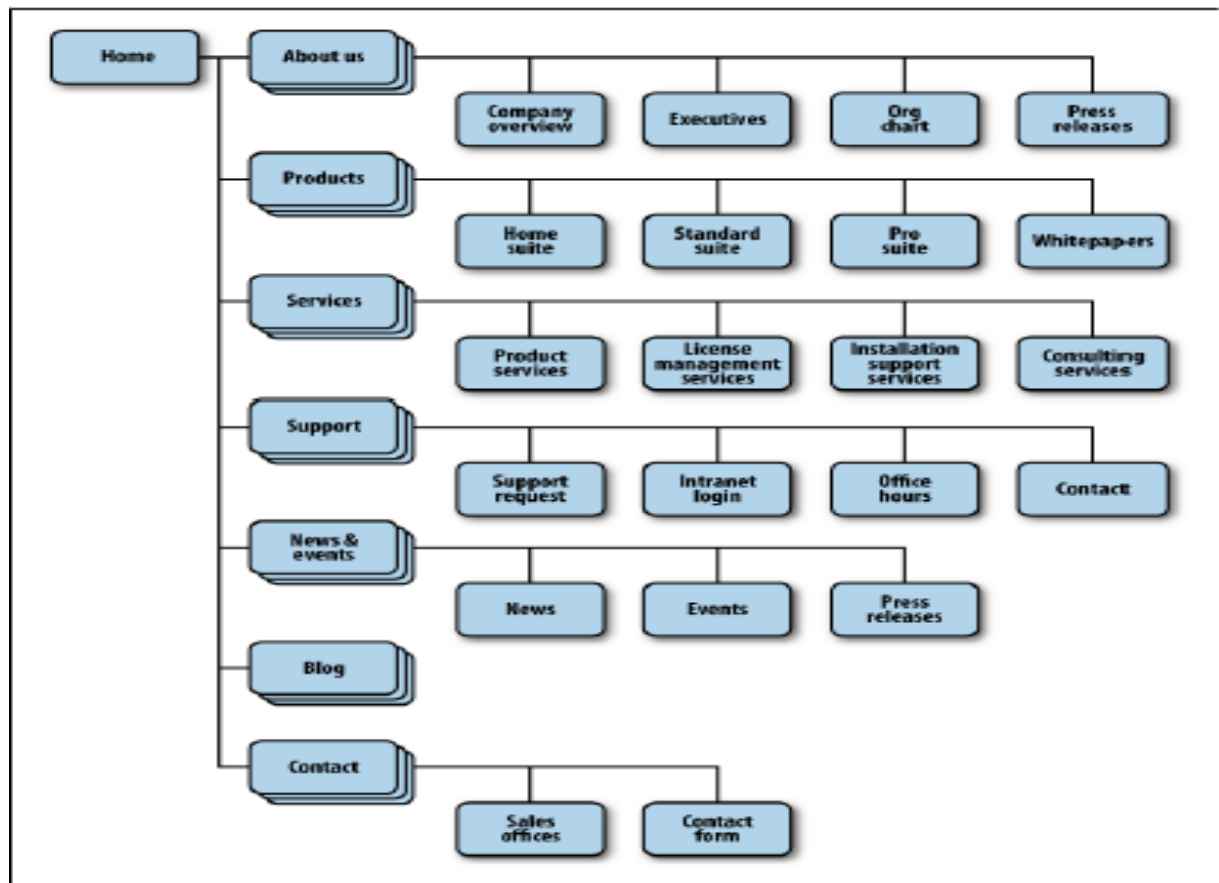


Figure: An example mobile site map Limit

### opportunities for mistakes:

- Now think of your own website.
- How many primary navigation areas do you have? Seven? Eight? Ten? Fifteen? What risk is there to the users for making a wrong choice?
- If they go down the wrong path, they can immediately click back
- tasks are short and users have limited time to perform them.





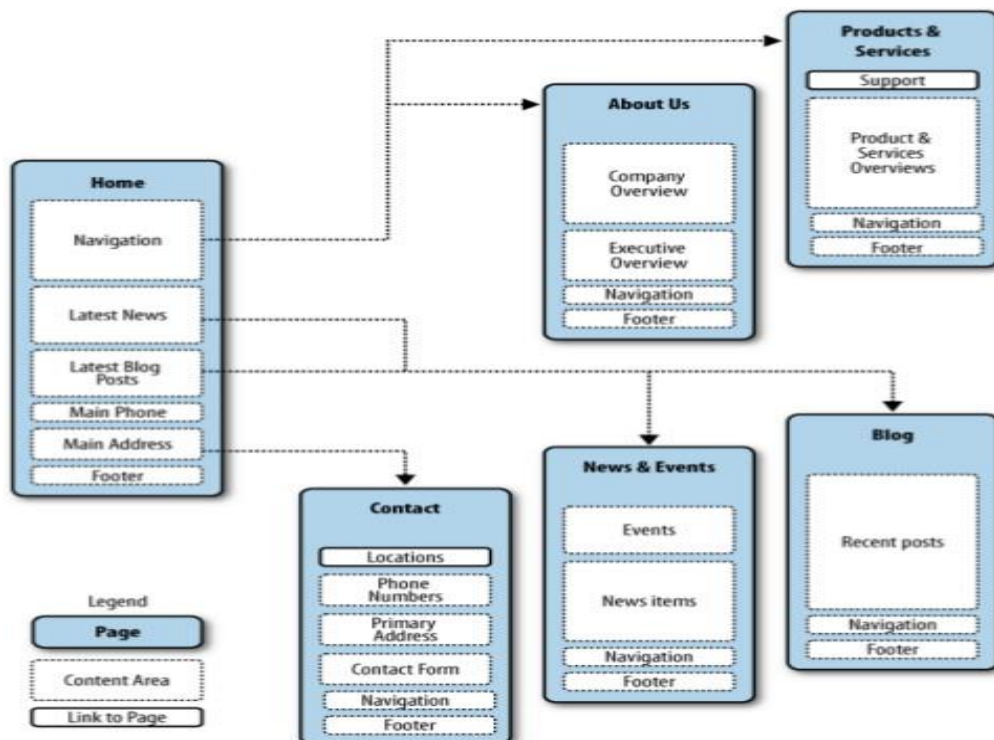
**Figure: An example of a bad mobile information architecture that was designed with desktop users in mind rather than mobile users**

### Confirm the path by teasing content:

providing at least one content item per category.

The challenge with ringtone sites is there are a lot of items, grouped by artist, album, genre, and so on.

The user starts with a goal like “I want a new ringtone” and finds an item that suits his taste within a catalog of tens of thousands of items.



## Figure Teasing content to confirm the user's expectations of the content within

constrained screen that teasing the first few items of the page provides the user

**Clickstreams:**

- Clickstream is a term used for showing the behavior on websites, displaying the order
- used to see the flaws in the information architecture

When all the paths are seen next to each other and take a step back, start to see shortcuts and how can get users to their goal faster or easier

A good architect's job is to create a map of user goals, not map out every technical contingency or edge case.

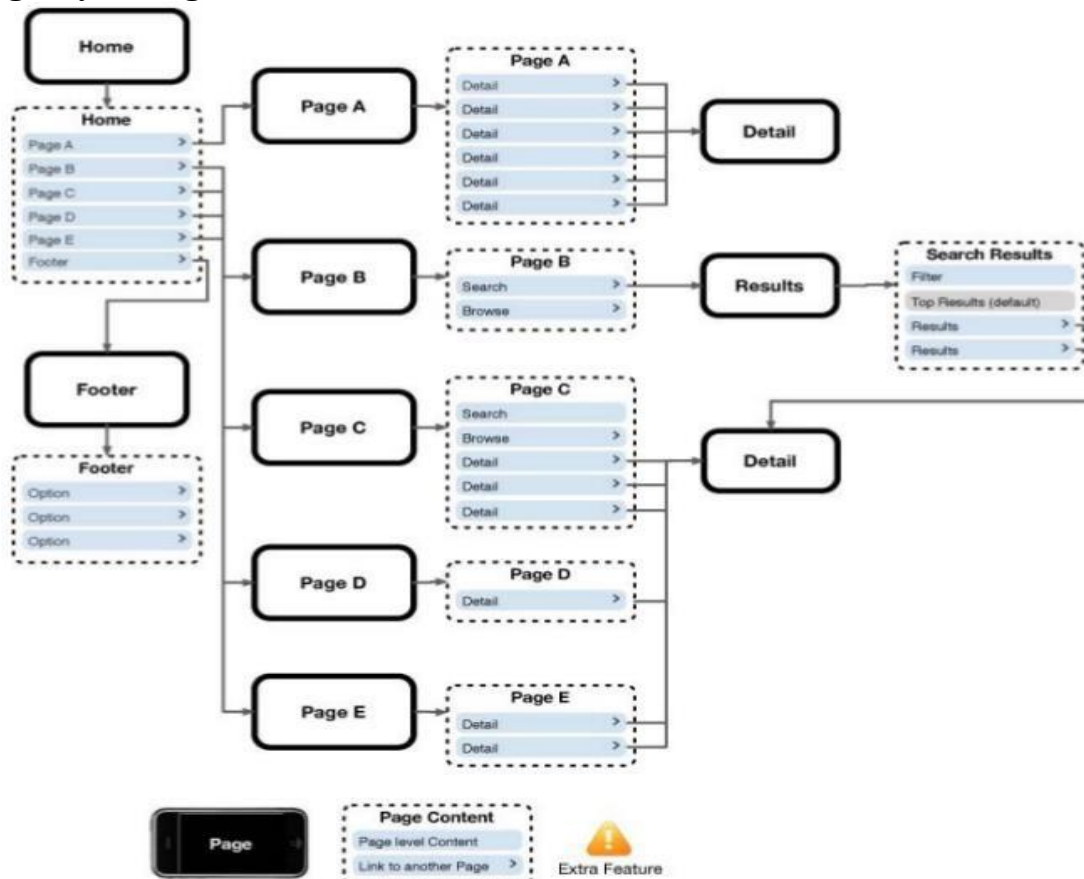


Figure An example clickstream for an iPhone web application

## Wireframes:

Wireframes are a way to lay out information on the page, also referred to as information design.

Site maps show how the content is organized in our informational space; wireframes show how the user will directly interact with it.

Wireframes are like the peanut butter to the site map jelly in our information architecture sandwich.

It's the stuff that sticks.

**Prototyping:**

Prototypes might sound like a scary step in the process.

Some view them as redundant or too time-consuming, preferring to jump in and start coding things..

**Paper prototypes:**

The most basic level we have is paper prototyping:

taking our printed-out wireframes or even drawings of our interface



*Figure 7-12. A touch interface paper prototype next to its smaller sibling*

**Context prototype:**

Take a higher-end device that enables you to load full-screen images on it.

Take your wireframes or sketches and load them onto the device, sized to fill the device screen.

**HTML prototypes:**

The third step is creating a lightweight, semi functional static prototype using XHTML, CSS, and JavaScript

This is a prototype that you can actually load onto a device and produce the nearest experience to the final product,

**Different Information Architecture for Different Devices:**

users will interact with a mobile experience are the same at the low end as they are on a high-end device.

The greatest challenge in creating valuable experiences is knowing when to lose what is not needed.

There is no choice on lower-end devices—it must be simple.

**MOBILE 2.0**

Following is a recap of the original seven principles of Web 2.0:

The Web as a platform: For the mobile context, this means “write once, deploy everywhere,” moving away from the costly native applications deployed over multiple frameworks and networks.

Harnessing collective intelligence:

End of the software release cycle:

Lightweight programming models:

Software above the level of a single device:

Rich user experiences:

**5.Explain in detail about the Elements Of Mobile Design(13)**

Good mobile design requires three abilities:

the first is a natural gift for being able to see visually

The second is the ability to manifest that vision into something for others to see

The third is knowing how to utilize the medium to achieve your design goals.

**Context:**

make sure to answer the following questions:

- Who are the users? What do you know about them?
- What type of behavior can you assume or predict about the users?
- What is happening? What are the circumstances in which the users will best absorb the content you intend to present?
- When will they interact?
- Are they at home and have large amounts of time?
- Are they at work where they have short periods of time?
- Will they have idle periods of time while waiting for a train, for example?
- Where are the users?
- Are they in a public space or a private space? Are they inside or outside? Is it day or is it night?

**Message:**

The message is the overall mental impression create explicitly through visual

design.

Branding shouldn't be confused with messaging.

Branding is the impression your company name and logo gives—essentially, your reputation.

Branding serves to reinforce the message with authority, not deliver it.

What is the message for each of these designs?

**Yahoo!:**

Yahoo! sort of delivers a message.

This app provides a clean interface, putting a focus on search and location, using color to separate it from the news content.

**ESPN:**

The ESPN site clearly is missing a message.

It is heavily text-based, trying to put a lot of content above the fold, to describe the message: bold, cluttered, and content-heavy.

**Disney:** Disney creates a message with its design.

Words you might use to describe the message: bold, busy, and disorienting.

**Wikipedia:** The Wikipedia design clearly establishes a message.

**Amazon:** Amazon sort of creates a message.

minimal but messy, product-heavy, and disorienting.

**Look and Feel:**

The concept of “look and feel” is an odd one, being subjective and hard to define. look and feel is used to describe appearance, as in “I want a clean look and feel” or “I want a usable look and feel.”

The problem is: as a mobile designer, what does it mean? And how is that different than messaging?

Look and feel in a literal sense, as something real and tactile that the users can “look” at, then “feel”—something they can touch or interact with.

**Layout:**

Layout is an important design element

two important pieces of information about different types of design.

First, there is confirmation that the navigation and layout are correct.

Second, there is a question about the “look and feel

**Different layouts for different devices:**

- The second part of layout design is how to visually represent content.
- In mobile design, the primary content element you deal with is navigation. Whether you are designing a site or app, you need to provide users with methods of performing tasks, navigating to other pages
- There are two distinct types of navigation layouts for mobile devices: touch and scroll.
- With touch, you literally point to where you want to go;
- therefore, navigation can be anywhere on the screen.
- This is the opposite of the scroll navigation type, where the device's D-pad is used to go left, right, up, or down.

**Color**

The fifth design element, color, is hard to talk about in a black-and-white book.



number of bits (binary digits) used to represent the color of a single pixel in a bitmapped image.

Different devices have different color depths.

### Color characteristics

Color	Represents
White	Light, reverence, purity, truth, snow, peace, innocence, cleanliness, simplicity, security, humility, sterility, winter, coldness, surrender, fearfulness, lack of imagination, air, death (in Eastern cultures), life, marriage (in Western cultures), hope, bland
Black	Absence, modernity, power, sophistication, formality, elegance, wealth, mystery, style, evil, death (in Western cultures), fear, seriousness, conventionality, rebellion, anarchism, unity, sorrow, professionalism
Gray	Elegance, humility, respect, reverence, stability, subtlety, wisdom, old age, pessimism, boredom, decay, decrepitude, dullness, pollution, urban sprawl, strong emotions, balance, neutrality, mourning, formality
Yellow	Sunlight, joy, happiness, earth, optimism, intelligence, idealism, wealth (gold), summer, hope, air, liberalism, cowardice, illness (quarantine), fear, hazards, dishonesty, avarice, weakness, greed, decay or aging, femininity, gladness, sociability, friendship
Green	Intelligence, nature, spring, fertility, youth, environment, wealth, money (U.S.), good luck, vigor, generosity, go, grass, aggression, coldness, jealousy, disgrace (China), illness, greed, drug culture, corruption (North Africa), life eternal, air, earth (classical element), sincerity, renewal, natural abundance, growth
Blue	Seas, men, productiveness, interiors, skies, peace, unity, harmony, tranquility, calmness, trust, coolness, confidence, conservatism, water, ice, loyalty, dependability, cleanliness, technology, winter, depression, coldness, idealism, air, wisdom, royalty, nobility, Earth (planet), strength, steadfastness, light, friendliness, peace, truthfulness, love, liberalism (U.S. politics), and conservatism (UK, Canadian, and European politics)
Violet	Nobility, envy, sensuality, spirituality, creativity, wealth, royalty, ceremony, mystery, wisdom, enlightenment, arrogance, flamboyance, gaudiness, mourning, exaggeration, profanity, bisexuality, confusion, pride

Color	Represents
Red	Passion, strength, energy, fire, sex, love, romance, excitement, speed, heat, arrogance, ambition, leadership, masculinity, power, danger, gaudiness, blood, war, anger, revolution, radicalism, aggression, respect, martyrs, conservatism (U.S. politics), Liberalism (Canadian politics), wealth (China), and marriage (India)
Orange	Energy, enthusiasm, balance, happiness, heat, fire, flamboyance, playfulness, aggression, arrogance, gaudiness, over-emotion, warning, danger, autumn, desire
Pink	Spring, gratitude, appreciation, admiration, sympathy, socialism, femininity, health, love, romance, marriage, joy, flirtatiousness, innocence and child-like qualities
Brown	Calm, boldness, depth, nature, richness, rustic things, stability, tradition, anachronism, boorishness, dirt, dullness, heaviness, poverty, roughness, earth

### The psychology of color:

People respond to different colors differently.

Using the right colors can be useful for delivering the right message and setting expectations.

### Color palettes:

Defining color palettes can be useful for maintaining a consistent use of color in your mobile design.

Color palettes typically consist of a predefined number of colors to use throughout the design.

**i) Sequential:** there are primary, secondary, and tertiary colors.

Often the primary color is reserved as the “brand” color

The secondary and tertiary colors are often complementary colors

**Adaptive:** An adaptive palette is one in which you leverage the most common colors present in a supporting graphic or image.

**Inspired:**

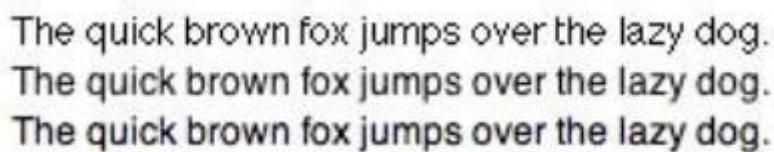
This is a design that is created from the great pieces of design you might see online, or offline, in which a picture of the design might inspire you.

## Typography

Higher-resolution screens allowed for a more robust catalog of fonts than just the device font.

**Subpixels and pixel density:**

A subpixel is the division of each pixel into a red, green, and blue (or RGB) unit at The addition of these RGB subpixels enables the eye to see greater variations of gray, creating sharper antialiasing and crisp text.



The quick brown fox jumps over the lazy dog.  
The quick brown fox jumps over the lazy dog.  
The quick brown fox jumps over the lazy dog.

### Different ways text can render on mobile screens

The Microsoft Windows Mobile platform uses the subpixel technique with its Clear-Type technology.

*Table 8-3. Dimensions and PPI for some mobile devices*

Mobile device	Diagonal	Pixels	PPI
Nokia N95	2.6"	240×320	153
Apple iPhone 3G	3.5"	320×480	163
Amazon Kindle	6.0"	600×800	167
HTC Dream	3.2"	320×480	181
Sony Ericsson W880i	1.8"	240×320	222
Nokia N80	2.1"	352×416	256

**Font replacement:**

the two most common are sIFR and Cufon.

sIFR uses Flash to replace HTML text with a Flash representation of the text, but the device of course has to support Flash.

Cufon uses JavaScript and the canvas element draws the glyphs in the browser,

**Readability:**

the ability to clearly follow lines of text with the eye and not lose one’s place or become disoriented. This can be done by following these six simple rules:

**Use a high-contrast typeface:**

Having a high-contrast typeface with regard to the background will increase visibility and readability.

**Use the right typeface:**

Provide decent leading (rhymes with “heading”) or line spacing Mobile screens are often held 10–12” away from the eye, which can make tracking each line difficult. Increase the leading to avoid having the users lose their place.

Leave space on the right and left of each line;

**Generously utilize headings:** Break the content up in the screen using text- based headings to indicate to the user what is to come.

Using different typefaces, color, and emphasis in headings can also help create a readable page.

**Use short paragraphs:**

keep paragraphs short, using no more than two to three sentences per paragraph.

**Graphics:**

The final design element is graphics, or the images that are used to establish or aid a visual experience.

Graphics can be used to supplement the look and feel, or as content displayed inline with the text.

**Iconography:**

The most common form of graphics used in mobile design is icons. Iconography is useful to communicate ideas and actions to users in a constrained visual space.

**Photos and images:**

Photos and images are used to add meaning to content, often by showing a visual display of a concept, or to add meaning to a design.

Because images have a defined height and width

they need to be scaled to the appropriate device size, either by the server

**6.Explain detail about various mobile design tools(13)**

Mobile design requires understanding the design elements and specific tools.

Some frameworks provide a complete interface toolkit, allowing designers or developers to simply piece together the interface

Mobile framework	Design tool	Interface toolkits
Java ME	Photoshop, NetBeans	JavaFX, Capuchin
BREW	Photoshop, Flash	BREW UI Toolkit, uiOne, Flash
Flash Lite	Flash	Flash Lite
iPhone	Photoshop, Interface Builder	iPhone SDK
Android	Photoshop, XML-based themes	Android SDK
Palm webOS	Photoshop, HTML, CSS, and JavaScript	Mojo SDK
Mobile web	Photoshop, HTML, CSS, and	W3C Mobile Web Best



	JavaScript	Practices
Mobile widgets	Photoshop, HTML, CSS, and JavaScript	Opera Widget SDK, Nokia Web Runtime
Mobile web apps	Photoshop, HTML, CSS, and JavaScript	iUI, jQTouch, W3C Mobile Web App Best Practices

## 1. DESIGNING FOR THE RIGHT DEVICE

"What device suits this design best?

What market niche would appreciate it most?

What devices are the most popular within that niche?"

This knowledge will help to develop porting and/or adaptation strategy, the most expensive and riskiest part of the mobile application.

## 2. DESIGNING FOR DIFFERENT SCREEN SIZES

Mobile devices come in all shapes and sizes.

Choice is great for consumers, but bad for design.

7. The greatest challenge to creating a design that works well on multiple screen sizes is filling the width.

- For content-heavy sites and applications, the width of mobile devices is almost the perfect readability, presenting not too many words per line of text.
- The problem is when you have to present a number of tasks or actions.

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Discuss about the above challenge and design to develop a mobile App.

### Challenge

- The client app, upon registration, stores users' driver's license.
- To notify a user when his driver's license is about to expire.
- The challenge augmented is that the license expiry date tends to differ for user to user.
- The app upon registration needs to store vehicle and mileage data.

- However, with so much data on the fly, it is evident to think about storing the data.
- Filtering results to a region, location and sub-filtering them to services/features/facilities.

## Design

- The colour palette was chosen such that it includes various shades of grey with light colours here and there.
- To make sure the users receive a notification when their driver's license is about to expire, Android Local Push Notifications—Alarm Manager to set the expiry notification was employed.
- To store the vehicle and mileage data, created the local SQLite DB and to manage complex filter, SOL query with app code was used.
- **Nearby stations**
- An app user can not only find a filling station near him, he can also navigate to its location and take a look at the services, products and facilities available at the station.
- **Mileage Calculator**
- The app calculates mileage of a vehicle based on the number of miles it travelled. It calculates number of miles it travelled and how much fuel it was refilled with an The app **filling station**.
- **License Expiry Notifications**
- The app notifies a user when the license is about to expire.
- **Rating and Feedback**
- Customers' feedback matters more than anything be it a grocery store or a filling station. The app has many station and each time an app user visits one, the app prompts him to rate the experience.

## Results

- The app reduced time and fuel people waste while searching for a fuel station. The app users became safer and more considerate drivers. Driver's License expiry notification assured they renew their licenses on time.
- 

8.The client wants a mobile application to acts as a platform for its users to enroll themselves and their friends in the training center. The Training centerhas a total of six branches that provides a variety of courses and training to their students.

The application is bilingual and is available in English and Hindi. This application has many things to offer to its users. It gives a comprehensive information about all the courses whether they are ongoing or upcoming. Any user can avail these courses by making the payment through the app itself.

Discuss about the above challenges and solution for developing the Mobile APP.(13)

## Challenges

The client is a reputed training institute. It's well-known for the variety of

courses and quality of teaching. However, they were facing problems in reaching out to more students. They wanted to develop a mobile application that can work like a platform to enroll in their institute and also to guide their students.

#### **Solution :**

- To overcome the challenges of the client an app has to be developed to fulfil all the clients' requirements.
- With this application, all their users can see the number of different courses, its eligibility, timings, instructor, and many more.
- The app also provides all the guidance to the students related to the institute.
- **Explore courses with various filters**
- The institute has many courses and that's why this feature comes in handy as it allows its users to search for a course by using different filters such as category, age, location, gender, start date, and many more.
- **Bilingual**
- The client's institute is a reputed one and they wanted to attract students of all demographics. That's why we need to develop an app in both English and Hindi language.
- **Online enrollment& payment**
- This feature allows the user to enroll for various courses of their choices. Along with that they can also make payments online via the mobile app.
- **Gallery**
- Users can always have a look at the gallery that features pictures from all six branches of the training institute.
- **Notify me**
- This feature is a crucial one as it lets its user to set a reminder to any of the upcoming course. Whenever, the date of that course approaches near, the app reminds the user to enroll for it.
- **News**
- This feature shows all the news related to academics. It also shows the details about examination taken for various vacancies.

#### **Result**

- This app will turn out to be a huge success for clients. It will play a pivotal role in attracting many new students into the institute.

9. With medical technologies taking huge leaps every year, most of our health-related woes are taken care of. Doctors are successfully treating some conditions which were once incurable. However, with the advancement, the number of tasks involving the medical procedure has also increased to an overwhelming level.

An app that helps to manage all those procedures and tasks in an easy and systematic manner need to be developed. This application brings together all the components of health report which includes the medical history, symptoms, medication, appointments, immunizations, allergies, and fitness records.

Discuss about the above challenges and solution for developing the APP(13)

## Challenges

- First need to fetch the thehealthkit& Fitbit data on the application.
- Integration of both will be a challenge as it would increase the complexity of the app.
- Moreover, to fetch data in real-time from the healthkit& Fitbit to the application will be a tough job.
- Other challenge is about the medicine reminders. Client would need this feature in which the user would get notifications for his/her medical dose.
- Apart from that, need to provide encryption and decryption of data which would ensure foolproof privacy and security of user's data.
- Need to provide multiple languages in the app.

Solution:

- To solve the first challenge can useHealthkit's& Fitbits' API to fetch all the data to the app.
- For the second challenge which was of medicine reminders, can synchronize with the calendars. Can add reminders according to the frequency of the dosage.
- For encryption and decryption, can use AES encryption algorithm that works parallelly across every platform such as iOS, Android, and PHP.
- To make this app available in all the languages can create a master in which all the language translations for all the modules can be stored.
- **Record symptoms**
- In this feature the user can record all his/her symptoms with details such as date of first appearance, severity, and other miscellaneous information.
- **Immunizations**
- The user can record history of all the vaccines, any other immunizations taken in a single app which will give the user and the doctor a clear idea about your immunization history.
- **Chronic conditions**
- This feature allows the user to record all the necessary details of his/her chronic disease which would help the doctor to take further action rapidly.
- **Allergies**

- In this section the user can fill all the details of the allergies if he/she has any. This will prevent cases in which doctor prescribes medication to which the patient is allergic, causing harm.
- **Fitness data**
- This is a crucial feature in which all the data from fitbit or healthkit is fetched to the app. Now the user can monitor his/her fitness stats and manage medication simultaneously.
- **Medicine dosage**
- The user can enter all the details such as their name, amount of dosage to be taken, and the frequency of a dosage of all the medicines that the user have been prescribed with.
- **Medical appointments synced with calendar**
- This is a critical feature as the user can sync all the appointments with the calendar. User will receive a reminder whenever the user have a medical appointment fixed that day.
- **Voice commands**
- This feature is useful for elderly users who may face problems in typing. They can simply give voice commands to access functions and to write notes.
- **Share PDFs, video, and audio files with the doctor**
- This feature gives the user a golden opportunity to present the medical history with a great amount of details to the doctor. In this feature the user can include PDFs, videos, and audio files for the doctor.
- **Create multiple dependent accounts**
- The user don't need to create separate accounts for each member of his family. By this feature, the user can create and manage multiple accounts of his family members on the same application

### **Result:**

- The application will get a tremendous amount of appreciation from all; especially, from those who had to manage a large number of medical tasks for themselves or their family members

## 1. Discuss in detail the purpose of drag and drop(15)

### Interesting Moments

drag and drop seems simple.

There are a number of individual states at which interaction is possible.

We call these microstates interesting moments:

- How will users know what is draggable?
- What does it mean to drag and drop an object?
- Where can you drop an object, and where is it not valid to drop an object?
- What visual affordance will be used to indicate draggability?
- Will valid and invalid drop targets be signified?
- Do you drag the actual object?
- Or do you drag just a ghost of the object?
- Or is it a thumbnail representation that gets dragged?
- What visual feedback should be used during the drag and drop interaction?

**The Events:** There are at least 15 events available for cueing the user during a drag and drop interaction:

**Page Load:** Before any interaction occurs, you can pre-signify the availability of drag and drop. For example, you could display a tip on the page to indicate draggability.

**Mouse Hover:** The mouse pointer hovers over an object that is draggable.

**Mouse Down:** The user holds down the mouse button on the draggable object.

**Drag Initiated:** After the mouse drag starts (usually some threshold—3 pixels).

**Drag Leaves Original Location:** After the drag object is pulled from its location or object that contains it.

**Drag Re-Enters Original Location:** When the object re-enters the original location.

**Drag Enters Valid Target:** Dragging over a valid drop target.

**Drag Exits Valid Target:** Dragging back out of a valid drop target.

**Drag Enters Specific Invalid Target:** Dragging over an invalid drop target.

**Drag Is Over No Specific Target:** Dragging over neither a valid or invalid target. Do you treat all areas outside of valid targets as invalid?

**Drag Hovers Over Valid Target :** User pauses over the valid target without dropping the object. This is usually when a spring loaded drop target can open up. For example, drag over a folder and pause, the folder opens revealing a new area to drag into.

**Drag Hovers Over Invalid Target:** User pauses over an invalid target without dropping the object. Do you care? Will you want additional feedback as to why it is not a valid target?

**Drop Accepted :** Drop occurs over a valid target and drop has been accepted.

**Drop Rejected:** Drop occurs over an invalid target and drop has been rejected. Do you zoom back the dropped object?

**Drop on Parent Container:** Is the place where the object was dragged from special? Usually this is not the case, but it may carry special meaning in some contexts.

**The Actors :** During each event you can visually manipulate a number of actors. The page elements available include:

- Page (e.g., static messaging on the page)
- Cursor
- Tool Tip
- Drag Object (or some portion of the drag object, e.g., title area of a module)
- Drag Objects Parent Container
- Drop Target

## Drag and Drop Module

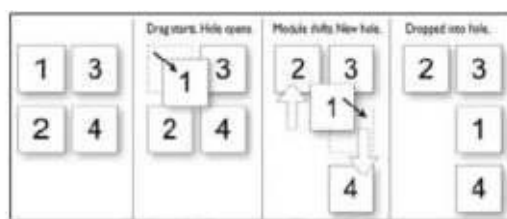
- to allow the user to directly place objects on the page.
- A typical pattern is Drag and Drop Modules on a page.
- Netvibes provides a good example of this interaction pattern.

## Considerations

- Placeholder target
- Insertion target

### Placeholder target

- Netvibes uses a placeholder (hole with dashed outline) as the drop target.
- The idea (illustrated in Figure ) is to always position a hole in the spot where the drop would occur.
- As 1 gets dragged to the spot between 3 and 4, the placeholder target jumps to fill in this spot as 4 moves out of the way.



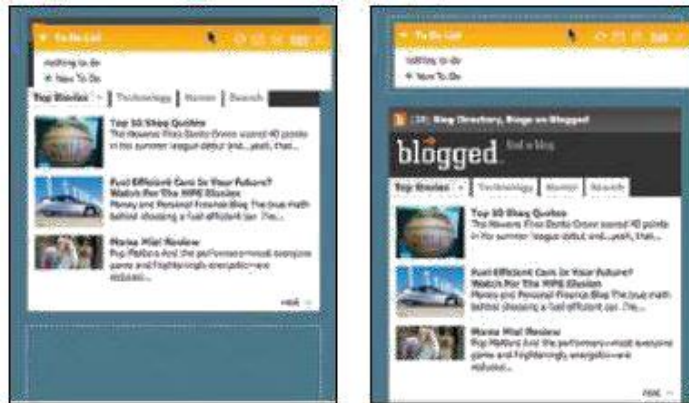
### Boundary-based placement.

its original size, targeting is determined by the boundaries of the dragged object and the

boundaries of the dragged-over object.

The mouse position is usually ignored because modules are only draggable in the title (a small region).

Both Netvibes and iGoogle take the boundary-based approach.



## Insertion target

Placeholder positioning is a common approach, but it is not the only way to indicate drop targeting.

An alternate approach is to keep the page as stable as possible and only move around an insertion target (usually an insertion bar).

## Drag distance

object being dragged is small, it does not intersect a large area.

It requires moving the small thumbnail directly to the place it will be dropped.

## Drag rendering

How should the dragged object be represented? Should it be rendered with a slight transparency (ghost)? Or should it be shown fully opaque? Should a thumbnail representation be used instead?

## Drag and Drop List

The Drag and Drop List pattern defines interactions for rearranging **items in a list**. 37

## Placeholder target

a simple hole can be exposed where the object will be placed when dropped.

## Insertion target



- The insertion bar appears under the ghosted item.
- The addition of the brackets on the left and right of the insertion bar is an attempt to make the targeting clearer.

### **Non—drag and drop alternative**

- drag and drop, the Netflix queue actually supports two other ways to move objects around:
- Edit the row number and then press the —Update DVD Queue button.
- Click the —Move to Top icon to pop a movie to the top.
- Modifying the row number is straightforward. It's a way to rearrange items without drag and drop.
- The —Move to Top button is a little more direct and fairly straightforward (if the user really understands that this icon means —move to top).
- Drag and drop is the least discoverable of the three, but it is the most direct, visual way to rearrange the list. Since rearranging the queue is central to the Netflix customer's satisfaction, it is appropriate to allow multiple ways to do so.

### **Drag and Drop Object**

- Drag and drop as a means of visually manipulating relationships is a powerful tool.
- Cogmap is a wiki for organizational charts.
- Drag and Drop Object is used to rearrange.

### **Drag and Drop Action**

- Drag and drop is also useful for invoking an action or actions on a dropped object.
- The Drag and Drop Action is a common pattern.
- Its most familiar example is dropping an item in the trash to perform the delete action.

## Considerations

This is not a trivial implementation.

the benefit of drag and drop for operating on a set of files.

The traditional model requires each photo to be selected individually for upload.

## Drag and Drop Collection

- A variation on dragging objects is collecting objects for purchase, bookmarking, or saving into a temporary area.
- This type of interaction is called Drag and Drop Collection.
- Drag and drop is a nice way to grab items of interest and save them to a list.
- Drag and drop is a natural way collect items for purchase

## 2.Explain the types of direct selection(13)

- **Toggle Selection:** Checkbox or control-based selection.
- **Collected Selection:** Selection that spans multiple pages.
- **Object Selection:** Direct object selection.
- **Hybrid Selection:** Combination of Toggle Selection and Object Selection

## Toggle Selection

The most common form of selection on the Web is Toggle Selection.

Checkboxes and toggle buttons are the familiar interface for selecting elements on most web pages.

Toggle Selection with checkboxes has some nice attributes:

- Clear targeting, with no ambiguity about how to select the item or deselect it.
- Straightforward discontinuous selection, and no need to know about Shift or Control key ways to extend a selection. Just click the checkboxes in any order, either in a continuous or discontinuous manner.
- Clear indication of what has been selected.

## Collected Selection

- Collected Selection is a pattern for keeping track of selection as it spans multiple pages.
- In Gmail, you can select items as you move from page to page.
- The selections are remembered for each page.

## Considerations

Gmail does provide a way to select all items across different pages.

When selecting all items on a individual page a prompt appears inviting the user to –Select conversations in Spam.



## Keeping the selection visible

- The real challenge for multi-page selection is finding a way to show selections gathered across multiple pages.
- You need a way to collect and show the selection as it is being created.

## Collected Selection and actions

- the drop-down menus contained two identical sets of commands.
- The first group of commands in the menu operated on the collected items in the tray.
- The second set of commands operated on the selected objects.

## Object Selection

- Object Selection, is when selection is made directly on objects within the interface.
- Sometimes using a checkbox does not fit in with the style of interaction desired.



## Considerations

- Desktop applications tend to use Object Selection.
- It is also natural that web-based mail applications that mimic desktop interactions employ this same style of selection.
- Object Selection can be extended by holding down the Shift key while clicking on a different item.

## Desktop-style selection

- Object Selection interactions include ways to use the mouse to drag-select objects.
- Yahoo! Photos introduced this same type of object selection to its photo gallery (Figure below). Individually clicking on a photo selects it.
- Using the Shift key and clicking also extends the selection.



## Hybrid Selection

- Mixing Toggle Selection and Object Selection in the same interface can lead to a confusing interface.
- Referring back to Yahoo! Bookmarks



Figure: In Yahoo! Bookmarks, one item is selected, but two items can be dragged by dragging on the unselected item.

## Considerations

There are a few important issues to consider when using Hybrid Selection.

### Confusing two models

One bookmark element is selected

The second bookmark element is unselected (the checkbox is clear).

In the right panel of clicking and dragging on the unselected bookmark element initiates a drag.

This occurs because three things are happening in the same space:

- Toggle Selection is used for selecting bookmarks for editing, deleting, etc.
- Object Selection is used for initiating a drag drop.

- Mouse click is used to open the bookmark on a separate page.

### 3. Explain in detail about contextual tools(13)

#### Interaction in Context

Desktop applications separate functionality from data.

Menu bars, toolbars, and palettes form islands of application functionality.

#### Fitts's Law

- Fitts's Law is an ergonomic principle that ties the size of a target
- The time to acquire a target is a function of the distance to and size of the target.

#### Contextual Tools

Contextual Tools are the Web's version of the desktop's right-click menus.

**Always-Visible Tools:** Place Contextual Tools directly in the content.

- **Hover-Reveal Tools:** Show Contextual Tools on mouse hover.
- **Toggle-Reveal Tools:** A master switch to toggle on/off Contextual Tools for the page.
- **Multi-Level Tools:** Progressively reveal actions based on user interaction.
- **Secondary Menus:** Show a secondary menu (usually by right-clicking on an object).

#### Always-Visible Tools

The simplest version of Contextual Tools is to use Always-Visible Tools.

Digg is an example of making Contextual Tools always visible

#### Relative importance

- The digg it action is represented as a button and placed prominently in the context of the story.
- The –bury it action is represented as a hyperlink along with other minor actions just below the story.

#### Discoverability

- Discoverability is a primary reason to choose Always-Visible Tools.
- Generally Contextual Tools in a list work well when the number of actions is kept to a minimum. Gmail provides a single Always-Visible Tool in its list of messages—the star rating—for flagging emails

## Hover-Reveal Tools

- One way to do this is to reveal the tools when the user pauses the mouse over an object. To-do items may be deleted or edited directly in the interface.
- The tools to accomplish this are revealed on mouse hover.

## Contextual Tools in an overlay

There are several actions available for a focused object.

Instead of placing tools beside the object being acted on, the revealed tools can be placed in an overlay.

there can be issues with showing contextual tools in an overlay:

1. Providing an overlay feels heavier. An overlay creates a slight contextual switch for the **user's attention**.
2. The overlay will usually cover other information—information that often provides context for the tools being offered.
3. Most implementations shift the content slightly between the normal view and the overlay view, causing the users to take a moment to adjust to the change.
4. The overlay may get in the way of navigation.

## Toggle-Reveal Tools

A variation on the two previous approaches is to not show any Contextual Tools until a special mode is set on the page.

A good example of Toggle-Reveal Tools is in Basecamp's category editing

## Considerations

Here are a few considerations to keep in mind when using Toggle-Reveal Tools.

### Soft mode

- it is a good thing to avoid specific modes in an interface.
- if a mode is soft it is usually acceptable.
- By soft we mean the user is not trapped in the mode.
- With Base camp, the user can choose to ignore the tools turned on.
- It just adds visual noise and does not restrict the user from doing other actions.

## Multi-Level Tools

Contextual Tools can be revealed progressively with Multi-Level Tools.

Additional tools are revealed when hovering over the newly visible tools

## Radial menus



- Radial menus\* such as in Songza have been shown to have some advantages over more traditional menus
- users can rely on muscle memory rather than having to look directly at the menu items.
- Second, the proximity and targeting size make the menu easy to navigate

## Default action

This interaction is very similar to one commonly used in desktop application: allowing a double-click to activate the first item (default action) in a right-click menu.

## 4. Discuss about the types of overlays(13)

Overlays are really just lightweight pop ups.

Browser pop ups are created as a new browser window Lightweight overlays are shown within the browser page as an overlay.

Browser pop ups often display browser interface controls (e.g., a URL bar).

Due to security concerns, in Internet Explorer 7 the URL bar is a permanent fixture on any browser pop-up window.



- Flash or Ajax-style techniques (Dynamic HTML), a web application can present a pop up in a lightweight overlay within the page itself.
- Lightweight overlays are just a lightweight in-page object.
- They are inexpensive to create and fast to display.
- The interface for lightweight overlays is controlled by the •web application and

not the browser.

- There is complete control over the visual style for the overlay.
- This allows the overlay to be more visually integrated into the application's interface



three specific types of overlays:

Dialog Overlays, Detail Overlays, and Input Overlays.

### Dialog Overlay

- Dialog Overlays replace the old style browser pop ups.
- Netflix provides a clear example of a very simple Dialog Overlay.

### Detail Overlay

The Detail Overlay allows an overlay to present additional information when the user clicks or hovers over a link or section of content.

### Input Overlay

- Input Overlay is a lightweight overlay that brings additional input information for each field tabbed into.
- American Express uses this technique in its registration for premium card such as its gold card.

## 5.Discuss about the types of inlays(13)

- Information, or dialog with the user needs to be an overlay.
- Another approach is to inlay the information directly within the page itself.



## **Dialog Inlay**

A simple technique is to expand a part of the page, revealing a dialog area within the page.

## **List Inlay**

- Lists are a great place to use Inlays.
- The List Inlay works as an effective way to hide detail until needed—while at the same time preserving space on the page for high-level overview information.
- Google Reader provides an expanded view

## **Detail Inlay**

- A common idiom is to provide additional detail about items shown on a page.
- Details can be shown inline as well.
- Roost allows house photos to be viewed in-context for a real estate listing with a Detail Inlay

## **Inlay Versus Overlay?**

Use an overlay when there may be more than one place a • dialog can be activated from (the

exception may be showing details for items in a list).

- Use an overlay to interrupt the process.
- Use an overlay if there is a multi-step process.
- Use an inlay when you are trying to avoid covering information on the page needed in the dialog.

## **6.Explain in detail about the various patterns that support Virtual pages(13)**

Patterns that support virtual pages include:

- **Virtual Scrolling**
- **Inline Paging**
- **Scrolled Paging**
- **Panning**
- **Zoomable User Interface**

## **Virtual Scrolling**

- websites could preload data and allow the user to scroll through it.

- process led to long delays in loading the page.
- Each fetch resulted in a page refresh.
- Virtual Scrolling demonstrate three different ways to manage the virtual space:
- Yahoo!
- Microsoft Live Search
- And PicLens

### **Inline Paging**

- What if instead of scrolling through content we just wanted to make pagination feel less like a page switch?
- By only switching the content in and leaving the rest of the page stable, we can create an Inline Paging experience.
- This is what Amazon's Endless.com site does with its search results.

### **Scrolled Paging**

- scrolling and paging into Scrolled Paging.
- Paging is performed as normal.

### **Virtual Panning**

- One way to create a virtual canvas is to allow users the freedom to roam in two-dimensional space.
- A great place for Virtual Panning is on a map.
- Google Maps allows you to pan in any direction by clicking the mouse down and dragging the map around.

### **Zoomable user interface**

- A Zoomable User Interface (ZUI) is another way to create a virtual canvas.
- panning or flicking through a flat, two-dimensional space, a ZUI allows the user to also zoom in to elements on the page.
- This freedom of motion in both 2D and 3D supports the concept of an infinite interface.

### **Paging Vs Scrolling**

Leading web designers and companies have taken different approaches to solving the same problems.

Yahoo! Mail chose Virtual Scrolling.

Gmail chose Inline Paging.

- When the data is more transient
- For transient data
- If the content is really continuous, scrolling is more natural than paging.
- If you get your revenue by page impressions, scrolling may not be an option for your business model.
- If paging causes actions for the content to become cumbersome, move to a scrolling model.

## 7. Discuss in detail about the Process flow patterns(13)

some Process flows it makes sense to keep the user on the same page throughout the process.

### Google blogger

The popular site Google Blogger generally makes it easy to create and publish blogs.

This is especially difficult when you are the victim of hundreds of spam comments left by nefarious companies hoping to increase their search ranking.

Blogger forces you to delete these comments through a three-step process.

Each step is an individual page, all punctuated with a page refresh.

**My (Bill's) blog site was recently spammed. It turns out that my 100 or so** articles all had 4 or more spam comments

1. Click the trash icon to delete the comment.
2. After page refreshes, click the – Remove Forever checkbox.
3. Click the – Delete Comment button.
4. After the page refreshes, click the link to return to my blog article.
5. Repeat steps 1–5 for each article with spam comments.

### The magic principle

The process for this task breaks down like this:

- Take pictures with a digital camera.

- Sometime later, upload the photos to a photo site like Flickr. This involves:

- Finding the cable.

- Starting iTunes.

- Importing all photos.

Using a second program, such as Flickr Uploadr, to upload the photos to Flickr.

- Copying the link for a Flickr set (which involves first locating the page for the uploaded set).

Send the link in email to appropriate friends. If some magic were invoked, here is how it might happen:

- The camera would be event-aware. It would know that is your daughter's eighth birthday.

- When finished taking pictures of the event, the camera would upload the pictures to Flickr.

- Flickr would notify family and friends that the pictures of the birthday party are available.

### **Interactive single page processor**

Consumer products come in a variety of shapes, sizes, textures, colors, etc.

After submitting the choice, a new page is displayed.

Only when the user arrives at this second page

### **Inline assistant process**

Another common place where multiple pages are used to complete a process is when adding items to a shopping cart.

Amazon provides the typical experience So what magic can we apply to move this from a multi-page experience to a single-page experience?

### **Dialog overlay process**

- page switch is an interruption to the user's mental flow.
- context switch is a chance for a user to leave the site.
- Dialog Overlay Process to encapsulate a multi-step flow inside a Dialog

Overlay.. Overlays allow us to keep the context of the page yet present a virtual space to conduct a conversation with the user.

### **Configuration process**

- Sometimes a Process Flow is meant to invoke delight
- various Configurator Process interfaces on the Web.
- Live Previews allow the user to see the effect of his changes on a simulated version of the real thing.

### **Static single page process**

- The Apple example illustrates another way to get rid of multiple pages in a Process Flow.
- if placing all the tasks on a single page is enough to cause the user to bail out; it is not a good idea.
- In the case of the Apple store, each item is optionally set, and it's just a single click to include or exclude an item from the purchase.