# CHAPTER 5

# Users Models

UNIT V

**Syllabus**

Predictive Models, Cognitive Models, Interaction with Natural Languages, Next Generation Interface, Socio-organizational Issues and Stakeholder Requirements, Heuristic Evaluation, Evaluation with Cognitive Models, Evaluation with Users.

## 5.1 Introduction

**Objective :** To design, implement and evaluate effective and usable Human Computer Interfaces.

Learn a variety of methods for evaluating the quality of a user interface.

**Outcome :** To inculcate basic theory, tools and techniques in HCI.

Apply the fundamental aspects of designing and evaluating interfaces.

Apply appropriate HCI techniques to design systems that are usable by people

**Important Discussions :**

- User models are crucial parts of HCI processes for the development of various HCI systems such as listed as follows:
  - Hand Gesture Recognition System (HGRS),
  - Character Recognition System (CRS),
  - Emotion Recognition System (ERS),
  - Face Recognition System
  - Fingerprint Recognition System
  - Handwriting Recognition Systematic.
- Moreover, diversified HCI methodologies are useful such as pattern recognition, classification, clustering, etc. to develop user models based on aforesaid HCI systems. In this context, appropriate use of user model along with designing techniques, and design thinking are required.

There exists two user models namely; 1. Predictive Model 2. Cognitive Model.

Also, Human Computer Interaction with Natural Language, Next Generation Interface using mobile devices, Socio-organizational Issues and Stakeholder Requirements using Software Architecture, Heuristics Evaluation long with evaluation are necessary in aforesaid HCI Systems.

## 2 P.'edictive Models

This is used to incorporate ways to help incorporate improved means of having good interaction with HCI's.

Predictive Models indudes :

a) Keystroke Level Model

b) ThroughPut (TP)

c) Fitt's Law.

### ) Keystroke Level Model

- This is used to predict how long it takes to execute a specific task and this is broken down into three areas :
  1) The carrying out of the operation such as pressing key buttons, using your mouse to point in an area or drawing something.
  2) Thinking about doing something, so before you actually get it done you need to think about it and the less time you need to think about something then the quicken you can actually carry out the action.
  3) The final area is how long it takes the actual system to do what you have asked it to do which will happen after the last two steps.
- Following points shows this is exactly what a keystroke model is used to check for and to measure :
  1) How long it takes for a key to be pressed and for how long it will take a user to release the key, therefore showing how quick a typist the user is.
  2) The time taken to move your mouse to a specified area on the screen.
  3) Just like the key press, it also is used to see how long it takes for you to carry out and release a mouse click.
  4) How long you need to change Hardware devices such as keyboards on to install a portable hard drive.
  5) As described in the second area it is used to see how long it will take a human brain will take to think about performing the actual action.
  6) How long it takes to type a string of characters, this will be used alongside key presses to

get an accurate measurement for how quick you can actually type.

7) Finally it will also measure how long it takes your system to recognize what you are doing and to actually carry out what you have requested.

### b) ThroughPut (TP)

- This is used to show the overall productivity of the computer/how well a computer perfc rms.
- It is used to show how quick a computer responds to a command, therefore shcwing you the computers processing speed and allowing you to yourself determine if it needs to be upgraded or not. This is therefore known as the response time, and as a computer gets older its response time will gradually get higher. For example when you add more things/material (soft) onto your hard drive and install more things. Software's than if you are trying to search for specific documents then it could take a bit longer to carry out the action. This is same as when you are trying to start your computer up, overtime it will take longer to actually turn on and therefore it will decrease your personal productivity.

### c) Fitt's Law

- This is used to predict how quick a user will be able to move to a specific area based on how far away it is and how large the object you are trying to reach is.
- This creates a direct correlation between time and size as well as time and distance as the further away you get from an object, the longer it will take to get to the object and the smaller an object it is, the longer that will also take a user to reach the object.
- This can be shown in a few different way; you can do this by pressing a screen using a touch screen option or by using a pointing device such as a mouse.
- By sticking to Fitt's Law you will need to choose buttons carefully as they will need to be sized properly and likewise Positioned properly as well.

## 5.3 Cognitive Models

### 5.3.1 Introduction

- Cognitive models have a rather computational flavor, this reflects the way that computational analogies are often used in cognitive psychology.
- The presentation of cognitive models is divided into following categories :
  1) Hierarchical representation of the user's task and goal structure.
  2) Linguistic and grammatical models
  3) Physical and device level models.

### 5.3.2 Goals and Task Hierarchies

- Many models make use of model of mental processing in which the user achieves goals by solving subgoals in a divide and conquer fashion.
- Imagine we want to produce a report on sales of introductory HCI textbooks. To achieve this goal we divide it into several subgoals, say gathering the data together, producing the table and histograms and writing the descriptive material. Concentrating on the data gathering, we decide to split this into further subgoals i.e. find data names of all introductory HCI textbooks and then search the book sales database.
- The examples can be laid out to expose this structure :
- Produce report

  Gather data

  - Find book name
  - Do key words search of names database

    << Further subgoals >>
  - Shift through name and abstracts by hand

    << Further subgoals >>
  - Search sales database

    << Further subgoals >>

  Layout tables and histogram

  << Further subgoals >>

  Write description

  << Further subgoals >>
- The Goals and Task Hierarchies includes :

#### 5.3.2.1 GOMS

A GOMS describe :

**i) Goals**

~~These are the users goals, describing what the users wants to achieve. Further, in GOMS~~ the goals are taken to represent a 'memory point' for the user, from which he can evaluate what should be done and to which he may return should any errors occur.

### ii) Operators

- These are the lowest level of analysis. They are the basic actions that the user must perfo in order to use the system. They may affect the system (e.g. press the 'x' key) or only user's mental state (e.g. read the dialog box).
- There is still a degree of flexibility about the granularity of operators, we may take t command level issue the SELECT command on be more primitive :
  - i) Move mouse to menu bar.
  - ii) Press center mouse button.

### iii) Methods

- As we already noted, there are typically several ways in which a goal can be split into subgoa For instance in a certain window manager a currently selected window can be closed to icon either by selecting the 'CLOSE' option from a pop-up menu, or by hitting the 'funct key' (L7).
- In GOMS these two goals decompositions are referred to as methods, so we have :
  - i) CLOSE-METHOD.
  - ii) 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 .(dot) used to indicate the hierarchical level of goals.

### iv) Selection

- From the above snippet we see the use of the word 'select' where the choice of met arises. GOMS does not leave this as a random choice, but attempts to predict which met will be used.
- ~~This is typically depends both on the particular user and on the state of the system~~ and de about the goals.

Example : A user sam, never uses the L7-METHOD, except of 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 'block' use the L7-METHOD.

- The goal hierarchies describes GOMS analysis are almost wholly below the level of the unit task defined earlier. A typical GOMS analysis would therefore consist of a single high-level goals, which is then decomposed into a sequence of unit tasks, all of which can be further decomposed down to the level of basic operators :

GOAL : EDIT-MANUSCRIPT

GOAL : EDIT-UNIT-TASK repeat until no more unit tasks.

### 3.2.2 Cognitive Complexity Theory (CCT)

CCT, introduced by Kieras and Polson, begin with the basic premises of goal decomposition from GOMS and enriches the model to provide more predictive power.

CCT has two parallel descriptions:

i) Users goal – Production rules.

ii) Computer system (device)

The production rules are a sequence of rules :

Example : If condition then action

- Where condition is a statement about the contents of working memory. If the condition is true then the production rule is said to fire.
- An action may consist of one or more elementary actions, which may be either changes to the working memory, or external actions such as keystrokes.
- The production rule program is written in a "LISP" programming language.

Example : We consider an editing task using the UNIX VI text editor. The task is to insert a space where one has been missed out in the text.

```
(SELECT – INSERT – SPACE
IF   (AND (TEST – GOAL perform unit task)
     (TEST – TEXT task is insert space)
     (NOT (TEST – GOAL insert space))
     (NOT (TEST – NOTE executing insert space)))
THEN ((ADD – GOAL insert space)
```

(ADD – NOTE executing insert space)

(Look – TEXT task is at % LINE % COL)))

(INSERT – SPACE – DONE)

- CCT has a set of 'style' rules for novices. These limits the form of the conditions and actions in the production rules.
- The rules in CCT need not represent error-free performance. They can be used to explain error phenomena, though they cannot predict them.
- CCT rules can represent more complex plans than the simple sequence/sequential hierarchies of GOMS.

### 5.3.3 Linguistic Models

The users interaction with a computer is often viewed in terms of a language, so it is not surprising that several modeling formalisms have developed centered around linguistic models concept.

#### 5.3.3.1 BNF (Back us – Noun Form)

- Representative of the linguistic approach is Reisner's use of BNF rules to describe the dialog grammar. This 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.

  Example Imagine a graphics system that has a line drawing function.

| | | |
|---|---|---|
| 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 :
  i) Non-terminals - Lower case letters.
  ii) Terminals - Upper case letters.
- Terminals represents the lower level of users behaviour such as pressing a key, clicking a mouse button or moving the mouse.
- Non-terminals are higher level abstractions. These are defined in terms of other non-terminals and terminals by a definition of the form.

**Syntax:**

Name : : = Expression

where,

: : = → Is defined as

\+ → Sequence

| → Choice

#### 5.3.3.2 Task-action Grammar (TAG)

- Measures based upon BNF have been criticized as not 'cognitive' enough. They ignore the advantages of consistency both in the languages structure and in its use of command names and letters.
- TAG attempts to deal with some of these problems by including elements such as parameterized grammar rules to emphasize consistency and encoding the user's world knowledge.

**Example :** We consider the three UNIX commands :

i) cp – For copying files

ii) mv – For moving files

iii) ln – For linking files.

- Each of these has two possible forms. They either have two arguments, a source and destination filename, or have any number of source filenames followed by destination directory :

Copy : : = 'cp' + filename + filename

| 'cp + filename + directory

Move : : = 'mv' + filename + filename

| 'mv' + filename + directory

Link : : = 'ln' + Filename + filename

| 'ln' + filename + directory.

### 5.3.4 Physical and Device Models

#### 5.3.4.1 Key Stroke-level Model

- This is used to predict how long it takes to execute a specific task and this is broken down into three areas :

  1) The carrying out of the operation such as pressing key buttons, using your mouse to point in an area or drawing something.

2) Thinking about doing something, so before you actually get it done you need to think about it and the less time you need to think about something then the quicker you can actually carry out the action.

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### 5.3.4.2 Three-State Model

– Button has developed a simple model of input devices. The three-state model, which captures some of the crucial distinctions, he begins by looking at a mouse. If you move it with no buttons pushed, it normally moves the mouse cursor about. This tracking behaviour is termed as 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 transition is shown in Fig. 5.3.1.

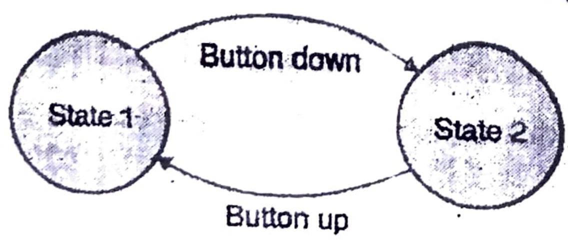


**Fig. 5.3.1 : Mouse Transition : States 1 and 2.**

– If instead we consider a light pen with a button, it behaves just like a mouse when it is touching the screen. When its button is not depressed, it is in State 1, and when its button is down State 2. However, the light pen has a third state, when the light pen is not touching the screen. In this state the system cannot track the light pen's position. This is called states as represented in Fig. 5.3.2.

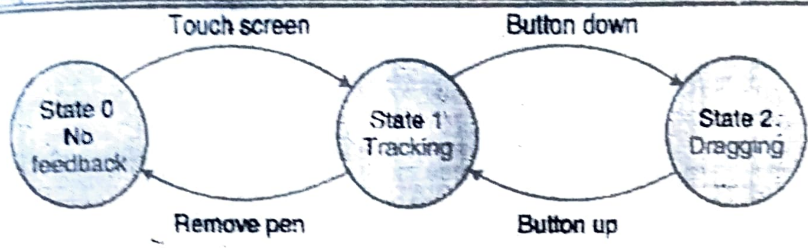


**Fig. 5.3.2 : Light pen transitions: Three States**

## 5.3.5 Cognitive Architectures

### 5.3.5.1 The Problem Space Model

The rational behavior is characterized as behavior that is intended to achieve a specific goal. This element of rationality is often used to distinguish between intelligent and machine like behavior.

In the field of AI (Artificial Intelligence) a system exhibiting rational behavior is referred to as a knowledge-level system. A knowledge - level system contains an agent behaving in an environment.

- The new computational model is the problem space model, based on the problem - solving work of Newell and Simon at Carnegie Mellon University.
- A problem space consists of a set of states and a set of operations that can be performed on the states.
- Behavior in a problem space is a two-step process;
  (i) The current operator is chosen based on the current state and then it applied to the current state to achieve the new state.
  (ii) It must represent rational behavior, and so it must characterized the goal of the agent.

### 5.3.5.2 Interacting Cognitive Subsystems (ICS)

- Barnard has proposed a very different cognitive architecture, called interacting cognitive subsystem (ICS). ICS provides a model of perception, cognition and action, but unlike other cognitive architectures, it is not intended to produce a description of the user in terms of sequences of actions that he performs.
- ICS provides a more holistic view of the user as an information-processing machine. The emphasis is on determining how easy particular procedures of action sequences become as they are made more automatic within the user.
- ICS attempts to incorporate two separate psychological traditions within one cognitive architecture.

## 5.4 Interaction with Natural Language

- Perhaps the most attractive means of communicating with computers, at least at first glance is by natural language.
- Users, unable to remember a command or lost in a hierarchy of menus, may long for the computer that is able to understand instructions expressed in everyday words.
- Natural language understanding, both of speech and written i/p.

## 5.5 Next Generation Interface

Implicit Human – Computer interaction as shown in Fig. 5.5.1.

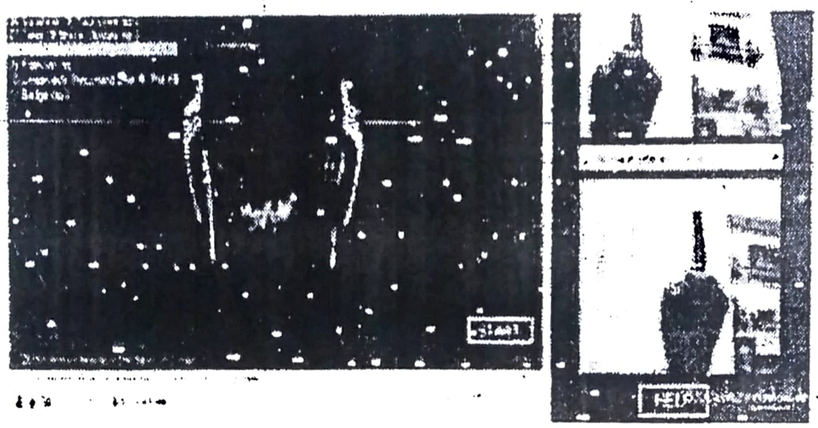

**Fig. 5.5.1 : Music Player Application using Hand Gestures**

## 5.6 Socio-organization Issues and Stakeholders Requirements

### 5.6.1 Introduction

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

(i) Systems may not take into account conflict and power relationships.

(ii) Those who benefit may not do the work

(iii) Not everyone may use systems

### 5.6.2 Organizational Issues

Many systems supporting work in organizations are supporting groups of workers, but this may be through specialist groupware systems or through shared data or processes.

#### 5.6.2.1 Cooperation or Conflict

- The term 'Computer – Supported Cooperation Work (CSCW) ' seems to assume that groups will be acting in a cooperative manner. This is obviously true to some extent, even opposing football teams cooperate to the extent that they keep within the rules of the game, but their cooperation only goes so far.
- People in organizations and groups have conflicting goals, and systems that ignore this are likely to fail spectacularly.

#### 5.6.2.2 Changing Power Structures

- The identification of stakeholders will uncover information transfer and power relationships that cut across the organizational structure indeed, all organizations have these informal networks that support both social and functional contacts.
- The physical layout of an organization often reflects the formal hierarchy each department is on different floor, with sections working in the same area of an office. If someone from sales wants to talk to someone from marketing then one of them must walk to the other's office.

#### 5.6.2.3 The Invisible Worker

- The ability to works and collaborate at a distance can allow functional groups to be distributed over different sites. This can take the form of cross-functional neighbourhood centres, where workers from different departments do their jobs in electronic contact with their functional colleagues.
- Alternatively, distributed groupware can allow the true home-based teleworker to operate on similar terms to an office based equivalent. The ecological and economic advantages of such working practices are now becoming well established, and it seems that communications and CSCW technology can overcome many of the traditional barriers.

#### 5.6.2.4 Who Benefits ?

- One frequent reason for the failure of information systems is that the people who get the benefits from the system are not the same as those who do the work.

  **Example :** Shared calendars.
- The beneficiary of the system is a manager who uses the system to arrange meeting times, but whose personal secretary does the work of keeping the calendar up to date.

### 5.6.2.5 Free Rider Problem

- Even where there is no bias toward any particular people, a system may still not func symmetrically, which may be a problem, particularly with shared communication systems. issue is the free rider problem. Take an electronic conferencing system. If there is plent discussion of relevant topics then there are obvious advantages to subscribing and reading contributions.
- However, when considering writing a contribution, the effort of doing so may outweighs benefits. The total benefit of the system for each uses weights the costs, but for any partic decision the balance is overturned.

### 5.6.2.6 Critical Mass

- Another issue related to the free rider problem is the need to develop a critical mass wh telephones were only in public places, their use as a form of pervasive interperson communication was limited. However, once a large number of people have telephones in th homes it becomes worthwhile paying to have a telephone installed.
- In cost/benefits terms, the early subscribers probably have a smaller benefit than the cost. O when the no. of subscribers increases beyond the critical mass does the benefit for all domina the cost Fig. 5.6.1.

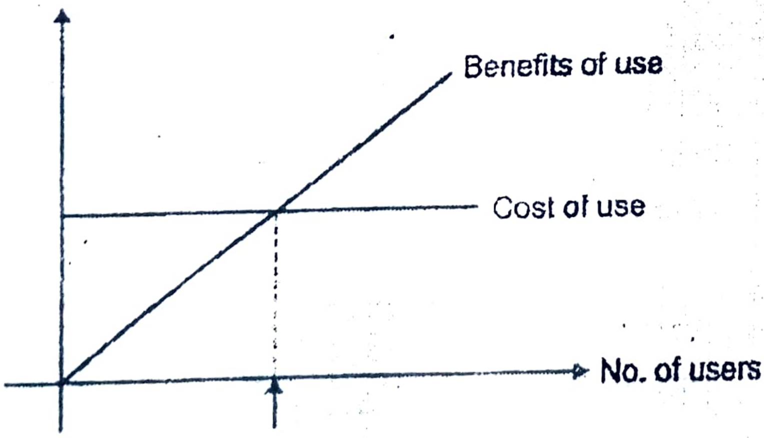


Fig. 5.6.1 : Cost/Benefits or System use

### 5.6.2.7 Automating Process-Work Flow and Business Process Re-engineeri (BPR)

- The major task in organizations is moving pieces of paper around. An order is received by pho and an order form filled by the sales executive. The order form is passed to accounts who che the credit rating and if all is okay it is passed on to stores who check availability and collect order together at the picking line. When the order is dispatched, a delivery note is packed with order and a copy is returned to accounts, who send an invoice to the customer.

Organizations have many such processes, and workflow systems aim to automate much of the process using electronic forms, which are forwarded to the relevant person based on pre-coded rules.

A more radical approach to organizational processes is found in BPR. Traditionally organizations have been structured around functions : Sales, accounts, stores, manufactures However, the purpose of an organization can be seen in terms of key business processes. The ordering/delivery process described above is a typical and important example. In BPR these processes are recorded and analyzed. Problems in the current process are noted and the whole process may be redesigned in order to make the path of the process more efficient.

#### 5.6.2.8 Evaluating the Benefits

- We have seen several problems that can arise from the mismatched between information systems and organizational and social factors let us assume that we have a system in place and it has not fallen a part at the seams. Everyone seems happy with it and there are no secret resentments. Now it is time to count the cost- it was an expensive system to buy and install, but was it worth it ? This is an almost impossible question to answer. The benefits from cooperative systems, especially organization- wide systems such as email or electronic conferencing, are in terms of job satisfaction or more fluid information flow.

### 5.6.3 Capturing Requirements

#### 5.6.3.1 Who are the Stakeholders?

- Understanding stakeholders is key to many of the approaches to requirement capture, since in an organizational setting it is not simply the end-user who is affected by the introduction of new technology.
- A stakeholder, therefore, can be defined as anyone who is affected by the success or failure of the system. It can be useful to distinguish different categories of stakeholders, and following categories/ categorization from the custom approach is helpful for this:

1) **Primary stakeholders** are people who actually use the system - the end users.
2) **Secondary stakeholders** are people who do not directly use the system, but receive output from it or provide input to it.
3) **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.

4) **Facilitating** stakeholder are people who are involved with the design, development and maintenance of the system.

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

1) **Primary stakeholder :** Travel agency staff airline booking staff
2) **Secondary stakeholder :** Customers, airline management
3) **Tertiary stakeholder :** Competitors, civil aviation authorities, customers travelling companion, airline shareholders.
4) **Facilitating stakeholder :** Design team, IT department staff.

### 5.6.3.2 Socio – Technical Models

It has been captured some certain common elements:

(i) The problem being addressed
(ii) Stakeholders affected.
(iii) The workgroups within organization
(iv) The changes will be supported
(v) The proposed technology.
(vi) External constraints and influences.

### 1. CUSTOM Methodology

- **CUSTOM is 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 terms to understand and fully document user requirements.
- **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.
- There are six key stages to carry out in a CUSTOM analysis :
  1) Describe the organization context, including its primary goals, physical characteristics, political and economic background.
  2) Identify and describe stakeholder.
  3) Identify and describe work-groups.
  4) Identify and stakeholders needs.
  5) Identify and describe task-object pairs.
  6) Consolidate and check stakeholder requirements.

## 2. Open System Task Analysis (OSTA)

- OSTA is an alternative socio – technical approach, which attempts to describe what happens when a technical system is introduced into an organizational work environment.
- Like CUSTOM, OSTA specifies the both social and technical aspects of the system. However, whereas in CUSTOM these aspects are framed in terms of stakeholder perspectives, in OSTA they are captured through a focus on tasks 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
  3) The external environment into which the system will be introduced is described.
  4) The transformation processes within the system are described.
  5) The social system is analyzed.
  6) The technical system is described.
  7) Performance satisfaction criteria are established.
  8) The new technical system is specified.

### 5.6.3.3 Soft System Methodology (SSM)

- The socio-technical models we have looked at focus on identifying requirements from both human and technical perspectives, but they assume a technological solution is being proposed.
- SSM as shown in Fig. 5.6.2 arises from the same tradition but takes a view of the organization as system of which technology and people are components.

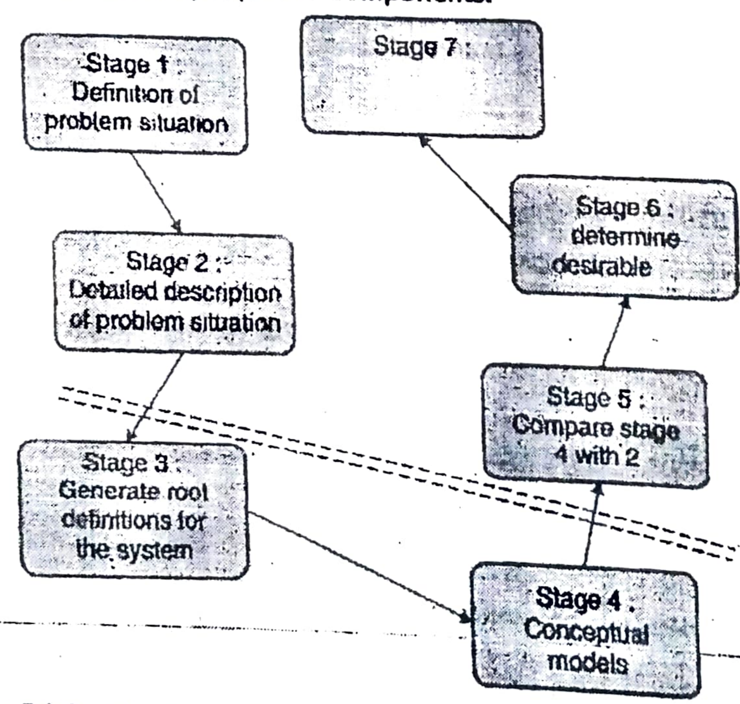


**Fig. 5.6.2 : The Seven Stages of Soft System Methodology (SSM)**

### 5.6.3.4 Participatory Design

- This 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.
- Characteristics :
  - o It aims to improve the work environment and task by the introduction of the design
  - o It is characterized by collaboration
  - o The approach is iterative.
- The participatory design process utilize a range of methods to help convey information between the user and designer. They include.
  - o Brainstorming
  - o Storyboarding
  - o Workshops
  - o Pencil and paper exercises

### 5.6.3.5 Ethnographic Methods

- Ethnography has become very influential, particularly in the study of group systems.
- Ethnography is based on very detailed recording of the interactions between people and the environment It has special focus on social relationships and how they affect the nature work.

## 5.7 Heuristic Evaluation

- It deals with usability and decision support system. A heuristic provides guidelines or rules or principles while taking decisions during simple and complex design. Heuristic evaluation is proposed by Jacob Nielsen and Rolf Molich. This evaluation is applicable for structuring HCI systems suing a set of rules in a simple and generic way of heuristic. It may be performed on specific design and at an early stage of evaluation. However, heuristic evaluation maybe applied on prototype, functional HCI systems, and complete HCI patterns. The major advantages are flexibility, low cost approach, use of enriched usability characteristics. The main objective of this evaluation is to provide potential towards solving usability problems. It is a guide line 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.
- It is a method of structuring the critique of a system using a set of relatively simple and general heuristics.

It can be performed on a design specification so it is useful for evaluating early design. But it can also be used on prototypes, storyboards, and fully functioning systems.

The general idea behind heuristic evaluation is that several evaluators independently critique a system to come up with potential usability problems. It is important that there are several of these evaluators and that the evaluations be done independently.

## 3 Evaluation with Cognitive Model

Cognitive models have a rather computational flavor, this reflects the way that computational analogies are often used in cognitive psychology.

The presentation of cognitive models is divided into following categories :

1) Hierarchical representation of the user's task and goal structure.
2) Linguistic and grammatical models.
3) Physical and device level models.

## .9 Evaluation with Users

- There is often an implicit assumption that it an interactive system is properly designed it will be completely intuitive to use and the user will require little or no help or training.
- A more helpful approach is to assume that the user will require assistance at various times and design this help into the system.
- The type of assistance users require varies and is dependent on many factors. There are four main types of assistance that users require :
  1. Quick reference
  2. Task – specific help
  3. Full – explanation
  4. Tutorial

If we were to design the ideal help system, what would it look like ? This is a difficult question to nswer, but we can point to some features that we might like our help system to have. Not every help ystem will have all of these features, sometimes for marks against which we can test the support tools e design.

equirements of user supports,

1. Availability
2. Accuracy and completeness
3. Consistency





4. Ro
5. Fl
6. Un

Q. 1 What

Q. 2 Expla langu

Q. 3 Discu used i

Q. 4 Write evalua

Q. 5 What i

Q. 6 What a

Q. 7 What a

Q. 8 Which

Q. 9 Which

Q. 10 What i

Q. 11 Which

Q. 12 How to

4. Robustness
5. Flexibility
6. Unobtrusiveness

## Review Questions

Q. 1 What are the differences and similarities between predictive models and cognitive models?

Q. 2 Explain overall process required for interaction between human and computer using natural language processing.

Q. 3 Discuss next generation interfaces such as gesture control used in home automation, robots used in daily task performance.

Q. 4 Write short note on Socio-Organizational issues and stakeholder requirements and heuristic evaluation.

Q. 5 What is the role of evaluation applied for cognitive models along with users ?

Q. 6 What are the various approaches used in cognitive models as user model ?

Q. 7 What are the various approaches used to user support ?

Q. 8 Which are the diversified phases used in designing user support system ?

Q. 9 Which are the various evaluation techniques applicable in user support systems ?

Q. 10 What is role of user participation in evaluation of user support system ?

Q. 11 Which are the criteria's applicable for choosing correct evaluation techniques ?

Q. 12 How to design system for cultural differences ?

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