

Chapter 2 Information System Concepts

2.1 Introduction

2.2 Overview of Information Systems and Practical Aspects of their Applications in Enterprise Processes

In the present era of rapid growth in the technology, IT is a key enabler in all walks of life for all types of enterprises whether commercial or non-commercial. IT helps the storage, processing, transmission and exploitation of information so as to meet the needs of individuals, enterprises or government. IT has ushered *(leading)* in rapid and dynamic changes in business environment and the way enterprises operate and provide products or services. Because of the global competition, enterprises are in greater need of efficient and timely provision of information to enhance the ability to make decisions based on relevant information.

With the advent of new tools for information and knowledge gathering in IT, we can expect continued refinement in the traditional skills of management i.e. planning, organizing, decision making and controlling processes and operations.

2.2.1 System

A system is a **group of inter connected components working towards the accomplishment of a common goal** by accepting inputs and producing outputs in an ordered transformation process.

A **system generally consists of input, processing, storage and output.**

✚ **Input**(*Jo padha*) is the data entering the system.

✚ **Processing**(*Jo dimag me chal raha ha*) is the manipulation of the input data.

✚ **Output**(*Jo exam me likha*) is the data/instruction given by the system after processing and

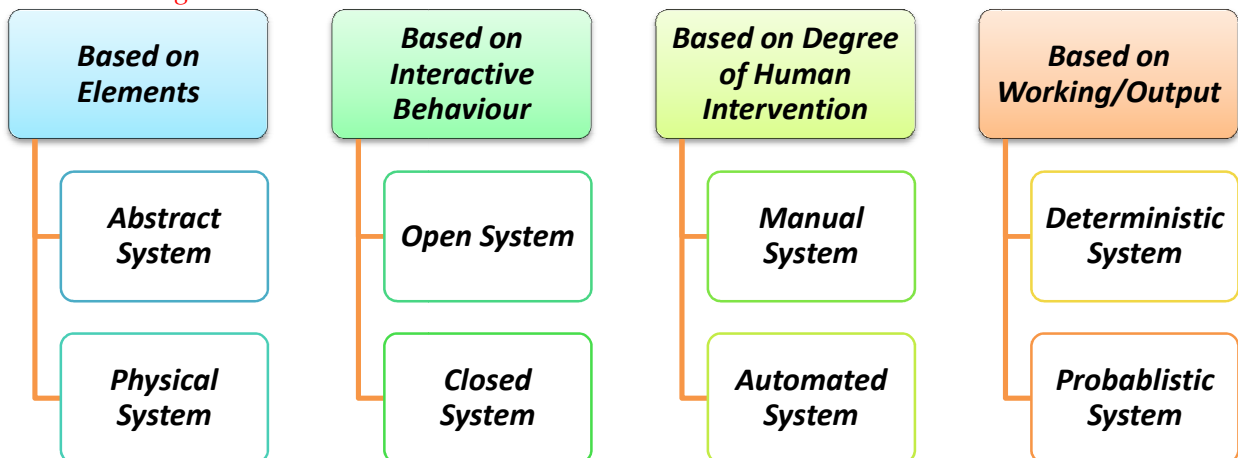
✚ **storage**(*Jo exam tak retain kia*) refers to the storage of data for current or future use.

For example; a **business is said to be system** because it contains input e.g. people, machine, money, materials etc., which are processed by means of different processes such as production, marketing, finance etc. and produces output i.e. services and goods.

2.2.2 Classification of System

System can be classified on the basis of various parameters like **E**lements, **I**nteractive behaviour, **D**egree of human intervention and **W**orking output as shown in below:

Code: EID working



(i) On the basis of Elements:

- ✚ **Abstract System** also known as **Conceptual System or Model** can be defined as an **orderly arrangement of interdependent ideas** or constructs.
- ✚ For example, a system of theology is an orderly arrangement of ideas about God and the relationship of humans to God.
- ✚ **Physical system** is a **set of tangible elements**, which operated together to accomplish an objective
- ✚ e.g. Computer system, University system etc.

(ii) On the basis of Interactive behavior:

May 2007: Differentiate between Open & Closed System.

Hint: Meaning, Exchange, Feedback, Life

May 2008: Write a short note on Closed and Open System.

- ✚ An **Open system interacts with other systems** in its environment.
- ✚ For example; Information system is an open system because it takes input from the environment and produces output to the environment, which changes as per the changes in the environment.
- ✚ A **closed system does not interact** with the environment and **does not change** with the changes in environment.
- ✚ Consider a 'throw-away' type sealed digital watch, which is a system, composed of a number of components that work in a cooperative fashion designed to perform some specific task. This watch is a closed system as it is completely isolated from its environment for its operation.

(iii) On the basis of degree of human intervention:

- ✚ In a **manual system** the data collection, maintenance and final reporting is done by human
- ✚ whereas it is carried out by computer system or say machine itself in the case of **automated system**.

(iv) On the basis of working/output:

- ✚ A **deterministic system operates in a predictable manner**.
- ✚ For example; software that performs on a set of instructions is a deterministic system
- ✚ A **probabilistic system** can be **defined in terms of probable behaviour**.
- ✚ For example: inventory system is a probabilistic system where the average demand, average time for replenishment, etc may be defined, but the exact value at any given time is not known.

Nov 2009: Identify and justify the type of each one of the following systems based on how they perform within an environment and/or certainty/ uncertainty:

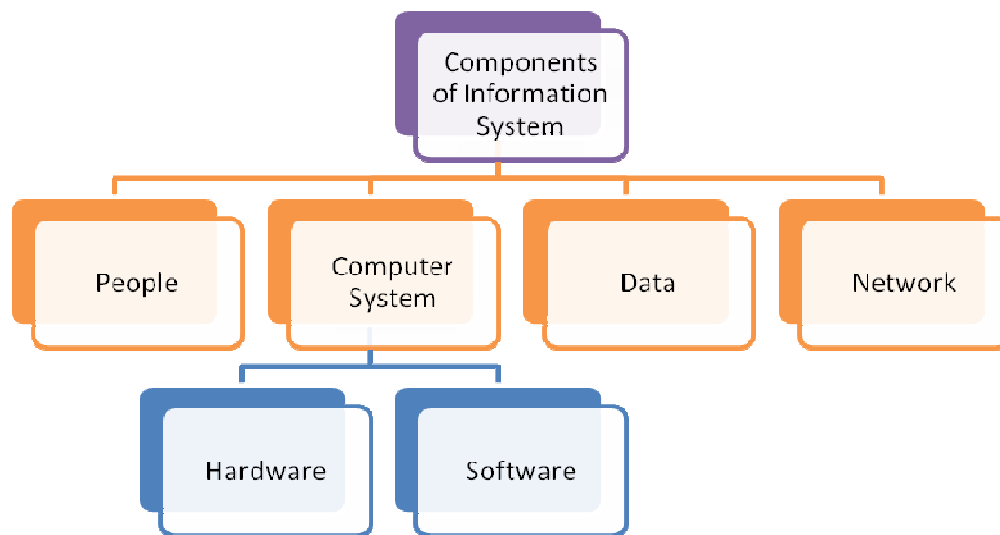
- i Marketing system;
- ii Communication system;
- iii Manufacturing system;
- iv Pricing system;
- v Hardware-Software system.

(Hint: Never use the word relatively open)

System	System Type	Justification
(i) Marketing system	Open system and probabilistic	The objective of the system is to maximize customer satisfaction by providing a free interactive environment. It takes input/feedbacks and facilitates the outcomes as products of the company and to create new customers.
(ii) Communication System	Open system & deterministic	The system interacts freely with its environment by taking input and returning output.
(iii) Manufacturing System	Relatively closed system and deterministic	This system neither interacts with the environment nor changes with the change in the environment. A manufacturing unit is completely isolated from its environment for its operation.
(iv) Pricing System	Open System and probabilistic	The system has a probable behavior and interacts freely with its environment by taking inputs and returning outputs.
(v) Hardware-Software System	Relatively closed system and deterministic	The interaction among the various parts of the system is known with certainty and it does not immediately change with the environment. The operational state of these systems is predictable.

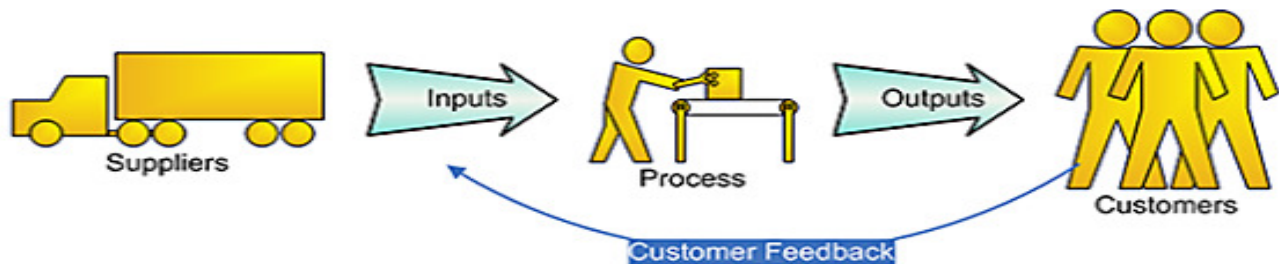
2.2.3 Information Systems and its Components

- There are different types of information systems (*Please note the answer we studied above is type of Information System*), i.e. Manual (paper and pencil) information system, Informal (word to mouth) information system, Formal (written procedures) information system and Computer based information system.
- This chapter mainly focuses on computer based information system.
- A **computer based Information system** is a **combination of people, IT and business processes** that helps management in taking important decisions to carry out the business successfully.
- An **information system comprise of people, hardware, software, data and network for communication support** shown in Figure below.
- Here, **people** mean the **IT professionals** i.e. system administrator, programmers **and end users** i.e. the persons, who can use hardware and software for retrieving the desired information.
- The **hardware** means the **physical components** of the computers i.e. server or smart terminals with different configurations like corei3/corei5/corei7 processors etc.
- Software** means the **system software** (different types of operating systems e.g. UNIX, LINUX, WINDOWS etc.), **application software** (different type of computer programs designed to perform specific task) **and utility software** (e.g. tools).
- The **data** is the **raw fact**, which may be in the form of database. The data may be alphanumeric, text, image, video, audio, and other forms.
- The **network** means **communication media** (internet, intranet, extranet etc.).



Components of Information Systems

An information system model comprises of following steps:



- ✚ **Input:** Data is collected from an organization or from external environments and converted into suitable format required for processing.
- ✚ **Processing:** This is converted into information (more meaningful form) obtained after manipulation of these collected data (Processing) and
- ✚ **Output:** Then information is stored for future use or communicated to user after application of respective procedure on it.
- ✚ Three basic activities of an information system that are defined above, helps enterprise in making decisions, control operations, analyze problems and create new products or services.
- ✚ *Apart from these activities, information systems also needs feedback*, which is output that is returned to appropriate members of the enterprises to help them to evaluate at the input stage.

Some of the important characteristics of Computer Based Information Systems are given as follows:

May 2011: Enumerate the characteristics of CBIS.

- ✚ All systems work for predetermined objectives and the system is designed and developed accordingly. *(Every human is born for a pre-determined objective (to remain alive) aur human isi k lie work karta ha)*
- ✚ In general, a system has a number of interrelated and interdependent subsystems or components.

No subsystem can function in isolation; it depends on other subsystems for its inputs. *(human has many body parts which are interrelated and interdependent aur koi bhi body part akela function nai kar sakta)*

✚ If one subsystem or component of a system fails; in most of the cases, the whole system does not work. However, it depends on 'how the subsystems are interrelated'. *(ek body part fail hua toh sab fail but ye unke relation pe dependent ha)*

✚ The way a subsystem works with another subsystem is called interaction. The different subsystems interact with each other to achieve the goal of the system. *(human body k body parts ek dusre k sath interact karte ha to achieve the goal of living)*

✚ The work done by individual subsystems is integrated to achieve the central goal of the system. The goal of individual subsystem is of lower priority than the goal of the entire system. *(human body ki body part k individual goal ko jara bhi importance nai dia jata jab human body ka goal bich me ata ha toh)*

Major areas of computer based applications:

Code: HIP FM

1. Human Resource Management-

- ✚ Human resource is the most valuable asset for an organization. Utilization of this resource in the most effective and efficient way is an important function for any enterprise.
- ✚ **Effective and efficient utilization of manpower** in a dispute-free environment in this key functional area ensures to facilitate disruption free and timely services in business.
- ✚ Human resource management system aims to achieve this goal.
- ✚ **Skill database maintained in HRM system**, with details of qualifications, training, experience, interests etc. helps management for allocating manpower to right activity at the time of need or starting a new project.
- ✚ This system also **keeps track of employees' output or efficiency**. Administrative functions like **keeping track of leave records** or handling other related functions are also included HRM system. An HRM system may have the following modules – Personnel administration; Recruitment management; Travel management; Benefit administration; Salary administration; Promotion management etc.

2. Inventory /Stores Management-

- ✚ The inventory management system is **designed** with a view **to keeping the track of materials** in the stores.
- ✚ The system is **used to regulate the maximum and minimum level of stocks**, raise alarm at danger level stock of any material, give timely alert for re-ordering of materials with optimal re-order quantity and facilitate various queries about inventory like total inventory value at any time, identification of important items in terms stock value (ABC analysis), identification most frequently moving items (XYZ analysis) etc.
- ✚ Similarly well-designed inventory management system for finished goods and semi-finished goods **provides important information for production schedule and marketing/sales strategy**.

3. Production or Manufacturing –

- ✚ The **objective** of this subsystem **is to optimally deploy man, machine and material** to maximize production or service.

- The system **generates production schedules and schedules of material requirements**, monitors the product quality, plans for replacement or overhauling the machinery and also helps in overhead cost control and waste control.

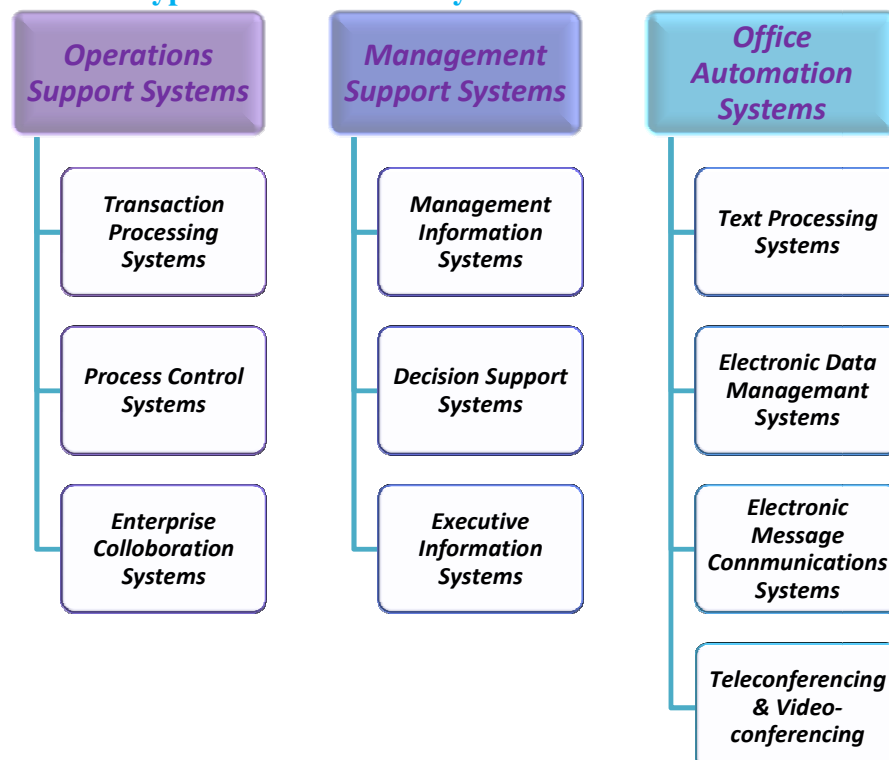
4. Finance and Accounting –

- The **main goal** of this subsystem (considering Business functions as whole system) **is to ensure the financial viability of the organization**, enforce financial discipline and plan and monitor the financial budget.
- It **also helps in forecasting revenues**, determining the best resources and uses of funds and managing other financial resources.
- Typical sub-application areas in finance and accounting are - Financial accounting; General ledger; Accounts receivable/payable; Asset accounting; Investment management; Cash management; Treasury management; Fund management and Balance sheet.

5. Marketing and Sales –

- Marketing and sales activities have a key role for running a business successfully in a competitive environment.
- The **objective** of this subsystem **is to maximize the sales** and ensure customer satisfaction.
- The marketing system **facilitates the chances of order procurement** by marketing the products of the company, creating new customers and advertising the products.
- The **sales department may use** an order processing system **to keep the status and track of orders**, generate bills for the orders executed and delivered to the customer, strategies for rendering services during warranty period and beyond, analyzing the sales data by category such as by region, product, sales man or sales value.
- The system **may also be used to compute commissions for dealers** or salesmen and thus helps the corporate managers to take decisions in many crucial areas.

2.2.4 Types of Information Systems



These aforementioned systems are described as follows:

(i) Operations Support Systems (OSS):

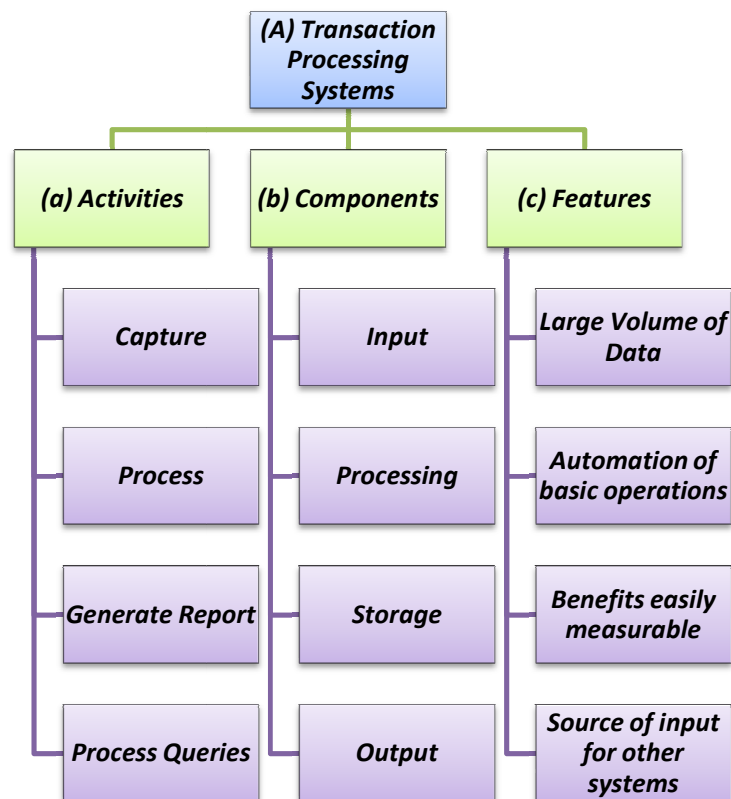
Information systems are required to **process the data generated and used in business operations**.

OSS produces a variety of information for internal and external use.

The **main objective** of OSS is **to improve the operational efficiency** of the enterprise.

These are further categorized as:

- (A) Transaction Processing Systems (TPS)-** At the lowest level of management, TPS is an information system that manipulates data from business transactions. Any business activity such as sales, purchase, production, delivery, payments or receipts involves transaction and these transactions are to be organized and manipulated to generate various information products for external use. For example, selling of a product to a customer will give rise to the need of further information like customer billing, inventory status and increase in account receivable balance. TPS will thus record and manipulate transaction data into usable information.



(a) Typically, a TPS involves the following activities:

- ✚ Capturing data to organize in files or databases;
- ✚ Processing of files/databases using application software;
- ✚ Generating information in the form of reports; and
- ✚ Processing of queries from various quarters of the organization.

A TPS may follow the periodic data preparation and batch processing (as in payroll application) or on-line processing (as in inventory control application).

However, in industries and business houses, now-a-days on-line approach is preferred in many applications as it provides information with up-to-date status.

(b) TPS Components:

1. Inputs –

- ✚ **Source documents**, such as customer orders, sales, slips, invoices, purchase orders, and employee time cards, **are the physical evidence of inputs** in to the Transaction Processing System.
- ✚ They **serve several purposes** like capturing data, facilitating operations by communicating data and authorizing another operation in the process, standardizing operations by indicating, which data require recording and what actions need to be taken and providing a permanent file for future analysis, if the documents are retained etc.

2. Processing – *(Input ko journals aur register me classify kar k rakhta ha)*

- ✚ This involves the **use of journals and registers to provide a permanent and chronological record of inputs**.
- ✚ Journals are used to record financial accounting transactions.
- ✚ Some of the common journals are sales journal, purchase journal, cash receipts journal etc.
- ✚ Registers are used to record other types of data not directly related to accounting.

3. Storage –

- ✚ Ledgers and files **provide storage of data** on both manual and computerized systems.
- ✚ The general ledger, the accounts/vouchers payable ledgers, and the accounts receivable ledger are the records of final account that provide summaries of a firm's financial accounting transactions.

4. Outputs –

- ✚ **Any document generated** in the system is output.
- ✚ Some documents are both output and input.
- ✚ For example; a customer invoice is an output from the order-entry application system and also an input document to the customer.
- ✚ The trial balance lists the balances of all the accounts on the ledger and tests the accuracy of the record keeping.
- ✚ Financial reports summarize the results of transaction processing and express these results in accordance with the principles of financial reporting.

(b) Features of TPS

Nov 2013: Define TPS. List out the salient features of TPS.

Basic features of TPS are given as follows:

1. Large volume of data-

- ✚ As TPS is **transaction oriented** and generally consists of large volumes of data, it **requires greater storage capacity**.
- ✚ Their **primary objective** is to ensure that the **data regarding the economic events** in the enterprises are **captured quickly and correctly**.

2. Automation of basic operations-

- Any TPS aims at automating the basic operations of a business enterprise and **plays a critical role in the day-to-day functioning** of the enterprise.
- Any **failure in the TPS** for a short period of time **can play havoc** with the functioning of the enterprise.
- Thus, TPS is an **important source of up-to-date information** regarding the operations in the enterprise.

3. Benefits are easily measurable-

- TPS **reduces the workload of the people** associated with the operations and improves their efficiency by automating some of the operations.
- Most of these **benefits** of the TPS **are tangible and easily measurable**. Therefore, cost benefit analysis regarding the desirability of TPS is easy to conduct.
- As the benefits from TPS are mainly tangible, the **user acceptance is easy to obtain**.

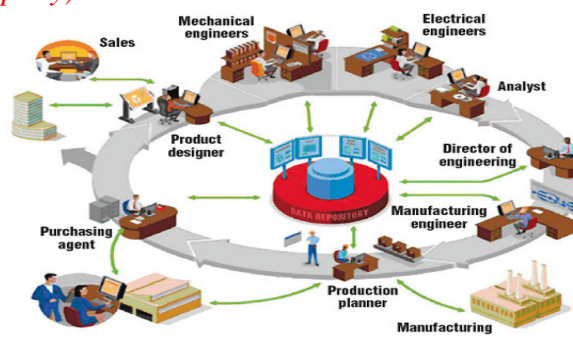
4. Source of input for other systems-

- TPS is the **basic source of internal information** for other information systems.
- Heavy reliance by other information systems** on TPS for this purpose **makes TPS important for tactical and strategic decisions** as well.

(B) Process Control System (PCS) –

In this type of system, **computer is used to control ongoing physical processes**. The computers are designed to automatically make decisions, which adjust the physical production process.

For example- the assembly lines of the automated factories. *(Diagram below shows automated factory plant of car manufacturing company)*



(C) Enterprise Collaboration Systems (ECS) –

These systems **use a variety of technologies to help people work together**.

It supports collaboration to communicate ideas, share resources and co-ordinate cooperative work efforts. Its objective is to use IT to enhance the productivity and creativity of teams in enterprises.

(ii) Management Support Systems (MSS):

MSS **supports managers in effective decision making** by providing relevant and required information at the right time to the right people.

(A) Management Information Systems (MIS)-

- MIS **enables management** at different levels **in decision making and problem solving** in contrast to TPS, which is operations oriented.
- They use results produced by the TPS, but they may also use other information.

- In any organization, decisions must be made on many issues that recur regularly and require a certain amount of information.
- Since the decision making process is well understood, the manager can identify the information that will be needed for the purpose.
- In turn, the **information systems can be developed so that reports are prepared regularly to support these recurring decisions.**
- Many experts have defined MIS in different ways.
- MIS has been defined by Davis and Olson as “An **I**ntegrated **U**ser-**M**achine system **D**esigned for providing information to support **O**perational **c**ontrol, **M**anagement **c**ontrol and decision making functions in an organization”.

Classwork:

- Other notable definition of MIS is “**MIS is a computer based system that provides flexible and speedy access to accurate data**”.
- MIS support the managers at different levels to take strategic (at top level) or tactical (at middle level) management decisions to fulfill the organizational goals.
- Nature of MIS at different levels has different flavors and they are available in the form of reports, tables, graphs and charts or in presentation format using some tools. MIS at the top level is much more comprehensive but is condensed or summarized compared to the information provided to those at middle level management.

(a) **Characteristics of an effective MIS:**

May 99/Nov 13: Discuss the characteristics of effective MIS

Code: Har manager ki ek khawis hoti hai vo ek uske hisab se (directed) uske lie (oriented) ek integrated database banavaye jo computerized aur jisme common database/flow ho but iske lie heavy planning karna padenga aur sub-system select karni padengi.

1. Management Directed –

- Because of management orientation of MIS, it is necessary that **management should actively direct the system's development efforts.**
- For system's effectiveness, it is necessary for management to **devote their sufficient time not only at the stage of designing the system but for its review** as well to ensure that the implemented system meets the specifications of the designed system.

2. Management Oriented –

- It means that **efforts for the development** of the information system **should start from an appraisal of management needs** and overall business objectives.
- Such a system is **not necessarily for top management** only **but** may **also** meet the information requirements of **middle level or operating levels of management** as well.

3. Integrated –

- The **best approach** for developing information systems **is the integrated approach** as

all the functional and operational information sub-systems are be tied together into one entity.

- ✚ An **integrated Information system has the capability of generating more meaningful information to management** as it takes a comprehensive view or a complete look at the interlocking sub-systems that operate within a company.

4. Computerized-

- ✚ Though MIS can be implemented without using a computer; the **use of computers increases the effectiveness** of the system.
- ✚ The use of computer equips the system to handle a wide variety of applications by providing their information requirements quickly.
- ✚ **Other necessary attributes of the computer to MIS are accuracy and consistency in processing data and reduction in clerical staff.**
- ✚ **These attributes make computer a prime requirement** in management information system.

5. Common Database –

- ✚ Database is the **mortar that holds the functional systems together.**
- ✚ **Database is defined as a "super-file", which consolidates and integrates data records formerly stored in many separate data files.**
- ✚ The organization of a database allows it to be accessed by several information sub-systems and thus, **eliminates the necessity of duplication** in data storage, updating, deletion and protection.

6. Common Data Flows –

- ✚ It **means the use of common input, processing and output procedures** and media whenever required.
- ✚ Data is captured by the system analysts only once and as close to its original source as possible.
- ✚ Afterwards, they try to utilize a minimum of data processing procedures and sub-systems to process the data and strive to minimize the number of output documents and reports produced by the system.
- ✚ This **eliminates duplication in data collections, simplifies operations** and produces an efficient information system.

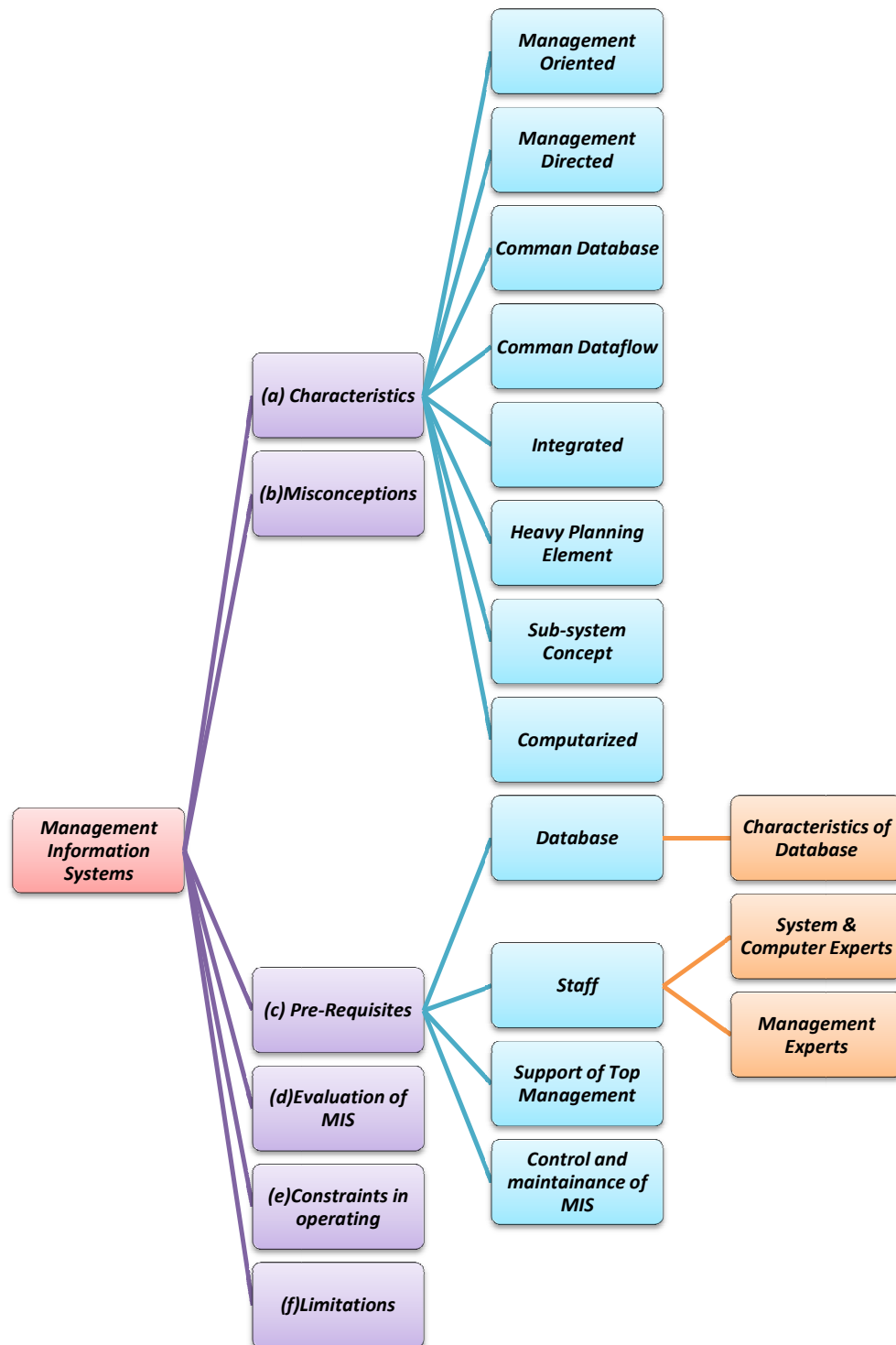
7. Heavy Planning Element –

- ✚ An MIS usually **takes one to three years** and sometimes even longer period to get established firmly within a company.
- ✚ Therefore, a MIS designer must be present in MIS development and **should consider future enterprise objectives** and requirements of information as per the organization structure of the enterprise as per requirements.

8. Sub System Concept –

- ✚ Even though the information system is viewed as a single entity, **it must be broken down into digestible sub-systems**, which can be implemented one at a time by developing a phased plan.

Bird Eye view chart on MIS



(b) Misconceptions about MIS –

Following are the major misconceptions about MIS:

Code: Koi bolta ha har vo system jo comuter based ho ya fir jo reporting system ho vo MIS hota ha, toh aur kisi ne bola MIS toh ek management technique ha jisme bunch of technology ha, itne me ek budhe uncle aa k bole MIS matlab computer, computer, computer aur budhe uncle thode samajdar the unhone sab ko samjaya jyada data matlab jyada information nai hota aur accuracy top management ko kam ki nai hoti.

- ✚ Any computer based information system is a MIS.
- ✚ Any reporting system is MIS.
- ✚ MIS is a management technique.
- ✚ MIS is a bunch of technologies.
- ✚ The study of MIS is about use of computers.
- ✚ More data in generated reports refers more information to managers.
- ✚ Accuracy plays vital role in reporting.

(c) **Pre-requisites of an Effective MIS –**

NOV 1999: What are the main pre-requisites of an effective MIS? Explain them briefly.

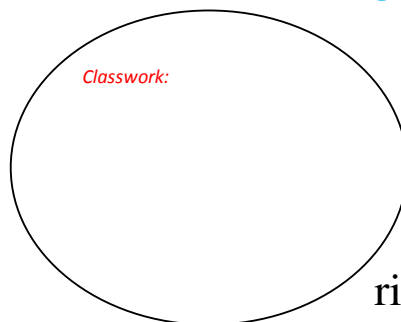
May 05/May 08: What are the main pre-requisites of MIS which makes it an effective tool.



Code: This picture shows pre-requisites for effective MIS- here database means the books musicians are using, singers & musicians are qualified system and management staff, obviously these guys are composing a music because top management is supporting them, the guy with the sticks in hand is trying to control and maintain the musicians.

1. Database –

- ✚ **Database is defined as a "super-file", which consolidates and integrates data records formerly stored in many separate data files.**
- ✚ The data in database is organized in such a way that accessing to the data is improved and redundancy is reduced.
- ✚ **The main characteristics of database are given as follows:**



riented

- ✚ It is **user-oriented**.

- ✚ It is **capable of being used as a common data source** to various users, helps in avoiding duplication of efforts in storage and retrieval of data and information.

- ✚ It is **available to authorized persons only**.

- ✚ It is **controlled by a separate authority** established for the purpose, known as Database Management System (DBMS).

2. Qualified System and Management Staff –

- ✚ The second pre-requisite of effective MIS is that it should be **manned by qualified officers**.

- ✚ For this, the organizational management base should comprise of two categories of officers:

- ✚ **Systems and Computer experts (engineers)** in addition to their expertise in their subject area/s should also be capable of understanding management concepts to facilitate the understanding of problems faced by the concern. They should also be clear about the process of decision making and information requirements for planning and control functions.

- ✚ **Management experts (Users)** should also understand quite clearly the concepts and operations of a computer. This basic knowledge of computers will be useful to place them in a comfortable position, while working with systems technicians in designing or otherwise of the information system.

3. Support of Top Management –

- ✚ The **support from top management is required for the effectiveness of MIS** in an organization.

- ✚ **The reasons for the same are as follows:**

Code: Bina management k support k implementation of MIS control nai honga, aur paise bhi kon denga isliye management ka support pane k lie usko benefits batao clearly.

- ✚ Any implementation, which does not receive the support of top management will **not be effectively controlled and tends to be get lesser priority** and may be delayed or abandoned.

- ✚ The **resources** involved in computer-based information systems are large and are growing larger in view of importance gained by management information system.

- ✚ **To gain the support** of top management, **the officers should place before top management all the supporting facts and state clearly the benefits**, which will accrue from it to the concern. This step will certainly enlighten management, and will change their attitude towards MIS. Their wholehearted support and cooperation will help in making MIS an effective one.

4. Control and maintenance of MIS-

- ✚ **Control** of the MIS means the **operation of the system as it was designed to operate**.

- ✚ Some time, users develop their own procedures or short cut methods to use the system,

which reduce its effectiveness.

- ✚ To check such habits of users, the management at each level in the organization should devise checks for the information system control.
- ✚ Maintenance is closely related to control. Formal methods for changing and documenting changes must be provided.

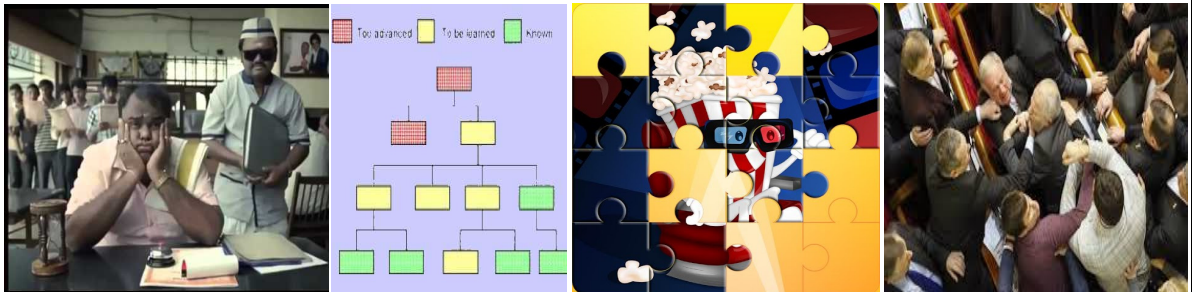
(d) Evaluation of MIS –

- ✚ An effective **MIS should be capable of meeting the information requirements of its executives in future as well.**
- ✚ This capability can be maintained by evaluating the MIS and taking appropriate timely action.
- ✚ **The evaluation of MIS should take into account the following major points:**
Code: Users se pucho kya kami ha, engineer(guiding) ko ye kamiya batao aur ye kamiya tabhi puri hongi jab system flexible honga.
 - ✚ **Ascertaining the views of users and the designers** about the capabilities and deficiencies of the system.
 - ✚ **Guiding the appropriate authority** about the steps to be taken to maintain effectiveness of MIS.
 - ✚ **Examining whether enough flexibility exists** in the system to cope with any expected or unexpected information requirement in future.

(e) Constraints in operating a MIS –

May 08/May 12: Explain the major constraints in operating MIS.

May 2002: Discuss the various constraints that come in the way of operating effective MIS. How this constraint can be avoided.



- ✚ **Non-availability of experts**, who can diagnose(*identify/analyze*) the objectives of the organization and provide a desired direction for installing operating system. This **problem may be overcome by grooming internal staff**, which should be preceded by proper selection and training.
- ✚ Experts usually face the **problem of selecting the sub-system** of MIS to be installed and operated upon. The **criteria**, which **should guide the experts**, depend upon the need and importance of a function for which MIS can be installed first.
- ✚ **Due to varied objectives** of business concerns, the **approach adopted by experts** for designing and implementing MIS **is a non-standardized one.**

✚ **Non-availability of cooperation from staff** is a crucial problem, which should be handled tactfully. This task should be carried out by organizing lecturers, showing films and also explaining to them the utility of the system. Besides this, some persons should also be involved in the development and implementation of the system.

(f) **Limitations of MIS –**

May 06/Nov 12: Discuss the limitations of MIS

Code: LIMITATIONS

L= LESS useful for solving unstructured problem	MIS is less useful for making non-programmed decisions. Such type of decisions is not of the routine type and thus requires information, which may not be available from existing MIS to executives.
I=Bad INPUT bad output	The quality of outputs of MIS is basically governed by quality of input & processes.
M=Frequent changes in Top MANAGEMENT will reduce quality	MIS effectiveness decreases due to frequent changes in top Management, organizational structure and operational team.
I=Lack of tight INTEGRATION	MIS are prepared for various functions like finance, marketing, production etc. and normally functional MIS lack tight data integration.
T=Limitations of TPS	MIS provides detailed & summarized information from operational databases created by TPS and therefore capabilities of MIS remain constrained by limitation of TPS.
A=Adhoc reports are not available	MIS cannot provide tailor-made information packages suitable for the purpose of every type of decision made by executives.
T=Non Quantitative Factors	MIS takes into account mainly quantitative factors, thus it ignores the non-quantitative factors like morale and attitude of members of organization, which have an important bearing on the decision making process of executives.
I=only INTERNAL information	
O=holding Information(not available to outsider)	The effectiveness of MIS is reduced in organizations, where the culture of hoarding information and not sharing with other holds.
NS=Not substitute for Management	MIS is not a substitute for effective management which means that it cannot replace managerial judgment in

making decisions in different functional areas. It is merely an important tool in the hands of executives for decision making and problem solving.

(B) Decision Support System (DSS) –

Nov 2002: Write a short note on DSS

May 2005: ‘A DSS supports human decision making rather than replacing it’. Justify this statement by stating the characteristics of DSS.

- ✚ DSS is a type of computerized information system that **supports business and organizational decision-making activities.**
- ✚ A properly-designed DSS is an **interactive software-based system** intended to **help** decision makers **to compile useful information** from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions.
- ✚ Thus *Decision Support System (DSS) can be defined as a system that provides tools to managers to assist them in solving semi-structured and unstructured problems in their own, somewhat personalized, way.*
- ✚ A DSS is **not intended to make decisions** for managers, **but rather to provide** managers with a **set of capabilities** that enable them to generate the information required by them in making decisions.
- ✚ A DSS **supports** the human decision-making process, **rather than a means to replace it.**

(a) Characteristics of DSS –

Nov 08/ May 12: What is DSS? Briefly explain characteristics of DSS.

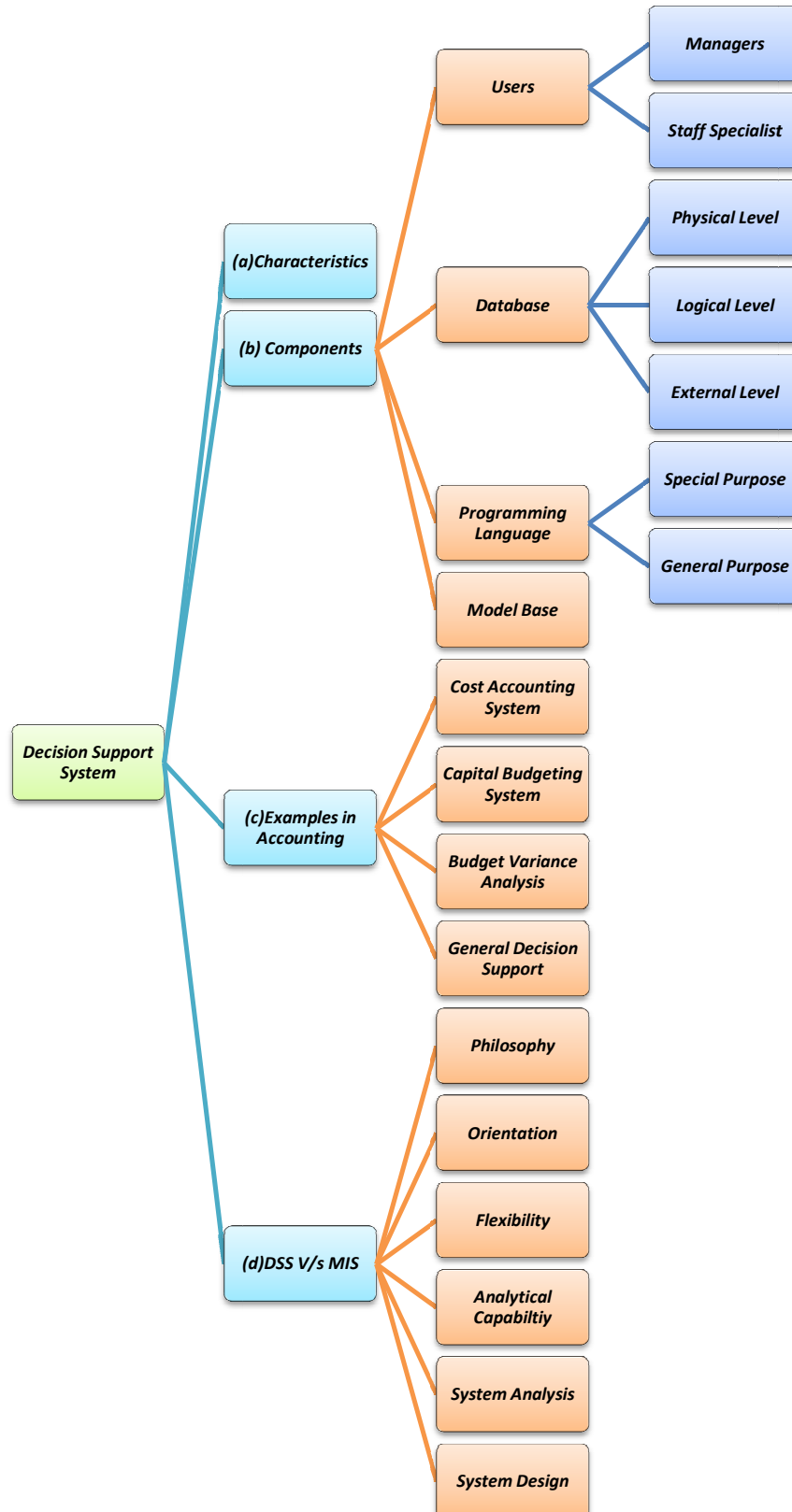
The key characteristics of DSS are given as follows:

Code: If I ask you DSS kaisa hona chahiye, sabse pehla ap k dimag me ayennga unstructured decision(at all levels) ko support karna chahiye, aur ab aise decisions k lie flexible honga bahut jaruri ha warna extend nai ho payenga. Aur manager se puchu kaisa hona chahiye toh vo bolenga aisa system jo decision pe focus kare aur na ki data/information pe aur sath hi sath user friendly(easy to use) bhi hona chahiye.

- ✚ DSS can be used for structured problems. *(I have typed the sentence as it is given in ICAI module but The real intention of this sentence is "DSS should support semi-structured or unstructured decisions.")*
- ✚ This **supports decision** making and occurs **at all levels of management.**
- ✚ It should be **flexible and adaptable.** i.e. it should be able to fit itself in the style of a particular manager and ready to change according to changes in the environment.
- ✚ DSS should be **extensible** and evolve overtime.
- ✚ DSS **focuses on decision** rather than data and information.
- ✚ DSS should be **user-friendly.**
- ✚ It should be **easy to use.** A user should not have knowledge of computer programming to generate reports that helps in decision making.

Below 3 points not covered in code:

- ✚ Instead of helping individuals working on independent tasks, it should be **able to help group making decisions**.
- ✚ DSSs are **used mainly for decision making** rather than communicating decisions and training purposes.



(b) Components of DSS –**May 2008: Briefly discuss four basic components of DSS.***Class work: Diagram for components of DSS***1. The user-**

The **user** of a DSS is usually a manager with an unstructured or semi-structured problem to solve.

📌 Manager-

These are the users, who have basic computer knowledge and want the DSS to be very user friendly. The manager may be at any level of authority in the organization (e.g., either top management or operating management).

📌 Staff Specialist (Analysts) –

These are the people, who are more details oriented and willing to use complex system in their day-to-day work.

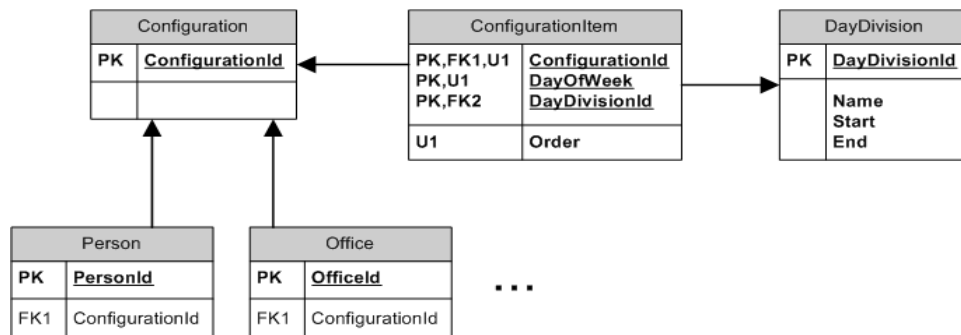
2. Databases –

- A DSS includes one or more databases that contain both routine and non-routine data from both internal and external sources.
- The data from external sources include data about the operating environment of an organization.
- For example; data about economic conditions, market demand for the organization's goods or services, and industry competition.
- External data include assumptions about such variables as interest rates, vacancy rates, market prices, and levels of competition.
- Some of the data may come from internal sources.
- An organization often generates this type of data in the normal course of operations.
- For example; data from the financial and managerial accounting systems such as account, transaction, and planning data.
- **Implementation(Storage) of Database-** Database is implemented at three levels as listed below:

Nov 2010: What do you understand by the term database? How is it implemented in three different levels.

📌 Physical level – (hardisk pe data store karna is physical level, aur isko control OS karta ha)

It involves the implementation of the database on the hard disk i.e. storage of data in the hard disk. The management of storage and access is controlled by operating system.



- Logical Level (Conceptual level)** – *(Hides details of the physical level. This level presents data as a set of tables. The DBMS maps data access between the conceptual to physical schemas automatically.)*

It is **designed by database administrator**, who have complete knowledge of DBMS **and he controls the same**.

It deals with the nature of data stored, the scheme of the data.

Storage which is logically divided into various tables having rows and columns and the techniques for defining relationships with indexes.

- External level** – *(eg: sales manager ko uska sales ka dabase alag se de dia)*
 The logical level defines schema, which is divided into smaller units known as sub-schemas and given to the managers each sub-schema containing all relevant data needed by one manager.

3. Planning languages –

Two types of planning languages that are commonly used in DSS are:

- General-purpose planning languages** that allow users **to perform many routine tasks**, for example; retrieving various data from a database or performing statistical analyses. The languages in most electronic spreadsheets are good examples of general-purpose planning languages. These languages enable user to tackle abroad range of budgeting, forecasting, and other worksheet-oriented problems.
- Special-purpose planning languages** are **more limited in what they can do, but they usually do certain jobs better than the general-purpose planning languages**. Some statistical languages, such as SAS are examples of special purpose planning languages.

4. Model base –

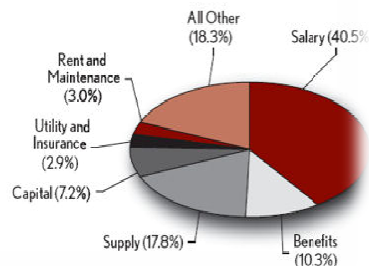
- The planning language in a DSS allows the user to maintain a dialogue with the model base, which is the **“brain” of DSS because it performs data manipulations and computations** with the data provided to it by the user and the database.
- There are many types of model bases, but most of them are custom-developed models that do some types of mathematical functions.
- For example**; cross tabulation, **regression analysis**, time series analysis, linear programming and financial computations. The analysis provided by the routines in the model base is the key to supporting the user’s decision.

(c) Examples of Decision Support Systems in Accounting –

May 2007: 'DSS are widely used as a part of an organization's accounting information system'. Give examples to support this statements.

Many DSS are developed in-house using either a general type of decision support program or a spreadsheet program to solve specific problems. Below are several illustrations of these systems:

Components of Cost for All Hospitals, 2004



$\frac{1}{0.35}$ or 0.028 for alternative 1, $\frac{1}{0.14}$ or 0.071 for alternative 2
and $\frac{1}{0.07}$ or 0.143 for alternative three.



1. Cost Accounting System- (In hospitals they invest crores of rupee in equipment now there costing to patient becomes a critical issues.)

- ✚ The health care industry is well known for its cost complexity.
- ✚ **Managing costs in this industry require controlling costs** of supplies, expensive machinery, technology, and a variety of personnel.
- ✚ Cost accounting applications **help health care enterprises calculate product costs for individual procedures or services.**
- ✚ One health care organization, for example, combines a variety of DSS applications in productivity, cost accounting, case mix, and nursing staff scheduling to improve its management decision making.



2. Capital Budgeting System-

- ✚ Companies **require new tools to evaluate** high-technology **investment decisions.**
- ✚ Decision makers need to supplement analytical techniques, such as net present value and internal rate of return, with **decision support tools** that **consider some benefits of new technology not captured in strict financial analysis.**
- ✚ One DSS designed to support decisions about investments in automated manufacturing technology is Auto Man, which allows decision makers to **consider financial, non financial, quantitative, and qualitative factors in their decision-making processes.**
- ✚ Using this decision support system, accountants, managers, and engineers identify and prioritize these factors.
- ✚ Then they can evaluate up to seven investment alternatives at once.

3. Budget Variance Analysis System-

- ✚ **Financial institutions rely heavily on their budgeting systems** for controlling costs and evaluating managerial performance.
- ✚ One institution **uses a computerized DSS to generate monthly variance reports** for division comptrollers.
- ✚ The system allows these comptrollers to graph, view, analyze, and annotate budget variances, as well as create additional one-and five-year budget projections using the

forecasting tools provided in the system.

- The DSS thus **helps** the comptrollers **create and control budgets** for the cost-center managers reporting to them.



4. General Decision Support System-

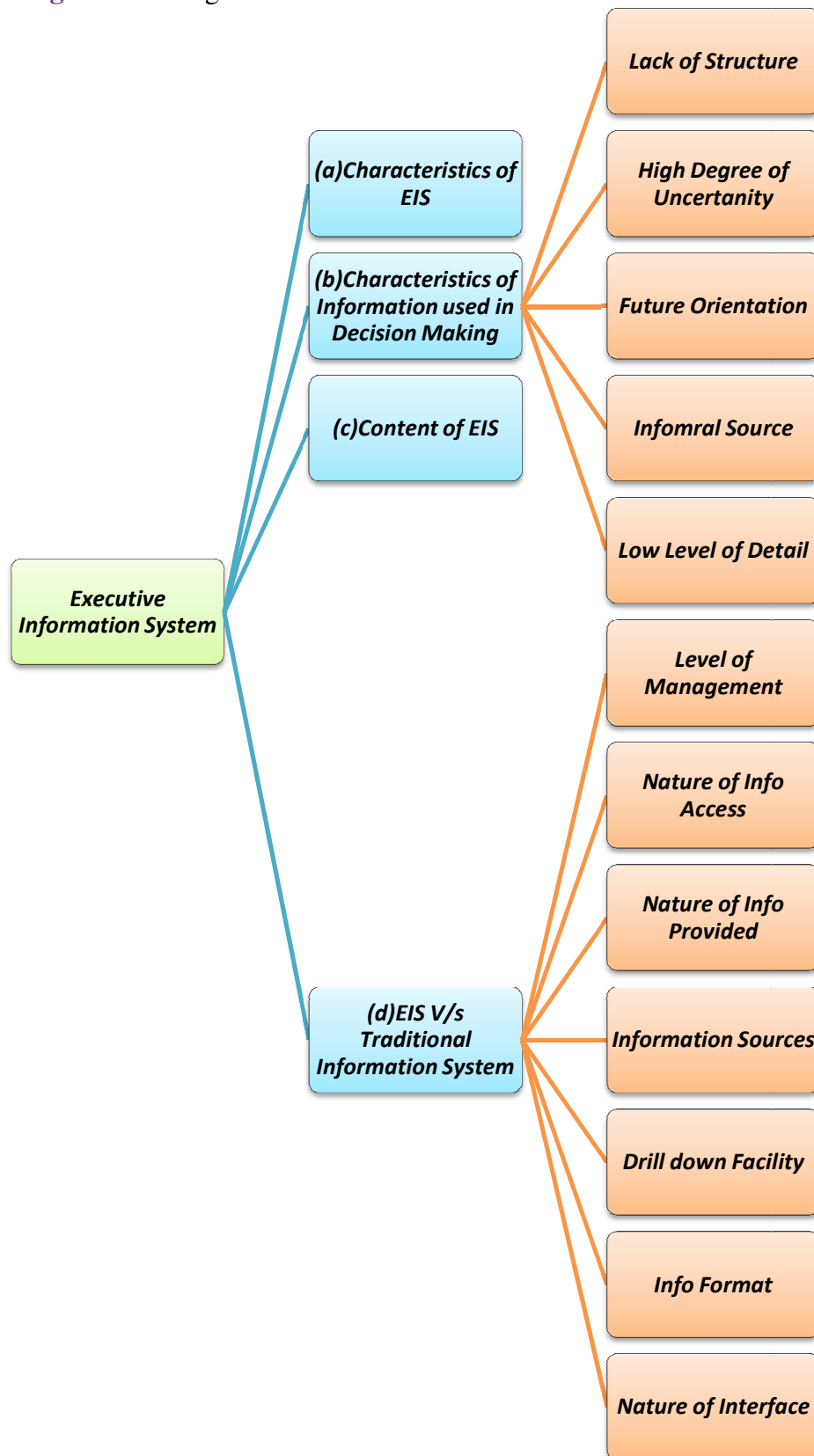
- As mentioned earlier, some planning languages used in decision support systems are general purpose and therefore have the **ability to analyze many different types of problems**. In a sense, these types of DSS are a decision-maker's tools.
- The user needs to input data and answer questions about a specific problem domain to make use of this type of decision support system.
- An example is a program called **Expert Choice** which **supports a variety of problems requiring decisions**.
- The user works interactively with the computer to develop a hierarchical model of the decision problem. The decision support system then asks the user to compare decision variables with each other.
- For instance, the system might ask the user how important cash inflows are versus initial investment amount to a capital budgeting decision.
- The decision maker also makes judgments about which investment is best with respect to these cash flows and which requires the smallest initial investment.
- Expert choice analyzes these judgments** and presents the decision maker with the best alternative.

(d) Difference between DSS and traditional MIS:

Dimensions	DSS	Traditional MIS
Philosophy	Providing integrated tools , data, models, and languages to end users	Providing structured information to end users
Orientation (Point of reference)	External orientation	Internal orientation
Flexibility	Highly flexible	Relatively inflexible (<i>vaise toh flexible nai ha but compred to DSS thoda bahut flexible bol sakte ha</i>)
Analytical capability	More analytical capability	Little analytical capability
System analysis	Emphasis on tools to be used in decision process	Emphasis on information requirement analysis
System design	Interactive process	System development based on static information requirements

(C) Executive Information Systems (EIS) –**Nov 2003: Write a short note on EIS**

It is sometimes referred to as an Executive Support System (ESS). **It serves the strategic level i.e. top level managers** of the organization.



- (a) **Characteristics of EIS** – Major Characteristics of an EIS are given as follows:

May 01/May 11/Nov 12: What is EIS? Discuss its various characteristics.

Code: Top Executive ko decision lena tha magar afsos use query language aur online analysis tools use karna nai ata tha..!! But ab dearne ko koi bat nai EIS internal aur external data use kar k rapid access to information aur quick access to management report denga.

- ✚ EIS is a Computer-based-information system that **serves the information need of top executives.**
- ✚ EIS **enables users to extract summary data and model complex problems** *without the need to learn query languages statistical formulas* or high computing skills.
- ✚ EIS **provides extensive online analysis** tool like trend analysis, market conditions etc.
- ✚ EIS provides **rapid access to timely information and direct access to management reports.**
- ✚ EIS is capable of accessing both internal and external data.
- ✚ EIS can easily be given as a DSS support for decision making.

- (b) **The Executive Decision-Making Environment –**

May 2010: describe the characteristics of types of information used in Executive Decision Making.

- The type of decisions that executives must make are very broad. Often, executives make these decisions based on a vision they have regarding ‘what it will take to make their enterprise successful.’
- To a large extent, executives rely much more on their own intuition than on the sophisticated analytical skills.
- The intuitive character of executive decision-making is reflected strongly in the types of information found most useful to executives.
- **Five characteristics of the types of information used in executive decision making are given as follows:**

Code: Informal source ki detail ka level low level hota ha, structure toh dur ki bat vo toh highly uncertain hota ha yahi ha dekho india ka future.

1. Informal Source –

- ✚ Executives, more than other types of managers, **rely heavily on informal source** for key information.
- ✚ For **example, lunch with a colleague** in another firm might reveal some important competitor strategies.
- ✚ **Informal sources such as television might also feature news of momentous concern** to the executive – news that he or she would probably never encounter in the company’s database or in scheduled computer reports.

2. Low level of detail –

- ✚ Most important executive **decisions are made by observing broad trends.**
- ✚ This requires the executive to be more aware of the large overview than the tiny items.

3. Lack of structure –

- ✚ Many of the **decisions made** by executives **are relatively unstructured**.
- ✚ These types of decisions are **not as clear-cut as deciding how to debug a computer program** or how to deal with an overdue account balance.
- ✚ Also, it is **not always obvious, 'which data are required'** or 'how to weigh available data when reaching a decision.'

4. High degree of uncertainty –

- ✚ Executives **work in a decision space** that is **often characterized by a lack of precedent**.
- ✚ For example, when the Arab oil embargo hit in mid 1970s, no such previous event could be referenced for advice.
- ✚ Executives also work in a **decision space where results are not scientifically predictable** from actions.
- ✚ If prices are lowered, for instance, product demand will not automatically increase.

5. Future orientation –

- ✚ Strategic-planning **decisions are made in order to shape future events**.
- ✚ As conditions change, enterprises must change also.
- ✚ It is the executive's responsibility to make sure that the organization keeps pointed toward the future.
- ✚ **Some key questions about the future include: "How will future technologies affect what the company is currently doing?"**
- ✚ What will the competition (or the government) do next?
- ✚ What products will consumers demand five years from now?"
- ✚ As one can see, the answers to all of these questions about the future external environment are vital.

(c) Contents of EIS –

Nov 2007: Briefly explain the principles to guide design of measures and indicators to be included in EIS.

- A general answer to the question of 'what data is appropriate for **inclusion** in an Executive Information System' is **"whatever is interesting to executives"**.
- EIS implementations begin with just a few measures that are clearly of interest to senior management and then expand in response to questions asked by those managers as they use the system.
- While the above indicates that selection of data for inclusion in an EIS is difficult, there are several guidelines that help to make that assessment.
- **A practical set of principles to guide the design of measures and indicators to be included in an EIS is presented below:**
 - ✚ **EIS measures must be easy to understand and collect.** Wherever possible, **data should be collected naturally** as part of the process of work. An EIS should not add substantially to the workload of managers or staff. *(Eg: you go for an audit and I tell you to collect data about fixed asset for me.. you will get frustrated. Now imagine another situation where I tell you that in any case you have to verify the Fixed Assets than why don't you verify it in a format that can be put in tax audit. You will say ok 😊)*

- ✚ EIS measures must be **based on a balanced view of the organization's objective**. Data in the system should reflect the objectives of the organization in the areas of productivity, resource management, quality and customer service.
- ✚ Performance indicators in an EIS must **reflect everyone's contribution** in a fair and consistent manner. Indicators should be as **independent as possible from variables outside the control of managers**. *(Eg: Mc'donalds ka policy ha k agar ap k hath se plate gir jate toh they will give u another for free ab yaha employee ki kya galti ap k hath se gira toh)*
- ✚ EIS measures must **encourage management and staff to share ownership** of the organization's objectives. *(Eg: Giving pay on variable basis, will motivate the employee)* Performance indicators must promote both team-work and friendly competition. Measures will be meaningful for all staff; people must feel that they, as individuals, can contribute to improving the performance of the organization.
- ✚ EIS information must be **available to everyone** in the organization. *(agar information sab ko available karna ha toh obviously usme secret information nai rakhna chahiye)* The objective is to provide everyone with useful information about the organization's performance. Information that must remain confidential should not be part of the EIS or the management system of the organization.
- ✚ EIS measures must **evolve to meet the changing needs** of the organization.

(d) **Difference between EIS and Traditional Information Systems -**

NOV 02/May 13: In what ways EIS differ from Traditional Information System

Dimensions of Difference	Executive Information System	Traditional Information System
Level of management	For top or near top executives	For lower staff
Nature of Information Access	Specific issues/problems and aggregate reports	Status reporting
Nature of information provided	Online tools and analysis	Offline status reporting
Information Sources	More external, less internal	Internal
Drill down facility to go through details at successive levels	Available	Not available
Information format	Text with graphics	Tabular
Nature of interface	User-friendly	Computer-operator generated