

# **Unit I: Information and System Concept**

## **- Management Information System**

### **Data and Information:**

#### **Introduction:**

Data can be defined as a representation of facts, concepts or instructions or raw material in a formalized manner which should be suitable for communication, interpretation, or processing by human or electronic machine.

Data is represented with the help of characters like alphabets (A-Z, a-z), digits (0-9) or special character (+, -, /, \*, <, >, =, etc.). It needs to be processed before it can be turned into something useful.

Data comes in many forms such as numbers, words, symbols, etc. Data relates to transactions, events and facts. On its own; it is not very useful. Information is organized or classified data which has some meaningful values for the receiver.

Information is the processed data on which decisions and actions are based. Information is data that has been processed in such a way as to be meaningful to the person who receives it.

For the decision to be meaningful, the processed data must qualify for the following characteristics:

1. **Timely:** Information should be available when required.
2. **Accuracy:** Information should be accurate.
3. **Completeness:** Information should be complete.

### **Difference between Data and Information:**

<b>Data</b>	<b>Information</b>
Data is raw, unorganized facts that need to be processed. Data can be something simple and seemingly random and useless until it is organized.	When data is processed, organized, structured or presented in a given context to make it useful, it is called information.
Data are the facts or details from which information is derived.	For data to become information, data needs to be put into context.
Each student's test score is one piece of data.	The average score of a class is information that can be derived from the given data.
"Data" comes from a singular Latin word, datum which originally meant "Something given."	It has always referred to the act of informing usually regarding education,

	instruction or other knowledge communication.
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## Types of Information:

Information is a meaningful output or results become from the processed data by using the system to control, analyze, manage and decision making on the particular objects. The types of information can be categorized as:



Fig: Classification of Information

*Notes*

### Classification by Characteristics:

#### 1. Action v/s Non-action Information:

The information which includes action is called information. The information which communicates only the status of a situation is a non-action information.

#### 2. Recurring v/s Non-recurring Information:

The information generated at regular intervals is recurring information. The monthly sales reports and stock statements are recurring information. The financial analysis or report on the market research study is non-recurring information.

#### 3. Internal v/s External Information:

The information generated through the internal sources of the organization is termed as internal information while the information generated through the government reports

and industry survey etc. is termed as external information as the sources of data are outside the organization.

## **Classification by Application:**

In terms of applications, information can be categorized as:

### **1. Planning Information:**

These are the information needed for establishing standard norms and specifications in an organization. This information is used in strategic, tactical, and operation planning of any activity. Examples of such information are time standards, design standards.

### **2. Control Information:**

This information is needed for establishing control of overall business activities through a feedback mechanism. This information is used for controlling attainment, nature and utilization of important processes in a system. When such information reflects a deviation from the established standards, the system should induce a decision or an action leading to control.

### **3. Knowledge Information:**

Knowledge is defined as "information about information". Knowledge information is acquired through experience and learning, and collected from archival data and research studies.

### **4. Organizational Information:**

Organizational information deals with an organization's environment, culture in the light of its objectives. Karl Weick's Organizational Information Theory emphasizes that an organization reduces its equivocality or uncertainty by collecting, managing and using this information prudently.

This information is used by everybody in the organization; examples of such information are employee and payroll information.

### **5. Functional/Operational Information:**

This is operation-specific information. For example, daily schedules in a manufacturing plant that refers to the detailed assignment of jobs to machines or machines to operators. In a service-oriented business, it would be the duty roster of various personnel. This information is mostly internal to the organization.

## 6. Database Information:

Database information construes large quantities of information that has multiple usage and application. Such information is stored, retrieved and managed to create databases. For example, material specification or supplier information is stored for multiple users.

## Classification by Management Hierarchy:

### 1. Strategic/Supervisor Level Information:

Strategic information is concerned with long term policy decisions that define the objectives of a business and checks how well these objectives are met. For example, acquiring a new plant, a new product, diversification of business etc., comes under strategic information.

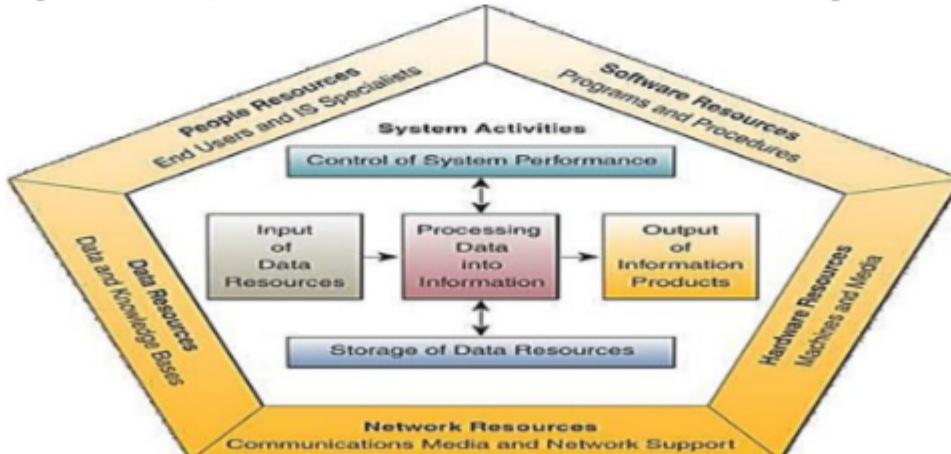
### 2. Tactical/Middle Level Information:

Tactical information is concerned with the information needed for exercising control over business resources, like budgeting, quality control, service level, inventory level, productivity level etc.

### 3. Operational/Lower Level Information:

Operational information is concerned with plant/business level information and is used to ensure proper conduction of specific operational tasks as planned/intended. Various operator specific, machine specific and shift specific jobs for quality control checks comes under this category.

## Components/Resources of Information System:



*Fig: Components/Resources of Information System*

## **1. People Resources:**

People are required for the operations of all information system. These people resources include:

### **a. End Users:**

End users are also called users or clients. They are the people who use an information system or the information they produce. They can be customers, salespersons, engineers, accountant, clerks, etc.

Most of the end-users in business are knowledge workers that are people who spend most of the time communicating and collaborating in team and workgroup and creating, using and distributing information.

### **b. Information System Specialists:**

They are the peoples, who develop and operates information system. They include system analyst, software developer and other managerial and technical information system personnel.

## **2. Hardware Resources:**

The concept of hardware resources includes all physical devices and materials used in information processing. It mainly includes:

### **a. Machines:**

It means computers and other peripherals used for input, processing and outputs including different types of computers, handheld devices and various input and output equipment.

### **b. Media:**

A media is used for the storage of data and programs. Different types of media like Magnetic Media (Floppy Disk, Magnetic Disk, Magnetic Tape, and Hard Disk), Optical Media (CD, DVD, and Blu-Ray), Flash Media (Pen-Drive, Memory Card, Etc.).

## **3. Software Resources:**

Software resources include all kinds of information processing instructions. It mainly includes:

#### **a. Programs:**

Programs or software program includes a set of instruction for performing specific task software program may be as system software and application software. System software is that software, which supports the operation of a system such as operating system, device driver, language processor, etc.

Application software programs used for processing data and providing results and solving problems like payroll software, word processing software, etc.

#### **b. Procedure:**

They are operating instruction for people who will use an information system such as instructions for using a software package.

### **4. Network Resources:**

Telecommunication technologies and networks like the internet, intranet and extranet have become essential to the successful e-business and e-commerce operation of all types of organization and for their computer-based information system. It mainly consists of:

#### **a. Communication Media:**

It is the medium used for data transmission over the network. It may be as, Cable Media like Twisted Pair Cable, Coaxial and Optical Fiber and Wireless Media as, Micro-wave, Radio-wave, Infrared wave, Bluetooth, Communication Satellite.

#### **b. Network Support:**

It includes many hardware and software necessary to support the operations and use of computer network. The various hardware devices may be like router, hub, switch, bridge, gateway, etc. and software like different types of protocols, network operating system, etc.

### **5. Data Resources:**

Data are vitally important for any organization and the main objective of an information system is to capture, process, store and distribute data and information in a systematic way.

Data can be in many forms like traditional alpha-numeric data, images, audio, video, animations, etc. To manage the data resources in a database we use any suitable DBMS software. These resources should manage database and knowledgebase.

A database is the organized collection of logically related data, whereas a knowledge base holds knowledge in a variety of form such as facts, rules and knowledge mainly gained through experience.

## **Quality, Cost and Value of Information:**

### **Quality of Information:**

Information quality is a measure of the value which the information provides to the user of that information quality is often perceived as subjective and the quality of information can then vary among users and among users of the information.

Nevertheless, a high degree of quality increases its objective or at least the inter subjectivity. Accuracy can be seen as just one element of IQ but, depending upon how it is defined, can be seen as encompassing many other dimensions of quality.

Information Quality is:

1. **Intrinsic IQ:** Accuracy, Objectivity, Believability, Reputation.
2. **Contextual IQ:** Relevancy, Value-Added, Timeliness, Amount of information.
3. **Representational IQ:** Interpretability, Format, Coherence, Compatibility.
4. **Accessibility IQ:** Accessibility, Access security.

Let us generate a list of the most essential characteristic features for information quality:

1. **Reliability:** It should be verifiable and dependable.
2. **Timely:** It must be current and it must reach the users well in time so that important decisions can be made in time.
3. **Relevant:** It should be current and valid information and it should reduce uncertainties.
4. **Accurate:** It should be free of errors and mistake, true and not deceptive.
5. **Sufficient:** It should be adequate in quality so that decisions can be made on its basis.
6. **Unambiguous:** It should be expressed in clear terms. In other words, it should have integrity.
7. **Complete:** It should meet all the needs in the current context.
8. **Unbiased:** It should be impartial, free from any bias. In other words, it should have integrity.
9. **Explicit:** It should not need any further explanation.

### **Cost of Information:**

The cost information system plays an important role in every organization within the decision making process. An important task of management is to ensure the control over operations, process, activity sectors, and not ultimately on costs.

Although in reaching the goal of an organization complete many control systems (production control, quality control and stocks control), the cost information system is important because it monitors the results of the others.

The detailed analysis of costs, the calculation of production cost, the loss qualification, the estimating of work efficiency provides a solid basis for the financial control.

### **Value of Information:**

Before a particular piece of information is acquired, decision-makers must know its value. In decision theory, the value of information is the value of the change in decision behavior because of the information.

The change in the behavior due to new information is measured to determine the benefits from its use. To arrive at the value of new information, the cost incurred to get this information is deducted from the benefits.

**To Determine The Value Of The Information We Have To Notice The Following Points:**

#### **1. Current:**

The information must apply to the present time. Keeping information current requires a process of eliminating the old and adding the new. While some types of information are more perishable than others, it is generally accepted that occupation and education information should be reviewed and updated at least annually to be current.

#### **2. Accurate:**

The information must be true, verifiable, and not deceptive. Accurate career information is based on empirical data and can be validated by comparing sources or checking for internal consistency.

#### **3. Relevant:**

Relevant information applies to the interests of the individuals who use it for the decisions they are facing. It should reduce a person's uncertainties about work and education while facilitating choice and planning.

Since, we live and work in local labor markets rather than in national ones, the better the description of local conditions, the more relevant it is to us. State and local information is usually more valuable than national.

#### **4. Specific:**

For information to be specific, it must contain concrete facts. General observations are often interesting and can provide a background for further analysis, but specific facts are essential to realistic planning and decision making.

#### **5. Understandable:**

People using information must be able to comprehend it before they can use it. Data must be analyzed and converted into words. The content of the message should avoid ambiguities and be informative to the intended audiences.

#### **6. Comparable:**

The information presented should be of uniform collection analysis, content, and format so that we can compare and contrast the various occupations, programs of study and schools.

### **Dimension of Information System:**

Information are processed data having particular meaning within a specific context. So, information may be the data that have been processed in some way or presented in a more meaningful fashion. The information has different dimensions and they are:

#### **1. Personal Dimensions of Information:**

As a knowledge worker, we work with and produce information. From a personal or knowledge worker points of view, there are three dimensions of information as:

##### **A. Time:**

The time dimension of information has two aspects:

1. Having access to information when we need it that means the information should be timeliness.
2. Having information that describes a period we are considering that means to provide the information of past or present to predict the future. Information is useful and relevant only if it describes the appropriate period.

##### **B. Location:**

It means having access to information, wherever we are. So, while accessing the information the location of the user or the information's location should not matter. We

should be able to access information at home, at a hotel room, while working down on-street, or even while travelling on an aeroplane. The location dimension is closely related to wireless computing and mobile device.

To keep information private and secure while providing access to remote users, business use intranets.

### C. Form:

The form dimension of information has two primary aspects are:

1. Having information in a form that is most usable and understandable by users like traditional alphanumeric, graphical, audio, video animation and other forms.
2. Information should be accurate that means free from errors.

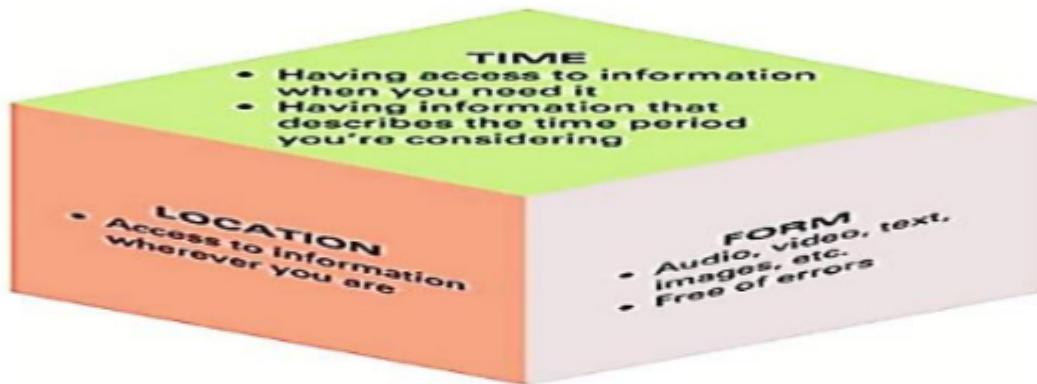


Fig: Personal Dimension of Information

## 2. Organizational Dimension of Information:

The various organizational dimensions of information are:

### A. Information Flows:

Information in an organization flows in four directions as UP, DOWN, HORIZONTAL, INWARD/OUTWARD. This flow of information is based on the structure of an organization including different levels like strategic level, tactical level, and operational level; and consisting of basic functional business units such as manufacturing and production, sales and marketing, account and finance, and human resources management.

1. **Upward flow** of information describes the current state of the organization based on its daily transaction. Lowest level of an organization (Operational Level), collects data from day to day business operations and passed upward to decision-makers, who monitor and respond to problems and opportunities.

2. **Downward flow** of information consist of strategies, goals and directives that originate at one level and are passed to the lower level.
3. **Horizontal flow** of information occurs in between different functional business units and work team. For example flow of information from sales and marketing to other business units like manufacturing, account and finance and Human Resource Management.
4. **Inward/Outward flows** of information consist of information that is communicated to customers, suppliers, distributors and other business partners for the purpose of doing business.

All these flows of information are based on information and communication technology (ICT).

### **B. Information Granularity:**

It refers to the extent of detail with in the information. On one end of this spectrum is coarse granularity that means highly summarized information. At the other end is fine granularity that means information that contains a great amount of details.

People in the highest level of the organization mainly deal with coarse granularity of information, people in the lower level of an organization need information with fine granularity.

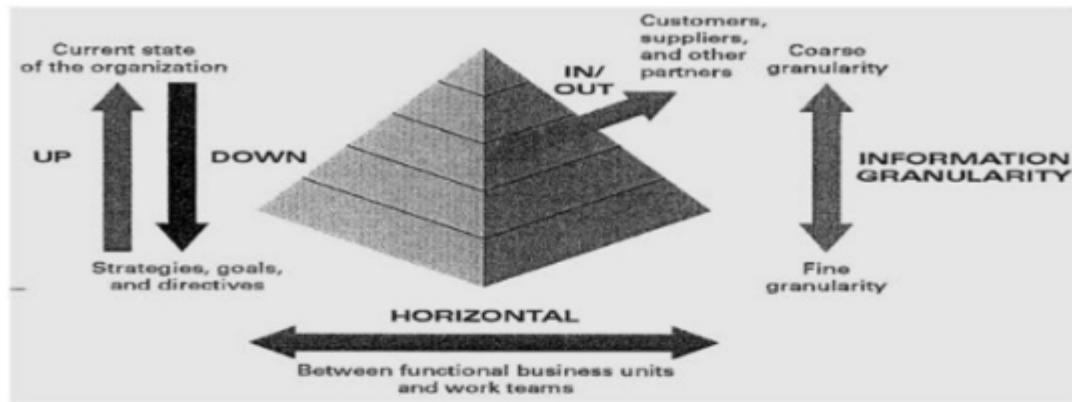
### **C. What Information Describes?**

Another organizational dimension of information is what information describe? Information can be internal, external, objective, subjective or some combination of the four.

1. **Internal Information:** It describes specific operational aspects of an organization that means the information generated through internal business transaction.
2. **External Information:** It describes the environment surrounding the organization.
3. **Objective Information:** It quantifiably describes something that is known.
4. **Subjective Information:** It attempts to describe that is something unknown.

### **D. How Information Is Used?**

Information is used at different level of organization (Operational, Tactical and Strategic Levels) to perform different business operations and to take different types of decisions (Structured, Semi-structured, Unstructured decisions) to enhance the efficiency of business operations and to support the decision-makers.



*Fig: Organizational Dimension of Information*

### **3. Technology Dimension of Information:**

The technology dimensions consist of computer hardware, software, data management technology and networking/telecommunications technology (including the internet). Management uses technology (hardware, software, storage and telecommunications) to carry out their functions. It is one of the many tools managers use to cope with change.

#### **1. Hardware:**

Hardware is the physical equipment used for input, processing and output activities in an information system. It consists of the following: the computer processing unit, various input, output and storage devices and physical media to link these devices together.

#### **2. Software:**

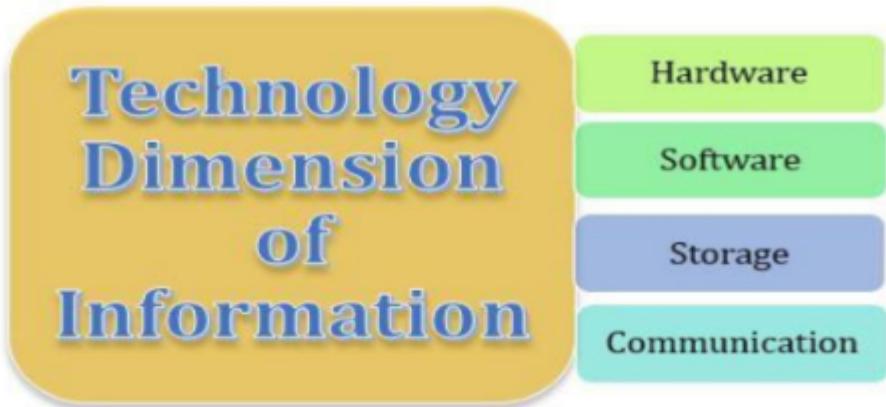
Software consists of the detailed preprogrammed instructions that control and coordinate the computer hardware components in an information system.

#### **3. Storage:**

Storage technology includes both the physical media for storing data, such as magnetic or optical disk or tape, and the software governing the organization of data on these physical media.

#### **4. Communication:**

Communication technology consisting of both physical devices and software links the various pieces of hardware and transfers data from one physical location to another. Computers and communications equipment can be connected in networks for sharing voice, data, image, sound or even video.



*Fig: Technology Dimension of Information*

All of these technologies represent resources that can be shared throughout the organization and constitute the firm's information technology infrastructure. The IT infrastructure provides the foundation or platform on which the firm can build its specific information system.

Each organization must carefully design and manage its information technology infrastructure so that it has the set of technology services it needs for the work it wants to accomplish with information systems.

## **System:**

### **System Concepts with General Model:**

A system can be defined as a set of interrelated component, with a clearly defined boundary working together to achieve a common set of objectives by accepting inputs and producing outputs in an organized transformation process.

In particular, the objective of an information system is to provide the appropriate outputs to the members of the organization.

Systems are said to be embedded in environments. An **environment** is the overall context in which a given system operates. Thus, environment is also a relative concept.

*Relative* here means that both system and environment are subjective categorizations whose relevance or suitability for an intended purpose is determined by the observer. It follows that the **boundary** separating system from environment is also subjective, that is to say, defined by the observer.

Boundaries can be physical or purely conceptual. A given system and its immediate environment can often be conceived of as a higher-level system which itself is embedded in a more general environment.

This illustrates the hierarchical nature of systems thinking. A system can also be decomposed into two or more lower-level subsystems by defining boundaries between different groups of tightly connected components.

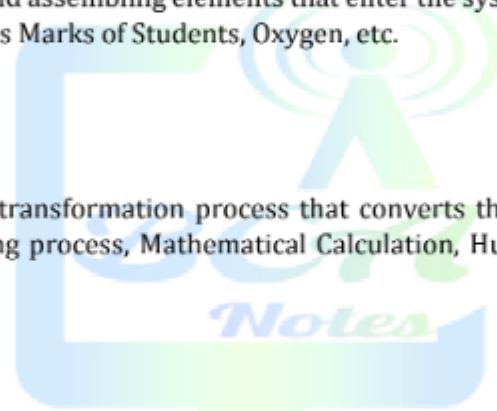
Typically, the criteria used for inferring connections are **structure**, the arrangement of the parts that make up the whole, and **function**, the characteristic action performed by the entity under study. Structure usually implies spatial contiguity while function is associated with temporal relatedness, usually synchronous.

## **Elements of System:**

A system has three basic elements input, processing and output. The other elements include control, feedback, boundaries, environment and interface are as below:

### **1. Input:**

It involves capturing and assembling elements that enter the system to be processed. For example: Raw Materials Marks of Students, Oxygen, etc.



### **2. Process:**

Processing involves a transformation process that converts the input into output. For example: Manufacturing process, Mathematical Calculation, Human Breathing Process, etc.



### **3. Output:**

It involves transforming elements that have been produced by the transmission process to their ultimate destination. For example: Finished Products, Mark sheet of students, Human Activity, etc.



### **4. Feedback:**

Feedback is data about the performance of the system and is used to enhance the quality of the output by making appropriate adjustment in input and processing steps.



### **5. Control:**

It involves monitoring and evaluating feedback to determine whether a system is moving toward the achievement of a goal.



## **6. Boundaries:**

The boundaries are nothing but the limit of the system. Setting up boundaries helps for better concentration of the actives carried in the system.

## **7. Environment:**

The things outside the boundary of the system are known as environment. Change in the environment affects the working of the system.

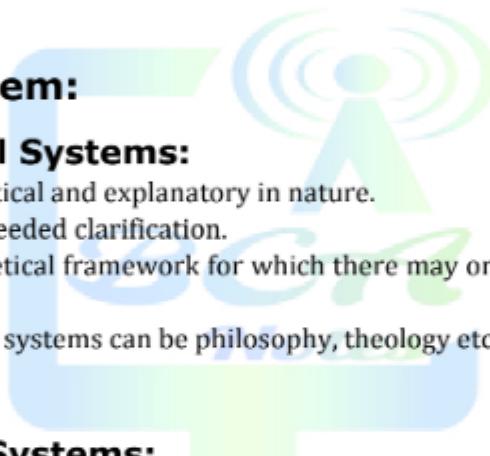
## **8. Interfaces:**

The interconnections and the interactions between the sub-systems is known as the Interfaces. They may be inputs and outputs of the systems.

## **Types of System:**

### **1. Conceptual Systems:**

- a. They are theoretical and explanatory in nature.
- b. Provide much-needed clarification.
- c. Provide a theoretical framework for which there may or may not be any real-life counterpart.
- d. Example of such systems can be philosophy, theology etc.



### **2. Empirical Systems:**

- a. They are very practical, specific and also very operational in nature.
- b. Can be based on the conceptual system.
- c. Examination system, surgery act as very good examples of the empirical systems.

### **3. Open Systems:**

- a. Involve continuous interaction with the environment.
- b. Exchanges the information, material, energy with the environment.
- c. Is open and also self-organizing in nature.
- d. Is also adoptive or adaptive to the changing environment as it is flexible.

### **4. Closed Systems:**

- a. Shuns any kind of exchange with the environment.
- b. Is rigid in nature.
- c. Is not at all amenable to the change.

- d. Is also self-contained.
- e. Is somewhat isolated in nature.
- f. Is having a well-defined boundary.
- g. Is not at all adaptive in nature.

## **5. Natural Systems:**

- a. Such Systems exist and also abound in nature.
- b. Are also not at all the results of the human endeavors?
- c. Rivers, mountains, minerals etc. are the major examples of natural Systems.

## **6. Artificial Systems:**

- a. Are manufactured (manmade).
- b. Examples of such Systems are dams, canals, roads, machines, factories etc.

## **7. Probabilistic Systems:**

- a. Based on the predictability of the behavior or the outcome.

## **8. Deterministic Systems:**

- a. In such systems, the interaction of the elements is known.
- b. As the behavior of the elements is pre-determined, it becomes possible to work upon the reaction well in the advance.

## **Subsystem:**

A system is defined as a combination of things or parts forming a complex or unitary whole. It's important to understand the difference between a process and a system. Business processes occur within a business system.

Processes are an organized set of steps intended to take some input and generate the desired output. Systems don't generate outputs but they provide the structure and environment within which a process can reside.

A subsystem, while a system in itself, is also wholly contained within a larger system. An online retailer may have a complex and extensive distribution system and within that system would be subsystems, such as delivery, order fulfilment, and inventory management.

For example: a disk subsystem is a part of a computer system. A bus is a part of the computer. A subsystem usually refers to hardware, but it may be used to describe

software. However, "module", "subroutine" and "component" are most typically used to describe parts of the software.

## **Feedback Control:**

All organizations exist as part of a larger system. Information systems are used to assist management by providing feedback on the firm's performance. Feedback refers to the outputs of a system that are transformed back into inputs to control the system's operation.

Information systems are used to compare the data on the actual performance with the standards developed earlier. Based on the information about the discrepancies, managers can formulate corrective actions, which are then fed back into the firm's operations.

## **System Approach to Organization:**

Business is plagued with recurring challenges or chronic problems that have defied solution. While significant gains in process and efficiency can be made by applying quality training, often the limitation of these approaches is met when the immeasurable or less tangible data, namely assumptions and beliefs is a key to evolving more effective actions and results.

A system's approach to organizational learning is a key to evolving the capacity of employees because it supports their understanding of how they are a part of the current unfolding story and how they can leverage a change.

Systems sensing and thinking is a way to improve the quality of conversations happening within our organization around complex business issues by developing employees ability to see and speak of the systems which govern their behavior and results.

We build this capacity by tackling real business issues, inviting all the key stakeholders of the issues to bring their perspective to the table and out of a more robust collective inquiry, crafting the action strategies to lever the change.

## **Application of System Concepts:**

A system modelling is generally a basic principle in engineering and in social sciences. The system is the representation of the entities under concern. Hence inclusion to or exclusion from system context is dependent on the intention of the modeler.

No model of a system will include all features of the real system of concern and no model of a system must include all entities belonging to a real system of concern. The application of system concepts can be explained below:

## **1. Systems in Information and Computer Science:**

In computer science and information science, system is a software system which has components as its structure and observable inter-process communications as its behavior. System can also be used referring to a framework be it software or hardware designed to allow software programs to run.

## **2. Systems in Engineering and Physics:**

In Engineering and Physics, a physical system is the portion of the universe that is being studied (of which a thermodynamic system is one major example). Engineering also has the concept of a system that refers to all of the parts and interactions between parts of a complex project.

Systems engineering refers to the branch of engineering that studies how this type of system should be planned, designed, implemented, built and maintained.

## **3. Systems in Social and Cognitive Sciences and Management Research:**

Social and Cognitive Sciences recognize systems in human person models and inhuman societies. They include human brain functions and human mental processes as well as normative ethics systems and social/cultural behavioral patterns.

In management science, operations research and organizational development, human organizations are viewed as systems (conceptual systems) of interacting components such as subsystems or system aggregates, which are carriers of numerous complex business processes and organizational structures.

## **4. Pure Logical Systems:**

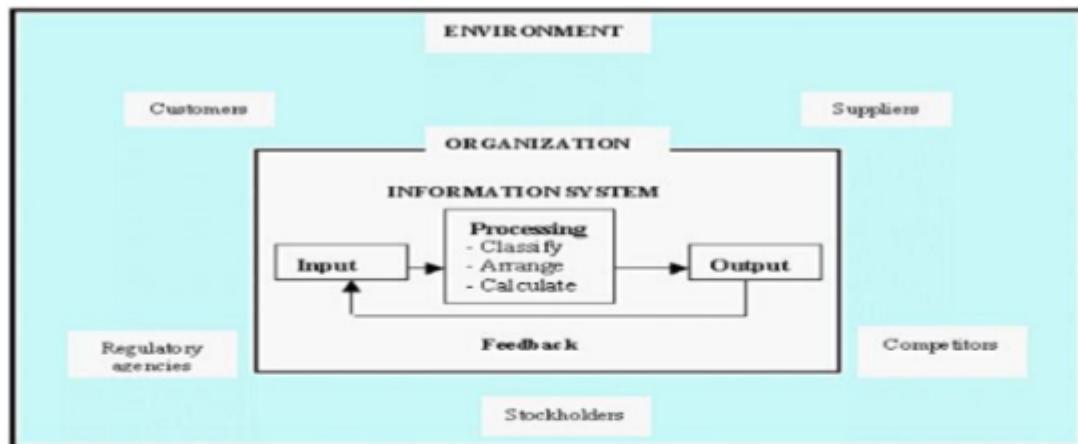
There is also such a thing as a logical system. The most obvious example is the calculus developed simultaneously by Leibniz and Isaac Newton. Logic has been applied to categories such as Taxonomy, Ontology, Assessment and Hierarchies.

## **5. Systems Applied to Strategic Thinking:**

In 1988, military strategist, John A. Warden III introduced his Five Ring System Model. The Air Campaign contending that any complex system could be broken down into five concentric rings. Each ring: Leadership, Processes, Infrastructure, Population and Action Units could be used to isolate key elements of any system that needed change.

# Information System:

## Introduction of Information System:



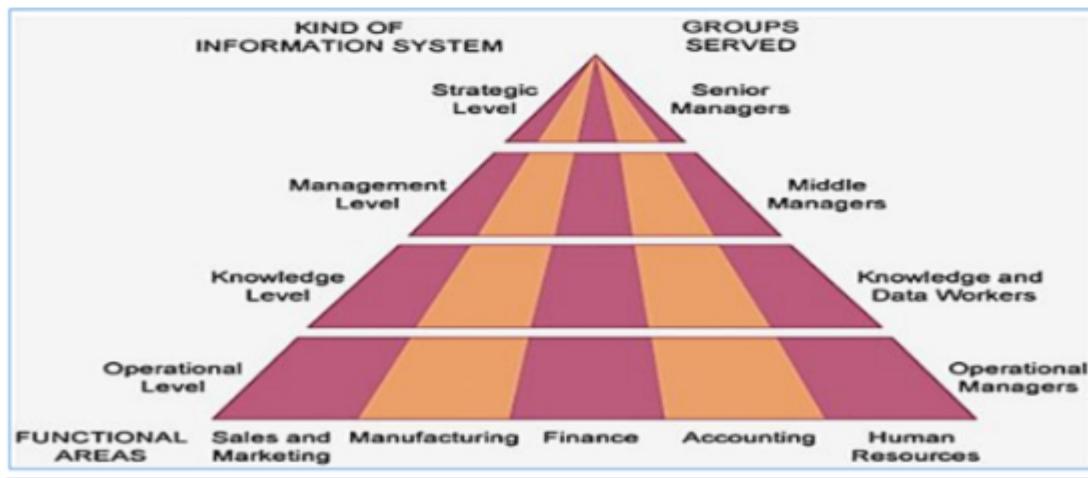
*Fig: Functions of Information System*

An information system can be defined technically as a set of interrelated components that collect, process, store and distribute information to support decision making and control in an organization.

In addition to support in decision making, coordination and control, information system may also help managers and workers to analyze a problem, to visualize complex subjects and create new products and services.

In other words, an information system can be any organized combination of hardware, software, communication network, data and people resources that retrieve, process, stores and disseminates information in an organization.

## Types of Information System:



An organization have different levels and different functional areas. According to levels and functions, an organization may need different types of information system to fulfil requirements of different levels of users. Commonly used information system at different levels of an organization are as:

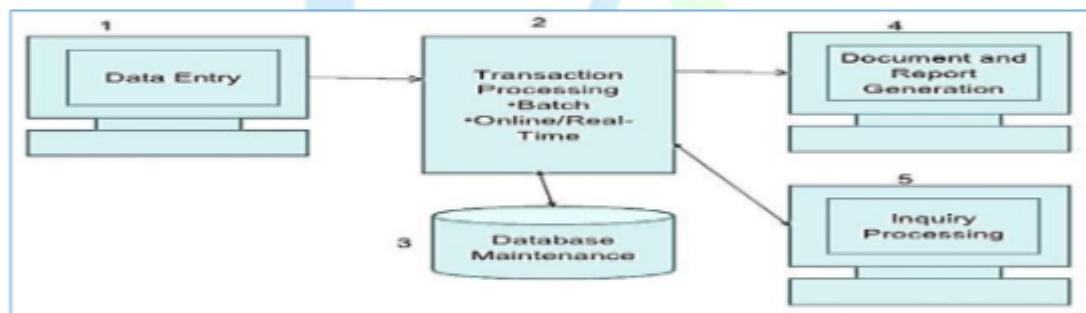
### **1. Transaction Processing System (TPS):**

TPSs are the basic business systems that serve the operational level of the organization. It is a computerized system that performs and records the daily routine transaction necessary to conduct business.

For example: Sales order entry, inventory management, banking system, payroll system, etc. At the operational level task, resource and goal are predefined and highly structured. So, TPS help in structured decision making at lower level of the organization.

#### **Transaction Processing Cycle:**

TPS captures and processes data describing business transactions, updating organizational database and producing a variety of information products. The main activities involved in transaction processing are:



*Fig: Transaction Processing Cycle*

#### **1. Data Entry and Validation:**

The transactional data may be collected using different medium such as Bar Code Reader (BCR), PoS terminal, Credit card reader, etc. The proper reading and editing of data is the primary requirement of TPS to provide quick and correct information.

#### **2. Data Processing:**

A TPS can process data in two different ways as:

##### **a. Online Processing:**

In online or real-time processing data are processed immediately after the occurrence of the transaction such processing must have quick response time. For example, a banking system, inventory management system, railway management system, etc.

**b. Batch Processing:**

In batch processing transactional data are accumulated over some time and processed in a group or batch. Such a system may have a very slow response time but the ability to process a large volume of data. For example payroll system telephone billing system, etc.

**3. Database Maintenance:**

An organization's database must be maintained by TPS so that it is always correct and up to date. So, a TPS updates corporate databases to reflect the changes resulting from day to day business operations.

**4. Documents and Reports Generations:**

TPS produces a variety of documents and reports such as purchase order, sales receipts, invoice, customer statements, etc. These documents and reports should be available when users require and generally available in pre-specified format either in softcopy or hardcopy form.

**5. Enquiry Processing:**

TPS allow the users to make enquiry and receive responses using simple database query language or by using simple data entry forms. Typically results are displayed in a variety of pre-specified format on the screen.

**Major Characteristics of TPS:**

- a. Process a large amount of data.
- b. Need high processing speed due to the large volume of data.
- c. Sources of data are mostly internal and the output mainly intended for the internal users.
- d. Process information on regular bases.
- e. Require large database storage capacity.
- f. Collect and monitor data generated during business activities.
- g. Input and output are structured and formatted in a pre-specified format.
- h. High level of detail is required especially in the input.
- i. Low calculation complexity, it means simple arithmetic and statistical calculations.

- j. Need a high level of accuracy, consistency and security.
- k. Requires high processing reliability interruption due to any reason is not acceptable.
- l. Ability to query files and database.

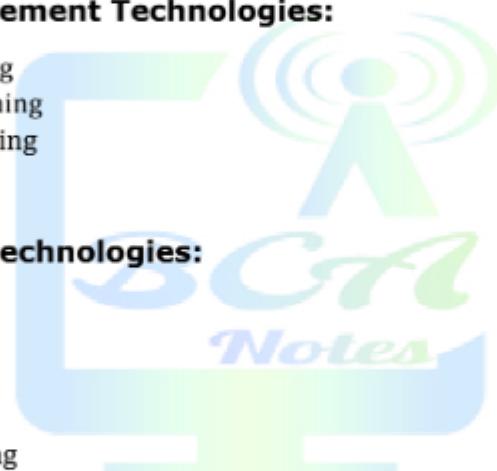
## **2. Office Automation System (OAS):**

OAS provides individual effective ways to process personal and organizational data, perform calculations and create documents.

They are used for increasing the efficiency and productivity of office workers and reducing paperwork OAS software tools are often integrated and designed for easy operations. There are different types of OAS technologies and they are:

### **Document Management Technologies:**

- a. Word Processing
- b. Desktop Publishing
- c. Document Imaging



### **Communication Technologies:**

- a. E-mail
- b. Voice-mail
- c. Chat
- d. Voice chat
- e. Teleconferencing
- f. Video conferencing
- g. Fax

## **3. Management Information System:**

Small business managers and owners rely on an industry-specific management information system, or MIS, to get current and historical operational performance data, such as sales and inventories data. Periodically, the MIS can create prescheduled reports, which company management can use in strategic, tactical and operational planning and operations.

## **4. Decision Support System:**

A decision support system or DSS allows small business managers and owners to use predefined or ad hoc reports to support operations planning and problem resolution

decisions. With DSS, users find answers to specific questions as a means to evaluate the possible impact of a decision before it is implemented.

## **5. Executive Support System:**

The executive support system or ESS contains predefined reports that help small business owners and managers identify long term trends in support of strategic planning and no routine decision making. The ESS system also offers analysis tools used to predict outcomes assess performance and calculate statistics based on existing data.

## **6. Expert System:**

It is a computer system that emulates the decision-making ability of a human expert. Expert systems are designed to solve complex problems by reasoning about knowledge, represented primarily as if-then rules rather than through conventional procedural code.

The first expert systems were created in the 1970s and then proliferated in the 1980s. Expert systems were among the first truly successful forms of AI software.

## **7. Office Information System:**

This system gives information about the office, enterprise, corporate and firm. It is always responsible for providing the information to the known and unknown user and employee.

## **8. Integrated Information System:**

It is a collection of information system that can be also called a package which is the combination of the information system. It is responsible for the organization to help the integrated information for the decision making and analysis.

## **9. Communication and Collaboration System:**

Communication refers to the exchanging of information between the users, organization and employee while collaboration refers to the partnership between the organizations having different goal but they can use the communication and collaboration system.

## **10. Knowledge Management System:**

"Right man in the right job and right decision in right time" can be called as knowledge management. So there are so many organizations that can use the knowledge management system which is used to manage the knowledge.

