Ch 1: Introduction

Data, Information, Process and Knowledge

Data:

- Data is in form of numbers, dates, text etc.
- It is raw, unorganized facts that need to be processed.
- It is simple and random.
- After organizing data, it becomes useful for user.

Information:

- When data is processed, organized, structured and presented in form of context then it becomes useful. This useful data is known as Information.
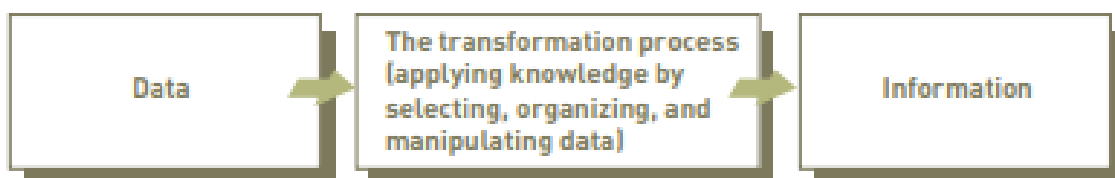
Data	→	Process	→	Information

Examples:

1. "Student's marks" are the Data where as "Average score of class" is Information.
2. "Dates" are the Data where as "Holiday's dates are information.
3. "Last 10 year's population detail" is Data where as "Increase Population chart is Information.
4. "Numbers of visitors in shop" is Data where as "Visitors' crowd is from which area?" is Information.
5. "History of temperature reading of world for last 10 years" is Data where as "Global temperature is rising" is Information.

Turning data into information is a **process**, or a set of logically related tasks performed to achieve a defined outcome. The process of defining relationships among data to create useful information requires knowledge.

Knowledge is the awareness and understanding of a set of information and the ways that information can be made useful to support a specific task or reach a decision.

The Process of Transforming Data into Information:

Data	→	The transformation process (applying knowledge by selecting, organizing, and manipulating data)	→	Information

2. Characteristic of Valuable Information: -

To be valuable to managers and decision makers, information should have the characteristics. These characteristics also make the information more valuable to the organization. If the information is inaccurate or incompatible poor decision can be made. Furthermore, if information is not pertinent to the

situation, not delivered to decision makers in a timely fashion or too complex to understand, it may be little value to the organization. The following are the characteristics of information.

Characteristics	Definition
Accurate	Accurate information is error free. In some cases, inaccurate information is generated because incorrect data is fed into the transformation process.
Complete	Complete information contains all the important facts. E.g. an investment report that does not include all-important costs is not complete.
Economical	Information should also be relatively economical to produce decision makers must always balance the value of information with the cost of producing it. ex. 5000 give some
Flexible i can acsses any information in net eims	Flexible information can be used for a verity & purposes. E.g. information on how much inventory is on hand for a particular part can be used by a sales representative in closing sale.
Reliable	Reliable information can be depended on in many cases, the reliability & information depends on the reliability & the data collection method.
Relevant	Relevant information is important to the decision maker. Information that lumbers prices might drop may not be relevant to a computer chip manufacture.
Simple	Information should also be simple, not overly complex, sophisticated & detailed information may not be needed. Infect, too much information can cause information overload.
Timely	Timely information is delivered where it is needed. Knowing last week's whether conditions will not help when trying to decide what coat to wear today.
Verifiable	Information should be verifiable. This means that you can check it to make sure it is correct, perhaps by checking many sources for the same information.
Accessible	Information should be easily accessible by authorized user to be obtained in the right format and at the right time meet their needs.
Secure	Information should be secure from access by unauthorized users.

INFORMATION SYSTEM

- An information system (IS) is a set of interrelated components that collect (input), manipulate (process), store, and disseminate (output) data and information and provide a corrective reaction (feedback mechanism) to meet an objective

- The feedback mechanism is the component that helps organizations achieve their goals, such as increasing profits or improving customer service.

Components of a System

A system's four components consist of input, processing, output, and feedback.
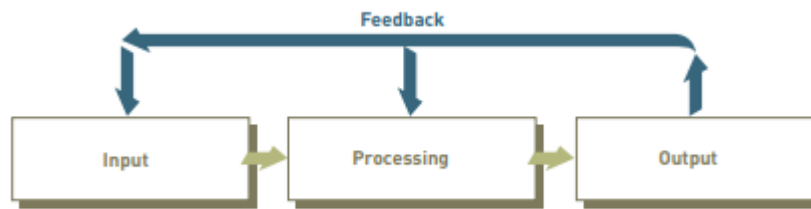
(1) Input:
- In information system, input is the activity of **gathering** and **capturing** raw data.

Example
- In producing paycheck, e.g., the number of hours worked for every employee must be collected before paycheck can be calculated or printed.
- In a university grading system, student grades must be obtained from instructions before a total summary of grades for the semester or quarter can be compiled and sent to the appropriate students.

(2) Processing:
- In information system, processing **involves converting or transforming data into useful output**.

- Processing can involve making calculating, making comparisons and taking alternate action, and storing data for future use.

(3) Output:
- In information system, output involves producing useful information, usually in the **form of documents & reports**.
- Output can include paychecks for employee. Reports for managers and information supplied to stockholders, banks, government agencies and other groups.
- In some cases, output from one system can become input for another.

(4) Feedback:
- In information system, feedback is output that is used to make changes to input or processing activities.
- The feedback is used to check and correct the input on the number of hours worked.

Input ⟶ Processing ⟶ Output

Feedback
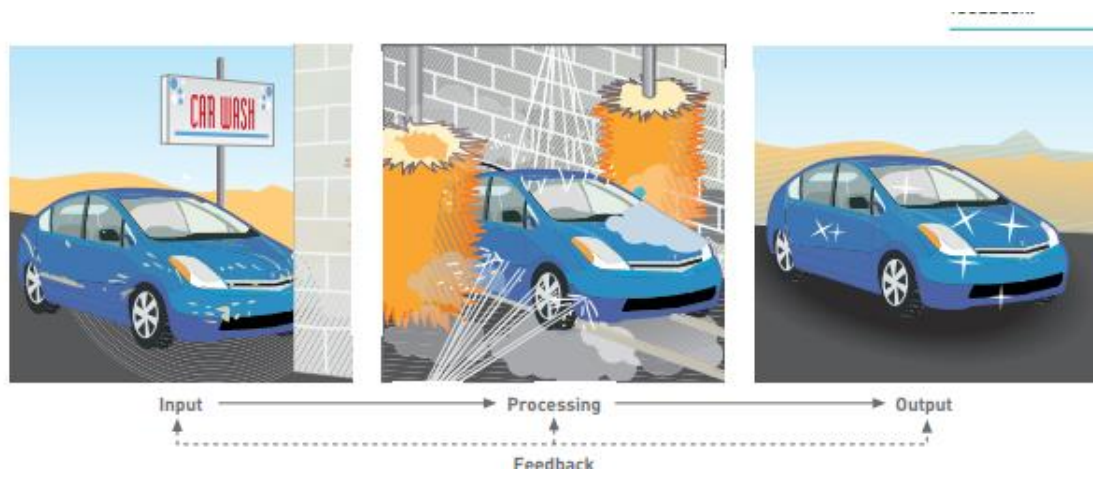
4. Manual and computerized system.

An information system can be manual or computerized

Manual Information System:

- In manual information system some investment analysts manually <mark>draw charts and trend lines</mark> to help them make investment decision.

- <mark>Tracking data on stock prices</mark> over the last few months or years, these analysts <mark>develop patterns on graph paper</mark> that help them determine what stock prices are likely to do in the next few days or weeks. Some investors have made millions of dollars using manual stock analysis information system.

- Many information systems begin as manual system and become computerized. <mark>E.g. postal service sorts mail.</mark> At one time most letters were visually scanned by postal employees to determine the ZIP code and were than manually placed in an appropriate bin. Today the bar-coded address on letters passing through the postal system are read electronically & automatically routed to appropriate bin via conveyors.

Computer Based Information System (CBIS):

- A computer based information system is a single set of hardware, software, database, telecommunication, people and procedures that are configured to collect, manipulate, store and process data into information.

- A business technology infrastructure includes all the hardware, software, database, telecommunication, people and procedures that are configured to collect, manipulate, store and process data into information.

Hardware: Hardware consists of <mark>computer equipments</mark> used to perform <mark>input processing and output activities</mark>. Input devices include keyboards, automatic scanning devices, equipment that can read magnetic ink and many other devices. Processing device include CPU and main memory. There are many output devices like printers and computer screen.

Software: Software is the <mark>computer programs that govern the operation of the computer</mark>. This program allows the computer to provide managers with information to increase profits reduce cost and provide better customer service. There are two types of software,

- ➢ **System Software:** System software controls <mark>basic computer operation</mark> such as start up.   Linux,Mac
- ➢ **Application Software:** Application software allows <mark>specific task to be accomplished</mark> such as word.

Database: A database is an organized <mark>collection of facts and information</mark>. An organized database contains facts & information on customers, employees, inventory, competitor's sales information and much more. Host managers and executives believe a database is one of the most valuable & important parts of a computer based information system.

Telecommunication, Network and Internet: Telecommunication is the <mark>electric transmission of signals</mark> for communication and enables organization to carry out their processes and tasks through effective computer networks.

    Networks are used to <mark>connect computers and computer equipment</mark> in a building, around the country or around the world to enable communications.

    The Internet is the <mark>world's largest computer network</mark>, actually consisting of thousands of interconnected networks, all freely exchanging information.

People: People are the <mark>most important element</mark> in most computer based information system. Information system personnel include all the people who <mark>manage, run program and maintain</mark> the system. Users are any people who use information system to get results.

Procedures: Procedures include the <mark>strategies, polices, methods and rules</mark> for using a computer based information system. E.g. some procedure describes when each program is to be run or executed. Other describes who can have access to facts in the database. Other procedure describes what is to be done incase of disaster.

Various steps to be followed for conversion of manual to computer based information system:

The steps involved in the conversion are preparations of:

- System description (overview)
- Input documents
- Output documents
- File design
- Program logic (detail)
- Computer program
- System verification
- Documenting

(1) **System description**

- It is usually prepared after preliminary investigation and definition of the problem. The description is essentially a statement of the major inputs, outputs, processing operations, and files needed.
- The purpose is to show the logical flow of information and the logical operations necessary to carry out the particular design alternative chosen. These are in both narrative and pictorial form.
- **Narrative**: The narrative description is an English language depiction of the operation. It should describe inputs, outputs, files and operations. It should be of that detail that will allow users and computer technicians to understand the operation of the system and to utilize the narrative as a starting point for more detailed design.
- **Pictorial**: A picture allows us to condense greatly the narrative version of our system description. The symbolic form facilitates a quick analysis of the job being performed and provides a visual overview of the entire operation.
- '**flow charting**' is one of the most popular techniques of use even today. System flow chart is a graphic diagramming tool used to show the flow of data media as they are processed by hardware devices and information processing procedures in an information system.
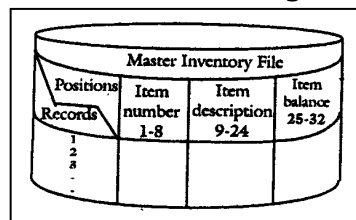
(2) Input documents

- It is necessary to specify how the information will be put into a form that is acceptable to the computer.
- Volume of information, frequency, accuracy, and verification requirements and the handling of the information are the considerations in the selection of input formats.
- The exact layout of input documents is necessary because the computer program is an exact and precise sequence of steps that operate only when data are located in prescribed positions.

(3) Output documents

- The output format should be <mark>treated with additional care</mark> since it represents the purpose or objective of the entire operation.
- It is the output document and hence the management is more concerned because of its critical nature. Hence, <mark>care should be taken in its design</mark>.

(4) File design

- The logic required to <mark>control the flow of data</mark> through the system is a part of systems design, and he <mark>flow is in turn dependent on the design of data files</mark>. These two steps are closely associated and should be considered in conjunction with considerations of type of <mark>equipment, storage capacity, input and output media and format</mark>.
- The <mark>character-by-character contents</mark> of every record are specified by the file record layouts. Our example here is disk file and hence we are concerned with disk record layout as shown in Figure below.

Master Inventory File

| Positions Records	Item number 1-8	Item description 9-24	Item balance 25-32
1			
2			
3			

- The item member is an 8 digit field, the same as that on the input terminal screen. The item description consists of two 8 digit fields making up 16 alphabetic characters. This description is an integral part of the inventory file maintained on disk.
- There is no reason to include it on the input screen representing individual transactions. The file design of the disk is completed by the 8 digit item balance field. For the sake of simplicity, other elements of file design-such as price, unit costs, weight etc are not included. The individual records are shown as 1, 2, 3...

(5) Program logic

- There are numerous means of thinking through documenting program logic. Flow charts are historically dominant; <mark>easy to depict and understand.</mark>
- The program <mark>flowchart is the programmer's logic</mark> of the detailed, step-by-step representation of how the computer program will accomplish the job.
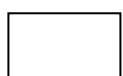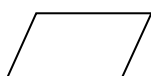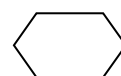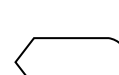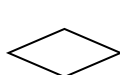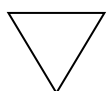

Process	input/output	Document	Manual	Preparation

Merge   Extract   Sort   Decision   Connector   Display

Figure: Flow chart symbols

The flow chart symbols for both programming and system flow-charting are shown in above figure. The flow chart must be written as a sequence of instructions that can be compiled (translated from a programming language to binary notation) into machine-readable format.

(6) Computer programming
- The details of computer programming are complex and specific. We are concerned only with the general nature of how the processor is instructed to perform its operation on the input data to produce output data in the desired format. In simplified form, an instruction to the processor consists of two parts.
    (i) An operation code (ii). Operands
- The operating code simply says, "Perform a READ operation", "Perform an ADD operation" and so on. The operands give additional information to the processor. Eg: being told to add is not enough, we must know what two things to add and where to put the answer. These pieces of information are called operands.
- Computer programs, no matter how large or complex, are made up of lots of print instructions like those just explained above. Today, a large assortment of operator machine languages is available.

(7) System verification
- After the program has been written and run through the compilation process, it is placed in memory in binary or 'machine readable' form and is ready   to   process   the   terminal   input, program in sequence, until the program comes to a halt.
- The possibilities of all programs working correctly for the first time approaches zero. Test cases must be run against each program and all errors corrected.

(8) Documentation
- More systems fail for lack of adequate documentation than for any other single reason. Three types of documentation needed are:
    (i) For input, a simple overview of the system, a clear description of what exactly input is expected and a note about what input is not acceptable.
    (ii)For running and maintaining the system, all the technical documentation generated during the development process.

(iii) For <mark>output</mark>, a simple overview of the system, a clear description of what the output means and a note about its limitations.