

CHAPTER

1

Introduction to Information Systems

What is Data?

- Raw Material
- Numbers and strings of letters with no precise context or meaning

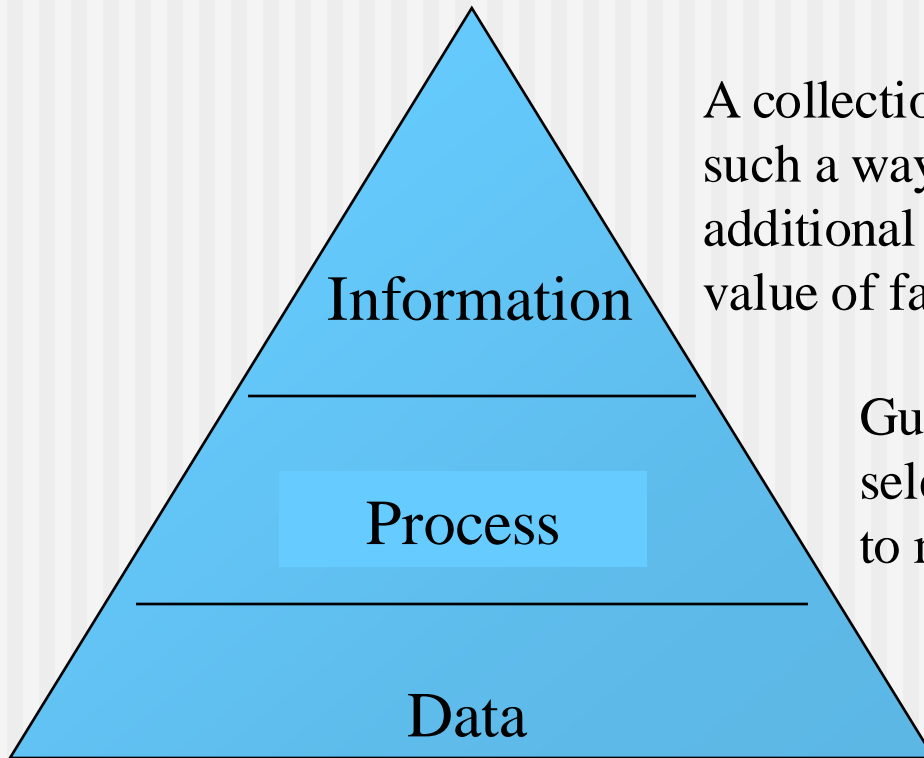
What is Information?

- Data processed with knowledge
- “Data endowed with relevance and purpose”
- “Data becomes information when its creator adds meaning”
- “An organized, meaningful, and useful interpretation of data”

What is Knowledge?

- “A body of guidelines and rules used to select, organize, and manipulate data to make it suitable for a given task”
- “An awareness and understanding of a set of information and how that information can be put to its best use”
- “Internalized information + the ability to utilize this information”

Data transformed into Information



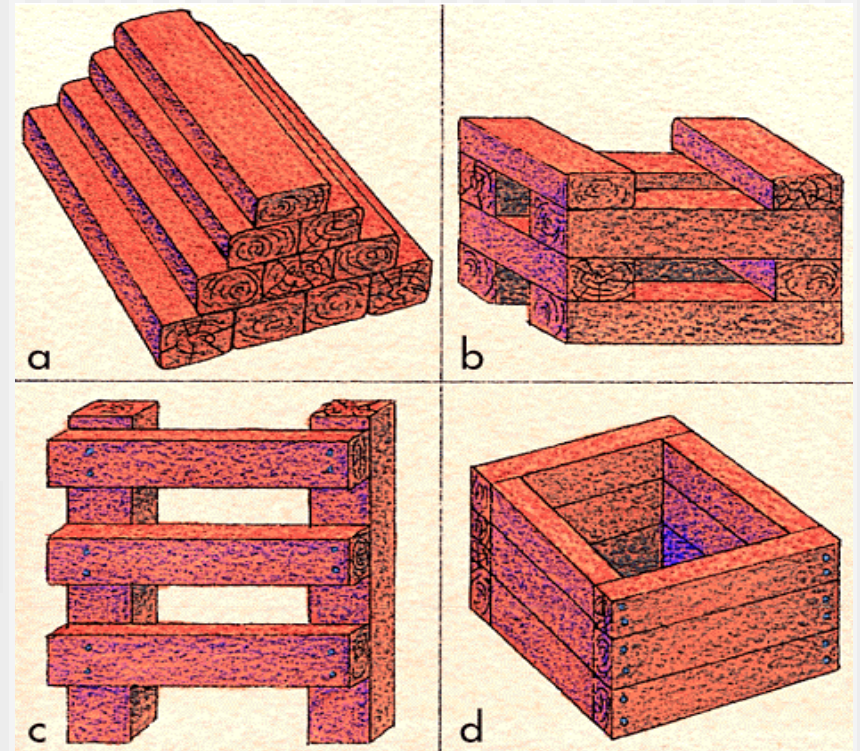
A collection of facts organized in such a way that they have additional value beyond the value of facts themselves.

Guidelines and procedures used to select, organize, and manipulate data to make it suitable for a specific task.

Raw facts

Data becomes Information

- Establishing relationships between data creates information.



Information = Data + Relationships

Characteristics of Valuable Information

- Relevant
- Complete
- Accurate
- Current/Timely
- Economical
- Accessible

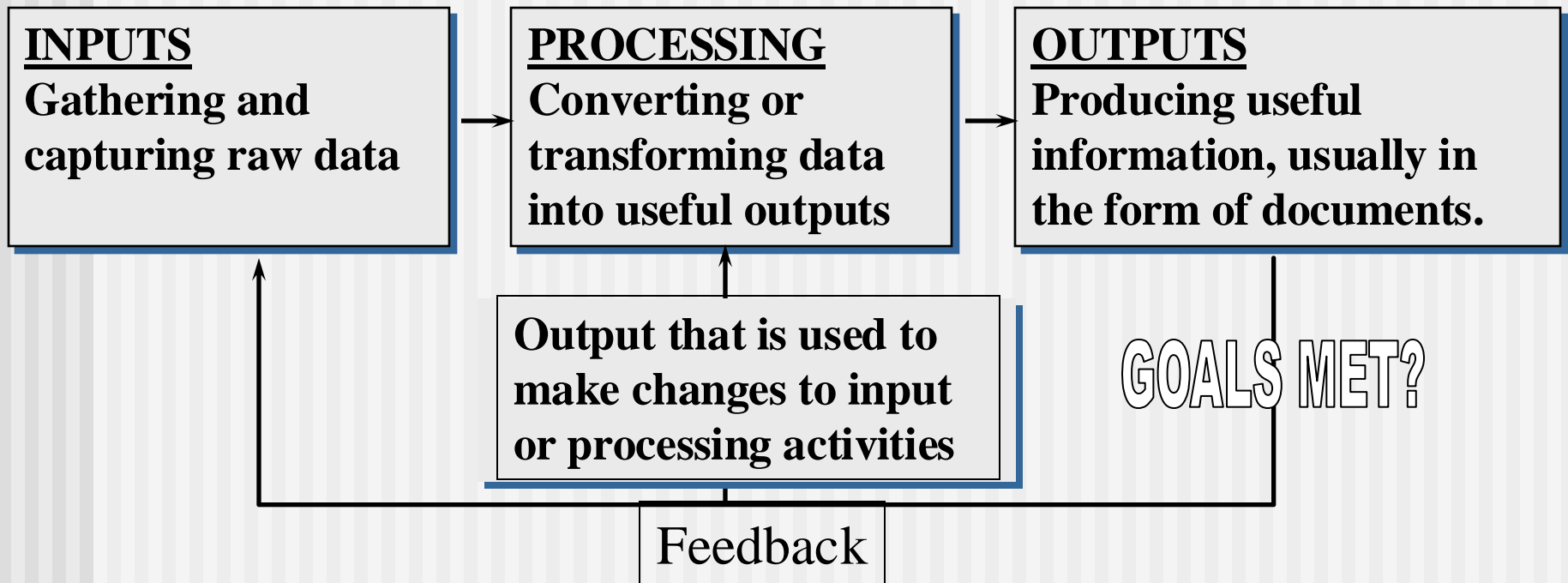
Determining the Value of Information

- Measurements
 - Time saved, lower costs
 - More accurate forecasts
 - Improved service
- Often difficult to quantify
- Payback period?

What is a System?

- Components that work together to achieve a goal by accepting input, processing it, and producing output in an organized manner.

Components of a System



What is a System?

System will have the following basic interacting components (functions):

- **Inputs and Outputs:** A major objective of a system is to produce an output that has value to its user. In order to get a good output, inputs to system must be appropriate.
- **Processing:** It is the element of a system that involves the actual transformation of input into output. It is the operational component of a system. Processors may modify the input totally or partially, depending on the specifications of the output.

What is a System?

System will have the following basic interacting components (functions):

- **Control:** The control elements guide the system. It is the decision-making subsystem that controls the pattern of activities governing input, processing, and output.
- **Feedback:** Feedback measures output against a standard in some form of procedure that includes communication and control. Feedback may be positive or negative, routine or informational. Positive feedback reinforces the performance of the system. It is routine in nature. Negative feedback generally provides the controller with information for action.

What is a System?

System will have the following basic interacting components (functions):

- **Environment:** The environment is the “supra-system” within which an organization operates. It is the source of external elements that impinge on the system. In fact, it often determines how a system must function.
- **Boundaries and Interfaces:** A system should be defined by its boundaries- the limits that identify its components, processes, and interrelationships when it interfaces with another system.

What is a System?



Types of System

Physical or Abstract Systems: **Physical** systems are tangible entities that may be static or dynamic in operation. **Abstract** systems are conceptual or nonphysical entities. They may be formulas of relationships among sets of variables or models – the abstract conceptualization of physical situations.

Types of System

- **Open or Closed Systems:** An **open** system has many interfaces with its environment. It permits interaction across its boundaries; it receives inputs from and delivers outputs to the outside. A **closed** system is isolated from environment influences.

Types of System

- **Deterministic and Probabilistic:** A Deterministic system is one in which the occurrence of all events is perfectly predictable. If we get the description of the system state at a particular time, the next state can be easily predicted. Probabilistic system is one in which the occurrence of events cannot be perfectly predicted.

System Performance

- Efficiency

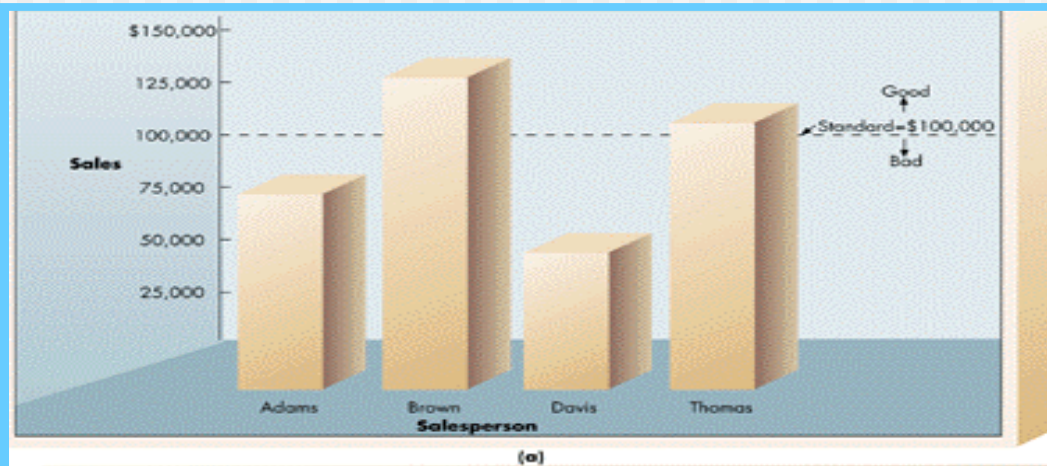
- A measure of what is produced divided by what is consumed.

- Effectiveness

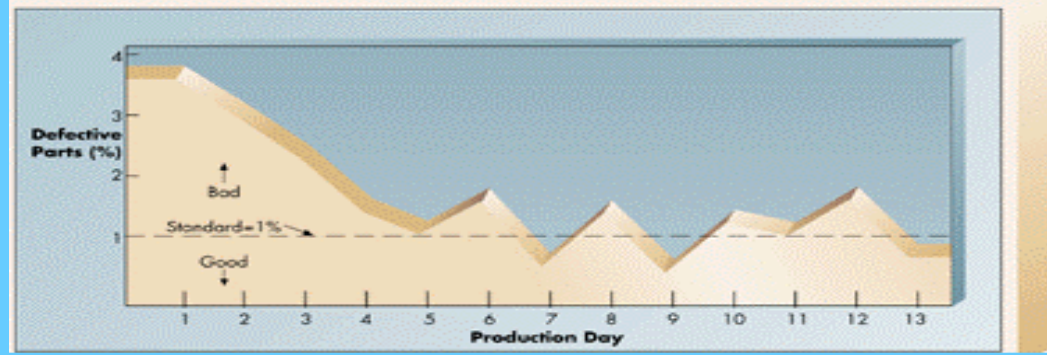
- A measure of what is achieved divided by the stated goal.

System Performance Standards

Sales



Defects



System Variables and Parameters

■ System Variable

- A quantity or item that can be controlled by the decision maker (controllable).
 - e.g. selling price

■ System Parameter

- A value or quantity that cannot be controlled by the decision maker.
 - e.g. raw material costs

So, What is an Information System?

Information: An organized, meaningful, and useful interpretation of data

System: Components that work together to achieve a goal by accepting input, processing it, and producing output in an organized manner

- Information System: Components that work together to process data and produce information (to help companies solve problems and make decisions).

The Components of a CBIS

- 1) Hardware
- 2) Software
 - Operating systems
 - Applications
- 3) Databases
- 4) Telecommunications/Networks
- 5) People
- 6) Procedures

Components of an IS

- In an organization, information systems consist of the following components. These components will formulate a system, which will help us to gather the required information for making decision in various levels of management.
- **Data** - Input that the system takes to produce information
- **Hardware** - Computer itself and its peripheral equipment: input, output, storage devices; includes data communication equipment
- **Software** - Sets of instructions that tell the computer how to input, process, output and store data

Components of an IS

- **Communication networks** - Hardware and software specializing in transmission and reception of electronic data.
- **People** - IS professionals who design, construct, operate and maintain IS. And end users who use the information system. People are the most important component in most computer based information systems.
- **Procedures** are the strategies, policies, methods and rules for using computer based information systems.

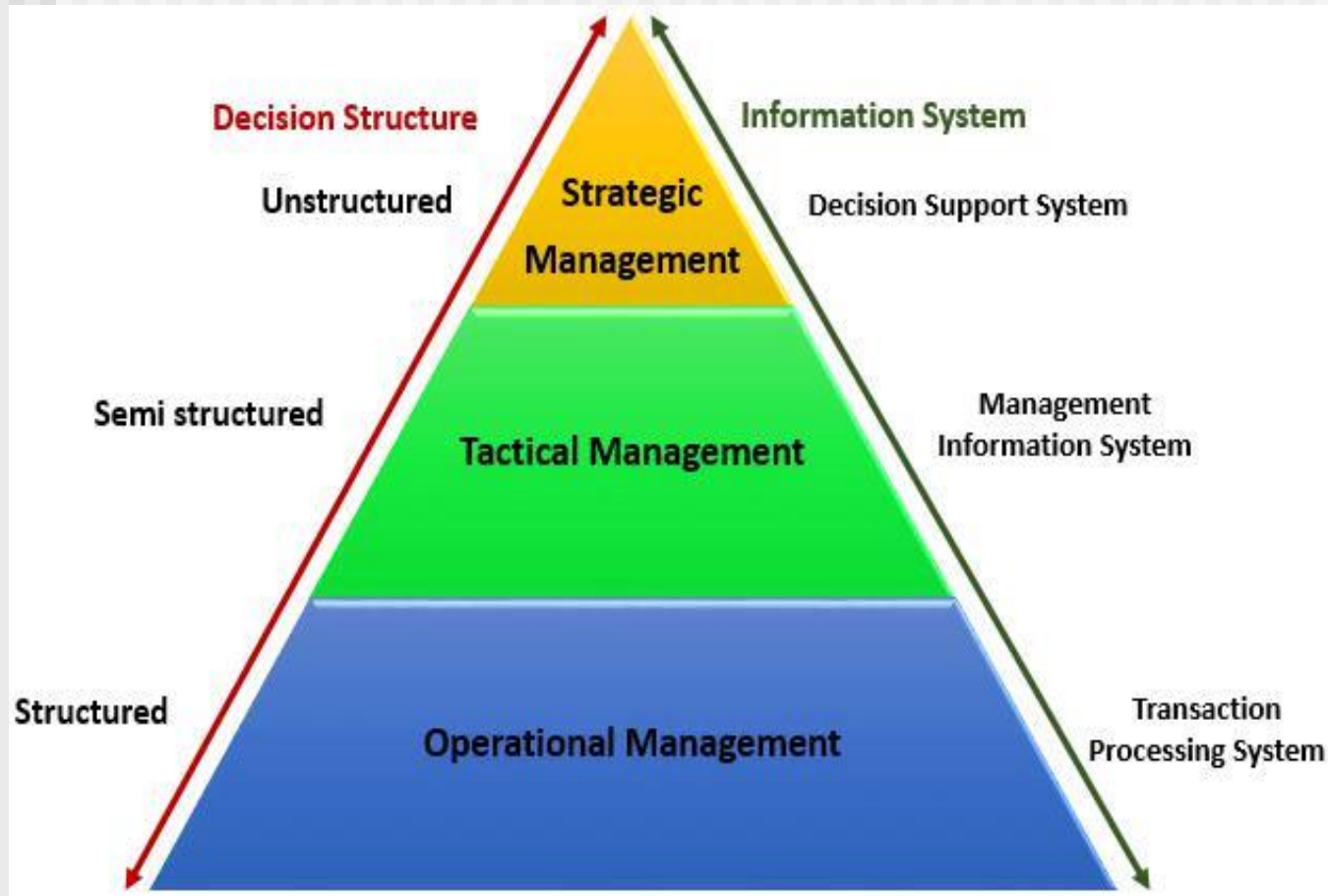
Types of Business Information Systems

- Transaction Processing
- E-Commerce
- Workflow
- Enterprise Resource Planning
- Management Information
- Decision Support
- Artificial Intelligence/Expert

Information system types

- A typical organization is divided into operational, middle, and upper level. The information requirements for users at each level differ. Towards that end, there are number of information systems that support each level in an organization.

Strategy Levels and IS Examples



Strategy Levels

Operational management level

- The operational level is concerned with performing day-to-day business transactions of the organization.
- Examples of users at this level of management include cashiers at a point of sale, bank tellers, nurses in a hospital, customer care staff, payroll system etc.
- Users at this level make structured decisions. This means that they have defined rules that guide them while making decisions.

Strategy Levels

Tactical Management Level

- Middle-level managers, heads of departments, supervisors, dominate this organization level. The users at this level usually oversee the activities of the users at the operational management level.
- Tactical users make semi-structured decisions. The decisions are partly based on set guidelines and judgmental calls.

Strategy Levels

Strategic Management Level

- This is the most senior level in an organization. The users at this level make unstructured decisions. Senior level managers are concerned with the long-term planning of the organization. They use information from tactical managers and external data to guide them when making unstructured decisions

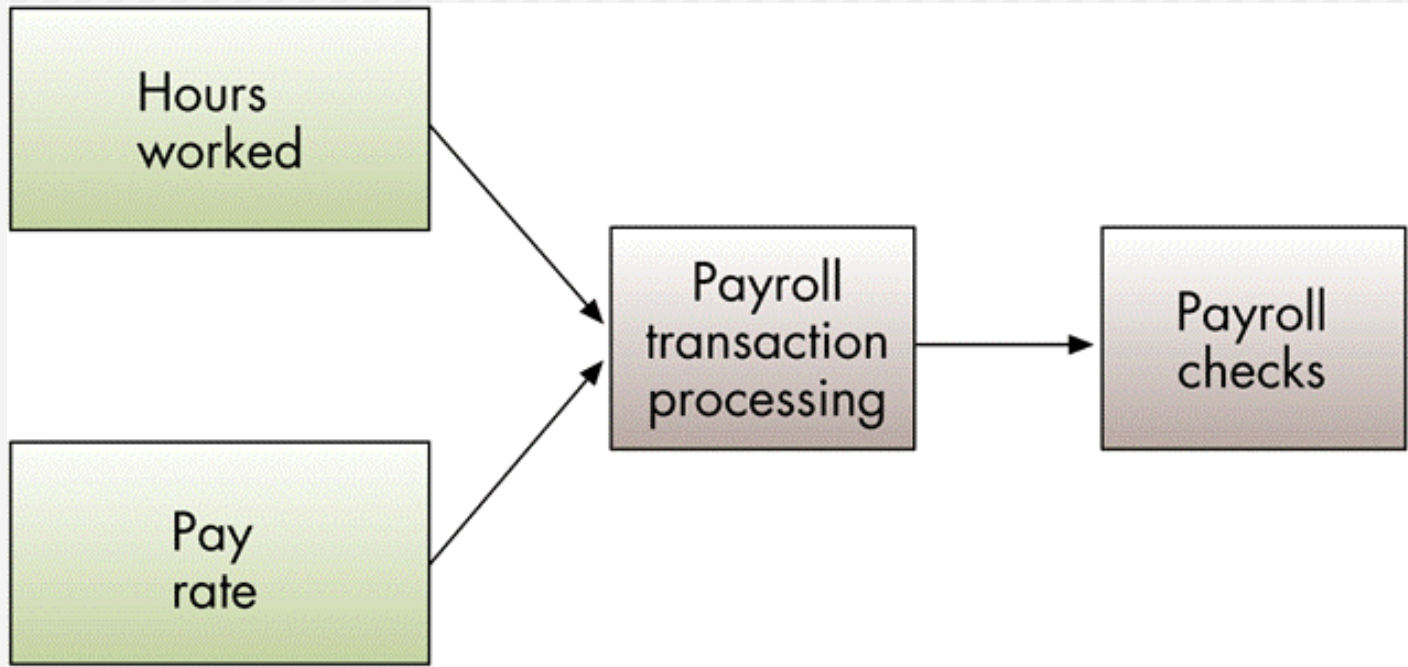
Transaction Processing

- Transaction
 - Any business related exchange
 - Tend to be routine, labor-intensive
 - “Interactions”

Transaction Processing

- Transaction processing system (TPS)
 - The application of information technology to routine, repetitive, and usually ordinary business transactions

Transaction Processing System



Information system types

Transaction Processing Systems (TPS)

- Transaction processing systems are used to record day-to-day business transactions of the organization. Users at the operational management level use them. The main objective of a transaction processing system is to answer routine questions such as;
- How printers were sold today?
- How much inventory do we have at hand?

Information system types

Transaction Processing Systems (TPS)

- The decisions made by operational managers are routine and highly structured.
- The information produced from the transaction processing system is very detailed.

Information system types

Transaction Processing Systems (TPS)

Examples of transaction processing systems include;

- **Point of Sale Systems** – records daily sales
- **Payroll systems** – processing employees' salary, loans management, etc.
- **Stock Control systems** – keeping track of inventory levels
- **Airline booking systems** – flights booking management

Information system types

Management Information Systems (MIS)

- The output from a transaction processing system is used as input to a management information system.
- The MIS system analyzes the input with routine algorithms i.e. aggregate, compare and summarizes the results to produced reports that tactical managers use to monitor, control, and predict future performance.

Enterprise Resource Planning (ERP)

- Integrated programs that can manage a company's entire set of business operations
- Often coordinate planning, inventory control, production and ordering

Management Information System (MIS)

- Management Information System
 - Used to provide routine information to help managers plan, control, and make decisions
- Characteristics
 - Focus on operational efficiency
 - Supports functional areas
 - Common database
 - Standard reports...

Management Information System

- Types of Reports
 - Scheduled
 - Demand
 - Exception

Information system types

Management Information Systems (MIS)

- For example, input from a point of sale system can be used to analyze trends of products that are performing well and those that are not performing well. This information can be used to make future inventory orders i.e. increasing orders for well-performing products and reduce the orders of products that are not performing well.

Information system types

Management Information Systems (MIS)

Examples of management information systems include;

- **Sales management systems** – they get input from the point of sale system
- **Budgeting systems** – gives an overview of how much money is spent within the organization for the short and long terms.
- **Human resource management system** – overall welfare of the employees, staff turnover, etc.

Information system types

Decision Support Systems (DSS)

- Decision support systems are used by senior management to make non-routine decisions. Decision support systems use input from internal systems (transaction processing systems and management information systems) and external systems.
- The main objective of decision support systems is to provide solutions to problems that are unique and change frequently.

Information system types

Decision Support Systems (DSS)

Decision support systems answer questions such as;

- What would be the impact of employees' performance if we double the production lot at the factory?
- What would happen to our sales if a new competitor entered the market

Decision Support Systems

- Decision Support Systems (DSS)
 - Used to support decision making (e.g. where to build, how much to order)
- Characteristics
 - Suggests and compares alternatives
 - Problem is complex
 - Information is voluminous

Information system types

Decision Support Systems (DSS)

Examples of decision support systems include;

- **Financial planning systems** – it enables managers to evaluate alternative ways of achieving goals. The objective is to find the optimal way of achieving the goal. A financial planning system will enable senior executives to ask what if questions and adjust the values for total sales, the cost of goods, etc. to see the effect of the decision and on the net profit and find the most optimal way.
- **Bank loan management systems** – it is used to verify the credit of the loan applicant and predict the likelihood of the loan being recovered.

Information system types

Artificial intelligence techniques in business

- Artificial intelligence systems mimic human expertise to identify patterns in large data sets.
- Companies such as Amazon, Facebook, and Google, etc. use artificial intelligence techniques to identify data that is most relevant to you.

Information system types

Artificial intelligence techniques in business

- Facebook usually makes very accurate predictions of people that you might know or went with to school. They use the data that you provide to them, the data that your friends provide and based on this information make predictions of people that you might know.
- Amazon uses artificial intelligence techniques too to suggest products that you should buy also based on what you are currently getting.
- Google also uses artificial intelligence to give you the most relevant search results based on your interactions with Google and your location.

E-Commerce

- E-Commerce

- Any business transaction executed electronically between parties involving the exchange of goods and/or services
 - B2B, B2C

- Workflow

- Rule-based

E-Commerce

- Lowering Barriers to Entry
 - Traditionally
 - Sales force
 - Advertising & promotion
 - Factories, warehouses, retail stores
 - Competing electronically
 - Increases the threat of new companies

Artificial Intelligence

- Artificial Intelligence (AI)
 - A field that involves computer systems taking on the characteristics of human intelligence
 - Robotics
 - Natural language processing
 - Learning systems
 - Neural networks (patterns & trends)

Expert Systems

- Expert Systems (ES)
 - Give the computer the ability to make suggestions and act like an expert in a particular field
 - Medical diagnoses
 - Repair problems
 - Credit evaluations
 - Investment strategies

Systems Development

- Systems Development
 - The activity of creating or modifying existing business systems.
- Objectives
 - Make the process manageable
 - Achieve predictable costs and timing

Systems Development Steps

- 1) Systems Investigation
 - Gain a clear understanding of the problem to be solved or opportunity to be addressed.
- 2) Systems Analysis
 - Define the problems and opportunities of the existing system.
- 3) Systems Design
 - Determine how the new system will work to meet the business needs defined during systems analysis.

Systems Development Steps

4) Systems Implementation

- Create or acquire the various system components defined in the design step, assemble them, and put the new system into operation.

5) System Maintenance and Review

- Check and modify the system so that it continues to meet changing business needs.