

System Analysis Design

Chapter 1 Data, Information and System



Learning Goals

- Distinction between Data and Information
- Description of types of Information: Tactical, Operational, Strategic, Statutory.
- Division of Management into different hierarchical levels.
- Type of Information needed at different levels of management.
- Division of organizations into several functional areas and their information requirements
- Attributes of Information.



Data and Information

Data: Raw material

- Data collection costs money
- □ Collect only necessary and sufficient data
- Data is generally used by machines
- Data is useless unless it is processed to create INFORMATION

Information: Processed data

- Data processed by machines giving information
- □ Information is used to run an organization efficiently
- Information used by managers to initiate actions



Example of Information Needed by a Shopkeeper

What are the information needed for daily operations?

- Daily sales account
- List of low stock items to be re-ordered
- List of overstock items
- Long overdue payments
- Profit and loss account

#Information used to streamline day to day operations are Operational information

What are the information needed to enhance his profit?

- Slow or fast moving items
- Reliable supplier of items
- Sales trends

#Information used to improve profitability of shop are Tactical information



Example of Information Needed by a Shopkeeper

- What are the information needed to expand the business?
 - Whether to stock different varieties of items
 - Whether to diversify
 - Whether to start a new branch in a different locality
 - Whether to start an e-shop

#Information to expand business and explore new opportunities are known as <u>Strategic Information</u>

- What are the information related to tax/government?
 - Income tax account
 - Sales tax account

#Used to provide information to the government known as Statutory Information



Types of Information

- STRATEGIC : Needed for long range planning and directions. This is less structured.
- TACTICAL : Needed to take short range decisions to improve profitability and performance.
- OPERATIONAL : Needed for day to day operations of the organization.
 - Eg: Daily Sales, Billing.
- STATUTORY : Needed by law to sent to government authorities.
 - Eg: Sales tax return.



Management Hierarchy and Information Needs





Need for Information Systems

- Increasing size of organizations thus data volume increases
- Timely processing for fast action
- Better competitiveness with better information
- Increasing of complexity of organizations require innovative processing
- Distributed organizations
- Same data can be processed in different ways



Management Structure

Chief Executive (Strategical)





Qualities of Information

<u>Quality</u>	How to ensure quality
Accurate	Ensure correct input and processing rules.
Complete	Include all data.
Timely	Give at right time
Trustworthy	Do not hide unpleasant information.
Relevant	Understand user needs.
Brief	Summarize relevant information.
Up-to-date	Include all data up to present time.
Significance	Use attractive format & graphical charts.



System's Concept and Definition

Term system is derived from the Greek word 'Systema' which means an organized relationship among functioning units or components.

A system is an orderly grouping of interdependent components linked together according to a plan to achieve a specific objective.



Characteristics of a System

Organization
Interaction
Interdependence
Integration
Central Objective



Continued...

Organization

It implies structure and order.

Interaction

It refers to manner in which each component functions with other components of the system.

Interdependence

Units/parts are dependent on each other.

Integration

The parts of a system work together within the system even though each part performs a unique function.

Central Objective

 Objective may be real or stated. All the components work together to achieve that particular objective.



Elements of a System

Outputs and Inputs Processor Control **Feedback** Environment Boundaries and Interface



Continued...

- **Inputs and Outputs** Inputs are the elements that enter the system for processing and output is the result of processing.
- **Processor-** It is the element that involves the actual transformation of input into output
- **Control** The control element guides the system.
- **Feedback** Output is compared against performance standards.
- **Environment** It is the supra system within which an organization operates.
- **Boundaries and Interface-** A system should be defined by its limits.



Types of System

Physical or Abstract System

Physical – These are tangible entities that may be static or dynamic in operation. For example- parts of a computer center are the desks, chairs etc. that facilitate operation of the computer. They are static and a programmed computer is dynamic.

Abstract System – These are conceptual or non physical entities. For example- the abstract conceptualization of physical situations. A model is a representation of a real or planned system. A model is used to visualize relationships.



Deterministic or Probabilistic System

Deterministic System – It operates in a predictable manner and the interaction between parts is known with certainty. For example: Two molecules of hydrogen and one molecule of oxygen makes water.

Probabilistic System – It shows probable behavior. The exact output is not known. For example: weather forecasting, mail delivery.



Open and Closed Systems

Open System – It has many interfaces with its environment. It interacts across its boundaries, it receives inputs from and delivers outputs to the outside world. It must adapt to the changing demands of the user.

Closed System – It is isolated from the environmental influences. A completely closed system is rare.



<u>Characteristics of</u> <u>Open Systems</u>

Input from outside- Open systems are self adjusting and self regulating. When functioning properly open system reaches a steady state or equilibrium.

Entropy- Dynamic systems run down over time resulting in loss of energy or entropy. Open systems resist entropy by seeking new input or modifying the processes to return to a steady state.



Continued...

Process, output and cycles- Open system produce useful output and operate in cycles, following a continuous flow path.

Differentiation- They have a tendency toward an increasing specialization of functions and a greater differentiation of their components. For example the role of machines and people tend toward greater specialization and greater interaction.

Equifinality - Goals are achieved through differing courses of action and a variety of paths.



Formal and Informal Information Systems

- **Formal Information System** is based on the organization represented by organization chart.
- The chart is a map of positions and their authority relationships, indicated by boxes and connected by straight lines.
- **Informal Information System** is an employee based system designed to meet personnel and vocational needs and to help solve, work related problems.



- Computer Based Information System relies on computer for handling business applications.
- Basically three types
 - Business Data processing

 Deals with operational information
 Management information system
 - Deals with tactical information
 - Decision support system(DSS)
 Deals with strategic information



- Enter data to be processed
- Edit, check input data
- Control check to see if the data is
 - correct and reasonable
- Store clean data as an organized data base in a storage



Business Data Processing

- There are 2 methods of business data processing
 - On-line transaction processing(OLTP)
 - Batch processing
- **OLTP:** is used for query processing and rapid actions to requests.
 - Example: Finding balance in one's bank account Booking railway tickets
- Batch processing: used for periodic data processing of massive data
 - Example: Processing university exam results at the end of each semester Payroll computation each month



- Analyze outputs of routine data processing using statistical or operations research tools
 - Eg: -Observe periodic demands by statistical analysis
 & use for tactical decisions
 - Use operations research tools to decide product mix using demand and cost data to maximize profit



Decision Support System

- Unstructured and difficult to obtain precise information
- Use of analytical and simulation models
- Aids to conceptualize through graphs, animation etc.
- Use of archival data to infer trends and rules
 Some artificial intelligence tools may be used