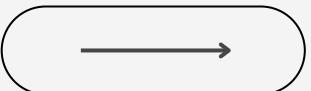


PRORTFOLIO # 2
A Comprehensive Study

DATE
08/31/2024



UNDERSTANDING DATA AND INFORMATION SYSTEMS



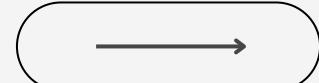
BS INFORMATION TECHNOLOGY
CIS 1102

PRESENTED BY
mizzi pomoy

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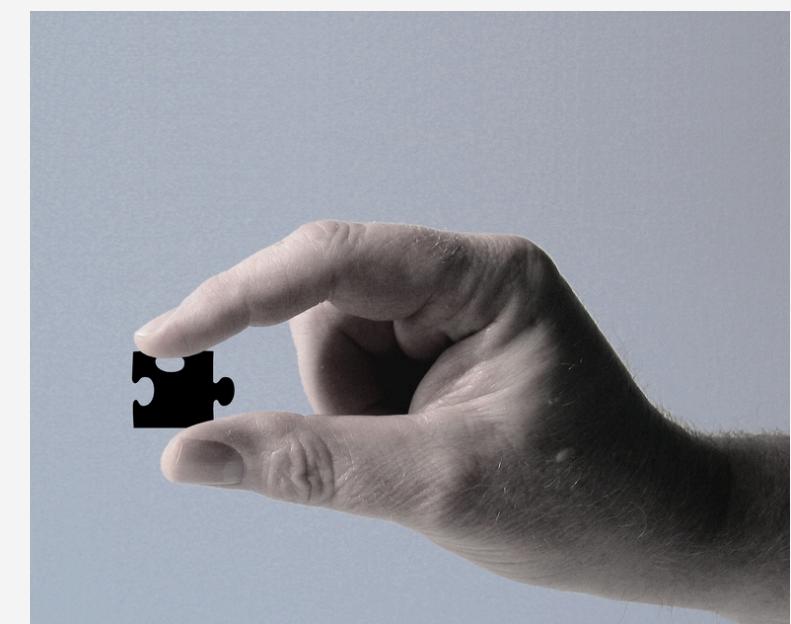
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OVERVIEW BETWEEN DATA AND INFORMATION



DATA

Data can be any character, text, word, number, and, if not put into context, means little or nothing to a human.



INFORMATION

Information is data formatted in a manner that allows it to be utilized by human beings in some significant way.



WHAT IS DATA?

It represents a fact or an event statement unrelated to other things. Data is generally used regarding hard facts. This can be a mathematical symbol or text used to identify, describe, or represent something like temperature or a person. The data simply exists and has no meaning beyond its existence (in itself). It can exist in any form, usable or not. The data exists in different formats, such as text, image, sound, or even video (Zemmouchi-Ghomari, 2022).

EXAMPLE:

- **Numbers:** 5, 42, 1001, 0.75
- **Text:** "John," "apple," "red," "January"
- **Dates:** "2024-08-25," "15:30"
- **Raw Measurements:** "Temperature: 30°C," "Weight: 75kg"
- **Unsorted Lists:** Names of students in a class, unsorted exam scores, raw sensor readings

THE SIGNIFICANCE OF DATA

Decision-Making

Data enables leaders to make informed strategic decisions using facts, projections, and predictive analytics. This data-driven decision making is vital for organizational growth and competing in the market (Chaudhary, 2023).

Science and Research

Data is at the core of scientific research and discovery. Researchers rely on data analysis to test hypotheses, derive insights, validate concepts, and make new findings. Data helps accelerate the pace of innovation (Chaudhary, 2023).

Technology and Innovation

The tech industry relies on data to improve products/services, enhance user experiences, and develop data-driven business models. Startups leverage data analytics to build disruptive solutions. (Chaudhary, 2023)

Social Good

Data helps governments, non-profits, and international agencies track progress on social issues, allocate resources, and design targeted interventions to uplift communities (Chaudhary, 2023).

Legal Research

In law, data aids in examining prior cases, understanding crime trends, conducting forensic analysis, projecting future litigation patterns, and regulating new technologies (Chaudhary, 2023).



HOW DOES DATA PROCESSING WORK?

The process involves transforming raw data into organized, relevant, and insightful information. This process typically includes data collection, extraction, cleaning, analysis, and presentation. By applying various techniques and tools, such as statistical analysis, visualization, and data modeling, businesses can extract valuable patterns, trends, and correlations from data sets, leading to actionable insights (Srivastava, 2024).





WHAT IS INFORMATION?

It is data combined with meaning. Information embodies the understanding of a relationship as the relationship between cause and effect (Watson, 2007). In other words, information is data that has meaning through relational connection. According to Ackoff, information is useful data; it provides answers to the questions: "who," "what," "where," and "when" (1989).

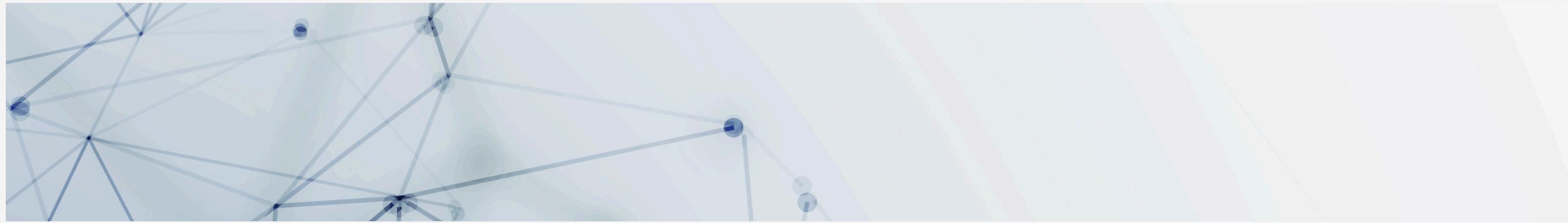
EXAMPLE:

- **Sales Report:** "The total sales for August 2024 are \$50,000," derived from daily sales data.
- **Student Grade:** "John's average grade for the semester is 85%," calculated from individual test scores.
- **Weather Summary:** "The average temperature in August was 29°C," based on daily temperature readings.

The Significance of Information in Business

It is a powerful tool that drives business strategy and profitability. By enhancing decision-making, optimizing operations, personalizing customer experiences, and driving innovation, data analytics empowers businesses to achieve their goals and stay competitive in a rapidly evolving market (Ltd, 2024).





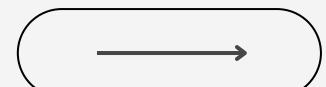
Data vs Information

Data

- Set of random and unorganized values, quantities, and figures that do not carry any meaning
- Low-level of knowledge
- Not dependent on information
- All data may not be useful
- It is input of information
- Does not provide any meaning
- It is vague in nature

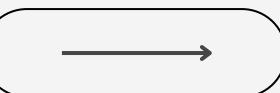
Information

- Processed and organized form of quantities, values or figures that carry a meaning
- Second level of knowledge
- It is dependent on data
- All information is useful
- It is an output of data
- Provides logical meaning
- It is specific in nature

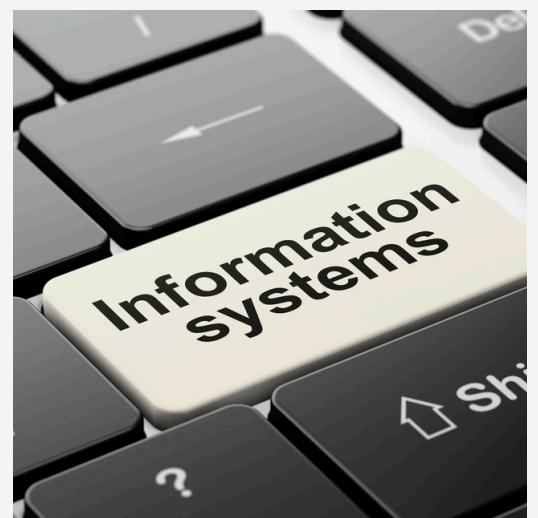


An information system (IS) is a set of interrelated components that collect, manipulate, store and disseminate information and provide a feedback mechanism to achieve a goal. The feedback mechanism helps organizations achieve their goals by increasing profits, improving customer service (Stair & Reynolds, 2008), and supporting decision-making and control in organizations (Laudon & Laudon, 2012).

WHAT IS AN INFORMATION SYSTEM?



What are the key components of an Information System?



- Hardware
- Software
- People
- Communication Systems
- Data and Information
- Procedures and Processes
- Security and Privacy



THE KEY COMPONENTS OF IS



Hardware: These are the physical devices that make up the Information System. Think of computers, servers, storage devices, and network equipment. They provide the necessary computing power and storage capacity.

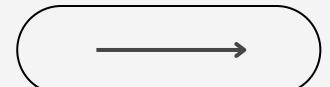
Software: Software programs are like the brains of the Information System. They control how data is processed, organized, and presented. This includes operating systems, database management systems, and various applications tailored to specific tasks.

People: Human users and administrators are an integral part of the Information System. They input data, oversee its processing, and utilize the system to obtain information.

Communication Systems: These are the means by which different parts of the Information System, as well as external users, connect and share data. This can include networks, internet connectivity, and even physical communication lines like telephone and other networking systems.

THE KEY COMPONENTS OF IS

(cont'd)

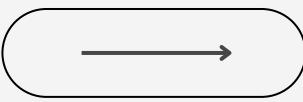


Data and Information: The core of the Information System is data. Data can be raw facts, figures, or records. The Information System processes this data, transforming it into meaningful information that can be used for decision-making.

Procedures and Processes: Information Systems are guided by predefined procedures and processes that determine how data is collected, processed, stored, and accessed. These procedures ensure consistency and reliability in information handling.

Security and Privacy: Information Systems must incorporate measures to safeguard data and information from unauthorized access, breaches, or data loss. Security and privacy are critical considerations.

1.1 & 1.2 : **Information Systems: Concept, Definition, Characteristics, Types and Components.** MLIS-1-1: **Information System and Programmes** (n.d).



IMPORTANT FUNCTIONS OF INFORMATION SYSTEMS

Input	Process	Output	Storage	Feedback
Information Systems receive data from various sources, which can be in the form of text, numbers, images, or any other format.	A process is a function which transforms data into information (Sean, 2015). Processing can include sorting, searching or performing calculations on the data.	The visual, auditory, or tactile perceptions provided by the computer after processing the provided information	Where data is held and still in the system. It may be the data that has been input, required during processing or results of processing.	A feedback/control loop is what happens to output when it is processed and produced (Sean, 2015).

CHARACTERISTICS OF INFORMATION TECHNOLOGY

The goal of an information system is to transform data into information in order to generate knowledge that can be used for decision making. In order for information to add value to a business and the decision maker it must possess characteristics to ensure quality. The following characteristics are necessary to add value (Bourgeois, 2019).

Accessible

Must be easily accessible by users to meet their needs in the right format at the right time. Access should be secure and prevent unauthorized access (Bourgeois, 2019).

Consistent

Contains no discrepancies, and the same measurements or structure are used regardless of the data source (Bourgeois, 2019).

Accurate

Free of errors and bias, and can be verified or validated (Bourgeois, 2019).

Cost

Balance the value of information to the cost of producing it (Bourgeois, 2019).

Complete

Contains all information and is not missing anything (Bourgeois, 2019).

Timely

Delivered when needed (Bourgeois, 2019).

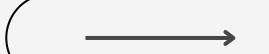
Relevant

Important to decision makers (Bourgeois, 2019).

Clear

Not overly complex, easy to understand (Bourgeois, 2019).

Why are Information Systems essential for running and managing a business nowadays?



Operational Excellence (OpEx)

It is an approach to business management that emphasizes continuous improvement and employee empowerment which aims to create a culture for business investment and identify and solve problems (Ahmed, 2023).

Improved Decision- Making

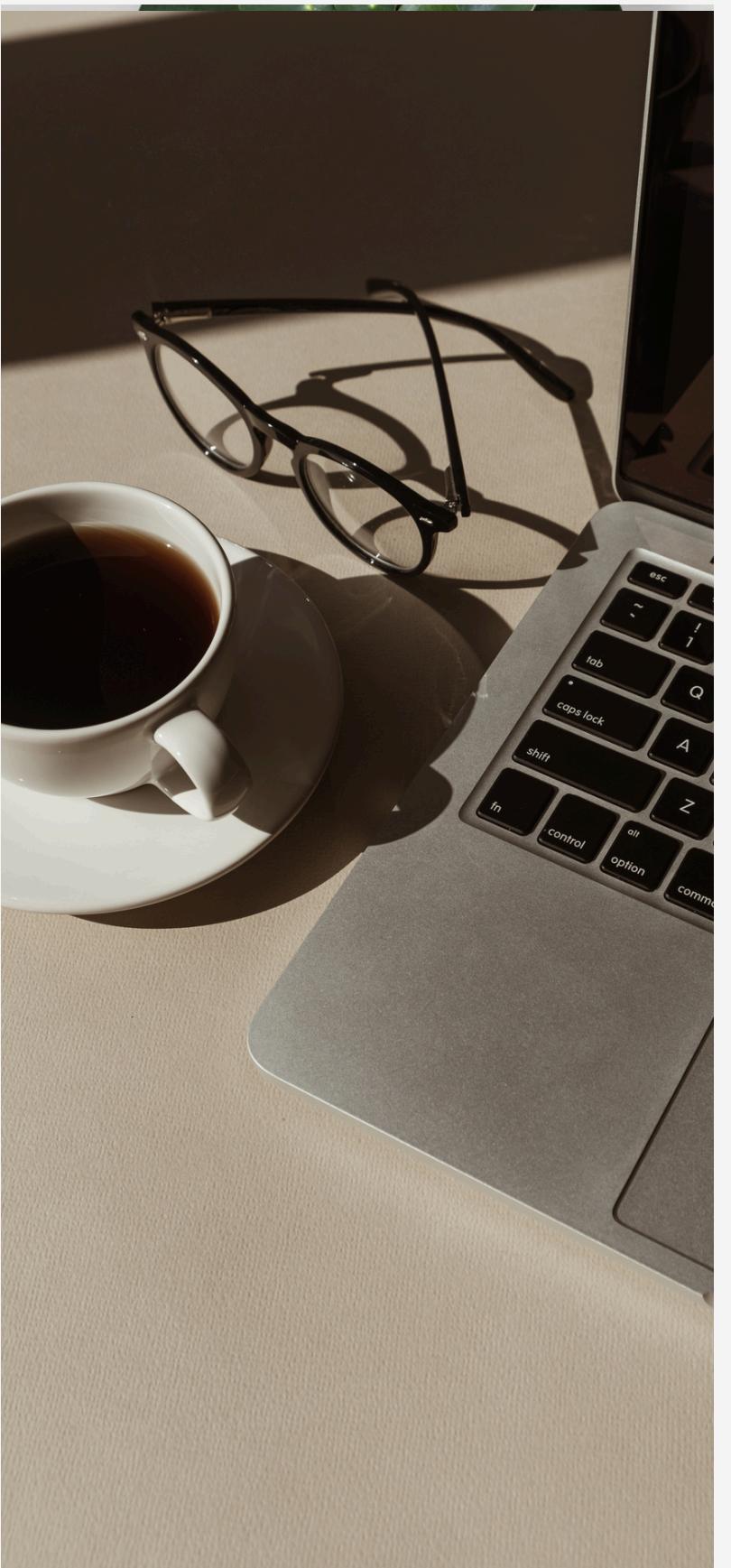
It enables businesses to identify trends and patterns in real-time data, analyze information more efficiently and accurately compared to manual methods (Ahmed, 2023).

New Products, Services & Business Models

Innovation is key to their development. It's vital for business success, enabling competitiveness and relevance in a dynamic market (Ahmed, 2023).

Survival

It is the ability of a business to continue operating despite changes in the business environment. This is achieved by investing in information systems that help businesses adapt to changes in the environment and remain competitive (Ahmed, 2023).



Different Types of Information Systems





Overview



01

Transaction Processing System are information system that processes data resulting from the occurrences of business transactions (Types Of Information System, 2022).

02

Management Information System is designed to take relatively raw data available through a Transaction Processing System and convert them into a summarized and aggregated form for the manager, usually in a report format (Types of Information System, 2022).

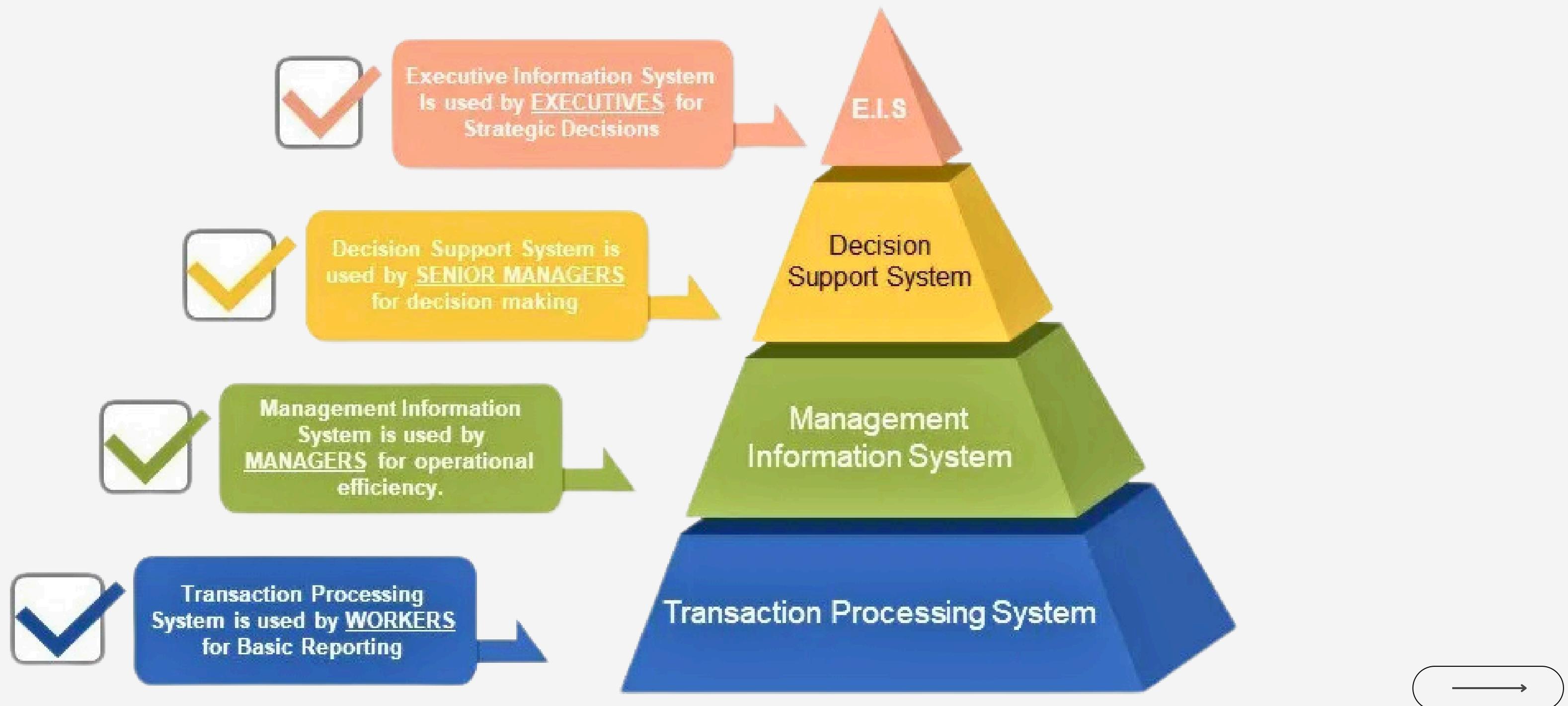
03

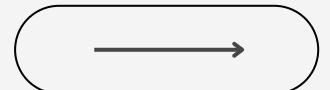
The **Decision Support System** is a management-level, interactive, computer-based information system that helps managers make decisions (Simplilearn, 2024).

04

An **Executive Information System** is a management support system that facilitates and supports the decision-making requirements of an organization's senior executives (Rouse, 2022).

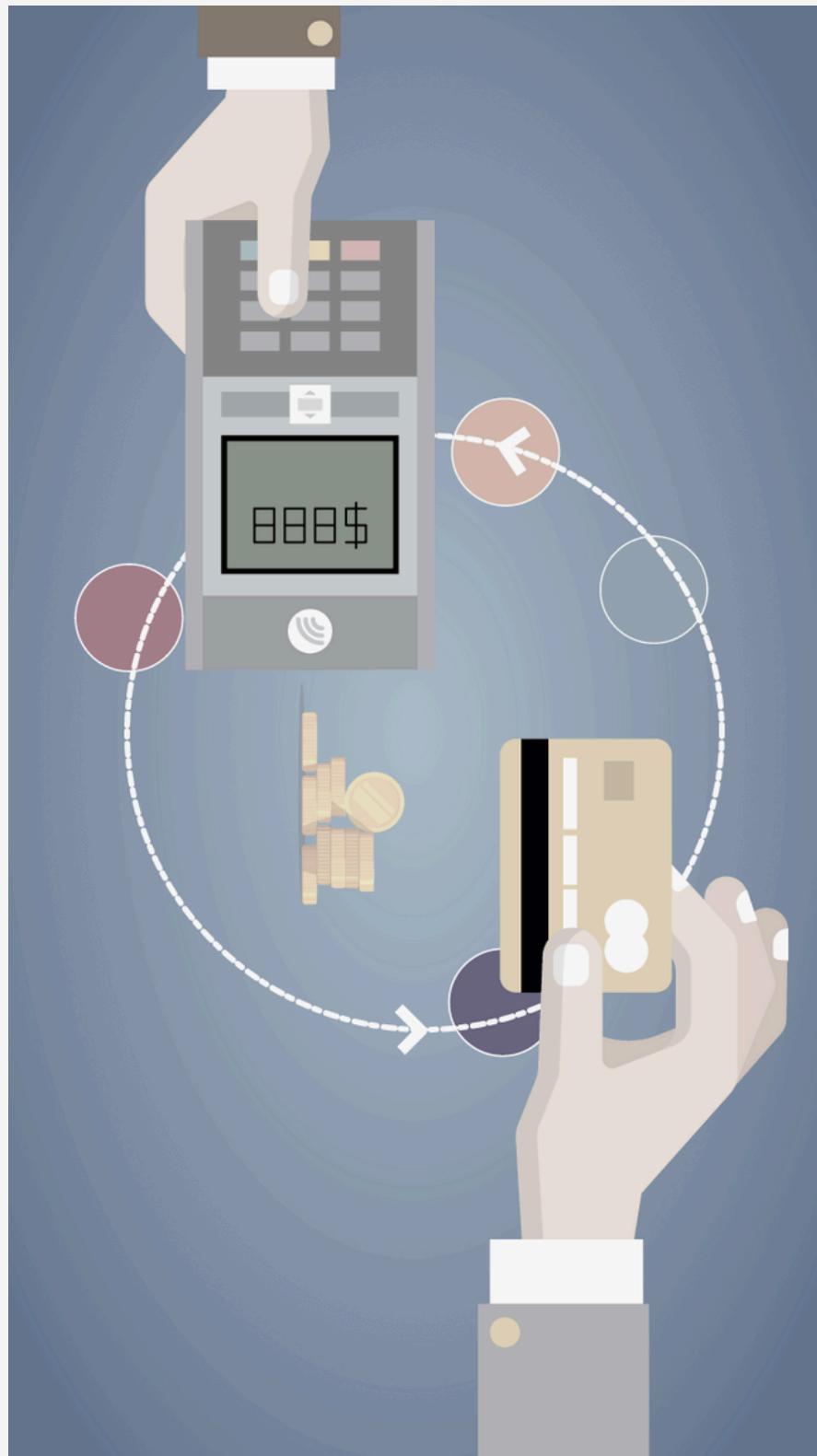
Hierarchical Organization of IS





What is Transaction Processing System?

A **Transaction Processing System (TPS)** is a type of data management information-processing software used during a business transaction to manage the collection and retrieval of both customer and business data (Scheider & Smalley, 2024).



FUNCTIONS OF A TRANSACTION PROCESSING SYSTEM

Functions of a TPS in terms of data processing requirements		
Inputs	Processing	Outputs
Transactions Events	Validation Sorting Listing Merging Updating Calculation	Lists Detail reports Action reports Summary reports?

EXAMPLES

- Payroll systems
- Order processing systems
- Reservation systems
- Stock control systems
- Systems for payments and funds transfers

WHAT ARE ITS ROLES?

- Produce information for other systems
- Cross boundaries (internal and external)
- Used by operational personnel + supervisory levels
- Efficiency oriented





COMPONENTS OF THE TRANSACTION PROCESSING SYSTEM

Input

This is the starting point of any transaction. It refers to the data or instructions that enter the TPS, typically initiated by a user or an external system. Inputs can take various forms, including customer orders, payment information, and inventory updates (Malyshev, 2024).

Processing

Once the TPS receives the input, the processing unit takes over. This component interprets the data, validates its accuracy, and performs the necessary actions based on the type of transaction (Malyshev, 2024).

Output

After processing the input, the TPS generates an output, which is the result of the transaction such as displaying a confirmation message on a screen, printing receipts or invoices, updating customer accounts or databases, and sending email notifications (Malyshev, 2024).

Database

This is the heart of a TPS, storing all the crucial data related to business transactions. The database can include information on customers, products, employees, financial transactions (Malyshev, 2024).

TYPES OF TRANSACTION PROCESSING SYSTEMS

Real-Time Processing TPS

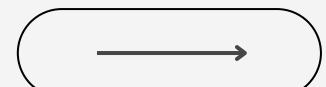
Process transitions as they occur. They enable to provide almost immediate updates and responses, with processing delays attributable to the system's technical capability only. When a customer purchases something online they receive confirmation and a receipt almost immediately. (Tomych, 2024).

- Online banking transactions
- Stock exchanges
- Reservation systems

Batch Processing TPS

Data for business transactions is grouped in batches of a predefined size, and processed periodically. By correlating batch size with the desirable periods of processing or by defining particular periods of processing, admins can regulate how batches are processed (Tomych, 2024).

- Report generation
- Payroll processing
- Sending out invoices



WHAT ARE THE TPS CHARACTERISTICS?

Speed & Efficiency

Designed to handle high volumes of transactions swiftly and efficiently (Dayal, 2024).

Accuracy & Reliability

These systems are built to ensure that transactions are processed accurately, with minimal errors or discrepancies (Dayal, 2024).

Concurrency & Parallel

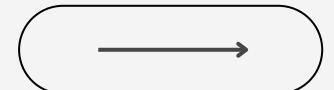
Allows multiple transactions to be processed simultaneously, ensuring that transactions can be executed concurrently without interfering with one another (Dayal, 2024).

ACID Properties

Atomicity ensures that transactions are treated as indivisible units. Consistency ensures that transactions leave the system in a consistent state. Isolation ensures that transactions are executed independently. Durability ensures transactions are permanently stored in the system (Dayal, 2024).

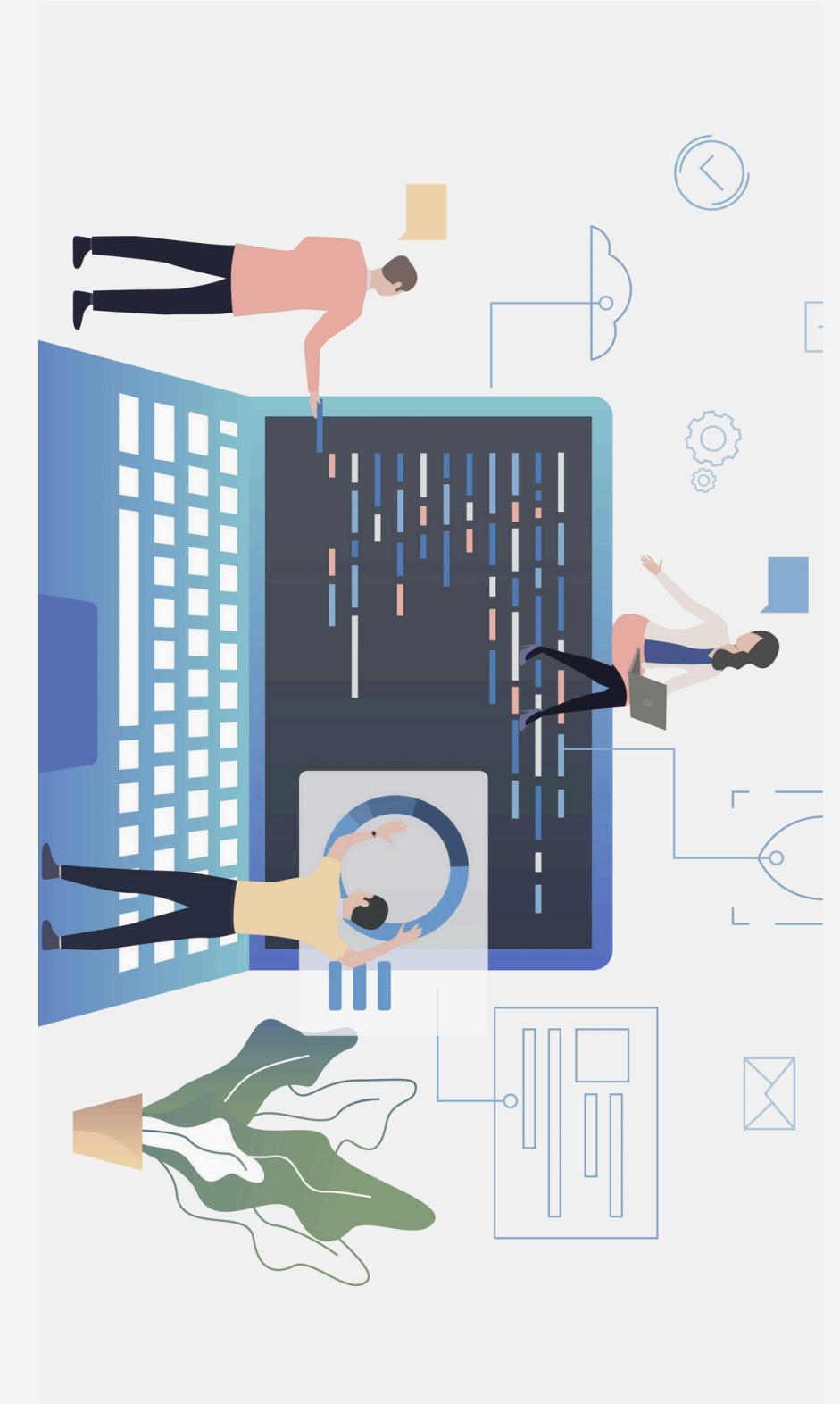
Transaction Logging & Recovery

Maintain transaction logs to record all changes made to the system. (Dayal, 2024).



What is Management Information System?

Management information systems (MIS) are integrated computer-based networks and applications that collect, store, and analyze data to help business leaders and managers make informed decisions (Shopify Staff, 2023).



FUNCTIONS OF A MANAGEMENT INFORMATION SYSTEM

Functions of a MIS in terms of data processing requirements		
Inputs	Processing	Outputs
Internal Transactions Internal Files Structured data	Sorting Merging Summarizing	Summary reports Action reports Detailed reports

EXAMPLES

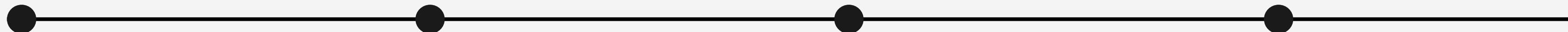
- Sales management systems
- Inventory control systems
- Budgeting systems
- Management Reporting Systems (MRS)
- Personnel (HRM) systems

WHAT ARE ITS ROLES?

- Based on internal information flows
- Support relatively structured decisions
- Inflexible and have little analytical capacity
- Used by lower and middle managerial levels
- Deals with the past and present rather than the future
- Efficiency oriented



THE EVOLUTION OF MANAGEMENT INFORMATION SYSTEM



Mid-1960s to mid-1970s:

Information systems were centralized during the early years of computerized MIS and were only focused on management and governance requirements. Accounting departments were in charge of most information systems and their reports.

Mid-1970s to mid-1980s:

Even though MIS was still primarily focused on management and oversight, additional departments were starting to take advantage of the technology. The form and scope of additional Information Systems steering groups and user-led initiatives often established projects.

Mid-1980s to late 1990s:

This period saw the growth of centralized information systems and the decentralization of information. Every division has its computer network. Information management was frequently referred to as "herding cats."

The late 1990s to today:

IS are still closely related to governance and management in the modern period, but they are extensively dispersed and accessible to almost every employee across several platforms. So that a client firm can easily access supplier information and their consumers, in turn, may access that information, many information systems are integrated amongst various companies.

THE 12 TYPES OF MANAGEMENT INFORMATION SYSTEMS

1.) Process Control

Gather data to create reports based on the performance of systems and processes.

2.) Management Reporting Systems

Generate reports for the company's operations.

3.) Inventory Control

Allow tracking of the current inventory state within a department or the company.

4.) Decision Support Systems

Gather information from internal and external resources and help team management make efficient business decisions.

5.) Expert Systems

Use Artificial Intelligence to simulate the judgment and behaviour of a person or organization with expertise and experience in a specific field.



THE 12 TYPES OF MANAGEMENT INFORMATION SYSTEMS

(cont'd)

6.) Executive Information Systems

Report company data to top management directly in an easy-to-read format.

7.) Transaction Systems

Automate business processes and collect data on a company's daily transactional activities.

8.) Accounting and Finance Systems

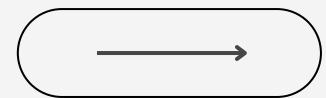
Track a company's assets and investments and processes financial and accounting-related operations.

9.) Sales and Marketing Systems

Facilitate tracking of a company's sales and marketing efficiency.

10.) HR Systems

Allows control of organizational information circulating within the company and oversees tasks like recruitment and daily administration, ensuring all employees comply with company standards.



THE 12 TYPES OF MANAGEMENT INFORMATION SYSTEMS

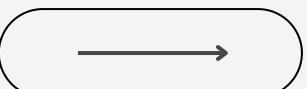
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11.) School Information Management Systems

Help educational institutions manage daily activities like attendance, payroll, and employee schedules.

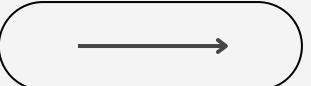
12.) Local Databases

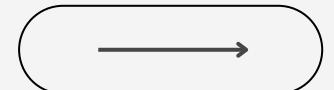
Offer information about the residents of a given locality.



The Characteristics of Management Information Systems

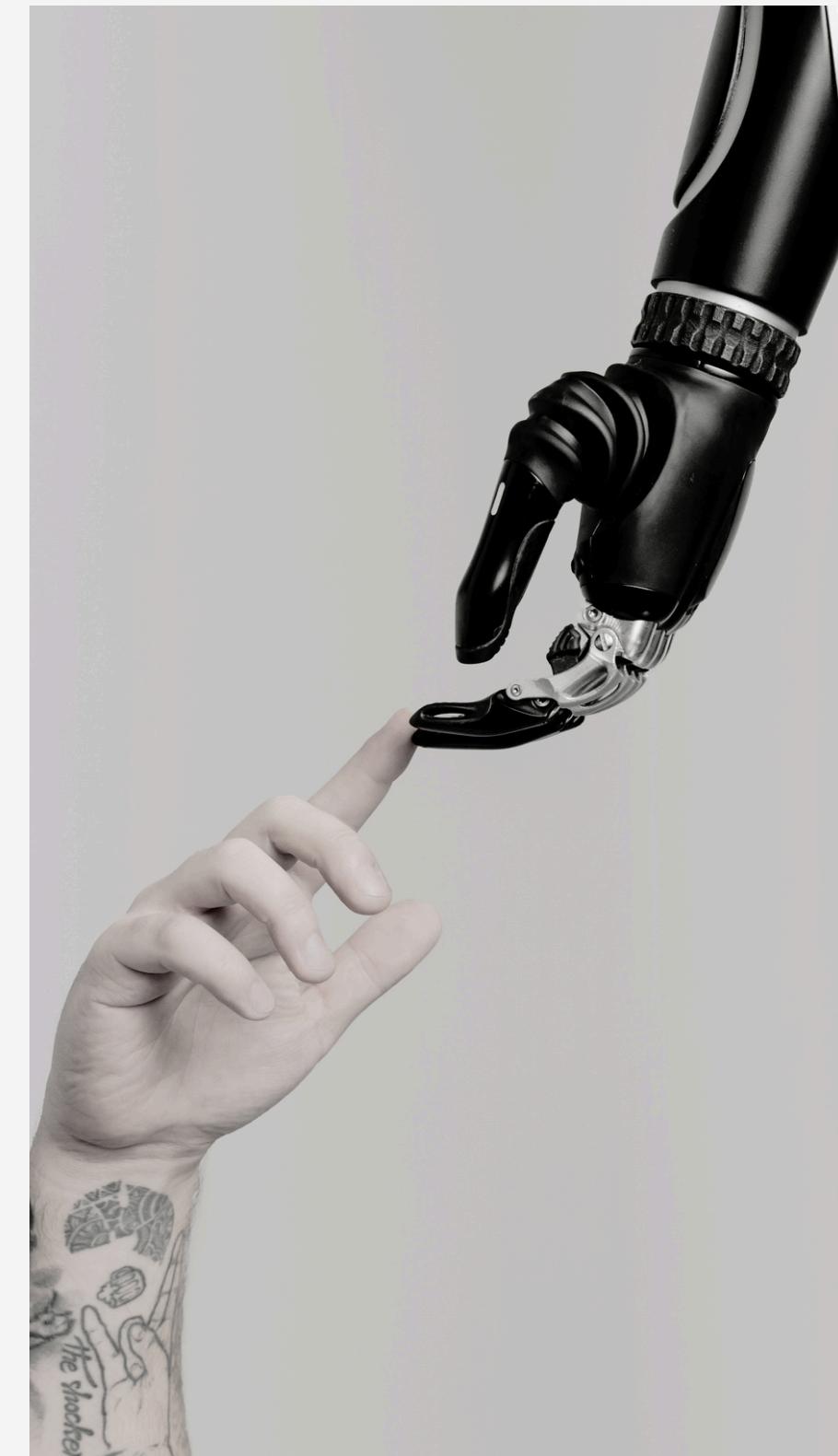
- Use a variety of internal data sources.
- Provide reports on the routine operations of an organization.
- Allow users to develop custom reports, such as detailed reports.
- Provide a variety of different reports, both scheduled and on demand.
- Must be accurate and avoid including estimates or probable expenses.
- Provide reports in various formats, including hard copies and electronic copies.
- The information must be relevant for making a strategic decision.





What is Decision Support System?

A **Decision Support System (DSS)** is a computer program application used to improve a company's decision-making capabilities. It analyzes large amounts of data and presents an organization with the best possible options available (Segal, 2024).



FUNCTIONS OF A DECISION SUPPORT SYSTEM

Functions of a DSS in terms of data processing requirements		
Inputs	Processing	Outputs
Internal Transactions Internal Files External Information?	Modelling Simulation Analysis Summarizing	Summary reports Forecasts Graphs / Plots

EXAMPLES

- Group Decision Support Systems (GDSS)
- Computer Supported Co-operative work (CSCW)
- Logistics systems
- Financial Planning systems
- Spreadsheet Models

WHAT ARE ITS ROLES?

- Supports ill- structured or semi-structured decisions
- Has analytical and/or modelling capacity
- Used by more senior managerial levels
- Concerned with predicting the future
- Effectiveness-oriented



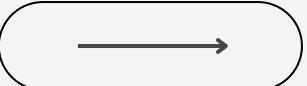
THE 12 TYPES OF DECISION SUPPORT SYSTEMS

1.) Communication-driven DSS

Targetted at internal teams, including partners. Its purpose are to help conduct a meeting, or for users to collaborate. The most common technology used to deploy the DSS is a web or client server. Examples: chats and instant messaging softwares, online collaboration and net-meeting systems (Power, n.d.).

2.) Data-driven DSS

Targeted at managers, staff and also product/service suppliers. It is used to query a database or data warehouse to seek specific answers for specific purposes. It is deployed via a main frame system, client/server link, or via the web (Power, n.d.).



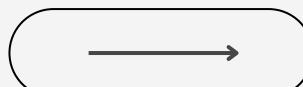
THE 12 TYPES OF DECISION SUPPORT SYSTEMS (cont'd)

3.) Document-driven DSS

More common, targeted at a broad base of user groups. The purpose of such a DSS is to search web pages and find documents on a specific set of keywords or search terms. The usual technology used to set up such DSSs are via the web or a client/server system (Power, n.d.).

4.) Knowledge-driven DSS

A catch-all category covering a broad range of systems covering users within the organization setting it up, but may also include others interacting with the organization. It is essentially used to provide management advice or to choose products/services. The typical deployment technology used to set up such systems could be client/server systems, the web, or software running on stand-alone PCs (Power, n.d.).

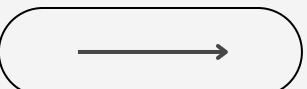


THE 12 TYPES OF DECISION SUPPORT SYSTEMS

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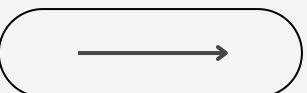
5.) Model-driven DSS

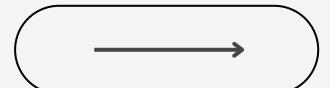
Complex systems that help analyse decisions or choose between different options. These are used by managers and staff members of a business, or people who interact with the organization, for a number of purposes depending on how the model is set up - scheduling, decision analyses etc. These DSSs can be deployed via software/hardware in stand-alone PCs, client/server systems, or the web (Power, n.d.).



The primary purpose of using a DSS is to present information to the customer in an easy-to-understand way. A DSS system is beneficial because it can be programmed to generate many types of reports, all based on user specifications. For example, the DSS can generate information and output its information graphically, as in a bar chart that represents projected revenue or as a written report (Segal, 2024).

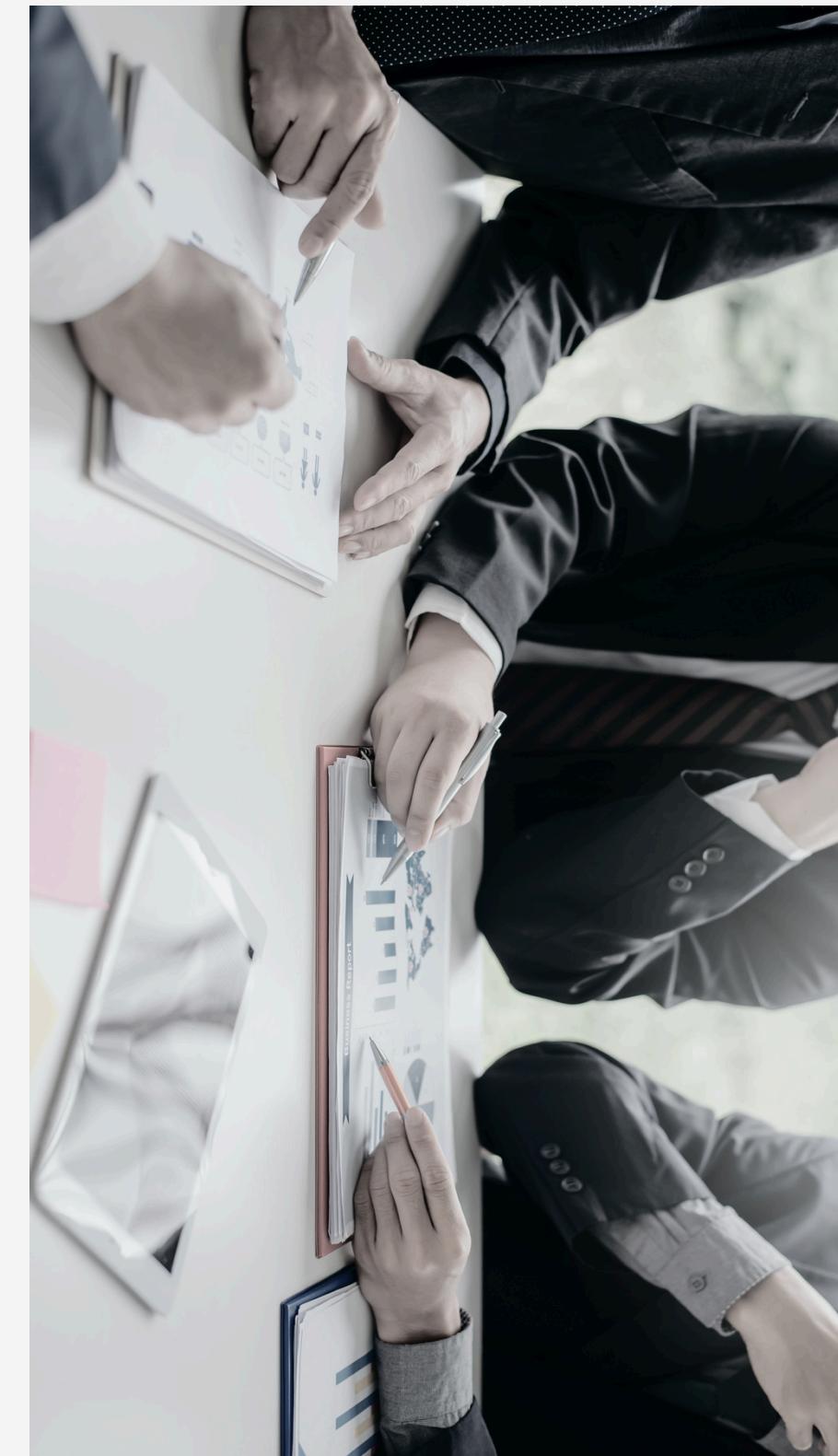
The Characteristics of Decision Support Systems





What is Executive Information System?

An **Executive Information System** is a strategic-level information system that is found at the top of the Pyramid. It helps executives and senior managers analyze the environment in which the organization operates, to identify long-term trends, and to plan appropriate courses of action.



FUNCTIONS OF A EXECUTIVE INFORMATION SYSTEM

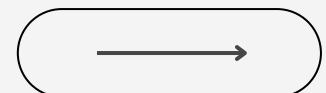
Functions of a EIS in terms of data processing requirements		
Inputs	Processing	Outputs
External Data Internal Files Pre-defined models	Summarizing Simulation "Drilling Down"	Summary reports Forecasts Graphs / Plots

EXAMPLES

- Executive Information System tends to be highly individualized and is often custom-made for a particular client group.
- However, a number of off-the-shelf EIS packages do exist and many enterprise level systems offer a customizable EIS module.

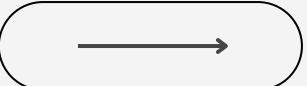
WHAT ARE ITS ROLES?

- Concerned with ease of use
- Concerned with predicting the future
- Effectiveness-oriented
- Highly flexible
- Supports unstructured decisions
- Uses internal and external data sources
- Used only at the most senior management levels



Not all company executives are tech-savvy. As such, an ideal EIS should have a graphical display that has an easy-to-use interface. Executives should be able to see all the variables and trends needed to make sound business decisions in a single dashboard. That way, they can make comparisons and projections to ensure growth (TECHSLANG, 2022).

The Characteristics of Executive Information Systems



AN ANALYSIS TO INFORMATION SYSTEMS

Understanding the distinction between data and information is foundational in computer science and information technology. Data refers to raw, unprocessed facts that have no specific meaning on their own. These can be numbers, texts, images, or any other form of representation. For example, the number "5" or the word "apple" are pieces of data, but they don't tell us much unless we put them into context. Conversely, information is processed data that carries meaning and can be used to make decisions.

When we say "John has 5 apples," we are providing information because it now makes sense and can be acted upon.

The transformation of data into information is crucial because it allows businesses, researchers, and everyday people to make informed decisions. In a business setting, for instance, raw sales data (numbers) can be processed into sales reports that show trends over time, which then helps managers to strategize for the future.

AN ANALYSIS TO INFORMATION SYSTEMS (cont'd)

Without this transformation, the raw data would be overwhelming and not very useful. This process is fundamental in all sectors, from healthcare to finance, where the correct interpretation of data into actionable information can mean the difference between success and failure.

Information Systems (IS) are the backbone of modern organizations, integrating technology with business processes to meet specific needs.

At its core, an IS is a combination of hardware, software, data, procedures, and people that work together to produce, store, and manage information. These systems are essential in helping businesses manage their operations, make decisions, and achieve strategic goals.

The effectiveness of an Information System depends on how well these components interact.

AN ANALYSIS TO INFORMATION SYSTEMS (cont'd)

The hardware must be reliable, the software must be user-friendly, the data must be accurate and timely, and the people using the system must be trained and competent. Moreover, the procedures and security measures in place must ensure that the system functions smoothly and securely. In today's world, where data breaches and cyber threats are common, the security aspect of IS is more important than ever. Organizations must ensure that their IS are not only functional but also secure and compliant with regulations.

Support systems in Information Systems are specialized tools that help in decision-making and problem-solving within an organization. These systems are designed to support different levels of management and operations. For instance, a Transaction Processing System (TPS) handles day-to-day transactions like sales, payments, and orders. It ensures that transactions are processed accurately and efficiently, which is critical for operational success.

AN ANALYSIS TO INFORMATION SYSTEMS (cont'd)

On the other hand, a Management Information System (MIS) processes data from the TPS and other sources to produce reports that help managers monitor and control their operations. It provides summarized information that is useful for tactical decision-making. Then there's the Decision Support System (DSS), which is more analytical and helps in making complex decisions by analyzing large datasets and presenting potential outcomes.

Finally, the Executive Information System (EIS) provides top executives with easy access to both internal and external information relevant to strategic goals, often through dashboards and real-time data.

Each of these systems plays a vital role in the overall IS framework, ensuring that organizations can operate efficiently, make informed decisions, and remain competitive in their respective industries.

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