

## Portfolio#2

### Data and Information, Information Systems, and Different Types of Support Systems in Information Systems

Name: Jemuel S. Valencia

ID No#: 11600135

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Instructor: Miss Marie Liza Navarrate

- **Data and Information**

It is common to think that data and information are the same, but they are distinct concepts. **Data** refers to raw, unprocessed facts or symbols. These can be discrete or continuous values, organized in structures such as tables, which provide context and meaning. Data may include statistics, quantities, or sequences of symbols that may later be interpreted formally (OECD, 2008). For example, a single number or a string of binary symbols constitutes data, which by itself lacks inherent meaning until it is analyzed (Statistical terms and concepts, 2019).

**Information**, however, is what data becomes after it is processed or interpreted. It represents the meaningful context derived from data, which reduces uncertainty and provides understanding. For instance, while a raw data set might include financial figures, the interpretation that reveals an overdrawn bank account conveys information (Anderson & Johnnesson, 1996). Information can also be abstract, extending beyond digital symbols to include analog signals, texts, images, and more (Anderson & Johnnesson, 1996). Thus, information is the result of interpreting data, making it meaningful and useful.

According to Tuomi (1999), data is often seen as the least abstract concept, with information being the next level of abstraction. This view suggests that data becomes information through interpretation, and information can further evolve into knowledge. For example, knowing the height of Mount Everest (data) might be supplemented by a book detailing its geological characteristics (information), which could then inform a guidebook on climbing it (knowledge) (Tuomi, 1999). Beynon-Davies (2002) emphasizes this distinction by noting that while data consists of symbols or signs, information arises when these symbols are understood in context.

In summary, **data is raw and unprocessed**, while **information is the interpretation of data** that provides meaning and context. This distinction highlights how data serves as the foundation for generating information, which can then contribute to knowledge (Yockey, 2005).

- **Information Systems**

**Information systems (IS)** are organizational tools designed to collect, process, store, and distribute data, enabling the transformation of data into meaningful information that aids in decision-making. These systems consist of components such as hardware, software, data, procedures, and people,

all working together to support business and organizational functions (Piccoli & Pigni, 2018). IS are essential for managing digital products and processing data to facilitate more informed decisions (O'Hara, Watson, & Cavan, 1999).

IS also function as communication systems where data acts as a form of social memory, assisting human decision-making and organizational actions. These systems support various business operations by integrating technology and people to optimize processes (Beynon-Davies, 2009). Moreover, information systems are a field of academic study, focusing on how hardware and software networks are utilized by individuals and organizations to manage and distribute data (CityU of Seattle, 2020).

For an IS to function effectively, it relies on six core components: hardware, software, data, procedures, people, and the internet (Kroenke, 2015).

1. **Hardware** refers to physical machinery like computers and input/output devices.
2. **Software** comprises the programs and manuals that guide the system's operations.
3. **Data**, which serves as the raw material of IS, is processed and stored by these systems, transforming it into meaningful information that supports organizational decisions.
4. **Procedures** outline the policies governing the system's use.
5. **People**—the often-overlooked component—operate and maintain the system.
6. The **internet** enables broader connectivity, enhancing the system's capacity to gather and share information globally.

Information systems are not merely tools for managing data but are integral to decision-making and strategic planning within organizations. By integrating people, processes, and technology, IS help ensure that data is not just collected and stored but transformed into valuable information that guides actions at all levels of the organization.

### • Different Types of Support Systems in Information Systems

IS are often viewed through a hierarchical lens, from **transaction processing systems (TPS)** at the bottom, which manage routine business transactions, to **management information systems (MIS)** that support decision-making processes by providing critical data analysis and reports. Further up, **decision support systems (DSS)** offer tools for handling unstructured and semi-structured decision problems, assisting managers in making informed choices amidst changing business conditions (Keen, 1980). At the top of the pyramid, **executive information systems (EIS)** provide high-level summaries and analyses that support senior executives in strategic decision-making (Laudon & Laudon, 1988; Power, 2002).

1. **Transaction Processing Systems (TPS)**: At the base of the hierarchy, TPS is responsible for handling the routine, day-to-day operations of an organization. These systems manage data associated with business transactions, such as sales, payments, and reservations. TPS ensures data accuracy, availability, and security, providing the foundational data that other systems rely on. One of the earliest TPS examples is the Sabre system, designed by IBM for American Airlines in the 1960s, which processed thousands of transactions daily (Scheider & Smalley, 2024).

2. **Management Information Systems (MIS):** Above TPS, MIS focuses on providing managers with the information needed for decision-making, coordination, and control in an organization. MIS collects data from TPS and processes it into reports that help monitor performance and aid in strategic planning. Its primary function is to streamline processes, enhance decision-making, and help businesses achieve their goals (Bourgeois, 2014). MIS integrates people, processes, and technology, contributing to improved managerial oversight and organizational efficiency (Saunders College of Business, 2017).
3. **Decision Support Systems (DSS):** DSS is geared toward helping management make complex decisions that are often unstructured or semi-structured. Unlike MIS, which focuses on operational control, DSS supports mid- to high-level management with tools to analyze data, identify trends, and simulate outcomes. DSS can be fully computerized or a mix of human input and technology, and it allows for greater flexibility and problem-solving in dynamic environments (Keen, 1980). This system is crucial for organizations facing rapidly changing scenarios that require adaptive decision-making.
4. **Executive Information Systems (EIS):** At the top of the hierarchy, EIS, also known as executive support systems (ESS), is designed for senior executives to assist in strategic decision-making. These systems provide easy access to both internal and external data relevant to the organization's goals, offering summary reports and analysis tools to support high-level decisions. EIS helps executives track performance, spot trends, and plan long-term strategies by offering a clear, aggregated view of the organization's operations (Power, 2002).

## **Analysis/Reaction**

As a computer science student myself, I've come to appreciate the distinction between data and information. Data is simply raw material, a collection of facts and figures. It's the building block of information, but it's only when we interpret and contextualize this data that it becomes meaningful. For instance, in my research projects I had back in senior high school, I often worked with large datasets taken from conducting surveys or studies. My goal is not just to process this data, but to extract insights that can be used to solve problems or make informed decisions.

The concept of information systems is equally important. As I delve deeper into the discipline of computer science, I will be constantly interacting with various systems—from simple scripts to complex software architectures. Understanding the components of these systems—hardware, software, data, and procedures—helps me appreciate the intricacies of how they work together. For example, when creating a program, I need to consider how the hardware, software, data, and procedures interact to produce the desired output.

Moreover, the hierarchical structure of support systems within information systems offers a valuable framework for understanding how data can be used to support decision-making at different levels of an organization. From transaction processing systems at the bottom to executive information systems at the top, each system plays a vital role in providing the information needed for effective management. As a computer science student, I can apply this knowledge to design systems that cater to specific needs and contribute to the overall success of an organization.

In conclusion, the concepts of data, information, and information systems are essential to my understanding of computer science. By recognizing the distinction between raw data and processed information, and by learning to design and implement effective information systems, I can play a role in transforming data into actionable insights. This knowledge will not only benefit me in my academic pursuits but also prepare me for a successful career in the field of computer science.

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