Introduction: Systems: An overview, Information and data: Definition and distinctions, features and qualities of information, types of information, process of generating information, value and cost of information, information as a corporate resource, information needs at various levels of management, and factors influencing information needs.

1. Introduction: Systems: An overview

What is system?

A system comprises interacting parts cooperating to accomplish a single objective or a group of related goals. These elements can be biological, physical, or abstract, but they are all linked by some contact or relationship that enables them to work together harmoniously.

Characteristics of System

For the analysis, design, and optimization of complex systems, it's critical to comprehend the features of a system. We shall review some of a system's important characteristics in this article.

Interconnected Components- A system comprises linked parts cooperating to complete a task. These elements might be tangible, living things, or intangible concepts. They engage in some relationship or engagement with one another that enables them to cooperate & work together in a planned way.

Structure- A system's structure describes how its components are arranged and related. The structure can be hierarchical or flat, depending on the system's complexity. Graphs of a system's structure can be shown using tools like flowcharts, block diagrams, and network diagrams.

Input/Output- A system converts inputs from its surrounding environment into outputs. The resources or data a system needs to function are inputs, while the outcomes or products of a system's operations are known as outputs. A system may have chemical, physical, biological, or abstract inputs and outputs.

Process- A system carries out procedures that convert inputs into outputs. The system's actions or duties to accomplish its objectives are known as processes. Depending on the system's nature, its procedures might be straightforward or intricate.

Boundary- A boundary determines the bounds of a system and isolates it from its surroundings. A system's border might be conceptual, physical, or both. The inputs & outputs that a system is capable of producing and receiving are determined by its boundaries.

Environment- A system interacts with the physical resources, other systems, and social and cultural variables that make up its environment. The performance and behavior of a system can be impacted by its environment. Tools like simulation or optimization may be used to study and simulate a system's environment.

Feedback- A system may contain feedback mechanisms that let it modify its behavior in response to the outcomes of its operations. Feedback systems can either encourage or rectify the system's behavior which determines whether they are positive or negative.

Complexity- When a system contains several interconnected parts and processes, it is said to be complicated. A system's performance and behavior can be impacted by its complexity. To study, create, and optimize complex systems, advanced tools, and procedures may be needed.

2. Information and data: Definition and distinctions

What is Data?

Data is a raw and unorganized fact that is required to be processed to make it meaningful. It can be considered as facts and statistics collected together for reference or analysis.

Data are individual units of information. In analytical processes, data are represented by variables. Data is always interpreted, by a human or machine, to derive meaning. So, data is meaningless. Data contains numbers, statements, and characters in a raw form.

Types of Data

There are two types of Data:

1. **Quantitative:** Quantitative data refers to numerical information like weight, height, etc.

2. **Qualitative:** Qualitative data refers to non-numeric information like opinions, perceptions, etc.

What is Information?

Information is defined as structured, organized, and processed data, presented within a context that makes it relevant and useful to the person who needs it. Data suggests that raw facts and figures regarding individuals, places, or the other issue, that is expressed within the type of numbers, letters or symbols.

Information is the knowledge that is remodelled and classified into an intelligible type, which may be utilized in the method of deciding. In short, once knowledge ends up being purposeful when conversing, it's referred to as info. It's one thing that informs, in essence, it provides a solution to a specific question. It may be obtained from numerous sources like newspapers, the internet, television, people, books, etc.

Features and qualities of information

Information is a vital resource for the success of any organization. Future of an organization lies in using and disseminating information wisely. Good quality information placed in right context in right time tells us about opportunities and problems well in advance.

Good quality information Quality is a value that would vary according to the users and uses of the information.

According to Wang and Strong, following are the dimensions or elements of Information Quality −

Intrinsic − Accuracy, Objectivity, Believability, Reputation

Contextual − Relevancy, Value-Added, Timeliness, Completeness, Amount of information
Representational − Interpretability, Format, Coherence, Compatibility
Accessibility − Accessibility, Access security

Various authors propose various lists of metrics for assessing the quality of information. Let us generate a list of the most essential characteristic features for information quality −

Reliability − It should be verifiable and dependable.
Timely − It must be current and it must reach the users well in time, so that important decisions can be made in time.
Relevant − It should be current and valid information and it should reduce uncertainties.
Accurate − It should be free of errors and mistakes, true, and not deceptive.
Sufficient − It should be adequate in quantity, so that decisions can be made on its basis.
Unambiguous − It should be expressed in clear terms. In other words, in should be comprehensive.
Complete − It should meet all the needs in the current context.
Unbiased − It should be impartial, free from any bias. In other words, it should have integrity.
Explicit − It should not need any further explanation.
Comparable − It should be of uniform collection, analysis, content, and format.
Reproducible − It could be used by documented methods on the same data set to achieve a consistent result.

3. Types of information

Information has its varieties. David B. Hertz and Albert B. Rubenstein (2014) have identified six types of information. These are as follows:
- Conceptual information.
- Empirical information.
- Procedural information.
- Stimulatory information.
- Stimulatory information.
- Policy information.
- Directive information.

1. Conceptual information: Conceptual information refers to information that relates to abstract or theoretical ideas, concepts, or principles. It is often used in academic or philosophical contexts to discuss broader ideas or concepts unrelated to specific examples or instances. Examples of conceptual information may include theories of psychology, philosophical concepts such as justice or morality, or mathematical concepts such as calculus or probability theory. Conceptual information is often used to build a framework or foundation for understanding more specific or concrete information. It can also be used to explain complex ideas or to make connections between seemingly unrelated topics.

2. Empirical Information: Empirical information is derived from observation, experimentation, or direct experience. It is based on data that can be measured or verified through objective and systematic methods. Empirical information is often used in scientific research, collected through experiments, surveys, or other forms of data collection. Examples of empirical information may include the results of a clinical trial, data on the effects of climate change, or observations of animal behavior. Empirical information is valued because it is based

on objective evidence and can be replicated and verified by others. It is often used to inform decision-making and to support or refute theories or hypotheses.

3. Procedural Information: Procedural information refers to information that provides instructions, directions, or steps on how to perform a task or complete a process. It is often presented as a manual, guide, or standard operating procedure (SOP). Procedural information is commonly used in manufacturing, healthcare, and transportation industries, where precise and consistent procedures are critical to ensuring safety, quality, and efficiency. Examples of procedural information may include instructions on operating a piece of machinery, guidelines for administering medication, or a step-by-step guide for performing a medical procedure. Procedural information is designed to be clear, concise, and easy to follow, and it may include visual aids such as diagrams or illustrations to help clarify the steps involved.

4. Stimulatory Information: Stimulatory information refers to information intended to provoke or stimulate a reaction or response from the audience. This type of information is often used in advertising, marketing, or public relations campaigns, where the goal is to capture the audience's attention and encourage them to take action. Stimulatory information may be designed to evoke a particular emotion, such as excitement, fear, or curiosity, or it may be intended to challenge or inspire the audience to think differently. Examples of stimulatory information may include provocative advertisements, political campaigns that use emotionally charged slogans, or motivational speeches that inspire people to take action. Stimulatory information can influence behavior, but it can also be controversial or divisive, depending on the context and the message being communicated.

- e.g. Victory Day celebration.

5. Policy Information: Policy information refers to information that pertains to government policies, laws, regulations, and guidelines that affect individuals, organizations, and society as a whole. It includes information about policy objectives, processes, outcomes, policy implementation, and evaluation data. Policy information is often used to inform decision-making and monitor policies' effectiveness over time. Examples of policy information may include reports on the impact of environmental regulations, data on the effectiveness of public health interventions, or analyses of the economic effects of tax policies. Policy information is essential for ensuring transparency and accountability in government decision-making and facilitating public participation and input into policy development processes. It is often disseminated through official government websites, public records, and media outlets.

6. Descriptive information: Descriptive information refers to information that describes a particular object, person, event, or situation in detail. It may include appearance, size, shape, color, texture, or behavior. Descriptive information is often used to create a mental image or picture of something or to provide a complete understanding of a particular topic or concept. Examples of descriptive information may include product descriptions in e-commerce, eyewitness accounts of a crime or accident, or detailed reports of historical events or cultural phenomena. Descriptive information facilitates communication and understanding between individuals and groups and provides context and background information in various fields such as literature, art, and science.

4. Process of Information Generation

All the while, information is being generated in the world, nay in the universe. The bursting of a supernova in a particular constellation, discovery of a planetary system around a star like the Sun, spotting of a river on the Mars, inundation of areas by a swelling river, eruption of a volcano, invention of a machine, successful testing of a drug, conquering of a deadly disease, birth of a child, and millions of other events are generating information every moment. You may be interested to know whether the generation of information follows any well-defined rule or it generates at random without any regard to any rule. If you just take a newspaper and try to find out how the news have generated you will notice that they have generated following certain modes. The Hindustan Times of 21 July 2004 contained the following headlines in its first page: i) HIV vaccine could come from AIIMS; ii) 'Soften Hurriat with foreign trips' iii) It's almost clear, monsoon's a failure, iv) NCERT's recipe for confusion. On going through the news it will be clear that the first news has resulted due to experimentation, the second news due to deliberation, the third news due to observation, and the fourth news again due to deliberation. In many cases, generation of information involves more than one mode. For example, Newton saw the falling of an apple from a tree. This observation immediately switched his thought process on which ultimately resulted in his propounding the theory of gravitation. In this case, the combination of observation and thought process gave rise to information. In the next section we intend to discuss various modes of the generation of information.

5.Modes of Information Generation

Information usually generates following such modes as Observation, Thought process, Deliberation or Imagination, Experimentation, Processing of data, Happening of various events, and so on. In certain cases like language, information generates following the path of evolution. Now, we shall discuss all these modes one by one.

(i)Observation

By the word 'observation' here we mean not only seeing with eyes, but also hearing, smelling, tasting and feeling with skin. We can get information about the sky whether it is sunny, cloudy or hazy by looking at it. Many a time, an ornithologist can identify a bird just by hearing its call. Often chemists can recognize a chemical substance, e.g. phenol, by smelling it. Our tongue gives us information about the taste of a substance. A simple touch by the hand is enough to know whether a substance is hot, cold or warm. Observation may be termed as the most potent mode of generation of information. Charles Darwin observed nature for years to gather information for establishing the theory of evolution. Astronomers all over the world gathered information by observing the celestial bodies for centuries initially with naked eyes and subsequently with telescopes. Similarly, microbiologists gathered information on all microbes observing them with microscopes. A police officer has to observe minutely every detail of the venue while investigating an accident, theft, etc. A scientist conducting an experiment has to observe very carefully the changes taking place in temperature, pressure, colour, etc. and faithfully record the changes. A doctor has to observe the condition of a patient at regular intervals to see whether his condition is improving or deteriorating. Thus, we find, in every walk of like observation is a prerequisite for the generation of information.

(ii)Thought Process, Deliberation and Imagination

Thought process is the mother of generation of information. Be it observation, experimentation or data collection, thought process is involved in every case to generate information. Man has

seen the solar and lunar eclipses for thousands of years and have tried to find out the underlying causes with his limited knowledge and generated information. The ancients observed that during eclipse the sun or the moon is gradually swallowed by something and again it comes out. Hence, the ancient Hindus reasoned that during an eclipse the sun or the moon is gradually gobbled by the beheaded Rahu. As it gobbles the celestial body through the mouth it comes out through the cutout throat. Considering the level of knowledge human beings possessed at that time, the reasoning was quite logical. After centuries of observation and reasoning, now we know the real cause of eclipse. The information we generate through our observation, experimentation, reasoning, etc may not always be absolutely true. In many cases, it is subject to correction at a later date. In Arthur Conan Doyle's novels we have seen both Dr. John Watson and Mr. Sherlock Holmes have visited together the site of the crime. It was always the superior thought process of Sherlock Holmes that was able to pinpoint the culprit. Be it a household, an office, an organisation or institution, the process of deliberation is encountered everywhere. While studying in class XII, many students are to appear in a number of entrance tests. When a student qualifies in more than one test, the student and the parents are to deliberate a lot to arrive at a decision as to the course the student is going to pursue. The moment the final decision is taken and is made known to others, information is generated Before declaring the dates of a general election, the Election Commission (EC) has to consider a number of factors like weather (usually rainy season is avoided), school and college examinations (because schools and colleges are used for setting up polling booths), availability of security personnel, dates suggested by various political parties, and so on. After deliberating on all the factors, when the EC announces its decision, information is generated. In a parliament or a legislative assembly, after a lot of debates, decisions are taken giving birth to plenty of information. An artist has to imagine about the art piece he is going to create, a chemical engineer has to visualise in his mind the chemical plant he is going to install, an architect is also to picture the building in the canvass of his mind. Once the art piece is complete, the blue prints of the chemical plant or the building are ready and handed over to the persons concerned, information is generated.

(iii).Experimentation

If we go through abstracting and indexing services devoted to physics, chemistry, biology, medicine, engineering, agriculture, and other scientific disciplines, we shall find that about two million articles are being included in these databases every year. Most of these articles are based on experimentation. Just from this, one can make out how much information is being generated per year through experimentation. It is however to be noted that experimentation is always attended with observation and thinking process. The results of experimentation usually appear in the form of research papers, short communications, patents and so on.

(iv)Processing of Data

Data processing occurs when data is collected and translated into usable information. Usually performed by a data scientist or team of data scientists, it is important for data processing to be done correctly as not to negatively affect the end product, or data output.

Data processing starts with data in its raw form and converts it into a more readable format (graphs, documents, etc.), giving it the form and context necessary to be interpreted by computers and utilized by employees throughout an organization.

(v)Events

The Concise Oxford Dictionary defines an event as 'a thing that happens or takes place [Pearsall, Judy (ed), 1999]. A scholar releasing a book, an artist inaugurating an exhibition, a philosopher explaining the concept of time, a saint giving a discourse on a religious matter, a political leader campaigning for vote, legislators debating in a parliament, a lawyer passing a judgement, the prime minister of a country taking oath of office, a war breaking out at a particular region of the world, a patient dying in a hospital due to neglect, a new train being flagged off by a minister, two buses colliding causing death and injuries to a number of passengers, a terrorist hijacking a plane, a comet appearing in the sky, a physicist bombarding an atom with alpha particles, a chemist conducting an experiment to create a new material, a geologist drilling a borehole to prospect petroleum deposit, a paleontologist spotting the skeleton of a dinosaur, a geneticist giving birth to a high-yielding variety of rice, an inventor filing a patent application, a surgeon performing an open heart surgery, a director shooting a new film, umpteen number of sports and games being held every day all over the world, adventurers venturing to conquer a mountain peak, etc. are all examples of events.

(vi)Evolution

Man started communicating by speech some 100,000 years ago [Odham's Colour Library of Knowledge: Language and Communication, 1968]. In those dizzy old days of human civilisation, the vocabulary of human beings of a particular race was only limited. They had only that many words which were required to express their ideas. As they invented newer and newer devices, encountered objects not known before, they started naming them for the purpose of easy identification. This led to the enrichment of vocabulary. When they moved from an old area to a new area they encountered numerous new things such as trees, animals, fruits, tubers, and so on. They also named them. In the course of their endless journey sometimes they encountered an alien race, which resulted either in fighting or friendship. For the exchange of ideas between two different races, need arose for interpretation. How and when the art of interpretation came into being is shrouded in mystery. However, this much is sure that the need for interpretation occasioned the need for linguistic information.

(vii)Dream

It is common with every human being to dream. Some of the dreams we remember, other we do not. The dream that we remember and convey about the same to others or record it in our diary, information is generated. Psychologists extract a lot of information about the subconscious mind of a patient through the interpretation of dreams. At times dreams provide the necessary information or clue for solving a problem. Kekule, an organic chemist, was trying to find out the structural formula of benzene for quite sometime, but failing again and again. One night, he dreamt that six snakes had created a ring by biting the tail of each other. This dream immediately gave him the information or clue that the structural formula of benzene would be ring-shaped.

6.Value and Cost of Information

Value and Cost of the Information

Information is a critical resource in today's data-driven world, playing a pivotal role in decision-making, strategy development, and operational efficiency. Understanding the value and cost of information is essential for individuals and organizations seeking to

harness its potential effectively. This exploration delves into the multifaceted nature of information, examining both its value and the associated costs.

The Value of Information

The value of information lies in its ability to inform, influence, and guide decision-making processes. It can be assessed in several dimensions:

(i)Decision-Making and Strategy

Information is a foundational element in decision-making. Access to accurate and timely information enables businesses and individuals to make informed choices, thereby reducing uncertainty and risk. For instance, market research information can help companies identify new opportunities, understand customer preferences, and tailor products or services accordingly. Strategic decisions informed by reliable data can lead to competitive advantages and long-term success.

(ii) Operational Efficiency

Information facilitates improved operational efficiency by streamlining processes and reducing waste. By analyzing data on production processes, inventory levels, or customer interactions, organizations can identify areas for improvement and optimize their operations. This leads to cost savings, enhanced productivity, and better resource allocation.

(iii)Innovation and Development

Information drives innovation by providing insights into emerging trends, technologies, and customer needs. Organizations that leverage information effectively can develop new products, services, or business models that meet market demands. Information also fosters a culture of continuous improvement and adaptation, which is vital in today's rapidly changing environment.

(iv)Risk Management

Information is crucial for identifying and mitigating risks. By analyzing historical data and monitoring current trends, organizations can predict potential challenges and develop strategies to address them. This proactive approach to risk management minimizes the impact of unforeseen events and ensures business continuity.

(v) Competitive Advantage

Organizations that effectively harness information gain a competitive edge. Information enables businesses to differentiate themselves in the market by offering superior products or services, enhancing customer experience, and improving brand reputation. Companies that are adept at information management are more agile and responsive to market changes.

The Cost of Information

While the value of information is significant, acquiring and managing information involves various costs. These costs can be direct or indirect and vary depending on the type of information and the methods used to collect and process it.

(i)Data Collection Costs

Collecting data involves expenses related to surveys, experiments, observations, and technology infrastructure. These costs include purchasing or developing data collection tools, hiring personnel to conduct research, and investing in data management systems. For instance, deploying IoT devices to gather real-time data requires substantial investment in sensors and network infrastructure.

(ii)Data Processing and Analysis Costs

Transforming raw data into meaningful information requires resources for processing and analysis. Organizations must invest in data processing software, analytical tools, and skilled personnel to interpret data. The cost of maintaining and updating software and training employees to use advanced analytical techniques can be significant.

(iii) Storage and Maintenance Costs

Storing data securely and maintaining its integrity over time is a crucial aspect of information management. Organizations must invest in secure data storage solutions, such as cloud services or data centers, to protect information from loss, theft, or damage. Regular maintenance and updates to storage systems are necessary to ensure data reliability.

(iv) Security and Privacy Costs

Protecting information from unauthorized access and ensuring compliance with data protection regulations (such as GDPR or CCPA) involves additional costs. Organizations must implement robust cybersecurity measures, conduct regular security audits, and invest in privacy management tools. Failure to protect information adequately can result in significant financial and reputational damage.

(v) Opportunity Costs

The time and resources spent on collecting and analyzing information could be used elsewhere within an organization. Therefore, there is an opportunity cost associated with information management. Organizations must carefully evaluate the potential benefits of information against the costs incurred to ensure that resources are allocated effectively.

7.Information as a Corporate Resource

In the modern business landscape, information has emerged as a vital corporate resource, akin to physical assets, capital, and human resources. As companies navigate increasingly complex and competitive environments, the ability to effectively harness information can determine success or failure. This exploration examines the multifaceted role of information as a corporate resource, highlighting its strategic importance, impact on operations, and the challenges associated with its management.

- **Strategic Importance of Information**

Information is foundational to strategic decision-making and planning. Informed decisions, based on reliable and timely information, enable businesses to navigate market dynamics, anticipate customer needs, and adapt to changes. Here's how information serves as a strategic asset:

(i)Market Intelligence:

Information about market trends, competitor activities, and consumer preferences helps businesses identify opportunities and threats. This intelligence is critical for developing competitive strategies, launching new products, and optimizing marketing efforts.

(ii)Innovation and Development:

Access to information on emerging technologies, industry developments, and customer feedback fuels innovation. Companies can leverage this data to improve existing products or create new offerings that meet evolving market demands.

(iii)Risk Management:

Information plays a crucial role in identifying, assessing, and mitigating risks. By analyzing historical data and monitoring real-time trends, businesses can anticipate potential challenges and develop strategies to address them proactively.

(iv)Resource Allocation:

Information supports efficient resource allocation by providing insights into operational efficiency, cost structures, and performance metrics. This ensures that resources are directed toward initiatives that deliver the highest value.

- **Operational Impact of Information**

Beyond strategic considerations, information profoundly impacts daily operations across various functions:

(i)Supply Chain Management:

Information facilitates efficient supply chain operations by enabling real-time tracking of inventory, demand forecasting, and supplier coordination. This reduces lead times, minimizes stockouts, and optimizes logistics.

(ii)Customer Relationship Management:

Businesses use customer data to personalize interactions, improve service delivery, and enhance customer satisfaction. Effective management of customer information builds loyalty and drives repeat business.

(a)Process Optimization:

Data-driven insights help identify inefficiencies and bottlenecks in business processes. Companies can streamline operations, reduce costs, and improve productivity by implementing targeted improvements.

(b)Performance Measurement:

Information enables the tracking of key performance indicators (KPIs) and benchmarks. Organizations use this data to assess progress toward goals, identify areas for improvement, and align employee performance with corporate objectives.

8.Information needs at various levels of management, and factors influencing information needs.

Information is a critical resource at all levels of management within an organization. It supports decision-making, strategic planning, and operational efficiency. The type and scope of information required vary across different management levels due to their distinct roles and responsibilities. Additionally, several factors influence information needs, including the organizational environment, technological advancements, and regulatory requirements. This discussion explores the information needs at various management levels and the factors that influence these needs.

- **Information Needs at Different Management Levels**

Organizations are typically structured into three primary management levels: top-level (strategic), middle-level (tactical), and lower-level (operational). Each level has unique information requirements to fulfill its responsibilities effectively.

(i)Top-Level Management

Top-level management, which includes executives such as CEOs, CFOs, and board directors, is responsible for setting the organization's strategic direction and ensuring long-term growth and sustainability. Their information needs are primarily focused on high-level, external, and future-oriented data.

Information Needs:

- **Strategic Planning:** Top executives require information related to market trends, economic forecasts, competitive analysis, and industry developments to formulate strategic plans and make informed decisions.
- **Performance Metrics:** Key performance indicators (KPIs), financial reports, and overall organizational performance data help executives assess whether the company is on track to meet its goals and objectives.
- **Risk Management:** Information about potential risks and opportunities, such as changes in regulations, political environments, and emerging technologies, is essential for mitigating risks and capitalizing on opportunities.
- **Innovation and Growth:** Data on technological advancements, customer preferences, and potential mergers or acquisitions aid in exploring growth opportunities and fostering innovation.

Characteristics:

- **Aggregate Data:** Information at this level is often aggregated and summarized to provide a broad overview of the organization's performance.
- **Long-term Focus:** The information is typically forward-looking, with a focus on long-term goals and sustainability.
- **External Orientation:** Top-level managers require information that reflects the external environment and macroeconomic conditions.

(ii). Middle-Level Management

Middle-level management includes department heads and division managers who act as a bridge between top-level and lower-level management. They are responsible for implementing strategic plans and overseeing operational functions.

Information Needs:

- **Resource Allocation:** Information on budget allocations, resource availability, and departmental performance is critical for effectively managing resources and ensuring alignment with strategic objectives.

- **Operational Efficiency:** Data related to process optimization, productivity metrics, and quality control help middle managers improve operational efficiency and effectiveness.
- **Team Performance:** Information on employee performance, training needs, and team dynamics is necessary for managing and developing teams.
- **Project Management:** Middle managers need detailed information about project timelines, milestones, and potential bottlenecks to ensure successful project execution.

Characteristics:

- **Detailed Data:** Information is more detailed and specific, providing insights into various functional areas.
- **Short- to Medium-term Focus:** The information has a medium-term orientation, focusing on implementing strategic initiatives and achieving departmental objectives.
- **Internal Orientation:** Middle managers require information that is both internally and externally oriented to manage operations and respond to environmental changes effectively.

(iii). Lower-Level Management

Lower-level management, which includes supervisors and team leaders, is responsible for overseeing day-to-day operations and ensuring that tasks are completed efficiently and effectively.

Information Needs:

- **Task Management:** Information related to daily schedules, task assignments, and workflow is crucial for coordinating activities and ensuring operational continuity.
- **Performance Monitoring:** Real-time data on employee productivity, attendance, and task completion helps supervisors manage performance and address issues promptly.

- **Quality Assurance:** Information on quality standards, defect rates, and customer feedback assists in maintaining quality and making necessary adjustments.
- **Inventory and Supply Chain:** Lower-level managers need information on inventory levels, order status, and supplier performance to ensure smooth operations and timely deliveries.

Characteristics:

- **Transactional Data:** The information is transactional and focused on daily operations.
- **Immediate Focus:** Information needs are short-term, addressing immediate operational concerns.
- **Internal Orientation:** The data is primarily internally oriented, focused on managing resources and processes effectively.

9.Factors Influencing Information Needs

Several factors influence the information needs of management at different levels, affecting how data is collected, processed, and utilized.

(i). Organizational Structure

- **Centralized vs. Decentralized:** In a centralized structure, information flow is top-down, and top management typically controls information distribution. In contrast, decentralized organizations empower lower levels with greater access to information.
- **Size and Complexity:** Larger and more complex organizations have more intricate information needs, requiring sophisticated data management systems to ensure timely access to relevant information.

(ii). Technological Advancements

- **Digital Transformation:** Emerging technologies such as big data analytics, artificial intelligence, and the Internet of Things (IoT) have revolutionized information management, enabling more accurate and real-time data insights.
- **Information Systems:** Advanced information systems and tools allow for better data collection, analysis, and reporting, meeting the dynamic information needs of all management levels.

(iii). Environmental Dynamics

- **Market Volatility:** Rapid changes in market conditions necessitate timely and relevant information to adapt strategies and operations accordingly.
- **Regulatory Changes:** Compliance with regulations and standards requires access to specific information to ensure adherence and avoid penalties.

(iv). Organizational Culture

- **Information Sharing:** An open culture that encourages information sharing fosters collaboration and innovation, impacting the flow and accessibility of information across levels.

- **Decision-Making Style:** Organizations with a participative decision-making style require broader access to information across levels to support collaborative decision-making.

(v). Strategic Goals

- **Alignment with Objectives:** Information needs are influenced by the organization's strategic goals and objectives. Information systems are designed to provide data that supports achieving these goals.

DATA AND INFORMATION

Data are raw facts, events, numbers and transactions, which have been collected, recorded, stored but are not yet processed. Data consist of numbers and characters (i.e. alphabets and special symbols) which are used to record facts and events about activities occurring in an environment.

Information is processed data. It is obtained after subjecting data to a series of processing operations which convert related groups of data (raw facts) into a meaningful and coherent form. Processing could be in the form of addition, subtracting, comparison, sorting, rearrangement etc. This makes information useful and meaningful. In other words, information could be defined as the desired form to which data is finally transformed after undergoing a series of processing.

Let us consider an example which distinguishes data from information. The costs of five different items are data while the total cost or average cost which is obtained from the different costs is information. Information must be communicated and received by a manager who uses it for decision making. On most occasions, what is information to one manager might be data needing further processing to another manager.

We should know that the main reason why people muddle both terms: data and information is because they are both dynamic in their state. That is, data used as input for a computational process may be an output of an earlier computation performed on the same computer and vice versa.

The Table below shows example of data being used as information and vice versa.

S/N	Operation	Data	Information
1	Typing of students name, Matriculation number and scores in computer science	Characters like alphabets (A-Z, a-z), digits (0-9), or special characters (+,-,*,/)	Set of characters (words) like Ade, 70, Sola etc.
2	Computation of a class average science in computer science	Each student's test score in computer science	The class average score in Computer science
3	Computation of a school average score in Computer science	Each class' average score in Computer science	The school's average score in Computer science

If we study the Table above, we shall realise that information (output), for a particular computational stage serves as input for the next operation. For example, the information (set of characters like Ade, 70, Sola etc) is what will be used as data input in the second operation (Computation of a class average score in computer science), and the same logic is applicable to the third operation.

The table below gives some distinctions between data and information

S/N	DATA	INFORMATION
1	Data is raw, an unchanged fact	Information is an organised and sorted fact
2	It serves as input into the computer system	It serves as an output from the computer system

3	Observation and recording are done to produce data	Analysis of data are done to obtain information
4	Data is the lowest level of knowledge	Information is the second level of knowledge
5	Data by itself is not significant	Information is significant

Data Conversion Process

The conversion of data to information is represented diagrammatical in the figure below
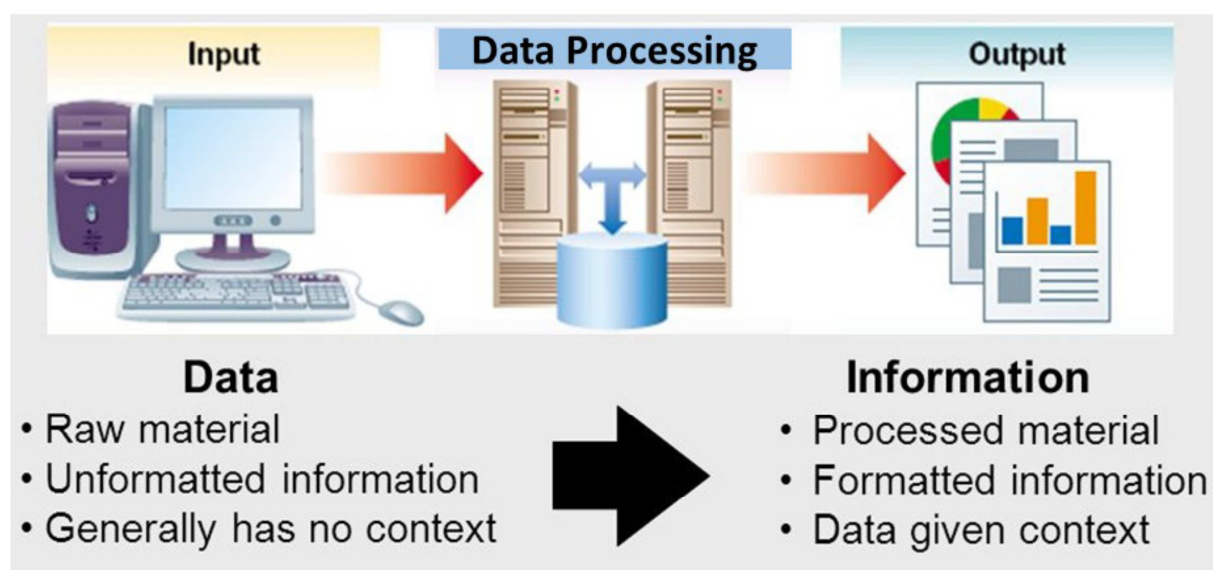
General Characteristics of Information

The following are the essential attributes of information for management decisions:

i.   It must be detailed enough to allow for effective decision
ii.   It must contain an appropriate level of details for the recipient. At the top management level, the information must be very broad in scope while at the operating or departmental management level; the information must be of a very detailed nature;
iii. It must relate to the current situation and have acceptable level of integrity;
iv.   It must be produced at an optimum cost and must be compatible with response time needs of the systems;
v.   It must be easily understood by the recipients. Presentation, in forms of charts, diagrams and tables may be essential. It must be concise and not contain unnecessary redundancy;
vi.   It must be precise and have an acceptable level of accuracy to the recipient. It must be producible at regular intervals and be relevant to its purpose. For example, bank balances are given to 2 decimal places for accuracy;
vii. It must be verifiable. Many knowledgeable people acting independently will produce the same information.
viii. It must be arranged or organised to suit the requirement or purpose for which it is needed.

ix.   Information, when derived, must be communicated through the right channel to the recipient.

Types of Information

Information needs of an organization can either be quantitative or qualitative

a. **Quantitative Information:** Quantitative information deals with the magnitudes of variables, their variability or absolute values. Some examples are Annual sales of a production company, Variation in the wages of low-level staff in an organization, Prices of goods; and Number of hours worked on a production line.

b. **Qualitative Information:** Qualitative information is related to the attributes of an entity in respect of quality factors. This type of information is not exact (precise) in nature but it is very useful for comparative measurement. Examples include standard of finished product in respect of paintwork or electroplating; and Variation of tolerances of manufactured parts i.e. deviation from standard dimensions.

Information System

With the proper definitions of data, information and the attributes of information given above, we can now define an Information System as distinct from information. An Information System is the set of interconnected procedures, the purpose of which is to provide managers at all levels and in all functions of an organization with the information necessary to enable them make timely and effective decisions.

Information Systems can also be defined as a combination or collection of people, hardware, software, communication networks and data resources that collects, transform and provides information to managers at all levels in all functions to allow timely and effective decision making in an organisation. These decisions are for:

i.   Planning,
ii.   Directing, and
iii. Controlling of all activities for which they are responsible

The common characteristics of all information systems are:

i.   The existence of procedures for orientating and/or collecting data;
ii.   The existence of procedures which sort and classify data, carry out arithmetic and logical operations on the data, holds data in the form of records for immediate or future use, summarise and analyse data and check the results for accuracy. All these activities constitute the processing of data; and
iii. The existence of procedures for communicating the processed data to appropriate managers.

Accounting Information System (AIS)

A special type of Information System for accounting professionals is the Accounting Information System. An Accounting Information System (AIS) consists of people, procedures and Information Technology (I.T). Just as we have above, the AIS performs three important functions in any organisation:

a. It collects and stores data about activities and transactions so that the organisation can review what has happened;

b. It processes data into information that is useful for making decisions that enable management to plan, execute and control activities; and

c. It provides adequate controls to safeguard the organisation's assets, including data. These controls ensure that the data is available when needed and that it is accurate and   reliable

d. It helps in the analysis of information presented in Payroll/Payslips; Stocks report; List of debtors/creditors; Cost summaries; Budget reports; Labour turnover statistics.

The AIS differs from other information systems in its focus on accountability and control.

Subsystems of Accounting Information Systems (AIS)
Most business organisations engage in many similar and repetitive transactions/activities. These transaction types can be grouped into the five basic cycles, which constitute the basic subsystems in the AIS:

a. The Expenditure subsystem/cycle which consists of the activities involved in buying and paying for goods or services used by the organisation;

b. The production subsystem/cycle which consists of the activities involved in converting raw materials and labour into finished products (only manufacturing organisations have production subsystem);

c. The Human Resources/payroll subsystem/cycle which consists of the activities involved in hiring and paying employees;

d. The Revenue subsystem/cycle which consists of the activities involved in selling goods or services and collecting payment for those sales; and

e. The Financing subsystem/cycle which consists of those activities involved in obtaining the necessary funds to run the organisation and in repaying creditors and distributing profits to investors.

The above basic subsystems suggest the most important work activities performed by Professional Accountants. Some of these include:

i.   Accounting systems and financial reporting;
ii.   Long-term strategic planning;
iii.   Managing the accounting and finance function;
iv.   Internal consulting;
v.   Short-term budgeting;
vi.   Financial and economic analysis;
vii.   Process improvement;
viii.   Computer systems and operations;
ix.   Performance evaluation (of the organisation); and
x.   Customer and product profitability analysis.

Benefits of Information systems
Information systems can help an organization in any of the following ways:

a. **Operational Efficiency**: This entails doing routine tasks faster, cheaper, neater and more accurately. The use of transaction processing software, word processing and electronic spreadsheet help to make operations more efficient;

b. **Functional Effectiveness**: This entails the use of decision support software which are oriented towards helping managers to make better decisions;

c. **Provision of better improved services**: This entails the use of help technologies like the automatic teller machine (ATM), e-commerce and the reservation systems used by travel agents. All these are examples of provision of improved services to customers;

d. **Better Product selection**: The provision of information helps in the selection of products offered for sales by industries like Banks, insurance companies, travel and financial services. Products that can be differentiated largely on the basis of the information inherent in them are called Information-Intensive Products; and

e. **Competitive Advantage**: The provision of information and the creation of new products through information technology can give some companies competitive advantage over other companies in the same industry.

Disadvantages of Information System

Everything that has an advantage will have some disadvantages and Information Systems is not an exception. Some of the disadvantages of Information systems include:

i. **Ease Of Fraud:** Information System makes whoever uses it efficient. This implies that if fraudsters have access to information systems, it will make their fraudulent activities efficient too.

ii. **Data Loss**: If there is a disaster and an organisation fails to back-up her data regularly, the information she has may be lost and this can lead to legal liability and may eventually lead to the collapse of an organisation.

iii. **GIGO Effect**: The popular term GIGO (Garbage-in Garbage-Out) implies that whatever you feed into the system is what you get. This becomes a disadvantage if wrong data is fed into the system, as it will produce wrong information that may ultimately lead to wrong decision making in businesses.

iv. Information can be deceptive sometimes, e.g. statistical information, if not well explained, which can lead to wrong use.

Roles of Information In the Accounting Environment

Accounting information plays major roles in organisations which include the following:

a. It identifies activities requiring action. For example, a cost report with a huge variance might stimulate investigation and possible corrective action;

b. It reduces uncertainty and thus provides a basis for choosing among alternative action. For example, it often used to set prices and determine credit policies

c. Information makes decision making process of the accountant to be fast

d. It makes the Accountant's output to be accurate

e. It enables the Accountant to develop strategies and formulate policies for the survival of their profession

f. It enables effective planning and control, desirable in the accounting profession

g. Information is needed in the accounting profession to proactively respond to rapidly changing conditions in the environment
h. It enables the Accountants to be abreast of government policies and regulations
i. It enables the Accountants to monitor and gain insights into the activities of their professional competitors
j. It enables the Accountants to meet customers' request adequately
k. It enables the Accountants to maintain patronage and goodwill of their customers