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About the Tutorial

Management Information System **(MIS)** is a planned system of collecting, storing, and disseminating data in the form of information needed to carry out the functions of management.

This tutorial covers the concepts related to information and provides a detailed coverage on MIS and other major enterprise-level systems. You will also learn how these systems help in the decision-making process, which is critical to any business enterprise.

Audience

This tutorial has been prepared for the beginners as well as advanced learners who want to learn the basics of Management Information System. This tutorial is very useful for the undergraduate students of computer science, engineering, business administration, management, science, commerce and arts where an introductory course on Management Information System is a part of the curriculum.

Prerequisites

Knowledge of computers is not a prerequisite to follow the contents of this tutorial. This tutorial does not require a background in computers or computer programming, though a basic knowledge of computer terminologies will help in understanding the given concepts very easily.

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1. MIS – Basic Information Concepts

Information can be defined as meaningfully interpreted data. If we give you a number 1-212-290-4700, it does not make any sense on its own. It is just a raw data. However if we say Tel: +1-212-290-4700, it starts making sense. It becomes a telephone number. If I gather some more data and record it meaningfully like:

```
Address: 350 Fifth Avenue, 34th floor
New York, NY 10118-3299 USA
Tel: +1-212-290-4700
Fax: +1-212-736-1300
```

It becomes a very useful information - the address of New York office of Human Rights Watch, a non-profit, non-governmental human rights organization.

So, from a system analyst's point of view, information is a sequence of symbols that can be construed to a useful message.

An **Information System** is a system that gathers data and disseminates information with the sole purpose of providing information to its users.

The main object of an information system is to provide information to its users. Information systems vary according to the type of users who use the system.

A **Management Information System** is an information system that evaluates, analyzes, and processes an organization's data to produce meaningful and useful information based on which the management can take right decisions to ensure future growth of the organization.

Information Definition

According to Wikipedia:

> "Information can be recorded as signs, or transmitted as signals. Information is any kind of event that affects the state of a dynamic system that can interpret the information.
>
> Conceptually, information is the message (utterance or expression) being conveyed. Therefore, in a general sense, information is "Knowledge communicated or received, concerning a particular fact or circumstance". Information cannot be predicted and resolves uncertainty."

Information Vs Data

Data can be described as unprocessed facts and figures. Plain collected data as raw facts cannot help in decision-making. However, data is the raw material that is organized, structured, and interpreted to create useful information systems.

Data is defined as 'groups of non-random symbols in the form of text, images, voice representing quantities, action and objects'.

Information is interpreted data; created from organized, structured, and processed data in a particular context.

According to Davis and Olson:

> "Information is a data that has been processed into a form that is meaningful to recipient and is of real or perceived value in the current or the prospective action or decision of recipient."

Information, Knowledge, and Business Intelligence

Professor Ray R. Larson of the School of Information at the University of California, Berkeley, provides an *Information Hierarchy*, which is:

- Data - The raw material of information.
- Information - Data organized and presented by someone.
- Knowledge - Information read, heard, or seen, and understood.
- Wisdom - Distilled and integrated knowledge and understanding.

Scott Andrews' explains *Information Continuum* as follows:

- Data - A Fact or a piece of information, or a series thereof.
- Information - Knowledge discerned from data.
- Business Intelligence - Information Management pertaining to an organization's policy or decision-making, particularly when tied to strategic or operational objectives.

Information/Data Collection Techniques

The most popular data collection techniques include:

- Surveys: A questionnaire is prepared to collect the data from the field.

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- Secondary data sources or archival data: Data is collected through old records, magazines, company website, etc.
- Objective measures or tests: An experimental test is conducted on the subject and the data is collected.
- Interviews: Data is collected by the system analyst by following a rigid procedure and collecting the answers to a set of pre-conceived questions through personal interviews.

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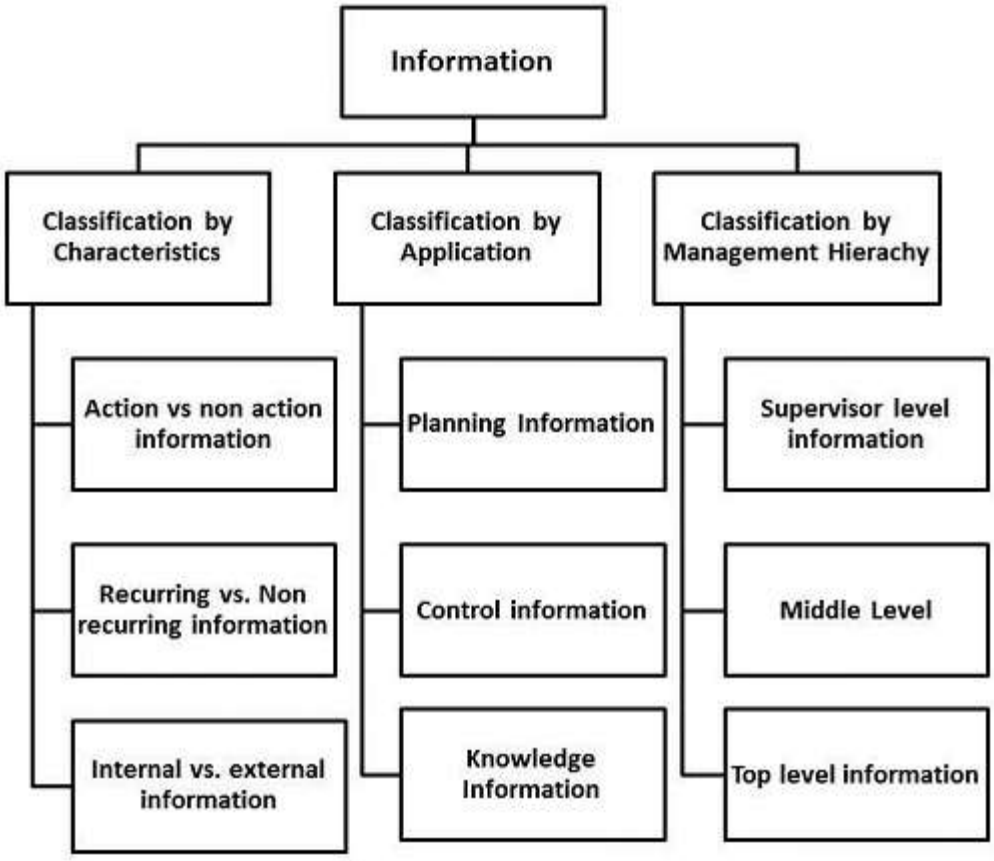
2. MIS – Classification of Information

Information can be classified in a number of ways and in this chapter, you will learn two of the most important ways to classify information.



Classification by Characteristic

Based on Anthony's classification of Management, information used in business for decision-making is generally categorized into three types:

- **Strategic Information:** Strategic information is concerned with long term policy decisions that defines the objectives of a business and checks how well these objectives are met. For example, acquiring a new plant, a new product, diversification of business etc., comes under strategic information.
- **Tactical Information:** Tactical information is concerned with the information needed for exercising control over business resources, like budgeting, quality control, service level, inventory level, productivity level etc.

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- **Operational Information:** Operational information is concerned with plant/business level information and is used to ensure proper conduction of specific operational tasks as planned/intended. Various operator specific, machine specific and shift specific jobs for quality control checks comes under this category.

Classification by Application

In terms of applications, information can be categorized as:

- **Planning Information:** These are the information needed for establishing standard norms and specifications in an organization. This information is used in strategic, tactical, and operation planning of any activity. Examples of such information are time standards, design standards.
- **Control Information:** This information is needed for establishing control over all business activities through feedback mechanism. This information is used for controlling attainment, nature and utilization of important processes in a system. When such information reflects a deviation from the established standards, the system should induce a decision or an action leading to control.
- **Knowledge Information:** Knowledge is defined as "information about information". Knowledge information is acquired through experience and learning, and collected from archival data and research studies.
- **Organizational Information:** Organizational information deals with an organization's environment, culture in the light of its objectives. Karl Weick's Organizational Information Theory emphasizes that an organization reduces its equivocality or uncertainty by collecting, managing and using these information prudently. This information is used by everybody in the organization; examples of such information are employee and payroll information.
- **Functional/Operational Information**: This is operation specific information. For example, daily schedules in a manufacturing plant that refers to the detailed assignment of jobs to machines or machines to operators. In a service oriented business, it would be the duty roster of various personnel. This information is mostly internal to the organization.
- **Database Information:** Database information construes large quantities of information that has multiple usage and application. Such information is stored, retrieved and managed to create databases. For example, material specification or supplier information is stored for multiple users.

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3. MIS – Quality 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.

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4. MIS – Information Need and Objective

Information processing beyond doubt is the dominant industry of the present century. Following factors states few common factors that reflect on the needs and objectives of the information processing:

- Increasing impact of information processing for organizational decision making.
- Dependency of services sector including banking, financial organization, health care, entertainment, tourism and travel, education and numerous others on information.
- Changing employment scene world over, shifting base from manual agricultural to machine-based manufacturing and other industry related jobs.
- Information revolution and the overall development scenario.
- Growth of IT industry and its strategic importance.
- Strong growth of information services fuelled by increasing competition and reduced product life cycle.
- Need for sustainable development and quality life.
- Improvement in communication and transportation brought in by use of information processing.
- Use of information processing in reduction of energy consumption, reduction in pollution and a better ecological balance in future.
- Use of information processing in land record managements, legal delivery system, educational institutions, natural resource planning, customer relation management and so on.

In a nutshell:

- Information is needed to survive in the modern competitive world.
- Information is needed to create strong information systems and keep these systems up to date.

Implications of Information in Business

Information processing has transformed our society in numerous ways. From a business perspective, there has been a huge shift towards increasingly automated business processes and communication. Access to information and capability of information processing has helped in achieving greater efficiency in accounting and other business processes.

A complete business information system accomplishes the following functionalities:

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- Collection and storage of data.
- Transform these data into business information useful for decision making.
- Provide controls to safeguard data.
- Automate and streamline reporting.

The following list summarizes the five main uses of information by businesses and other organizations:

- **Planning** - At the planning stage, information is the most important ingredient in decision making. Information at planning stage includes that of business resources, assets, liabilities, plants and machineries, properties, suppliers, customers, competitors, market and market dynamics, fiscal policy changes of the Government, emerging technologies, etc.
- **Recording** - Business processing these days involves recording information about each transaction or event. This information is collected, stored, and updated regularly at the operational level.
- **Controlling** - A business need to set up an information filter, so that only filtered data is presented to the middle and top management. This ensures efficiency at the operational level and effectiveness at the tactical and strategic level.
- **Measuring** - A business measures its performance metrics by collecting and analyzing sales data, cost of manufacturing, and profit earned.
- **Decision-making** - MIS is primarily concerned with managerial decision-making, theory of organizational behavior, and underlying human behavior in organizational context. Decision-making information includes the socio-economic impact of competition, globalization, democratization, and the effects of all these factors on an organizational structure.

In short, this multi-dimensional information evolves from the following logical foundations:

- Operations research and management science
- Theory of organizational behavior
- Computer science:
  - Data and file structure
  - Data theory design and implementation
  - Computer networking
  - Expert systems and artificial intelligence
- Information theory

Following factors arising as an outcome of information processing help speed up of business events and achieve greater efficiency:

- Directly and immediate linkage to the system

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- Faster communication of an order
- Electronic transfer of funds for faster payment
- Electronically solicited pricing (helps in determining the best price)

MIS Need for Information Systems

Managers make decisions. Decision-making generally takes a four-fold path:

- Understanding the need for decision or the opportunity,
- Preparing alternative course of actions,
- Evaluating all alternative course of actions,
- Deciding the right path for implementation.

MIS is an information system that provides information in the form of standardized reports and displays for the managers. MIS is a broad class of information systems designed to provide information needed for effective decision making.

Data and information created from an accounting information system and the reports generated thereon are used to provide accurate, timely and relevant information needed for effective decision making by managers.

Management information systems provide information to support management decision making, with the following goals:

- Pre-specified and preplanned reporting to managers.
- Interactive and ad-hoc support for decision making.
- Critical information for top management.

MIS is of vital importance to any organization, because:

- It emphasizes on the management decision making, not only processing of data generated by business operations.
- It emphasizes on the systems framework that should be used for organizing information systems applications.

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5. MIS – Major Enterprise Applications

Enterprise applications are specifically designed for the sole purpose of promoting the needs and objectives of the organizations.

Enterprise applications provide business-oriented tools supporting electronic commerce, enterprise communication and collaboration, and web-enabled business processes both within a networked enterprise and with its customers and business partners.

Services Provided by Enterprise Applications

Some of the services provided by an enterprise application includes:

- Online shopping, billing and payment processing
- Interactive product catalogue
- Content management
- Customer relationship management
- Manufacturing and other business processes integration
- IT services management
- Enterprise resource management
- Human resource management
- Business intelligence management
- Business collaboration and security
- Form automation

Basically these applications intend to model the business processes, i.e., how the entire organization works. These tools work by displaying, manipulating and storing large amounts of data and automating the business processes with these data.

Most Commonly Used Enterprise Applications

Multitude of applications comes under the definition of Enterprise Applications. In this section, let us briefly cover the following applications:

- Management information system (MIS)
- Enterprise Resource Planning (ERP)
- Customer Relationship Management (CRM)
- Decision Support System (DSS)

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- Knowledge Management Systems (KMS
- Content Management System (CMS)
- Executive Support System (ESS)
- Business Intelligence System (BIS)
- Enterprise Application Integration (EAI)
- Business Continuity Planning (BCP)
- Supply Chain Management (SCM)

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