

## An introduction to Information Systems


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### A System

- A **system** can be defined as a collection of interrelated components that work together towards a collective goal. The function of a system is to receive inputs and transform these into outputs.

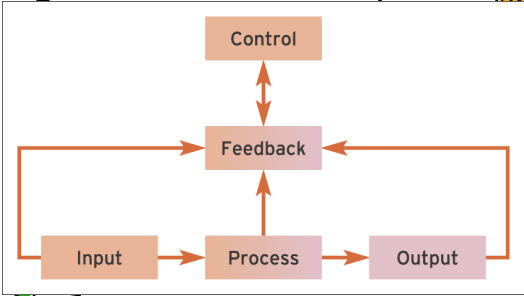
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### A basic model of a transformation process



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### A generic model of a system



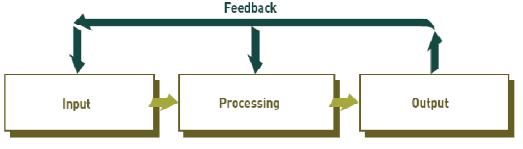
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### What is an Information System?

- Information system (IS) is a set of interrelated elements that
  - Collect (input), manipulate (process), store, and disseminate (output) data and information, and provide a corrective reaction (feedback mechanism) to meet an objective

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### What is an Information System?



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## Input, Processing, Output, Feedback

- Input
  - Activity of gathering and capturing raw data
- Processing
  - Converting data into useful outputs
- Output
  - Production of useful information, usually in the form of documents and reports
- Feedback
  - Information from the system that is used to make changes to input or processing activities

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## What is a BIS?

- 'A business information system is a group of interrelated components that work collectively to carry out input, processing, output, storage and control actions in order to convert data into information products that can be used to support forecasting, planning, control, coordination, decision making and operational activities in an organisation.'

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## Manual and Computerized Information Systems

- An information system can be:
  - Manual
  - Computerized

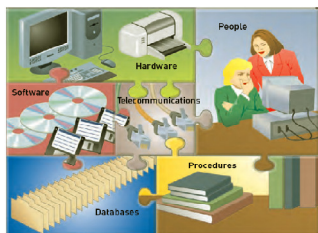
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## Computer-Based Information Systems

- Single set of hardware, software, databases, telecommunications, people, and procedures
  - That are configured to collect, manipulate, store, and process data into information

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## Computer-Based Information Systems (continued)



**Figure 1.6**  
The Components of a Computer-Based Information System.

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## CBIS

- Hardware
  - Consists of computer equipment used to perform input, processing, and output activities
- Software
  - Consists of the computer programs that govern the operation of the computer
- Database
  - Organized collection of facts and information, typically consisting of two or more related data files

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## CBIS

- Telecommunications, networks, and the Internet
  - The electronic transmission of signals for communications
- Networks
  - Connect computers and equipment to enable electronic communication
- Internet
  - World's largest computer network, consisting of thousands of interconnected networks, all freely exchanging information



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## CBIS

- People
  - Can be the most important element in most computer-based information systems
- Procedures
  - Include strategies, policies, methods, and rules for using the CBIS



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## System characteristics 1

- *The components of a system work towards a collective goal.* This is known as the system's **objective**.
- The objective of a system is normally very specific and can often be expressed in a single sentence.



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## System characteristics

- As an example, the objective of a car might be expressed simply as follows to transport people and goods to a specified location.
- **System objective:** All components of a system should be related to one another by a common objective.



## System characteristics 2

- *Systems do not operate in complete isolation.*
- They are contained within an **environment** that contains other systems and external agencies.
- The scope of a system is defined by its **boundary**.
- Everything outside of the boundary is part of the system's environment, everything within the boundary forms of the system itself.



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## System characteristics 2

- The boundary also marks the **interface** between a system and its environment.
- The interface describes exchanges between a system and the environment or other systems.
- **Environment:** The surroundings of a system, beyond its boundary.



### System characteristics 3

- *Systems can be complex and can be made up of other, smaller systems. These are known as **subsystems**.*
- Systems composed of one or more subsystems are sometimes referred to as **suprasystems**.
- The objective of a subsystem is to support the larger objective of the suprasystem.



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### System characteristics 3

- For an organisation, the subsystems such as marketing and finance would lie within the system's boundary, while the following elements would lie outside as part of the business environment:
  - Customers, sales channel/distributors, suppliers, competitors, partners, government and legislation, the economy.



### System characteristics 3

- An organisation will interact with all these elements that are beyond the system boundary in the environment.
- We refer to this as an **open system**.
- Most information systems will fall into this category since they will accept input and will react to it.



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### System characteristics 4

- *Subsystems in an information system interact by exchanging information.*
- This is known as the interface between systems.
- For information systems and business systems, having clearly defined interfaces is important to an efficient organisation.



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### System characteristics 4

- For example, sales orders must be passed from the sales subsystem to the finance subsystem and the distribution subsystem in a clear, repeatable way.
- If this does not happen, orders may be lost or delayed and customer service will be affected.



### System characteristics 5

- *The linkage or coupling between subsystems varies.*
- The degree of **coupling** defines how closely linked different subsystems are.
- It is a fundamental principle of systems theory and BIS design that subsystems should be loosely coupled.
- Systems or subsystems that are highly dependent on one another are known as **close-coupled systems**.
- In such cases, the outputs of one system are the direct inputs of another.



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### System characteristics 5

- **Decoupled systems** (or subsystems) are less dependent on one another than coupled systems and so are more able to deal with unexpected situations or events.
- Such systems tend to have higher levels of autonomy, being allowed more freedom to plan and control their activities.



### Systems characteristics 6

- *Systems are hierarchical.*
- Systems are made up of subsystems that may themselves be made up of other subsystems.
- From this, one should realise that the parts of a system are dependent on one another in some way.



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### Systems characteristics 6

- This **interdependence** means that a change to one part of a system leads to or results from changes to one or more other parts.
- **Interdependence:** Interdependence means that a change to one part of a system leads to or results from changes to one or more other parts.



### Different Kinds of Systems

- Four main types of information system serve different organizational levels:
- **1. Operational-level systems**
  - support operational managers by keeping track of the elementary activities and transactions of the organization, such as sales, receipts, cash deposits, payroll, credit decisions, and the flow of materials in a factory.



### Different Kinds of Systems

- **2. knowledge-level systems**
  - support the organization's knowledge and data workers.
  - The purpose of knowledge-level systems is to help the business firm integrate new knowledge into the business and to help the organization control the flow of paperwork.



### Different Kinds of Systems

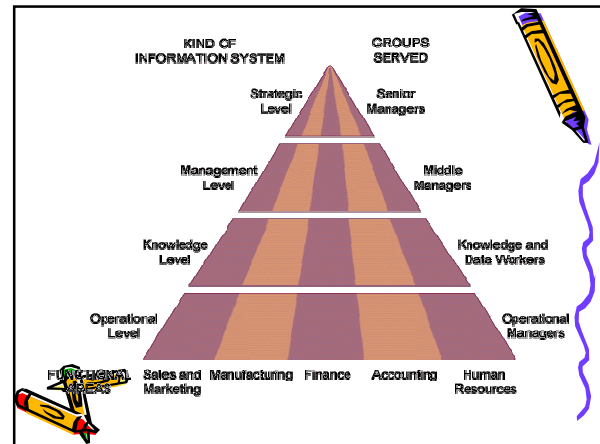
- **3. Management-level systems**
  - serve the information systems that support the monitoring, controlling, decision-making, and administrative activities of middle managers.



## Different Kinds of Systems

### • 4. Strategic-level systems

- help senior management tackle and address strategic issues and long-term trend,
- both in the firm and in the external environment.
- Information systems also serve the major business functions, such as sales and marketing, manufacturing, finance, accounting, and human resources.



## Examples of specific systems

### • Sales and Marketing Systems

- The sale and marketing function is responsible for selling the organization's products or services.
- Marketing is concerned with identifying the customers for the firm's products or services, determine what they need or want, planning and developing products and services to meet their needs, and advertising and promoting these products and services.

## Examples of systems

### • Manufacturing and Production Systems

- The manufacturing and production function is responsible for actually producing the firm's goods and services.
- Manufacturing and production activities deal with the planning, development, and maintenance of production facilities; the establishment of production goals;
- the acquisition, storage, and availability of production materials; and the scheduling of equipment, facilities, materials, and labour required to fashion finished products.

## Examples of systems

### • Finance and Accounting Systems

- The finance function is responsible for managing the firm's financial assets, such as cash, stocks, bonds, and other investments,
- The finance function is also in charge of managing the capitalization of the firm.

## Examples of systems

### • Human Resources Systems

- The human resource function is responsible for attracting, developing, and maintaining the firm's workforce.
- Human resources information systems support activities such as identifying potential employees, maintaining complete records on existing employees, and creating programs to develop employees' talents and skills.

## Examples of systems

- Strategic-level human resources system identify the employee requirements (skills, educational level, types of positions, number of positions, and cost) for meeting the firm's long term business plans.



## Advantages of computer processing

- **Speed:** Computers can process millions of instructions each second, allowing them to complete a given task in a very short time.
- **Accuracy:** The result of a calculation carried out by a computer is likely to be completely accurate. In addition, errors that a human might make, such as a typing error, can be reduced or eliminated entirely.



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## Advantages of computer processing

- **Reliability:** In many organisations, computer-based information systems operate for twenty-four hours a day and are only ever halted for repairs or routine maintenance.
- **Repetitive tasks:** Computer-based information systems are suited to highly repetitive tasks that might result in boredom or fatigue in people. The use of technology can help to reduce errors and free employees to carry out other tasks.



## Limitations of computer-based processing

- **Judgement/experience:** Despite advances in artificial intelligence techniques and expert systems, computer-based information systems are considered incapable of solving problems using their own judgement and experience.
- **Improvisation/flexibility:** In general, computer-based information systems are unable to react to unexpected situations and events.



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## Limitations of computer-based processing

- **Innovation:** Computers lack the creativity of a human being.
- They are unable to think in the abstract and are therefore restricted in their ability to discover new ways of improving processes or solving problems.



## Limitations of computer-based processing

- **Intuition:** Human intuition can play an important part in certain social situations.
- For example, one might use intuition to gauge the emotional state of a person before deciding whether or not to give them bad news.
- BIS cannot use intuition in this way and are therefore unsuitable for certain kinds of situations.



### Limitations of computer-based processing

- **Qualitative information:** Managers often make unstructured decisions based on the recommendations of others.
- Their confidence in the person they are dealing with often has a major influence on the decision itself.
- Once again, BIS cannot act upon qualitative information of this kind.



### Enterprise Systems

- Enterprise systems aim to support the business processes of an organisation across any functional boundaries that exist within that organisation. They use internet technology to integrate information within the business and with external stakeholders such as customers, suppliers and partners.



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### Enterprise Systems

- Four main elements of an enterprise system are the following:
  - enterprise resource planning (ERP) which is concerned with internal production, distribution and financial processes;
  - customer relationship management (CRM) which is concerned with marketing and sales processes;



### Enterprise Systems

- supply chain management (SCM) which is concerned with the flow of materials, information and customers through the supply chain and;
- supplier relationship management (SRM) which is concerned with sourcing, purchasing and the warehousing of goods and services.



### Questions

