Information system

Unit 1

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Data, Information, and Knowledge

- Data:– Raw facts.
- Information:– Collection of facts organized and processed in such a way that they have value beyond the individual facts.
- Process: – Set of logically related tasks performed to achieve a define outcome.
- Knowledge: – Awareness and understanding of a set of information and the ways information can be made useful.

Information

- Information has a precise meaning and it is different from data. The information has a value in decision making while data does not have. Information brings clarity and creates an intelligent human response in the mind. Data is like raw materials while the information is equivalent to the finished goods produced after processing the raw material.

Characteristics of Information

- Defined as an Acronym: ACCURATE
- A → ACCURATE
- C → COMPLETE
- C → COST – BENEFICIAL
- U → USER – TARGETED
- R → RELEVENT
- A → AUTHORITATIVE
- T → TIMELY
- E → EASY TO USE

Characteristics of Information :

Timeliness : Timeliness means that information must reach the recipients within the prescribed timeframes. For effective decision-making.

Accuracy : Information should be accurate. It means that information should be free from mistakes, errors &, clear Accuracy also means that the information is free from error.

- **Relevance :** Information is said to be relevant if it answers especially for the recipient what, why, where, when, who and why?
- **Completeness :** The information which is given to a manager must be complete and should meet all his needs. Incomplete information may result in wrong decisions and thus may prove costly to the organization.

- The **validity** of the information relates to the purpose of the information. In other words, it is the answer to the question-dose the information meet the purpose of decision making for which it is being collected? The validity also depends on how the information is used.
- **Consistency:** The information is termed as inconsistent if it is derived form a data which dose not have a consistent pattern of period.

DEFINING A SYSTEM

- A collection of components that work together to realize some objectives forms a system. Basically there are three major components in every system, namely input, processing and output.
- **Definition of System** :

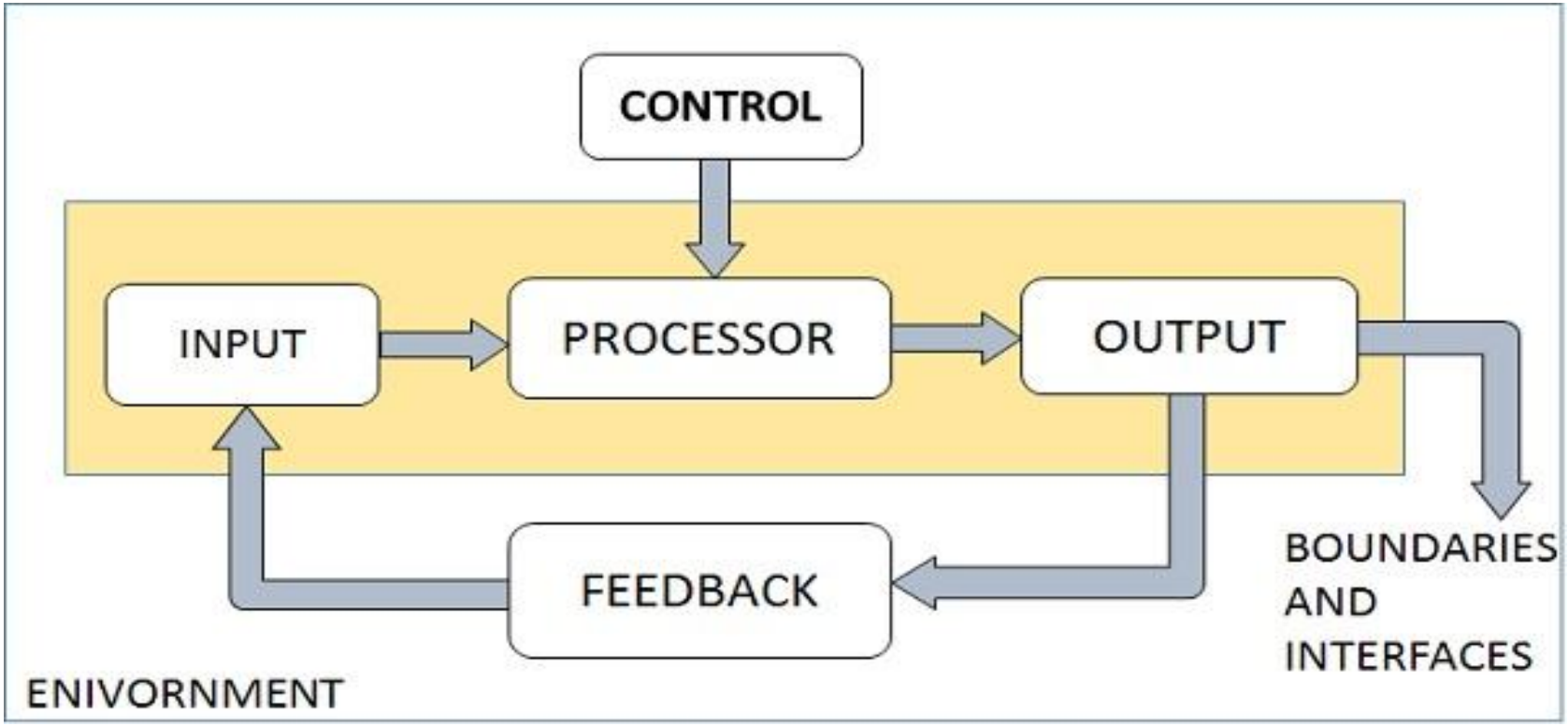
"A system is an orderly grouping of interdependent components linked together according to a plan to achieve a specific objective".

Characteristics of a System

- Organization
- Interaction
- Interdependence
- Integration
- Central Objective

Elements of a System

1. Outputs and inputs.
2. Processor (s).
3. Control.
4. Feedback.
5. Environment.
6. Boundaries and interface.


CONTROL
INPUT
PROCESSOR
OUTPUT
FEEDBACK
BOUNDARIES
AND
INTERFACES
ENIVORNMENT

Types of systems

- **Physical or abstract systems**
- **Open or Closed Systems**
- **Deterministic or Probabilistic**
- **Social, Human Machine, Machine System**
- **Adaptive and Non Adaptive System**

Types of Systems

- The systems can be divided into the following types
- **Physical or Abstract Systems**
- Physical systems are tangible entities. We can touch and feel them.
- Physical System may be static or dynamic in nature. For example, desks and chairs are the physical parts.
- A programmed computer is a dynamic system in which programs, data, and applications can change according to the user's needs.
- Abstract systems are non-physical entities or conceptual that may be formulas, representation or model of a real system.

- **Open Closed System- Majority of systems are open systems**
- An open system must interact with its environment. It receives inputs from and delivers outputs to the outside of the system.
- open system has many interfaces with its environment
- can also adapt to changing environmental conditions
- can receive inputs from, and delivers output to the outside of system

- Open Systems: exchange information, material, or energy with the environment, including random and undefined inputs.
- Examples:
  - Biological Systems, and Organizational Systems
- Open systems tend to have form and structure

- **Closed systems:** Systems that don't interact with their environment. Closed systems exist in concept only.

- Closed and open systems:
  - Closed system: self contained, one that does not exchange material, information, or energy with its environment.
  - Examples:
    - A freshman in an 8:00 AM class;
    - A chemical reaction in a sealed, insulated container.

- Natural and Artificial
  - Natural
    - Occur in nature without human intervention
    - Biological systems- immune systems, digestive
  - Artificial
    - Human made or modified
    - Information systems, stereo
    - What about the immune system?
    - Artificial systems are measured

- **Adaptive and Non Adaptive System**
- Adaptive System responds to the change in the environment in a way to improve their performance and to survive. For example, human beings, animals.
- Non Adaptive System is the system which does not respond to the environment. For example, machines.

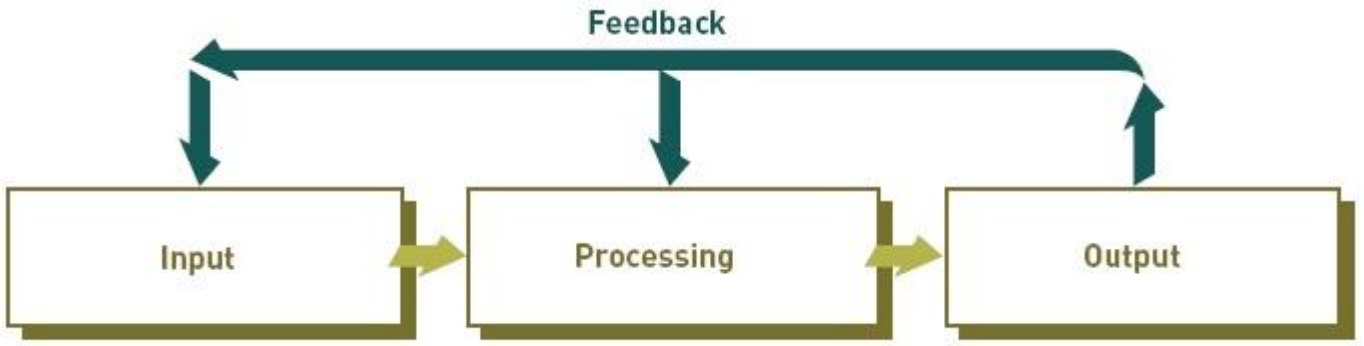
- Deterministic versus probabilistic
  - deterministic: The interaction between the parts or subsystems is known for certain;
    - example: a computer program which performs exactly to a set of instructions
  - probabilistic: A system that can be described in terms of probable behavior (a certain degree of error);
    - examples: An inventory system, a five year old (who does not follow a certain set of instructions).

What Is an Information System?

- **Information system**, an integrated set of components for collecting, storing, and processing data and for providing information, knowledge, and digital products. Business firms and other organizations rely on information systems to carry out and manage their operations, interact with their customers and suppliers, and compete in the marketplace. Information systems are used to run interorganizational supply chains and electronic markets.

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

- Feedback mechanism
  - The component that helps organizations achieve their goals, such as increasing profits or improving customer service



Manual and Computerized Information Systems

- An information system can be:
  - Manual
- Example: Developing patterns and trends on graph paper for stock analysis
  - Computerized
- Example: Using program trading to track the market

Computer-Based Information Systems

- CBIS components

– **Hardware**: Computer equipment used to perform input, processing, and output activities

– **Software**: Computer programs that govern the operation of the computer

– **Database**: Organized collection of facts and information

– **Telecommunications**: Electronic transmission of signals for communications

– **Networks**: Connect computers and equipment in a building, around the country, and around the world

Strategic Management

- The People
  - Board of Directors
  - Chief Executive Officer
  - President
- Decisions
  - Develop Overall Goals
  - Long-term Planning
  - Determine Direction
    - Political
    - Economic
    - Competitive

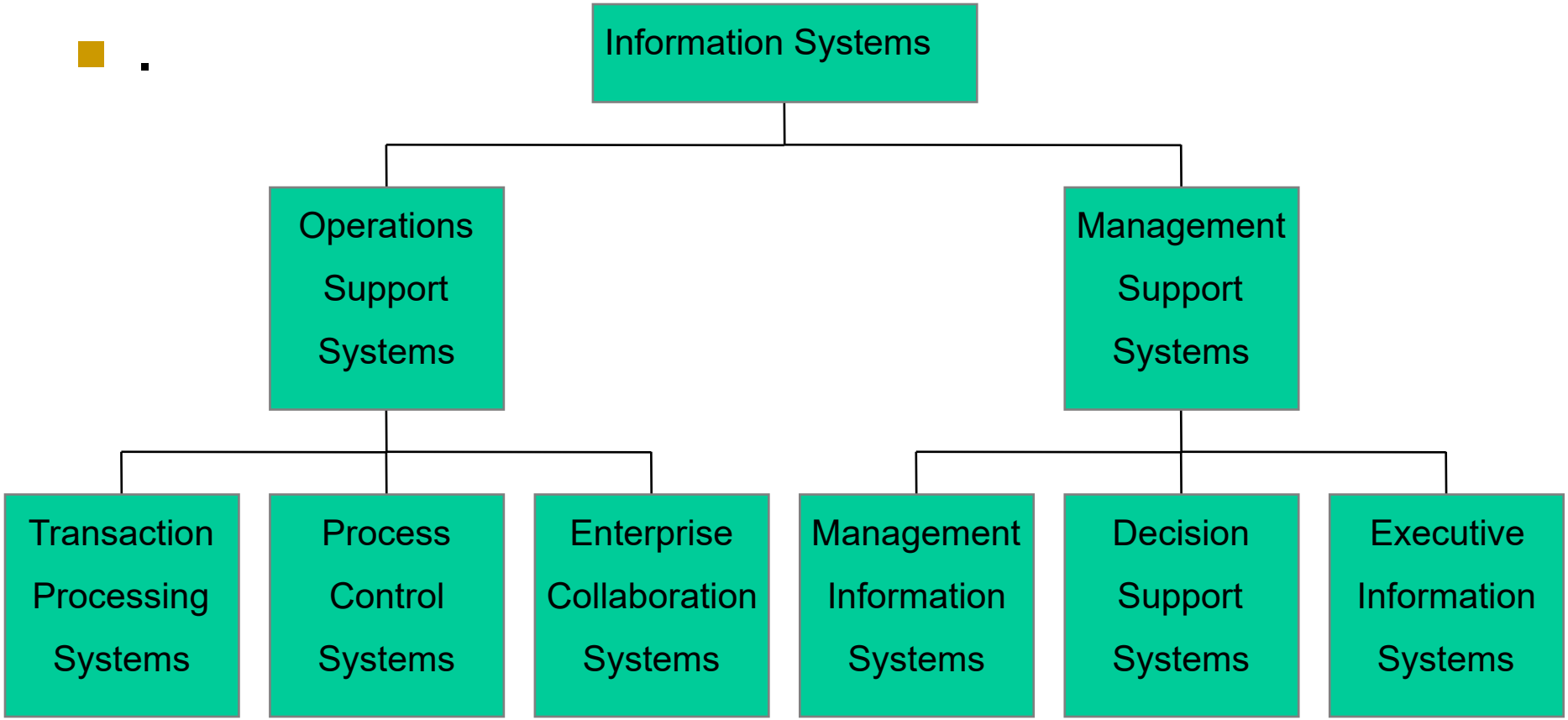
Tactical Management

- People
  - Business Unit Managers
  - Vice-President to Middle-Manager
- Decisions
  - short-medium range planning
  - schedules
  - budgets
  - policies
  - procedures
  - resource allocation

Operational Management

- People
  - Middle-Managers to
  - Supervisors
  - Self-directed teams
- Decisions
  - short-range planning
  - production schedules
  - day-to-day decisions
  - use of resources
  - enforce polices
  - follow procedures

Types of Information Systems



Computer Based Information System (CBIS)

i) Transaction Processing System (TPS)

ii) Management Information System (MIS)

iii) Decision Support System (DSS)

iv) Executive Support System (ESS)

v) Office Automation Systems (OASs)

vi) Business Expert Systems (BESs)

- **Operation Support Systems – help run the daily business, but do not provide much information for managerial decision-making**
  - **Transaction Processing Systems – record & process daily transactions**
  - **Process Control Systems - monitor and control physical processes**
  - **Enterprise Collaboration Systems (Office Automation Systems) – enhance team and workgroup communications and productivity**

- **Management Support Systems**
  - **Management Information Systems – reports and displays for managers to help them make better business decisions**
  - **Decision Support Systems – direct computer support for decision-making**
  - **Executive Information Systems – critical information specifically for executives to make better decisions; not just a better MIS**

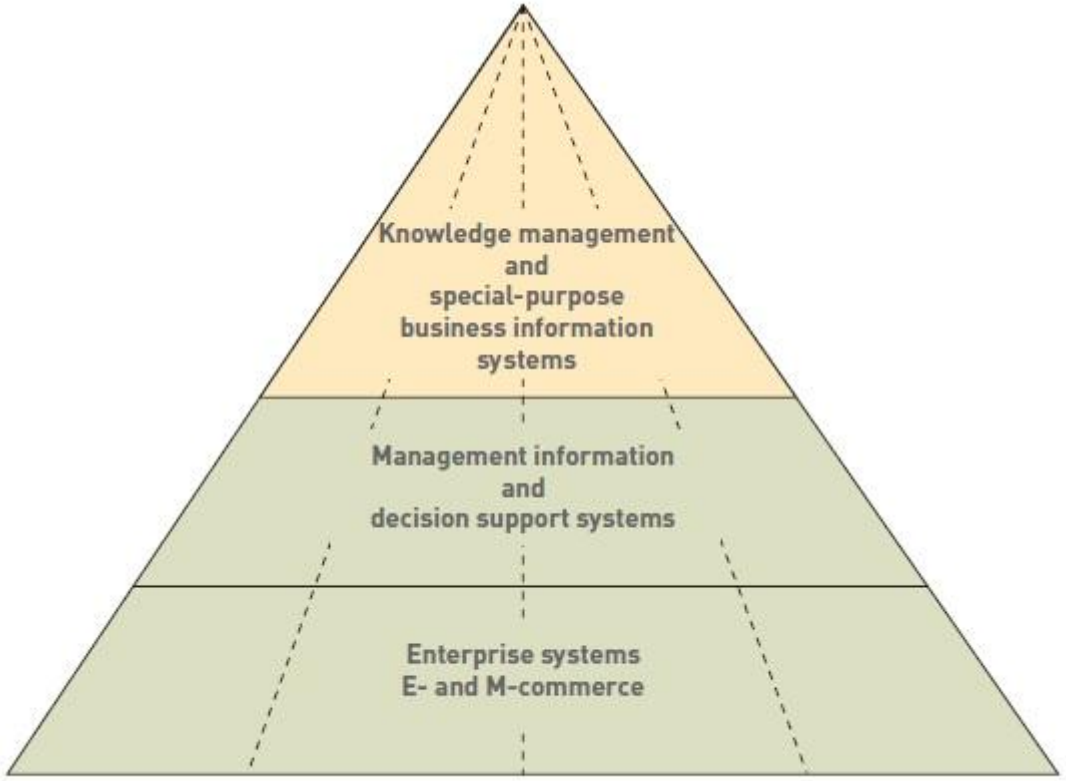
- **Other Categories of Information Systems**
  - **Expert Systems – expert advice for operational decisions**
  - **Knowledge Management Systems – support creation, organization of business knowledge**
  - **Strategic Information Systems – apply IT to products, services, and processes for strategic advantage**
  - **Functional Business Systems – support basic business functions**
  - **Cross-Functional Systems – integrate various roles and outputs into a variety of functions**

- Management Information Systems (MIS)
  - Reports and displays
  - Example: daily sales analysis reports
- Decision Support Systems (DSS)
  - Interactive and ad hoc support
  - Example: a what-if analysis to determine where to spend advertising dollars
- Executive Information Systems (EIS)
  - Critical information for executives and managers
  - Example: easy access to actions of competitors

- Expert Systems
  - Provide expert advice
  - Example: credit application advisor
- Knowledge Management Systems
  - Support creation, organization, and dissemination of business knowledge throughout company
  - Example: intranet access to best business practices

Business Information Systems

- ESS
- MIS/DSS
- TPS



Transaction Processing Systems (TPS)

- *Computerized system that performs and records the daily routine transactions necessary to conduct the business; these systems serve the operational level of the organization*

- TYPE: Operational-level
- INPUTS: transactions, events
- PROCESSING: updating
- OUTPUTS: detailed reports
- USERS: operations personnel, supervisors
- DECISION-MAKING: highly structured

EXAMPLE: payroll, accounts payable

Decision Support Systems (DSS)

- *Information system at the management level of an organization that combines data and sophisticated analytical models or data analysis tools to support semi-structured and unstructured decision making.*

- TYPE: Management-level
- INPUTS: low volume data
- PROCESSING: simulations, analysis
- OUTPUTS: decision analysis
- USERS: professionals, staff managers
- DECISION-MAKING: semi-structured

- **EXAMPLE:** sales region analysis

Management Information Systems

- *Information system at the management level of an organization that serves the functions of planning, controlling, and decision making by providing routine summary and exception reports.*

- TYPE: Management-level
- INPUTS: high volume data
- PROCESSING: simple models
- OUTPUTS: summary reports
- USERS: middle managers
- DECISION-MAKING: structured to semi-structured

- **EXAMPLE**: annual budgeting

Executive Support Systems

- *Information system at the strategic level of an organization that address unstructured decision making through advanced graphics and communications.*
- TYPE: Strategic level
- INPUTS: aggregate data; internal and external
- PROCESSING: interactive
- OUTPUTS: projections
- USERS: senior managers
- DECISION-MAKING: highly unstructured

- **EXAMPLE**: 5 year operating plan

Office Automation Systems (OAS)

- Office automation refers to the application of computes and communication technology to office functions. Office automation systems are meant to improve the productivity of managers at various levels of management of providing secretarial assistance and better communication facilities.

  Office activities may be grouped under two classes, namely

  i) Activities performed by clerical personnel (clerks, secretaries, typist)

  ii) Activities performed by the executives (managers, engineers or other professionals like economist, researches etc.)

In the first category, the following is a list of activities.

a) Typing
b) Mailing
c) Scheduling of meetings and conferences,
d) Calendar keeping, and
e) Retrieving documents

The following is a list of activities in the second category (managerial category)

a) Conferencing.
b) Production of information (messages, memos, reports) and controlling performance.

Business Expert Systems: These systems are one of the main types of knowledge-based information systems. These systems are based on artificial intelligence, and are advanced information systems. A business expert system is a knowledge based information system that uses its knowledge about a specific, complex application area to act as an expert. The main components of an expert system are:

a. Knowledge Base.

b. Interface Engine.

c. User Interface.

Components of an information system

- Information system resources.

(people ,hardware ,software ,data ,network)

- Information system activities.

(input ,processing , output ,storage ,control)

- Information system products.

Components of an Information System

- People Resources
  - End Users
  - IS Specialists
- Hardware Resources
  - Computer systems
  - Peripherals
- Software Resources
  - System software
  - Application software
  - Procedures

Data Resources

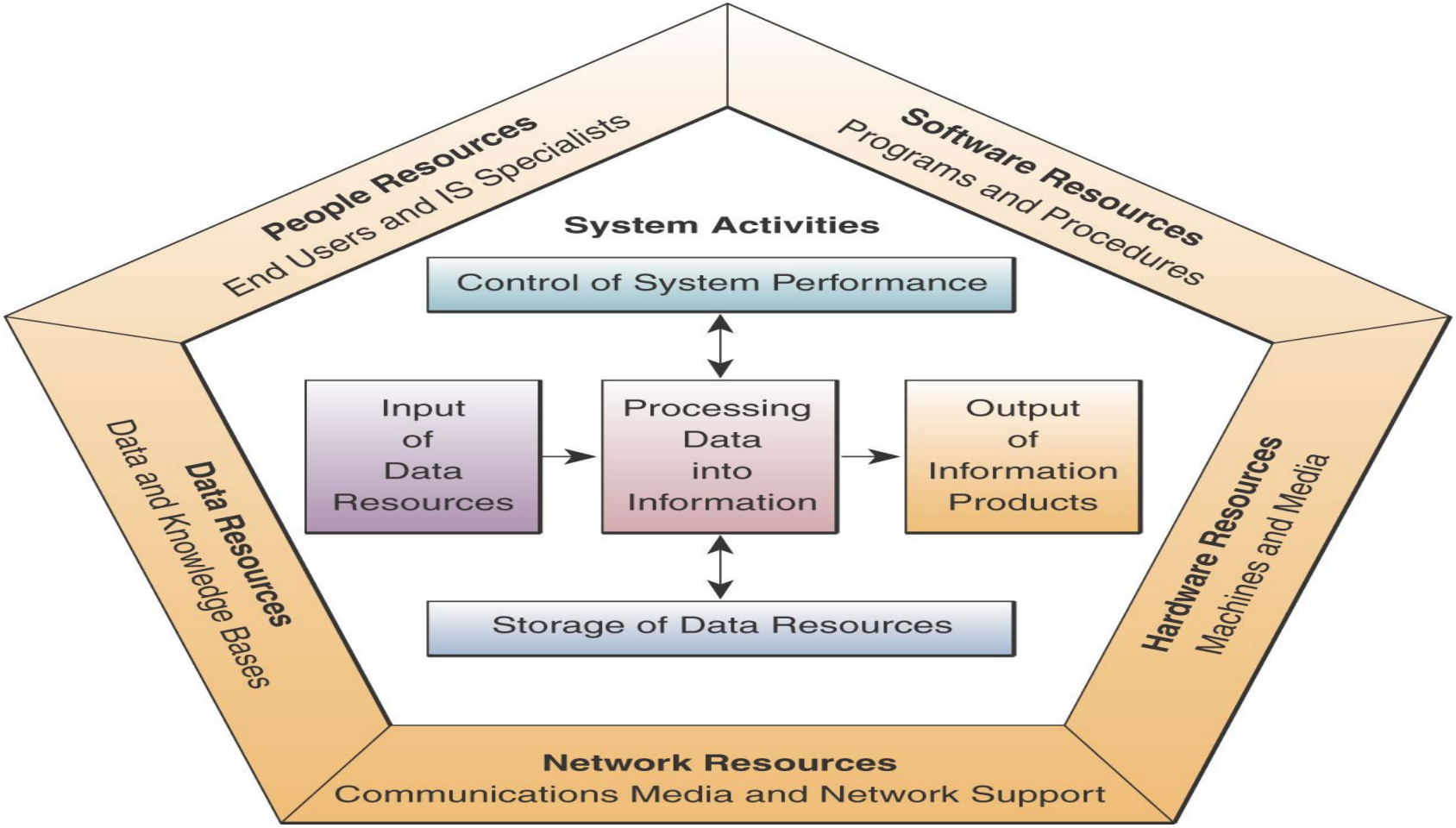
Data versus Information

Network Resources

Communication media

Network support

Components of an Information System



Changing business environment

- Changing nature of workforce.
- Powerful customer.
- Technological pressures
- Globalization.
- Reengineering process.

Developing IS Solutions to Business Challenges

Alternatives to system development

- External acquisition.
- Outsourcing.
- End –user development.

A Systems Approach to Problem Solving

- **A. The Scientific Method vs. The Systems Approach**
- **The Scientific Method**
- The systems approach is based on the established problem-solving methodology known as the scientific method. The scientific method consists of five steps:
- 1. Recognize phenomena in the real world.
- 2. Formulate a hypothesis about the causes or effects of the phenomena.
- 3. Test the hypothesis through experimentation.
- 4. Evaluate the results of the experiments.
- 5. Draw conclusions about the hypothesis.

- **The Systems Approach**
- The systems approach is a modification of the scientific method. It stresses a systematic process of problem solving. Problems and opportunities are viewed in a systems context. Studying a problem and formulating a solution becomes an organized system of interrelated activities:

1. Define a problem or opportunity in a systems context.
2. Gather data describing the problem or opportunity
3. Identify alternative solutions.
4. Evaluate each alternative solution.
5. Select the best solution.
6. Implement the selected solution.
7. Evaluate the success of the implemented solution.

- The activities and steps of the systems approach are typically grouped into a smaller number of stages of problem solving:
- a. Understanding a problem or opportunity (steps 1 and 2).
- b. Developing a solution (steps 3 through 5).
- c. Implementing a solution (steps 6 and 7).

- **A. Understanding a Problem or Opportunity**
- To solve a problem an opportunity requires a thorough understanding of the situation at hand. This implies viewing the problem/opportunity in a systematic fashion within a systems context.
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- 1. **<u>Defining Problems and Opportunities</u>.** Problems and opportunities must be identified when using the systems approach.

  a. A problem is a basic condition that causes undesirable results.
- b. An opportunity is a condition that presents the potential for desirable results.

- 2. **Gathering Data and Information.** Data and information need to be captured to gain sufficient background into the problem or opportunity situation. In the context of a business systems problem, information gathering may encompass the following:
- a. Interviews with employees, customers, and managers.
- b. Questionnaires to appropriate end users in the organization.
- c. Personal observation or involvement in business operations.
- d. Examination of documents, reports, procedures manuals, and other documentation.
- e. Inspecting accounting and management reports to collect operating statistics, cost data, and performance results.
- f. Development, manipulation, and observation of a model of the business operations or systems affected by the problem or opportunity.

- **B. Developing a Solution**
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- Once you understand a problem or opportunity, you can develop an appropriate solution.
- 3. **Designing Alternative Solutions.** Jumping immediately from problem definition to a single solution limits your options and robs you of the chance to consider the advantages and disadvantages of several alternatives. Of course, having too many alternatives can obscure the best solution. Alternative solutions may come from past experience, advice of others, simulation of business operations models, and your own intuition and ingenuity. The "doing nothing" option is also a valid alternative.

- 4. **Evaluating Alternative Solutions.** To identify the best solution, the proposed alternatives need to be evaluated. The goal of evaluation is to determine how well each alternative solution helps the firm and its selected subsystems meet their objectives.
- **D. Implementing a Solution**
- 6. Implement the selected solution. Once a solution has been selected, it must be implemented. An implementation plan may have to be developed. A project management effort may be required to supervise the implementation of large projects. Typically, an implementation plan specifies the activities, resources, and timing needed for proper implementation. This may include:
- a. Types and sources of hardware and software.
- b. Construction of physical facilities.
- c. Hiring and training of personnel.
- d. Start-up and operating procedures.
- e. Conversion procedures and timetables.

- 7. **Postimplementation Review (Evaluate the success of the implemented solution).** The focus of the postimplementation review is to determine if the implemented solution has indeed helped the firm and selected subsystems meet their system objectives. If not, the systems approach assumes you will cycle back to a previous step and make another attempt to find a workable solution.
- **E. Applying the Systems Approach to Information Systems.**
- A variety of information systems development methodologies tailor the systems approach to the process of developing information systems solutions to business problems. A firm may experience difficulties in applying the systems process to IS due to:
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- 1. Departmental/unit and/or emotional conflicts.
- 2. Rapidly changing environmental conditions.

Effectiveness and Efficiency Criteria

- Efficiency mean saving time, money or effort. being efficient mean doing the thing the right way.
- Effectiveness mean how well the job gets done. the quality of the output. being effective means doing right thing.
- The relationship between effectiveness and efficiency is that effectiveness is measure of “goodness "of output. While efficiency is measure the resources required to achieve the “output” .
- Effectiveness present an external view related to whether the product is what the customer really wants.

Effectiveness is measured in terms.

1)Product’s cost.

2) Quality.

3) Reliability.

Efficiency is measured in terms.

1)Productivity.

2)Consistency.

3)Rate of output.

4) Cycle time.

5)Flexibility

6) Security