Chapter -1

Information system

Information System *(CT 751)* **BCT IV/II**

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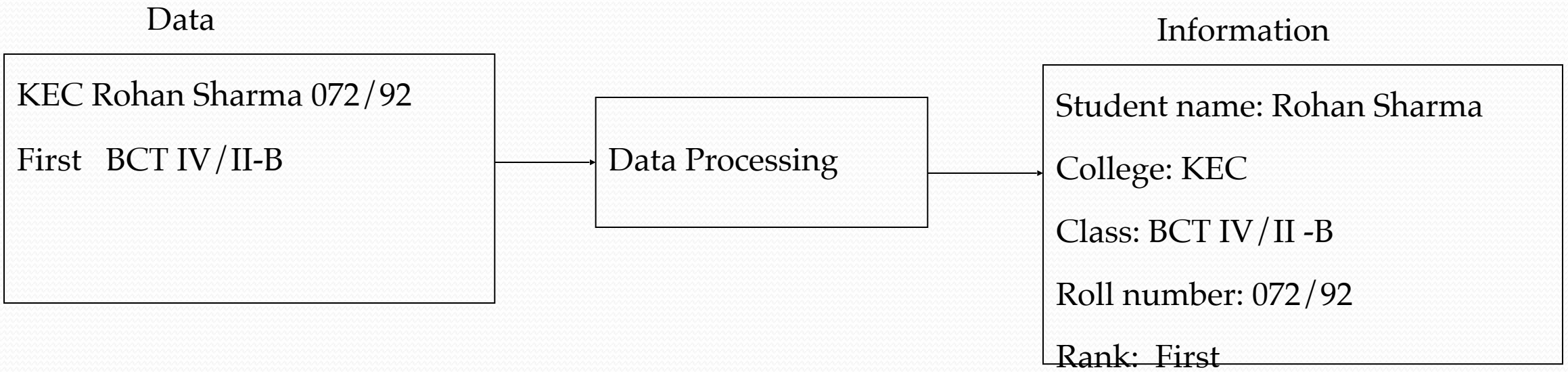
Outline

- **Information system**
  - Introduction
  - Classification and evolution of IS [IT vs. IS]
  - IS in functional area
  - Information system architecture
  - Qualities of information systems
  - Managing Information System resources
  - Balanced scorecard – case studies

Introduction (Data, Information & Knowledge)

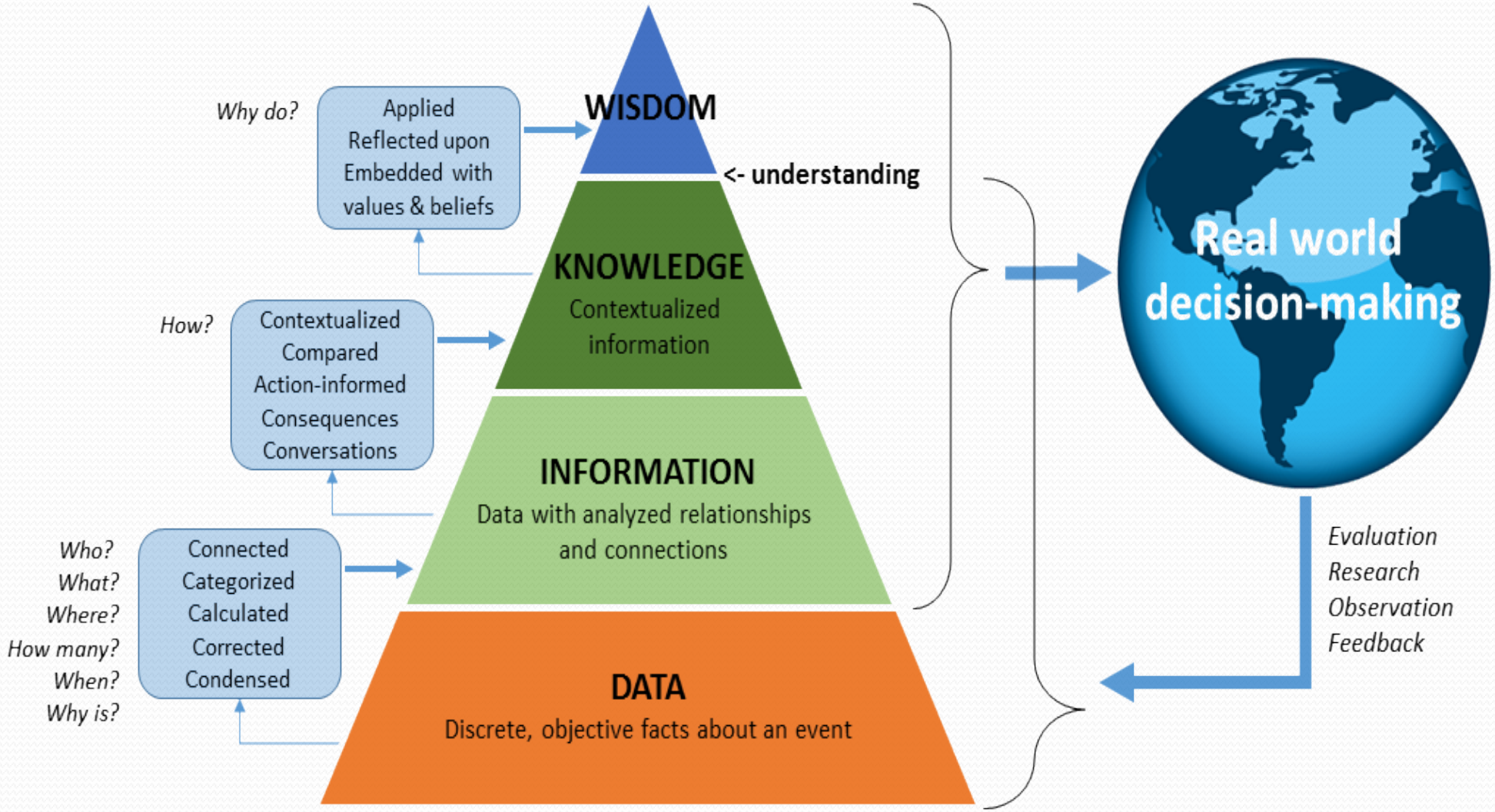
- **Data are the raw facts** that can be processed by any computing machine.
- When data are **processed, organized, structured or presented** in a given context so as to make them useful, they are called Information.
- So, **Information** is data that has been processed in such a way as to be meaningful to the person who receives it.
- It may be any thing that is communicated.
- Hence, the information is an stimulus that has some meaning for its receiver.

Data Vs Information



Knowledge

- Information may further be processed and/or manipulated to form knowledge.
- Knowledge is the concise and appropriate collection of information in a way that makes it useful.
- **Hence,** Information refers to processed data about someone or something, while the knowledge refers to useful information gained through learning and experience.
- **For example,** “86" is data, "your marks is 86" is information, and "It is result of your hard work" is knowledge.

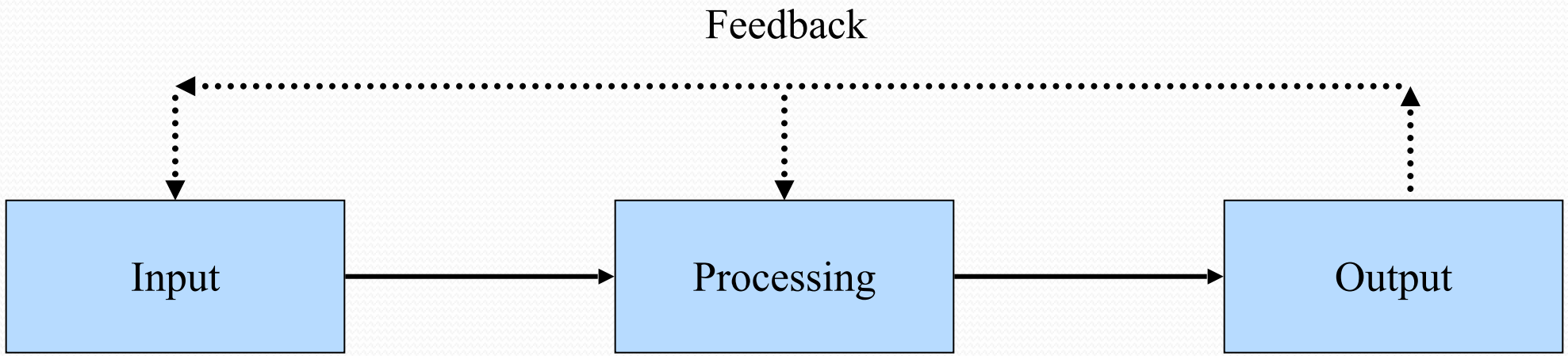

Why do?
Applied
Reflected upon
Embedded with
values & beliefs
WISDOM
<- understanding
How?
Contextualized
Compared
Action-informed
Consequences
Conversations
KNOWLEDGE
Contextualized
information
Who?
What?
Where?
How many?
When?
Why is?
Connected
Categorized
Calculated
Corrected
Condensed
INFORMATION
Data with analyzed relationships
and connections
DATA
Discrete, objective facts about an event
Real world
decision-making
Evaluation
Research
Observation
Feedback

What is an Information System?

- An **information system** is an arrangement of **people, data, processes, interfaces, networks, and technology** that interact for the purpose of supporting and improving both day-to-day operations in a business (sometimes called ***data processing), as well as supporting the problem solving and decision making*** needs of management (sometimes called ***information services).***

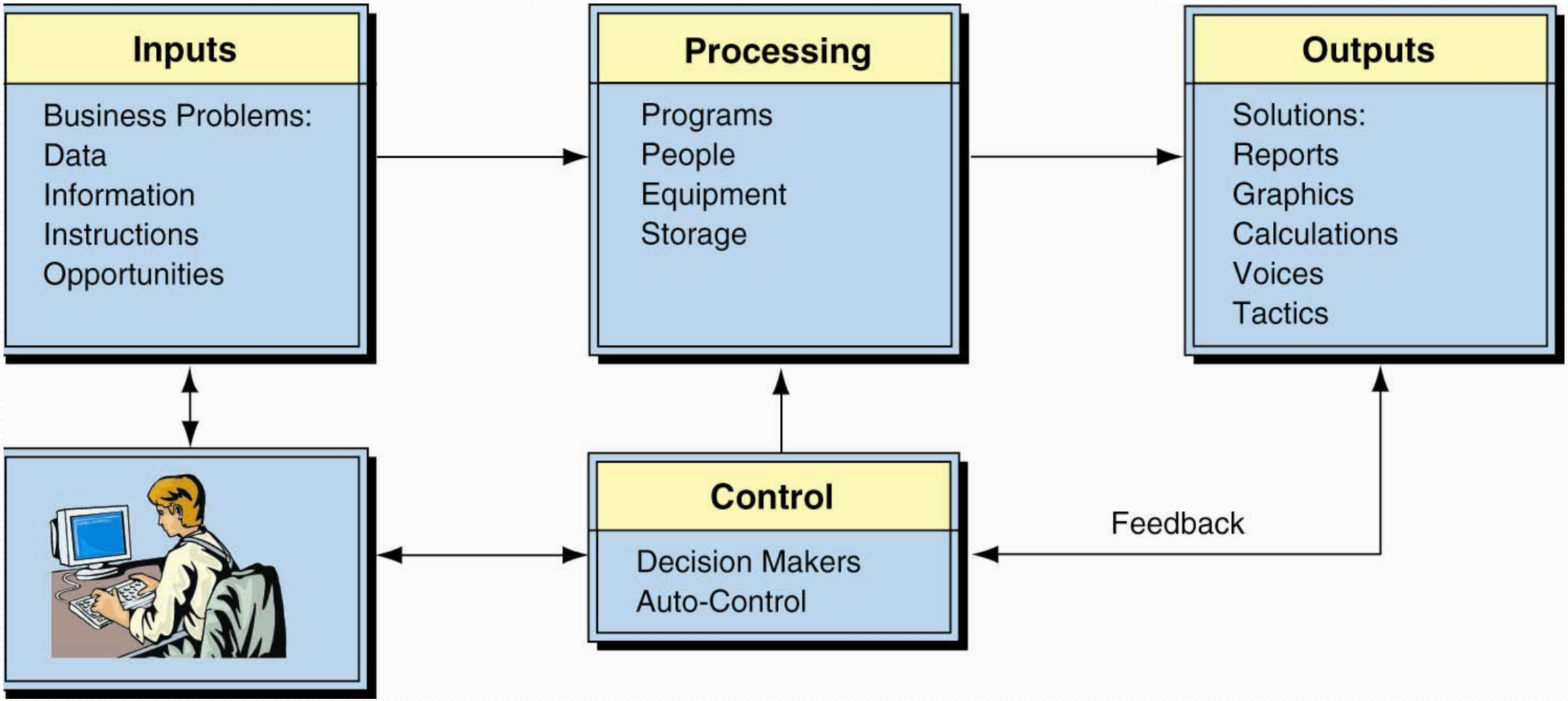
What is an Information System?

- An **information system (IS)** collects, processes, stores, analyzes, and disseminates information for a specific purpose.
- Like any other system, an information system includes ***inputs*** (data, instructions) and ***outputs*** (reports, calculations).
- It ***processes*** the inputs by using Information technology and produces outputs that are sent to users or to other systems via electronic networks and a ***feedback*** mechanism that ***controls*** the operation.



Model of an information system

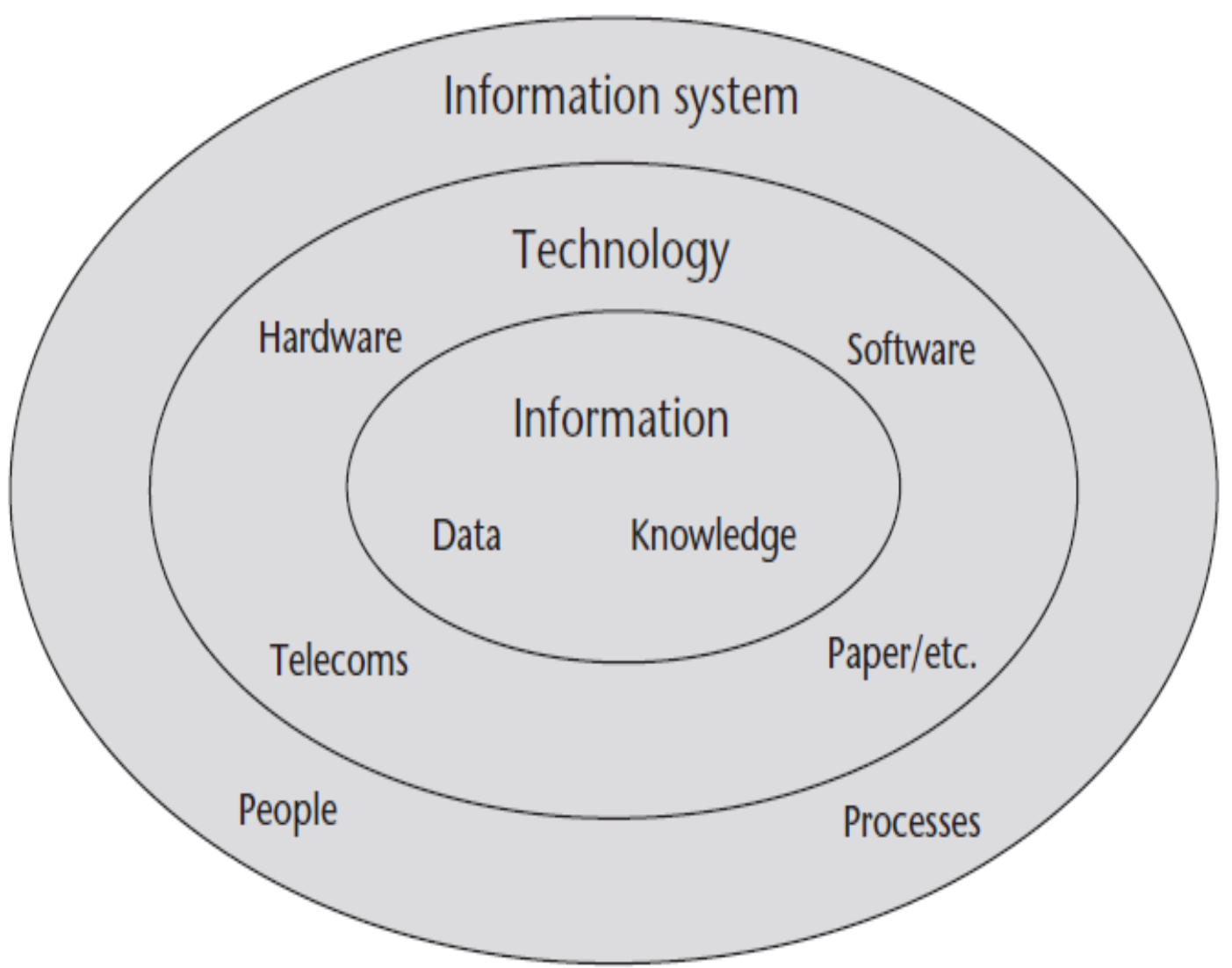
Information System Is A System



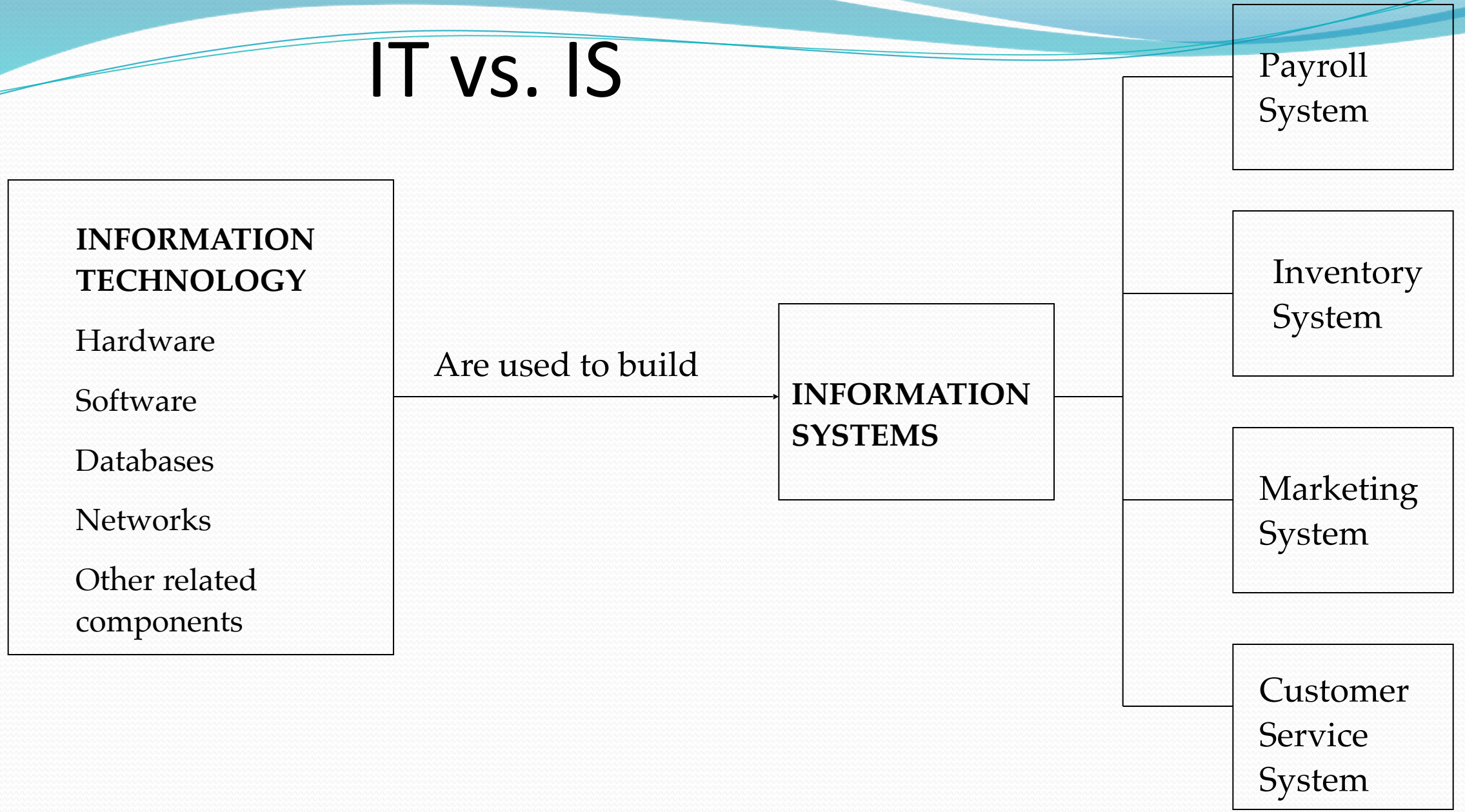
What is a Computer Application System?

- A **computer application is computer-based solution to one or more business** problems and needs. One or more computer applications are typically contained within an information system.
- **Information technology** has significantly expanded the power and potential of most information systems.
- **Information technology is a contemporary term that describes the** combination of computer technology (hardware and software) with telecommunications technology (data, image, and voice networks).

IT vs. IS


Information system
Technology
Hardware
Software
Information
Data
Knowledge
Telecoms
Paper/etc.
People
Processes

IT vs. IS


INFORMATION TECHNOLOGY
Hardware
Software
Databases
Networks
Other related components
Are used to build
INFORMATION SYSTEMS
Payroll System
Inventory System
Marketing System
Customer Service System

IT vs. IS

Information Technology

- IT describes the technological transfer, storage and accessibility of information.
- IT falls under the IS umbrella— it deals with the technological components that are used in the information systems themselves.
- By definition, IT is the study, design, implementation, support or management of computer-based information systems.
- IT encompasses hardware, software, databases and networks.
- IT is a subset of IS.
- IT is an engineering originating term.

Information System

- IS is an overarching umbrella term for the systems, people and processes that businesses use to create, store, manipulate and distribute information.
- IS is the bridge between technology and the user.
- For instance, the hardware and software used to create, maintain and access an electronic health record is an information system.
- IS is a business originating term.

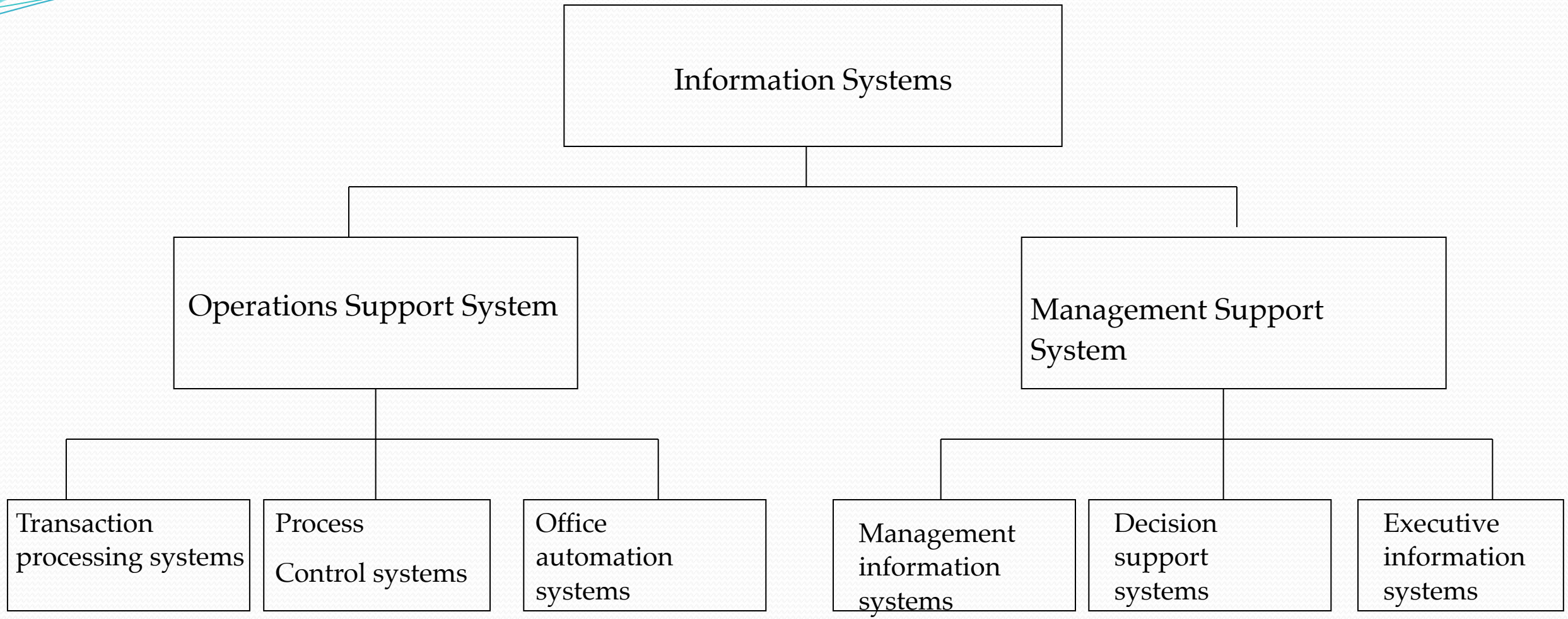
Evolution of Information System

- 1950 – 1960: Electronic Data Processing, Transaction Processing System
- 1960 to 1970: Management Information Systems
- 1970 to 1980: Decision Support Systems
- 1980 to 1990: Executive Information Systems
- 1990 to 2000: Knowledge Management Systems
- 2000 – present: E-Business

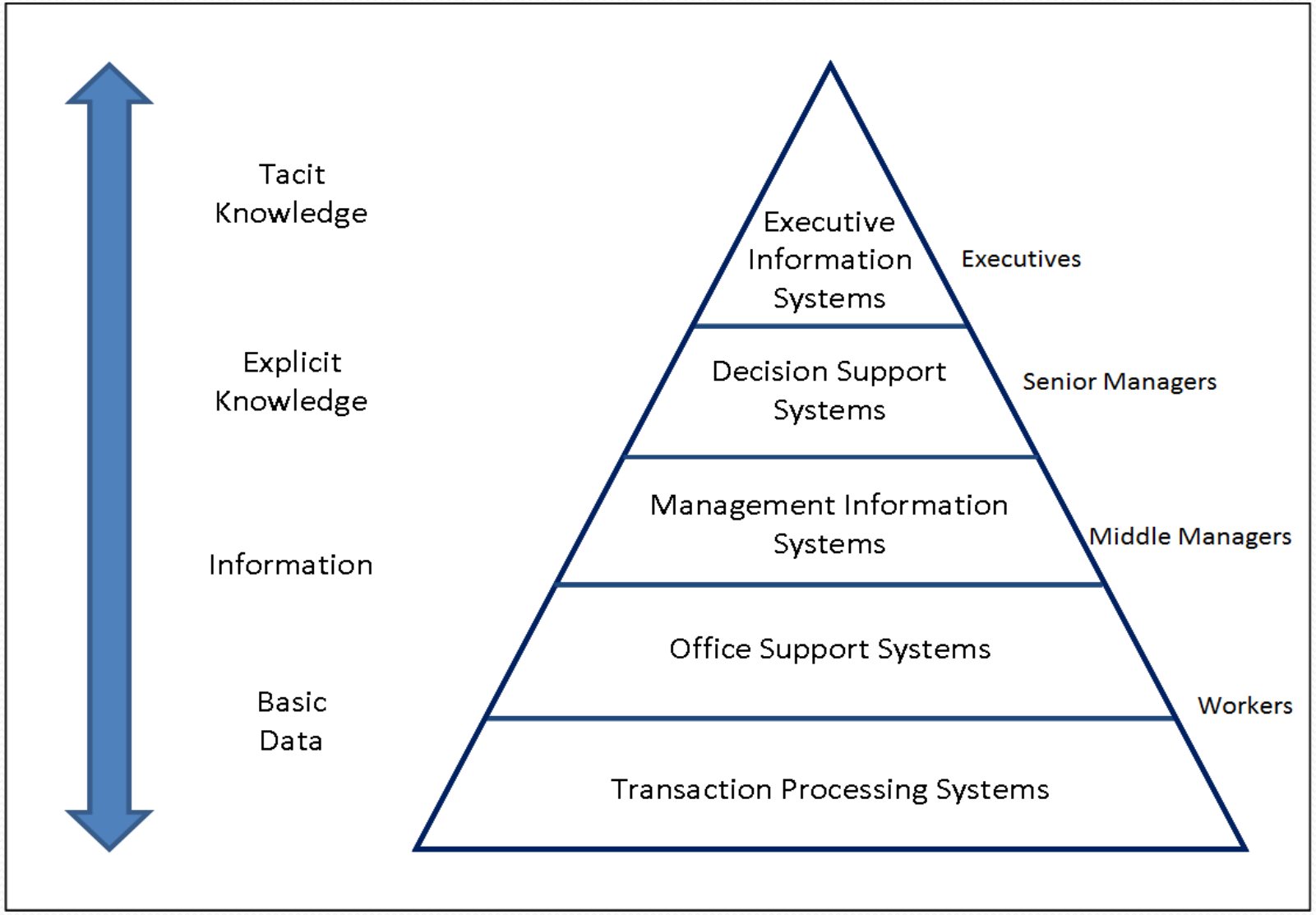
The Evolution of Information System : Summary

1950 – 1960	1960 – 1970	1970 – 1980	1980 – 1990	1990 – 2000	2000 – Present
Data Processing	**Management Reporting**	**Decision Support**	**Executive Support**	**Knowledge Management**	**E-Business**
Collects, stores, modifies and retrieve day-to-day transactions of an organization	Pre-specified reports and displays to support business decision-making	Interactive ad-hoc support for the decision-making process	Provide both internal and external information relevant to the strategic goals of the organization	Supports the creation, organization and dissemination of business knowledge	Greater connectivity, higher level of integration across applications
Help workers	Helps middle managers	Helps senior managers	Helps Executives	Help available enterprise wide	Helps global e-business

Classification of IS



Classification of Information System



- Higher up the pyramid, the less structured the decision.
- More summarized information.

- Lower down the pyramid, the more structured the decision.
- More detailed information.
- Internal orientation

Three types of decision/Problems

- Structured: given set of rules (objective)
- Semi-structured: objectivity and intuitive
- Unstructured: predominately intuitive

Structured

- Structured decisions are those which are made **according to specified procedures of rules** or structured decisions are those that are easily made from a given set of inputs.
- Deciding to send a reminder notice to a customer for an overdue balance is considered to be structured decision.

Semi-structured

- Semi-structured decisions are those for which information obtained from a computer system or information system is only a portion of the total knowledge needed to make decision.
- Advertise a new product or how much to spend on MIS.

Unstructured

- Unstructured decisions are novel, and significant.
- There is no cut and dried method for handling the problem because it hasn't arisen before or because it's precise nature and structure are mysterious or complex, or because it so important' that it deserves a custom tailored treatment.
- These, types of decisions often , involve a high degree of freedom.
- They may require a lot of creativity and intuitions from the decision maker to tell what factors will come into play in an unstructured play.

Office Automation Systems

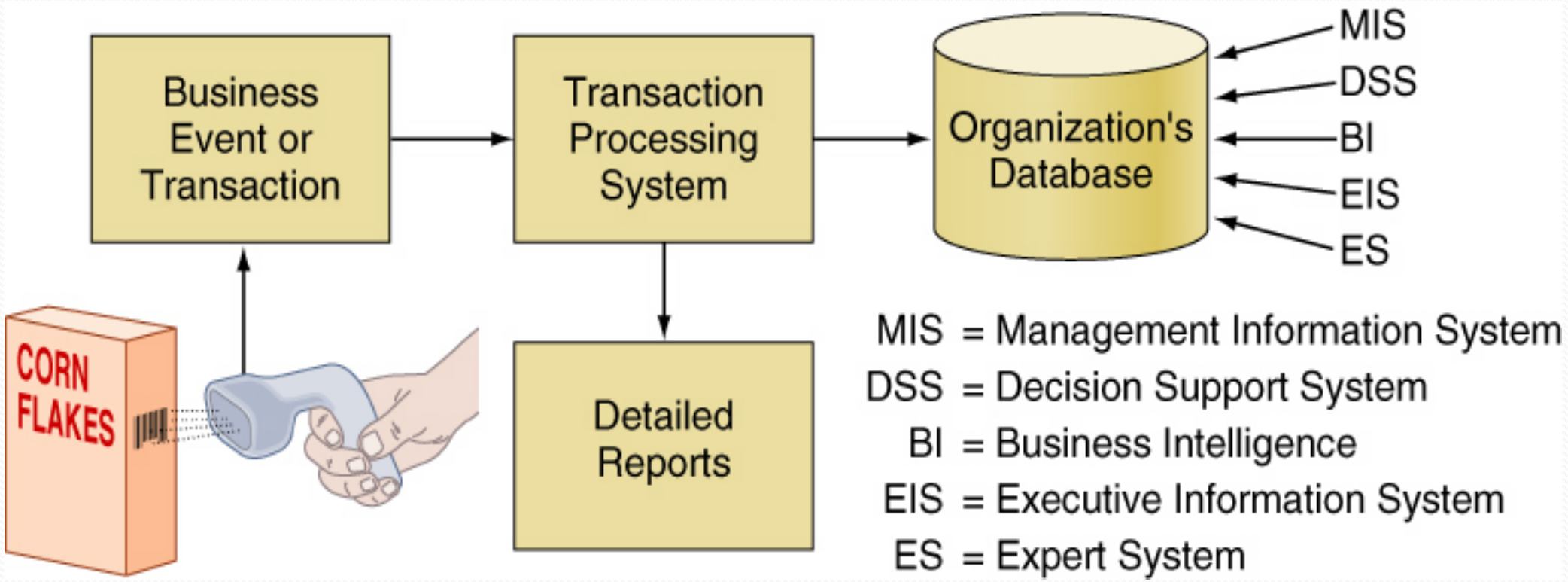
Office automation (OA) systems support the wide range of business office activities that provide for improved work flow and communications between workers, regardless of whether or not those workers are located in the same office.

- **Personal information systems** are those designed to meet the needs of a single user. They are designed to boost an individual's productivity.
- **Work group information systems** are those designed to meet the needs of a work group. They are designed to boost the group's productivity.

Office Automation Systems

- This is the use of computer systems to execute a variety of office operations, such as word processing, accounting, and e-mail. Office automation almost always implies a network of computers with a variety of available programs. Office automation (OA) is regarded as being of major importance in improving business efficiency in most financial institutions. Office automation systems are also used to automate routine office tasks, such as
  - (creation of documents,)document preparation
  - The billing ,
  - Personal information management (message distribution)
  - Information retrieval

How Transaction Processing Systems Manage Data



Transaction Processing Systems (TPS)

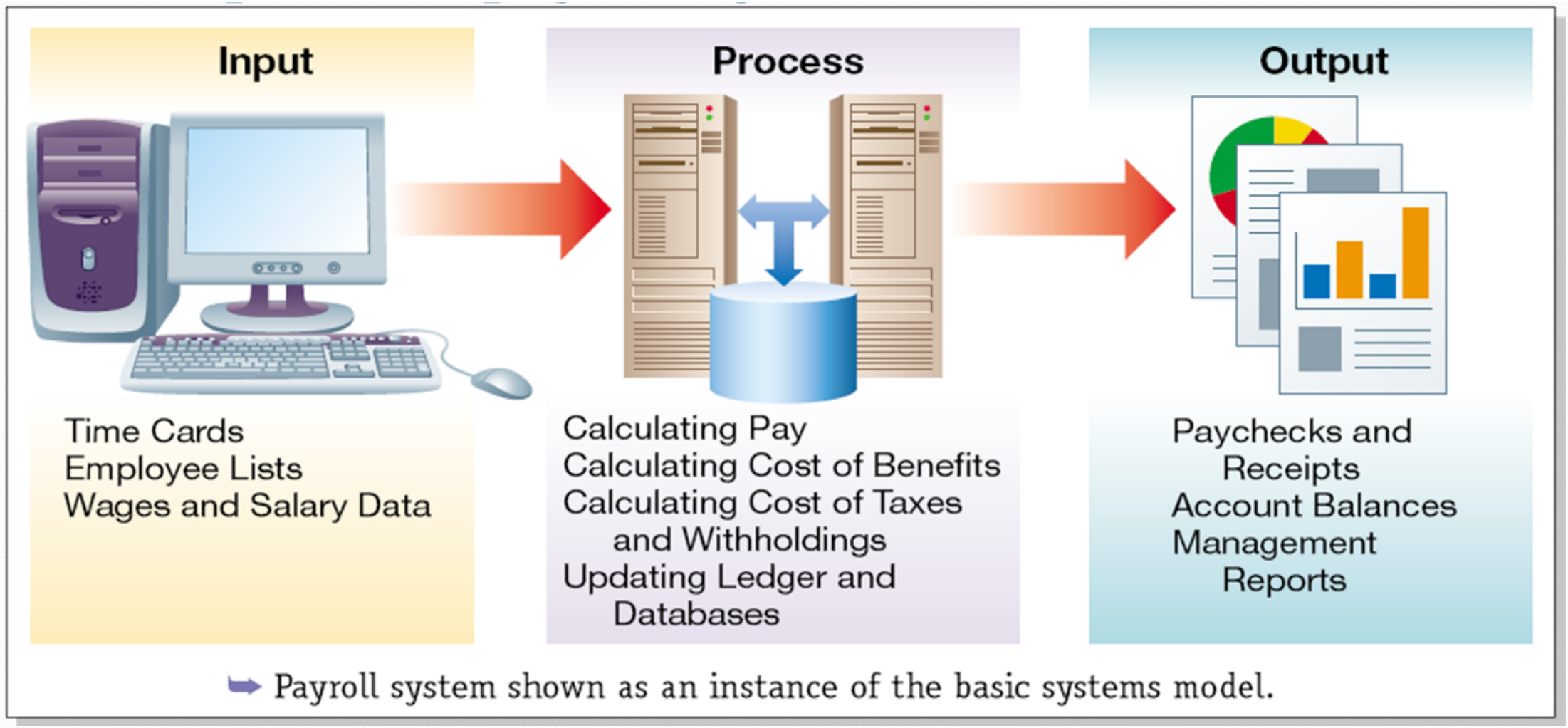
- Transaction processing systems are used to record day to day business transactions of the organization.
- These systems serve the operational level of the organization.

- TYPE: Operational-level
- INPUTS: transactions, events
- PROCESSING: updating; (e.g. stock levels)
- OUTPUTS: detailed reports
- USERS: operations personnel, supervisors
- DECISION-MAKING: highly structured. (sale of products)

EXAMPLE:

- **Point of Sale Systems** – records daily sales
- **Payroll systems** – processing employees salary, loans management, etc.
- **Stock Control systems** – keeping track of inventory levels
- **Airline booking systems** – flights booking management

Example: TPS payroll system



Payroll system shown as an instance of the basic systems model.

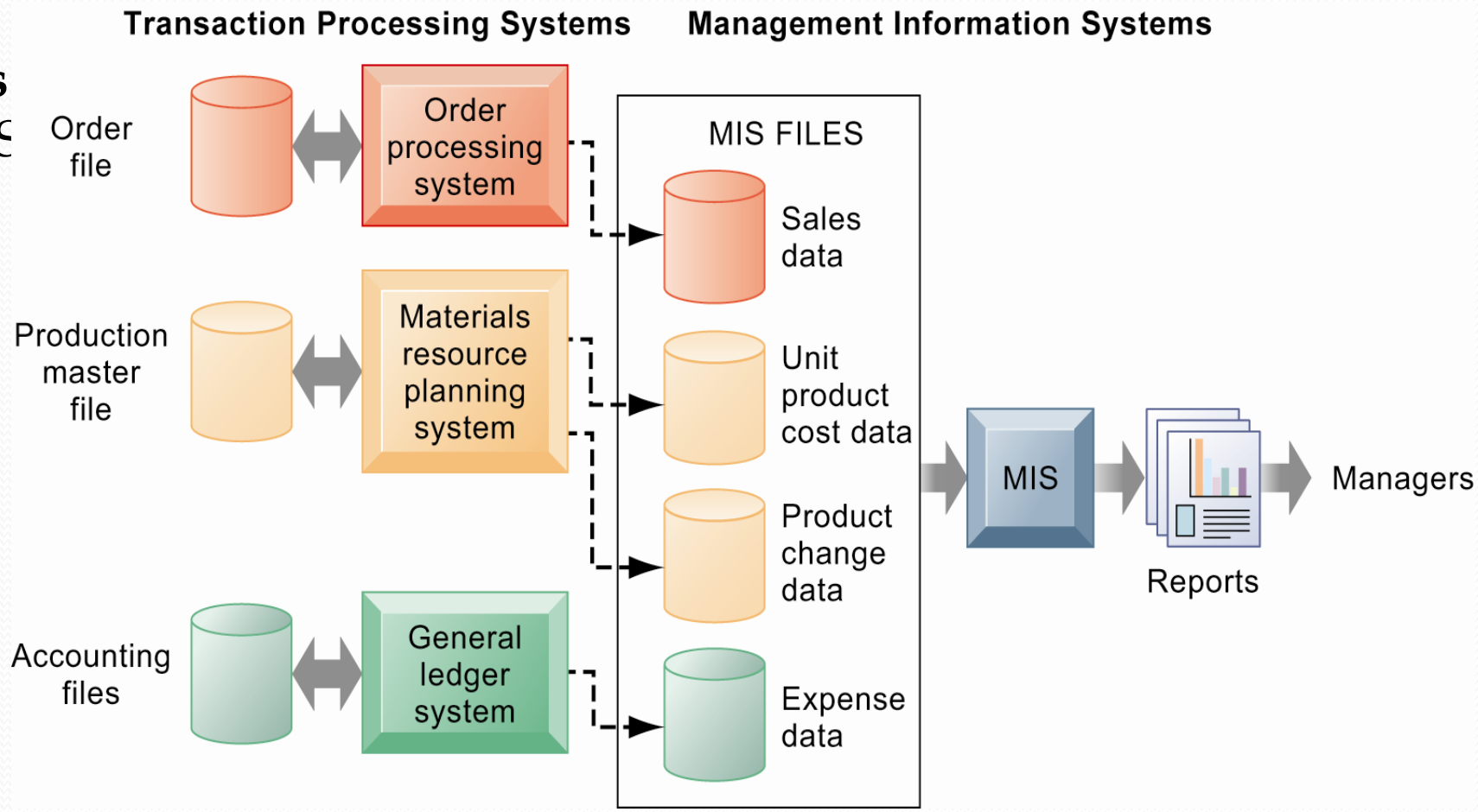
Management information systems(MIS)

- 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**.
- Management Information Systems (MIS) are used by **tactical managers** to monitor the organization's current performance status.
- The output from a transaction processing system is used as input to a management information system.
- The MIS system analyzes the input ,compare and summarizes the results to produce reports that tactical managers use to monitor, control and predict future performance.

Management information systems(MIS)

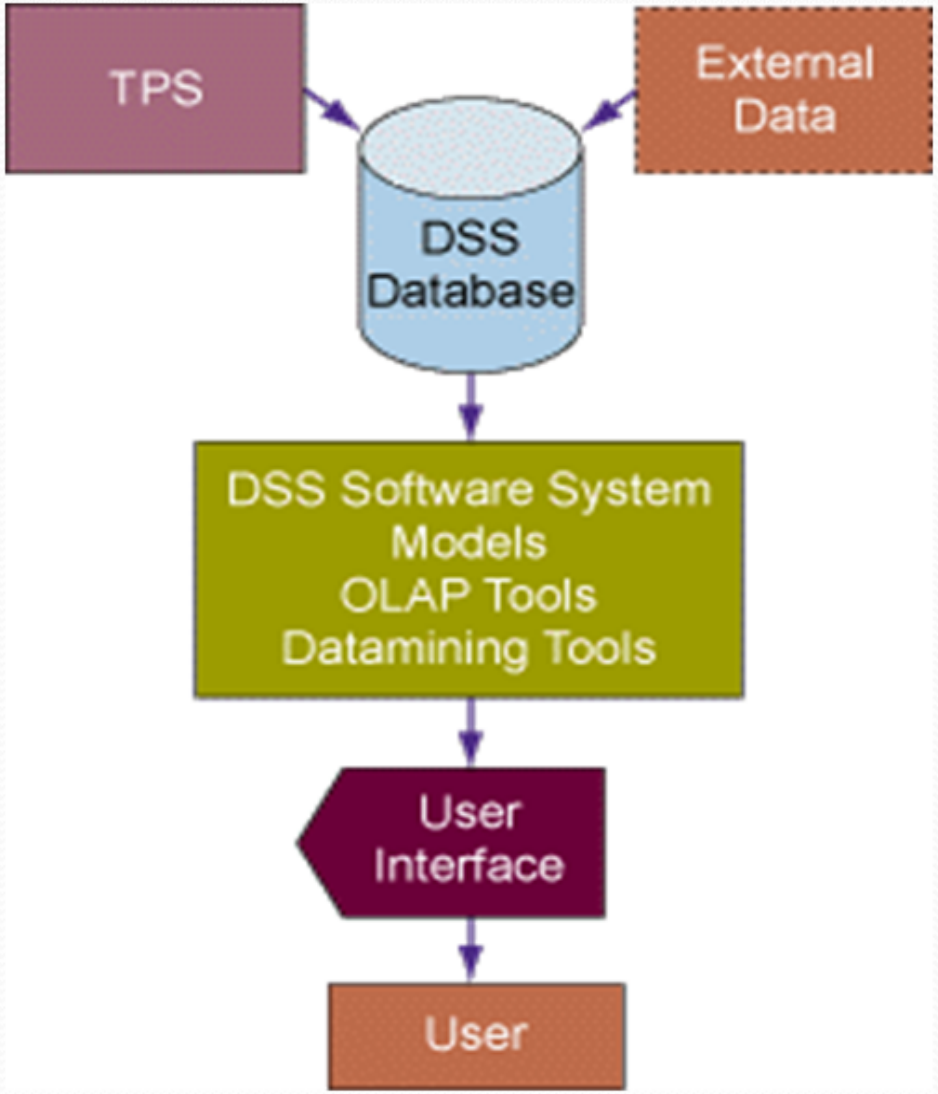
- **EXA PLES:**
- **Sales management systems** they get input from the POS
- **Budgeting systems** : gives an overview of how much money is spent within the organization

  for the short a long terms.
- **Human resource management system**: overall welfare of the employees, staff turnover, etc.



Decision Support System(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.



Decision Support System (DSS)

- DSS help managers make decisions that are unique, rapidly changing, and not easily specified in advance.
- Decision support systems use sophisticated mathematical models, and statistical techniques (probability, predictive modeling, etc.) to provide solutions, and they are very interactive.
- Although DSS use internal information from TPS and MIS, they often bring in information from external sources, such as current stock prices or product prices of competitors.

- **NOTE:** Will be discussed in detail in **chapter-4**

Executive Support Systems (ESS)

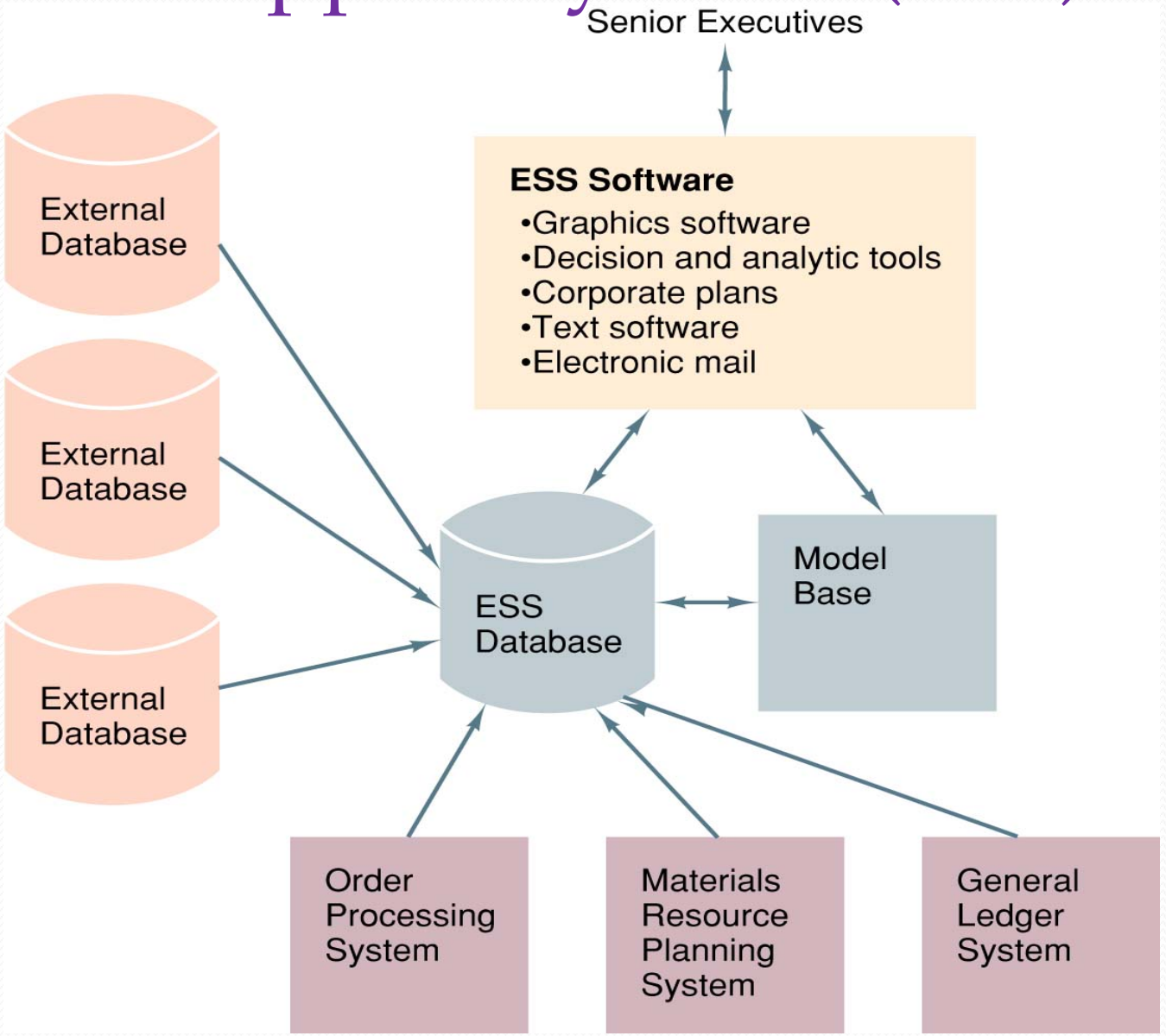
Information system at the strategic level of an organization that address unstructured decision making through advanced graphics and communications.

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

Executive Support Systems (ESS)



Executive Support Systems (ESS)

- Senior managers use a category of information systems called **executive support systems (ESS)** to make decisions.
- ESS serves the strategic level of the organization.
- They address unstructured decisions and create a generalized computing and communications environment rather than providing any fixed application or specific capability.
- ESS employs the most advanced graphics software and can deliver graphs and data from many sources immediately to a senior executive's.

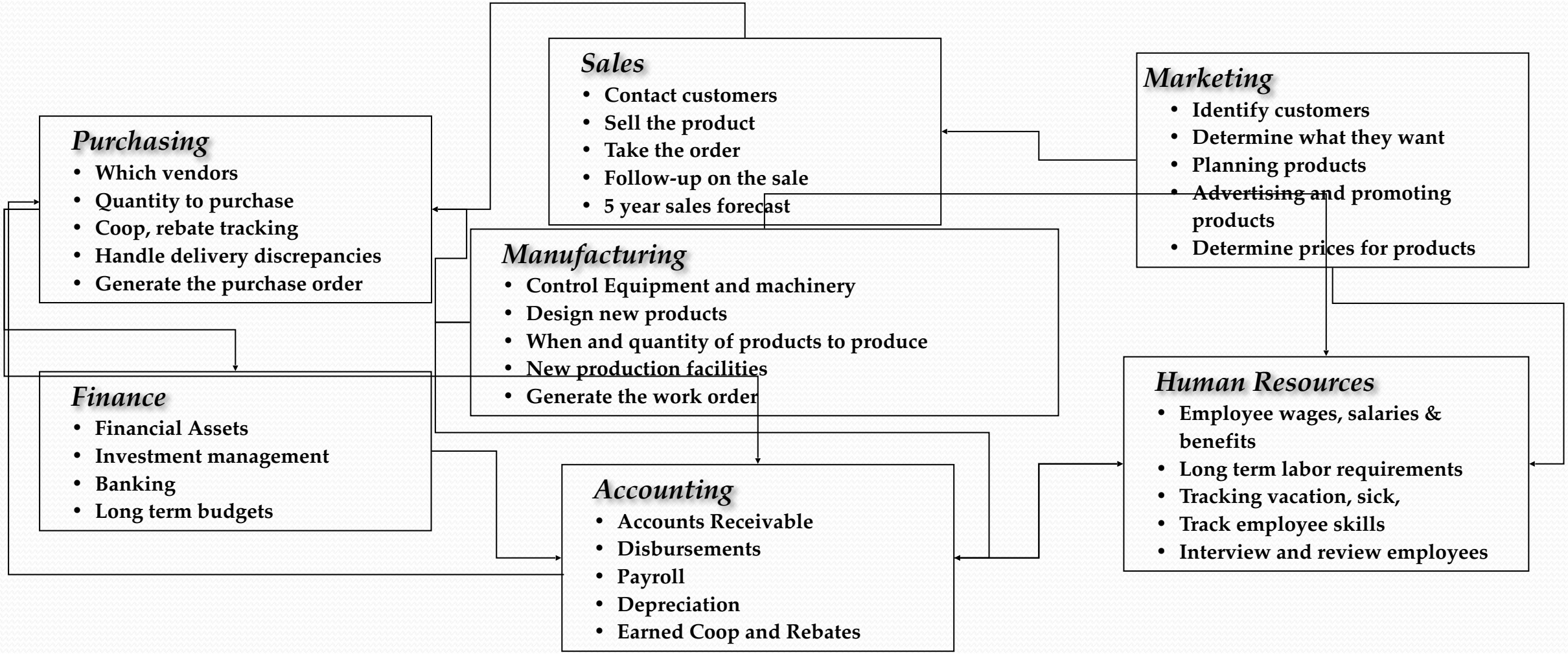
Executive Support Systems (ESS)

- Unlike the other types of information systems, ESS is not designed primarily to solve specific problems.
- ESS is designed to incorporate data about external events such as new tax laws or competitors, but they also draw summarized information from internal MIS and DSS.
- Instead, ESS provides a generalized computing and telecommunications capacity that can be applied to a changing array of problems.
- While many DSS are designed to be highly analytical, ESS tends to make less use of analytical models.

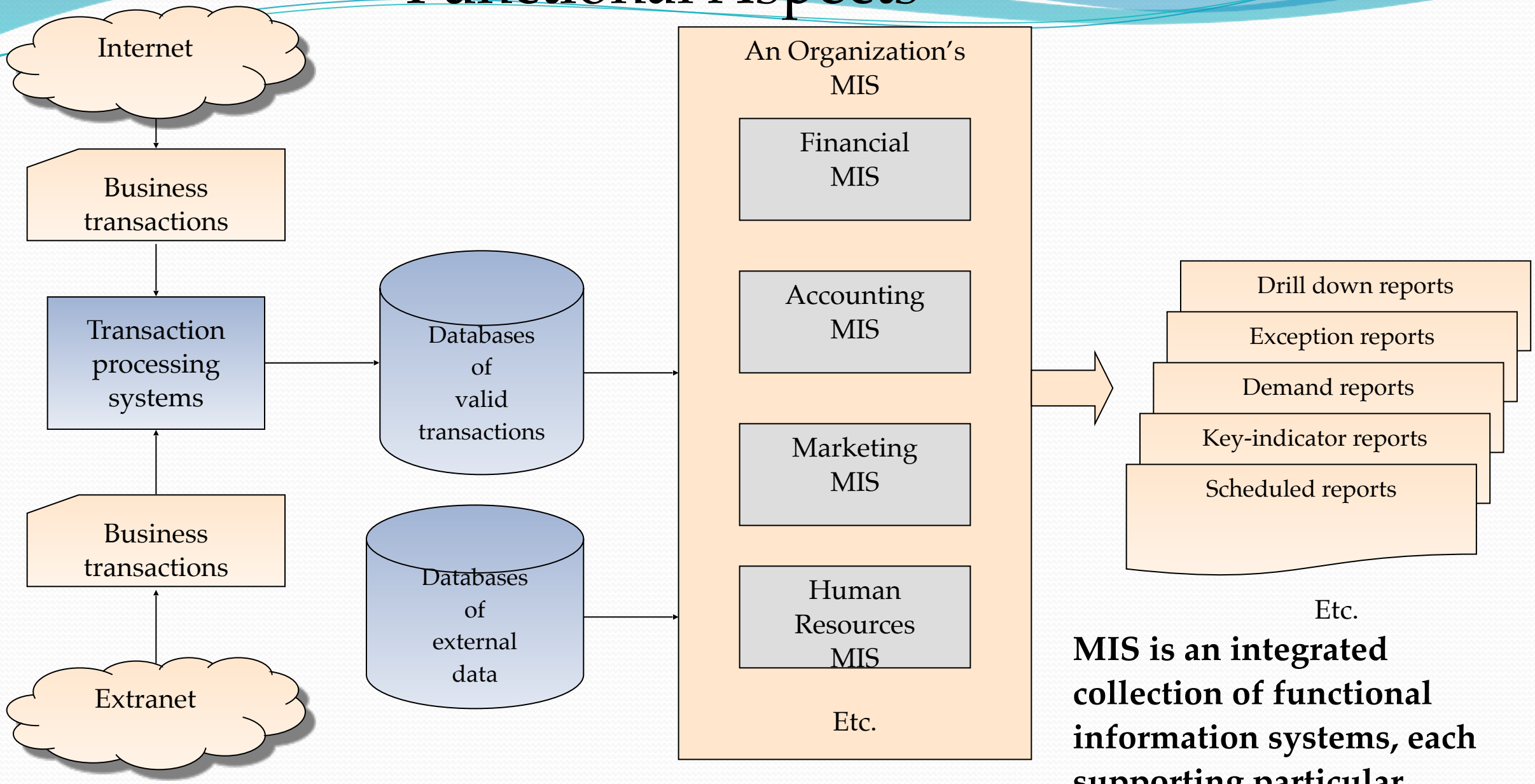
Features/Properties of an ESS

- **Ease of use**
  - The system must be fast and extremely simple to use as it will be used by busy executives.
- **Access to data**
  - There must be unhindered rapid access to data permitting vertical and horizontal exploration.
- **Data Analysis**
  - EIS should provide facilities for such things as ratios, trend calculations, and data integration forecasts.
- **Quality Presentation**
  - The system should provide interesting and understandable formats using colours, graphics, and diagrams.

Information System - Functional Perspectives



Functional Aspects

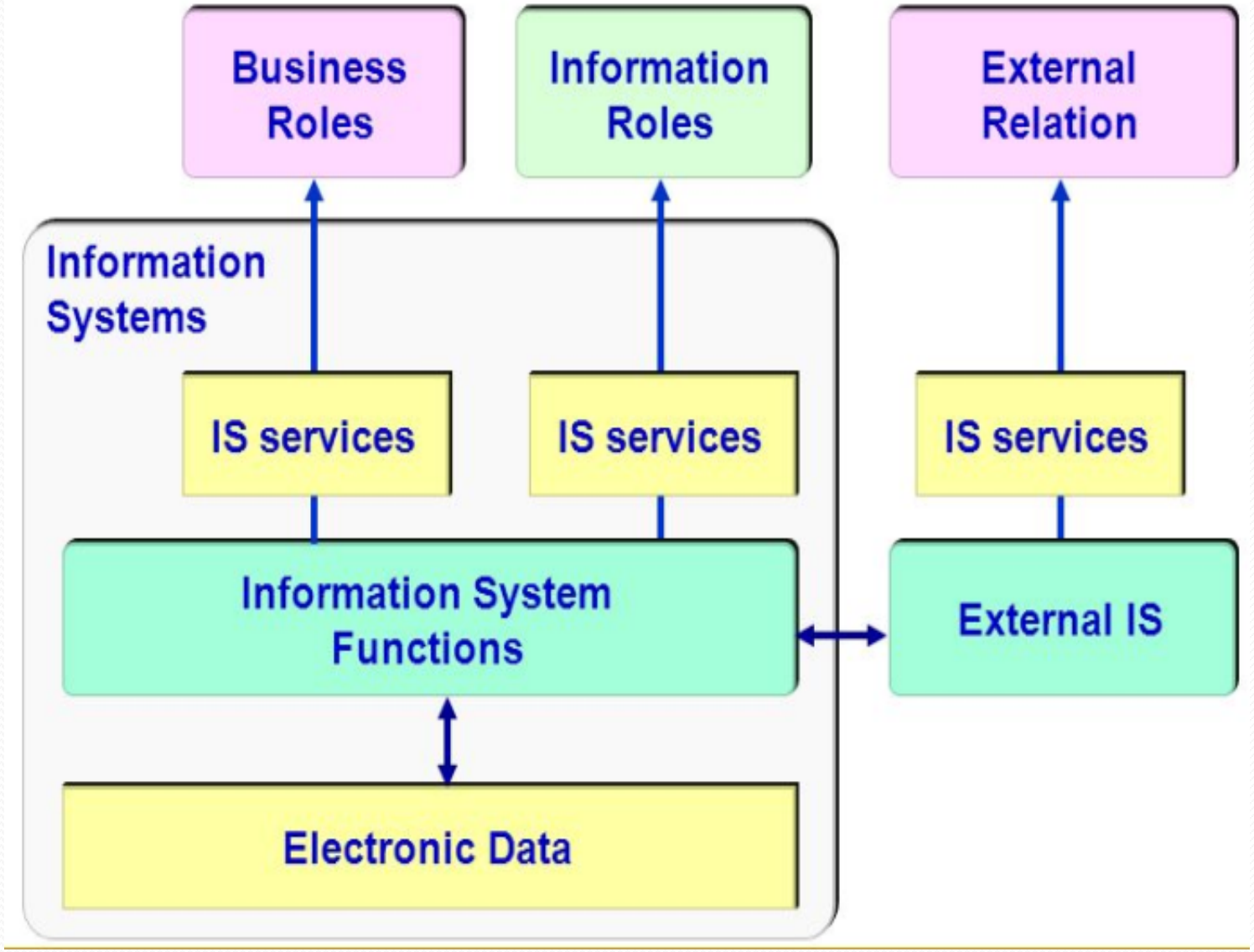


MIS is an integrated collection of functional information systems, each supporting particular functional areas.

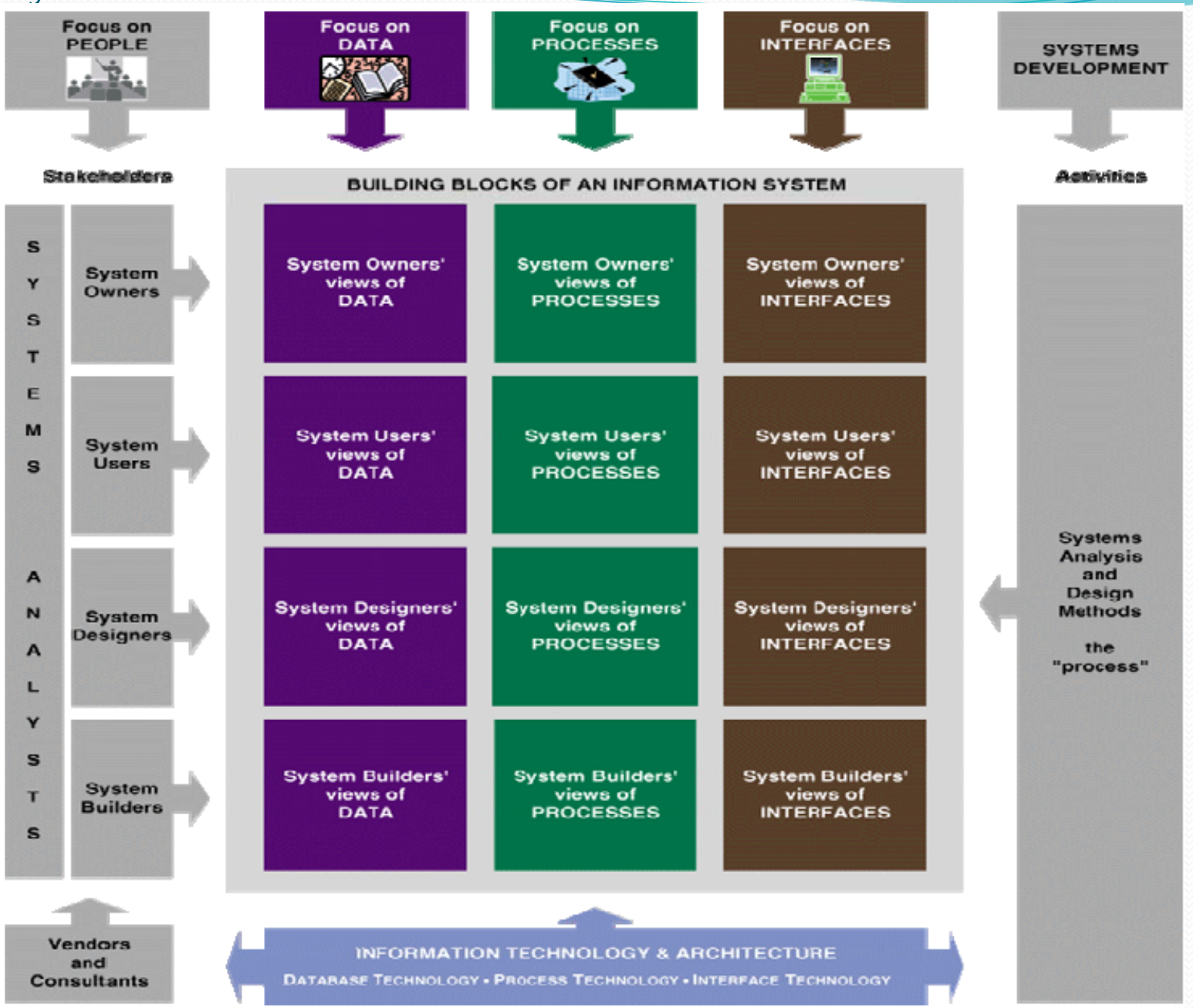
Information System Architecture

- An information system architecture is a formal definition of the business processes and rules, systems structure, technical framework, and product technologies for a business or organizational information system.
- An information system architecture usually consists of four layers:
  - Business process architecture,
  - Systems architecture,
  - Technical architecture,
  - Product delivery architecture.

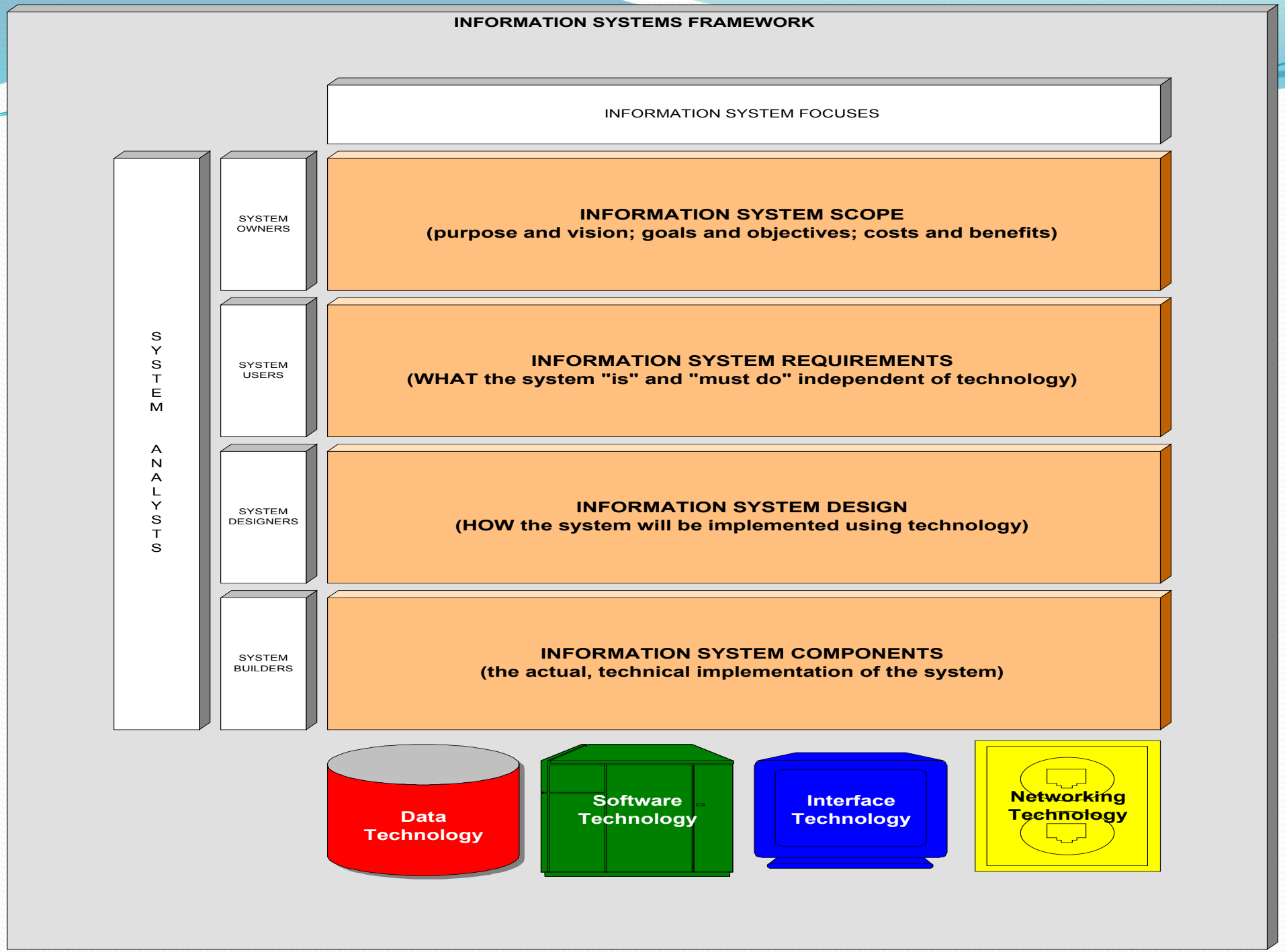
Information System Architecture



Information System Architecture



Information System Perspectives



A Framework For Information Systems Architecture

- **What is an Information Systems Architecture?**
  - An **information systems architecture** provides a unifying framework into which various people with different perspectives can organize and view the fundamental building blocks of information systems.
  - Stakeholders have different views of the system and each has something "at stake" in determining the success of the system.
  - **Stakeholders** can be broadly classified into four groups:
    - System Owners
    - System Users
    - System Designers
    - System Builders

Perspectives - The People Side of Information Systems

- **What are Information Workers?**
  - The term **information worker** (also called knowledge worker) was coined to describe those people whose jobs involve the creation, collection, processing, distribution, and use of information.
- **System Owners**
  - **System owners** are an information system's sponsors and chief advocates. They are usually responsible for budgeting the money and time to develop, operate, and maintain the information system. They are also ultimately responsible for the system's justification and acceptance.

Perspectives - The People Side of Information Systems

System Users

- **System users** are the people who use (and directly benefit from) the information system on a regular basis – capturing, validating, entering, responding to, storing, and exchanging data and information.
- There are many classes of system users including:
  - Internal Users
    - Clerical and service workers
    - Technical and professional staff
      - **Knowledge workers** are a subset of information workers whose responsibilities are based on a specialized body of knowledge.
    - Supervisors, middle managers, and executive managers

Perspectives - The People Side of Information Systems

- **System Users**
  - There are many classes of system users including: (continued)
    - Remote and Mobile Users
    - External Users
- **System Designers**
  - **System designers** translate users' business requirements and constraints into technical solutions. They design the computer files, databases, inputs, outputs, screens, networks, and programs that will meet the system users' requirements. They also integrate the technical solution back into the day-to-day business environment.

Perspectives - The People Side of Information Systems

- **System Builders**
  - **System builders** construct the information system components based upon the design specifications from the system designers. In many cases, the system designer and builder for a component are one and the same.
  - The applications programmer is the classic example of a system builder.
- **The Role of the System Analyst**
  - For the system owners and users, the analyst typically constructs and validates their views.
  - For the system designers and builders, the analyst (at the very least) ensures that the technical views are consistent and compatible with the business views.

Qualities of Information System

The main qualities of good management information system are:

1.Relevance

2. Accuracy

3. Timely

4. Exhaustive

5. Cost-Effective

Qualities of Good Management Information System

1. Relevance: Information is good only if it is relevant. This means that it should be pertinent and meaningful to the decision maker and should be in his area of responsibility.

2. Accuracy: A key measure of the effectiveness of an MIS is the accuracy and reliability of its information. The accuracy of the data it uses and the calculations it applies determine the effectiveness of the resulting information.

3. Timely: Information must be delivered at the *right time and the right place to the right person.* Information outside of the requested time frame may skew information and lead to an improperly informed decision.

Qualities of Good Management Information System

4. **Completeness:** An effective MIS presents all the most relevant and useful information for a particular decision. If some information is not available due to missing data, it highlights the gaps and either displays possible scenarios or presents possible consequences resulting from the missing data.

5. **Cost-Effective:** The MIS needs to be a cost-effective and efficient system for gathering information. The information is not desirable if the solution is more costly than the problem.

6. **Usefulness:** The information a manager receives from an MIS may be relevant and accurate, but it is only useful if it helps him with the particular decisions he has to make.

7. **Available:** Information may be useless if it is not readily accessible ‘ in the desired form, when it is needed.

Information Systems Resources

- The individual **data** being processed through the use of **hardware** and **software** and shared through **network** connection has allowed us to utilize more **information** in less time.

  ✓Networks …connected in some manner that allows to sharing of resources

  ✓Hardware and Peripheral Devices …tangible and can be touched

  ✓Software …intangible and can't be touched physically

  ✓Data …one piece of a record

  ✓People …work together to create usable information

Managing Information Resources

- Information Resources
  - Hardware
  - Software
  - Databases
  - Networks
  - Procedures
  - Security facilities
  - Physical buildings

Balanced Scorecard(BSC)

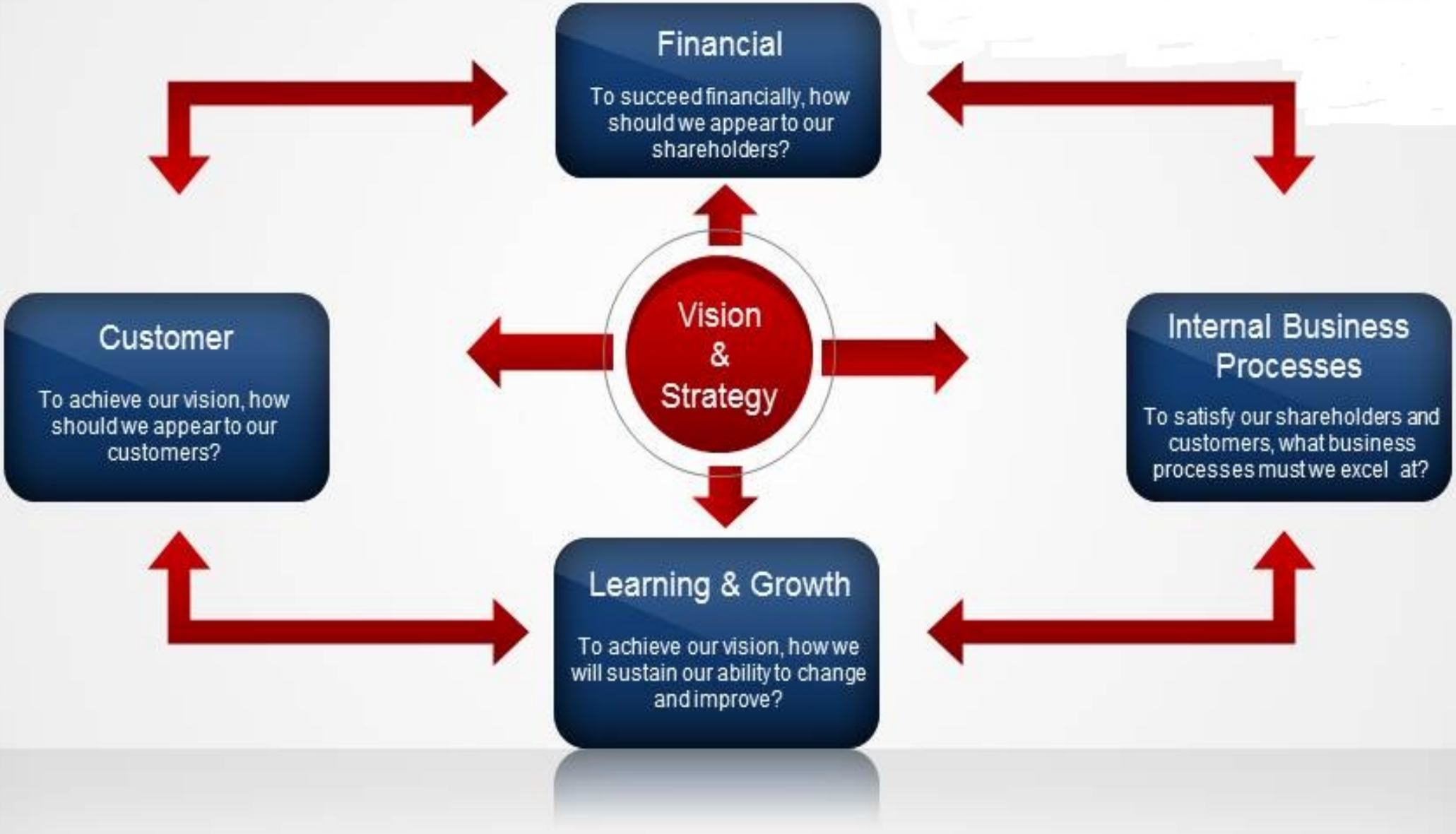
- A balanced scorecard is a performance metric used in strategic management **to identify and improve various internal functions** of a business and their resulting external outcomes.
- The balanced scorecard was first introduced by accounting academic Dr. Robert Kaplan and business executive and theorist Dr. David Norton.
- The balanced scorecard system aims to **provide a more comprehensive view to managers** by complementing financial measures with additional metrics that gauge performance in areas such as customer satisfaction and product innovation.

Four perspectives of balanced scorecard

1) **Financial analysis,** which includes measures such as operating income, sales growth and return on investment.
2) **Customer analysis,** which looks at customer satisfaction and retention.
3) **Internal analysis**, which looks at how business processes are linked to strategic goals.
4) **Learning and growth analysis,** which assesses employee satisfaction and retention, as well as information system performance.

Balanced Score Card ICT

Balanced Scorecard Perspectives



Building a balanced scorecard

- **Preparation:** The organization identifies the business unit for which a top-level scorecard is appropriate.
- **First round of interviews:** A balanced scorecard facilitator interviews senior managers for about 90 minutes each to obtain input on strategic goals and performance measures.
- **First executive workshop**: Top management arranges with the facilitator to start developing the scorecard by reaching a consensus on the mission and strategy and linking the measurements to them.
- **Second round of interviews:** The facilitator reviews, consolidates and documents input from the executive workshop and interviews each senior executive to form a tentative balanced scorecard.

Cont..

- **Third executive workshop:** Senior executives reach a consensus on the vision, objectives and measurements hashed out in the prior two workshops and develop stretch targets for each measure; once this is complete, the team agrees on an implementation plan.
- **Implementation:** A newly formed team implements a plan that aims to link performance measures to databases and IT systems, to communicate the balanced scorecard throughout the organization and to encourage the development of second-level metrics for decentralized units.
- **Periodic reviews:** A quarterly or monthly "blue book" on the balanced scorecard measures is prepared and viewed by managers. The balanced scorecard metrics are re-visited annually as a part of the strategic planning process.

Thank you

Next Class:

Chapter-2: Control, Audit and Security of Information system