SYSTEMS ANALYSIS AND DESIGN

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FAITH • INTEGRITY • EXCELLENCE

Presentation Content

- Introduction
- Systems Analysis and Design Overview
  - *System*
  - *Information System*
- Information System Development Life Cycle
  - *Four fundamental phases*
    - 1: Planning,
    - 2: Analysis
    - 3: Designing,
    - 4: Implementation

Introduction

- Systems Analysis and Design is an active field in which analysts repetitively learn new approaches and different techniques for building the system more effectively and efficiently.
- The primary objective of systems analysis and design is to improve organizational systems.
- This course provides a basic understanding of:
  - *system characteristics,*
  - *system design,*
  - *and its development processes.*
- It is a good introductory guide that provides an overview of all the concepts necessary to build a system.

Systems

- What is a System?
  - a set of things working together as parts of a mechanism
  - an interconnecting network; a complex whole.

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

Systems

Constraints of a System

- *A system must have some **structure and behavior** which is designed to achieve a predefined objective.*
- ***Interconnectivity** and **interdependence** must exist among the system components.*
- *The **objectives of the organization** have a **higher priority** than the objectives of its subsystems.*

- For example, traffic management system, payroll system, automatic library system, human resources information system.

System Properties

- A system has the following properties −
- Organization - implies structure and order.
- It is the arrangement of components that helps to achieve predetermined objectives.

❑Interaction - It is defined by the manner in which the components operate with each other.

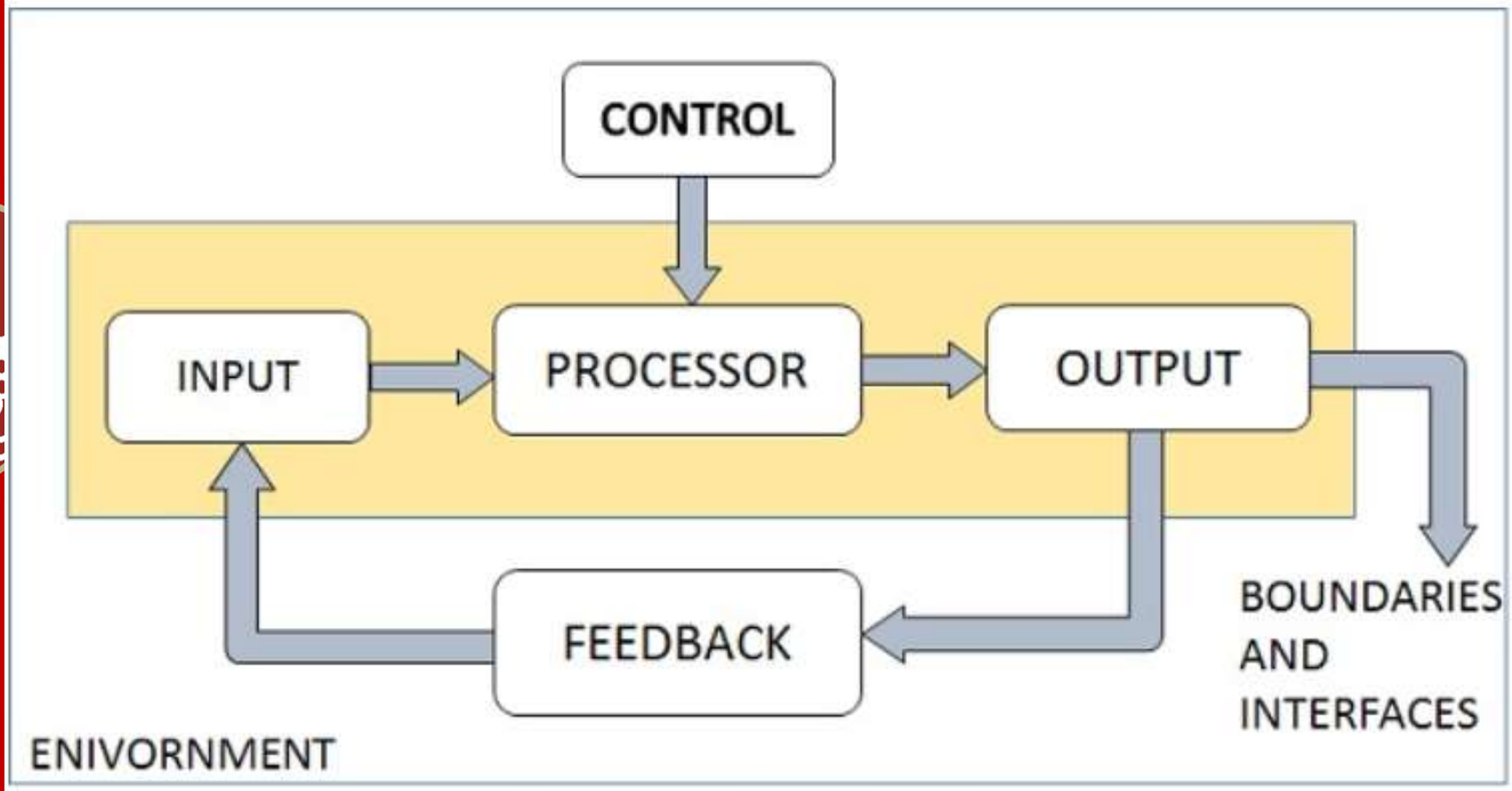
- For example, in an organization, purchasing department must interact with production department and payroll with personnel department.

❑Interdependence - means how the components of a system depend on one another.

- For proper functioning, the components are coordinated and linked together according to a specified plan. The output of one subsystem is the required by other subsystem as input.
- Integration - is concerned with how a system components are connected together.
- It means that the parts of the system work together within the system even if each part performs a unique function.

System Elements

- Elements of a System
- The following diagram shows the elements of a system −



Element of a Systems

Outputs and Inputs

- *The main aim of a system is to produce an output which is useful for its user.*
- *Inputs are the information that enters into the system for processing.*
- *Output is the outcome of processing.*

Processor(s)

- *The processor is the element of a system that involves the actual transformation of input into output.*
- *It is the operational component of a system. Processors may modify the input either totally or partially, depending on the output specification.*
- *As the output specifications change, so does the processing. In some cases, input is also modified to enable the processor for handling the transformation.*

Control

- *The control element guides the system.*
- *It is the decision–making subsystem that controls the pattern of activities governing input, processing, and output.*
- *The behavior of a computer System is controlled by the Operating System and software. In order to keep system in balance, what and how much input is needed is determined by Output Specifications.*

- **Feedback**
  - *Feedback provides the control in a dynamic system.*
  - *Positive feedback is routine in nature that encourages the performance of the system.*
  - *Negative feedback is informational in nature that provides the controller with information for action.*

❑**Environment**

  - *The environment is the "supersystem" within which an organization operates.*
  - *It is the source of external elements that strike on the system.*
  - *It determines how a system must function. For example, vendors and competitors of organization's environment, may provide constraints that affect the actual performance of the business.*

❑**Boundaries and Interface**

  - *A system should be defined by its boundaries. Boundaries are the limits that identify its components, processes, and interrelationship when it interfaces with another system.*
  - *Each system has boundaries that determine its sphere of influence and control.*
  - *The knowledge of the boundaries of a given system is crucial in determining the nature of its interface with other systems for successful design.*

Information Systems

People
The actors who interact in a business process

Business Processes
Goal-oriented activities conducted by a business

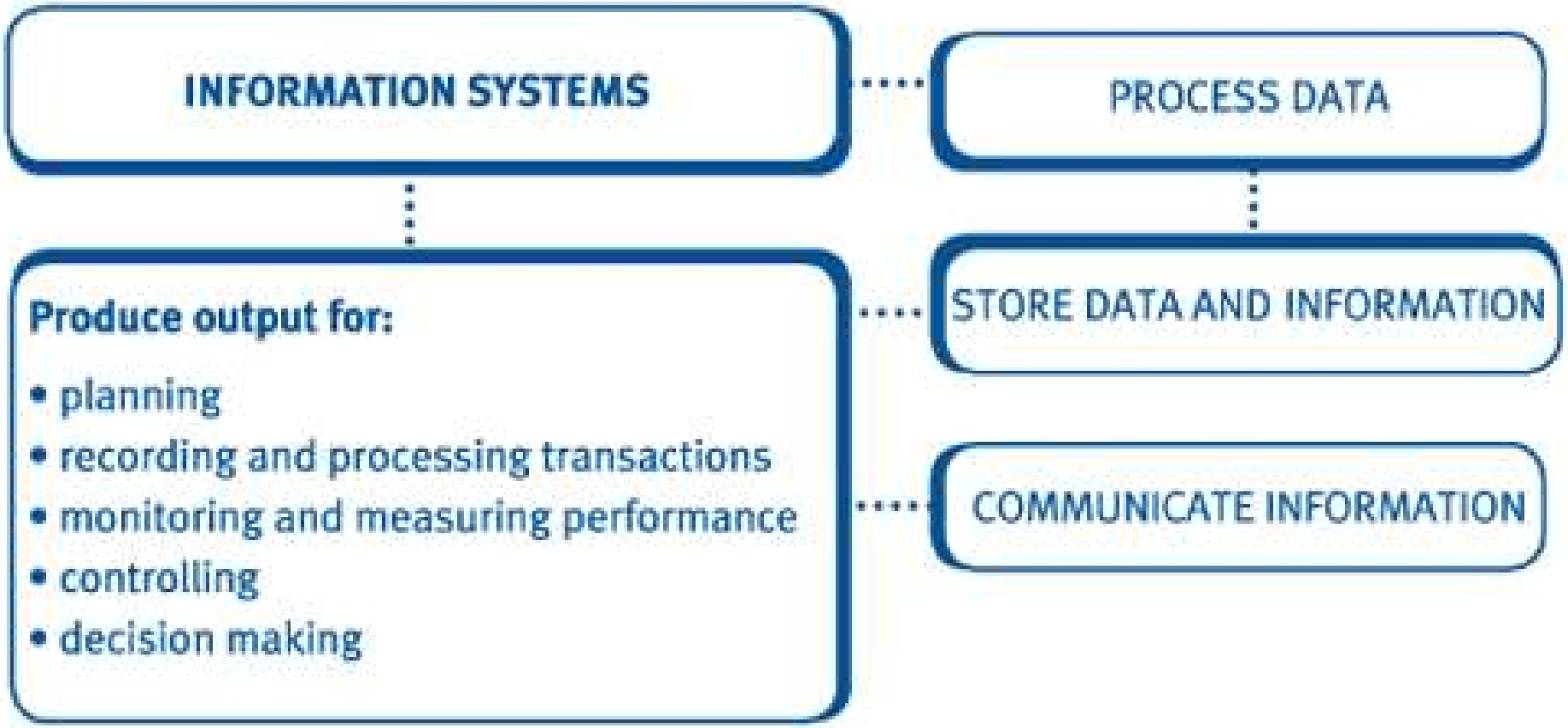
Information Technology
Hardware/software used to facilitate business activities

Information Systems

- IS can be any organised combination of people, hardware, software, communication network and data resources that collect, transform and disseminate information in an organisation.

- Some IS use single manual (paper and pencil) communication channels and others use a computer based information systems that use computer hardware and software, the internet and other telecommunication networks, computer based resources, managerial technique and many other information technologies to transform data into an endless variety of information product for consumers and business professional.

Information Systems



Categories of Information

Volume of Information	Type of Information	Information Level	Management Level	System Support
Low Consensed	Unstructured	Strategic Information	Upper	DSS
Medium Moderately Processed	Moderately Structured	Management Control Information	Middle	MIS
Large Detail Reports	Highly Structured	Operational Information	Lower	DPS

Strategic Information

- *This information is required by topmost management for long range planning policies for next few years. For example, trends in revenues, financial investment, and human resources, and population growth.*
- *This type of information is achieved with the aid of Decision Support System (DSS).*

Managerial Information

- *This type of Information is required by middle management for short and intermediate range planning which is in terms of months. For example, sales analysis, cash flow projection, and annual financial statements.*
- *It is achieved with the aid of Management Information Systems (MIS).*

Operational information

- *This type of information is required by low management for daily and short term planning to enforce day-to-day operational activities. For example, keeping employee attendance records, overdue purchase orders, and current stocks available.*
- *It is achieved with the aid of Data Processing Systems (DPS).*

Systems Development

Systems development is systematic process which includes phases such as:

- *planning,*
- *analysis,*
- *design,*
- *deployment,*
- *and maintenance.*

Systems Analysis

- It is a process of collecting and interpreting facts, identifying the problems, and decomposition of a system into its components.
- System analysis is conducted for the purpose of studying a system or its parts in order to identify its objectives.
- It is a problem solving technique that improves the system and ensures that all the components of the system work efficiently to accomplish their purpose.
- Analysis specifies **what the system should do**.

Systems Design

- It is a process of planning a new business system or replacing an existing system by defining its components or modules to satisfy the specific requirements. Before planning, you need to understand the old system thoroughly and determine how computers can best be used in order to operate efficiently.
- System Design focuses on **how to accomplish the objective of the system**.
- System Analysis and Design (SAD) mainly focuses on −
  - *Systems*
  - *Processes*
  - *Technology*

Process of System Design

- **System Design process** – a set of activities, methods, best practices, deliverables, and automated tools that stakeholders use to develop and continuously improve information systems and software
  - *Using a consistent process for system development:*
    - Create efficiencies that allow management to shift resources between projects
    - Produces consistent documentation that reduces lifetime costs to maintain the systems
    - Promotes quality

Where Do Systems Designs Projects Come From?

- **Problem** – an undesirable situation that prevents the organization from fully achieving its purpose, goals, and/or objectives.
- **Opportunity** – a chance to improve the organization even in the absence of an identified problem.
- **Directive** - a new requirement that is imposed by management, government, or some external influence.

Where Do Systems Design Projects Come From?

- Planned Projects
  - *An **information systems strategy plan** has examined the business as a whole to identify those system development projects that will return the greatest strategic (long-term) value to the business*
  - *A **business process redesign** has thoroughly analyzed a series of business processes to eliminate redundancy and bureaucracy and to improve efficiency and value added. Not it is time to redesign the supporting information system for those redesigned business processes.*

Where Do Systems Design Projects Come From?

- Unplanned projects
  - *Triggered by a specific problem, opportunity, or directive that occurs in the course of doing business.*
  - ***Steering committee** – an administrative body of system owners and information technology executives that prioritizes and approves candidate system development projects.*
  - ***Backlog** – a repository of project proposals that cannot be funded or staffed because they are a lower priority than those that have been approved for system development.*

PROJECT IDENTIFICATION AND INITIATION

- A project is identified when someone in the organization identifies a ***business need*** to build a system.
- A need may surface when an organization identifies unique and competitive ways of using IT.
- To leverage the capabilities of ***emerging technologies*** such as cloud computing, 4G/5G,

Recent Significant IT Failures

Company	Year	Outcome
Hudson Bay (Canada)	2005	Inventory system problems lead to $33.3 million loss.
UK Inland Revenue	2004/5	$3.45 billion tax-credit overpayment caused by software errors.
Avis Europe PLC (UK)	2004	Enterprise resource planning (ERP) system cancelled after $54.5 million spent.
Ford Motor Co.	2004	Purchasing system abandoned after deployment costing approximately $400 M
Hewlett-Packard Co.	2004	ERP system problems contribute to $160 million loss.
AT&T Wireless	2004	Customer relations management system upgrade problems lead to $100M loss

The Impact of System Development

Who develops Systems?

- *In-house applications*
- *Software packages*
- *Internet-based application services*
- *Outsourcing*
- *Custom solutions*
- *Enterprise-wide software strategies*

How Business Uses Information Systems

- In past, IT managers divided systems into categories based on the user group the system served
  - *Office systems (admin staff)*
  - *Operational systems (operational personnel)*
  - *Decision support systems (middle m'gers)*
  - *Executive information systems (top m'gers)*

How Business Uses Information Systems

- Today, it makes more sense to identify a system by its functions & features, rather than by users
  - *Enterprise computing systems*
  - *Transaction processing systems*
  - *Business support systems*
  - *Knowledge management systems*
  - *User productivity systems*

Assignment 1

- Create a group depending on the class size.
- Where Do Systems Designs Projects Come From?
  - *Each group should explain this concept and give 5 real examples from the 3main ones we discussed in class.*

Requirements

- Your work should show the contributions of each member
- Hard copy and softcopy should be presented