

Lecture No: 1 introduction

1- What is a system?

The term system is derived from the Greek word *systema*, which means an organized relationship among functioning units or components. A system exists because it is designed to achieve one or more objectives. We come into daily contact with the transportation system, the telephone system, the accounting system, the production system, and, for over two decades, the computer system. Similarly, we talk of the business system and of the organization as a system consisting of interrelated departments (subsystems) such as production, sales, personnel, and an information system. There are more than a hundred definitions of the word system, but most seem to have a common thread that suggests that a **system** is an orderly grouping of interdependent components linked together according to a plan to achieve a specific objective or goal.

2- Characteristics of a System

Our definition of a system suggests some characteristics that are present in all systems: organization (order), interaction, interdependence, integration and a central objective.

2-1 Organization

Organization implies structure and order. It is the arrangement of components that helps to achieve objectives. In the design of a business system, for example, the hierarchical relationships starting with the president on top and leading downward to the blue – collar workers represents the organization structure. Such an arrangement portrays a system – subsystem relationship, defines the authority structure, specifies the formal flow of communication and formalizes the chain of command. Like – wise, a computer system is designed around an input device, a central processing unit, an output device and one or more storage units. When linked together they work as a whole system for producing information.

2-2 Interaction

Interaction refers to the manner in which each component functions with other components of the system. In an organization, for example, purchasing must interact with production, advertising with sales and payroll with personnel. In a computer system, the central processing unit must interact with the input device to solve a problem. In turn, the main memory

holds programs and data that the arithmetic unit uses for computation. The interrelationship between these components enables the computer to perform.

2-3 Interdependence

Interdependence means that parts of the organization or computer system depend on one another. They are coordinated and linked together according to a plan. One subsystem depends on the input of another subsystem for proper functioning: that is, the output of one subsystem is the required input for another subsystem. This interdependence is crucial in systems work. In summary, no subsystem can function in isolation because it is dependent on the data (inputs) it receives from other subsystems to perform its required tasks.

2-4 Integration

Integration refers to the holism of systems. Synthesis follows analysis to achieve the central objective of the organization. Integration is concerned with how a system is tied together. It is more than sharing a physical part or location. It means that parts of the system work together within the system even though each part performs a unique function. Successful integration will typically produce a synergistic effect and greater total impact than if each component works separately.

2-5 Central objective

The last characteristic of a system is its central objective. Objectives may be real or stated. Although a stated objective may be the real objective, it is not uncommon for an organization to state one objective and operate to achieve another. The important point is that users must know the central objective of a computer application early in the analysis for a successful design and conversion. Political as well as organizational considerations often cloud the real objective. This means that the analyst must work around such obstacles to identify the real objective of the proposed change.

3- Elements of a System

In most cases, systems analysts operate in a dynamic environment where change is a way of life. The environment may be a business firm, a business application, or a computer system. To reconstruct a system, the following key elements must be considered:

- **Outputs and inputs.**

Major objective of a system is to produce an output that has value to its user. Whatever the nature of the output (goods, services, or information), it must be in line with the expectations of the intended user. Inputs are the elements (material, human resources, and information) that enter 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 totally or partially, depending on the specifications of the output. This means that as the output specifications change so does the processing

- **Control.**

The control element guides the system. It is the decision making subsystem that controls the pattern of activities governing input, processing, and output. In a computer system, the operating system and accompanying software influence the behavior of the system. Output specifications determine what and how much input is needed to keep the system in balance.

- **Feedback.**

Control in a dynamic system is achieved by feedback. Feedback measures output against a standard in some form of cybernetic procedure that includes communication and control. Output information is fed back to the input and / or to management (Controller) for deliberation. After the output is compared against performance standards, changes can result in the input or processing and consequently, the output. Feedback may be positive or negative, routing or informational. Positive feedback reinforces the performance of the system. It is routine in nature. Negative feedback generally provides the controller with information for action. In systems analysis, feedback is important in different ways. During analysis, the user may be told that the problems in a given application verify the initial concerns and justify the need for change. Another form of feedback comes after the system is implemented. The user informs the analyst about the performance of the new installation. This feedback often results in enhancements to meet the user's requirements.

- **Environment.**

The environment is the "suprasystem" within which an organization operates. It is the source of external elements that impinge on the system. In fact, it often determines how a system must function.

- **Boundaries and interface.**

A system should be defined by its boundaries – the limits that identify its components, processes and interrelationship when it interfaces with another system.