

INFS 328

Systems Analysis and Design

Systems Theory

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Session Overview

To have a good appreciation of the techniques of Systems analysis and design, it is essential to examine; what we mean by a system, the essential nature of a system and the characteristics of a system to the study of Systems Analysis and Design. This can best be understood by studying what System Theory is.

Session Outline

The key topics to be covered in the session are as follows:

- Systems Theory – Definition and Types of Systems
- System Elements
- The Relationship of Systems Theory to the Study of Systems Analysis and Design



Topic One

SYSTEMS THEORY



Systems Theory

DEFINITIONS OF A SYSTEM

- In its simplest form a system is a set of components that interact with one another for some purpose.
- A System may be considered as an assembly of components united by some form of regulated interaction to form an organized whole.
- Lastly, a system may be an organized set of procedures required to accomplish a specific function.



Systems Theory

EXAMPLES AND TYPES OF SYSTEMS

Society and nature abound in systems. For example Nervous system, digestive system for a body, society, organizes legal system, political systems, educational systems, tax systems etc. Organizations have information-order systems, management information system, product information system, personal data system, Information system etc. Hospitals have record keeping systems – health insurance systems etc.



Systems Theory

TYPES OF SYSTEMS

There are two (2) types of systems namely;

- Abstract and
- Physical.



Systems Theory

TYPES OF SYSTEMS - ABSTRACT SYSTEM

This is conceptual. It is a product of the human mind. It is not a system that can be seen or pointed to as an existing entity. Examples of abstract systems include, social systems, theological systems, cultural systems etc. Bear in mind that none of these entities can be photographed, drawn or otherwise physically pictured. However, they do exist and can be discussed, studied and analyzed. An example is the conceptual design of a systems project.



Systems Theory

TYPES OF SYSTEMS - PHYSICAL SYSTEM

In contrast to an abstract system, a physical system is a set of elements rather than ideas or constructs that operate in relation to each other to accomplish a common goal or purpose. Examples are computer systems and communication systems. Computer systems are collections of hardware elements that work interdependently under some means of control to process data and produce output reports and communication systems are collections of components that can represent and transmit bits of information from one point to another.



Topic Two

SYSTEM ELEMENTS



Systems Theory

SYSTEM ELEMENTS

Within the basic definitional framework of a system are the elements that are necessary for the very existence of the system.

These may be identified to include; the Environment, System Boundaries, Input/ Output, System Components. Input – Process – output characteristics, Interfaces and many more which will not be discussed here.



Systems Theory

SYSTEM ELEMENTS - Environment

All systems operate within an environment. The environment surrounds the system, both affecting and being affected by it. The environment defines its external relationships. Closed Systems do not interact with the environment. Open Systems interact with the environment by taking information and putting it out. They are dependent on the environment and sensitive to changes within it.



Systems Theory

SYSTEM ELEMENTS – System Boundaries

These distinguish or separate the environment from the system. The system exists within the boundaries, and anything lying outside them constitutes the environment. The system boundary line determines what is included within the system and what is not.



Systems Theory

SYSTEM COMPONENTS

System components are sub systems or smaller systems lying within a bigger system. That big system has several components and these smaller units work together with each other to accomplish the goals of their individual units and the goal of the larger system.



Systems Theory

SYSTEM ELEMENTS – Input/ Output

The system interacts with the environment by means of input and output. Input is anything entering the system from the environment. Output is anything leaving the system, crossing the boundaries to the environment. In a computer system, data enters the system as processed data



Systems Theory

INPUT – PROCESSING – OUTPUT CHARACTERISTICS

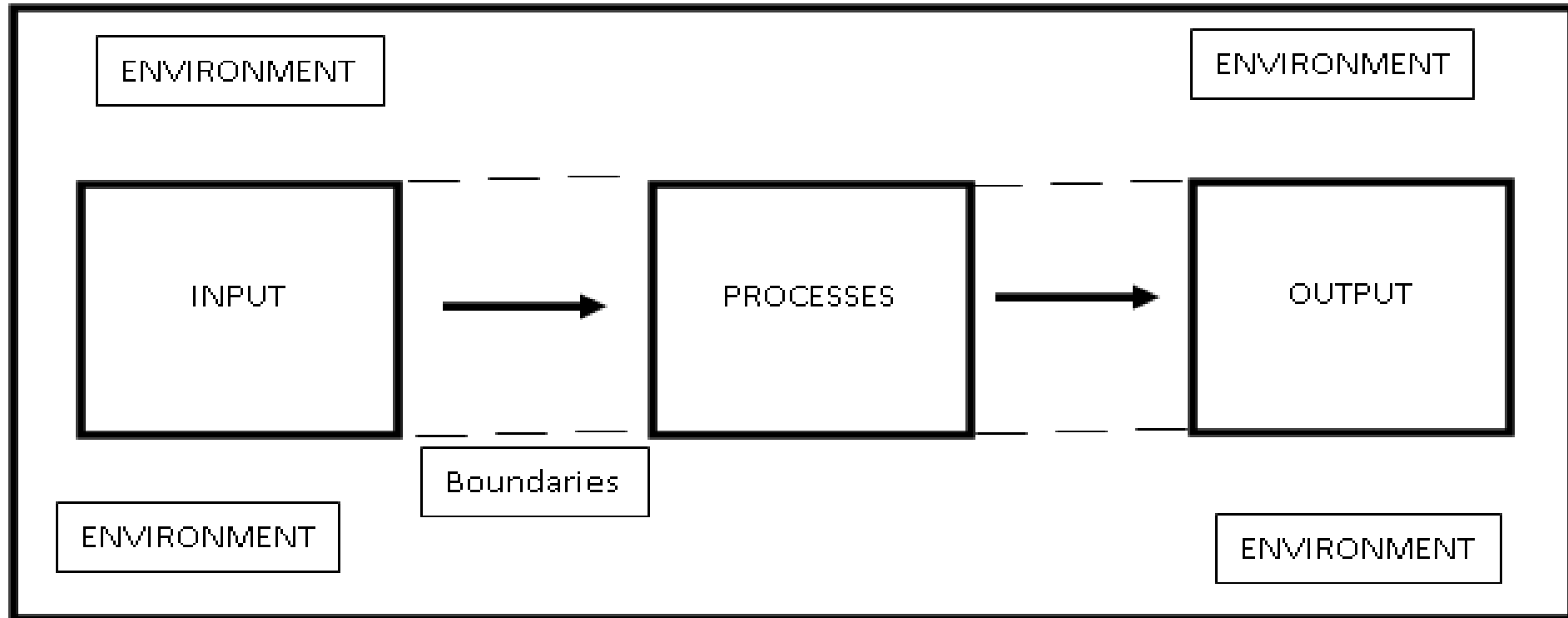
A System has an input, process and output. Input/ Output have already been explained. Processes are methods of converting input into output.

Interfaces are the meeting points for the systems or sub systems. In other words interfaces are created when system or sub system boundaries meet. This usually involves some form of resource exchange often in the form of an input – output relationship



Systems Theory

A system may be represented by the following diagram
Elements Of A SYSTEM



Topic Three

RELATIONSHIP BETWEEN SYSTEMS THEORY AND SYSTEMS ANALYSIS AND DESIGN



Systems Theory

The Relationship Between Systems Theory and Systems Analysis and Design

The following aspects of the systems theory explain why some techniques are adopted in system projects.

- The Environment
- Interfaces
- Systems boundaries
- Input – Process –Out characteristics

Systems Theory

The Relationship Between Systems Theory and Systems Analysis and Design

When a newly designed system is implemented it has to be done in an environment which will make the system operational. The design is based on the input – process – output characteristics. The inputs to the system should be identified as well as the process the input will have to go through to yield the desired output. The outputs then will determine the type of output designs either print or electronic.

The system boundaries will define any limits and constraints that the system to be designed would have. They will also determine the types of interfaces that the new system to be designed will have in order to be operational.

Systems Theory

INFORMATION SYSTEM

This is an arrangement of people, data, processes, information presentation and information technology that interact to support and improve day-to-day operations in a business as well as support the problem solving and decision making needs of management and users.

Examples are payroll system, inventory system, account receivable system, sales system etc. Systems that are normally automated as far as system analysis and design is concerned are information systems.