: What is a system?

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System is used as part of many technology-related concepts including decision support system (DSS) and transaction processing system (TPS) -- two general categories of computing and information systems. These examples of systems highlight the nesting and interrelationships among systems. Managers and MIS specialists use the concept of a system frequently and assume the concept is well understood. Despite the widespread usage of the term and our intuitive understanding of what it means, it is hard for most of us to agree on the formal meaning of the concept. Actually identifying a working or "live" system is often subjective and difficult. We begin exploring this key term by defining it.

A system is an interrelated set of components including people, activities, technology and procedures that are designed or intended to achieve a predefined purpose. A system receives input from its environment. The various subsystems or components of a system interact to produce outputs. Systems are defined in terms of their components. System components are surrounded by an imaginary boundary that separates a specific system from its environment. A system designer identifies both inputs from the environment as well as the outputs from the system. Systems also have feedback mechanisms to provide a means of controlling the operation of the system. Feedback is an output from a system that later reenters the system as an input (cf., Power, 2002).

Schoderbek, Kefalas and Schoderbek (1975) define a system as "a set of objects together with relationships between the objects and their attributes, connected or related to each other and to their environment in such a manner as to form an entirety or whole (p. 352)."

Also, a system can be defined as group of independent but interrelated elements comprising a unified whole. Businessdictionary.com defines system as an "organized, purposeful structure regarded as a 'whole' consisting of interrelated and interdependent elements (components, entities, factors, members, parts etc.). These elements continually influence one another (directly or indirectly) to maintain their activity and the existence of the system, in order to achieve the common purpose, the 'goal' of the system. All systems have (a) inputs, outputs, and feedback mechanisms, (b) maintain an internal steady-state (called homeostasis) despite a changing external environment, (c) display properties that are peculiar to the whole (called emergent properties) but are not possessed by any of the individual elements, and (d) have boundaries that are usually defined by the system observer."

Let’s examine a simple conceptual specification of a system. The initial input into the system is a bank customer requesting a loan. The customer makes a request to a bank officer. The bank officer

collects information from the customer and enters that information into a computerized form. A loan approval model is built into a computerized decision aid. Some people identify the computerized model as the actual decision support system. The banker uses the result from the computerized loan approval model to finalize the decision to approve or deny the loan. In some cases the loan information will need to be shared with a loan committee possibly using a group support system. The actual decision is then communicated to the customer either face-to-face or by a formal letter that may be generated by a computerized decision aid. Feedback comes from the customer.

This decision process and the overall conceptual system may include multiple decision support systems. The bank's transaction processing system would be updated when the loan was made and the funds distributed. The loan is the primary transaction. Making the loan is the decision process. DSS can support making loans or a DSS can help analyze lending activity at the bank or predict lending activity and interest rates.

In general, systems have structure, defined by its 1) parts and their attributes;
2) behavior including transformations and changes; and 3)interconnectivity, parts of a system have functional as well as structural relationships between and among each part.

In a decision support system, the primary focus is often the computerized components. This is a narrow perspective for defining the components of a system. It is often helpful to define the DSS boundary to include a broader decision process that may involve people performing non-computerized tasks as well as more routine data gathering tasks. The users of the computerized tools are then also part of the broader system definition. Finally, the actual communication or transmission of decisions may not occur using computerized systems, but are part of the process. This communication step needs to be considered in the design of the DSS and it should be included within the boundary of the broad, conceptual system.

To build a DSS, we need to define a specific decision making system or process on both a broad, conceptual level and a more concrete, specific level. Both managers and DSS designers need to understand what the boundaries are of the current "as is" system. The specific purpose of a proposed "will be" decision support system needs to be defined early in the DSS design and development process.

References

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