

: What is the theory of decision support systems?

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Past practice and experience usually guide computerized decision support development more than theory and general principles. Theories are propositions, principles and classification systems that explain empirical phenomena. Some developers say each situation is different so no theory is possible. Others argue we have conducted insufficient research to develop theories. For many reasons the theory of decision support and DSS has not been addressed extensively in the literature. An accepted theory of decision support systems can help us build better decision support systems.

Let's begin discussing DSS theory by briefly reviewing the broadest set of ideas or propositions that come closest to the start of a theory of decision support or decision support systems (DSS). The propositions all come from the work of the late Nobel Laureate Economist Herbert Simon. From Simon's classic book **Administrative Behavior** (1945):

Proposition 1: Information stored in computers can increase human rationality if it is accessible when it is needed for the making of decisions.

Proposition 2: Specialization of decision-making functions is largely dependent upon the possibility of developing adequate channels of communication to and from decision centers.

Proposition 3: Where a particular item of knowledge is needed repeatedly in making decisions, the organization can anticipate this need and, by providing the individual with this knowledge prior to decision, can extend his area of rationality. This is particularly important when there are time limits on making decisions.

From Simon's (1973) paper on "Applying Information Technology to Organization Design", we can identify 3 additional propositions related to a theory of decision support systems:

Proposition 4: "In the post-industrial society, the central problem is not how to organize to produce efficiently (although this will always remain an important consideration), but how to organize to make decisions--that is, to process information."

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Proposition 5: From the information processing point of view, division of labor means factoring the total system of decisions that need to be made into relatively independent subsystems, each one of which can be designed with only minimal concern for its interactions with the others.

Proposition 6: The key to the successful design of information systems lies in matching the technology to the limits of the attentional resources... In general, an additional component (man or machine) for an information-processing system will improve the system's performance *only if*:

1. Its output is small in comparison with its input, so that it conserves attention instead of making additional demands on attention;
2. It incorporates effective indexes of both passive and active kinds (active indexes are processes that automatically select and filter information for subsequent transmission);
3. It incorporates analytic and synthetic models that are capable not merely of storing and retrieving information, but of solving problems, evaluating solutions, and making decisions.

A number of other authors have discussed topics related to building a theory of decision support and DSS. We must examine research about when DSS are and should be used and results related to the design and development of DSS. Simon's propositions address the need for and the effectiveness of Decision Support Systems.

In summary, computerized decision support is desirable and useful when the system has a high likelihood of providing relevant, quality information to decision makers when they need it and want it.

References

Simon, Herbert A., *Administrative Behavior*, A study of decision-making processes in administrative organization (3rd edition). New York: The Free Press, 1945, 1965, 1976.

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Simon, Herbert A., "Applying Information Technology to Organization Design", Public Administration Review, Vol. 33, pp. 268-78, 1973.

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