Chapter 1.12
Interactive, Flexible, and Adaptable Decision Support Systems

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INTRODUCTION

Over the four decades of its history, decision support systems (DSSs) have moved from a radical movement that changed the way information systems were perceived in business, to a mainstream commercial information technology movement that all organizations engage. This interactive, flexible, and adaptable computer-based information system derives from two main areas of research: the theoretical studies of organizational decision making done at the Carnegie Institute in the 1950s and early 1960s as well as the technical work on interactive computer systems which was mainly performed by the Massachusetts Institute of Technology (Keen & Morton, 1978).

DSSs began due to the importance of formalizing a record of ideas, people, systems, and technologies implicated in this sector of applied information technology. But the history of this system is not precise due to the many individuals involved in different stages of DSSs and various industries while claiming to be pioneers of the system (Arnott & Pervan, 2005; Power, 2003). DSSs have become very sophisticated and stylish since these pioneers began their research. Many new systems have expanded the frontiers established by these pioneers yet the core and basis of the system remains the same. Today, DSSs are used in the finance, accounting, marketing, medical, as well as many other fields.

BACKGROUND

The basic ingredients of a DSS can be stated as follows: the data management system, the model management system, the knowledge engine, the user interface, and the users (Donciulescu, Filip, & Filip, 2002). The database is a collection of current or historical data from a number of application groups. A database can range in size from storing it in a PC that contains corporate data that have been downloaded, to a massive data warehouse that is continuously updated by major organizational transaction processing systems (TPSs). When referring to the model management system, it is primarily a stand-alone system that uses some type of model to perform "what if" and other kinds of analysis. This model must be easy to use, and therefore the design of such model is based on a strong theory or model combined with a good user interface.

A major component of a DSS is the knowledge engine. To develop an expert system requires input from one or more experts; this is where the knowledge engineers go to work to see who can translate the knowledge as described by the expert into a set of rules. A knowledge engineer acts like a system analyst but has special expertise in eliciting information and expertise from other professionals (Lauden & Lauden, 2005).

The user interface is the part of the information system through which the end user interacts with the system; it is a type of hardware and the series of on-screen commands and responses required for a user to work with the system. An information system will be considered a failure if its design is not compatible with the structure, culture, and goals of the organization. Research must be conducted to design a close organizational fit, to create comfort and reliability between the system and user. In a DSS, the user is as much a part of the system as the hardware and software. The user can also take many roles such as decision maker, intermediary, maintainer, operator, and feeder. A DSS may be the best one in its industry but it still requires a user to make the final decision.

Power (2003) introduced a conceptual level of DSSs, which contains five different categories. These categories include model-driven DSS, communication-driven DSS, data-driven DSS, document-driven DSS, and knowledge-driven DSS. Defining a DSS is not always an easy task due to the many definitions available. Much of this problem is attributed to the different ways a DSS can be classified. At the user level, a DSS can be classified as passive, active, or cooperative.

Essentially, a DSS is a computer-based system that provides help in the decision-making process. However, this is a broad way of defining the subject. A better way of describing a DSS is to say it is a flexible and interactive computer-based system that is developed for solving nonstructured management problems. Basically, the system uses information inputted from the decision maker (data and parameters) to produce an output from the model that ultimately assists the decision maker in analyzing a situation. In the following sections, we first discuss design and analysis methods/techniques/issues related to DSSs. Then, the three possible ways to enhance DSSs will be explored.

DESIGN AND ANALYSIS METHODS/ TECHNIQUES/ISSUES RELATED TO DSSS

Design Methods

Today, DSSs hold a primary position in an organization's decision making by providing timely and relevant information to decision makers. It has become a key to the success or survival of many organizations. However, there is a high tally of failure in information systems development projects, even though they are a focal point of industrial concern (Goepp, Kiefer, & Geiskopf, 2006). Designing methods have become an important