Chapter 2.17
Design and Analysis of Decision Support Systems

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ABSTRACT

Since their creation in the early 1960's, Decision Support Systems (DSSs) have evolved over the past four decades and continues to do so today. Although DSSs have grown substantially since its inception, improvements still need to be made. New technology has emerged and will continue to do so and, consequently, DSSs need to keep pace with it. Also, knowledge needs to play a bigger role in the form of decision making. We first discuss design and analysis methods/techniques/issues related to DSSs. Then, the three possible ways to enhance DSSs will be explored.

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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 1950's and early 1960's 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 (Power, 2003; Arnott & Pervan, 2005). According to Arnott (2006), the DSS field began in the early 1970s as a radical alternative to large-scale management information systems (MIS). Over time, major changes in information technology have enabled new decision support movements. In the late 1980s and mid-1990s, multidimensional modeling, OLAP technology, and advances in storage technology and data modeling led to the deployment of large-scale executive information systems, data warehousing, and business intelligence. Now DSSs have become very sophisticated and stylish since the early pioneering 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 et al., 2002). The database is a collection of current or historical data from a number of application groups. Databases can range in size from storing it in a PC that contains corporate data that has 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's 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, 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 (Laudon & Laudon, 2005).

The user interface is the part of the information system through which the end user interacts with the system; type of hardware and the series of on-screen command 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 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, 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 DSS is to say it is a flexible and interactive computer-based