

What is a DSS?

by D. J. Power

Decision support system (DSS) covers a wide variety of systems, tools and technologies. Some people think the term DSS is dated and that it has been replaced by a "new type" of system called on-line analytical processing or OLAP. Others seem to emphasize creating knowledge-based DSS as the "state-of-the-art" in decision support systems. Operations researchers primarily focus on optimization and simulation models as the "real" DSS. In my opinion the term decision support system and its acronym DSS remains a useful and inclusive term for many types of information systems that support decision making.

Keep in mind as you read articles in the DSS literature that if a computerized system is NOT an on-line transaction processing system (OLTP), someone will be tempted to call it a DSS. If a software program runs on a PC and can help a manager make a decision then someone will likely refer to it as a DSS. EIS, ESS, geographic information systems (GIS), OLAP, software agents, knowledge discovery systems and group DSS can all be lumped into the category of systems we call DSS.

So how do IS managers and business executives discuss building the DSS that the executives really want? How do we sort through all of the noise surrounding this catch-all term -- Decision Support System? My first answer is to gain as much knowledge as you can about DSS. My second answer is to engage in a DSS design and development process that involves both future executive users of the system and IS managers. Knowledgeable business executives should speak candidly with IS staff about deliverables, capabilities, outcomes, needs and what decisions should be supported by a proposed system. To reach these goals, let's begin by discussing two major categories of DSS: enterprise-wide DSS and desk-top DSS.

Enterprise-wide DSS are linked to large, data warehouses and serve many managers in a company. Desk-top, single-user DSS are small systems that reside on an individual manager's PC. These two categories include a broad range of functionality. In the next few paragraphs, I'll mention some buzz words like data warehouse, OLAP, executive information systems (EIS), knowledge-based DSS, intranets and client-server architectures; readers who are unfamiliar with these terms should visit my on-line DSS glossary for definitions.

Much excitement surrounds development of enterprise-wide DSS with very large data warehouses that supposedly let decision makers find out almost anything about their company in a matter of moments. Decision makers can drill-down, slice and dice, graph and chart corporate and external data. A highly publicized example is the Decision Maker's Workbench (DMW), developed in 1994 by Mervyn's Department Stores and MicroStrategy. The claims for it are thankfully more modest than for some data warehouse/OLAP type systems.

Published vendor case studies indicate Decision Maker's Workbench has been widely distributed throughout the Mervyn's organization. Supposedly it has enhanced the decision-making capacity of end-users at all levels. The system has over 850GB of data and DMW allows for trend analyses and performance analyses as well as inventory stock analyses. DMW use a 12-processor Sequent Symmetry 790, Oracle 7.1, and MicroStrategy's DSS Agent. A number of web sites have Mervyn's case studies:
Microstrategy - http://www.strategy.com/success/msi_smr1.htm
Oracle - http://www.oracle.com.sg/corporate/oracle_at_work/html/mervyns.htm
Data Warehouse Institute - <http://www.dw-institute.com/cases/mervyns.htm>

Enterprise-wide DSS can range from fairly simple systems to complex data intensive and analytically sophisticated executive information systems. Borrowing from Steven Alter (1980) we can identify enterprise-wide DSS that are primarily file drawer systems that allow for immediate access to data items. At a somewhat more sophisticated level we find data analysis systems that make it easy to manipulate data using computerized analytical tools like statistics packages, data mining, etc. The most sophisticated enterprise-wide analysis systems provide access to a series of decision-oriented databases or data marts, predefined models and charts, and triggers and alerts linked to events or variables in the corporate data warehouse.

The most sophisticated enterprise-wide DSS build on and extend the executive information systems (EIS) advertised in the late 1980s. EIS used "state-of-the-art" graphics, communications, and data storage methods to provide executives easy on-line access to current information about the status of a company. Much of the "state-of-the-art" from 1987 we now take for granted and our systems are more powerful than what most vendors hoped to deliver in 1987.

In most organizations we see bridges between enterprise-wide DSS, data warehouses, and desktop DSS. For example, some DSS consultants envision an enterprise-wide DSS that is primarily a file drawer system for providing data that is then analyzed on a PC. This one-way bridge is only one type of DSS architecture. Much thought needs to be given to what data is stored where and how it will be analyzed and displayed. DSS architecture is a complex topic that I can't resolve quickly. For now let's conclude that DSS can be both enterprise-wide and on the desktop of a single user. A client-server architecture can create bridges to move data and analyses back and forth from the client desktop and associated DSS tools to server storage and server-based DSS tools. DSS and data can be everywhere and anywhere in an enterprise.

Desktop, single-user DSS are not receiving the hype and attention given to enterprise-wide DSS, but they can be especially useful. Sometimes we use spreadsheet programs like Excel or Lotus 1 2 3 for desktop analyses or to develop specific DSS applications for individual managers. Sometimes we purchase specialized DSS packages for an individual PC or for a server. Expert Choice is an example of a specialized package that serves as a desktop DSS.

Expert Choice implements the analytical hierarchy process. This Windows software package can be used to support a number of decision situations, including structuring of complex problems, developing priorities and ranking alternatives, measuring consistency of judgments, allocating resources, and conducting a cost/benefit analysis. The program assists in organizing problem-related information in a hierarchical model consisting of a goal, possible scenarios, criteria, and alternatives. Expert Choice enables the decision maker to systematically make judgments about the relative importance of criteria and the preference for alternatives relative to criteria. Readers should visit URL <http://www.expertchoice.com> for more information on this product.

There is also a range of desktop DSS that are available. We can find file drawer DSS on a single executive's PC implemented in Microsoft Access. Accounting and financial models can be implemented as desktop DSS in Microsoft Excel and as programmed components in enterprise-wide DSS. In some organizations analysts prepare a financial analysis using desktop tools and publish the results to the company intranet or EIS. Another DSS tool, simulation, is usually implemented in desktop packages. Optimization software packages and DSS built with them are commonly implemented as single-user desktop packages. In some settings however, a specific DSS optimization model may use live or "real time" data received over a local or wide area network in its calculations. Finally, suggestion model DSS or knowledge-based systems are often implemented as a desktop, single-user application.

Knowledge-based systems are also sometimes called "expert systems". These computer programs analyze data using symbolic logic, have an explicit knowledge base, and have an ability to explain conclusions in a way that users can understand. Knowledge-based systems can be useful to remind an experienced decision maker of options or issues to consider and to help a new manager make a complex decision.

All types of DSS help managers answer questions relevant to a decision situation. The questions may be sophisticated and complex or simple and even somewhat simplistic. For example, a manager might query a database to ask questions like what is total sales for each of the last five years; what items have been out of stock more than 5 days in a month; and which customers had the most orders (\$ value) in 1996. Managers may also ask questions like are we meeting profit targets; and what salespersons are meeting their sales goals. A specific DSS may only support operational decision making or it may support more strategic and long-run decision making and problem solving. DSS have a defined purpose and the subjects or topics covered in the DSS database, the variables included, the time series of data that is available and the tools for retrieving and analyzing data determine the questions we can actually ask and the decision relevant information we can create. The design and capabilities of our DSS influence the fact-based decisions we can make.

So what are the caveats? Let the DSS buyer BEWARE. What you want is not always what you need and what you need is not always what you will get. It is easy to over-promise when building a DSS and it is easy for managers to develop unrealistic expectations for their new DSS. Even the best DSS will not eliminate "bad" decisions.

Some managers will continue to ask the wrong questions and draw the wrong conclusions from the information they receive. Because of its wide scope and high development cost, an enterprise-wide DSS is likely to have enormous credibility with users. So we need to recognize that enterprise-wide DSS can compound and magnify the harm from decision errors.

DSS designers, builders and users need to be "critical" consumers of DSS. On a more positive note, DSS do NOT have to "do every thing and have all the bells and whistles" to be useful. Decision makers can sometimes benefit greatly from rapidly retrieving a single fact; or benefit from being able to perform a simple ad hoc data analysis; or by viewing data in prespecified reports or "screens" in a rudimentary EIS.

So what is a DSS? A decision support system (DSS) is an interactive computer-based system intended to help managers make decisions. A DSS helps a manager retrieve, summarize and analyze decision relevant data. It may be primarily a data-oriented DSS or a model-oriented DSS. It may be an enterprise-wide DSS that supports a large group of managers in a networked, client-server environment with a specialized data warehouse or a desktop, single user DSS on the PC in a manager's office. So remember building a successful decision support system begins with understanding what type of computer-based system you are trying to build and NOT with what you call it.

References

Alter, S.L. Decision Support Systems: Current Practice and Continuing Challenge. Reading, MA: Addison-Wesley, 1980.

Power, D.J. "DSS Glossary". World Wide Web, <http://dssresources.com/glossary/> , 1997

Please cite this paper as: Power, D. J. "What is a DSS?". DSstar, The On-Line Executive Journal for Data-Intensive Decision Support, October 21, 1997: Vol. 1, No. 3.