

# : *What is the history of computerized decision support?*

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Supposedly, if we study history we are less likely to make the same mistakes again. Decision support was one of the first uses of computers. Computerized decision support systems (DSS) have improved decision-making in many situations, but there have been failures. This brief review of decision support technology evolution touches primarily on DSS pioneers and their successes. My online DSS history articles provide more details.

## **First generation decision support**

Some researchers trace the origins of computerized decision support systems to 1951 and the Lyons Tea Shops business use of the LEO I (Lyons Electronic Office I) digital computer. LEO handled the company's accounts and logistics. Software factored in the weather forecast to help determine the goods carried by "fresh produce" delivery vans to Lyons' United Kingdom shops (cf. Land, 2008).

A few years later work started on the Semi-Automatic Ground Environment (SAGE), a control system for tracking aircraft used by NORAD from the late 1950s to the early 1980s. The name SAGE, a wise mentor, indicated the decision support nature of the system. SAGE was a real-time control system, a real-time communication system, and a real-time management information system (Everett, Zraket and Bennington, 1963).

Pioneering work of George Dantzig, Douglas Engelbart and Jay Forrester established the feasibility of building computerized decision support systems. In 1952, Dantzig became a research mathematician at the Rand Corporation, where he implemented linear programming on its experimental computers. In the mid-1960s, Engelbart and colleagues developed the first hypermedia—groupware system called NLS (oNLine System). NLS had on-screen video teleconferencing and was a forerunner to group decision support systems. Forrester was involved in building SAGE. In addition, Forrester started the System Dynamics Group at the Massachusetts Institute of Technology Sloan School.

Prior to about 1965, it was very expensive to build large-scale information systems. At this time, the IBM System 360 and other more powerful mainframe and minicomputer systems made it more practical and cost-effective to develop Management Information Systems (MIS) in large companies. MIS focused on providing managers with structured, periodic reports derived from accounting and transaction systems (Davis, 1974).

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### Moving to the next generation

In the late 1960s, a new type of information system became practical, model-oriented DSS or management decision systems. In 1971, Michael S. Scott Morton published his Harvard Business School doctoral research involving a computerized management decision system. He had studied how computers and analytical models could help managers make a key decision. Scott Morton conducted an experiment where marketing and production managers used a management decision system to coordinate production planning for laundry equipment. The decision system ran on a 21 inch cathode ray tube monitor with a light pen connected using a 2400 bits per second modem to a pair of Univac 494 computer systems (Scott Morton, 1967; Scott Morton, 1971).

In 1971, Gorry and Scott-Morton argued that Management Information Systems primarily focused on structured decisions and suggested that the Information Systems for semi-structured and unstructured decisions should be termed Decision Support Systems.

In the late 1970s, researchers were discussing both practice and theory issues related to decision support systems and companies were implementing a variety of systems. In 1979, John Rockart published an article in the Harvard Business Review that led to the development of executive information systems (EISs). In 1980, Steven Alter published a framework for categorizing decision support systems based on studying 58 DSS. He identified both data-oriented and model-oriented DSS.

Ralph Sprague and Eric Carlson's book *Building Effective Decision Support Systems* (1982) explained in detail the Sprague DSS framework of a data base, model base and dialog generator. In addition, they provided a practical, understandable overview of how organizations could and should build DSS. By 1982, researchers considered decision support systems a new class of information systems.

Financial planning systems became especially popular decision support tools. The idea was to create a "language" that would "allow executives to build models without intermediaries (Gray, 1983)."

Thirty years after Lyons Tea used a computerized system to support operations decision-making, managers and researchers recognized DSS could support decision-makers at any level in an organization. DSS could support operations, financial management, management control and strategic decision-making. The scope, purpose and targeted users for a computerized DSS was expanding.

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### **Expanding decision support technologies**

Beginning in approximately 1982, academic researchers developed software to support group decision-making. In 1985, Procter & Gamble built a DSS that linked sales information and retail scanner data. The new term in the late 1980s, business intelligence (BI), described a set of concepts and methods to improve business decision-making by using fact-based support systems. Some people used BI interchangeably with briefing books, report and query tools and executive information systems. Data warehousing and On-Line Analytical Processing (OLAP) defined a broader category of data-driven DSS.

In the early 1990s, Bill Inmon and Ralph Kimball actively promoted using relational database technologies to build DSS. Kimball was known as "The Doctor of DSS" and Inmon became the "father of the data warehouse". Inmon defined a decision support system as "data used in a free form fashion to support managerial decisions". The DSS environment contained only archival, time variant data.

A major technology shift had occurred from mainframe and time-sharing DSS to client/server-based DSS. Vendors introduced desktop OLAP tools during this period. DBMS vendors "recognized that decision support was different from OLTP and started implementing real OLAP capabilities into their databases (Powell, 2001)". By 1995, large-scale data warehousing, a convergence of OLAP, EIS and BI, and the possibilities of the World-Wide Web began to stimulate innovation and created a renewed interest in decision support systems.

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