

Turban, Aronson, and Liang Decision Support Systems and Intelligent Systems, Seventh Edition

Chapter 1 Management Support Systems: An Overview



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Course Content

- Dss, MSS and BI
- MIS and Management science
- Technologies of DSS
- DSS with Datawarehouse and DSS Databases
- DSS with big data
- DSS with Machine learning



Grading System

- 30 midterm
- 10 section
- 10 Project
- 50 Final Exam

 Sections >> cover some of the DSS technologies, BI dashboards and predictive models



Learning Objectives

- Understand how management uses computer technologies.
- Learn basic concepts of decision-making.
- Understands decision support systems.
- Recognize different types of decision support systems used in the workplace.
- Determine which type of decision support system is applicable in specific situations.
- Learn what role the Web has played in the development of these systems.



Managers and Decision Making: Why Computerized Support?

Competition

Speed

• The MANAGERS are <u>always</u> responsible for decision making



Mintzberg's 10 Management Roles

- **Interpersonal** (concerns the contact between the manager and the people in his environment.)
 - Figurehead : symbolic head
 - Leader: Responsible for the motivation and activation of subordinates; responsible for staffing, training, and associated duties.
 - Liaison: Maintains self-developed network of outside contact and informers who provide favors and information.
- Informational (The managerial roles in this category involve processing information they send, pass on and analyse information)
 - Monitor :Seeks and receives a wide variety of special information (much of it current) to develop a thorough understanding of the organization and environment.
 - Disseminator: Transmits information received from outsiders or from subordinates to members of the organization.
 - Spokesperson: Transmits information to outsiders on the organization's plans, policies, actions, results and so forth; serves as an expert on the organization's industry



Mintzberg's 10 Management Roles

- Decisional (The managerial roles in this category involve using information)
 - Entrepreneur: Searches the organization and its environment for opportunities and initiates improvement projects to bring about change; supervises design of certain projects
 - Disturbance Handler: Responsible for corrective action when the organization faces important, unexpected disturbances
 - Resource Allocation: Responsible for the allocation of organization resources of all kinds
 - Negotiator: Responsible for representing the organization at major negotiations



CEO

- What Is Chief Executive Officer (CEO)?
- The highest-ranking executive in a company, whose primary responsibilities include making major corporate decisions, managing the overall operations and resources of a company, acting as the main point of communication between the board of directors (the board) and corporate operations and being the public face of the company.
- A CEO is elected by the board and its shareholders.



A CEO's role

- Varies from one company to another depending on the company's size, culture, and corporate structure.
- In large corporations, CEOs typically deal only with very high-level strategic decisions and those that direct the company's overall growth.
- In smaller companies, CEOs often are more hands-on and involved with day-to-day functions. CEOs can set the tone, vision, and sometimes the culture of their organizations.
- Because of their frequent dealings with the public, sometimes the chief executive officers of large corporations become famous. Mark Zuckerberg, the CEO of Facebook (FB), for example, is a household name today.
- Similarly, Steve Jobs, founder and CEO of Apple (AAPL)



Mintzberg identified six characteristics of the CEO job

- Managers process large, open-ended workloads under tight time pressure - a manager's job is never done.
- Managerial activities are relatively short in duration, varied and fragmented and often self-initiated.
- CEOs prefer action and action driven activities and dislike mail and paperwork.
- They prefer verbal communication through meetings and phone conversations.
- They maintain relationships primarily with their subordinates and external parties and least with their superiors.
- Their involvement in the execution of the work is limited although they initiate many of the decisions.



Managerial Decision Making and Information Systems

• <u>Management</u> is a process by which organizational goals are achieved through the use of resources



- Resources: Inputs
- Goal Attainment: Output
- Measuring Success:

Productivity = Outputs / Inputs



Productivity

 The ratio of outputs to inputs that measures the degree of success of an organization and its individual parts



Factors Affecting Decision-Making

- New technologies and better information distribution have resulted in more alternatives for management.
- Complex operations have increased the costs of errors, causing a chain reaction throughout the organization.
- Rapidly changing global economies and markets are producing greater uncertainty and requiring faster response in order to maintain competitive advantages.
- Increasing governmental regulation coupled with political destabilization have caused great uncertainty.

Figure 1.1 Factors Affecting Decision Making

Factor	Trend Results	
Technology Information/computers	Increasing —— Increasing ——	→ More alternatives to choose from
Structual complexity Competition	Increasing —— Increasing ——	Larger cost of making errors
International markets Political stability Consumerism Government intervention	Increasing —— Decreasing —— Increasing —— Increasing ——	→ More uncertainty regarding the future
Changes, fluctuations	Increasing ——	Need for quick decisions





Cognitive Limits

- The human mind has limited processing and storage capabilities.
- Any single person is therefore limited in their decision-making abilities.
- Collaboration with others allows for a wider range of possible answers but will often be faced with communications problems.



What do Decision Support Systems Offer?

- Quick computations at a lower cost
- Group collaboration and communication
- This knowledge sharing is enhanced through the use of GSS (Group Support System), KMS (Knowledge Management System), and EIS (Enterprise Information System).
- Increased productivity
- Ready access to information stored in multiple
 databases and data warehouse (ex. Large data warehouse like
 the one operated by Wal-Mart, contain petabytes of data special methods and
 sometimes parallel computing are needed to organize and search the data)
- Ability to analyze multiple alternatives and apply risk management
- Enterprise resource management
- Tools to obtain and maintain competitive advantage



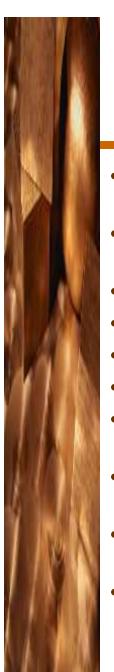
For example,

 Many of us are hit daily with a barrage of e-mail. Intelligent agents (a type of artificial intelligence) as part of e-mail client system can effectively filter out the undesired e-mail messages.



Management Support Systems (MSS)

- The support of management tasks by the application of technologies
 - Sometimes called Decision Support
 Systems or Business Intelligence



Management Support Systems Tools

- Decision Support Systems (DSS)
- Management Science (/ operations research (ORMS)
- Business Analytics
- Data Mining
- Data Warehouse
- Business Intelligence
- Online Analytical Processing (OLAP)
- Computer-Assisted Systems Engineering (CASE) tools
- Group Support Systems (GSS)
- Enterprise Information systems (EIS)

- Enterprise Information Portals (EIP)
- Enterprise Resource Management (ERM)
- Enterprise Resource Planning (ERP)
- Customer Relationship Management (CRM)
- Supply-Chain Management (SCM)
- Knowledge Management Systems (KMS)
- Knowledge Management Portals (KMP)
- Expert systems (ES)
- Artificial Neural Network (ANN)
- Intelligent Agents
- E-commerce DSS



Decision Support Frameworks

A structured decision (Programmed)

is one in which the phases of the decision-making process have standardized procedures, clear objectives, and clearly specified input and output. There exists a procedure for arriving at the best solution (An example of a programmed decision is reordering office supplies).

An unstructured decision (Unprogrammed)

is one where not all of the decision-making phases are structured and human plays an important role.

(An example of an unstructured decision in my company is what types of new content should be created and what market should be targeted).

A semistructured decision

has some, but not all, structured phases where standardized procedures may be used in combination with individual judgment intuition.



Figure 1.2 Decision Support Frameworks

	Type of Control			N. Markey 60	
Type of Decision	Operation al Control	Managerial Control	Strategic Planning	Technology Support Needed	
Structured	Accounts 1 receivable, account payable, order entry	Budget analysis, short-term forecasting, personnel reports, make-or-buy	Financial 3 management (investment), warehouse location, distribution systems	Management information system, management science models, transaction processing	
Semistructured	Production 4 scheduling, inventory control	Credit evaluation, budget preparation, plant layout, project scheduling, reward system design, inventory categorization	Building new plant, mergers and acquisitions, new product planning, compensation planning, quality assurance planning, HR policies, inventory planning	DSS, KMS, GSS, CRM, SCM	
Unstructured	Selecting a cover for a magazine, buying software, approving loans help desk	Negotiating, recruiting an executive, buying hardware, lobbying	R & D planning, new technology development, social responsibility planning	GSS, KMS ES, neural networks	
Technology Support Needed	Management information system, managment science	Management science, DSS, ES, EIS, SCM CRM, GSS, SCM	GSS, CRM EIS, ES, neural networks, KMS		



Type of Control

Strategic Planning: Defines longrange goals and policies for resource allocation

Managerial Control: The acquisition and efficient use of resource in the accomplishment of organizational goals.

Operational Control: The efficient and effective execution of specific tasks₁₋₂₂



DSS as an umbrella term

- The term DSS is also sometimes used as an umbrella term to describe any computerized system that supports decision-making in an organization.
- We next describe some of the most important DSS technologies



Group Support Systems

- Getting people at one place is expensive and time consuming
- Time limitation to give the decision
- Traditional meetings last long

Systems that provide interaction and communication between people with the aid of IT are called collaborative computing systems, groupware systems, electronic systems, or simply GSS

 Videoconferencing, audioconferencing, electronic brainstorming, voting, document sharing, etc..



Enterprise Information Systems(EIS)

- An enterprise information system (EIS) is any kind of information system which improves the functions of an enterprise business processes by integration
- Enterprise Information Portals EIPs view information across entire organizations
- Provide rapid access to detailed information through drill-down.
- Provide user-friendly interfaces through portals.
- Identifies opportunities and threats



Enterprise Information Systems (EIS)

Specialized systems include ERM

(Enterprise Resource Management), ERP (Enterprise Resource Planning) >>user access to

different systems and processes and functions $\mathsf{CRM}(\mathsf{Customer}\;\mathsf{Relationship}\;\mathsf{Management})$,

and SCM (Supply-Chain Management) >> flow of goods and materials

- Provides timely and effective corporate level tracking and control.
- Filter, compress, and track critical data and information.



Knowledge Management Systems

- Knowledge that is organized and stored in a repository for use by an organization
- Can be used to solve similar or identical problems in the future
- ROIs (return on investment) as high as a factor of 25 within one to two years.
- Web technologies feature prominantly
- Provides access to knowledge repository, a textual database.



Issues in Knowledge Management Systems

- Where to find knowledge
- How to classify it
- How to ensure its quality
- How to store it
- How to maintain it
- How to use it
- Motivate people to contribute their knowledge "brainstorming".
- People who leave the organization take their knowledge with them.



KMS Application: Xerox Experience

- Problem: With decreasing demand for copying, Xerox strugled to survive the digital revolution.
- Solution Method: Developed an intranet based knowledge repository in 1996 to support sales people to quickly answer customers' queries.
- Result: Days of investigations have decreased to a few minutes.
- Implications:
 - Questions and solutions are indexed to easily retrieve information in the latter requests. So the system improves itself.
 - Accumulated knowledge is analyzed to learn the products strenghts, weaknesses, customer trends, etc.
- Challenges in organizational culture change:
 - Persuade people to share knowledge.
 - Learn to use intranet and KMS.



Expert Systems

- Technologies that apply reasoning methodologies in a specific domain through machine learning
- Attempts to mimic human experts' problem solving
- Examples include:
 - Artificial Intelligence Systems
 - Artificial Neural Networks (neural computing) uses a pattern-recognition approach to problem-solving.
 - Genetic Algorithms solve problems in an evolutionary way. They
 mimic the process of evolution and search for extremely good solution.
 - Fuzzy Logic approaches problems the way people do. It can handle the imprecise nature of how humans communicate information.
 - Intelligent Agents help in automating various tasks, increasing productivity and quality.



Expert Systems

- Expertise is transferred from expert to computer
- The knowledge is stored in the computer
- Users run the computer whenever advice is needed
- The ES asks for facts, make inferences, arrive at a conclusion like a human consultant
- May explain the logic behind the advice



Methodologies of ES: Artificial Neural Networks

- Application of decision methodologies requires explicit data, information or knowledge stored in a computer ad manipulated when needed.
- In complex real world where the environment changes rapidly, people make decisions based on partial, incomplete or inexact information, by using their "experiences".
- In the absence of explicit data, ANN recall similar experiences, learn from them in a computerized system.
- Uses pattern recognition approach, i.e., learns patterns in data presented during training and can apply it to new cases, predict the future behaviors of systems, people, markets, etc.

Ex: Detecting unusual credit card expenditures and bank loan approvals



Methodologies of ES:

 Genetic algorithms: mimic the process of evolution and search for an extremely good solution by survival of the fittest rule
 Ex: Max. Advertising profit at tv stations

 Fuzzy logic: assist decision makers in solving problems with imprecise statements of parameters, approaches the problems the way people do.

Ex: "The weather is really hot". How hot is hot?

 Intelligent agents learn what you want to do, take over some tasks like travel agents, real estate agents.



- List and define the three phases of the decision-making process (according to Simon).
- Simon's three phases of the decision-making process are: intelligence, where conditions that call for decisions are identified; design, where possible courses of action are invented, developed, and analyzed; and choice, where a course of action is selected.



Define DSS.

Decision Support Systems are computer-based information systems that use data and models to support un-structured decisions made by managers.



There are four major characteristics of DSS.

These are:

- It uses data and models.
- It is used to assist managers when they solve semi-structured or unstructured problems.
- 3. It is used to support the manager; it does not replace the manager.
- Its goal is to support the effectiveness of decisions.



The major benefits provided by DSS include:

- 1) It may provide solutions for problems that cannot be solved by other methods.
- 2) It performs a thorough, quantitative analysis in a very short time.
- 3) It exposes the user to new insights, and these can be used as learning tools.



- 4) It facilitates communication and improves teamwork.
- 5) It allows increased control and may improve performance.
- 6) It can reduce or eliminate the cost of wrong decisions.
- 7) It provides consistent and objective decisions.
- 8) It frees managers for more important tasks because they are able to perform tasks in less time and with less effort.



Typical information that a decision support application might gather and present would be,

- (a) Accessing all information assets, including legacy and relational data sources;
- (b) Comparative data figures;
- (c) Projected figures based on new data or assumptions;
- (d) Consequences of different decision alternatives, given past experience in a specific context.



DSS can be categorized into five types:

- 1.Communication-driven DSS
- 2.Data-driven DSS
- 3.Document-driven DSS
- 4. Knowledge-driven DSS
- 5.Model-driven DSS



Communication-driven DSS

Most communications-driven DSSs are targeted at internal teams, including partners. Its purpose are to help conduct a meeting, or for users to collaborate. The most common technology used to deploy the DSS is a web or client server. Examples: chats and instant messaging software, online collaboration and net-meeting systems.

Data-driven DSS

Most data-driven DSSs are targeted at managers, staff and also product/service suppliers. It is used to query a database or data warehouse to seek specific answers for specific purposes. It is deployed via a main frame system, client/server link, or via the web. Examples: computer-based databases that have a query system to check (including the incorporation of data to add value to existing databases.



Document-driven DSS

Document-driven DSSs are more common, targeted at a broad base of user groups. The purpose of such a DSS is to search web pages and find documents on a specific set of keywords or search terms. The usual technology used to set up such DSSs are via the web or a client/server system.

Knowledge-driven DSS:

Knowledge-driven DSSs or 'knowledgebase' are a **catch-all category covering a broad range of systems** covering users within the organization setting it up but may also include others interacting with the organization - for example, consumers of a business.

Usually built using datamining techniques. It is essentially used to provide management advice or to choose products/services. The typical deployment technology used to set up such systems could be client/server systems, the web, or software running on stand-alone PCs.



Model-driven DSS

Model-driven DSSs are complex systems that help analyze decisions or choose between different options. These are used by managers and staff members of a business, or people who interact with the organization, for several purposes depending on how the model is set up - scheduling, decision analyses etc. These DSSs can be deployed via software/hardware in stand-alone PCs, client/server systems, or the web.

Model-driven DSS are generally not data intensive. Rather they use parameters entered by decision makers and help them analyse a situation. They generate optimal solutions that are consistent with time and resource constraints.