Characteristics of an MIS

A management information system performs the following functions:

Provides reports with fixed and standard formats:

☐ **All reports are produced in an easy-to-read and standard format, so managers in various functional areas find consistencies in reports.**

Produces hard-copy and soft-copy reports:

☐ **Standard reports are typically printed on papers and they are termed as hard copy**
☐ Soft copy reports are displayed on computer screens.

Uses internal data stored in the computer system:

☐ MIS reports use primarily internal sources of data that are contained in computer databases (through TPSs).

End users are able to develop their own custom reports:

☐ Although most of the standard reports are designed by and analyst, the users should be able to develop reports on an ad-hoc basis.

Requires formal requests from users

☐ Whenever information system personnel (analyst, programmer) develop a report, a formal request is necessary. This is not required for ad-hoc reports.

Decisions Support Systems

Decision support systems are organized collections of people, procedures, software, databases, and devices that are in place to support managerial decision-making and problem-solving activities. DSSs are generally structured for use at all levels within an organization, although upper managers are more likely to find a need for these systems. DSSs are used to bring structure to the unstructured problems that are found within a firm. Quite often, DSSs are used to assist in routine problems since many contain programmable parameters.

A **decision support system (DSS)** is an information system designed to help users reach a decision when a decision-making situation arises. A variety of DSSs exist to help with a range of decisions.

A decision support system uses data from internal and/or external sources.

Internal sources of data might include sales, manufacturing, inventory, or financial data from an organization's database. Data from **external sources** could include interest rates, population trends, and costs of new housing construction or raw material pricing. Users of a DSS, often managers, can manipulate the data used in the DSS to help with decisions.

Capabilities of a Decision Support System

DSSs offer a range of capabilities. They are typically more flexible than either MISs or TPSs and are available to aid decision-makers in a variety of situations. They also provide support for all phases of the problem-solving process, and are designed to support a variety of decision frequencies and differing problem structures.
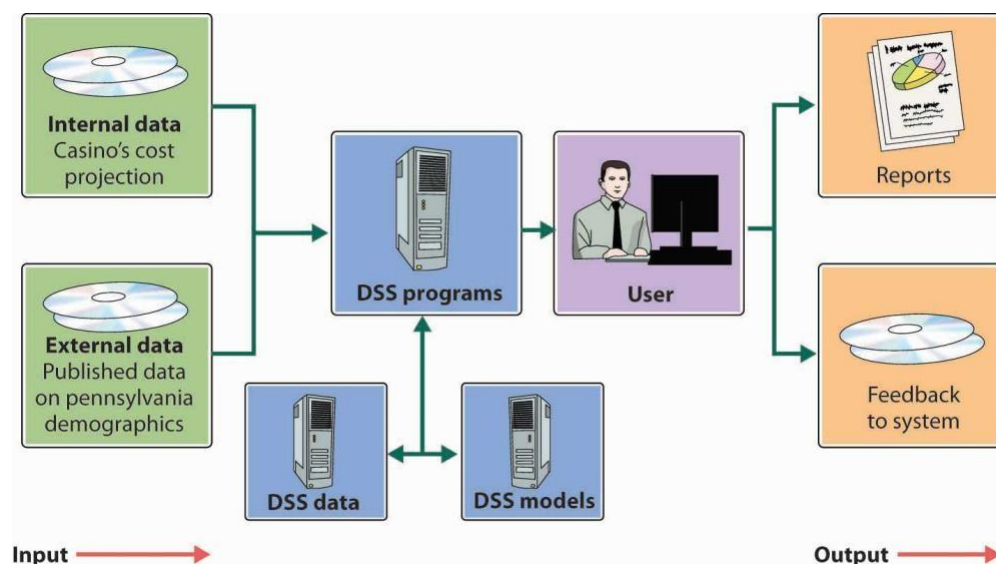
The Characteristics and Capabilities of DSS

The Characteristics and Capabilities of DSS are:

1. Support for decision makers (mainly in semi- and un-structured situation) by bringing together human judgment and computerized information.

2. Support for all managerial levels, ranging from top executives to line managers.

3. Support for individuals (from different departments, organizational levels or different organizations) as well as groups of decision makers working somewhat independently – virtual teams through collaborative Web tools.

4. Support for independent or sequential decisions that may be made once, several times or repeatedly.

5. Support in all phases of decision-making process (*intelligence, design, choice, and implementation*).

6. Support for a variety of decision-making process and style.

7. The decision maker should be reactive, able to confront changing conditions quickly and able to adapt the DSS to meet these changes. DSS are flexible, so users can *add, delete, combine, change or rearrange basic elements*.

8. User-friendliness, strong graphical capabilities and natural language interactive human-machine interface can greatly increase the effectiveness of DSS, Most new DSS application use Web-based interfaces.

9. Improvement the effectiveness of decision making rather than its efficiency. When DSS are deployed, decision making often takes longer but the decisions are better.

10. The decision maker has complete control over all steps of the decision-making process in solving a problem – a DSS aims to support not to replace the decision maker.

11. End users are able to develop and modify simple systems by themselves. Larger systems can be built with assistance from information system specialist. Online analytical process (OLAP) and data mining software, with data warehouses, allow users to build very large and complex DSS.

12. Models are generally utilized to analyze decision-making situations. The modeling capability enables experimentation with different strategies under different configurations.

13. Access is provided to a variety of data sources, formats and types, including GIS, multimedia and object oriented.

14. Can be employed as a standalone tool used by an individual decision maker in one location or distributed throughout an organization and in several organizations along the supply chain. It can be integrated with other DSS or applications and it can be distributed internally and externally using networking and Web technologies.

What are the Difference between Structured and Unstructured Decisions?

We build business information systems to produce the information we need to make business decision. Decisions can be divided into two types: Structured and Unstructured.

Structured decisions are those choices you make by following a specific set of instructions. If three people face the same structured decision, they have access to the same data or information, and they follow the same set of instructions or processing, therefore, they will all arrive at the same conclusion. Structured decisions tend to be relatively easy decisions because you know exactly how you're going to arrive at a result. For example, if we manage inventory and reorder points have been set for each item, we know we must place an order to restock an item when the quantity-on-hand falls equal to or below the reorder point. The decision is made by comparing two numbers. The routine outputs of an MIS usually help lower level managers make structured decisions.

Unstructured decisions are those choices we make by following instinct or some other non-distinct guideline. Three people facing the same unstructured decision with access to the same data or information may follow three different paths and arrive at three different conclusions. Unstructured decisions tend to be the more difficult choices we face. Let's take the inventory management example again. Sometimes, reorder points have not been set for inventory items. Let's say you have a brand new item that you are selling. You've never sold this item before. You have no market research that tells you how popular this item will be. You must decide how many units of this item to order and stock. How do you pick that number? Guess. Use your lucky number. Throw a dart. There are no instructions to guide your decision therefore, this is an unstructured decision. Middle and upper level management tend to make such decisions, often based on experience, judgment and other intangible determinants. DSS outputs often support unstructured decisions.

Types of DSS

Data-Driven DSS

Data-Driven DSS take the massive amounts of data available through the company's TPS and MIS systems and cull from it useful information which executives can use to make more informed decisions. They don't have to have a theory or model but can "free-flow" the data.

The first generic type of Decision Support System is a **Data-Driven DSS.** These systems include file drawer and management reporting systems, data warehousing and analysis systems, Executive Information Systems (EIS) and Spatial Decision Support Systems. Business Intelligence Systems are also examples of Data-Driven DSS. Data-Driven DSS emphasize access to and manipulation of large databases of structured data and especially a time-series of internal company data and sometimes external data. Simple file systems accessed by query and retrieval tools provide the most elementary level of functionality. Data warehouse systems that allow the manipulation of data by computerized tools tailored to a specific task and setting or by more general tools and operators provide additional functionality. Data-Driven DSS with Online Analytical Processing (OLAP) provide the highest level of functionality and decision support that is linked to analysis of large collections of historical data.

Model-Driven DSS
A second category, **Model-Driven DSS,** includes systems that use accounting and financial models, representational models, and optimization models. Model-Driven DSS

emphasize access to and manipulation of a model. Simple statistical and analytical tools provide the most elementary level of functionality. Some OLAP systems that allow complex analysis of data may be classified as hybrid DSS systems providing modeling, data retrieval and data summarization functionality. Model-Driven DSS use data and parameters provided by decision-makers to aid them in analyzing a situation, but they are not usually data intensive. Very large databases are usually not needed for Model-Driven DSS.

Model-Driven DSS

Model-Driven DSS were isolated from the main Information Systems of the organization and were primarily used for the typical "what-if" analysis. That is, "What if we increase production of our products and decrease the shipment time?" These systems rely heavily on models to help executives understand the impact of their decisions on the organization, its suppliers, and its customers.

Knowledge-Driven DSS

The terminology for this third generic type of DSS is still evolving. Currently, the best term seems to be **Knowledge- Driven DSS.** Adding the modifier "driven" to the word knowledge maintains a parallelism in the framework and focuses on the dominant knowledge base component. Knowledge-Driven DSS can suggest or recommend actions to managers. These DSS are person computer systems with specialized problem-solving expertise. The "expertise" consists of knowledge about a particular domain, understanding of problems within that domain, and "skill" at solving some of these problems. A related concept is Data Mining. It refers to a class of analytical applications that search for hidden patterns in a database. Data mining is the process of sifting through large amounts of data to produce data content relationships.

Document-Driven DSS

A new type of DSS, a **Document-Driven DSS** or Knowledge Management System, is evolving to help managers retrieve and manage unstructured documents and Web pages. A Document-Driven DSS integrates a variety of storage and processing technologies to provide complete document retrieval and analysis. The Web provides access to large document databases including databases of hypertext documents, images, sounds and video. Examples of documents that would be accessed by a Document-Based DSS are policies and procedures, product specifications, catalogs, and corporate historical documents, including minutes of meetings, corporate records, and important correspondence. A search engine is a powerful decision aiding tool associated with a Document-Driven DSS.

Communications-Driven and Group DSS

Group Decision Support Systems (GDSS) came first**,** but now a broader category of **Communications-Driven DSS** or groupware can be identified. This fifth generic type of Decision Support System includes communication, collaboration and decision support technologies that do not fit within those DSS types identified. Therefore, we need to identify these systems as a specific category of DSS. A Group DSS is a hybrid Decision Support System that emphasizes both the use of communications and decision models. A Group Decision Support System is an interactive computer-based system intended to facilitate the solution of problems by decision-makers working together as a group. Groupware supports electronic communication, scheduling, document sharing, and other

group productivity and decision support enhancing activities We have a number of technologies and capabilities in this category in the framework – Group DSS, two-way interactive video, White Boards, Bulletin Boards, and Email.

Inter-Organizational or Intra-Organizational DSS
A relatively new targeted user group for DSS made possible by new technologies and the rapid growth of the Internet is customers and suppliers. We can call DSS targeted for external users an **Inter-organizational DSS.** The public Internet is creating communication links for many types of inter-organizational systems, including DSS. An Inter-Organizational DSS provides stakeholders with access to a company's intranet and authority or privileges to use specific DSS capabilities. Companies can make a Data-Driven DSS available to suppliers or a Model-Driven DSS available to customers to design a product or choose a product. Most DSS are **Intra-**

Organizational DSS
Organizational DSS are designed for use by individuals in a company as "standalone DSS" or for use by a group of managers in a company as a Group or Enterprise-Wide DSS.
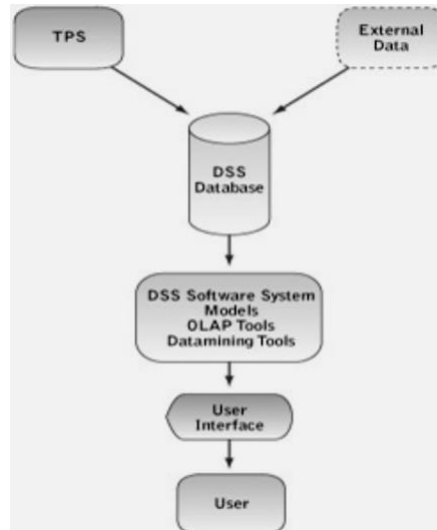
Function-Specific or General Purpose DSS
Many DSS are designed to support specific business functions or types of businesses and industries. We can call such a Decision Support System a function-specific or industry- specific DSS. A **Function-Specific DSS** like a budgeting system may be purchased from a vendor or customized in-house using a more general-purpose development package. Vendor developed or "off-the-shelf" DSS support functional areas of a business like marketing or finance; some DSS products are designed to support decision tasks in a specific industry like a crew scheduling DSS for an airline. A task-specific DSS has an important purpose in solving a routine or recurring decision task. Function or task-specific DSS can be further classified and understood in terms of the dominant DSS component that is as a Model-Driven, Data-Driven or Suggestion DSS. A function or task-specific DSS holds and derives knowledge relevant for a decision about some function that an organization performs (e.g., a marketing function or a production function). This type of DSS is categorized by purpose; function-specific DSS help a person or group accomplish a specific decision task. General-purpose DSS software helps support broad tasks like project management, decision analysis, or business planning.

Components of DSS
Traditionally, academics and MIS staffs have discussed building Decision Support Systems in terms of four major components:

- The user interface
- The database
- The models and analytical tools and
- The DSS architecture and network

A Comparison of DSS and MIS

A DSS differs from an MIS in numerous in the following ways:

Factor	DSS	MIS
Problem Type	A DSS is good at handling unstructured problems that cannot be easily programmed.	An MIS is normally used only with more structured problems.
Users	A DSS supports individuals, small groups, and the entire organization. In the short run, users typically have more control over a DSS.	An MIS supports primarily the organization. In the short run, users have less control over an MIS.
Support	A DSS supports all aspects and phases of decision making; it does not replace the decision maker - people still make the decisions.	This is not true of all MIS systems - some make automatic decisions and replace the decision maker.
Emphasis	A DSS emphasizes actual decisions and decision-making styles.	An MIS usually emphasizes information only.
Approach	A DSS is a direct support system that provides interactive reports on computer screens.	An MIS is typically an indirect support system that uses regularly produced reports.
System	The computer equipment that provides decision support is usually on-line (Directly connected to the computer system) and related to real time (providing immediate results). Computer terminals and display screens are examples - These devices can provide immediate information and answers to questions.	An MIS, using printed reports that may be delivered to managers once a week, may not provide immediate results.
Speed	Because a DSS is flexible and can be implemented by users, it usually takes less time to develop and is better able to respond to requests.	An MIS's response time is usually longer.
Output	DSS reports are usually screen oriented, with the ability to	An MIS, however, typically is oriented toward printed reports

	generate reports on a printer.	and documents.
Development	DSS users are usually more directly involved in its development. User involvement usually means better systems that provide superior support. For all systems, user involvement is the most important factor for the development of a successful system.	DSS users are usually more directly involved in its development. User involvement usually means better systems that provide superior support. For All systems, user involvement are the most important factor for the development of a successful system.

Executive Information Systems (ESS)

Executive Support Systems (ESS) supplies the necessary tools to senior management. The decisions at this level of the company are usually never structured and could be described as "educated guesses." Executives rely as much, if not more so, on external data than they do on data internal to their organization. Decisions must be made in the context of the world outside the organization. The problems and situations senior executives face are very fluid, always changing, so the system must be flexible and easy to manipulate.

The Role of ESS in the Organization

Executives often face information overload and must be able to separate the chaff from the wheat in order to make the right decision. On the other hand, if the information they have is not detailed enough they may not be able to make the best decision. An ESS can supply the summarized information executives need and yet provide the opportunity to **drill down** to more detail if necessary.

As technology advances, ESS are able to link data from various sources both internal and external to provide the amount and kind of information executives find useful. As common software programs include more options and executives gain experience using these programs, they're turning to them as an easy way to manipulate information. Many executives are also turning to the Web to provide the flexibility they need.

Benefits of ESS

As more executives come up through the ranks, they are more familiar with and rely more on technology to assist them with their jobs. Executive Support Systems don't provide executives with ready-made decisions. They provide the information that helps them make their decisions. Executives use that information, along with their experience, knowledge, education, and understanding of the corporation and the business environment as a whole, to make their decisions.

Executives are more inclined to want summarized data rather than detailed data (even though the details must be available). ESS relies on graphic presentation of information because it's a much quicker way for busy executives to grasp summarized information. Because of the trend toward flatter organizations with fewer layers of management, companies are employing ESS at lower levels of the organization. This trend will probably continue as more managers become knowledgeable about the power and flexibility of ESS.

Advantages

- Simple for high-level executives to use Operations do not require extensive computer experience

- Provides timely delivery of company summary information
- Provides better understanding of information
- Filters data for better time management
- Provides system for improvement in information tracking

Disadvantages

- Computer skills required to obtain results
- Requires preparation and analysis time to get desired information
- Detail oriented Provides detailed analysis of a situation
- Difficult to quantify benefits of DSS How do you quantify a better decision?
- Difficult to maintain database integrity
- Provides only moderate support of external data and graphics capabilities

Examples of ESS

The examples of ESS provided in the lesson offer interesting contrasts of how each organization uses its system to aid in the decision-making process.

The Sutter Home Winery uses mostly external data, including information from the Internet, in its ESS. It organizes the information in order to help executives make decisions based on trends in the marketplace. The information includes data on competitors and information from market research. Sutter uses its system output to determine sales forecasts, marketing campaigns, and investment plans.

Managers at the Royal Bank of Canada are able to choose their own criteria (from among 15 choices) to drill down and navigate data through easy-to-use interfaces. They don't have to accept data in formats chosen by someone else who may not understand individual manager's needs. Data analysis is more timely because the information is quicker to obtain and more convenient than before.

Virtually all of the information in the U.S. General Services Administration's ESS is internal data used to help executives manage the government's assets and inventory of buildings. The information is used for analysis of the efficient, or inefficient, use of buildings. The systems include the ability to drill down to more specific detail if necessary. Output includes graphs and pictures of the inventory. Huge amounts of data are available quicker and are more specific to the user's needs.

Characteristics of ESS

An ESS has many distinct characteristics that differentiate it from other applications software. A list of these features is presented in table below. A successful executive information system minimizes hard copy reports while keeping high-level executives up dated. With an ESS, qualitative information is obtained without producing volumes of paper.

Advanced internal control and communication are typical focuses of an ESS. The ability to view exception reporting on the computer screen is an example of an ESS-facilitated management control technique. Most Executive Support Systems highlight the areas of the business that are going astray. Color codes are used to display data that are in an acceptable or unacceptable range as defined by the executive. This technique allows the computer to track important project assignments within a company using the executive

information system. An ESS allows access to external as well as company internal information.

Characteristics	Description
Degree of use	High, consistent, without need of technical assistance
Computer skills required	Very low -must be easy to learn and use
Flexibility	High - must fit executive decision making style
Principle use	Tracking, control
Decisions supported	Upper level management, unstructured
Data supported	Company internal and external
Output capabilities	Text, tabular, graphical, trend toward audio/video in future
Graphic concentration	High, presentation style
Data access speed	Must be high, fast response