

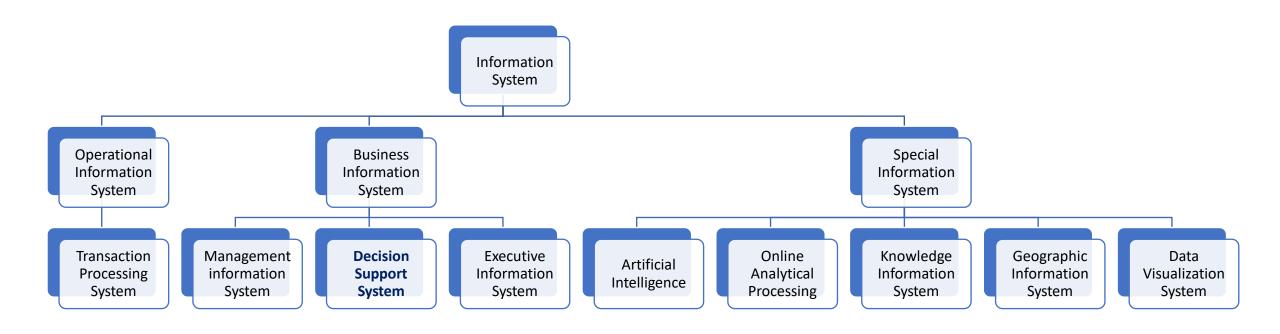
#### **DECISION SUPPORT SYSTEM**

# CONCEPTS, TECHNOLOGIES, MODELS AND APPLICATIONS

TEACHING TEAM
DECISION SUPPORT SYSTEM COURSE



# **Information System Topology**





# Relationship between MIS and DSS

 Flow-processing procedures based on computer data, and integrated with other procedures to provide information in a timely and effective manner to support decision-making and other management functions



- 1. Procedure
- 2. Data
- 3. Information
- 4. Time
- 5. Effective
- 6. Decision-making



#### Difference between MIS and DSS

Factor	DSS	MIS
Approach	Serves as a direct support system that provides interactive reports on computer screens.	Typically serves as an indirect support system that uses regularly produced reports.
Development	Has users who 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.	Is frequently several years old and often was developed for people who are no longer performing the work supported by the MIS.
Emphasis	Emphasizes actual decisions and decision-making styles.	Usually emphasizes information only.
Output	Produces reports that are usually screen oriented, with the ability to generate reports on a printer.	Is oriented toward printed reports and documents.
Problem type	Can handle unstructured problems that cannot be easily programmed.	Normally used only with structured problems.
Speed	Is flexible and can be implemented by users, so it usually takes less time to develop and is better able to respond to user requests.	Provides response time usually longer than a DSS.
Support	Supports all aspects and phases of decision making; it does not replace the decision maker—people still make the decisions.	In some cases, makes automatic decisions and replaces the decision maker.
System	Uses computer equipment that is usually online (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.	Uses printed reports that might be delivered to managers once per week, so it cannot provide immediate results.
Users	Supports individuals, small groups, and the entire organi- zation. In the short run, users typically have more control over a DSS.	Primarily supports the organization. In the short run, users have less control over an MIS.



# **Decision Support System**

- DSS is part of a computer-based information system (including knowledge-based systems (knowledge management)) intended to support decision making in an organization or company.
- A computer system that processes data into information to make decisions about specific semi-structured problems.
- An interactive information system that provides information, modeling and data manipulation to assist decision making in semistructured and unstructured situations.



#### Definition of DSS

- An organized collection of people, procedures, software, databases, and devices used to help make decisions that solve problems.
- The focus of a DSS is on decision-making effectiveness when faced with unstructured or semi-structured business problems.
- Decision support systems offer the potential to generate higher profits, lower costs, and better products and services.



### **DSS Visualization**







#### Querying and Reporting

1960s

#### Query Modules & Report Generators

- Management Information System (MIS) was conceptualized as a corporate information store
- Batch querying and reporting of transaction data was provided through report generators

#### Decision Support & Modeling

1970s

#### Early DSS Tools

- Commercial tools for building DSS using financial and quantitative models emerged
- First gen bespoke DSS solutions were built for specific purposes (portfolio management, pricing etc.)

#### Analytical Processing

1980s

#### **DSS & 4GL Environments**

- 4GL languages and environments are used for reporting and analysis
- Model and data-driven DSS solutions continued to evolve
- Executive Information and Support Systems solutions were developed
- Spreadsheets began to be used for data reporting and descriptive analytics

#### Enterprise Performance Management

1990s

#### Data Warehouse & BI

- Data warehouses and multidimensional databases experienced rapid growth
- BI tools market for reporting, data presentation grew rapidly
- Companies enabled crossfunctional enterprise-wide querying, drill-down, and analytic capabilities
- Companies leveraged tools for web-based analytics

#### Next Gen Data Processing

#### 2000s

#### Data Processing & Analytic Platforms

- Businesses used large scale data processing frameworks for raw data storage and archiving
- Companies experimented with discovery and unstructured data analysis, real time analytics
- New age information industry players employ big data analytics



- "Decision Support System" (DSS) is conceptualized as a computerized system for structured and unstructured decision making
- The DSS concept undergoes significant expansion and evolution
- "Information Engineering" is conceptualized
- Adoption of 4GL languages and environments picks up
- Spreadsheet software became widely adopted

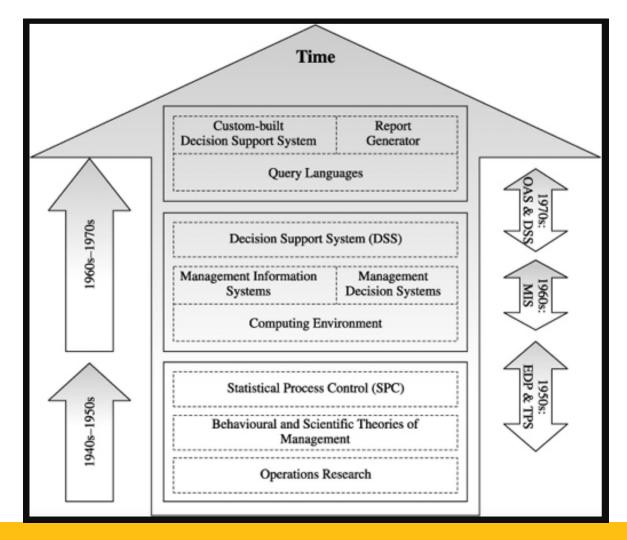
- Enterprise data warehouse and online analytical processing (OLAP) are conceptualized
- The concept of Business Intelligence (BI) emerges
- Vendors start marketing solutions for web-based analytics

- Distributed data processing for big data emerges
- New advanced analytic techniques become possible due to hardware and software advancements
- New analytic databases and appliances emerge
- New service models, such as Analytics as a Service, emerge





# History of DSS - Models and Applications





#### Characteristics of DSS

Structured decisions with computer assistance to support managers in decision making

Increase the **effectiveness** of management decision making

**Automation** of decision making to produce certain solutions



#### Characteristics of DSS

- Provide rapid access to information.
- Handle large amounts of data from different sources.
- Provide report and presentation flexibility.
- Offer both textual and graphical orientation.
- Support drill-down analysis.
- Perform complex, sophisticated analyses and comparisons using advanced software packages.
- Support optimization, satisficing, and heuristic approaches.
- Perform simulation analysis.
- Forecast a future opportunity or problem.



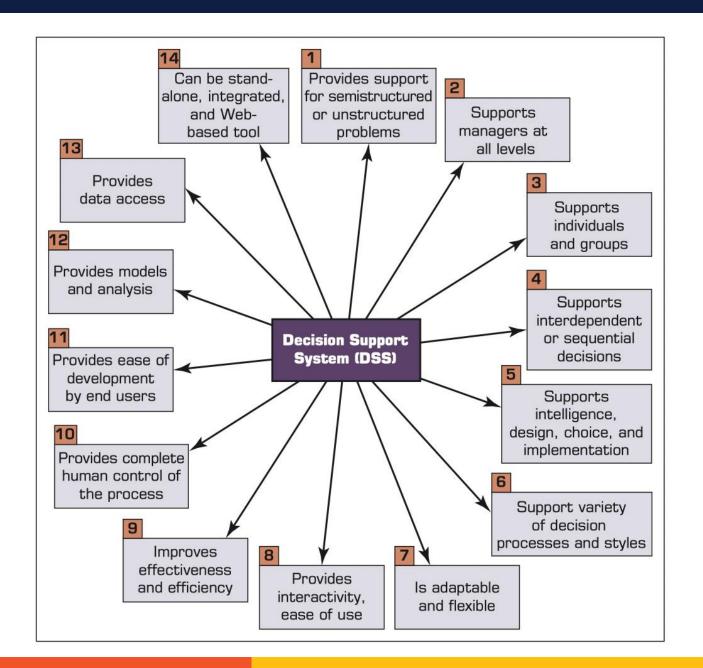
#### Characteristics of DSS

- Support for Problem-Solving Phases
   Phases include intelligence, design, choice, implementation, and monitoring.
- Support for Various Decision Frequencies ad hoc DSS and institutional DSS
- Support for Various Decision-Making Levels
   provide help for managers at various levels within an organization.



# Objectives of Using DSS

- Supports finding solutions to complex problems.
- Quick response to changing/uncertain situations and conditions.
- Implement various strategies with different configurations quickly and precisely.
- New views and learning.
- Facilitate communication.
- Improve management control and performance.
- Save cost.
- Speed up decision making.
- Increase managerial effectiveness, work shorter hours with less effort.
- Increase analysis productivity.



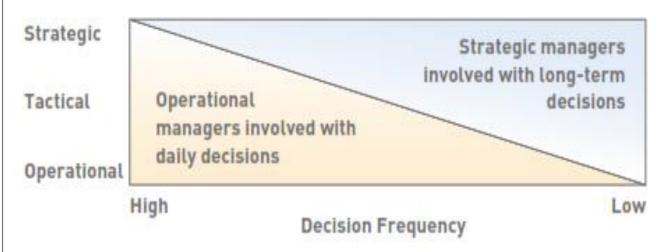


# Key Characteristics and Capabilities of DSS



# Types of Decision Forms and Their Users

	Type of Control		
Type of Decision	Operational Control	Managerial Control	Strategic Planning
Structured	Monitoring accounts receivable Monitoring accounts payable Placing order entries	Analyzing budget Forecasting short-term Reporting on personnel Making or buying	Managing finances Monitoring investment portfolio Locating warehouse Monitoring distribution systems
Semistructured	Scheduling production Controlling inventory	Evaluating credit Preparing budget Laying out plant Scheduling project Designing reward system Categorizing inventory	Building a new plant Planning mergers and acquisitions Planning new products Planning compensation Providing quality assurance Establishing human resources policies Planning inventory
Unstructured	Buying software Approving loans Operating a help desk Selecting a cover for a magazine	Negotiating Recruiting an executive Buying hardware Lobbying	Planning research and development Developing new technologies Planning social responsibility





#### Problems -> Decision

Problems	Decision
<ul> <li>Structured: 3 stages including intelligent, design, choice</li> <li>Unstructured: does not include 3 stages</li> <li>Semi Structured: one/2 stages</li> </ul>	<ol> <li>There are many alternatives</li> <li>There are conditions</li> <li>Follows a structured or unstructured pattern</li> <li>There are many inputs/variables</li> <li>There are risk factors</li> <li>It requires speed, accuracy and precision</li> </ol>



# Components of DSS

#### **Data Management**

• Database Management Systems (DBMS), which organize relevant data

#### **Model Management**

 Analytical skills, which involving financial models, statistics, management science, or various other quantitative models

# Communication (Dialog Subsytem)

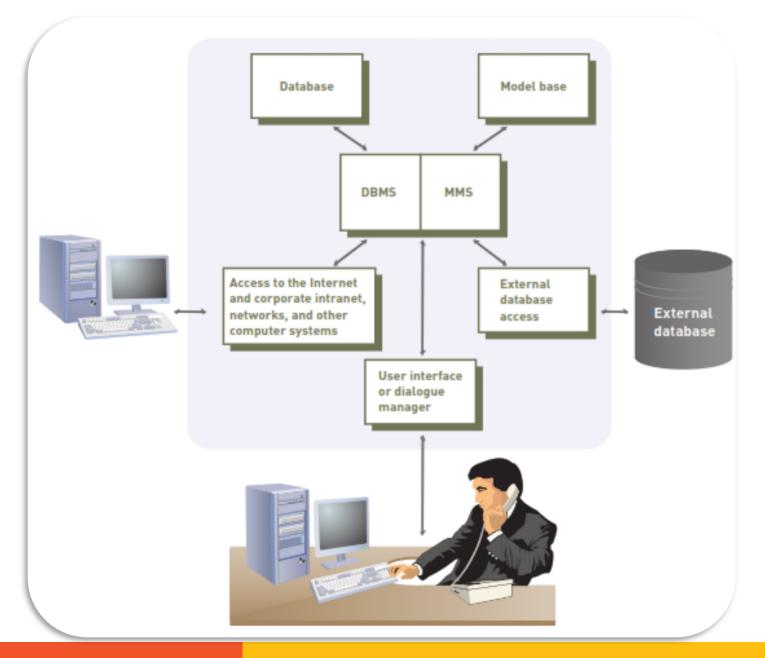
User interface, to interact with DSS

#### **Knowledge Management**

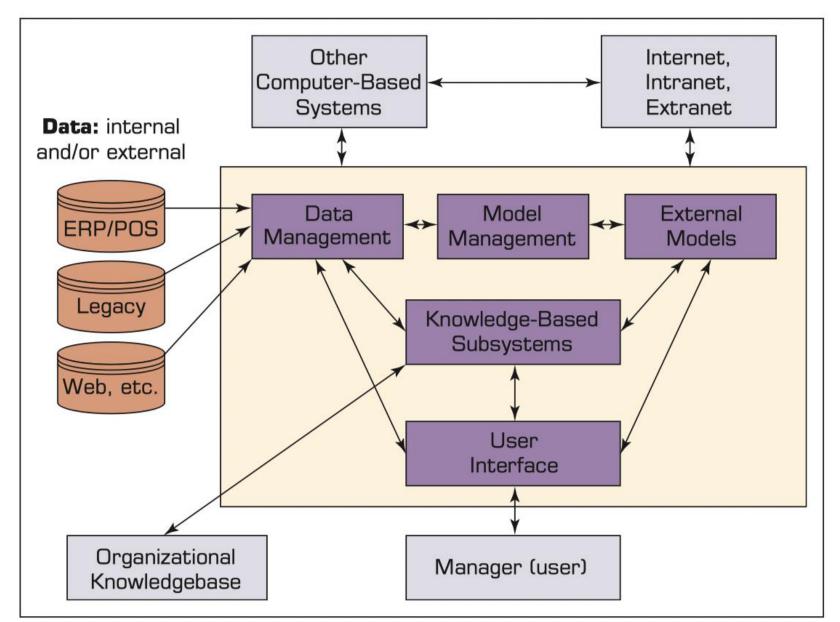
 Independent subsystem, which is optimal and supports other subsystems







# Components of DSS





# Schematic View of DSS

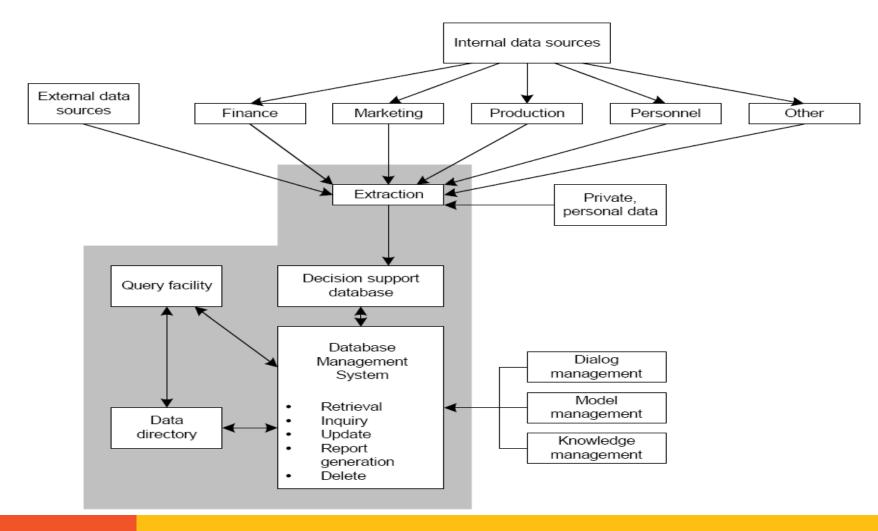


# **Technical Stages of DSS**

- 1. Problem definition
- 2. Collection of relevant data or information elements
- 3. Processing data into information in the form of graphic and written reports
- 4. Determination of alternative solutions (can be in percentage)



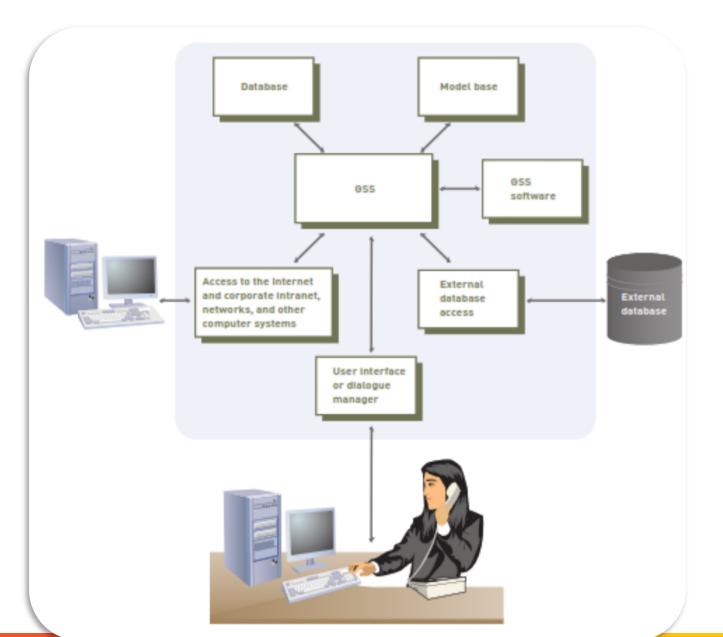
# **Example of DSS Architecture**





#### Limitations of DSS

- There are management capabilities and human talents that cannot be modeled into a system.
- Knowledge treasury.
- Depends on the capabilities of the software used.
- Does not have intuitive abilities.





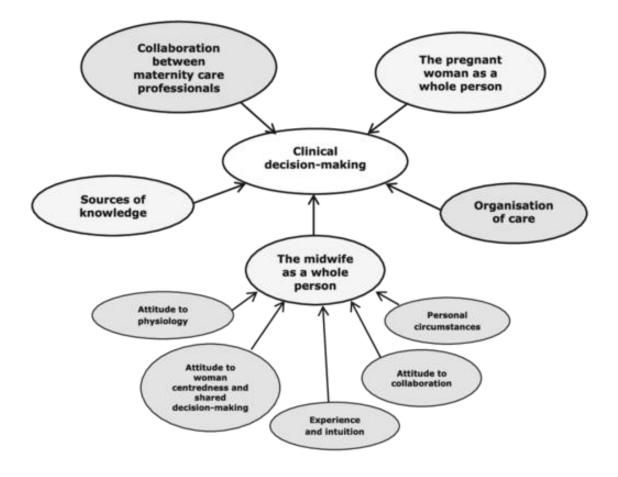
# Group DSS (GDSS)

 A group support system and a computerized collaborative work system, consists of most of the elements in a DSS, plus software to provide effective support in group decision-making settings



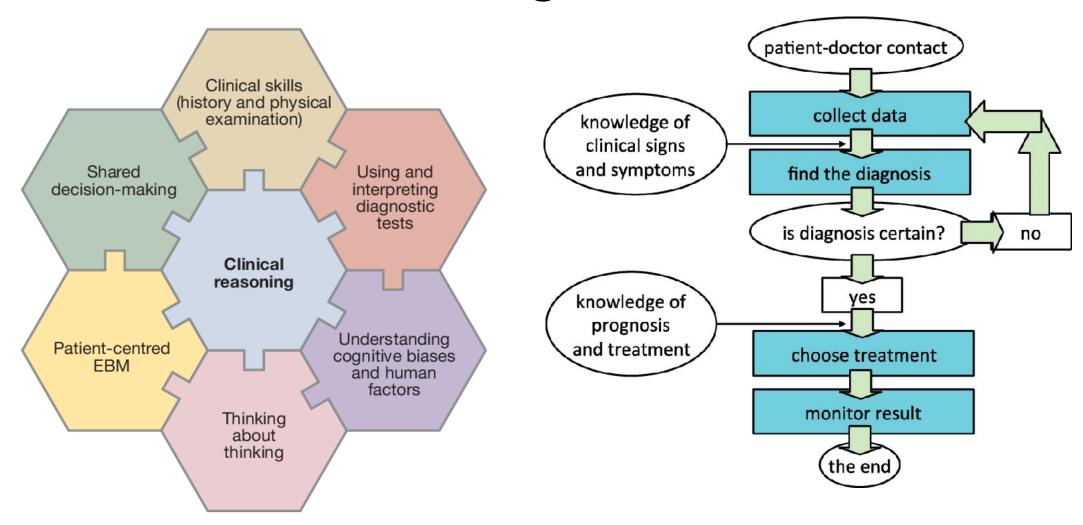
# Clinical Decision Making

 Clinical decision making is a contextual, continuous, and evolving process, where data are gathered, interpreted, and evaluated to select an evidence-based choice of action.





# Clinical Decision Making





# OODA Decision Making Loop

- A way of thinking about the decision-making process
- Encourages decision-makers to think critically, anticipate threats, and neutralize them before they become critical

