Module 5
Decision support in business

Introduction, Decision support trends, Decision support systems (DSS), Management Information Systems, Online analytical processing, Using DSS, Executive information systems, Enterprise portals and decision support, Knowledge management systems, Business and Artificial Intelligence (AI), An overview of AI, Expert systems.

Introduction : we identify the following key roles in this unit.

•Identify the changes taking place in the form and use of decision support in business.

•Identify the role and reporting alternatives of management information systems.

•Describe how online analytical processing can meet key information needs of managers.
Learning Objectives

•Explain the decision support system concept and how it differs from traditional management information systems.

•Explain how the following information systems can support the information needs of executives, managers, and business professionals: •Executive information systems

•Enterprise information portals

•Knowledge management systems

•Identify how neural networks, fuzzy logic, genetic algorithms, virtual reality, and intelligent agents can be used in business.

•Give examples of several ways expert systems can be used in business decision-making situations.

Decision Support Systems(DSS)

•As companies migrate toward responsive e-business models, they are investing in new data-driven decision support application frameworks that help them respond rapidly to changing market conditions and customer needs.

Information, Decisions and Management

This figure emphasizes that the type of information required by decision makers in a company is directly related to the level of management decision making and the amount of structure in the decision situations they face. levels of management decision making still exist, but their size, shape, and participants continue to change as todays fluid

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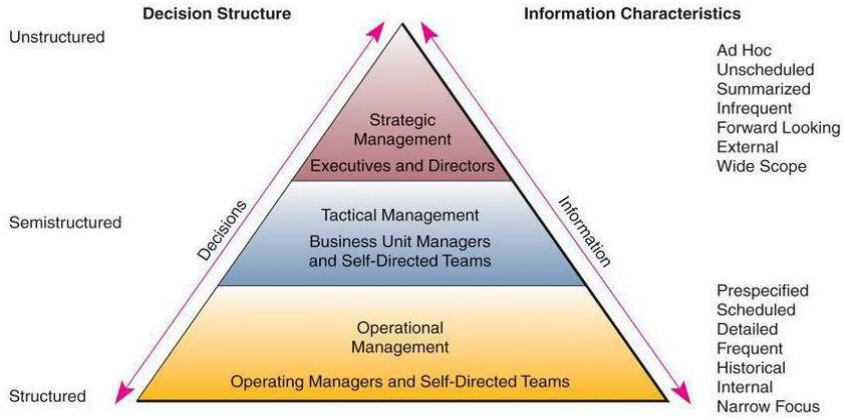


Levels of Management Decision Making

•Strategic – group of executives develop overall organizational goals, strategies, policies, and objectives as part of a strategic planning process

•Tactical – managers and business professionals in self-directed teams develop short- and medium-range plans, schedules and budgets and specify the policies, procedures and business objectives for their subunits

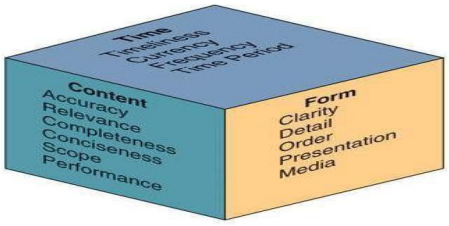
•Operational – managers or members of self-directed teams develop short-range plans such as weekly production schedules

Information Quality

Definition:

•Information products whose characteristics, attributes, or qualities make the information more value

•*Attributes of Information Quality*



Time Dimension	
Timeliness	Information should be provided when it is needed.
Currency	Information should be up-to-date when it is provided.
Frequency	Information should be provided as often as needed.
Time Period	Information can be provided about past, present, and future time periods.
Content Dimension	
Accuracy	Information should be free from errors.
Relevance	Information should be related to the information needs of a specific recipient for a specific situation.
Completeness	All the information that is needed should be provided.
Conciseness	Only the information that is needed should be provided.
Scope	Information can have a broad or narrow scope, or an internal or external focus.
Performance	Information can reveal performance by measuring activities accomplished, progress made, or resources accumulated.
Form Dimension	
Clarity	Information should be provided in a form that is easy to understand.
Detail	Information can be provided in detail or summary form.
Order	Information can be arranged in a predetermined sequence.
Presentation	Information can be presented in narrative, numeric, graphic, or other forms.
Media	Information can be provided in the form of printed paper documents, video displays, or other media.

Decision Structure

•Structured – situations where the procedures to follow when a decision is needed can be specified in advance

•Unstructured – decision situations where it is not possible to specify in advance most of the decision procedures to follow

•Semi structured - decision procedures that can be prespecified, but not enough to lead to a definite recommended decision

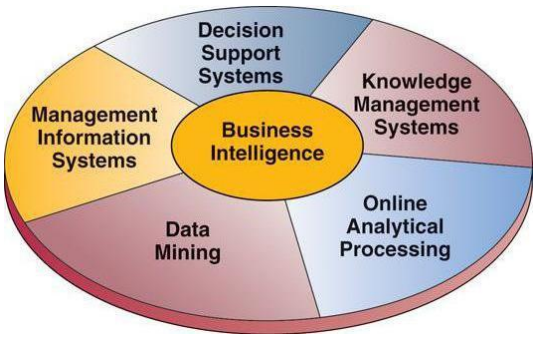
Decision Support Trends

•This emerging class of applications focuses on personalized decision support, modeling, information retrieval, data warehousing, what-if scenarios, and reporting.

MIS vs. DSS

	Management Information Systems	Decision Support Systems
• Decision support provided	Provide information about the performance of the organization	Provide information and decision support techniques to analyze specific problems or opportunities
• Information form and frequency	Periodic, exception, demand, and push reports and responses	Interactive inquiries and responses
• Information format	Prespecified, fixed format	Ad hoc, flexible, and adaptable format
• Information processing methodology	Information produced by extraction and manipulation of business data	Information produced by analytical modeling of business data

Business Intelligence



•Executive class information delivery and decision support software tools used by lower levels of management and by individuals and teams of business professionals

Decision Support Systems (DSS)

Definition:

•Computer-based information systems that provide interactive information support to managers and business professionals during the decision-making process using the following to make semi structured business decisions

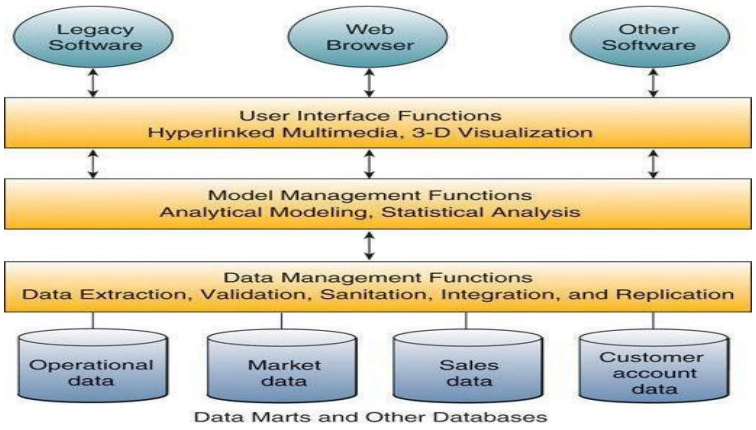
•Analytical models

•Specialized databases

•A decision maker's own insights and judgments

•An interactive, computer-based modeling process

DSS Components

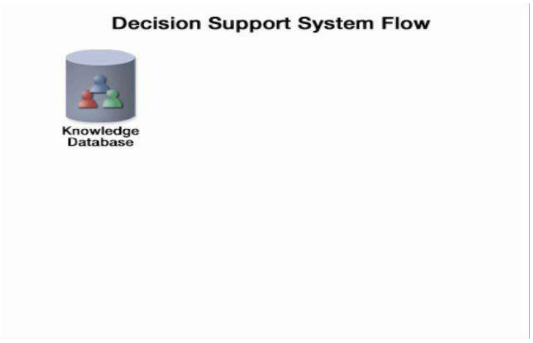


Model Base

Definition:

•Software component that consists of models used in computational and analytical routines that mathematically express relationships among variables

Decision Support System



Management Information Systems (MIS)

Definition:

•An information system that produces information products that support many of the day-to-day decision-making needs of managers and business professionals

Management Reporting Alternatives

•Periodic Scheduled Reports

•Exception Reports

•Demand Reports and Responses

•Push Reporting

Online analytical processing Using DSS

Definition:

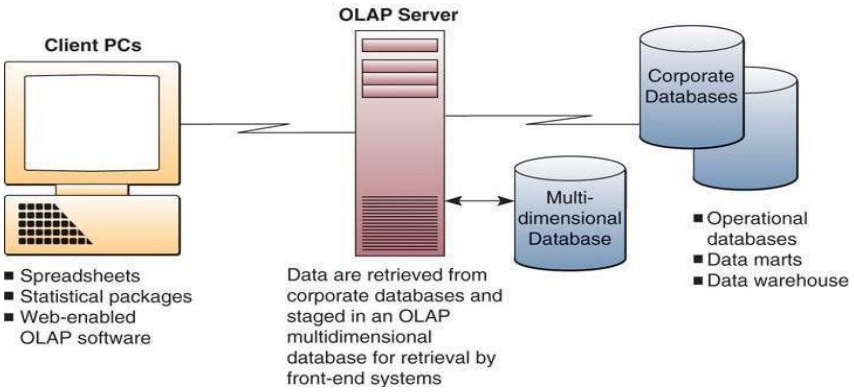
•Enables mangers and analysts to interactively examine and manipulate large amounts of detailed and consolidated data from many perspectives Analytical Operations

•Consolidation – aggregation of data

•Drill-down – detail data that comprise consolidated data

•Slice and Dice – ability to look at the database from different viewpoints

OLAP Technology



Geographic Information Systems (GIS)

Definition:

•DSS that uses geographic databases to construct and display maps and other graphics displays that support decisions affecting the geographic distribution of people and other resources

Data Visualization Systems (DVS)

•DVS represent complex data using interactive three-dimensional graphical forms such as charts, graphs, and maps

•DVS tools help users to interactively sort, subdivide, combine, and organize data while it is in its graphical form.

Using DSS

•What-if Analysis – end user makes changes to variables, or relationships among variables, and observes the resulting changes in the values of other variables

•Sensitivity Analysis – value of only one variable is changed repeatedly and the resulting changes in other variables are observed

•Goal-Seeking – set a target value for a variable and then repeatedly change other variables until the target value is achieved

•Optimization – goal is to find the optimum value for one or more target variables given certain constraints then one or more other variables are changed repeatedly until the best values for the target variables are discovered

Data Mining for Decision Support

•Data mining software analyzes the vast stores of historical business data that have been prepared for analysis in corporate data warehouses, and tries to discover patterns, trends, and correlations hidden in the data that can help a company improve its business performance.

•Data mining software may perform regression, decision tree, neural network, cluster detection, or market basket analysis for a business.

Market Basket Analysis (MBA)

Definition:

•The purpose is to determine what products customers purchase together with other products

Executive information systems

Definition:

•Information systems that provide top executives, managers, analysts, and other knowledge workers with immediate and easy access to information about a firm's key factors that are critical to accomplishing an organization's strategic objectives.

Features of an EIS

Information presented in forms tailored to the preferences of the executives using the system

•Customizable graphics displays

•Exception reporting

•Trend analysis

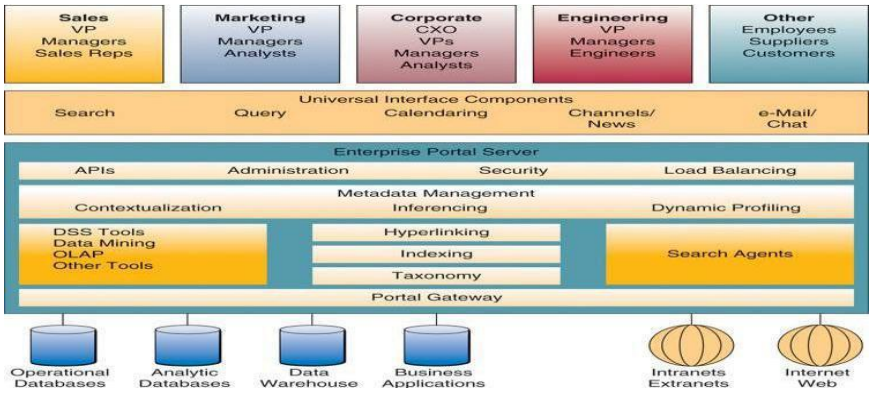
•Drill down capability

Enterprise Portals and Decision Support

Definition:

A Web-based interface and integration of MIS, DSS, EIS, and other technologies that gives all intranet users and selected extranet users access to a variety of internal and external business applications and services

Enterprise Information Portal Components



Knowledge Management Systems

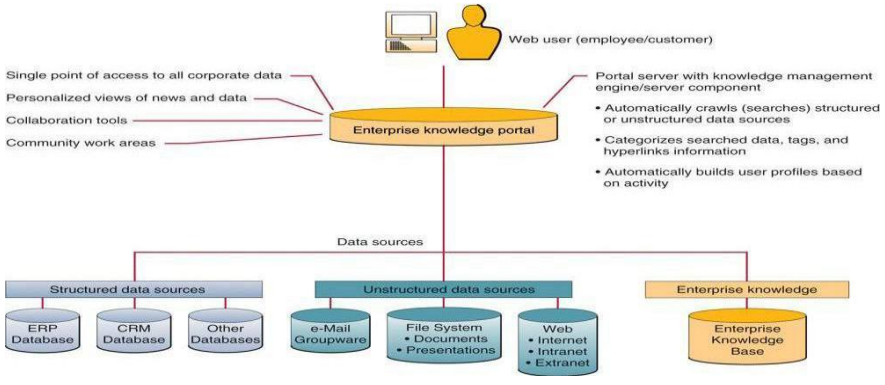
Definition:

The use of information technology to help gather, organizes, and share business knowledge within an organization

Enterprise Knowledge Portals

Definition:

Entry to corporate intranets that serve as their knowledge management systems



Business and Artificial Intelligence (AI)

Artificial Intelligence Uses:

- Design jet engines
- Monitor factory equipment and signal when preventative maintenance is needed
- Gain insights into human genome for pharmaceutical research
- Detect credit card fraud

Case #2: Business Value of AI

AI Benefits:

- Data mining systems sift instantly through a deluge of data to uncover patterns and relationships that would elude an army of researchers
- Companies can predict sales and other customer behaviors

Challenges in AI Systems:

- Getting transaction data
- Dealing with disparate sources of data
- What is the business value of AI technologies in business today? Use several examples from the case to illustrate your answer.
- What are some of the benefits and limitations of data mining for business intelligence? Use Bank Financials experience to illustrate your answer.

Artificial Intelligence (AI)

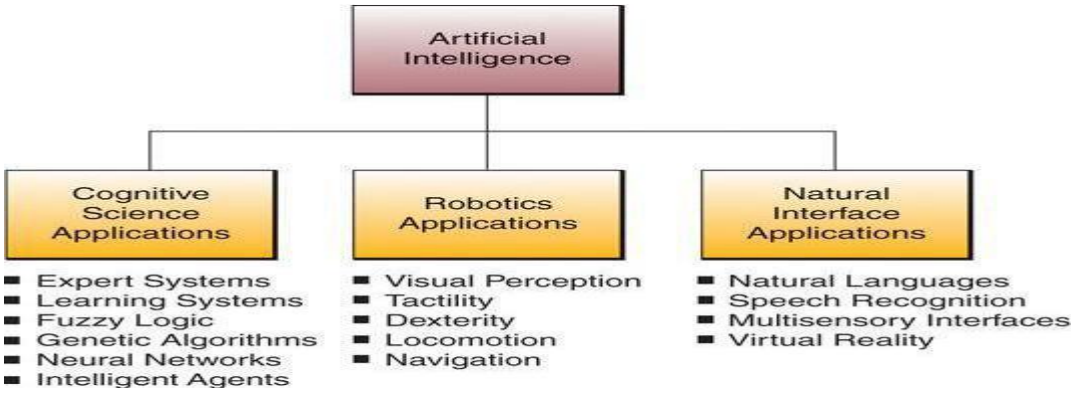
Definition:

- A field of science and technology based on disciplines such as computer science, biology, psychology, linguistics, mathematics, and engineering
- Goal is to develop computers that can simulate the ability to think, as well as see, hear, walk, talk, and feel.

Attributes of Intelligent Behavior

- Think and reason
- Use reason to solve problems
- Learn or understand from experience
- Acquire and apply knowledge
- Exhibit creativity and imagination
- Deal with complex or perplexing situations
- Respond quickly and successfully to new situations
- Recognize the relative importance of elements in a situation
- Handle ambiguous, incomplete, or erroneous information

Domains of Artificial Intelligence



Cognitive Science

Definition:

•Focuses on researching how the human brain works and how humans think and learn

Robotics

Definition:

•Robot machines with computer intelligence and computer controlled, humanlike physical capabilities

Natural Interfaces

Definition:

•Includes natural language, speech recognition, and the development of multi sensory devices that use a variety of body movements to operate computers

Expert Systems

Definition:

•A knowledge-based information system that uses its knowledge about a specific, complex application to act as an expert consultant to end users

Expert System Components

•Knowledge Base – facts about specific subject area and heuristics that express the reasoning procedures of an expert

•Software Resources – inference engine and other programs refining knowledge and communicating with users

Methods of Knowledge Representation

•Case-Based – examples of past performance, occurrences and experiences

•Frame -Based – hierarchy or network of entities consisting of a complex package of data values

•Object-Based – data and the methods or processes that act on those data

•Rule-Based – rules and statements that typically take the form of a premise and a conclusion

Expert System Benefits

•Faster and more consistent than an expert

•Can have the knowledge of several experts

•Does not get tired or distracted by overwork or stress

•Helps preserve and reproduce the knowledge of experts

Expert System Limitations

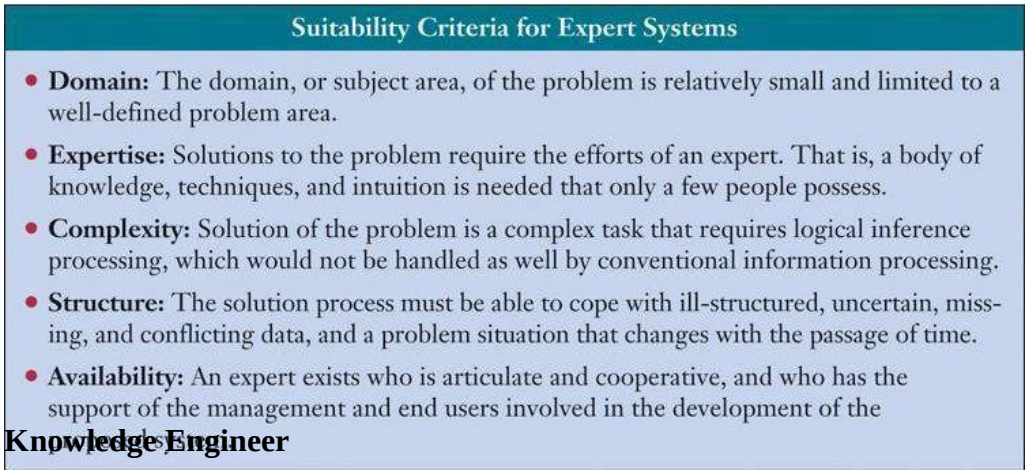
•Limited focus

•Inability to learn

•Maintenance problems

•Developmental costs

Suitability Criteria for Expert Systems



Knowledge Engineer

Definition:

- A professional who works with experts to capture the knowledge they posses

Neural Networks

Definition:

- Computing systems modeled after the brain's mesh-like network of interconnected processing elements, called neurons

Fuzzy Logic

Definition:

- Method of reasoning that resembles human reasoning since it allows for approximate values and inferences and incomplete or ambiguous data instead of relying only on crisp data

Genetic Algorithms

Definition:

- Software that uses Darwinian, randomizing, and other mathematical functions to simulate an evolutionary process that can yield increasingly better solutions to a problem

Virtual Reality (VR)

Definition:

- Computer-simulated reality that relies on multisensory input/output devices such as a tracking headset with video goggles and stereo earphones, a data glove or jumpsuit with fiber-optic sensors that track your body movements, and a walker that monitors the movement of your feet.

Intelligent Agents

Definition:

- A software surrogate for an end user or a process that fulfills a stated need or activity by using built-in and learned knowledge base to make decisions and accomplish tasks in a way that fulfills the intentions of a user

User Interface Agents

•Interface Tutors – observe user computer operations, correct user mistakes, and provide hints and advice on efficient software use

•Presentation – show information in a variety of forms and media based on user preferences

•Network Navigation – discover paths to information

•Role-Playing – play what -if games and other roles to help users understand information and make better decisions

Information Management Agents

•Search Agents – help users find files and databases, search for desired information, and suggest and find new types of information products, media, and resources

•Information Brokers – provide commercial services to discover and develop information resources that fit the business or personal needs of a user

•Information Filters – receive, find, filter, discard, save, forward, and notify users about products received or desired

Note

•Information systems can support a variety of management decision -making levels including strategic, tactical and operational as well as structured, semi structured and unstructured.

•Decision support in business is changing, driven by rapid developments in end user computing and networking.

Summary

•Management information systems provide prespecified reports and responses to managers on a periodic, exception, demand, or push reporting basis, to meet their need for information to support decision making.

•Online analytical processing interactively analyzes complex relationships among large amounts of data stored in multidimensional databases.

Summary

•Data mining analyzes the vast amounts of historical data that have been prepared for analysis in data warehouses.

•Decision support system are interactive, computer-based information systems that use DSS software and a model base and database to provide information tailored to support semi structured and unstructured decisions faced by individual managers.

•Executive information systems are easy to use and enable executives to retrieve information tailored to their needs and preferences.

•Enterprise information and knowledge portals provide a customized and personalized Web-based interface for corporate intranets to give their users easy access to a variety of internal and external business applications, databases, and information services that are tailored to their individual preferences and information needs.

•The goal of artificial intelligence is the development of computer functions normally associated with human physical and mental capabilities.

•Expert systems are knowledge -based information systems that use software and a knowledge base about a specific, complex application area to act as expert consultants to users in many business and technical applications.