Chapter 12

Management Decision Support and Intelligent Systems

Information Technology For Management 6th Edition

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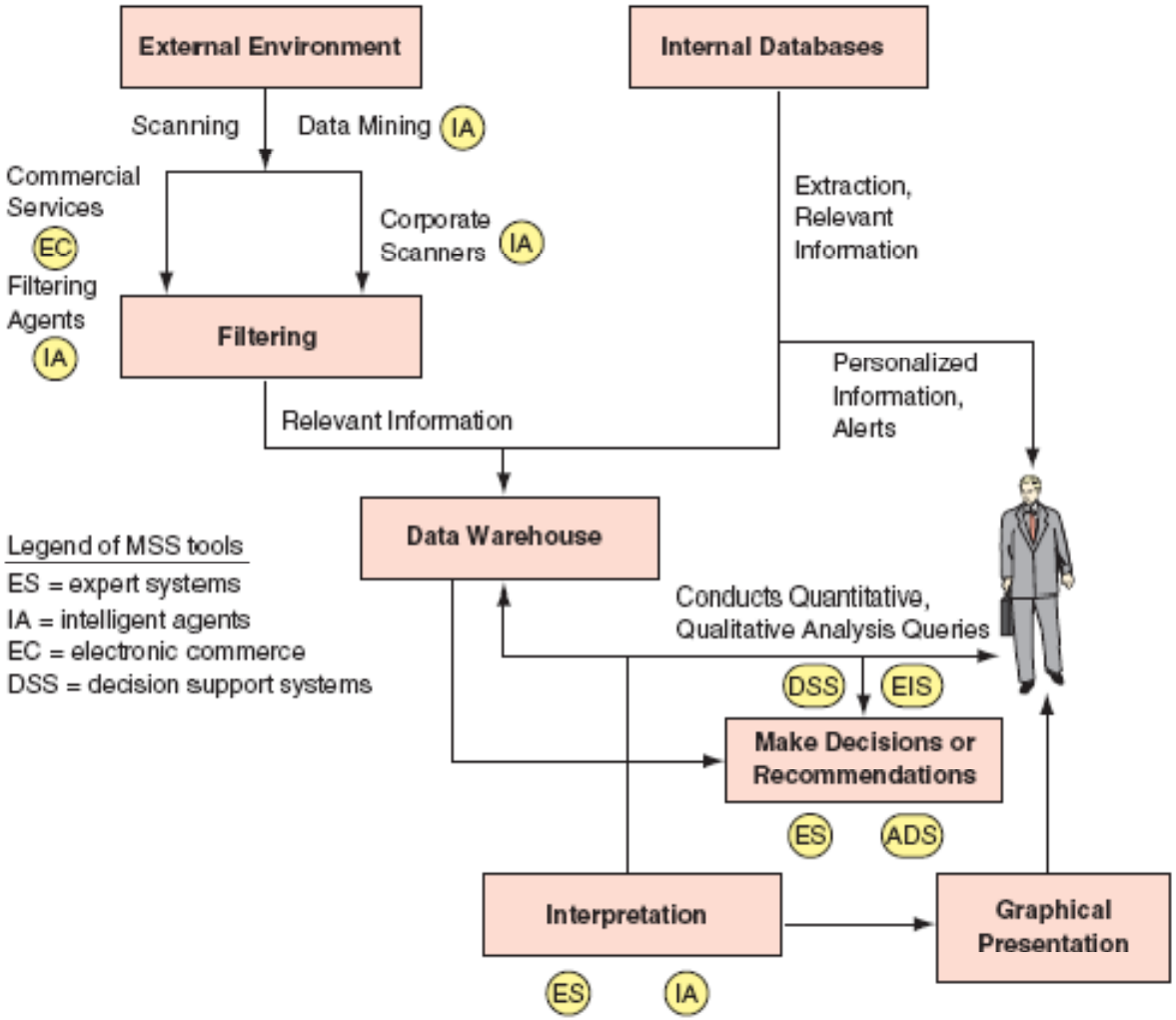
Learning Objectives

- Describe the concepts of managerial, decision making, and computerized support for decision making.
- Justify the role of modeling and models in decision making.
- Describe decision support systems (DSSs) and their benefits, and describe the DSS structure.
- Describe the support to group (including virtual) decision making.
- Describe organizational DSS and executive support systems, and analyze their role in management support.
- Describe artificial intelligence (AI) and list its benefits and characteristics.

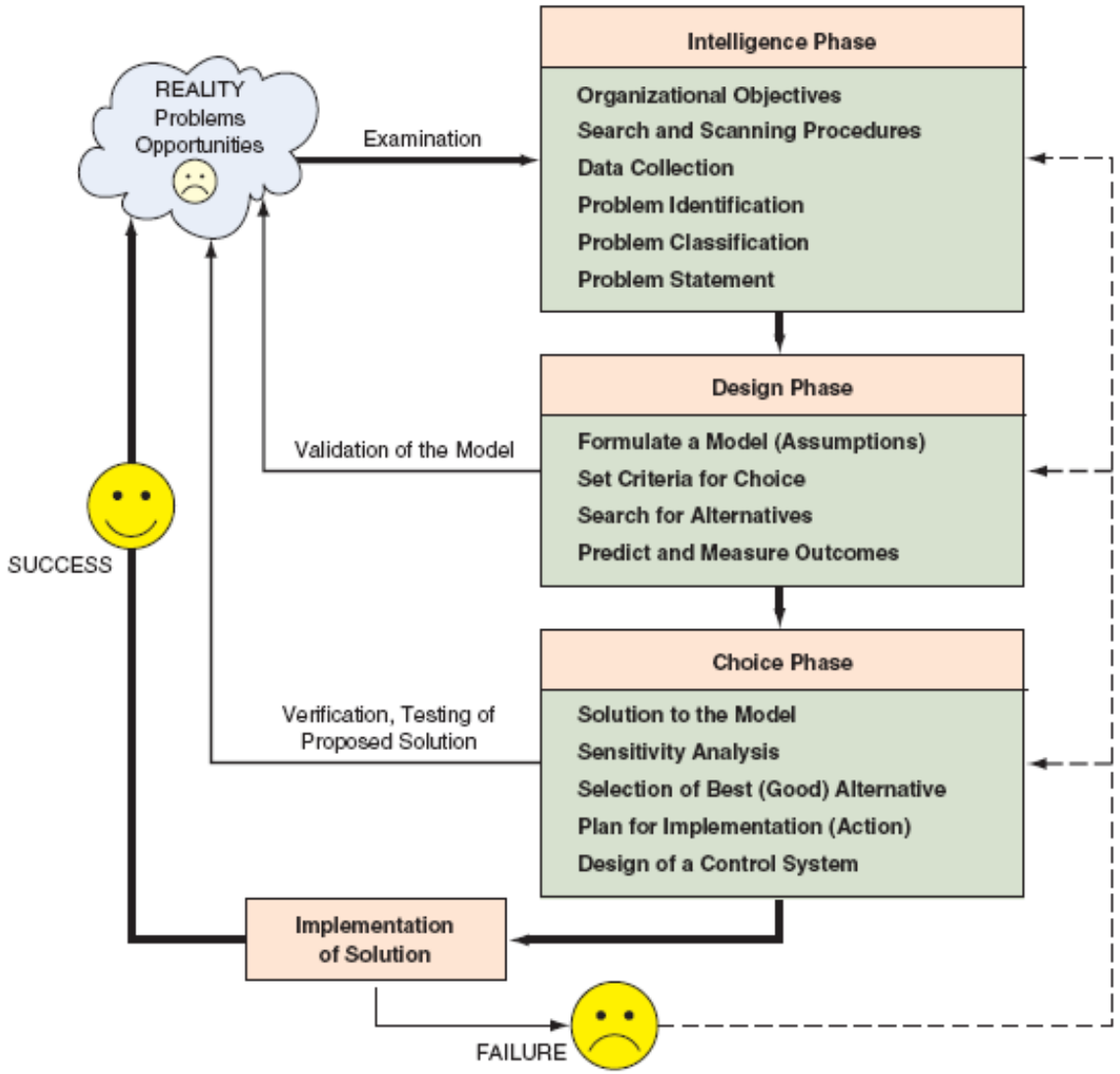
Learning Objectives (Continued)

- List the major commercial AI technologies
- Define an expert system and its components and describe its benefits and limitations.
- Describe natural language processing and compare it to speech understanding.
- Describe Artificial Neural Networks (ANNs) and their characteristics and major applications. Compare it to fuzzy logic and describe its role in hybrid intelligent systems.
- Describe automated decision support - advantages and areas of application
- Describe special decision support applications including the support of frontline employees.

Decision Process



Decision Complexity



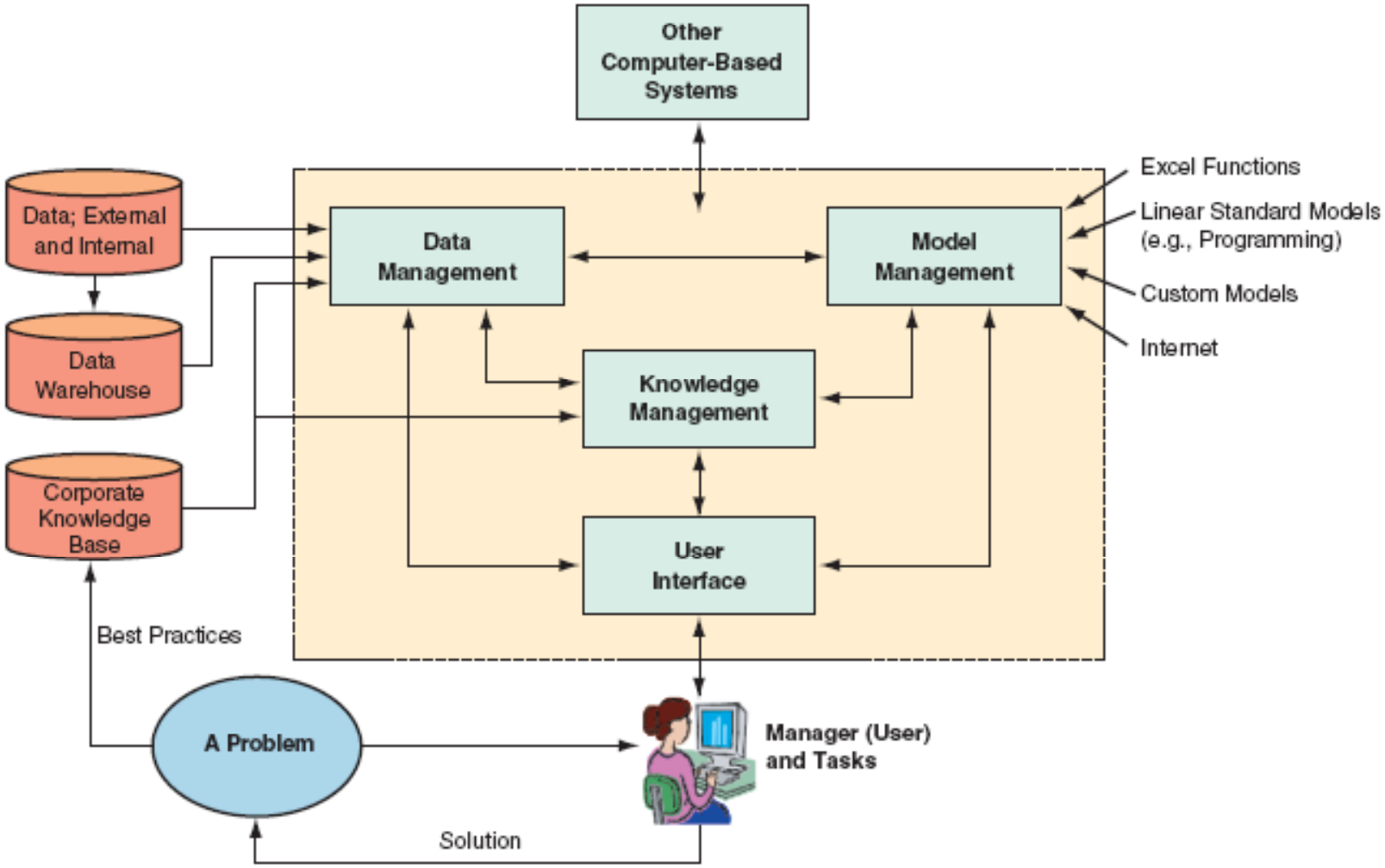
Characteristics and Capabilities of DSSs

- **Sensitivity analysis** is the study of the impact that changes in one (or more) parts of a model have on other parts.
- **What-if analysis** is the study of the impact of a change in the assumptions (input data) on the proposed solution.
- **Goal-seeking analysis** is the study that attempts to find the value of the inputs necessary to achieve a desired level of output.

Structure and Components of DSSs

- **Data management subsystem** contain all the data that flow from several sources.
- **Model management subsystem** contains completed models and the building blocks necessary to develop DSS applications.
- **User interface** covers all aspects of the communications between a user and the DSS.
- **Users** are the persons faced with the problem or decision that the DSS is designed to support.
- **Knowledge-based subsystems** provide the required expertise for solving some aspects of the problem.

DSS Process


Other Computer-Based Systems
Data; External and Internal
Data Warehouse
Corporate Knowledge Base
Data Management
Model Management
Knowledge Management
User Interface
Excel Functions
Linear Standard Models (e.g., Programming)
Custom Models
Internet
Best Practices
A Problem
Manager (User) and Tasks
Solution

Organizational Decision Support System (ODSS)

- **Organizational Decision Support System (ODSS)** is a DSS that focuses on an *organizational* task or activity involving a *sequence* of operations and decision makers and provides the following:
  - It affects several organizational units or corporate problems;
  - It cuts across organizational functions or hierarchical layers;
  - It involves computer-based and (usually) communications technologies.

Executive Information (Support) Systems

- **Executive information system (EIS)** also known as an **executive support system (ESS)**, is a computer-based technology designed specifically for the information needs of top executives and provides for:
  - Rapid access to timely information;
  - Direct access to management reports;
  - Very user friendly and supported by graphics.
  - ***Exception reporting*** – reporting of only the results that deviate from a set of standards.
  - ***Drill down reporting*** – investigating information in increasing detail.
  - Easily connected within online information services and e-mail.
  - Include analysis support, communications, office automation and intelligence support.

Enterprise Decision Simulator

- Technology that supports the informational needs of executives in the so-called “corporate war room”.
- Management Cockpit is a strategic management room that enables top-level decision makers to pilot their businesses better.
- The environment encourages more efficient management meetings and boosts team performance via effective communication.

Enterprise Decision Simulator (Continued)

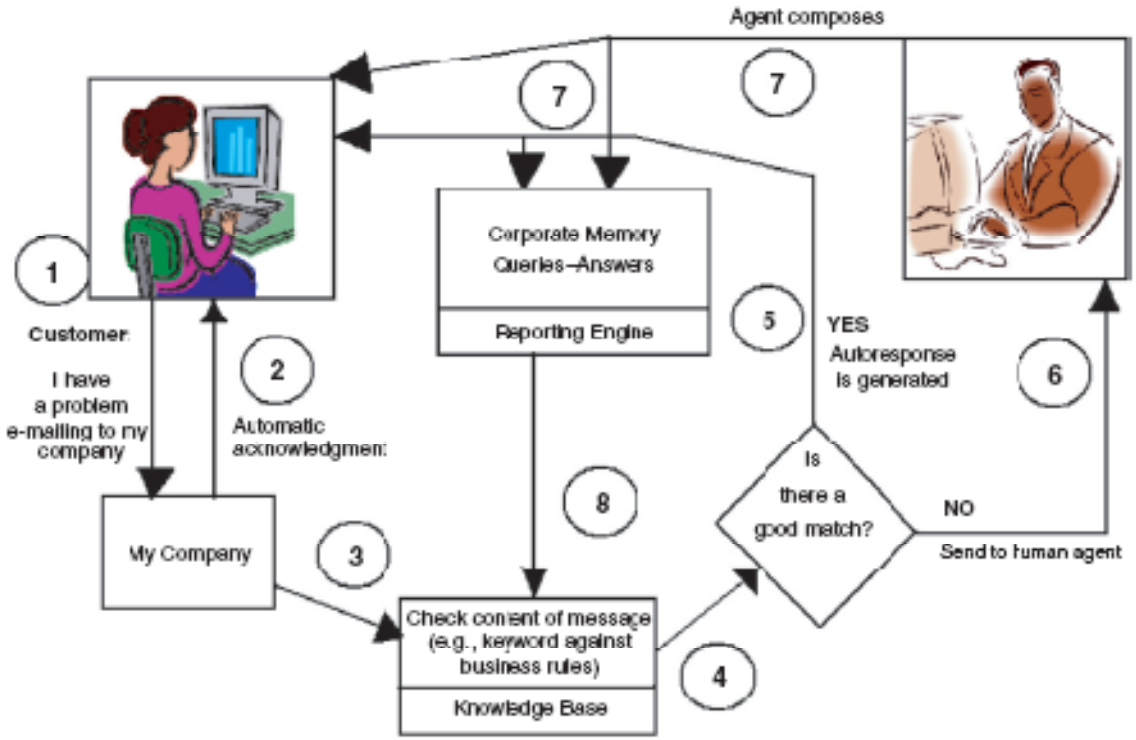
- Key performance indicators and information relating to critical success factors are displayed graphically on the walls of the meeting room.
- The cockpit environment is integrated with SAP's ERP products and reporting systems.
- External information can be easily imported to the room to allow competitive analysis.

Intelligent Systems

Expert systems (ESs) are attempts to mimic human experts. It is decision-making software that can reach a level of performance comparable to a human expert in some specialized and usually narrow problem area. The idea is simple: expertise is transferred from an expert or other source of expertise to the computer.

- The transfer of expertise from an expert to a computer and then to the user involves four activities:
  - Knowledge acquisition (from experts or other sources)
  - Knowledge representation (organized as rules or frames in the computer)
  - Knowledge inferencing is performed in a component called the inference engine of the ES and results in the recommendation.
  - Knowledge transfer to the user (the expert's knowledge has been transferred to users).

Intelligent Systems (cont'd)



The Benefits of Expert Systems

Benefit	Description
Increased output and productivity	ESs can configure for each custom order. Increasing production capabilities
Increased quality	ESs can provide consistent advise and reduce error rates.
Capture and dissemination of scarce expertise	Expertise from anywhere in the world can be obtained and used.
Operation in hazardous environments	Sensors can collect information that an ES interprets, enabling human workers to avoid hot, humid, or toxic environments.
Accessibility to knowledge and help desks	ESs can increase the productivity of help – desk employee, or even automate this function.
Reliability	ESs do not become tired or bored, call in sick or go on strike. They consistently pay attention to details.
Ability to work with incomplete or uncertain information	Even with answer of ‘ don’t know ‘ an ES can produce an answer, though it may not be a definite one.
Provision of training	The explanation facility of an ES can serve as a teaching device and knowledge base for novices.
Enhancement of decision- making and problem-solving capabilities	ESs allow the integration of expert judgment into analysis (e.g., diagnosis of machine malfunction and even medical diagnosis).
Decreased decision-making time	ESs usually can make faster decision than humans working alone.
Reduce downtime	ESs can quickly diagnose faster decisions than humans and prescribe repairs.

Natural Language Processing & Voice Technologies

- **Natural language processing (NLP):** Communicating with a computer in English or whatever language you may speak.
- **Natural language understanding/speech (voice) recognition:** The ability of a computer to comprehend instructions given in ordinary language, via the keyboard or by voice.
- **Natural language generation/voice synthesis:** Technology that enables computers to produce ordinary language, by “voice” or on the screen, so that people can understand computers more easily.

Neural Networks

- **Neural networks** are a system of programs and data structures that approximates the operation of the human brain.
- **Neural networks** are particularly good at recognizing subtle, hidden, and newly emerging patterns within complex data as well as interpreting incomplete inputs.

Fuzzy Logic

- **Fuzzy logic** deals with the uncertainties by simulating the process of human reasoning, allowing the computer to behave less precisely and logically than conventional computers do.
  - Involves decision in gray areas.
  - Uses creative decision-making processes.

Simulation Systems

Simulation generally refers to a technique for conducting experiments (such as "what-if") with a computer on a model of a management system. Because DSS deals with semi structured or unstructured situations, it involves complex reality, which may not be easily represented by optimization or other standard models but can often be handled by simulation. Therefore, simulation is one of the most frequently used tools of DSSs.

- Advantages of Simulation.
  - Allows for inclusion of the real-life complexities of problems.
  - Is descriptive.
  - Can handle an extremely wide variation in problem types.
  - Can show the effect of compressing time.
  - Can be conducted from anywhere.

Why Managers Need IT Support

- A key to good decision making is to explore and compare many relevant alternatives. The more alternatives that exist, the more computer-assisted search and comparisons are needed.
- Typically, decisions must be made under time pressure. Frequently it is not possible to manually process the needed information fast enough to be effective.

Why Managers Need It Support (Continued)

- It is usually necessary to conduct a sophisticated analysis in order to make a good decision. Such analysis requires the use of modeling.
- Decision makers can be in different locations and so is the information. Bringing them all together quickly and inexpensively may be a difficult task.

Managerial Issues

- **Cost justification, intangible benefits.** While some of the benefits of management support systems are tangible, it is difficult to put a dollar value on the intangible benefits of many such systems.
- **Documenting personal DSS.** Many employees develop their own DSSs to increase their productivity and the quality of their work. It is advisable to have an inventory of these DSSs and make certain that appropriate documentation and security measures exist.
- **Security.** Decision support systems may contain extremely important information for the livelihood of organizations. Taking appropriate security measures, especially in Web-based distributed applications, is a must.
- **Ready-made commercial DSSs.** With the increased use of Web-based systems and ASPs, it is possible to find more DSS applications sold off the shelf, frequently online. The benefits of a purchased or leased DSS application sometimes make it advisable to change business processes to fit a commercially available DSS.

Managerial Issues (Continued)

- **Intelligent DSS.** Introducing intelligent agents into a DSS application can greatly increase its functionality.
- **Organizational culture.** The more people recognize the benefits of a DSS and the more support is given to it by top management, the more the DSS will be used.
- **Embedded technologies.** Intelligent systems are expected to be embedded in at least 20 percent of all IT applications in about 10 years. It is critical for any prudent management to closely examine the technologies and their business applicability.
- **Ethical issues.** Corporations with management support systems may need to address some serious ethical issues such as privacy and accountability.

Chapter 12

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