ACS-1803
Introduction to Information Systems

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Systems that span Organizational Boundaries

Lecture Outline 8-1

Decision Support Systems

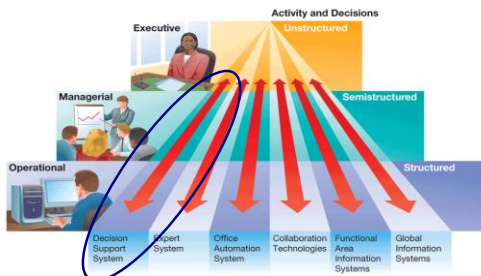
Systems That Span Organizational Boundaries

Figure 6.19 Organizational boundary-spanning information systems.
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Decision Support Systems

Decision Support Systems
Special-purpose information systems designed to support **managerial-level** employees in organizational decision making

System Details
These systems use **computational software** to construct models for analysis (most common is MS Excel) to solve problems (e.g. sales or resource forecasts)

Supported Activities:
"What-if" analysis – changing one or more variables in the model to observe the effect (e.g. What is the payment if the interest rate increases by 1% ?)

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Characteristics of Decision Support Systems

Inputs	Data and models; data entry and data manipulation commands (via user interface)
Processing	Interactive processing of data and models; simulations, optimization, forecasts
Outputs	Graphs and textual reports; feedback to system operator (via user interface)
Typical Users	Midlevel managers (although a DSS could be used at any level of the organization)

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Decision Support Systems (DSS)

▶ Typically include:

a) Database Management System (DBMS)

b) Model Base that uses the data base
  ➤ structured representation of some aspect of reality
  ➤ Through modeling we can examine effects of decisions
  ➤ a model always includes assumptions e.g., inflation rate, net earnings level over 5 years; cost increases

c) User-friendly Interface (dialog), often involving graphics
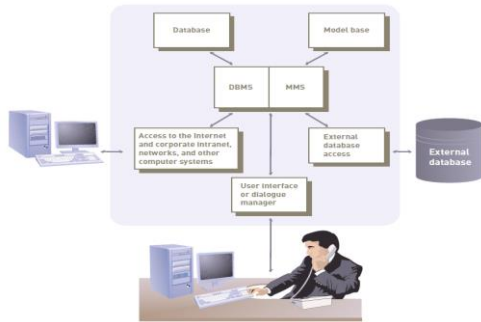
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Components of a Decision Support System (DSS)
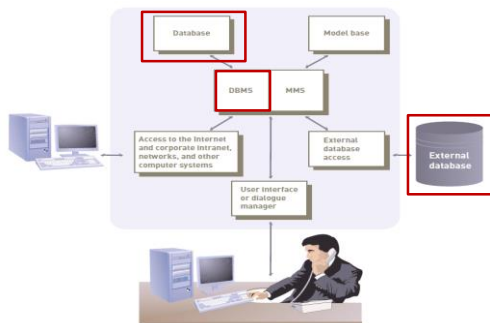
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Components of a Decision Support System (DSS)

1. Database Management System (DBMS):
   - Allows managers and decision makers to perform qualitative analysis on data stored in company's databases, data warehouses, and data marts
   - Can also be used to connect to external databases
   - Data-driven DSS:
     - Performs qualitative analysis based on the company's databases

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Components of a Decision Support System (DSS)

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Components of a Decision Support System (DSS)

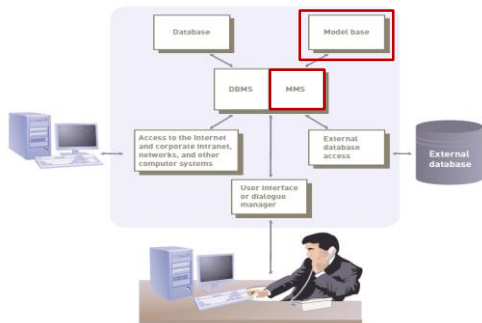2. Model Base:
   ▸ Allows managers and decision makers to perform *quantitative analysis* on both internal and external data
   ▸ Model management software (MMS):
      ▸ Coordinates the use of models in a DSS
   ▸ Model-driven DSS:
      ▸ Performs mathematical or quantitative analysis

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Components of a Decision Support System (DSS)

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Model Base Examples

Model Type	Description	Software
Financial	Provides cash flow, internal rate of return, and other investment analysis	Spreadsheet, such as Microsoft Excel
Statistical	Provides summary statistics, trend projections, hypothesis testing, and more	Statistical programs, such as SPSS or SAS
Graphical	Assists decision makers in designing, developing, and using graphic displays of data and information	Graphics programs, such as Microsoft PowerPoint
Project Management	Handles and coordinates large projects; also used to identify critical activities and tasks that could delay or jeopardize an entire project if they are not completed in a timely and cost-effective fashion	Project management software, such as Microsoft Project

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## Components of a Decision Support System (DSS)

3. User Interface or Dialogue manager:

- ▸ Allows decision makers to easily access and manipulate the DSS and to use common business terms and phrases
- ▸ Allows users to interact with the DSS to obtain information
- ▸ Assists with all aspects of communications between user and hardware and software that constitute the DSS
- ▸ Allows for manipulation of variables

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User Interface Example
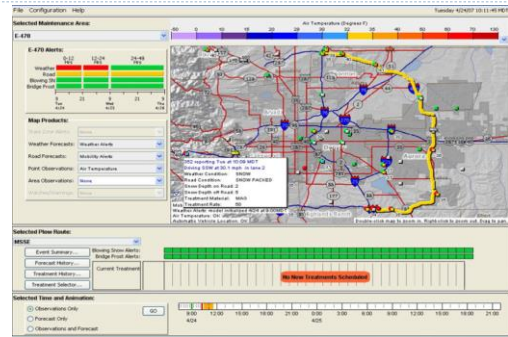
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Three Fundamental DSS Components
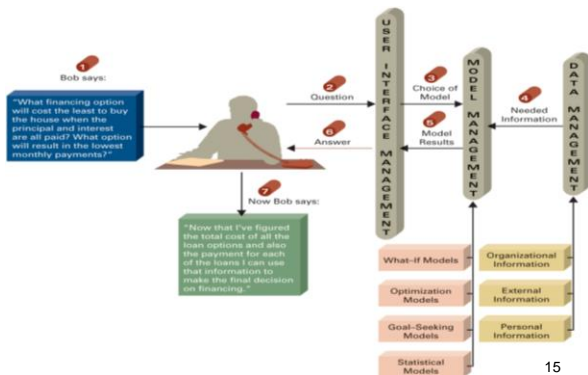
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Model Driven DSS vs. Data Driven DSS

▸ A Model Driven DSS uses various models such as statistical model, simulation model or financial model for decision makings and to come up with a decision or strategy. Decisions are based on models.

▸ A Data Driven DSS emphasizes access to and manipulation of a time-series of internal company data and sometimes external data to aid decision makings. So, decisions are based on analyzed data.

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Model-Driven Ex. – Loan Calculator

Variables to be Analyzed

Interest Rate	Loan Duration
4% per year	3 years
6% per year	4 years
8% per year	5 years

Loan Calculator Model
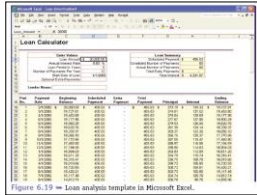
Analysis Results

Interest Rate	Loan Duration	Monthly Payment	Total Paid	Total Interest	Feasible Payment
4% per year	3 years	$590.48	21,257.27	$1,257.27	No
6% per year	4 years	$488.26	$23,436.41	$3,436.41	No
8% per year	5 years	$405.53	$24,331.67	$4,331.67	Yes
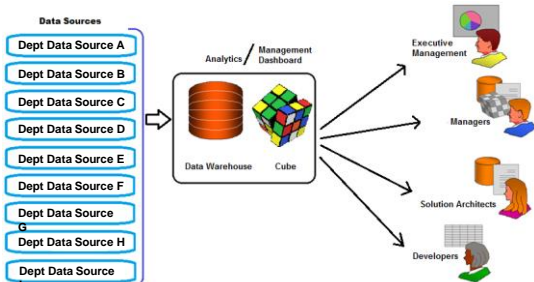
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Data Driven DSS

Emphasizes access to and manipulation of a time-series of internal company data and sometimes external data to aid decision makings

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Model Driven DSS **vs.** Data Driven DSS

Model-Driven DSS	Data-Driven DSS
User interacts primarily with a (mathematical) model and its results	User interacts primarily with the data
Helps to solve well-defined and structured problems (what-if-analysis)	Helps to solve mainly unstructured problems
Contains in general various and complex models	Contains in general simple models
Large amounts of data are not necessary	Large amounts of data are crucial
Helps to understand the impact of decisions on organizations	Helps to prepare decisions by showing developments in the past and by identifying relations or patterns
Software technology can be deployed on the desktop to execute the model (i.e. MS Excel, MS Access)	Query applications that are run on the central system against a corporate database or warehouse

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A Comparison of DSS and MIS

▸ DSS differs from an MIS in numerous ways, including:
  ▸ The type of problems solved
  ▸ The support given to users
  ▸ The decision emphasis and approach
  ▸ The type, speed, output, and development of the system used
  ▸ See comparison of DSS with MIS

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A Comparison of DSS and MIS

Factor	DSS	MIS
Problem Type	Can handle unstructured problems that cannot be easily programmed.	Normally used only with structured problems.
Users	Supports individuals, small groups, and the entire organization. In the short run, users typically have more control over a DSS.	Supports primarily the organization. In the short run, users have less control over an MIS.
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.
Emphasis	Emphasizes actual decisions and decision-making styles.	Usually emphasizes information only.
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.
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.
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.
Output	Produces reports that are usually screen oriented, with the ability to generate reports on a printer.	Is oriented toward printed reports and documents.
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.

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DSS Examples (Model or Data-Driven)

▸ Evaluate alternative investment in mortgage portfolios
  ▸ Fidelity.com (on-line investor center)

Model-Driven DSS

▸ Evaluate and compare air fares
  ▸ Travelocity.ca
  ▸ Expedia.ca

Data-Driven DSS

▸ Evaluate and compare various automobile prices
  ▸ Edmunds.com

Data-Driven DSS

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More Data-Driven DSS Examples

▸ Airline industry: DSS helps to find proper pricing to maximize overall revenue from selling seats for each flight
  ▸ Manager enters departure airport, arrival airport, # of stops, times of departure and arrival, # days in advance for reservation, # persons, size of plane, utilized capacity on similar previous flights etc.
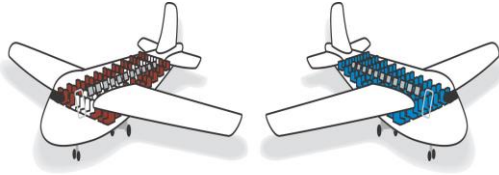 ▸ System suggests variable ticket prices

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Data-Driven DSS - Airline Industry

▸ Yield management systems are designed to maximize the amount of revenue that an airline generates on each flight.

▸ Yield management systems are the reason that an airfare you're quoted over the phone can be $100 higher when you call back an hour later.

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Data-Driven DSS - Airline Industry

Average seat = $420
Yield = $50,400

120 seats occupied at
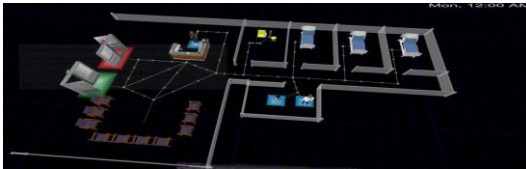average price of $420
per seat = $50,400 total
yield for the flight.

Average seat = $325
Yield = $65,000

200 seats occupied at
average price of $325
per seat = $65,000 total
yield for the flight.

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Medical Clinic DSS Simulation Model Using Models and Data

▸ HC-Simulation Software to Optimize Healthcare Processes
▸ Flexsim Heathcare Urgent Care Tutorial
  ▸ Video 1 http://www.youtube.com/watch?v=neBCg7N1UyM
  ▸ Video 2 http://www.youtube.com/watch?v=dgKflwbfrvk
  ▸ Video 3 http://www.youtube.com/watch?v=dNLqgC-CazM

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