MODULE 6
Decision Making

Objective

- Identify information processing as the foundation of managerial work
- Identify which media are more suitable for supporting managerial work
- Describe decision making/problem solving systems in Organizations
- Decision support content of different types of information systems
- Differences in characteristics of Information Systems
- Discuss models of decision making
- Describe decision making process
- Describe Decision Support Systems (DSS)
- Describe major themes
- Describe benefits of DSS
- Examine DSS relationship with:
  - decision task structure
  - decision context
  - user psychological types
- Describe seven basic types of DSS
- Discuss different categories of DSS
  - Based on support
    » Data-Based DSS
    » Model-Based DSS
    » Expert System
  - Based on nature of decision situation
  - Based on number of users
- Examine how DSS effectiveness is reduced
How can information systems help managerial work?

- What do managers do?
  - Functions:
    » Plan, organize, command, coordinate, control.
  - Roles
    » interpersonal
    » informational
    » decisional

- Information processing foundations of Managerial work
  - Information handling, decision making, communication

- The purpose of Information processing
  - reducing uncertainty and resolving equivocality

- Media suitable for handling uncertainty and equivocality – Richness

Which media is more suitable to support managerial work?

![Media Richness Diagram](chart.png)

- Uncertainty reduction
  (obtain additional data seek answers to explicit questions)
- Equivocality reduction
  (clarify, reach agreements decide which questions to ask)

Less Rich More Rich
Decision Making/Problem Solving Systems

- Organizational Systems for sensing, identifying, analyzing, adopting solutions, and control of implementation
- Components of systems
  - Target problem situation
  - Decision makers
  - Information systems
Decision support content of different types of information systems

- Decision Support Systems
- Executive Information Systems
- Expert Systems
- Information Reporting Systems
- Workgroup Information Systems
- Personal Information Systems
- Office Information Systems
- Transaction Processing Systems

<table>
<thead>
<tr>
<th>Differences in system characteristics</th>
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<tbody>
<tr>
<td>Dimensions</td>
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</tr>
<tr>
<td>Type of users</td>
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<td>Focus</td>
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<td>Applications</td>
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<tr>
<td>Ease of use</td>
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<tr>
<td>Processing Interest</td>
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<tr>
<td>Reason for development</td>
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Models of Decision Making

◆ Rational model
  – Economic rational actor - obtains all the facts, weighs likelihood of all
    the alternative outcomes, and chooses the one with the highest
    probable value. (expected value)
  – Expected monetary value

◆ Satisfying
  – Less than optimization
  – More realistic
  – Limited number of alternatives

◆ Organizational and Political
  – Sub-units or members with own “goals” and “resources”
  – Power struggle
  – Bargaining and negotiation
**Decision Making Process**

- Decision making process
  - Intelligence
    » Sensing, finding, identifying, and defining problem/opportunity
  - Design
    » Diagnosing the problem/opportunity
    » Generating alternatives
  - Choice
    » Choosing the best alternative

**Decision Support Systems**

- An information system
- Purpose to provide information for making informed decisions
  Interactive (needed for experimenting and prospecting)

**Definitions of DSS**

- **Gorry and Scott-Morton (1971):** Management Decision Systems -- Interactive computer-based systems, which help decision makers utilize data and models to solve unstructured problems.
- **Keen and Scott-Morton (1978):** Decision support systems couple the intellectual resources of individuals with the capabilities of the computer to improve the quality of decisions. It is a computer-based support system for management decision makers who deal with semi-structured problems.

**Basic themes of DSS**

- Information systems.
- Used by managers.
- Used in making decisions.
- Used to support, not to replace people.
- Used when the decision is "semistructured" or "unstructured."
- Incorporate a database of some sort.
- Incorporate models.
DSS Benefits

- Improving Personal Efficiency
- Expediting Problem Solving
- Facilitating Interpersonal Communications
- Promoting Learning or Training
- Increasing Organizational Control

DSS as a system

- **Man-Machine System** DSS is a man-machine system for decision making purposes. Man part is more open and probabilistic while the machine part is more closed and deterministic.
  
  E.g. DSS for deciding PRICE and ADVERTISING levels

- **Closed-loop system with feedback** external to system DSS uses feedback to adjust output. Feedback is not internal like an elevator. The user provides judgmental inputs to DSS.

- **DSS components**: Database, model base, knowledge base, interface which interact with each other and the user.

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**DSS COMPONENTS**

![DSS Components Diagram]

- DATA
- MODELS
  - DBMS
  - KBMS
  - MBMS
  - DGMS
- USER
DSS: DECISION TASK, CONTEXT, USER

DSS relationship with task

- Nature of decision task-classification by structure

DSS relationship with decision context

- Decision Context
  - Emergent versus established setting
  - Level of decision making – Scope

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Strategic
Managerial
Operational
INFORMATION CHARACTERISTICS FOR DIFFERENT TYPES OF DECISIONS

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Operational</th>
<th>Managerial</th>
<th>Strategic</th>
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<tbody>
<tr>
<td><strong>Accuracy</strong></td>
<td>High</td>
<td></td>
<td>Low</td>
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<tr>
<td><strong>Level of detail</strong></td>
<td>Detailed</td>
<td>Aggregate</td>
<td></td>
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<tr>
<td><strong>Time horizon</strong></td>
<td>Present</td>
<td>Future</td>
<td></td>
</tr>
<tr>
<td><strong>Use</strong></td>
<td>Frequent</td>
<td>Infrequent</td>
<td></td>
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<tr>
<td><strong>Source</strong></td>
<td>Internal</td>
<td>External</td>
<td></td>
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<tr>
<td><strong>Scope</strong></td>
<td>Narrow</td>
<td>Wide</td>
<td></td>
</tr>
<tr>
<td><strong>Nature</strong></td>
<td>Quantitative</td>
<td>Qualitative</td>
<td></td>
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<tr>
<td><strong>Age</strong></td>
<td>Current</td>
<td>Current/old</td>
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USER’S PSYCHOLOGICAL TYPES

- To take a test of your personality, go to http://www.davideck.com (optional)
- Introversion vs. Extraversion
  - less vs. more immediate interaction
  - on line chat vs. delayed electronic discussion
- Sensing vs. iNtuition
  - large number of facts vs. less data more ‘hunches’
  - data-oriented DSS vs. less exhaustive DSS
- Thinking vs. Feeling
  - more use of logic vs. more human/ eclectic
  - Optimization or suggestion models vs. “group ware”
- Judgement vs. Perception
  - quick to decide vs. slow to decide
  - model-oriented DSS vs. data-oriented DSS
**DSS relationship with user**

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**Temperament**

- **SP (Sensing & Perceptive)**
  - Coherence of plan
  - Following selected solution

- **SJ (Sensing & Judging)**
  - Categorizing, classifying
  - Generating creative alternatives

- **NT (iNtuition & Thinking)**
  - Attending to facts & details
  - Looking at impact on people

- **NF (iNtuition & Feeling)**
  - Attending to facts & details
  - Developing realistic alternatives
  - Implementation

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**Taxonomy of DSS**

- Basis for taxonomy: the degree to which the system determines the decision

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**The DSS Hierarchy**

- Suggestion systems
- Optimization systems
- Representational models
- Accounting models
- Analysis information systems
- Data analysis systems
- File drawer systems

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**File drawer systems**

- They are the simplest type of DSS
- Can provide access to data items
- Data is used to make a decision
- ATM Machine
- Use the balance to make transfer of funds decisions
Data Analysis Systems

- Provide access to data
- Allows data manipulation capabilities
- Airline Reservation system
- No more seats available
- Provide alternative flights you can use
- Use the info to make flight plans

Analysis Information Systems

- Provide access to multiple data sources
- Combines data from different sources
- Allows data analysis capabilities
- Compare growth in revenues to industry average- requires access to many sources
- The characteristic of the recent “data warehouse” is similar

Accounting models

- Use internal accounting data
- Provide accounting modeling capabilities
- Can not handle uncertainty
- Uses Bill of Material
- Calculate production cost
- Make pricing decisions

Representational models

- Can incorporate uncertainty
- Uses models to solve decision problem using forecasts
- Can be used to augment the capabilities of accounting models
- Use the demand data to forecast next years demand
- Use the results to make inventory decisions.
Optimization systems
- Used to estimate the effects of different decision alternative
- Based on optimization models
- Can incorporate uncertainty
- Assign sales force to territory
- Provide the best assignment schedule

Suggestion systems
- A descriptive model used to suggest to the decision maker the best action
- A prescriptive model used to suggest to the decision maker the best action
- May incorporate an Expert System
- Applicant applies for personal loan
- Use the system to recommend a decision

DSS CATEGORIES
- Support based DSS (Alter 1980)
  - Data-based DSS
  - Model-based DSS
Based on the nature of the decision situation (Donovan & Madnick 1977)
- Institutional
  » Culture of the organization
  » Regularly used
  » Used by more than one person
- Ad hoc
  » One of kind
  » One-time use
  » Used by single individual

Based on number of users (Keen 1980)
Individual, Multi-individual, Group

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Individual</th>
<th>Multi-individual</th>
<th>Group</th>
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<tr>
<td>Improving personal efficiency</td>
<td>H</td>
<td>H</td>
<td>L</td>
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<td>Expediting problem solving</td>
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<td>Facilitating communication</td>
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<td>Promoting learning</td>
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<tr>
<td>Increasing control</td>
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**How can information systems help managerial work?**
- Suitability of DSS in terms of task structure, decision context, and user. How is DSS adapted to fit the requirements of task, context, and user?
- Examine a decision situation of your choice and discuss desired DSS features. For example: look at the structuredness of decision tasks, management level, user type, etc. Is DSS helpful? Why? Or Why not?
- Identify detrimental effects of DSS. Can DSS contribute to making a bad decision and even to the downfall of an organization?
Detrimental DSS effects

- Design flaws
- Inadequate understanding of task or user
- Inadequate modeling of “reality”
- Inadequate understanding of human information processing constraints
- Can promote cognitive biases!