How do information systems fit into the Simon decision-making framework?

What is a typical Management Information System (MIS)?

What is a Decision Support System (DSS)?

What is a typical Executive Support System?
◆ How do information systems fit into the Simon decision-making framework?

Herbert Simon Stages of Decision Making

Intelligence
• Scan the internal organization to identify problems or opportunities
• Scan the external environment to identify problems or opportunities

Design
• Generate decision alternatives
• Evaluate decision alternatives

Choice
• Emphasize and prioritize decision alternatives

Implementation/Monitoring
• Provide feedback on the implementation decision

Example: a manufacturing firm (Boeing) is reviewing its manufacturing process. How does it apply these ideas?

Intelligence
• Should we be considering new equipment?
• Internal considerations - more efficient and productive
• External considerations - more cost competitive, higher quality

Design
Alternatives
• Do nothing - implications?
• Lease - cash flows (higher continuing costs)
• Purchase - cash flow (high up front costs)
What is a typical Management Information System (MIS)?

What are they?
- Systems that assist in controlling the firm (internal)
- Provide reports on the firm’s performance
  - Intelligence stage – scan internal organization
  - Implementation stage – provide feedback

A generic MIS - see Figure 9.1

Note:
- Types of reports
  - Scheduled
  - Key-indicator (CSF)
  - Demand
  - Exception
  - Drill-down
- Sources of data
  - Valid transactions (not operations TPS DB)
  - Internal corporate DB
  - External DB

Characteristics of MIS problem domains
- Support routine and repetitive decision making
- Information (reporting) needs mostly prespecified
- Designed for many managers (not a specific manager)
- Managed by IT group (not end user)
What is a Decision Support System (DSS)?

Definition: An interactive system under user control, providing data and models as the basis for discussing and evaluating semi and unstructured decisions.

Characteristics of DSS problem domains
- Future focus
- May be disagreement on the problem definition
- Requirements not stable
- Internal and external data requirements

Generic DSS - see Figure 10.9 - models, data (internal/external), dialog (presentation)

Relationships to Simon framework
- Intelligence - scan both internal organization and external environment
- Design - Generate/evaluate decision alternatives
- Choice - Emphasize and prioritize decision alternatives

One company - two examples: Puget Sound Power Energy

Institutional (recurring) Example: Justifying rates to UTC.
- Future demand unknown
- Must supply everyone
- Long and expensive capital construction process
- Decent rate of return for shareholders

Ad Hoc Example: Should they merge with Washington Energy Resources?
- Cost structure
- Political considerations
- Union considerations
- Economies of scale
- Positioning for the future
**DSS Analytical Modeling Process** - exploring the problem domain to better understand what is happening. Simon’s Design and Choice activities (*generate*, *evaluate*, and *prioritize* alternatives)

**What if:** $y = f(x)$ - change the value of $x$ (independent variable) and see what happens to $y$ (dependent variable).

$$\text{MonthlyPayment} = f(\text{interestRate}, \text{loanAmt}, \text{term})$$

**Sensitivity Analysis:** repeated applications of *What if* to
- Determine how much a change in $x$ impacts $y$
- Determine which $x$’s impact $y$ the most

Used to better understand how the model (world) works.

**Goal Seek:** Given $y = f(x)$, set a target or goal for $y$ and have the model determine the value of $x$.

**Lease vs purchase example**

**Choice stage**
- Develop a NPV analysis (helps choose the best)
- Evaluate sensitivity (how sensitive is your model to various assumptions?)

**Risk Analysis:** Using Monte Carlo simulation to generate scenarios using various probability distributions for input parameters. Results are presented as probability distributions.
What is a typical Executive Support System?

Definition: a system with many features common to both a DSS and MIS. Focus is on immediate and easy access to the firm's critical success factors (CSF). Generally oriented to high-level manager. Strategic focus.

Components
- Direct use by executive (tailored to individual preferences)
- Internal and external database support
- Communications

Relationship to Simon framework
- Some aspects of MIS
  - Intelligence (both internal/external) but with a strategic (as opposed to an operational) focus
  - Implementation (feedback)
- Some aspects of DSS - help reduce uncertainty
  - Design/Choice via modeling

Typical features
- Simple interface
- Browse capability
- Multiple presentation formats
- Increasing level of detail (drill down)