

## Supporting Business Decision-Making

*Good information is essential for fact-based decision-making.*



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## Decision Support System Definition

A Decision Support System is an interactive computer-based system or subsystem that helps people use computer communications, data, documents, knowledge and models to identify and solve problems, complete decision process tasks, and make decisions.

"DSS comprise a class of information system that draws on transaction processing systems and interacts with the other parts of the overall information system to support the decision-making activities of managers and other knowledge workers in organizations" (Sprague and Carlson, 1982, p. 9).

DSS are ancillary or auxiliary systems; they are not intended to replace skilled decision-makers.

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## DSS Assumptions



- *Is good information and analysis essential for fact-based decision-making? IF YES, THEN*
- Build DSS when good information is likely to improve decision-making
- Build DSS when managers need and want computerized decision support

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## MIS and DSS History

- Late 1960s, MIS focused on providing structured, periodic reports.
- Late 1960s, first DSS built using interactive computer systems, Scott Morton
- 1975-1980 DSS using financial models with "What if?" analysis
- 1975 Steve Alter MIT dissertation
- 1979-1982 Theoretical foundations
- Mid-1980s Executive Information Systems and GDSS
- Early 1990s shift to client/server DSS, Business Intelligence, Bill Inmon and Ralph Kimball aka "Dr. DSS"
- 1995 Data warehousing, data mining and the World-wide Web
- 1998 Enterprise performance management and balanced scorecard
- 2000 Application service providers (ASPs) and Portals

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## DSS Conceptual Perspective

- Decision Support Systems are both off-the-shelf, packaged applications and custom designed systems.
- Alter (1980)
  - designed specifically to facilitate a decision process
  - should support rather than automate decision making
  - should be able to respond quickly to the changing needs of decision makers
- Business intelligence, knowledge management

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## Characteristics of DSS

- Body of knowledge
- Record keeping
- Provide structure for a particular decision
- Decision maker interacts directly with DSS
- Facilitation
- Ancillary. Not intended to replace decision makers
- Repeated use
- Task-oriented
- Identifiable
- Decision impact. Improve accuracy, timeliness, quality and overall effectiveness of a specific decision or a set of related decisions

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## Characteristics of Decision Support Information

- Right Information - accurate, relevant and complete
- Right Time - current, timely information
- Right Format - easy to understand and manipulate
- Right Cost -- Cost/Benefit Trade-Off

## Is a DSS an MIS?

- MIS describe a broad, general category of information systems or a functional reporting system.
- MIS is used to identify an academic major
- Data-Driven DSS meet management reporting needs
- Decision Support Systems is a broad category of interactive, analytical management information systems

## Transaction Processing



- What is a transaction? A work task recorded by a data capture system. Purchase, order, payment.
- Record current information but does not maintain a database of historical information
- Emphasize data integrity and consistency

## DSS vs. Transaction Processing Systems (TPS)

- TPS is designed to expedite and automate transaction processing, record keeping, and business reporting
- TPS is related to DSS because TPS provides data for reporting systems and data warehouses
- DSS are designed to aid in decision-making tasks and/or decision implementation

## Alter's Categories of DSS

- File Drawer Systems
  - Data Analysis Systems
  - Analysis Information Systems
  - Accounting and Financial Models
  - Representational Models
  - Optimization Models
  - Suggestion Models
- } Data-Driven  
 } Model-Driven  
 } Knowledge-Driven

## An Expanded DSS Framework

- Primary framework dimension is the **dominant component** or driver of the decision support system (Power, 2002)
- Secondary dimensions are
  - the **intended or targeted users**,
  - the specific **purpose** of the system
  - the primary deployment or **enabling technology**

Identify the system component that provides primary functionality → dominant component

- Communications technologies
- Data and data management
- Documents and document management
- Knowledge base and processing
- Models and model processing

## DSS Framework

- Communications-driven DSS
  - Interactive computer-based system intended to facilitate the solution of problems by decision-makers working as a group
  - Group DSS may be communications-driven or model-driven

## DSS Framework

- Data-driven
  - Includes File Drawer/Management Reporting, Data Warehousing and Analysis Systems, Executive Information Systems (EIS), and Geographic Information Systems external data
    - Emphasize access to and manipulation of large databases and especially a time-series of internal company data and sometimes external data
- Document-driven DSS
  - Retrieve and manage unstructured documents and web pages

## DSS Framework

- Knowledge-driven
  - Built using AI tools, data mining tools and management expert systems
- Model-driven
  - Include systems that use accounting and financial models, representative models, and optimization models
    - Emphasize access to and manipulation of a model, What if? analysis

## DSS Framework

- Intended Users, e.g. Inter-Organizational DSS
  - Designed for customers and suppliers
  - Data, model, document, knowledge, or communications-driven
- Purpose, e. g. Function and Industry-Specific DSS
  - A DSS that is designed specifically for a narrow task
  - Specific rather than General purpose
  - Vertical Market/Industry-Specific

## Enabling Technology

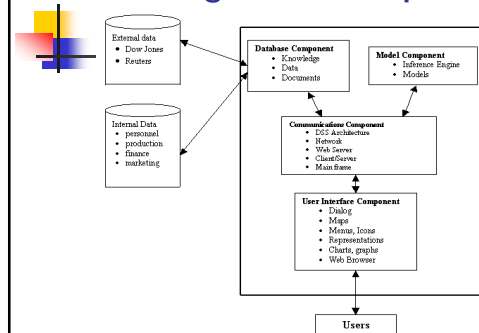
**USE the Web to deliver any category of DSS = Web-based DSS**

**Web-based, Communications-driven DSS**  
**Web-based, Data-driven DSS**  
**Web-based, Document-driven DSS**  
**Web-based, Knowledge-driven DSS**  
**Web-based, Model-driven DSS**

## Describing a Specific DSS

- A web-based, model-driven DSS for truck routing used by a dispatcher
- A handheld PC-based, knowledge-driven DSS for accident scene triage used by an EMT
- A web-enabled, data-driven DSS for real-time performance monitoring used by a factory manager
- A PC-based, model-driven DSS for planning supply chain activities used by logistics staff

## Building DSS - components



## Building DSS – User Interface

- User Interface
  - Most Important Component
  - Tools needed
    - DSS Generator
    - Query & Reporting Tools
    - Front-End Development Packages

## Building DSS - Database

- Database
  - Collection of current and historical data from a number of sources
  - Large databases are called data warehouses or data marts
  - Size of data warehouses are discussed in terms of multiple Terabytes (TB)

## Building DSS - models

- Mathematical and Analytical Tools
  - Used and manipulated by managers
  - Each Model-driven DSS has a specific purpose
  - Values of key variables and parameters are frequently changed– “What If?” analysis

## Building DSS - Architecture

- DSS Architecture and Networking
  - How hardware is organized
  - How software and data are distributed and organized
  - How components of the system are integrated and connected
  - Communications component



## Challenges of DSS

- Rapid technology change
- Managers as users and customers
- Major issues
  - What to computerize?
  - What data? Source?
  - What processing and presentation?
  - Are current DSS results decision-impelling?
  - What technology for a new DSS?



## Questions

- How does a transaction processing system differ from decision support system?
- What categories of DSS are included in the DSS framework?
- How are DSS and MIS related, similar, different?