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Decision Support Systems and Intelligent Systems,
Seventh Edition

Chapter 3
Decision Support Systems:
An Overview





Learning Objectives

- Understand DSS configurations.
- Learn characteristics and capabilities of DSS.
- Understand DSS components.
- Describe structure of DSS components.
- Understand how DSS and the Web interact.
- Learn the role of the user in DSS.
- Understand DSS hardware and integration.
- Learn DSS configurations.



Southwest Airlines Flies in the Face of Competition Through DSS Vignette

- Successfully integrates DSS applications
- Ties ERP applications to OLAP, allowing retrieval of financial data
- Allows access to both financial and operational data



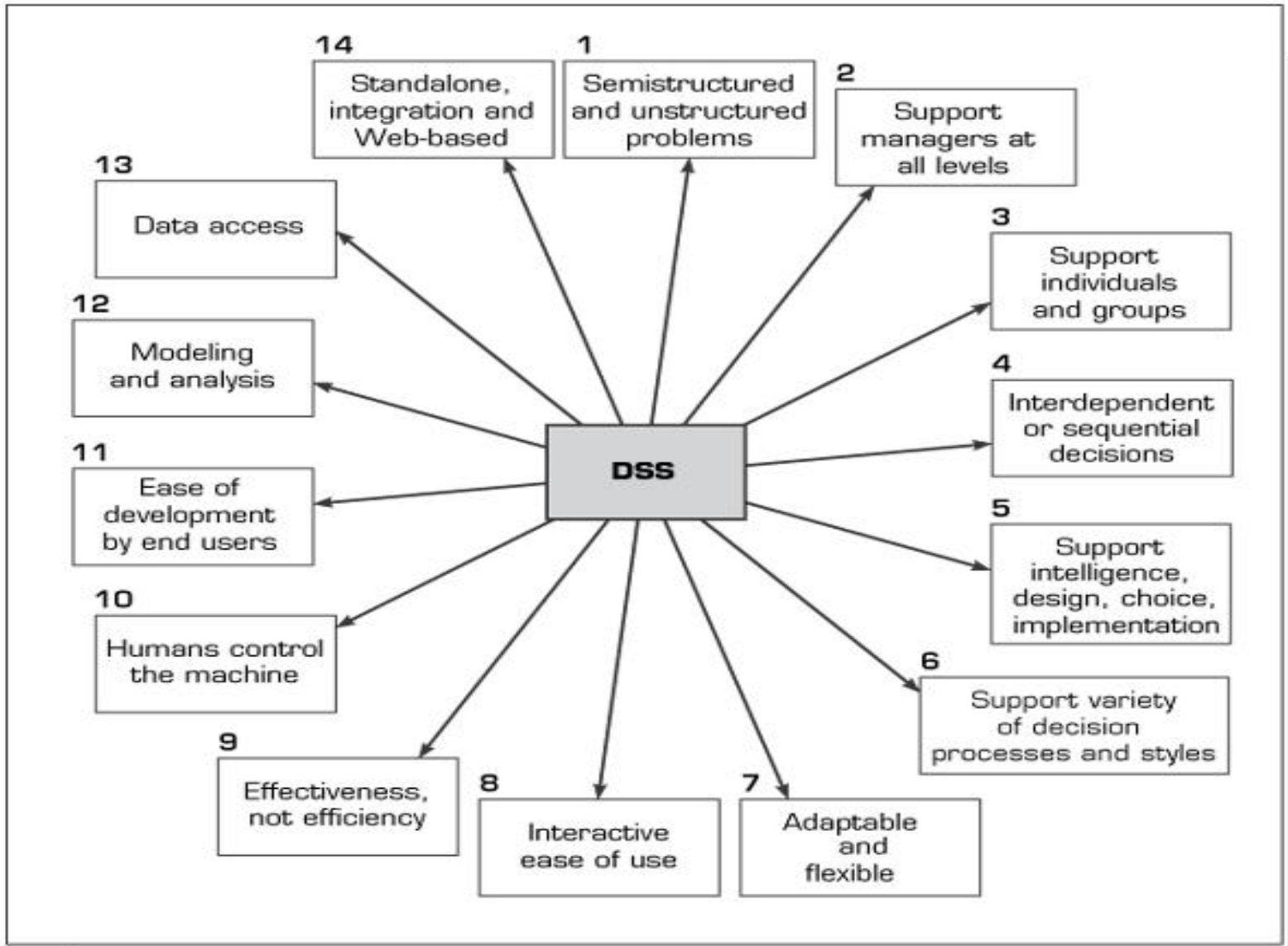
Decision Support Systems

- Systems designed to support managerial decision-making in unstructured problems
- More recently, emphasis has shifted to inputs from outputs
- Mechanism for interaction between user and components
- Usually built to support solution or evaluate opportunities

DSS

- A DSS is a methodology that supports decision-making.
- It is:
 - Flexible;
 - Adaptive;
 - Interactive;
 - GUI-based;
 - Iterative; and
 - Employs modeling.

Figure 3.2 Key Characteristics and Capabilities of DSS





Business Intelligence

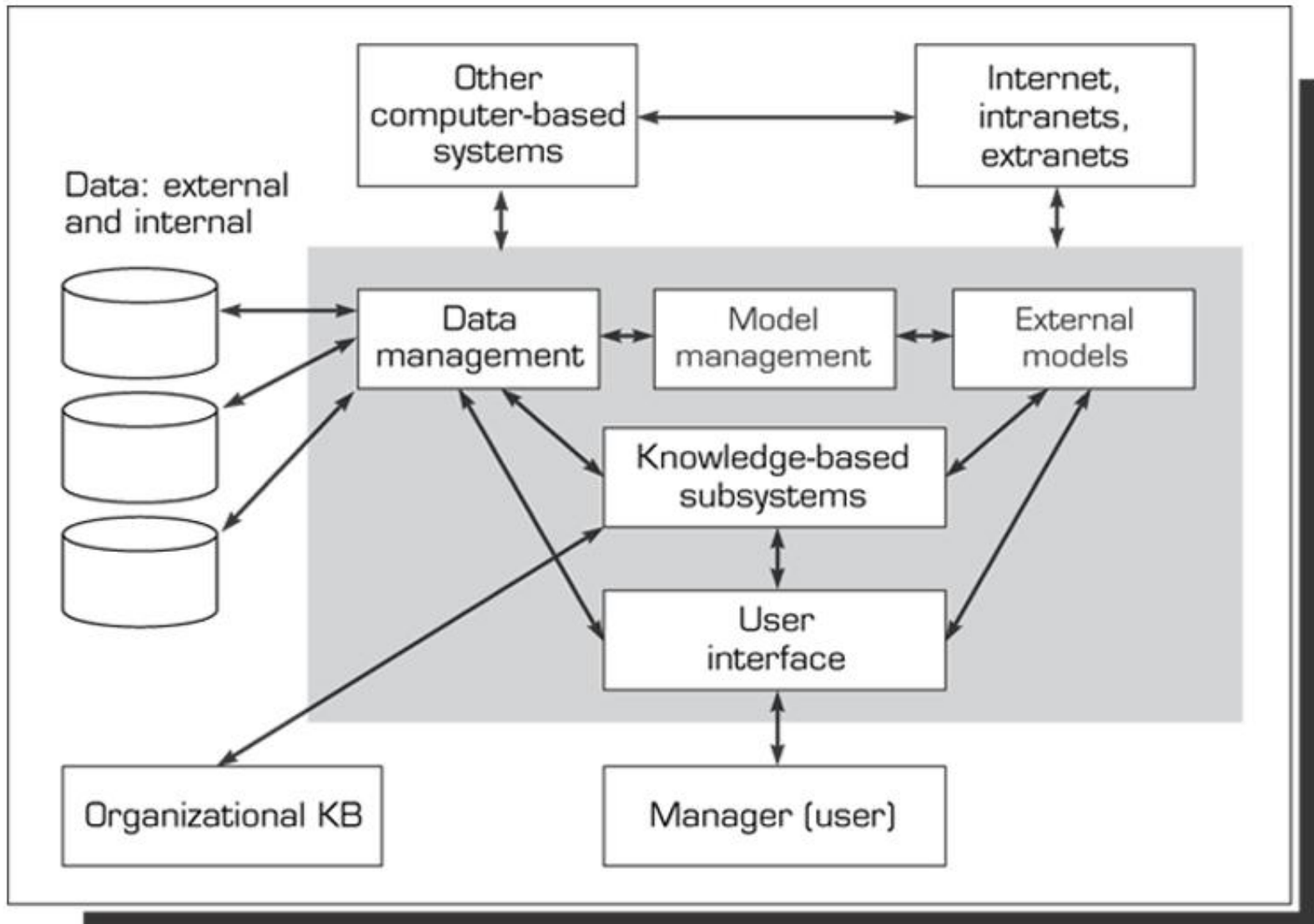
- Proactive
- Accelerates decision-making
- Increases information flows
- Components of proactive BI:
 - Real-time warehousing
 - Exception and anomaly detection
 - Proactive alerting with automatic recipient determination
 - Seamless follow-through workflow
 - Automatic learning and refinement



Components of DSS

- Subsystems:
 - Data management
 - Managed by DBMS
 - Model management
 - Managed by MBMS
 - User interface
 - Knowledge Management and organizational knowledge base

Figure 3.3 A Schematic View of DSS

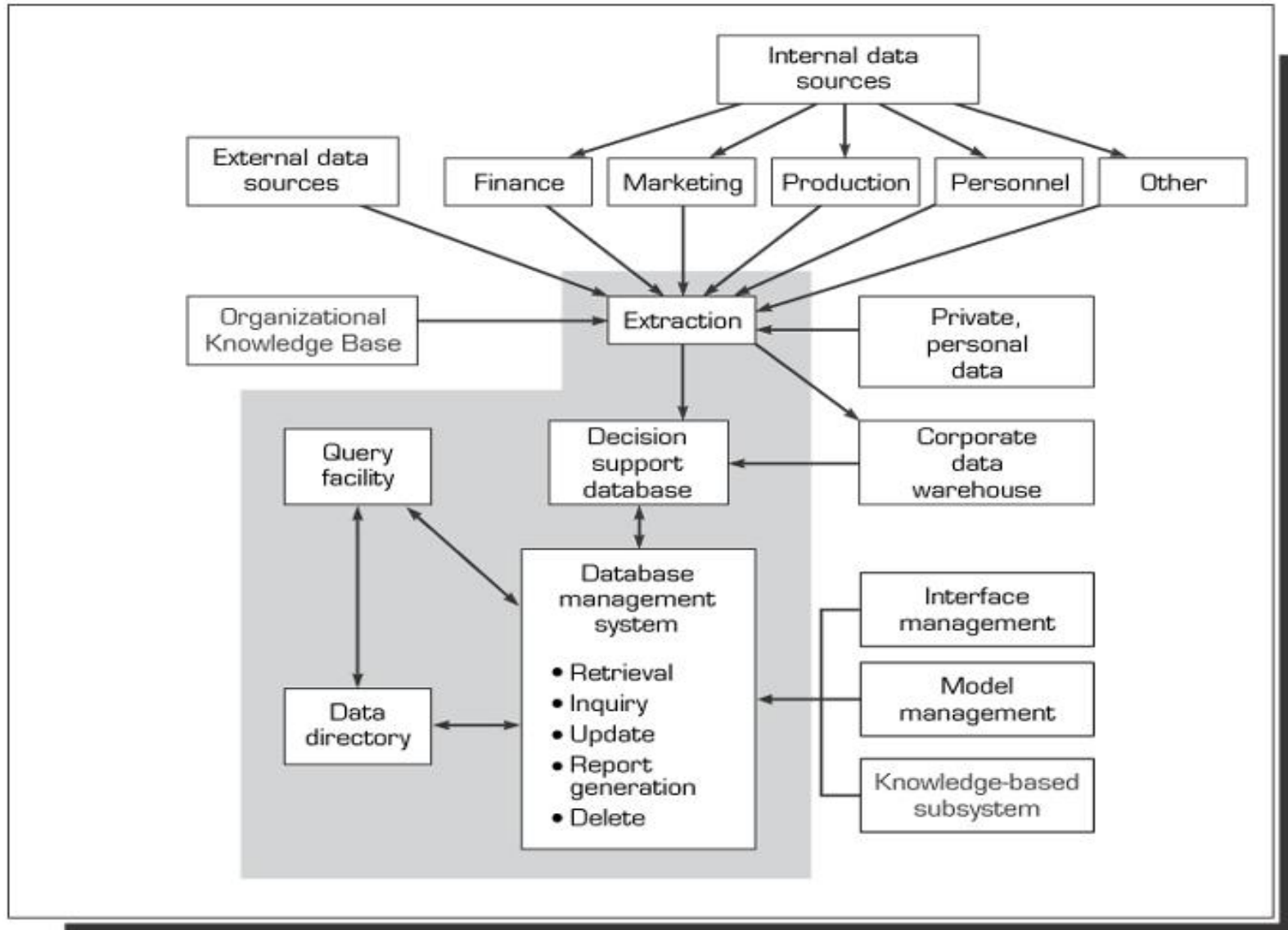




Data Management Subsystem

- Components:
 - Database
 - Database management system
 - Data directory
 - Query facility

Figure 3.4 The Structure of the Data Management Subsystem





Database

- Interrelated data extracted from various sources, stored for use by the organization, and queried
 - Internal data, usually from TPS
 - External data from government agencies, trade associations, market research firms, forecasting firms
 - Private data or guidelines used by decision-makers



Database Management System

- Extracts data
- Manages data and their relationships
- Updates (add, delete, edit, change)
- Retrieves data (accesses it)
- Queries and manipulates data
- Employs data dictionary



Data Directory

- Catalog of all data
 - Contains data definitions
 - Answers questions about the availability of data items
 - Source
 - Meaning
 - Allows for additions, removals, and alterations




Model Management Subsystem

- Components:
 - Model base
 - Model base management system
 - Modeling language
 - Model directory
 - Model execution, integration, and command processor



Models

- Strategic
 - Supports top management decisions
- Tactical
 - Used primarily by middle management to allocate resources
- Operational
 - Supports daily activities
- Analytical
 - Used to perform analysis of data



Placeholder

figure 3.5



Model Base Management System

- Functions:
 - Model creation
 - Model updates
 - Model data manipulation
 - Generation of new routines
- Model directory:
 - Catalog of models
 - Definitions



Model Management Activities

- Model execution
 - Controls running of model
- Model command processor
 - Receives model instructions from user interface
 - Routes instructions to MBMS or module execution or integration functions
- Model integration
 - Combines several models' operations

User Interface System

Data management
and DBMS

Knowledge-based
system

Model
management and
MBMS

User Interface Management System (UIMS)

Natural Language Processor

Input
Action
Languages

Output
Display
Language

PC Display

Users

Printers, Plotters

Based on Figure 3.6, Schematic
View of the User Interface



User Interface Management System

- GUI
- Natural language processor
- Interacts with model management and data management subsystems
- Examples
 - Speech recognition
 - Display panel
 - Tactile interfaces
 - Gesture interface



Knowledge-Based Management System

- Expert or intelligent agent system component
- Complex problem solving
- Enhances operations of other components
- May consist of several systems
- Often text-oriented DSS

DSS Hardware

- De facto standard
- Web server with DBMS:
 - Operates using browser
 - Data stored in variety of databases
 - Can be mainframe, server, workstation, or PC
 - Any network type
 - Access for mobile devices



DSS Classifications

- Alter
 - Extent to which outputs can directly support or determine the decision
 - Data oriented or model oriented
- Holsapple and Whinston
 - Text oriented, database oriented, spreadsheet oriented, solver oriented, rule oriented, or compound
- Intelligent

TABLE 3.4 Characteristics of Different Classes of Decision Support Systems

| <i>Orientation</i> | <i>Category</i> | <i>Type of Operation</i> | <i>Type of Task</i> | <i>User</i> | <i>Usage Pattern</i> | <i>Time</i> |
|--------------------|------------------------------|---|-------------------------------|--|--|--|
| Data | File drawer systems | Access data items | Operational | Nonmanagerial line personnel | Simple inquiries | Irregular |
| | Data analysis systems | Ad hoc analysis of data files | Operational analysis | Staff analyst or managerial line personnel | Manipulation and display of data | Irregular or periodic |
| Data or Models | Analysis information systems | Ad hoc analysis involving multiple databases and small models | Analysis, planning | Staff analyst | Programming special reports, developing small models | Irregular, on request |
| Models | Accounting models | Standard calculations that estimate future results on the basis of accounting definitions | Planning, budgeting | Staff analyst or manager | Input estimates of activity; receive estimated monetary results as output | Periodic (e.g., weekly, monthly, yearly) |
| | Representational models | Estimating consequences of particular actions | Planning, budgeting | Staff analyst | Input possible decision; receive estimated results as output | Periodic or irregular (ad hoc analysis) |
| | Optimization models | Calculating an optimal solution to a combinatorial problem | Planning, resource allocation | Staff analyst | Input constraints and objectives; receive answer | Periodic or irregular (ad hoc analysis) |
| | Suggestion models | Performing calculations that generate a suggested decision | Operational | Nonmanagerial line personnel | Input a structured description of the decision situation; receive a suggested decision as output | Daily or periodic |

Source: Condensed from Alter (1980), pp. 90–91.



DSS Classifications

- Donovan and Madnick
 - Institutional
 - Problems of recurring nature
- Ad hoc
 - Problems that are not anticipated or are not repetitive
- Hackathorn and Keen
 - Personal support, group support, or organizational support



DSS Classifications

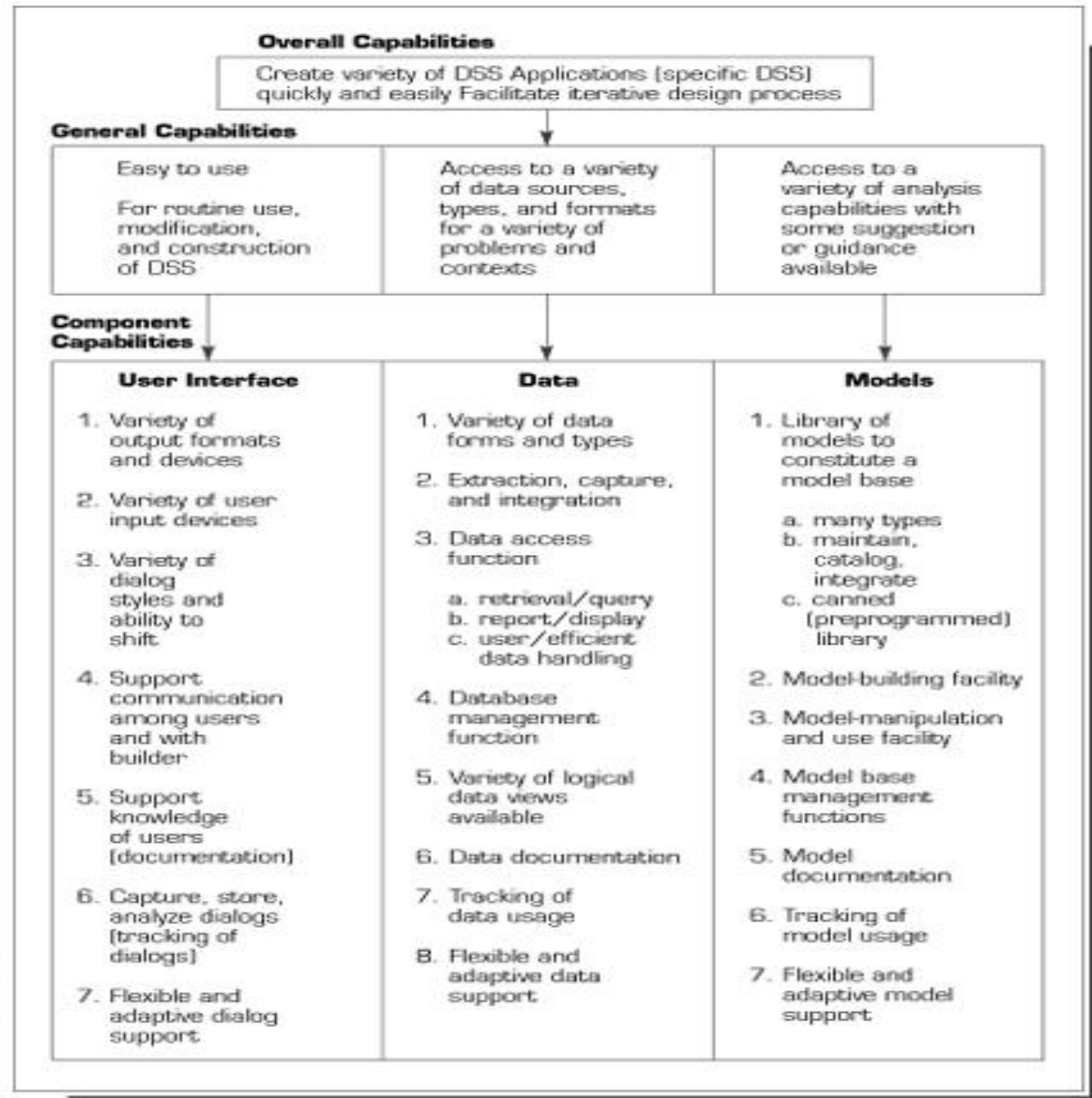
- GSS v. Individual DSS
 - Decisions made by entire group or by lone decision maker
- Custom made v. vendor ready made
 - Generic DSS may be modified for use
 - Database, models, interface, support are built in
 - Addresses repeatable industry problems
 - Reduces costs



Web and DSS

- Data collection
- Communications
- Collaborations
- Download capabilities
- Run on Web servers
- Simplifies integration problems
- Increased usability features

Figure 3.7
Summary
of DSS
Capabilities



Source: Based on Ralph Sprague and Eric Carlson, *Building Effective Decision Support Systems*, 1982, p. 313. Reprinted by permission of Prentice Hall, Inc.