Chapter 11: Executive Information and Support Systems

- **DSS have been rarely used by top executives**

- **Why?**

- **What are the needs of top executives?**

- **What is needed in computer-based information systems for upper management?**

Unique MSS Tools

- **Executive Information Systems (EIS)**
- **Executive Support Systems (ESS)**
- **and Organizational DSS (ODSS)**

Plus

- **Client/Server Architecture (C/S)**
- **Enterprise Computing**

11.1 Opening Vignette: The Executive Information System at Hertz Corporation

The Problem

- **High competition**

- **Keys to Success - Marketing and flexible planning**

- **Instantaneous marketing decisions (decentralized)**

- **Based on information about cities, climates, holidays, business cycles, tourist activities, past promotions, and competitors' and customers' behavior**

- **Must know competitors' pricing information**

- ***The Problem* - How to provide accessibility to this information and use it effectively**

The Initial Solution:
A Mainframe-Based DSS (1987)

Later: The <u>Executive Information System (EIS)</u> in 1988

- **PC-based front-end to the DSS**
- **Commander EIS (Comshare Inc.)**
- **Tools to analyze the mountains of stored information**
- **To make real-time decisions without help**
- **Extremely user-friendly**
- **Maintained by the marketing staff**
- **Continuous upgrades and improvements**
- **Conformed to how Hertz executives work**
- **Implementation and acceptance were no problem**
- **System allows Hertz to better use its information and IS resources**

11.2 Executive Information Systems: Concepts and Definitions

- **Tool that can handle the executives' many needs for timely and accurate information in a meaningful format (DSS In Focus 11.1)**

- **Most Popular EIS Uses**
  - **Decision making (by providing data)**
  - **Scheduling (to set agendas and schedule meetings)**
  - **Email and electronic briefing (to browse data and monitor situations)**

(Table 11.1)

TABLE 11.1 Reasons for Using EIS

Purpose for Using EIS	Percent of EIS Users
Decision Making	50.0
Scheduling	50.0
E-Mail	43.8
Electronic Briefing	37.5
Tickler and Follow Up Functions	31.3
Other	6.3

(*Source:* Based on Nord and Nord [1996], Exhibit 4)

DSS In Focus 11.1: Why EIS?

Most common benefits: Improvement in the quality and quantity of information available to executives. Factors identified by Watson et al. [1991] and Watson et al. [1997]:

Information Needs (Internal and External):

- More timely information
- Greater access to operational data
- Greater access to corporate databases
- More concise, relevant information
- New or additional information
- More information about the external environment
- More competitive information
- Faster access to external databases
- Faster access to information
- Reduced paper costs

EIS Improvements in Executive Job Performance Ability:

- Enhanced communications
- Greater ability to identify historic trends
- Improved executive effectiveness
- Improved executive efficiency
- Fewer meetings, and less time spent in meetings
- Enhanced executive mental models
- Improved executive planning, organizing, and controlling
- More focused executive attention
- Greater support for executive decision making
- Increased span of control

- **Majority of personal DSS support the work of professionals and middle-level managers**
- **Organizational DSS support planners, analysts, and researchers**
- **Rarely do top executives directly use a DSS**

- **Executive Information Systems (EIS)**
- **(or Executive Support Systems (ESS)**

- **Technology emerged to meet executive information needs**

- **EIS - Rapid growth**

- **Prime Tool for Gaining Competitive Advantage**

- **Many Companies - Sizable Increase in Profits with EIS**

- **Sometimes the Payback Period is Measured in Hours**

- **New Internet / World Wide Web and Corporate Intranets EIS Developments**

EIS and ESS Definitions

Executive Information System (EIS)

- **A computer-based system that serves the information needs of top executives**
- **Provides rapid access to timely information and direct access to management reports**
- **Very user-friendly, supported by graphics**
- **Provides exceptions reporting and "drill-down" capabilities**
- **Easily connected to the Internet**
- **Drill down**

Executive Support System (ESS)

A Comprehensive Support System that Goes Beyond EIS to Include

- **Communications**
- **Office automation**
- **Analysis support**
- **Intelligence**

(DSS In Action 11.2)

11.3 Executives' Role and Their Information Needs

- **Decisional Executive Role (2 Phases)**
  - 1. **Identification of problems and/or opportunities**
  - 2. **The decision of what to do about them**
- **Flow Chart and Information Flow (Figure 11.1)**
- **Use Phases to Determine the Executives' Information Needs**

Methods for Finding Information Needs

- **Wetherbe's Approach [1991] (Figure 11.2)**

  1. Structured Interviews (Table 11.2)
    - **IBM's Business System Planning (BSP)**
    - **Critical Success Factors (CSF)**
    - **Ends/Means (E/M) Analysis**

  2. Prototyping

- **Watson and Frolick's Approach [1992]**
    - **.Asking (interview approach)**
    - **.Deriving the needs from an existing information system**
    - **.Synthesis from characteristics of the systems**
    - **.Discovering (Prototyping)**
      - **Ten methods (Table 11.3)**

TABLE 11.2 Methods and Sample Questions for Structured Interviews

Method	Sample Interview Questions
1. The executive interview portion of IBM's Business System Planning (BSP): Specify problems and decisions	a. What are the major problems encountered in accomplishing the purposes of the organizational unit you manage? b. What are good solutions to those problems? c. How can information play a role in any of those solutions? d. What are the major decisions associated with your management responsibilities? e. What improvements in information could result in better decisions?
2. Critical success factors (CSF): Specify critical success factors	a. What are the critical success factors of the organizational unit you manage? Most managers have four to eight of these. b. What information is needed to ensure that critical success factors are under control? c. How do you measure the specific CSFs? For example: prompt shipment of orders (a CSF) is measured by the percentage of time shipments are delivered on schedule.
3. End/means (E/M) analysis: Specify effectiveness criteria or outputs and efficiency criteria for processes used to generate outputs	a. What are the resulting goods or services provided by the business process? b. What makes these goods or services effective to recipients or customers? c. What information is needed to evaluate that effectiveness? d. What are the key means or processes used to generate or provide goods or services? e. What constitutes efficiency in the providing of these goods or services? f. What information is needed to evaluate that efficiency?

TABLE 11.3 Methods for Assessing Information Requirements

Interaction	Noncomputer Related	Computer Related
Direct Executive Interaction	• **Participation in strategic planning sessions** • **Formal CSF sessions** • **Informal discussions of information needs** • **Tracking executive activities**	• **Collaborative work system sessions (e.g., GDSS, Intranet)**
Indirect Executive Interaction	• **Discussions with support personnel** • **Examination of noncomputer-generated information** • **Attendance at meetings**	• **Software tracking of EIS usage** • **Examinations of computer-generated information**

Source: H. J. Watson and M. Frolick, "Determining Information Requirements for an Executive Information System," *Information System Management*, Spring 1992. Reprinted from *Journal of Information Systems Management* (New York: Auerbach Publications), 1992 Research Institute of America Inc. Used with permission.

DSS In Focus 11.3: How to Find Executives' Information Needs

1. Ask senior executives what questions they would ask upon their return from a three-week vacation.
2. Use the critical success factor (CSF) methodology.
3. Interview all senior managers to determine what data they think are most important.
4. List the major objectives in the short- and long-term plans and identify their information requirements.
5. Ask the executives what information they would least like for their competition to see.
6. Either through an interview or observation process, determine what information from current management reports is actually being used by the executive.
7. Provide more immediate, online access to current management reports, and then ask executives how you can better tailor the system to their needs. (Executives are much better at telling you what is wrong with what you have given them than at telling you what they need.)
8. Use the Business System Planning (BSP) method.
9. Use the Ends/Means (E/M) analysis method.
10. Use the Strategic Business Objectives (SBO) approach.
11. Use the Information Success Factors (ISF) method.
12. Use prototyping (show, criticize, improve).

Volonino and Watson's Strategic Business Objectives Approach [1991]

- **Attempts to address some potential problems of the other methods**
- **Ignoring soft information**
- **Identifying the information timeliness**
- **Independence of information and specific executives**

- **Organization-wide view**
- **Identify business objectives**
- **Link them to the information needs of individuals throughout the organization**
- **EIS evolves into an enterprise-wide system**

SBO Method

- **Determine the organization's SBOs**
- **Identify related business processes**
- **Prioritize the SBOs and their related business processes**
- **Determine the information critical to each business process**
- **Identify information linkages across the SBO business processes**
- **Plan for development, implementation and evolution**

- **SBO method meshes well with Business Process Reengineering**
- **Requires extensive coordination of communication between executive users and EIS developers**

Other Approaches

- **Information Success Factors Approach**

- **Problem: Needs Change as Executives' Tasks and Responsibilities Change**

- **EIS Evolves**

11.4 Characteristics of EIS

Table 11.4

- **Important Terms Related to EIS Characteristics**
  - **Drill Down**
  - **Critical Success Factors (CSF)**
    Monitored by five types of information
    1. Key problem narratives
    2. Highlight charts
    3. Top-level financials
    4. Key factors
    5. Detailed responsibility reports

TABLE 11.4 EIS Characteristics and Benefits

Quality of information:
- Is flexible
- Produces correct information
- Produces timely information
- Produces relevant information
- Produces complete information
- Produces validated information.

User interface:
- Includes sophisticated graphic user interface (e.g., GUI)
- Includes a user-friendly interface
- Allows secure and confidential access to information
- Has a short response time (timely information)
- Is accessible from many places
- Includes a reliable access procedure
- Minimizes keyboard use; alternatively uses infrared controllers, mouse, touch pads, and touch screen
- Provides quick retrieval of desired information
- Is tailored to management styles of individual executives
- Contains self-help menu.

Technical capability provided:

- Access to aggregate (global) information
- Access to electronic mail
- Extensive use of external data
- Written interpretations
- Highlights problem indicators
- Hypertext and hypermedia
- Ad hoc analysis
- Multidimensional presentation and analysis
- Information presented in hierarchical form
- Incorporates graphics and text in the same display
- Provides management by exception reports
- Shows trends, ratios, and deviations
- Provides access to historical and most current data
- Organized around critical success factors
- Provides forecasting capability
- Produces information at various levels of detail ("drill down")
- Filters, compresses, and tracks critical data
- Supports open-ended problem explanation.

Benefits:

- **Facilitates the attainment of organizational objectives**
- **Facilitates access to information**
- **Allows the user to be more productive**
- **Increases the quality of decision making**
- **Provides a competitive advantage**
- **Saves time for the user**
- **Increases communication capacity**
- **Increases communication quality**
- **Provides better control in the organization**
- **Allows the anticipation of problems/opportunities**
- **Allows planning**
- **Allows finding the cause of a problem**
- **Meets the needs of executives.**

*Source***: Based on Bergeron et al. [1991]**

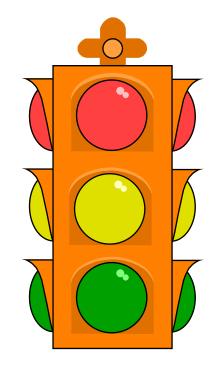**DSS In Focus 11.4: Typical Key Performance Indicators**

Profitability	**Profitability measures for each department, product, region, and so on; comparisons among departments and products and with competitors**
Financial	**Financial ratios, balance sheet analysis, cash reserve position, rate of return on investment**
Marketing	**Market share, advertisement analysis, product pricing, weekly (daily) sales results, customer sales potential**
Human Resources	**Turnover rate, level of job satisfaction**
Planning	**Corporate partnership ventures, sales growth/ market share analysis**
Economic Analysis	**Market trends, foreign trades and exchange rates, industry trends, labor cost trends**
Consumer Trends	**Consumer confidence level, purchasing habits, demographic data**

- **Status Access**
  - **Analysis by**
    - **Built-in functions**
    - **Integration with DSS products**
    - **Intelligent agents**
- **Exception Reporting**
- **Use of Color**
- **Navigation of Information**
- **Communication**

11.5 Comparing EIS and MIS

- **Relationship between MIS and EIS (Figure 11.3)**
  - **MIS is TPS based**
  - **MIS typically lacks data integration across functional areas**
  - **Differences (Table 11.5)**
  - **MIS does not accommodate many users' decision styles**
  - **Often has slow response time**
  - **Executive decision making is complex and multidimensional**
  - **MIS usually designed to handle fairly structured, simpler configurations**
  - **MIS do not usually combine data from multiple sources**
  - **New advances are changing that**

TABLE 11.5 MIS and EIS: A Comparison

System	Primary Purpose	Primary Users	Primary Output	Primary Operations	Time Orientation	Example
MIS	Internal monitoring	Managers and executives	Predefined periodic reports	Summarize information	Past	Sales report
EIS	Internal and external monitoring	Executives	Predefined customized periodic or ad hoc reports, presentations, and queries	Integrate present, track CSF	Past, present and future	Market share tracking

Source: Reprinted with permission, Millet et al. [1991], "Alternative Paths to EIS," *DSS-91 Transactions*, Eleventh International Conference on Decision Support Systems, Ilze Zigurs (Ed.), The Institute of Management Sciences, 290 Westminster Street, Providence, RI 02903.

11.6 Comparing and Integrating EIS and DSS

- **Tables 11.6 and 11.7 compare the two systems**
  - **Table 11.6 - Typical DSS definitions related to EIS**
  - **Table 11.7 - Compares EIS and DSS**

- **EIS is part of decision support**

TABLE 11.6 Definitions of DSS Related to EIS

Relevant Portion of DSS Definition	Author	Comparison to EIS
"CBIS consisting of three subsystems: a problem-solving subsystem . . ."	Bonczek et al. [1980]	No problem-solving subsystem exists in an EIS.
"DSS can be developed *only* through an adaptive process . . ."	Keen [1980]	EIS may or may not be developed through an adaptive process.
"Model-based set of procedures . . ."	Little [1970]	EIS is not model-based.
"Extendible system . . . supporting decision modeling. . . used at irregular intervals."	Moore and Chang [1980]	EIS is not extendible, might not have modeling capabilities, and is used at regular intervals.
"Utilizes data and models . . ."	Scott Morton [1971]	EIS does not utilize models.

TABLE 11.7 Comparison of EIS and DSS

Dimension	EIS	DSS
Focus	Status access, drill down	Analysis, decision support
Typical users	Senior executives	Analysts, professionals, managers (via intermediaries)
Impetus	Expediency	Effectiveness
Application	Environmental scanning, performance evaluation, identification of problems and opportunities	Diversified areas where managerial decisions are made
Decision support	Indirect support, mainly high-level and unstructured decisions and policies	Supports semistructured and unstructured decision making, and ad hoc, but some repetitive decisions
Type of information	News items, external information on customers, competitors, and the environment; scheduled and demand reports on internal operations	Information to support specific situations
Principle use	Tracking and control; opportunity identification	Planning, organizing, staffing, and control
Adaptability to individual users	Tailored to the decision-making style of each individual executive, offers several options of outputs	Permits individuals' judgments, what-if capabilities, some choice of dialog style
Graphics	A must	Important part of many DSS

User-friendliness	A must	A must if no intermediaries are used
Processing of information	Filters and compresses information, tracks critical data and information	EIS triggers questions, answers are worked out by using the DSS and fed back into the EIS
Supporting detailed information	Instant access to the supporting details of any summary ("drill down")	Can be programmed into the DSS, but usually is not
Model base	Limited built-in functions	The core of the DSS
Construction	By vendors or IS specialists	By users, either alone or with specialists from the Information Center or the IS Department
Hardware	Mainframe, RISC Workstation, LANs, or distributed systems	Mainframe, RISC Workstation, PCs, or distributed systems
Nature of software packages	Interactive, easy access to multiple databases, online access, sophisticated DBMS capabilities, complex linkages	Large computational capabilities, modeling languages and simulation, application and DSS generators
Nature of information	Displays pregenerated info about past and present, creates new information about past, present, and future	Creates new information about the past, present, and future

Integrating EIS and DSS: An Executive Support System (ESS)

- **EIS output launches DSS applications**
- **Intelligent ESS**
- **Users' roles**
  - **Commander Decision (Figure 11.4)**
  - **Commander OLAP**

- **Integrating EIS and Group Support Systems**
  - **EIS vendors - Easy interfaces with GDSS**
  - **Some EIS built in Lotus Domino / Notes**
  - **Comshare Inc. and Pilot Software, Inc. - Lotus Domino/Notes-based enhancements and Web/Internet/Intranet links**

11.7 Hardware and Software

■ **EIS Hardware**

- **Mainframe computers using graphics terminals**

- **Personal computers connected to a mainframe, a minicomputer, or a powerful RISC workstation**

- **Departmental LAN or a client/server architecture**

- **An enterprise-wide network, or on a client/server enterprise-wide system. Workstations perform high-speed graphics displays**

■ **EIS (Enterprise Information System,**

EIS Software

- **Major Commercial EIS Software Vendors**
  - **Comshare Inc. (Ann Arbor, MI; http://www.comshare.com)**
  - **Pilot Software Inc. (Cambridge, MA; http://www.pilotsw.com)**
- **Application Development Tools**
  - **In-house components**
  - **Comshare Commander tools**
  - **Pilot Software's Command Center Plus and Pilot Decision Support Suite**

DSS In Focus W11.*: Representative EIS / ESS Integrated Products

1. *Commander EIS.* **This system has several built-in analytical tools, such as forecasting. In addition, it is designed for easy interface with DSS tools.**
2. *EIS Tool Kit.* **This PC-based product (from Ferox Microsystems Inc.) works with Encore Plus, a financial modeling DSS from the same vendor. The EIS/DSS combination is designed primarily to support financial and accounting planning.**
3. *Command Center EIS.* **This product (from Pilot Software, Inc.), which is linked with a DSS engine called FCS and with Decision Support Suite (see Section 11.12), is also linked with a software called Advantage/G.**
4. *Express/EIS.* **This product (from Information Resources Inc.) is an enterprise-wide system that integrates the powerful Express DSS generator with EIS II. This product is based on a multidimensional relational data model and it provides single, unifying, and flexible architecture.**
5. *GENTIA.* **This client/server and web-ready product (from Planning Sciences) integrates DSS capabilities with EIS.**
6. *Holos.* **This product (from Holistic Systems) combines EIS and DSS activities into one system, together with dynamic links to operational data.**
7. *TRACK (EIS).* **This product (from DecisionWorks Ltd., London, UK) interfaces with IBM's DSS tools.**
8. *PowerPlay.* **This product (from Cognos Inc.) incorporates statistical analysis to analyze data.**

Trend for EIS Software Vendors with Third Party Vendors Producing Specialized EIS Applications

- **Comshare, Inc.'s Commander Series**
  - **Commander FDC** for consolidation, reporting, and analysis of financial information
  - **Commander Budget Plus** for budget development and multidimensional planning
  - **Commander Prism** for personal multidimensional analysis and modeling
  - **Arthur** - a family of supply chain focused applications for retailing (planning, allocation and tracking)
  - **Boost Application Suite** - a decision support solution for the consumer goods industry (Boost Sales and Margin Planning, Boost Sales Analysis)

More EIS Software

- **Pilot Software, Inc.**
  - **Budget 2000** (with EPS, Inc.) is a budgeting application that includes the power of Pilot Decision Support Suite for budget preparation
  - **In Touch/2000** is a software agent that enables organizations to instantly create personal cubes (multidimensional databases), sales reports, budget forecasts and marketing plans
  - **Sales & Marketing Analysis Library** of Pilot Decision Support Suite to perform detailed business reporting for sales and marketing professionals

Commercial EIS Software

■ **Typically Includes**
- – **Office Automation**
- – **Electronic Mail**
- – **Information Management**
- – **Remote Information Access**
- – **Information Analysis**

■ **Representative List of EIS Software Products**

(Table W11.*)

TABLE W11.x Representative EIS Products

Product	Vendor
Command Center	Pilot Software, Inc.
Commander DeskView, Commander Decision	Comshare, Inc.
Commander EIS, EIS LAN; Commander Decision	Comshare, Inc.
DSS Executive	Micro Strategy Inc.
Easel Workbench, ENFIN	Easel Corp.
EIS Tool Kit	Ferox Microsystems, Inc.
Executive Decisions	IBM Corp.
Express/EIS	Information Resources, Inc.
Focus/EIS; EDA/EIS	Information Builders, Inc.
Forest and Trees	Trinzic Corp.
GENTIA	Planning Sciences
Holos	Holistic Systems, Inc.
IMRS On Track	IMRS Inc.
Notes	Lotus Development Corp.
Pilot Decision Support Suite V5	Pilot Software, Inc.

11.8 EIS, Data Access, Data Warehousing, OLAP, Multidimensional Analysis, Presentation, and the Web

- **When data are delivered and viewed by an executive, by definition, the software is considered to be an EIS**

- **Data warehouses as data sources for EIS**

- **Advanced data visualization methods and hypermedia within EIS**

  Comshare, Inc.'s Execu-View

TABLE 11.8 EIS Hardware Options

Option	EIS Information Source	User Interface
1	Mainframe (or minicomputer or RISC Workstation)	Graphical terminal (dumb)
2	Mainframe (or minicomputer or RISC Workstation)	PCs
3	LAN-based PCs (or servers) on a departmental client/server	PCs (regular, GUI)
4	Enterprise-wide network (many possible databases)	PCs (regular, GUI)

Hypermedia over an Intranet via a Web Browser within the EIS

- **Comshare Commander DecisionWeb**
- **Internet Publishing module of the Pilot Decision Support Suite**

- **On-line Analytical Processing (OLAP) Tools**
  - **Slice-and-dice multidimensional data cube**

OLAP Packages

- **DSS Web (MicroStrategy, Inc.)**
- **Oracle Express Server (Oracle Corp.)**
- **Commander DecisionWeb (Comshare, Inc.)**
- **DataFountain (Dimensional Insight Inc.)**
- **Pilot Internet Publisher (Pilot Software, Inc.)**
- **WebOLAP (Information Advantage Inc.)**
- **Focus Fusion (Information Builders, Inc.)**
- **Business Objects Inc. (Business Objects)**
- **InfoBeaconWeb (Platinum Technology, Inc.)**
- **BrioQuery (Brio Technology Inc.)**
- **Data multidimensionality - In Touch/2000 - Pilot personal cubes**

Pilot Software, Inc.'s Decision Support Suite

- **Client/server, LAN-based, Windows-based software product (was Lightship)**
- **Pilot Desktop for ad hoc end-user data access**
- **Pilot Designer for development of executive information applications**
- **Pilot Analysis Server for access to multidimensional data models**
- **Pilot Discovery Server for data mining and predictive modeling**
- **Pilot Internet Publisher for publishing multidimensional data on the World Wide Web**
- **Pilot Sales & Marketing Library for a specific vertical market**
- **Excel Add-in - OLAP front end with Pilot Analysis Server**

11.9 Enterprise EIS

- **Tool for Enterprise Support**
  - **Executive-only EIS**
  - **Enterprise-wide Information System**

  - **Functional Management DSS Tools are Integrated with EIS**
  - **EIS is Diffusing Lower into Organization Levels**
- **EIS = Enterprise Information System**
- **EIS = Everybody's Information System**

TABLE 11.9 Level of Management Using EIS

Level of Management Using EIS	Percent of EIS Users
CEO	50.0
President	31.3
Vice-President	93.8
Middle Management	87.5
Other	18.8

(*Source:* Based on Nord and Nord [1996], Exhibit 1)

11.10 EIS Implementation: Success or Failure

EIS Development Success Factors (Table 11.10)

- **Committed Executive Sponsor**
- **Correct Definition of Information Requirements**
- **Top Management Support**

TABLE 11.10 The Major Successful EIS Development Factors

Factors	Total Count (Out of 214)
Executive sponsor	32
Define information requirements	29
Top management support	22
Manage data	15
Cost considerations	14
Manage system spread and evolution	12
Manage user expectations	12
Deliver first version quickly	11
Manage organizational resistance	10
Link EIS and business objectives	9
Evolutionary development approach	8
EIS development support team	6
Appropriate technology	5
Decide between vendor, custom software	5
Start limited, not small	5

(*Source:* **Compiled from Rainer and Watson [1995], Table 2.**)

11.10 EIS Implementation: Success or Failure

EIS Implementation - Different from DSS, CBIS

Critical Success Factors for Implementation of EIS

1. A committed and informed executive sponsor

2. An operating sponsor

3. A clear link to business objective(s)

4. Appropriate IS resources

5. Appropriate technology

6. Management of data problems

7. Management of organizational resistance

8. Management of spread and system evaluation

EIS Operational Success Factors
(Table 11.11)

- Deliver timely information
- Improve efficiency
- Provide accurate information
- Provide relevant information
- Ease of use
- Provide access to the status of the organization
- Provide improved communications

An IS for upper management must fit with their decision styles

TABLE 11.11 Successful Operational EIS Factors

Factors	Total Count (Out of 427)
Timely information	42
Improve efficiency	32
Accurate information	29
Relevant information	25
Ease of use	24
Status access	24
Improve communications	20
Minimal or no training	15
Adaptable interface	14
Adapt to changing information requirements	14
Exception reporting	14
Convenient information	13
Standard definitions in the enterprise	10
Access external data	10
Drill down	9
Multiple modes of presentation	7
Access soft, human data	6
Access internal data	6
Accountability for providers	6
Color	6
Graphics	6
Fast response time	6
Easy to obtain hard copy	6
Trend analysis	5
Improve operational control	5
Concise information	5

(*Source:* **Compiled from Rainer and Watson [1995], Table 4**)

Motivations for Developing an EIS

- **Internal in nature**
- **Providing easier, faster access to information**
- **80 % - Evolving approach**
- **Sequencing of the phases varies**
- **More successful development efforts include**
  - **Initiation**
  - **Definition of systems objectives**
  - **Feasibility analysis**

Determinates of EIS Acceptance

- **Rapid Development Time**
- **Staff Size**
- **EIS Age**

- **Not Ease of Use**
- **Not High Usage**
- **Not Many Features**
- **Not a Staff Close to Users**

Factors Contributing to EIS Failures
(Table 11.12)

- **Technology-related factors**
- **Support-related factors**
- **User-related factors**

- **Most EIS fail because they do not provide value for their high cost though EIS benefits are difficult to measure**

TABLE 11.12 Factors Contributing to EIS Failures

1. Technology-Related Factors	**a. The EIS is no better than the original system** **b. The technology is inadequate or inappropriate** **c. The interfaces are complicated or menus are extensive**
2. Support-Related Factors	**a. Users' information requirements were ignored** **b. Changes in users' information needs were not kept up with** **c. Providing electronic reports identical to the original paper reports with no enhancements** **d. Inadequate business knowledge among support staff members** **e. Not addressing a significant business problem** **f. A lack of data availability** **g. Late delivery of operating data**
3. User-Related Factors:	**1. Limiting the focus of the EIS to one user** **2. Lack of commitment from users** **3. Executive sponsor's lack of clarity for the purpose of the EIS** **4. Not providing a means for executives to communicate ideas and insights** **5. Users not able to communicate decisions** **6. Political resistance** **7. Hard-to-use technology resisted by users** **8. Middle management fears executives will meddle in their daily operations**

(*Source:* **Based on Young and Watson [1995], Table 2)**

Benefit and Cost Assessment Practices in EIS

- **Most Systems' Realized Expected Benefits Were *Lower* than Expectation**

- **Greatest Problem - Information Contents, Not Information Delivery Issues**

Unexpected EIS Benefits

- **Enhancements to the enterprise-wide information architecture**

- **Consolidation of data into warehouses**

- **Consolidation of analysis tools into OLAP methods**

- **Consistency of *terminology* across the enterprise**

11.11 Including Soft Information in EIS

Soft information is fuzzy, unofficial, intuitive, subjective, nebulous, implied, and vague

Soft Information Used in Most EIS

- **Predictions, speculations, forecasts, and estimates (78.1%)**
- **Explanations, justifications, assessments, and interpretations (65.6%)**
- **News reports, industry trends, and external survey data (62.5%)**
- **Schedules and formal plans (50.0%)**
- **Opinions, feelings, and ideas (15.6%)**
- **Rumors, gossip, and hearsay (9.4%)**

Soft Information Enhances EIS Value

- **More in the Future**
  - **External news services**
  - **Competitor information**
  - **Ease of entering soft information**

11.12 The Future of EIS and Research Issues

- **Toolbox for customized systems - Commander EIS LAN, Forest and Trees, and Pilot Decision Support Suite**
- **Multimedia support (databases, video and audio news feeds, GIS)**
- **Virtual Reality and 3-D Image Displays**
- **Merging of analytical systems with desktop publishing**
- **Client/server architecture**
- **Web-enabled EIS (Comshare Commander DecisionWeb, Pilot Decision Support Suite Internet Publishing module, SAS Institute Internet support enterprise software suite)**
- **Automated support and intelligent assistance**
- **Integration of EIS and Group Support Systems**
- **Global EIS**

Research Issues

- **Relationship between the executive sponsor's organizational position and commitment level to EIS success**

- **Most important factors when selecting an operating sponsor?**

- **Prediction of EIS benefits in advance**

- **How EIS software affects the development process and system success**

- **Best staffing level and organizational structure for the builder/support staff**

- **Most effective methods to identify executives' information requirements**
- **Major EIS data management problems and their solutions**
- **Impact of soft data on EIS success**
- **Major problems associated with spread and evolution**
- **How to increase EIS functionality while maintaining ease of use**
- **Effective use of emerging technologies with EIS**
- **Most effective screen presentation formats**

Current Trends in EIS

- **More enterprise-wide EIS with greater decision support capabilities**

- **Integration with other software (Lotus Domino / Notes and World Wide Web)**

- **More intelligence - intelligent software agents**

Other EIS Issues

- **How to assess EIS benefits and costs**
- **How to cluster EIS benefits depending on planned system uses**
- **How EIS diffuses throughout the organization**
- **How to perform screen management - creation, modification and elimination**

Five Broad Categories of EIS Benefits

(Table W11.1)

- **Help developers in design and development**

- **(Iyer and Aronson [1995])**

TABLE W11.1 The Five Categories of EIS Benefits

Categories of EIS Benefits	Benefits within Each Category
1. Information	a. More timely information b. Faster access to information c. More accurate information d. More relevant information e. More concise information
2. Environmental Scanning	a. Better access to soft information b. Improved access to external data c. Better environmental scanning d. More competitive information
3. Improving Executives' Effectiveness	a. Improved communications b. Improved executive performance c. Save executive time d. Improved presentation of data
4. Meeting Strategic Objectives	a. Increased span of control b. Improved planning c. Improved decision making d. Better problem understanding e. Better development of alternatives
5. Economy	a. Cost savings b. Less paper c. Support TQM program d. More responsive to changing customer needs e. Support downsizing the organization

Source: Iyer and Aronson [1995]

11.13 Organizational DSS (ODSS)

- **Three Types of Decision Support**
  - **Individual**
  - **Group**
  - **Organizational**

Hackathon and Keen [1981]

TABLE 11.13 Differences between Regular DSS and ODSS

TABLE 11.14 Differences between Regular DSS and ODSS.

	Regular (Traditional) DSS	ODSS
Purpose	Improve performance of an individual decision maker, or of a small group.	Improve the efficiency and effectiveness of organizational decision making.
Policies	Must "sell" the system to an individual.	The system must be sold to the organization.
Construction	Usually an informal process (except in large DSS).	Significant undertaking; requires structured approach.
Focus	On the individual and on his or her objectives.	Focus on the functions to be performed and not on the individual users.
Support	Support is usually provided to one individual, or one unit, in one location.	Disseminate and coordinate decision making across functional areas, hierarchical levels, and geographically dispersed units.

Source: Based on Walker [1990].

- **Organizational decision support focuses on an organizational task or activity involving a sequence of operations and actors**

- **Each individual's activities must mesh closely with other people's work**

- **Computer support is for**
  - **Improving communication and coordination**
  - **Problem solving**

Definitions of ODSS

- **A combination of computer and communication technology designed to coordinate and disseminate decision-making across functional areas and hierarchical layers in order that decisions are congruent with organizational goals and management's shared interpretation of the competitive environment (R. T. Watson [1990])**

- **A DSS that is used by individuals or groups at several workstations in more than one organizational unit who make varied (interrelated but autonomous) decisions using a common set of tools (Carter et al. [1992])**

- **A distributed decision support system (DDSS). Not a manager's DSS, but supports the organization's division of labor in decision making (Swanson and Zmud [1990])**

- **Apply the technologies of computers and communications to enhance the organizational decision-making process. Vision of technological support for group processes to the higher level of organizations (King and Star [1990])**

Common Characteristics of ODSS (George [1991])

- **Focus is on an organizational task or activity or a decision that affects several organizational units or corporate problems**

- **Cuts across organizational functions or hierarchical layers**

- **Almost always involves computer-based technologies, and may involve communication technologies**

- **Can Integrate ODSS with Group DSS and Executive Information Systems**
  - **Example: Egyptian Cabinet ODSS with EIS (DSS In Action 11.15)**

11.14 The Architecture of ODSS

- **General Structure for ODSS (Figure 11.5)**

- **Major Differences ODSS Structure and Traditional DSS**
  - **Case Management Component (CMS)**
  - **Accessible by several users, in several locations, via LANs**
  - **May have an intelligent component**

Case Management

- **Run a model many times**
- **Much output and many files**
- **Helps the user manage the large numbers of similar runs**

- **Case = a specific run (scenario) of a computer model**

CMS Main Functions

1. Record keeping of the model cases
2. Documenting the changes from one run to the next
3. Output comparison facilitation

11.15 Constructing an ODSS

- **Formal, structured approach**
- **Large, complex, system programming effort**
- **Combination of the SDLC and iterative approach**

Phases

1. **Getting started (a structured, organizational phase)**

   a) **Needs assessment**

   b) **Getting management support**

   c) **Getting organized. Set up steering committee; identify project team members**

   d) **Getting a plan of action**

2. **Developing the conceptual design**

3. Developing the system

      a) Designing the physical system

      b) Developing the system's models and database

4. Implementing and maintaining the system:

      a) Installation

      b) Programming and updating system's modules (programs)

      c) Creating and updating the database

      d) Documenting the modules and database

      e) Training users

11.16 ODSS Example: The Enlisted Force Management System (EFMS)

- Improve the effectiveness and efficiency Air Force staff managing the enlisted force in decision-making and information-processing

- Objective: to provide a group of airmen that is best able to support the missions and operational programs of the Air Force

- Iterative, continuous task

- Decisions about force structure, promotion policies, and the procurement, assignment, training, compensation, separation, and retirement of personnel

- Five major, independent organizational units (in three geographically locations)

- More than 125 person-years went into the EFMS development

The Elements of EFMS

- **Model Base**
  - **Authorization projection**
  - **Grade allocation**
  - **Aggregate planning, programming, and oversight**
  - **Skills management**
- **Screening and Impact Assessment Models**

Hardware and Databases

- **EFMS's mainframe computer**
- **DSS generator language, EXPRESS**
- **Access databases and models on PCs through EXPRESS**

Databases from

- **Output from another EFMS model**
- **Data supplied by other branches of the Air Force**
- **External data**
  - **The EFMS and other Air Force computer systems exchange data regularly**

11.17 Implementing ODSS

Important ODSS Implementation Issues

1. Steering committee for direction and control

2. Project team members join on an ad hoc basis

3. The System Management Office (SMO)

4. Conceptual design

    a) Design principles

    b) Functions to be supported

    c) Models

    d) Data requirements

    e) Hardware and software considerations

Model Base

- **Flexibility, adaptability and easy maintainability**
- **Interlinked system of many small models**

Database

- **Coordination and integration**
- **Specification of a common, consistent, easily accessed, centralized database**
- **All information from one module is automatically (instantaneously) available to others**
- **Internal and external data**
- **Many modules have their own databases**

User Interface

- **Common for all elements**
- **Menu driven**
- **Easy to learn**
- **Easy to use**
- **Graphical User Interface (1993)**

ODSS Data

- **Understanding or defining the problem situation**

- **Estimating the nature of the models**

- **Validating the models**

- **Running the models (input data)**

- **Database construction and data cleaning:**

  25 % - 30 % of effort

Integration and Networking

- **Many models and databases**
- **Integration of models, data, and knowledge can be complex**

- **Artificial Intelligence in ODSS**
  - **Ideal - especially in CMS and machine learning (automatic rule induction)**

Summary

- **EIS serves the information needs of top executives and others**
- **EIS provides rapid access to timely information at various levels of detail**
- **Very user friendly (user-seductive)**
- **ESS also has analysis capabilities**
- **Executives' work: finding problems (opportunities) and making decisions**
- **Finding the information needs of executives is very difficult**

- **Methods: CSF (Critical Success Factors), BSP (Business System Planning), SBO (Strategic Business Objectives) and E/M (Ends/Means)**
- **Many EIS benefits are intangible**
- **Drill down**
- **Management by exception approach, centered on CSF, key performance indicators, and highlight charts**
- **In contrast to MIS, EIS has an overall organizational perspective and uses external data extensively**
- **Trend to integrate EIS and DSS tools**
- **EIS requires either a mainframe or a LAN**

- **Constructing an EIS can be difficult. Vendors or consultants**
- **EIS development tools**
- **Intranets to deliver information to executives**
- **Web-enabled EIS**
- **EIS success - many factors ranging from appropriate technology to managing organizational resistance**
- **The executive sponsor is *crucial* for the success of an EIS**
- **EIS failure - no value provided**
- **An EIS must fit the executives' decision styles**

- **Multidimensional analysis and presentation**

- **Access to database information by end-users, enterprise-wide**

- **EIS technology and use diffusing to lower levels of management**

- **Data warehouses and client/server front end environments make an EIS a useful tool for end users**

- **EIS can provide valuable soft information**

- **Organizational DSS (ODSS) deals with decision making across functional areas and hierarchical organizational layers**

- **ODSS includes a case management system (CMS)**
- **ODSS is used by individuals and groups and operates in a distributed environment**
- **ODSS deals with organizational tasks**
- **ODSS for similar, repetitive situations involves a case management component**
- **ODSS is frequently integrated with EIS and/or GDSS**
- **ODSS built using both traditional SDLC and prototyping**
- **Data and databases are critical to the success of ODSS**
- **ODSS usually use several quantitative and qualitative models**

Questions for the Opening Vignette

1. Explain how Hertz added an EIS that is used as a front end to the DSS

2. Why did the new DSS not satisfy the executives' information needs?

3. Why was it so important for the new system to provide information that conformed to the way executives at Hertz worked? Do you think that the system would have been acceptable otherwise? Why or why not?

4. What capabilities did the PCs bring to the EIS?

5. Why is it important for Hertz to be able to monitor competitors' marketing strategies in real time?

Appendix W11-A: The Client/Server Architecture and Enterprise Computing

- **Approach to organizing PCs, local area networks, and possibly mainframes, into a flexible, effective, and efficient system**

TABLE W11-A.1 The Benefits and Potential Problems of the Client/Server Architecture

Feature	Benefit	Potential Problems
Networked webs of small, powerful computers	If one machine goes down, your business machines stay up. The appropriate task may be run on the appropriate computer	No one machine may be capable of storing the entire database No one machine may be capable of performing necessary computational tasks Parts don't always work together. There are several possible culprits when something goes wrong Designing the division of work between client and server may be complicated
Computer arrays with thousands of MIPS; clients' aggregate MIPS beyond calculation	The system provides the power to get things done without monopolizing resources. End-users are empowered to work locally	Coordination of efforts and communication contention may occur
Some workstations are as powerful as mainframes, but cost 90% less	By giving you more power for less money, the system offers you the flexibility to make other purchases or to increase your profits	You locate or build support tools yourself The software developed for the Mac or Windows is different from that for mainframes The computational power may be underutilized
Open systems	You can pick and choose hardware, software, and services from various vendors	Too many options and / or incompatible systems may be difficult to manage and maintain
Systems grow easily and are infinitely expandable	It's easy to modernize your system as your needs change. Expanded capacity may be added incrementally	Continual upgrades may cause incompatible software problems Older machines may not run newer software
Individual client operating environments	You can mix and match computer platforms to suit the needs of individual departments and users	Managing and maintaining a variety of small systems can be difficult

(*Source*: Based in part on *Byte*, June 1993, p. 100)

C/S Characteristics

- **The clients are PCs or workstations, attached to a network. Clients access network resources**

- **The user interfaces directly with the client (via GUI)**

- **Servers provide shared resources to several clients**

- **A server provides clients with service capabilities (databases, large disk drives, or communications)**

- **Servers can be workstations, mainframes, minicomputers, and/or LAN PC devices**

- **A client forms one or more queries or commands, in a predefined language such as SQL, for presentation to the server**
- **Clients can send queries or commands to the servers**
- **Server transmits results to client's screen**
- **Typical servers: database server, file server, print server, image-processing server, computing server, and communication server (Web server)**
- **Server only reacts to client's requests**
- **Servers can communicate with each other**
- **Tasks are split into two: front-end portion (client), and back-end portion (server(s))**

Client / Server Computing

- **Changes the way people work**

- **People are empowered to access databases**

Client/Server Applications Categories

- **Messaging applications, such as electronic mail**

- **Disseminating a database among several computer networks**

- **Offering file- or peripheral-sharing, or remote computer access**

- **Processing-intensive applications where jobs are divided into tasks, each of which is performed by a different computer**

Enterprise-wide Client/Server Architecture

- **Computing systems that involve an entire organization**

- **Architecture for an integrated computer system to serve the business needs of the enterprise**

- **Technological framework that contains multiple applications, hardware, databases, networks, and management tools, usually from multiple vendors**

- **Requires a consensus on a set of standards ranging from operating systems to telecommunication protocols**

- **Requires a consensus on a common open management platform and a strong organizational commitment**

Major Benefits of Enterprise Computing

- **Reliable and responsive service**
- **Smooth incorporation of new client/server solutions with existing approaches**
- **Frequent and rapid changes, and increasing complexity**
- **Greater optimization of network and system resources**
- **Automation of management processes**
- **Network and data security**

- **Enterprise client/server architecture provides total integration of departmental and corporate IS resources**
- **Provides better control and security over data in a distributed environment**
- **IS organizations can maximize the value of information by increasing its availability. Enterprise client/server computing empowers organizations to**
  - **Reengineer business processes**
  - **Distribute transactions to streamline operations**
  - **Provide better and newer services to customers**