

# Lesson Proper for Week 15

## Information, Decisions, and Management

Levels of management decision making still exists, but their size, shape, and participants continue to change as today's fluid organizational structures evolve. Thus, the levels of managerial decision making that must be supported by information technology in a successful organization are:

- **Strategic Management.** Typically, a board of directors and an executive committee of the CEO and top executives develop overall organizational goals, strategies, policies, and objectives as part of a strategic planning process.
- **Tactical Management.** Increasingly, business professionals in self-directed teams as well as business unit managers develop short- and medium-range plans, schedules, and budgets and specify the policies, procedures, and business objectives for their subunits of the company.
- **Operational Management.** The members of self-directed teams or operating managers develop short-range plans such as weekly production schedules.

## Information Quality

What characteristics of information products make them valuable and useful to you? To answer this important question, we must first examine the characteristics or attributes of information quality. Information that is outdated, inaccurate, or hard to understand is not very meaningful, useful, or valuable to your or other business professionals. People need information of high quality, that is, information products whose characteristics, attributes, or qualities make the information more valuable to them.

## Decision Structure

One way of understanding decision making is by looking at decision structure. Decisions made at the operational management level tend to be more structured, those at the tactical level more semistructured, and those at the strategic management level more unstructured. Structured decisions involve situations where the procedures to follow, when a decision is needed, can be specified in advance. The inventory reorder decisions faced by most businesses are a typical example. Unstructured decisions involve decision situations where it is not possible to specify in advance most of the decision procedures to follow. Most decisions related to long-term strategy can be bought off as unstructured (that is, "What product lines should we develop over the next five years?"). Most business decision situations are semistructured. That is, some decision procedures can be prespecified, but not enough to lead to a definite recommended decision.

## Decision Support Trends

The fast pace of new information technologies like PC hardware and software suites, client/server networks, and networked PC versions of DSS software made decision support available to lower levels of management, as well as to nonmanagerial individuals and self-directed teams of business professionals.

Thus, the growth of corporate intranets and extranets, as well as the Web, has accelerated the development and use of "executive class" information delivery and decision support software tools by lower levels of management and by individuals and teams of business professionals. In addition, this dramatic expansion has opened the door to use of such **business intelligence** (BI) tools by the suppliers, customers, and other business stakeholders of a company for customer relationship management, supply chain management, and other e-business applications.

## Decision Support Systems

**Decision support systems** are computer-based information systems that provide interactive information support to managers and business professionals during the decision-making process. Decision support systems use (1) analytical models, (2) specialized databases, (3) a decision maker's own insights and judgements, and (4) an interactive, computer-based modeling process to support the making of semistructured business decisions.

## DSS Components

Unlike management information systems, decision support systems rely on model bases as well as databases as vital systems resources. A DSS model base is a software component that consists of models used in computational and analytical routines that mathematically express relationships among variables.

DSS software packages can combine model components to create integrated models that support specific types of decisions. DSS software typically contains built-in analytical modeling routines and also enables you to build your own models. Many DSS packages are now available in microcomputer and Web-enabled versions. Of course, electronic spreadsheet packages also provide some of the model building (spreadsheet models) and analytical modeling (what-if and goal-seeking analysis) offered by more powerful DSS software.

## Management Information Systems

An MIS produces information products that support many of the day-to-day decision-making needs of managers and business professionals. Reports, displays, and responses produced by management information systems provide information that these decision makers have specified in advance as adequately meeting their information needs. Such predefined information products satisfy the information needs of decision makers at the operational and tactical levels of organization who are faced with more structured types of decision situations.

## Management Reporting Alternatives

Management information systems provide a variety of information products to managers. Four major **reporting alternatives** are provided by such systems.

- **Periodic Scheduled Reports.** This traditional form of providing information to managers uses a prespecified format designed to provide managers with information on a regular basis. Typical examples of such periodic scheduled reports are daily or weekly sales analysis reports and monthly financial statements.
- **Exception Reports.** In some cases, reports are produced only when exceptional conditions occur. In other cases, reports are produced periodically but contain information only about these exceptional conditions. For example, a credit manager can be provided with a report that contains only information on customers who have exceeded their credit limits. Exception reporting reduces information overload, instead of overwhelming decision makers with periodic detailed reports of business activity.

- **Demand Reports and Responses.** Information is available whenever a manager demands it. For example, Web browsers and DBMS query languages and report generators enable managers at PC workstations to get immediate responses or to find and obtain customized reports as a result of their requests for the information they need. Thus, managers do not have to wait for periodic reports to arrive as scheduled.
- **Push Reporting.** Information is pushed to a manager's networked workstation. Thus, many companies are using webcasting software to selectively broadcast reports and other information to the networked PCs of managers and specialists over their corporate intranets.

Online analytical processing enables managers and analysts to interactively examine and manipulate large amounts of detailed and consolidated data from many perspectives. OLAP involves analyzing complex relationships among thousands or even millions of data items stored in data marts, data warehouses, and other multidimensional databases to discover patterns, trends, and exception conditions. An OLAP session takes place online in real time, with rapid responses to a manager's or analyst's queries, so that their analytical or decision-making process is undisturbed.

Online analytical processing involved several basic analytical operations, including consolidation, "drill-down," and "slicing and dicing."

- **Consolidation.** Consolidation involved the aggregation of data. This can involve simple roll-ups or complex groupings involving interrelated data. For example, data about sales offices can be rolled up to the district level, and district-level data can be rolled up to provide a regional-level perspective.
- **Drill-Down.** OLAP can also go in the reverse and automatically display detail data that comprise consolidated data. This is called drill-down. For example, the sales by individual products or sales reps that make up a region's sales totals could be easily accessed.
- **Slicing and Dicing.** Slicing and dicing refers to the ability to look at the database from different viewpoints. One slice of the sales database might show all sales of a product type within regions. Another slice might show all sales by sales channel within each product type. Slicing and dicing is often performed along a time axis in order to analyze trends and find time-based patterns in the data.

## Geographic Information and Data Visualization Systems

**Geographic information systems (GIS)** and **data visualization systems (DVS)** are special categories of DSS that integrate computer graphics with other DSS features. A geographic information system is a DSS that uses geographic databases to construct and display maps and other graphics displays that support decisions affecting the geographic distribution of people and other resources.

Data visualization systems represent complex data using interactive three-dimensional graphical forms such as charts, graphs, and maps. DVS tools help users to interactively sort, subdivide, combine, and organize data while the data are in their graphical form. This helps users discover patterns, links, and anomalies in business or scientific data in an interactive knowledge discovery and decision support process.

## Using Decision Support Systems

Using a decision system involves an interactive analytical modelling process. Using a decision support system involves four basic types of analytical modeling activities: (1) what-if analysis, (2) sensitive analysis, (3) goal-seeking analysis, and (4) optimization analysis. Let's briefly look at each type of analytical modeling that can be used for decision support.

### **What-If analysis**

In **what-if analysis**, a user makes changes to variables, or relationships among variables, and observes the resulting changes in the values of other variables.

### **Sensitivity Analysis**

**Sensitivity analysis** is a special case of what-if analysis. Typically, the value of only one variable is changed repeatedly, and the resulting changes on other variables are observed. As such, sensitivity analysis is really a case of what-if analysis involving repeated changes to only one variable at a time. Some DDS packages automatically make repeated small changes to a variable when asked to perform sensitivity analysis.

### **Goal-Seeking Analysis**

**Goal-seeking analysis** reverses the direction of the analysis done in what-if and sensitivity analyses. Instead of observing how changes in a variable affect other variables, goal-seeking analysis (also called how can analysis) sets a target value (a goal) for variable and then repeatedly changes other variables until the target value is achieved.

### **Optimization Analysis**

**Optimization analysis** is a more complex extension of goal-seeking analysis. Instead of setting a specific target value for a variable, the goal is to find the optimum value for one or more target variables, given certain constraints. Then one or more other variables are changed repeatedly, subject to the specified constraint, until the best values for the target variables are discovered.

### **Data Mining for Decision Support**

Data mining software may perform regression, decision tree, neural network, cluster detection, or market basket analysis for a business. The data mining can highlight buying patterns, reveal customer tendencies, cut redundant costs, or uncover seen profitable relationships and opportunities.

Market basket analysis (MBA) is one of the most common and useful types of data mining for marketing. The purpose of market basket analysis is to determine what products customers purchase together with other products. MBA takes its name from the concept of customers throwing all their purchases into a shopping cart (a market basket) during grocery shopping. Knowing what products people purchase as a group can be very helpful to a retailer or to any other company.

## **Executive Information Systems**

**Executive information system (EIS)** are information systems that combine many of the features of management information systems and decision support systems. When they were first developed, their focus was on meeting the strategic information needs of top management. Thus, the first goal of executive information systems was to provide top executives with immediate and easy access to information about a firm's *critical success factors* (CSFs), that is, key factors that are critical to accomplishing an organization's strategic objectives.

However, executive information systems are becoming so widely used by managers, analysts, and other knowledge workers that they are sometimes humorously called "everyone's information systems." More popular alternative names are enterprise information system (IS) and executive support systems (ESS). These names also reflect the fact that more features, such as Web browsing, electronic mail, groupware tools, and DDS and expert system capabilities, are being added to many systems to make them more useful to managers and business professionals.

## **Enterprise Portals and Decision Support**

Decision support in business is changing, driven by rapid developments in end user computing and networking; Internet and Web technologies; and Web-enabled business applications. One of the key changes taking place in management information and decision support systems in business is the rapid growth of enterprise information portals.

## **Enterprise Information Portals**

An **enterprise information portal (EIP)** is a Web-based interface and integration of MIS, DDS, EIS, and other technologies that gives all intranet users and selected extranet users access to a variety of internal and external business applications and services. Enterprise information portals are typically tailored or personalized to the needs of individual business users or groups of users, giving them a personalized *digital dashboard* of information sources and applications.