
**COMMONWEALTH OF AUSTRALIA**

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11.3 Executive Support in the Enterprise

We have described how DSS and GDSS help managers make unstructured and semi-structured decisions. Executive support systems (ESS), which we introduced in Chapter 2, also help managers with unstructured problems, focusing on the information needs of senior management. Combining data from internal and external sources, ESS create a generalized computing and communications environment that can be focused and applied to a changing array of problems. ESS help senior executives monitor organizational performance, track activities of competitors, spot problems, identify opportunities, and forecast trends.

The Role of Executive Support Systems in the Organization

Contemporary ESS can bring together data from all parts of the organization and allow managers to select, access, and tailor them as needed using easy-to-use desktop analytical tools and online data displays. Use of the systems has migrated down several organizational levels so that the executive and any subordinates are able to look at the same data in the same way.

Today's systems try to avoid the problem of data overload so common in paper reports because the data can be filtered or viewed in graphic format (if the user so chooses). ESS have the ability to drill down, moving from a piece of summary data to lower and lower levels of detail. The ability to drill down is useful not only to senior executives but to employees at lower levels of the organization who need to analyze data. OLAP tools for analyzing large databases provide this capability.

A major challenge of building executive support systems has been to integrate data from systems designed for very different purposes so that senior executives can review organizational performance from a firm-wide perspective. In the traditional firm, which typically had hundreds or even thousands of incompatible systems, pulling such information together and making sense out of it was a major task. Today, properly configured and implemented enterprise systems can provide managers with timely, comprehensive, and accurate firm-wide information. ESS based on such data can be considered logical extensions of enterprise system functionality.

External data, including data from the Web, are now more easily available in many ESS as well. Executives need a wide range of external data from current stock market news to competitor information, industry trends, and even projected legislative action. Through their ESS, many managers have access to news services, financial market databases, economic information, and whatever other public data they may require.

Contemporary ESS include tools for modeling and analysis. With only a minimum of experience, most managers find they can use these tools to create graphic comparisons of data by time, region, product, price range, and so on. (Whereas DSS use such tools primarily for modeling and analysis in a fairly narrow range of decision situations, ESS use them primarily to provide status information about organizational performance.)

ESS must be designed so that high-level managers and others can use them without much training. One area that merits special attention is the determination of executive information requirements. ESS need to have some facility for environmental scanning. A key information requirement of managers at the strategic level is the capability to detect signals of problems in the organizational environment that indicate strategic threats and opportunities (Walls et al., 1992). The ESS need to be designed so that both external and internal sources of information can be used for environmental scanning purposes.
ESS potentially could give top executives the capability of examining other managers' work without their knowledge, so there may be some resistance to ESS at lower levels of the organization. Implementation of ESS should be carefully managed to neutralize such opposition (see Chapter 13).

**Benefits of Executive Support Systems**

Much of the value of ESS is found in their flexibility. These systems put data and tools in the hands of executives without addressing specific problems or imposing solutions. Executives are free to shape the problems as necessary, using the system as an extension of their own thinking processes. These are not decision-making systems; they are tools to aid executives in making decisions.

The most visible benefit of ESS is their ability to analyze, compare, and highlight trends. The easy use of graphics allows the user to look at more data in less time with greater clarity and insight than paper-based systems can provide. In the past, executives obtained the same information by taking up days and weeks of their staffs' valuable time. By using ESS, these staffs and the executives themselves are freed up for the more creative analysis and decision making in their jobs. ESS capabilities for drilling down and highlighting trends also may enhance the quality of such analysis and can speed up decision making (Leidner and Elam, 1993–1994).

Executives are using ESS to monitor performance more successfully in their own areas of responsibility. Some companies are using these systems to monitor key performance indicators for the entire firm and to measure firm performance against changes in the external environment (see the Window on Management). The timeliness and availability of the data result in needed actions being identified and taken earlier. Problems can be handled before they become too damaging; opportunities can also be identified earlier. These systems can thus help organizations move toward a "sense and respond" strategy.

A well-designed ESS could dramatically improve management performance and increase upper management's span of control. Immediate access to so much data allows executives to better monitor activities of lower units reporting to them. That very monitoring ability could allow decision making to be decentralized and to take place at lower operating levels. Executives are often willing to push decision making further down into the organization as long as they can be assured that all is going well. Alternatively, executive support systems based on enterprise-wide data could potentially increase management centralization, enabling senior executives to monitor the performance of subordinates across the company and direct them to take appropriate action when conditions change.

**Executive Support Systems and the Digital Firm**

To illustrate the different ways in which an ESS can enhance management decision making, we now describe important types of ESS applications for gathering business intelligence and monitoring corporate performance, including ESS based on enterprise systems.

**ESS for Business Intelligence**

Today, customer expectations, Internet technology, and new business models can alter the competitive landscape so rapidly that managers need special capabilities for competitive intelligence gathering. ESS can help managers identify changing market conditions, formulate responses, track implementation efforts, and learn from feedback.

BP Sony NV, the Netherlands branch of the multinational electronics giant, wanted more insight from the marketplace to drive its competitive strategy. Until recently, its management reports were based primarily on financial and administrative data that took at least 24 hours to generate. Management wanted to be able to make meaningful decisions based on marketing and sales data as well so it could respond quickly to marketplace changes. Sony Netherlands constructed a data warehouse and Executive Information System for this purpose.

The system is now available to 78 users in management, marketing, and sales. They can use the system to help them define strategies, search for opportunities, identify problems, and substantiate actions. Using a drill-down function, they can examine the underlying numbers behind the total result. For instance, while senior management can obtain sales
Digital Cockpits Help Steer the Enterprise

Jeffrey Immelt, General Electric’s (GE) chairman and chief executive officer (CEO), is faced with the difficult task of keeping up with all 11 of GE’s primary divisions. Even though GE is one of the world’s largest corporations, he and his senior managers now can obtain a solid overview of each division and of the whole corporation in a matter of minutes, using GE’s intranet. His secret? The corporate cockpit, which is GE’s name for its version of a digital dashboard. A digital dashboard presents key performance indicators that give top executives quick but clear pictures of their company’s financial health.

This corporate information is extremely vital and yet so confidential that only 45 top GE executives are allowed access to it, although more have access to the digital dashboard of their own divisions. GE began development of its corporate cockpit in 2000, completing it in June 2002. The software is a combination of digital and graphics data, and its users can see them either way through tabs at the top of the screen. The top-level corporate data are mostly distillations of data from the digital dashboards of each of the 11 divisions. It presents information in nine categories, including headcounts, sales, orders, and pricing.

Naturally the divisional dashboards display differing critical information that is specific to their own units. For example, NBC includes its TV ratings while GE’s card services division displays the number of delinquent credit card accounts.

GE’s plastics division shows three basic categories: manufacturing, selling, and procurement, with more specific measurements being displayed under these categories. So, for example, manufacturing data includes the number of days without a major production incident, while procurement displays the current price of benzene, which is a critical commodity for its plastics. If a specific measurement goes above or below a predetermined number, it is displayed in red, and if it is too far out of the range, executives are automatically alerted to the problem either through e-mail or paging.

Executives can click on any specific number and another screen pops up that displays its underlying data.

Electronic Data Systems’ (EDS) dashboard application version is called Pole Position and uses automobile graphics on a four-quadrant chart to represent the data flowing in from an automated sales force program that tracks where revenues come from. In the top right quadrant is a Formula One racer representing EDS service offerings such as Web design or database consulting that frequently prevail over fierce competitors. A dump truck in the top left quadrant represents wins against easy competition, and the bottom right quadrant shows a sporty roadster, representing wins against good competition that do not generate significant revenue. The bottom left quadrant displays a clunker with the hood up, for which the message is obvious. Each vehicle is color-coded for profitability.

According to Larry Biagini, GE’s chief technology officer, “These things are all about making sure we react before things get out of hand,” because these numbers are how the executives “feel the pulse” of their businesses. “With this, Jeff [Immelt] and the [divisional] CEOs can get together and, without setting up a formal agenda, sit down and look around and take different paths in their discussions.” His point is that “It allows flexibility we haven’t had in the past, and it absolutely allows faster decision times.”

To Think About: What are the management benefits of digital dashboards? How do these dashboard systems provide value for the firm? What technical, organization and management issues did the companies described here have to address in developing and installing their digital dashboards?


results by business unit or product group, a marketing manager can use the system to look only at the group of products he or she was responsible for. The manager can produce a report to indicate exactly which products are strong or weak performers or to rank dealers by performance. The system is flexible, easy to use, and can provide much of this information to the user online (Information Builders, 2000).

Cookson Electronics of Foxborough, Massachusetts, a supplier of materials used in printed circuit boards and semiconductor packaging, has 14 divisions around the world. Each is responsible for a different point in the electronics lifecycle, providing parts for computers, cellphones, and other consumer electronics. The semiconductor field has highly cyclical fluctuations in business, and Cookson divisions responsible for this part of the business can help the entire firm predict demand by anticipating industry cycles. Working with senior managers, Cookson’s senior intelligence officer Yann Morvan developed a list of key
Cognos Visualizer dashboards use a diverse selection of maps and charts to display multiple metrics simultaneously, enabling decision-makers to view some or all key business measures in one place. Digital dashboards use easy-to-understand displays to provide management with a comprehensive view of firm performance.

intelligence topics (KGTs) linked to strategic decisions. For example, a KIT might cover the firm’s top five competitors, suppliers, customers, or technologies.

The Cognos Electronic Business Intelligence System (CEBIS), based on Lotus Notes, enables Cognos’s 6,000 worldwide employees to access and contribute competitive intelligence information, such as competitor strategic alliances or geographic extensions or significant investments in research and development. Senior managers can use CEBIS to subscribe to the latest information on a specific KIT and receive news and analysis via e-mail or fax. Cognos expects the information from CEBIS will help managers counter threats and anticipate changes (Shand, 2000).

**Monitoring Corporate Performance: Balanced Scorecard Systems**

Companies have traditionally measured value using financial metrics such as return on investment (ROI), which we describe in Chapter 13. Many firms are now implementing a **balanced scorecard** model that supplements traditional financial measures with measurements from additional perspectives such as customers, internal business processes, and learning and growth. Managers can use balanced scorecard systems to see how well the firm is meeting its strategic goals. The goals and measures for the balanced scorecard vary from company to company. Companies are setting up information systems to populate the scorecard for management.

Aurora Consolidated Laboratories, a division of Aurora Health Care, is Wisconsin’s largest private employer, with 13 hospitals, dozens of clinics and health centers, and 3,500 physicians reporting through over 100 cost centers. In addition to monitoring costs closely, management wanted to measure customer satisfaction, the efficiency of Aurora’s lab processes, satisfaction of key partners and suppliers, and employee motivation and productivity. The company implemented a Web-based reporting and communications system based on WebFOCUS from Information Builders Inc., which uses data from more than 35 databases consolidated in a data warehouse to give managers a scorecard on how well they are progressing. The system provides up-to-date data on corporate performance, graphs and charts to spot trends and anomalies, and the capability to drill down to see detailed data behind the trends. Users can save reports from the system as HTML files for later viewing with their Web browsers. The system was initially available to 25 users, including senior managers, vice presidents, and selected supervisors but is being gradually opened to other managers (Information Builders, 2000).

Amsterdam-based ING Bank, which is part of the ING Group global financial services firm, adopted a balanced scorecard approach when it reorganized. Management wanted to shift from a product to a client orientation and develop appropriate performance indicators to measure progress in this new direction. In 1997, the bank built a Web-based balanced scorecard application using SAS tools for data warehousing and statistical analysis to mea-
Strategic Performance Management Tools for Enterprise Systems

<table>
<thead>
<tr>
<th>Enterprise System Vendor</th>
<th>Description</th>
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<tbody>
<tr>
<td>SAP</td>
<td>Web-enabled mySAP Strategic Enterprise Management™ module provides reports giving managers a comprehensive view of firm performance. Features corporate performance metrics, simulation, and planning tools. Managers can model and communicate key performance indicators for a Balanced Scorecard. Another measurement tool called the Management Cockpit can be used to monitor strategic performance indicators using internal and external benchmarks.</td>
</tr>
<tr>
<td>PeopleSoft</td>
<td>Web-enabled Enterprise Performance Management (EPM) features modules for workforce analytics, customer relationship analytics, financial analytics, supply chain analytics, and profitability management for financial services. The Financial Analytics module supports Activity-Based Management and the Balanced Scorecard.</td>
</tr>
<tr>
<td>Oracle</td>
<td>Strategic Enterprise Management includes support for the Balanced Scorecard, activity-based management, and budgeting. A value-based management module under development will help companies develop and apply new accounting methods for quantifying intellectual capital.</td>
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sure progress with 21 indicators. Data to fill out the scorecard, from sources such as financial ledger applications and client retention and market penetration ratios, feed a central data warehouse. The data come from systems running on Lotus Notes, Microsoft Excel spreadsheets, and Oracle and DB2 databases. The data warehouse and balanced scorecard software run on IBM RS/6000 servers. ING initially made the balanced scorecard system available only to midrange executives in sales, but later extended it to 3,000 users, including people at nearly every level of its relationship management group. Users regularly check progress with the scorecard. For example, by comparing how many visits they have made to different clients, sales people can make better decisions about how to allocate their time (McCune, 2000).

Enterprise-wide Reporting and Analysis

Enterprise system vendors are now providing capabilities to extend the usefulness of data captured in operational systems to give management a picture of the overall performance of the firm. Some provide reporting of metrics for balanced scorecard analysis as well as more traditional financial and operating metrics. Table 11-4 describes strategic performance management tools for each of the major enterprise system vendors.

Companies can use these new enterprise-reporting capabilities to create measures of firm performance that were not previously available. The head of Strategic Planning at Dow Chemical led a cross-functional steering team to develop a set of measures and reports based on data from the company’s SAP enterprise system. Process experts in different areas of the company defined reporting categories such as expense management, inventory management, and sales. Dow then developed a data mart for each type of data, amounting to over 20 data marts. The data marts are integrated so that the numbers for the “business results” mart balance with numbers in the expenses and sales marts. Dow also implemented a new set of performance measures based on shareholder value and activity-based costing. Activity-based costing is a budgeting and analysis model that identifies all the resources, processes, and costs, including overhead and operating expenses, required to produce a specific product or service. It focuses on determining firm activities that cause costs to occur rather than merely tracking what has been spent. It allows managers to see which products or services are profitable or losing money so they can determine the changes required to maximize firm profitability. Instead of reporting in terms of product and income, the system can focus on contribution margins and customer accounts, with the ability to calculate the current and lifetime value of each account. The system is used by over 5,000 people, ranging from Dow’s CEO to plant floor workers (Davenport, 2000).

Detroit Edison, the seventh-largest electric utility company in the United States, decided it needed a more in-depth understanding of the true nature of its costs to cope with deregulation and new sources of competition. It implemented PeopleSoft’s Activity-Based Management (ABM) analytics software, which provides management with operational activity-based costing. Model for identifying all the company activities that cause costs to occur while producing a specific product or service so that managers can see which products or services are profitable or losing money and make changes to maximize firm profitability.
FINANCE AND ACCOUNTING
The finance and accounting function is replete with DSS and ESS applications. Many DSS are based on financial models for breakeven analysis, profitability analysis, capital budgeting, and financial forecasting. Retail financial service firms depend on model-based DSS for client portfolio analysis and investment recommendations. ESS often provide overviews of firm-wide financial performance, including activity-based costing and financial measures for balanced scorecard reporting. Reporting monthly or yearly cash flows and balances is a typical MIS for the finance and accounting function. You can find examples of finance and accounting applications on pages 364–368 and 371–373.

HUMAN RESOURCES
The human resources function uses model-based decision-support systems for analysis of labor contract costs or alternative compensation plans for nonunion employees. Executive information systems are used for human resources planning to project the firm's long-term labor force requirements. Comparing employee salaries to budgeted compensation amounts is a typical MIS for human resources.

MANUFACTURING AND PRODUCTION
The manufacturing and production function requires many decisions about the optimization of production, logistics, and maintenance that must evaluate many interrelated variables. Model-based DSS have been guiding decisions about supply chain management, including the development of optimal production plans, delivery schedules, and inventory allocations. Recommending optimal plans for dispatching and routing vehicles and for facilities management are popular GIS applications. ESS can provide overviews of the firm's production resources. Comparing actual production amounts to targeted amounts for a monthly or yearly period is a typical MIS for manufacturing and production. You can find examples of manufacturing and production applications on pages 355–356, 358–359, and 365.

SALES AND MARKETING
DSS applications abound in sales and marketing. Model driven DSS support decisions about product pricing, sales forecasting, and advertising and promotional campaigns. Companies increasingly use data-driven DSS for customer relationship management (CRM) to analyze customer purchasing patterns, detect customer retention problems, identify profitable customers, and develop targeted marketing campaigns. Some of these DSS for CRM combine customer data from Web transactions with customer transaction data from offline sources. Many Web-based DSS provide access to information and products to influence customer purchasing decisions. ESS can be used for competitor analysis and identification of opportunities for new products or sales channels. GIS can analyze sales patterns and market data by location, supporting decisions on how to locate retail outlets or target marketing campaigns. Listing the best- and worst-performing sales territories for a monthly or yearly period is a typical MIS for sales and marketing. You can find examples of sales and marketing applications on pages 346–347, 352, 356–359, 371–373.

views of the process and activity costs for which they are personally responsible. ABM is part of PeopleSoft's Enterprise Performance Management application package, which extracts information from existing enterprise resource planning systems to provide high-level, industry-specific, and role-based performance and profitability measurement, analysis, and reporting. Detroit Edison used PeopleSoft ABM to create five cost models for three different lines of business-power generation, transmission and distribution, and corporate support. The software helped the company analyze the processes involved in the production of a product as well as product costs so that it could identify process improvements as well as cost reduction opportunities to save millions of dollars (PeopleSoft, 2002).

Management of Nissan Motor Company of Australia must oversee the activities of 550 people in 23 sites across the Australian continent. The company is primarily involved in Nissan's import and distribution activities for 35,000 automobiles each year. Like other automotive companies, Nissan Australia has extensive reporting requirements, including detailed controlling reports for financial accounts and monthly accounts. Managers need detailed reports down to the model level, with controlling reports for each department. When Nissan used an old legacy mainframe system, it would take up to two weeks to create and distribute reports to the company's board of directors.

In 1997, Nissan Australia installed SAP's R/3 enterprise software, serving as a pilot for the rest of the Nissan organization. The company also installed Information Builders' SNAPpack Power Reporter to create custom reports with a Web interface and powerful drill-down capabilities that did not require extensive programming to produce. These reports can be generated immediately and include profit-and-loss reports, gross margin analysis, balance sheets, and wholesale and retail vehicles. Management requests for more profit analysis reports by model, state, and other variables can be easily satisfied (Information Builders, 2000).
Management is responsible for determining where management support systems can make their greatest contribution to organizational performance and for allocating the resources to build them. Management needs to work closely with system builders to make sure that these systems effectively capture the right set of information requirements and decision processes for guiding the firm.

Management support systems can improve organizational performance by speeding up decision making or improving the quality of management decisions. However, some of these decision processes may not be clearly understood. A management support system will be most effective when system builders have a clear idea of its objectives, the nature of the decisions to be supported, and how the system will actually support decision making.

Systems to support management decision making can be developed with a range of technologies, including the use of large databases, modeling tools, graphics tools, datamining and analysis tools, and electronic meeting technology. Identifying the right technology for the decision or decision process to be supported is a key technology decision.

**For Discussion**

1. As a manager or user of information systems, what would you need to know to participate in the design and use of a DSS or an ESS? Why?

2. If businesses used DSS, GDSS, and ESS more widely, would they make better decisions? Explain.

**Summary**

1. **How can information systems help individual managers make better decisions when the problems are nonroutine and constantly changing?** A special category of systems called decision-support systems (DSS) combines data, sophisticated analytical models and tools, and user-friendly software into a single powerful system that can support semistructured or unstructured decision making. There are two kinds of DSS: model-driven DSS and data-driven DSS. A DSS provides results of model-based or data-driven analysis that help managers design and evaluate alternatives and monitor the progress of the solution that was adopted.

   DSS can help support decisions for supply chain management and customer analysis as well as model alternative business scenarios. DSS targeted toward customers as well as managers are becoming available on the Web. A special category of DSS called geographic information systems (GIS) uses data visualization technology to analyze and display data for planning and decision making with digitized maps. The components of a DSS are the DSS database, the DSS software system, and the user interface. The DSS database is a collection of current or historical data from a number of applications or groups that can be used for analysis. The data can come from both internal and external sources including enterprise systems and the Web. The DSS software system consists of OLAP and datamining tools or mathematical and analytical models that are used for analyzing the data in the database. The user interface allows users to interact with the DSS software tools directly.

2. **How can information systems help people working in a group make decisions more efficiently?** People working together in a group can use group decision-support systems to help them in the process of arriving at a decision. A group decision-support system (GDSS) is an interactive computer-based system to facilitate the solution of unstructured problems by a set of decision-makers working together as a group rather than individually. Group decision-support systems (GDSS) have hardware, software, and people components. Hardware components consist of the conference room facilities, including seating arrangements and computer and other electronic hardware. Software components include tools for organizing ideas, gathering information, ranking and setting priorities, and documenting meeting sessions. People components include participants, a trained facilitator, and staff to support the hardware and software.

   A GDSS helps decision-makers meeting together to arrive at a decision more efficiently and is especially useful for increasing the productivity of meetings larger than four or five people. However, the effectiveness of GDSS is contingent on the composition of the group, the task, appropriate tool selection and meeting support, and the organizational context of the meeting.