Chapter 9

Achieving Operational Excellence and Customer Intimacy: Enterprise Applications

LEARNING OBJECTIVES

After reading this chapter, you will be able to answer the following questions:

1. How do enterprise systems help businesses achieve operational excellence?
2. How do supply chain management systems coordinate planning, production, and logistics with suppliers?
3. How do customer relationship management systems help firms achieve customer intimacy?
4. What are the challenges posed by enterprise applications?
5. How are enterprise applications used in platforms for new cross-functional services?

Interactive Sessions:

Southwest Airlines Takes Off with Better Supply Chain Management

Enterprise Applications Move to the Cloud

CHAPTER OUTLINE

CANNONDALE LEARNS TO MANAGE A GLOBAL SUPPLY CHAIN

If you enjoy cycling, you may very well be using a Cannondale bicycle. Cannondale, headquartered in Bethel, Connecticut, is the world-leading manufacturer of high-end bicycles, apparel, footwear, and accessories, with dealers and distributors in more than 66 countries. Cannondale's supply and distribution chains span the globe, and the company must coordinate manufacturing, assembly, and sales/distribution sites in many different countries. Cannondale produces more than 100 different bicycle models each year; 60 percent of these are newly introduced to meet ever-changing customer preferences.

Cannondale offers both make-to-stock and make-to-order models. A typical bicycle requires a 150-day lead time and a four-week manufacturing window, and some models have bills of materials with over 150 parts. (A bill of materials specifies the raw materials, assemblies, components, parts, and quantities of each needed to manufacture a final product.) Cannondale must manage more than 1 million of these bills of materials and more than 200,000 individual parts. Some of these parts come from specialty vendors with even longer lead times and limited production capacity.

Obviously, managing parts availability in a constantly changing product line impacted by volatile customer demand requires a great deal of manufacturing flexibility. Until recently, that flexibility was missing. Cannondale had an antiquated legacy material requirements planning system for planning production, controlling inventory, and managing manufacturing processes that could only produce reports on a weekly basis. By Tuesday afternoon, Monday's reports were already out of date. The company was forced to substitute parts in order to meet demand, and sometimes it lost sales. Cannondale needed a solution that could track the flow of parts more accurately, support its need for flexibility, and work with its existing business systems, all within a restricted budget.

Cannondale selected the Kinaxis RapidResponse on-demand software service as a solution. RapidResponse furnishes accurate and detailed supply chain information via an easy-to-use spreadsheet interface, using data supplied automatically from Cannondale's existing manufacturing systems. Data from operations at multiple sites are assembled in a single place for analysis and decision making. Supply chain participants from different locations are able to model manufacturing and inventory data in "what-if" scenarios to see the impact of alternative actions across the entire supply chain. Old forecasts can be compared to new ones, and the system can evaluate the constraints of a new plan.

Cannondale buyers, planners, master schedulers, sourcers, product managers, customer service, and finance personnel, use RapidResponse for sales reporting, forecasting, monitoring daily inventory availability, and feeding production schedule information to Cannondale's manufacturing and order processing systems. Users are able to see up-to-date information for all sites. Management uses the system daily to examine areas where there are backlogs.

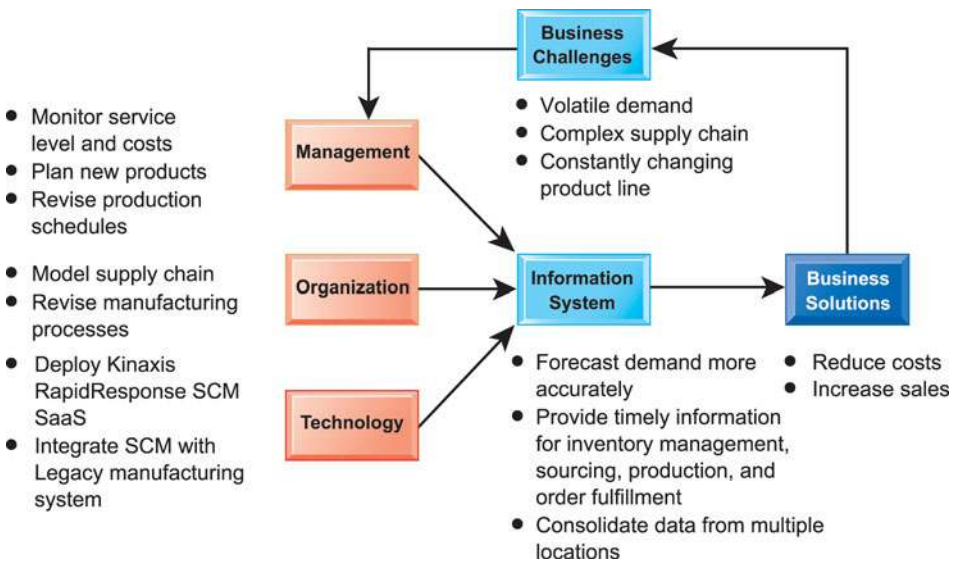
The improved supply chain information from RapidResponse enables Cannondale to respond to customer orders much more rapidly with lower levels of inventory and safety stock. Cycle times and lead times for producing products have also been reduced. The company's dates for promising deliveries are more reliable and accurate.

Sources: Kinaxis Corp., "Cannondale Improves Customer Response Times While Reducing Inventory Using RapidResponse," 2010; www.kinaxis.com, accessed June 21, 2010; and www.cannondale.com, accessed June 21, 2010.

Cannondale's problems with its supply chain illustrate the critical role of supply chain management (SCM) systems in business. Cannondale's business performance was impeded because it could not coordinate its sourcing, manufacturing, and distribution processes. Costs were unnecessarily high because the company was unable to accurately determine the exact amount of each product it needed to fulfill orders and hold just that amount in inventory. Instead, the company resorted to keeping extra "safety stock" on hand "just in case." When products were not available when the customer wanted them, Cannondale lost sales.

The chapter-opening diagram calls attention to important points raised by this case and this chapter. Like many other firms, Cannondale had a complex supply chain and manufacturing processes to coordinate in many different locations. The company had to deal with hundreds and perhaps thousands of suppliers of parts and raw materials. It was not always possible to have just the right amount of each part or component available when it was needed because the company lacked accurate, up-to-date information about parts in inventory and what manufacturing processes needed those parts.

An on-demand supply chain management software service from Kinaxis helped solve this problem. The Kinaxis RapidResponse software takes in data from Cannondale's existing manufacturing systems and assembles data from multiple sites to furnish a single view of Cannondale's supply chain based on up-to-date information. Cannondale staff are able to see exactly what parts are available or on order as well as the status of bikes in production. With better tools for planning, users are able to see the impact of changes in supply and demand so that they can make better decisions about how to respond to these changes. The system has greatly enhanced operational efficiency and decision making.



9.1 Enterprise Systems

Around the globe, companies are increasingly becoming more connected, both internally and with other companies. If you run a business, you'll want to be able to react instantaneously when a customer places a large order or when a shipment from a supplier is delayed. You may also want to know the impact of these events on every part of the business and how the business is performing at any point in time, especially if you're running a large company. Enterprise systems provide the integration to make this possible. Let's look at how they work and what they can do for the firm.

WHAT ARE ENTERPRISE SYSTEMS?

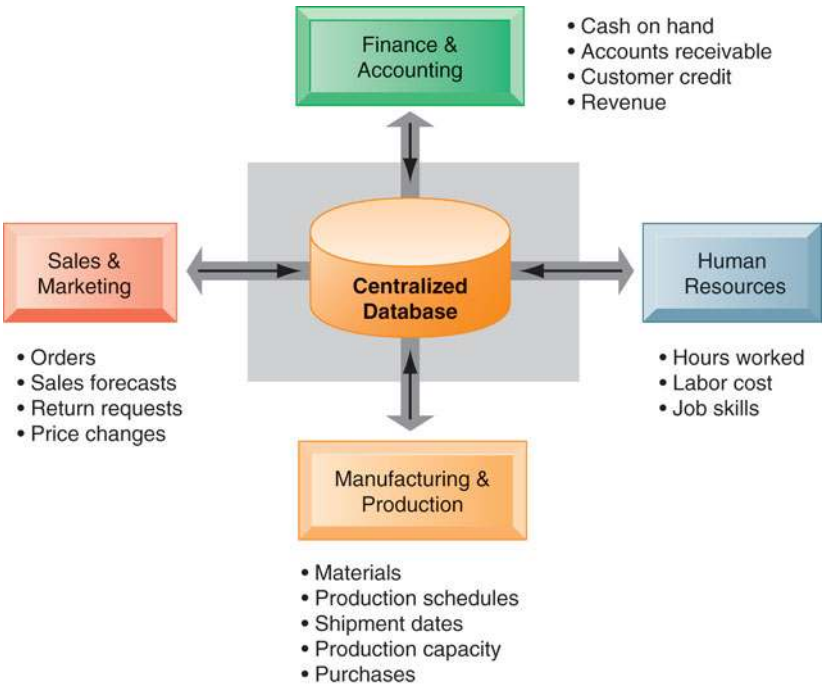
Imagine that you had to run a business based on information from tens or even hundreds of different databases and systems, none of which could speak to one another? Imagine your company had 10 different major product lines, each produced in separate factories, and each with separate and incompatible sets of systems controlling production, warehousing, and distribution.

At the very least, your decision making would often be based on manual hard-copy reports, often out of date, and it would be difficult to really understand what is happening in the business as a whole. Sales personnel might not be able to tell at the time they place an order whether the ordered items are in inventory, and manufacturing could not easily use sales data to plan for new production. You now have a good idea of why firms need a special enterprise system to integrate information.

Chapter 2 introduced enterprise systems, also known as enterprise resource planning (ERP) systems, which are based on a suite of integrated software modules and a common central database. The database collects data from many different divisions and departments in a firm, and from a large number of key business processes in manufacturing and production, finance and accounting, sales and marketing, and human resources, making the data available for applications that support nearly all of an organization's internal business activities. When new information is entered by one process, the information is made immediately available to other business processes (see Figure 9-1).

If a sales representative places an order for tire rims, for example, the system verifies the customer's credit limit, schedules the shipment, identifies the best shipping route, and reserves the necessary items from inventory. If inventory stock were insufficient to fill the order, the system schedules the manufacture of more rims, ordering the needed materials and components from suppliers. Sales and production forecasts are immediately updated. General ledger and corporate cash levels are automatically updated with the revenue and cost information from the order. Users could tap into the system and find out where that particular order was at any minute. Management could obtain information at any point in time about how the business was operating. The system could also generate enterprise-wide data for management analyses of product cost and profitability.

FIGURE 9-1 HOW ENTERPRISE SYSTEMS WORK



Enterprise systems feature a set of integrated software modules and a central database that enables data to be shared by many different business processes and functional areas throughout the enterprise.

ENTERPRISE SOFTWARE

Enterprise software is built around thousands of predefined business processes that reflect best practices. Table 9-1 describes some of the major business processes supported by enterprise software.

Companies implementing this software must first select the functions of the system they wish to use and then map their business processes to the predefined business processes in the software. (One of our Learning Tracks shows how SAP enterprise software handles the procurement process for a new piece of equipment.) Identifying the organization's business processes to be included in the system and then mapping them to the processes in the enterprise software is often a major effort. A firm would use configuration tables provided by the software to tailor a particular aspect of the system to the way it does business. For example, the firm could use these tables to select whether it wants to track revenue by product line, geographical unit, or distribution channel.

TABLE 9-1 BUSINESS PROCESSES SUPPORTED BY ENTERPRISE SYSTEMS

Financial and accounting processes, including general ledger, accounts payable, accounts receivable, fixed assets, cash management and forecasting, product-cost accounting, cost-center accounting, asset accounting, tax accounting, credit management, and financial reporting.
Human resources processes, including personnel administration, time accounting, payroll, personnel planning and development, benefits accounting, applicant tracking, time management, compensation, workforce planning, performance management, and travel expense reporting.
Manufacturing and production processes, including procurement, inventory management, purchasing, shipping, production planning, production scheduling, material requirements planning, quality control, distribution, transportation execution, and plant and equipment maintenance.
Sales and marketing processes, including order processing, quotations, contracts, product configuration, pricing, billing, credit checking, incentive and commission management, and sales planning.

If the enterprise software does not support the way the organization does business, companies can rewrite some of the software to support the way their business processes work. However, enterprise software is unusually complex, and extensive customization may degrade system performance, compromising the information and process integration that are the main benefits of the system. If companies want to reap the maximum benefits from enterprise software, they must change the way they work to conform to the business processes in the software. To implement a new enterprise system, Tasty Baking Company identified its existing business processes and then translated them into the business processes built into the SAP ERP software it had selected. To ensure it obtained the maximum benefits from the enterprise software, Tasty Baking Company deliberately planned for customizing less than 5 percent of the system and made very few changes to the SAP software itself. It used as many tools and features that were already built into the SAP software as it could. SAP has more than 3,000 configuration tables for its enterprise software.

Leading enterprise software vendors include SAP, Oracle (with its acquisition PeopleSoft) Infor Global Solutions, and Microsoft. There are versions of enterprise software packages designed for small businesses and on-demand versions, including software services delivered over the Web (see the Interactive Session on Technology in Section 9.4). Although initially designed to automate the firm's internal "back-office" business processes, enterprise systems have become more externally-oriented and capable of communicating with customers, suppliers, and other entities.

BUSINESS VALUE OF ENTERPRISE SYSTEMS

Enterprise systems provide value both by increasing operational efficiency and by providing firm-wide information to help managers make better decisions. Large companies with many operating units in different locations have used enterprise systems to enforce standard practices and data so that everyone does business the same way worldwide.

Coca Cola, for instance, implemented a SAP enterprise system to standardize and coordinate important business processes in 200 countries. Lack of standard, company-wide business processes prevented the company from leveraging its worldwide buying power to obtain lower prices for raw materials and from reacting rapidly to market changes.

Enterprise systems help firms respond rapidly to customer requests for information or products. Because the system integrates order, manufacturing, and delivery data, manufacturing is better informed about producing only what customers have ordered, procuring exactly the right amount of components or raw materials to fill actual orders, staging production, and minimizing the time that components or finished products are in inventory.

Alcoa, the world's leading producer of aluminum and aluminum products with operations spanning 41 countries and 500 locations, had initially been organized around lines of business, each of which had its own set of information systems. Many of these systems were redundant and inefficient. Alcoa's costs for executing requisition-to-pay and financial processes were much higher and its cycle times were longer than those of other companies in its industry. (Cycle time refers to the total elapsed time from the beginning to the end of a process.) The company could not operate as a single worldwide entity.

After implementing enterprise software from Oracle, Alcoa eliminated many redundant processes and systems. The enterprise system helped Alcoa reduce requisition-to-pay cycle time by verifying receipt of goods and automatically

generating receipts for payment. Alcoa's accounts payable transaction processing dropped 89 percent. Alcoa was able to centralize financial and procurement activities, which helped the company reduce nearly 20 percent of its worldwide costs.

Enterprise systems provide much valuable information for improving management decision making. Corporate headquarters has access to up-to-the-minute data on sales, inventory, and production and uses this information to create more accurate sales and production forecasts. Enterprise software includes analytical tools for using data captured by the system to evaluate overall organizational performance. Enterprise system data have common standardized definitions and formats that are accepted by the entire organization. Performance figures mean the same thing across the company. Enterprise systems allow senior management to easily find out at any moment how a particular organizational unit is performing, determine which products are most or least profitable, and calculate costs for the company as a whole.

For example, Alcoa's enterprise system includes functionality for global human resources management that shows correlations between investment in employee training and quality, measures the company-wide costs of delivering services to employees, and measures the effectiveness of employee recruitment, compensation, and training.

9.2 Supply Chain Management Systems

If you manage a small firm that makes a few products or sells a few services, chances are you will have a small number of suppliers. You could coordinate your supplier orders and deliveries using a telephone and fax machine. But if you manage a firm that produces more complex products and services, then you will have hundreds of suppliers, and your suppliers will each have their own set of suppliers. Suddenly, you are in a situation where you will need to coordinate the activities of hundreds or even thousands of other firms in order to produce your products and services. Supply chain management systems, which we introduced in Chapter 2, are an answer to these problems of supply chain complexity and scale.

THE SUPPLY CHAIN

A firm's **supply chain** is a network of organizations and business processes for procuring raw materials, transforming these materials into intermediate and finished products, and distributing the finished products to customers. It links suppliers, manufacturing plants, distribution centers, retail outlets, and customers to supply goods and services from source through consumption. Materials, information, and payments flow through the supply chain in both directions

Goods start out as raw materials and, as they move through the supply chain, are transformed into intermediate products (also referred to as components or parts), and finally, into finished products. The finished products are shipped to distribution centers and from there to retailers and customers. Returned items flow in the reverse direction from the buyer back to the seller.

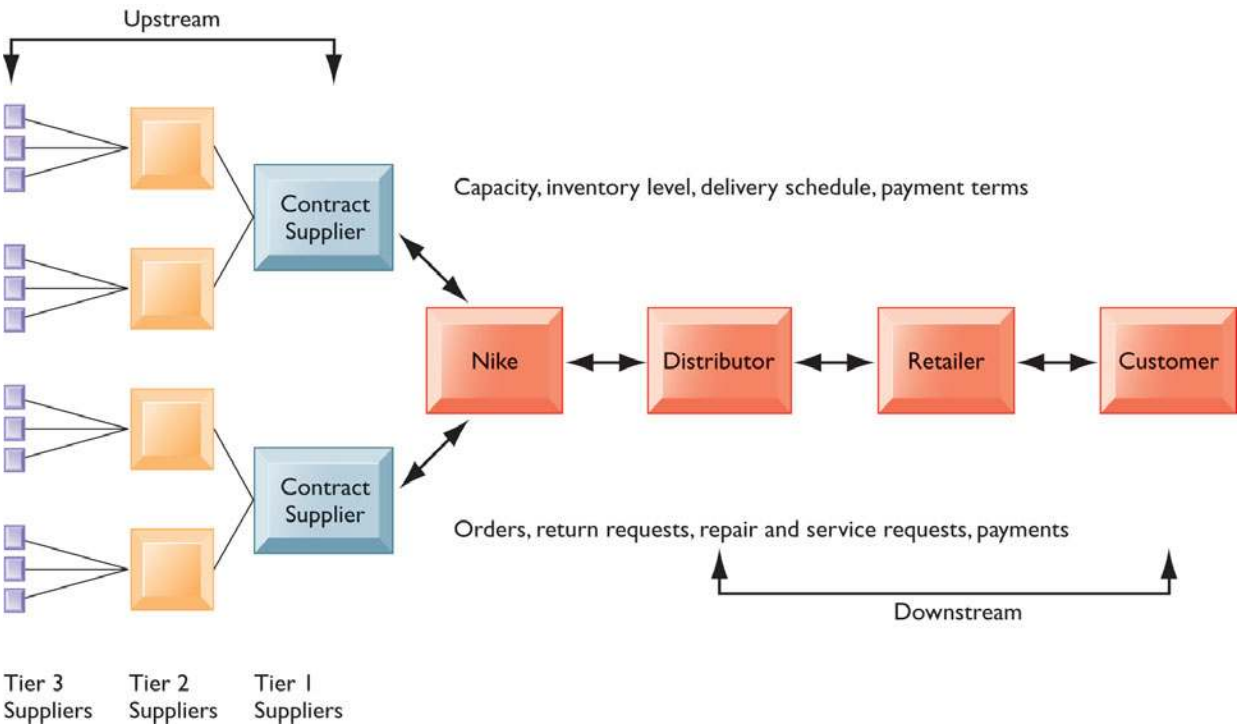
Let's look at the supply chain for Nike sneakers as an example. Nike designs, markets, and sells sneakers, socks, athletic clothing, and accessories throughout the world. Its primary suppliers are contract manufacturers with factories in China, Thailand, Indonesia, Brazil, and other countries. These companies fashion Nike's finished products.

Nike's contract suppliers do not manufacture sneakers from scratch. They obtain components for the sneakers—the laces, eyelets, uppers, and soles—from other suppliers and then assemble them into finished sneakers. These suppliers in turn have their own suppliers. For example, the suppliers of soles have suppliers for synthetic rubber, suppliers for chemicals used to melt the rubber for molding, and suppliers for the molds into which to pour the rubber. Suppliers of laces would have suppliers for their thread, for dyes, and for the plastic lace tips.

Figure 9-2 provides a simplified illustration of Nike's supply chain for sneakers; it shows the flow of information and materials among suppliers, Nike, and Nike's distributors, retailers, and customers. Nike's contract manufacturers are its primary suppliers. The suppliers of soles, eyelets, uppers, and laces are the secondary (Tier 2) suppliers. Suppliers to these suppliers are the tertiary (Tier 3) suppliers.

The *upstream* portion of the supply chain includes the company's suppliers, the suppliers' suppliers, and the processes for managing relationships with them. The *downstream* portion consists of the organizations and processes for distributing and delivering products to the final customers. Companies doing manufacturing, such as Nike's contract suppliers of sneakers, also manage their own *internal supply chain* processes for transforming materials, components, and services furnished by their suppliers into finished products or intermediate products (components or parts) for their customers and for managing materials and inventory.

FIGURE 9-2 NIKE'S SUPPLY CHAIN



This figure illustrates the major entities in Nike's supply chain and the flow of information upstream and downstream to coordinate the activities involved in buying, making, and moving a product. Shown here is a simplified supply chain, with the upstream portion focusing only on the suppliers for sneakers and sneaker soles.

The supply chain illustrated in Figure 9-2 only shows two contract manufacturers for sneakers and only the upstream supply chain for sneaker soles. Nike has hundreds of contract manufacturers turning out finished sneakers, socks, and athletic clothing, each with its own set of suppliers. The upstream portion of Nike's supply chain would actually comprise thousands of entities. Nike also has numerous distributors and many thousands of retail stores where its shoes are sold, so the downstream portion of its supply chain is also large and complex.

INFORMATION SYSTEMS AND SUPPLY CHAIN MANAGEMENT

Inefficiencies in the supply chain, such as parts shortages, underutilized plant capacity, excessive finished goods inventory, or high transportation costs, are caused by inaccurate or untimely information. For example, manufacturers may keep too many parts in inventory because they do not know exactly when they will receive their next shipments from their suppliers. Suppliers may order too few raw materials because they do not have precise information on demand. These supply chain inefficiencies waste as much as 25 percent of a company's operating costs.

If a manufacturer had perfect information about exactly how many units of product customers wanted, when they wanted them, and when they could be produced, it would be possible to implement a highly efficient **just-in-time strategy**. Components would arrive exactly at the moment they were needed and finished goods would be shipped as they left the assembly line.

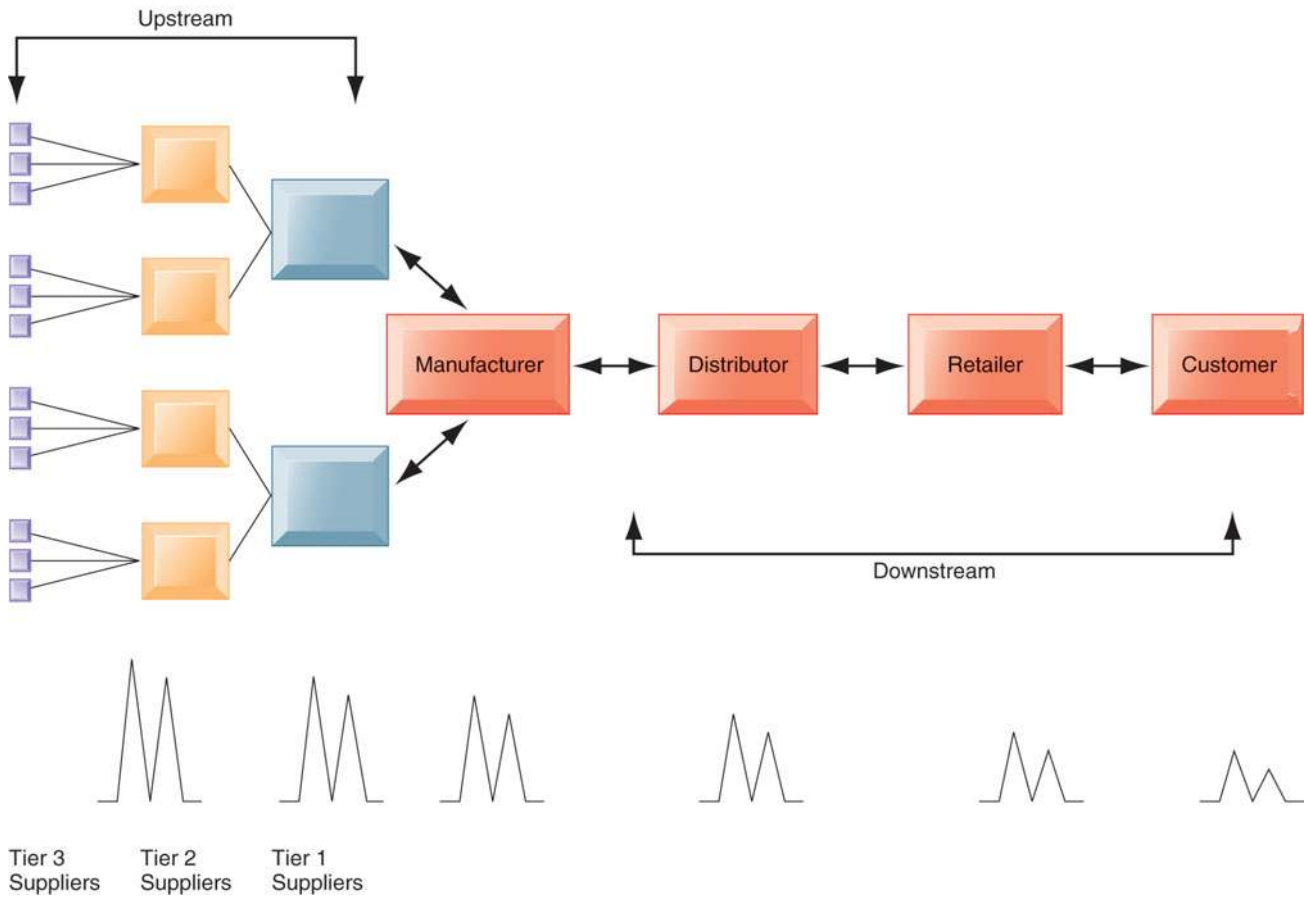
In a supply chain, however, uncertainties arise because many events cannot be foreseen—uncertain product demand, late shipments from suppliers, defective parts or raw materials, or production process breakdowns. To satisfy customers, manufacturers often deal with such uncertainties and unforeseen events by keeping more material or products in inventory than what they think they may actually need. The *safety stock* acts as a buffer for the lack of flexibility in the supply chain. Although excess inventory is expensive, low fill rates are also costly because business may be lost from canceled orders.

One recurring problem in supply chain management is the **bullwhip effect**, in which information about the demand for a product gets distorted as it passes from one entity to the next across the supply chain. A slight rise in demand for an item might cause different members in the supply chain—distributors, manufacturers, suppliers, secondary suppliers (suppliers' suppliers), and tertiary suppliers (suppliers' suppliers' suppliers)—to stockpile inventory so each has enough "just in case." These changes ripple throughout the supply chain, magnifying what started out as a small change from planned orders, creating excess inventory, production, warehousing, and shipping costs (see Figure 9-3).

For example, Procter & Gamble (P&G) found it had excessively high inventories of its Pampers disposable diapers at various points along its supply chain because of such distorted information. Although customer purchases in stores were fairly stable, orders from distributors would spike when P&G offered aggressive price promotions. Pampers and Pampers' components accumulated in warehouses along the supply chain to meet demand that did not actually exist. To eliminate this problem, P&G revised its marketing, sales, and supply chain processes and used more accurate demand forecasting

The bullwhip is tamed by reducing uncertainties about demand and supply when all members of the supply chain have accurate and up-to-date information. If all supply chain members share dynamic information about inventory

FIGURE 9-3 THE BULLWHIP EFFECT



Inaccurate information can cause minor fluctuations in demand for a product to be amplified as one moves further back in the supply chain. Minor fluctuations in retail sales for a product can create excess inventory for distributors, manufacturers, and suppliers.

levels, schedules, forecasts, and shipments, they have more precise knowledge about how to adjust their sourcing, manufacturing, and distribution plans. Supply chain management systems provide the kind of information that helps members of the supply chain make better purchasing and scheduling decisions. Table 9-2 describes how firms benefit from these systems.

TABLE 9-2 HOW INFORMATION SYSTEMS FACILITATE SUPPLY CHAIN MANAGEMENT

INFORMATION FROM SUPPLY CHAIN MANAGEMENT SYSTEMS HELPS FIRMS
Decide when and what to produce, store, and move
Rapidly communicate orders
Track the status of orders
Check inventory availability and monitor inventory levels
Reduce inventory, transportation, and warehousing costs
Track shipments
Plan production based on actual customer demand
Rapidly communicate changes in product design

SUPPLY CHAIN MANAGEMENT SOFTWARE

Supply chain software is classified as either software to help businesses plan their supply chains (supply chain planning) or software to help them execute the supply chain steps (supply chain execution). **Supply chain planning systems** enable the firm to model its existing supply chain, generate demand forecasts for products, and develop optimal sourcing and manufacturing plans. Such systems help companies make better decisions such as determining how much of a specific product to manufacture in a given time period; establishing inventory levels for raw materials, intermediate products, and finished goods; determining where to store finished goods; and identifying the transportation mode to use for product delivery.

For example, if a large customer places a larger order than usual or changes that order on short notice, it can have a widespread impact throughout the supply chain. Additional raw materials or a different mix of raw materials may need to be ordered from suppliers. Manufacturing may have to change job scheduling. A transportation carrier may have to reschedule deliveries. Supply chain planning software makes the necessary adjustments to production and distribution plans. Information about changes is shared among the relevant supply chain members so that their work can be coordinated. One of the most important—and complex—supply chain planning functions is **demand planning**, which determines how much product a business needs to make to satisfy all of its customers' demands. Manugistics and i2 Technologies (both acquired by JDA Software) are major supply chain management software vendors, and enterprise software vendors SAP and Oracle-PeopleSoft offer supply chain management modules.

Whirlpool Corporation, which produces washing; machines, dryers, refrigerators, ovens, and other home appliances, uses supply chain planning systems to make sure what it produces matches customer demand. The company uses supply chain planning software from i2 Technologies, which includes modules for master scheduling, deployment planning, and inventory planning. Whirlpool also installed i2's Web-based tool for Collaborative Planning, Forecasting, and Replenishment (CPFR) for sharing and combining its sales forecasts with those of its major sales partners. Improvements in supply chain planning combined with new state-of-the-art distribution centers helped Whirlpool increase availability of products in stock when customers needed them to 97 percent, while reducing the number of excess finished goods in inventory by 20 percent and forecasting errors by 50 percent (Barrett, 2009).

Supply chain execution systems manage the flow of products through distribution centers and warehouses to ensure that products are delivered to the right locations in the most efficient manner. They track the physical status of goods, the management of materials, warehouse and transportation operations, and financial information involving all parties. Haworth Incorporated's Warehouse Management System (WMS) is an example. Haworth is a world-leading manufacturer and designer of office furniture, with distribution centers in four different states. The WMS tracks and controls the flow of finished goods from Haworth's distribution centers to its customers. Acting on shipping plans for customer orders, the WMS directs the movement of goods based on immediate conditions for space, equipment, inventory, and personnel.

The Interactive Session on Organizations describes how supply chain management software improved decision making and operational performance at Southwest Airlines. This company maintains a competitive edge by combining superb customer service with low costs. Effectively managing its parts inventory is crucial to achieving these goals.

INTERACTIVE SESSION: ORGANIZATIONS

SOUTHWEST AIRLINES TAKES OFF WITH BETTER SUPPLY CHAIN MANAGEMENT

"Weather at our destination is 50 degrees with some broken clouds, but they'll try to have them fixed before we arrive. Thank you, and remember, nobody loves you or your money more than Southwest Airlines."

Crew humor at 30,000 feet? Must be Southwest Airlines. The company is the largest low-fare, high-frequency, point-to-point airline in the world, and largest overall measured by number of passengers per year. Founded in 1971 with four planes serving three cities, the company now operates over 500 aircraft in 68 cities, and has revenues of $10.1 billion. Southwest has the best customer service record among major airlines, the lowest cost structure, and the lowest and simplest fares. The stock symbol is LUV (for Dallas's Love Field where the company is headquartered), but love is the major theme of Southwest's employee and customer relationships. The company has made a profit every year since 1973, one of the few airlines that can make that claim.

Despite a freewheeling, innovative corporate culture, even Southwest needs to get serious about its information systems to maintain profitability. Southwest is just like any other company that needs to manage its supply chain and inventory efficiently. The airline's success has led to continued expansion, and as the company has grown, its legacy information systems have been unable to keep up with the increasingly large amount of data being generated.

One of the biggest problems with Southwest's legacy systems was lack of information visibility. Often, the data that Southwest's managers needed were safely stored on their systems but weren't "visible", or readily available for viewing or use in other systems. Information about what replacement parts were available at a given time was difficult or impossible to acquire, and that affected response times for everything from mechanical problems to part fulfillment.

For Southwest, which prides itself on its excellent customer service, getting passengers from one location to another with minimal delay is critically important. Repairing aircraft quickly is an important part of accomplishing that goal. The company had $325 million in service parts inventory, so any solution that more efficiently handled that inventory and reduced aircraft groundings would have a strong impact on the airline's bottom line. Richard Zimmerman, Southwest's manager of inventory management, stated that "there's a significant cost when we have to ground aircraft because we ran out of a part. The long-term, cost-effective way to solve that problem was to increase productivity and to ensure that our maintenance crews were supported with the right spare parts, through the right software application."

Southwest's management started looking for a better inventory management solution, and a vendor that was capable of working within the airline's unique corporate culture. After an extensive search, Southwest eventually chose i2 Technologies, a leading supply chain management software and services company that was recently purchased by JDA Software. Southwest implemented the i2 Demand Planner, i2 Service Parts Planner, and i2 Service Budget Optimizer to overhaul its supply chain management and improve data visibility.

I2 Demand Planner improves Southwest's forecasts for all of the part location combinations in its system, and provides better visibility into demand for each part. Planners are able to differentiate among individual parts based on criticality and other dimensions such as demand volume, demand variability, and dollar usage. I2 Service Parts Planner helps Southwest replenish its store of parts and ensures that "the right parts are in the right location at the right time." The software can recommend the best mix of parts for each location that will satisfy the customer service requirements of that location at the lowest cost. If excess inventory builds up in certain service locations, the software will recommend the most cost-efficient way to transfer that excess inventory to locations with parts deficits. I2 Service Budget Optimizer helps Southwest use its historical data of parts usage to generate forecasts of future parts usage.

Together, these solutions gather data from Southwest's legacy systems and provide useful information to Southwest's managers. Most importantly, Southwest can recognize demand shortages before they become problems, thanks to the visibility provided by i2's solutions. Southwest's managers

now have a clear and unobstructed view of all of the data up and down the company's supply chain.

By using what-if analysis, planners can quantify the cost to the company of operating at different levels of service. Zimmerman added that i2 "will help us lower inventory costs and keep our cost per air seat mile down to the lowest in the industry. Also, the solutions will help us ensure that the maintenance team can quickly repair the aircraft so that our customers experience minimal delays." The results of the i2 implementation were increased availability of parts, increased speed and intelligence of decision making, reduced parts inventory by 15 percent, saving the company over $30 million, and increased service levels from 92 percent prior to the implementation to over 95 percent afterwards.

Sources: Chris Lauer, *Southwest Airlines: Corporations That Changed the World*, Greenwood Press, May 2010; www.i2.com, "Ensuring Optimal Parts Inventory at Southwest Airlines," and "Service Parts Management," accessed April 25, 2010; and www.southwest.com, accessed July 1, 2010.

CASE STUDY QUESTIONS

1. Why is parts inventory management so important at Southwest Airlines? What business processes are affected by the airline's ability or inability to have required parts on hand?
2. Why management, organization, and technology factors were responsible for Southwest's problems with inventory management?
3. How did implementing the i2 software change the way Southwest ran its business?
4. Describe two decisions that were improved by implementing the i2 system.

MIS IN ACTION

Visit i2's site (www.i2.com) and learn more about some of the other companies using its software. Pick one of these companies, then answer the following questions:

1. What problem did the company need to address with i2's software?
2. Why did the company select i2 as its software vendor?
3. What were the gains that the company realized as a result of the software implementation?

GLOBAL SUPPLY CHAINS AND THE INTERNET

Before the Internet, supply chain coordination was hampered by the difficulties of making information flow smoothly among disparate internal supply chain systems for purchasing, materials management, manufacturing, and distribution. It was also difficult to share information with external supply chain partners because the systems of suppliers, distributors, or logistics providers were based on incompatible technology platforms and standards. Enterprise and supply chain management systems enhanced with Internet technology supply some of this integration.

A manager will use a Web interface to tap into suppliers' systems to determine whether inventory and production capabilities match demand for the firm's products. Business partners will use Web-based supply chain management tools to collaborate online on forecasts. Sales representatives will access suppliers' production schedules and logistics information to monitor customers' order status.

Global Supply Chain Issues

More and more companies are entering international markets, outsourcing manufacturing operations, and obtaining supplies from other countries as well as selling abroad. Their supply chains extend across multiple countries and regions. There are additional complexities and challenges to managing a global supply chain.

Global supply chains typically span greater geographic distances and time differences than domestic supply chains and have participants from a number of different countries. Although the purchase price of many goods might be lower abroad, there are often additional costs for transportation, inventory (the need for a larger buffer of safety stock), and local taxes or fees. Performance standards may vary from region to region or from nation to nation. Supply chain management may need to reflect foreign government regulations and cultural differences. All of these factors impact how a company takes orders, plans distribution, sizes warehousing, and manages inbound and outbound logistics throughout the global markets it services.

The Internet helps companies manage many aspects of their global supply chains, including sourcing, transportation, communications, and international finance. Today's apparel industry, for example, relies heavily on outsourcing to contract manufacturers in China and other low-wage countries. Apparel companies are starting to use the Web to manage their global supply chain and production issues.

For example, Koret of California, a subsidiary of apparel maker Kellwood Co., uses e-SPS Web-based software to gain end-to-end visibility into its entire global supply chain. E-SPS features Web-based software for sourcing, work-in-progress tracking, production routing, product-development tracking, problem identification and collaboration, delivery-date projections, and production-related inquiries and reports.

As goods are being sourced, produced, and shipped, communication is required among retailers, manufacturers, contractors, agents, and logistics providers. Many, especially smaller companies, still share product information over the phone, via e-mail, or through faxes. These methods slow down the supply chain and also increase errors and uncertainty. With e-SPS, all supply chain members communicate through a Web-based system. If one of Koret's vendors makes a change in the status of a product, everyone in the supply chain sees the change.

In addition to contract manufacturing, globalization has encouraged outsourcing warehouse management, transportation management, and related operations to third-party logistics providers, such as UPS Supply Chain Solutions and Schneider Logistics Services. These logistics services offer Web-based software to give their customers a better view of their global supply chains. Customers are able to check a secure Web site to monitor inventory and shipments, helping them run their global supply chains more efficiently.

Demand-Driven Supply Chains: From Push to Pull Manufacturing and Efficient Customer Response

In addition to reducing costs, supply chain management systems facilitate efficient customer response, enabling the workings of the business to be driven more by customer demand. (We introduced efficient customer response systems in Chapter 3.)

Earlier supply chain management systems were driven by a push-based model (also known as build-to-stock). In a **push-based model**, production master schedules are based on forecasts or best guesses of demand for products, and products are "pushed" to customers. With new flows of information made possible by Web-based tools, supply chain management more easily follows a pull-based model. In a **pull-based model**, also known as a demand-driven model or build-to-order, actual customer orders or purchases trigger events in the supply chain. Transactions to produce and deliver only what customers have ordered move up the supply chain from retailers to distributors

to manufacturers and eventually to suppliers. Only products to fulfill these orders move back down the supply chain to the retailer. Manufacturers use only actual order demand information to drive their production schedules and the procurement of components or raw materials, as illustrated in Figure 9-4. Walmart's continuous replenishment system described in Chapter 3 is an example of the pull-based model.

The Internet and Internet technology make it possible to move from sequential supply chains, where information and materials flow sequentially from company to company, to concurrent supply chains, where information flows in many directions simultaneously among members of a supply chain network. Complex supply networks of manufacturers, logistics suppliers, outsourced manufacturers, retailers, and distributors are able to adjust immediately to changes in schedules or orders. Ultimately, the Internet could create a "digital logistics nervous system" throughout the supply chain (see Figure 9-5).

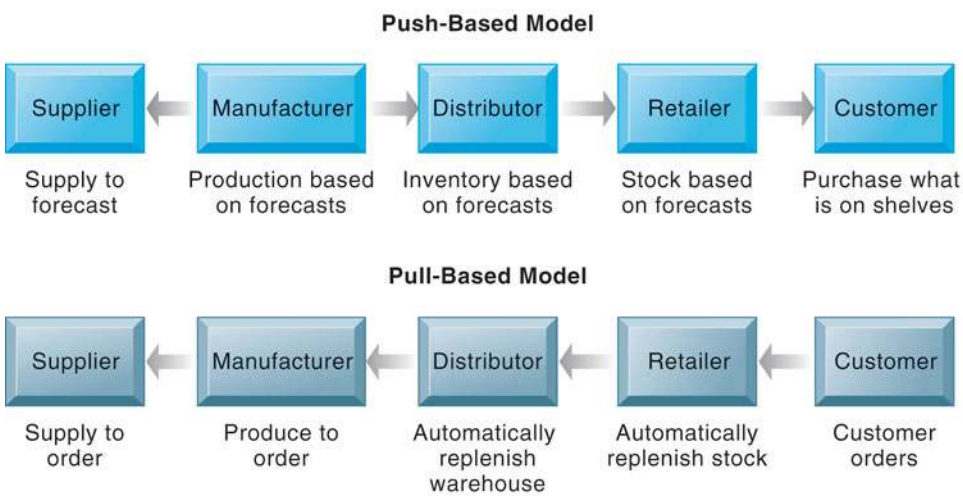
BUSINESS VALUE OF SUPPLY CHAIN MANAGEMENT SYSTEMS

You have just seen how supply chain management systems enable firms to streamline both their internal and external supply chain processes and provide management with more accurate information about what to produce, store, and move. By implementing a networked and integrated supply chain management system, companies match supply to demand, reduce inventory levels, improve delivery service, speed product time to market, and use assets more effectively.

Total supply chain costs represent the majority of operating expenses for many businesses and in some industries approach 75 percent of the total operating budget. Reducing supply chain costs may have a major impact on firm profitability.

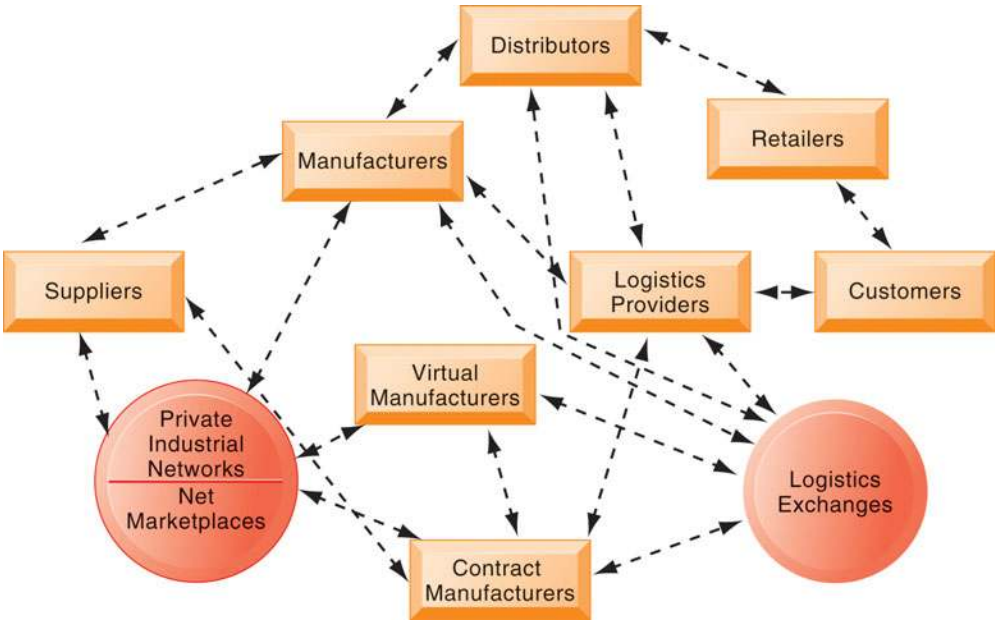
In addition to reducing costs, supply chain management systems help increase sales. If a product is not available when a customer wants it, customers often try to purchase it from someone else. More precise control of the supply chain enhances the firm's ability to have the right product available for customer purchases at the right time.

FIGURE 9-4 PUSH- VERSUS PULL-BASED SUPPLY CHAIN MODELS



The difference between push- and pull-based models is summarized by the slogan "Make what we sell, not sell what we make."

FIGURE 9-5 THE FUTURE INTERNET-DRIVEN SUPPLY CHAIN



The future Internet-driven supply chain operates like a digital logistics nervous system. It provides multidirectional communication among firms, networks of firms, and e-marketplaces so that entire networks of supply chain partners can immediately adjust inventories, orders, and capacities.

9.3 Customer Relationship Management Systems

You've probably heard phrases such as "the customer is always right" or "the customer comes first." Today these words ring more true than ever. Because competitive advantage based on an innovative new product or service is often very short lived, companies are realizing that their only enduring competitive strength may be their relationships with their customers. Some say that the basis of competition has switched from who sells the most products and services to who "owns" the customer, and that customer relationships represent a firm's most valuable asset.

WHAT IS CUSTOMER RELATIONSHIP MANAGEMENT?

What kinds of information would you need to build and nurture strong, long-lasting relationships with customers? You'd want to know exactly who your customers are, how to contact them, whether they are costly to service and sell to, what kinds of products and services they are interested in, and how much money they spend on your company. If you could, you'd want to make sure you knew each of your customers well, as if you were running a small-town store. And you'd want to make your good customers feel special.

In a small business operating in a neighborhood, it is possible for business owners and managers to really know their customers on a personal, face-to-face basis. But in a large business operating on a metropolitan, regional, national, or even global basis, it is impossible to "know your customer" in this intimate way. In these kinds of businesses there are too many customers and too many different ways that customers interact with the firm (over the Web, the phone,

fax, and in person). It becomes especially difficult to integrate information from all theses sources and to deal with the large numbers of customers.

A large business's processes for sales, service, and marketing tend to be highly compartmentalized, and these departments do not share much essential customer information. Some information on a specific customer might be stored and organized in terms of that person's account with the company. Other pieces of information about the same customer might be organized by products that were purchased. There is no way to consolidate all of this information to provide a unified view of a customer across the company.

This is where customer relationship management systems help. Customer relationship management (CRM) systems, which we introduced in Chapter 2, capture and integrate customer data from all over the organization, consolidate the data, analyze the data, and then distribute the results to various systems and customer touch points across the enterprise. A **touch point** (also known as a contact point) is a method of interaction with the customer, such as telephone, e-mail, customer service desk, conventional mail, Web site, wireless device, or retail store.

Well-designed CRM systems provide a single enterprise view of customers that is useful for improving both sales and customer service. Such systems likewise provide customers with a single view of the company regardless of what touch point the customer uses (see Figure 9-6).

Good CRM systems provide data and analytical tools for answering questions such as these: "What is the value of a particular customer to the firm over his or her lifetime?" "Who are our most loyal customers?" (It can cost six times more to sell to a new customer than to an existing customer.) "Who are our most profitable customers?" and "What do these profitable customers want to buy?" Firms use the answers to these questions to acquire new customers, provide better service and support to existing customers, customize their offerings more precisely to customer preferences, and provide ongoing value to retain profitable customers.

FIGURE 9-6 CUSTOMER RELATIONSHIP MANAGEMENT (CRM)

CRM systems examine customers from a multifaceted perspective. These systems use a set of integrated applications to address all aspects of the customer relationship, including customer service, sales, and marketing.

CUSTOMER RELATIONSHIP MANAGEMENT SOFTWARE

Commercial CRM software packages range from niche tools that perform limited functions, such as personalizing Web sites for specific customers, to large-scale enterprise applications that capture myriad interactions with customers, analyze them with sophisticated reporting tools, and link to other major enterprise applications, such as supply chain management and enterprise systems. The more comprehensive CRM packages contain modules for **partner relationship management (PRM)** and **employee relationship management (ERM)**.

PRM uses many of the same data, tools, and systems as customer relationship management to enhance collaboration between a company and its selling partners. If a company does not sell directly to customers but rather works through distributors or retailers, PRM helps these channels sell to customers directly. It provides a company and its selling partners with the ability to trade information and distribute leads and data about customers, integrating lead generation, pricing, promotions, order configurations, and availability. It also provides a firm with tools to assess its partners' performances so it can make sure its best partners receive the support they need to close more business.

ERM software deals with employee issues that are closely related to CRM, such as setting objectives, employee performance management, performance-based compensation, and employee training. Major CRM application software vendors include Oracle-owned Siebel Systems and PeopleSoft, SAP, Salesforce.com, and Microsoft Dynamics CRM.

Customer relationship management systems typically provide software and online tools for sales, customer service, and marketing. We briefly describe some of these capabilities.

Sales Force Automation (SFA)

Sales force automation modules in CRM systems help sales staff increase their productivity by focusing sales efforts on the most profitable customers, those who are good candidates for sales and services. CRM systems provide sales prospect and contact information, product information, product configuration capabilities, and sales quote generation capabilities. Such software can assemble information about a particular customer's past purchases to help the salesperson make personalized recommendations. CRM software enables sales, marketing, and delivery departments to easily share customer and prospect information. It increases each salesperson's efficiency in reducing the cost per sale as well as the cost of acquiring new customers and retaining old ones. CRM software also has capabilities for sales forecasting, territory management, and team selling.

Customer Service

Customer service modules in CRM systems provide information and tools to increase the efficiency of call centers, help desks, and customer support staff. They have capabilities for assigning and managing customer service requests.

One such capability is an appointment or advice telephone line: When a customer calls a standard phone number, the system routes the call to the correct service person, who inputs information about that customer into the system only once. Once the customer's data are in the system, any service representative can handle the customer relationship. Improved access to consistent and accurate customer information help call centers handle more calls per day and decrease the duration of each call. Thus, call centers and customer service groups achieve greater productivity, reduced transaction

time, and higher quality of service at lower cost. The customer is happier because he or she spends less time on the phone restating his or her problem to customer service representatives.

CRM systems may also include Web-based self-service capabilities: The company Web site can be set up to provide inquiring customers personalized support information as well as the option to contact customer service staff by phone for additional assistance.

Marketing

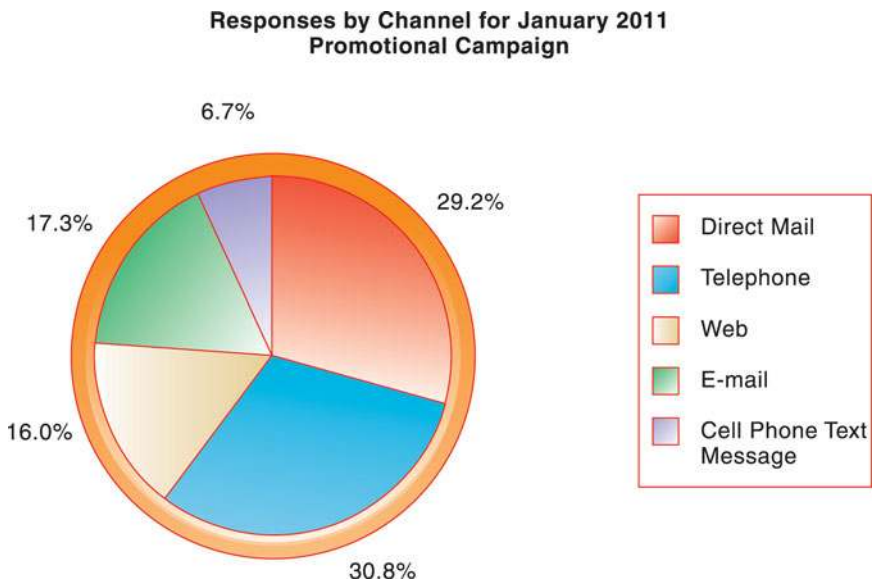
CRM systems support direct-marketing campaigns by providing capabilities for capturing prospect and customer data, for providing product and service information, for qualifying leads for targeted marketing, and for scheduling and tracking direct-marketing mailings or e-mail (see Figure 9-7). Marketing modules also include tools for analyzing marketing and customer data, identifying profitable and unprofitable customers, designing products and services to satisfy specific customer needs and interests, and identifying opportunities for cross-selling.

Cross-selling is the marketing of complementary products to customers. (For example, in financial services, a customer with a checking account might be sold a money market account or a home improvement loan.) CRM tools also help firms manage and execute marketing campaigns at all stages, from planning to determining the rate of success for each campaign.

Figure 9-8 illustrates the most important capabilities for sales, service, and marketing processes that would be found in major CRM software products. Like enterprise software, this software is business-process driven, incorporating hundreds of business processes thought to represent best practices in each of these areas. To achieve maximum benefit, companies need to revise and model their business processes to conform to the best-practice business processes in the CRM software.

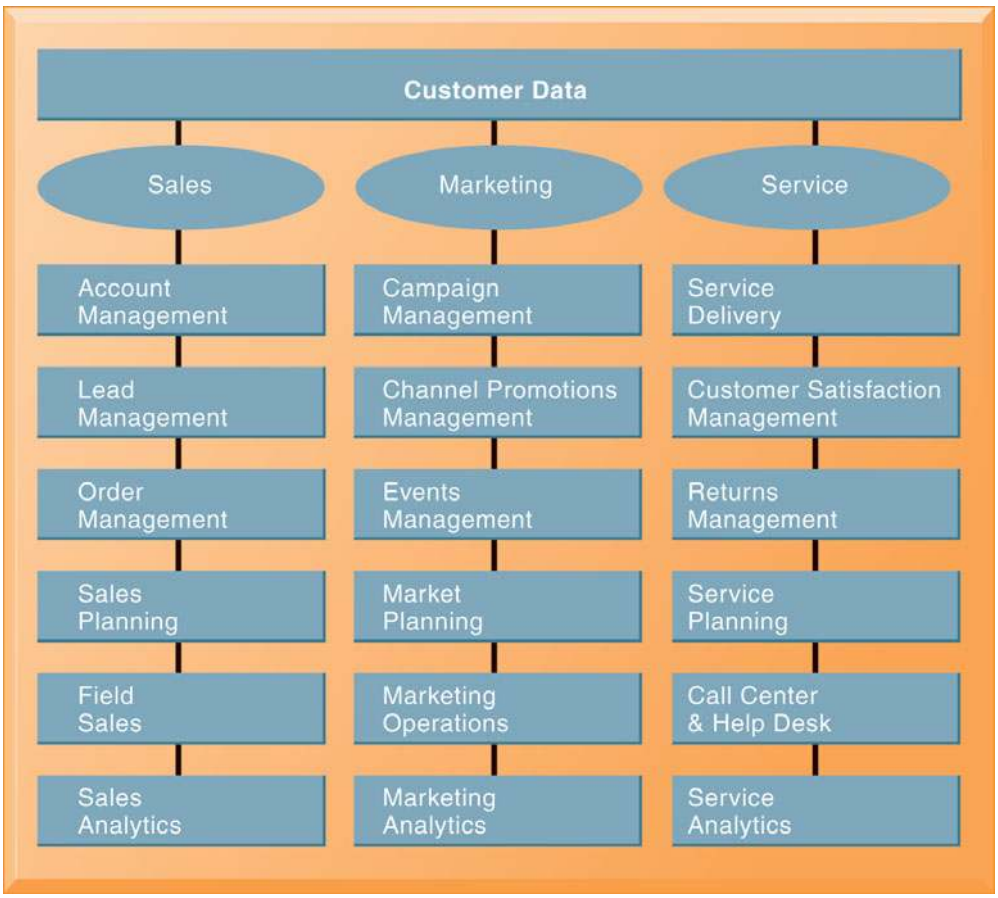
Figure 9-9 illustrates how a best practice for increasing customer loyalty through customer service might be modeled by CRM software. Directly

FIGURE 9-7 HOW CRM SYSTEMS SUPPORT MARKETING



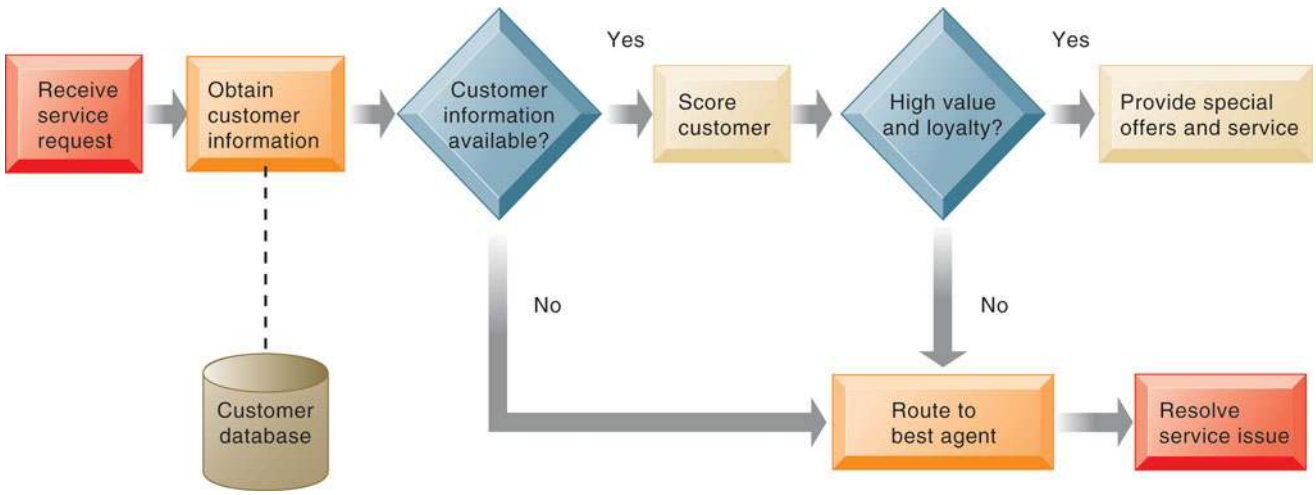
Customer relationship management software provides a single point for users to manage and evaluate marketing campaigns across multiple channels, including e-mail, direct mail, telephone, the Web, and wireless messages.

FIGURE 9-8 CRM SOFTWARE CAPABILITIES



The major CRM software products support business processes in sales, service, and marketing, integrating customer information from many different sources. Included are support for both the operational and analytical aspects of CRM.

FIGURE 9-9 CUSTOMER LOYALTY MANAGEMENT PROCESS MAP



This process map shows how a best practice for promoting customer loyalty through customer service would be modeled by customer relationship management software. The CRM software helps firms identify high-value customers for preferential treatment.

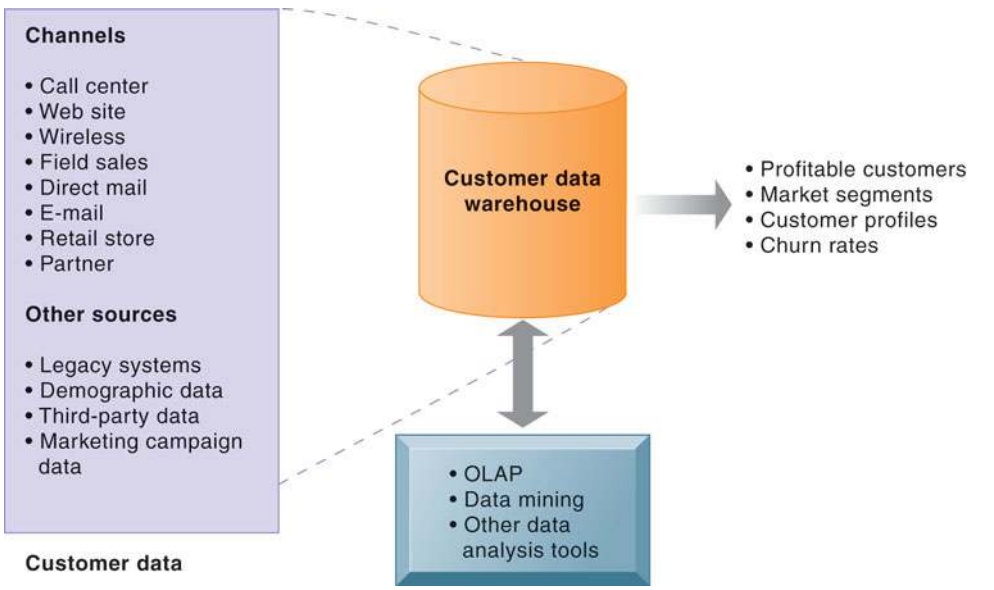
servicing customers provides firms with opportunities to increase customer retention by singling out profitable long-term customers for preferential treatment. CRM software can assign each customer a score based on that person's value and loyalty to the company and provide that information to help call centers route each customer's service request to agents who can best handle that customer's needs. The system would automatically provide the service agent with a detailed profile of that customer that includes his or her score for value and loyalty. The service agent would use this information to present special offers or additional service to the customer to encourage the customer to keep transacting business with the company. You will find more information on other best-practice business processes in CRM systems in our Learning Tracks.

OPERATIONAL AND ANALYTICAL CRM

All of the applications we have just described support either the operational or analytical aspects of customer relationship management. **Operational CRM** includes customer-facing applications, such as tools for sales force automation, call center and customer service support, and marketing automation. **Analytical CRM** includes applications that analyze customer data generated by operational CRM applications to provide information for improving business performance.

Analytical CRM applications are based on data warehouses that consolidate the data from operational CRM systems and customer touch points for use with online analytical processing (OLAP), data mining, and other data analysis techniques (see Chapter 6). Customer data collected by the organization might be combined with data from other sources, such as customer lists for direct-marketing campaigns purchased from other companies or demographic data. Such data are analyzed to identify buying patterns, to create segments for targeted marketing, and to pinpoint profitable and unprofitable customers (see Figure 9-10).

FIGURE 9-10 ANALYTICAL CRM DATA WAREHOUSE



Analytical CRM uses a customer data warehouse and tools to analyze customer data collected from the firm's customer touch points and from other sources.

Another important output of analytical CRM is the customer's lifetime value to the firm. **Customer lifetime value (CLTV)** is based on the relationship between the revenue produced by a specific customer, the expenses incurred in acquiring and servicing that customer, and the expected life of the relationship between the customer and the company.

BUSINESS VALUE OF CUSTOMER RELATIONSHIP MANAGEMENT SYSTEMS

Companies with effective customer relationship management systems realize many benefits, including increased customer satisfaction, reduced direct-marketing costs, more effective marketing, and lower costs for customer acquisition and retention. Information from CRM systems increases sales revenue by identifying the most profitable customers and segments for focused marketing and cross-selling.

Customer churn is reduced as sales, service, and marketing better respond to customer needs. The **churn rate** measures the number of customers who stop using or purchasing products or services from a company. It is an important indicator of the growth or decline of a firm's customer base.

9.4 Enterprise Applications: New Opportunities and Challenges

Many firms have implemented enterprise systems and systems for supply chain management and customer relationship because they are such powerful instruments for achieving operational excellence and enhancing decision making. But precisely because they are so powerful in changing the way the organization works, they are challenging to implement. Let's briefly examine some of these challenges, as well as new ways of obtaining value from these systems.

ENTERPRISE APPLICATION CHALLENGES

Promises of dramatic reductions in inventory costs, order-to-delivery time, as well as more efficient customer response and higher product and customer profitability make enterprise systems and systems for supply chain management and customer relationship management very alluring. But to obtain this value, you must clearly understand how your business has to change to use these systems effectively.

Enterprise applications involve complex pieces of software that are very expensive to purchase and implement. It might take a large Fortune 500 company several years to complete a large-scale implementation of an enterprise system or a system for SCM or CRM. The total cost for an average large system implementation based on SAP or Oracle software, including software, database tools, consulting fees, personnel costs, training, and perhaps hardware costs, runs over $12 million. The implementation cost of a enterprise system for a small or mid-sized company based on software from a "Tier II" vendor such as Epicor or Lawson averages $3.5 million. (Wailgum, 2009).

Enterprise applications require not only deep-seated technological changes but also fundamental changes in the way the business operates. Companies

must make sweeping changes to their business processes to work with the software. Employees must accept new job functions and responsibilities. They must learn how to perform a new set of work activities and understand how the information they enter into the system can affect other parts of the company. This requires new organizational learning.

Supply chain management systems require multiple organizations to share information and business processes. Each participant in the system may have to change some of its processes and the way it uses information to create a system that best serves the supply chain as a whole.

Some firms experienced enormous operating problems and losses when they first implemented enterprise applications because they didn't understand how much organizational change was required. For example, Kmart had trouble getting products to store shelves when it first implemented i2 Technologies supply chain management software in July 2000. The i2 software did not work well with Kmart's promotion-driven business model, which created sharp spikes in drops in demand for products. Overstock.com's order tracking system went down for a full week in October 2005 when the company replaced a homegrown system with an Oracle enterprise system. The company rushed to implement the software, and did not properly synchronize the Oracle software's process for recording customer refunds with its accounts receivable system. These problems contributed to a third-quarter loss of $14.5 million that year.

Enterprise applications also introduce "switching costs." Once you adopt an enterprise application from a single vendor, such as SAP, Oracle, or others, it is very costly to switch vendors, and your firm becomes dependent on the vendor to upgrade its product and maintain your installation.

Enterprise applications are based on organization-wide definitions of data. You'll need to understand exactly how your business uses its data and how the data would be organized in a customer relationship management, supply chain management, or enterprise system. CRM systems typically require some data cleansing work.

Enterprise software vendors are addressing these problems by offering pared-down versions of their software and "fast-start" programs for small and medium-sized businesses and best-practice guidelines for larger companies. Our Interactive Session on Technology describes how on-demand and cloud-based tools deal with this problem as well.

Companies adopting enterprise applications can also save time and money by keeping customizations to the minimum. For example, Kennametal, a $2 billion metal-cutting tools company in Pennsylvania, had spent $10 million over 13 years maintaining an ERP system with over 6,400 customizations. The company is now replacing it with a "plain vanilla," non-customized-version of SAP enterprise software and changing its business processes to conform to the software (Johnson, 2010).

NEXT-GENERATION ENTERPRISE APPLICATIONS

Today, enterprise application vendors are delivering more value by becoming more flexible, Web-enabled, and capable of integration with other systems. Standalone enterprise systems, customer relationship systems, and supply chain management systems are becoming a thing of the past.

The major enterprise software vendors have created what they call *enterprise solutions*, *enterprise suites*, or *e-business suites* to make their customer relationship management, supply chain management, and enter-

prise systems work closely with each other, and link to systems of customers and suppliers. SAP Business Suite, Oracle's e-Business Suite, and Microsoft's Dynamics suite (aimed at mid-sized companies) are examples, and they now utilize Web services and service-oriented architecture (SOA, see Chapter 5).

SAP's next-generation enterprise applications are based on its enterprise service-oriented architecture. It incorporates service-oriented architecture (SOA) standards and uses its NetWeaver tool as an integration platform linking SAP's own applications and Web services developed by independent software vendors. The goal is to make enterprise applications easier to implement and manage.

For example, the current version of SAP enterprise software combines key applications in finance, logistics and procurement, and human resources administration into a core ERP component. Businesses then extend these applications by linking to function-specific Web services such as employee recruiting or collections management provided by SAP and other vendors. SAP provides over 500 Web services through its Web site.

Oracle also has included SOA and business process management capabilities into its Fusion middleware products. Businesses can use Oracle tools to customize Oracle's applications without breaking the entire application.

Next-generation enterprise applications also include open source and on-demand solutions. Compared to commercial enterprise application software, open source products such as Compiere, Apache Open for Business (OFBiz), and Openbravo are not as mature, nor do they include as much support. However, companies such as small manufacturers are choosing this option because there are no software licensing fees and fees are based on usage. (Support and customization for open source products cost extra.)

SAP now offers an on-demand enterprise software solution called Business ByDesign for small and medium-sized businesses in select countries. For large businesses, SAP's on-site software is the only version available. SAP is, however, hosting function-specific applications (such as e-sourcing and expense management) available by subscription that integrate with customers' on-site SAP Business Suite systems.

The most explosive growth in software as a service (SaaS) offerings has been for customer relationship management. Salesforce.com has been the leader in hosted CRM solutions, but Oracle and SAP have also developed SaaS capabilities. SaaS and cloud-based versions of enterprise systems are starting to be offered by vendors such as NetSuite and Plex Online. Compiere sells both cloud and on-premise versions of its ERP systems. Use of cloud-based enterprise applications is starting to take off, as discussed in the Interactive Session on Technology.

The major enterprise application vendors also offer portions of their products that work on mobile handhelds. You can find out more about this topic in our Learning Track on Wireless Applications for Customer Relationship Management, Supply Chain Management, and Healthcare.

Salesforce.com and Oracle have added Web 2.0 capabilities that enable organizations to identify new ideas more rapidly, improve team productivity, and deepen interactions with customers. For example, Salesforce Ideas enables subscribers to harness the "wisdom of crowds" by allowing their customers to submit and discuss new ideas. Dell Computer deployed this technology as Dell IdeaStorm (dellideastorm.com) to encourage its customers to suggest and vote on new concepts and feature changes in Dell products.

INTERACTIVE SESSION: TECHNOLOGY

ENTERPRISE APPLICATIONS MOVE TO THE CLOUD

You've already read about Salesforce.com in this book. It's the most successful enterprise-scale software as a service (SaaS). Until recently, there were few other SaaS enterprise software applications available on the Internet. Today, that's changed, as a growing number of cloud-based enterprise resource planning (ERP) and customer relationship management (CRM) application providers enter this marketspace. While traditional enterprise software vendors like Oracle are using their well-established position to grab a share of the cloud-based application market, newcomers like RightNow, Compiere, and SugarCRM have found success using some different tactics.

Most companies interested in cloud computing are small to midsize and lack the know-how or financial resources to successfully build and maintain ERP and CRM applications in-house. Others are simply looking to cut costs by moving their applications to the cloud. According to the International Data Corporation (IDC), about 3.2 percent of U.S. small businesses, or about 230,000 businesses, use cloud services. Small-business spending on cloud services increased by 36.2 percent in 2010 to $2.4 billion.

Even larger companies have made the switch to the cloud. For example, camera manufacturer Nikon decided to go with a cloud-based solution as it attempted to merge customer data from 25 disparate sources and applications into a single system. Company officials were hoping to eliminate maintenance and administrative costs, but not at the expense of a storage system that met their requirements, was never out of service, and worked perfectly.

Nikon found its solution with RightNow, a cloud-based CRM provider located in Bozeman, Montana. The company was founded in 1997 and has attracted firms intrigued by its customizable applications, impeccable customer service, and robust infrastructure. Prices start at $110 per user per month and the average deployment time is 45 days.

Nikon had been using several different systems to perform business functions, and was struggling to merge customer data located in a variety of legacy systems. While looking for vendors to help implement a Web-based FAQ system to answer customer questions and provide support on the basis of these data, the company came across RightNow. Nikon found that not only did RightNow have the capability to implement that system, but it also had an array of other useful services. When Nikon discovered that it could combine outbound e-mail, contact management, and customer records into a single system in RightNow's cloud, it made the move, expecting to receive a solid return on the investment.

What Nikon got was far more than expected: an astonishing 3,200 percent return on investment (ROI), equivalent to a savings of $14 million after three years! The FAQ system reduced the number of incoming calls to Nikon's customer service staff. More customers found the information they needed on the Web, call response times dropped by 50 percent, and incoming e-mail dropped by 70 percent. While Nikon still hosts its SAP ERP system internally due to its complexity, Nikon switched its entire CRM system to RightNow.

Not all companies experience gains of that magnitude, and cloud computing does have drawbacks. Many companies are concerned about maintaining control of their data and security. Although cloud computing companies are prepared to handle these issues, availability assurances and service-level agreements are uncommon. Companies that manage their CRM apps with a cloud infrastructure have no guarantees that their data will be available at all times, or even that the provider will still exist in the future.

Many smaller companies have taken advantage of a new type of cloud computing known as open source cloud computing. Under this model, cloud vendors make the source code of their applications available to their customers and allow them to make any changes they want on their own. This differs from the traditional model, where cloud vendors offer applications which are customizable, but not at the source code level.

For example, Jerry Skaare, president of O-So-Pure (OSP), a manufacturer of ultraviolet water purification systems, selected the Compiere Cloud Edition versions of ERP software hosted on the Amazon EC2 Cloud virtual environment. OSP had long outgrown its existing ERP system and was held back by inefficient, outdated processes in accounting, inventory, manufacturing, and e-commerce. Compiere ERP provides a complete end-to-end ERP solution that automates processes from accounting

to purchasing, order fulfillment, manufacturing, and warehousing.

Compiere uses a model-driven platform that stores business logic in an applications dictionary rather than being hard-coded into software programs. Firms using Compiere are able to customize their applications by creating, modifying, or deleting business logic in the applications dictionary without extensive programming. In contrast to traditional ERP systems that encourage subscribers to modify their business processes to conform to the software, Compiere encourages its subscribers to customize its system to match their unique business needs.

The fact that the Compiere software is open source also makes it easier for users to modify. OSP was attracted to this feature, along with the robust functionality, scalability, and low cost, of the Compiere ERP Cloud Edition. Skaare said that he was comfortable that "the little idiosyncrasies of my company" could be handled by the software. Though Skaare is unlikely to make any changes himself, it's important for him to know that his staff has the option to tweak OSP's ERP applications. Open source cloud computing provides companies that flexibility.

Not to be outdone, established CRM companies like Oracle have moved into SaaS. Pricing starts at $70 per month per user. Oracle may have an edge because its CRM system has so many capabilities and includes embedded tools for forecasting and analytics, including interactive dashboards. Subscribers are able to use these tools to answer questions such as "How efficient is your sales effort?" or "How much are your customers spending?"

Bryant & Stratton College, a pioneer in career education, used Oracle CRM On Demand to create more successful marketing campaigns. Bryant & Stratton analyzed past campaigns for tech-savvy recent high school graduates, as well as older, non-traditional students returning to school later in life. Oracle CRM On Demand tracked advertising to prospective students and determined accurate costs for each lead, admissions application, and registered attending student. This information helped the school determine the true value of each type of marketing program.

Sources: Marta Bright, "Know Who. Know How." *Oracle Magazine*, January/February 2010; Brad Stone, "Companies Slowly Join Cloud-Computing," *The New York Times*, April 28, 2010; and Esther Shein, "Open-source CRM and ERP: New Kids on the Cloud," *Computerworld*, October 30, 2009.

CASE STUDY QUESTIONS

1. What types of companies are most likely to adopt cloud-based ERP and CRM software services? Why? What companies might not be well-suited for this type of software?
2. What are the advantages and disadvantages of using cloud-based enterprise applications?
3. What management, organization, and technology issues should be addressed in deciding whether to use a conventional ERP or CRM system versus a cloud-based version?

MIS IN ACTION

Visit the Web site of RightNow, Compiere, or another competing company offering a cloud-based version of ERP or CRM. Then answer the following questions:

1. What kinds of open source offerings does the company have, if any? Describe some of the features.
2. Toward what types of companies is the company marketing its services?
3. What other services does the company offer?

Enterprise application vendors have also beefed up their business intelligence features to help managers obtain more meaningful information from the massive amounts of data generated by these systems. Rather than requiring users to leave an application and launch separate reporting and analytics tools, the vendors are starting to embed analytics within the context of the application itself. They are also offering complementary analytics products, such as SAP Business Objects and Oracle Business Intelligence Enterprise Edition. We discuss business intelligence analytics in greater detail in Chapter 12.

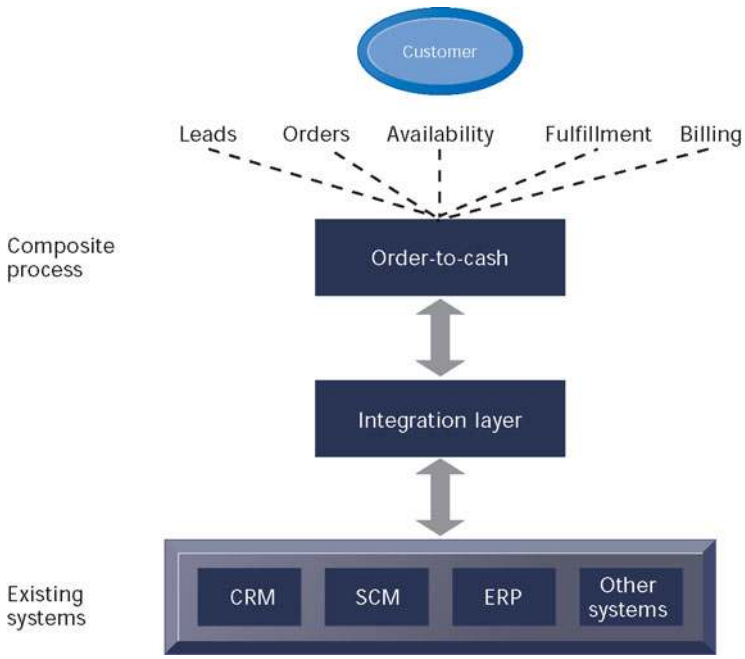
Service Platforms

Another way of extending enterprise applications is to use them to create service platforms for new or improved business processes that integrate information from multiple functional areas. These enterprise-wide service platforms provide a greater degree of cross-functional integration than the traditional enterprise applications. A **service platform** integrates multiple applications from multiple business functions, business units, or business partners to deliver a seamless experience for the customer, employee, manager, or business partner.

For instance, the order-to-cash process involves receiving an order and seeing it all the way through obtaining payment for the order. This process begins with lead generation, marketing campaigns, and order entry, which are typically supported by CRM systems. Once the order is received, manufacturing is scheduled and parts availability is verified—processes that are usually supported by enterprise software. The order then is handled by processes for distribution planning, warehousing, order fulfillment, and shipping, which are usually supported by supply chain management systems. Finally, the order is billed to the customer, which is handled by either enterprise financial applications or accounts receivable. If the purchase at some point required customer service, customer relationship management systems would again be invoked.

A service such as order-to-cash requires data from enterprise applications and financial systems to be further integrated into an enterprise-wide composite process. To accomplish this, firms need software tools that use existing applications as building blocks for new cross-enterprise processes (see Figure 9-11). Enterprise application vendors provide middleware and tools that use XML and Web services for integrating enterprise applications with older legacy applications and systems from other vendors.

FIGURE 9-11 ORDER-TO-CASH SERVICE



Order-to-cash is a composite process that integrates data from individual enterprise systems and legacy financial applications. The process must be modeled and translated into a software system using application integration tools.

Increasingly, these new services will be delivered through portals. Portal software can integrate information from enterprise applications and disparate in-house legacy systems, presenting it to users through a Web interface so that the information appears to be coming from a single source. For example, Valero Energy, North America's largest refiner, used SAP NetWeaver Portal to create a service for wholesale clients to view their account information all at once. SAP NetWeaver Portal provides an interface to clients' invoice, price, electronic funds, and credit card transaction data stored in SAP's customer relationship management system data warehouse as well as in non-SAP systems.

9.5 Hands-on MIS Projects

The projects in this section give you hands-on experience analyzing business process integration, suggesting supply chain management and customer relationship management applications, using database software to manage customer service requests, and evaluating supply chain management business services.

Management Decision Problems

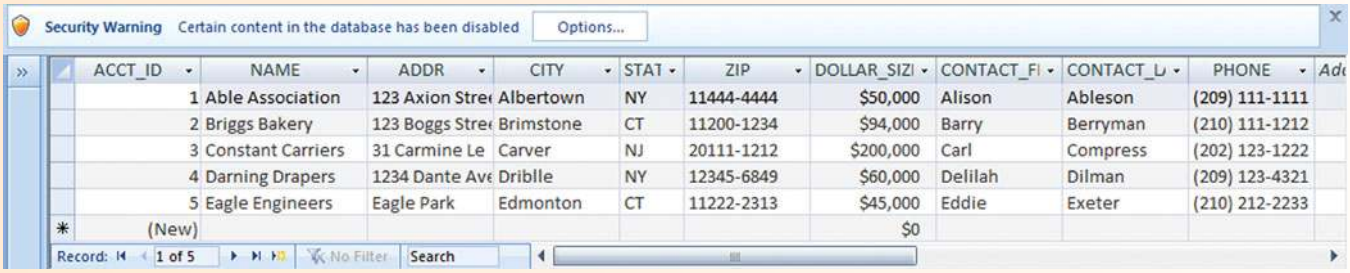
1. Toronto-based Mercedes-Benz Canada, with a network of 55 dealers, did not know enough about its customers. Dealers provided customer data to the company on an ad hoc basis. Mercedes did not force dealers to report this information, and its process for tracking dealers that failed to report was cumbersome. There was no real incentive for dealers to share information with the company. How could CRM and partner relationship management (PRM) systems help solve this problem?
2. Office Depot sells a wide range of office products and services in the United States and internationally, including general office supplies, computer supplies, business machines (and related supplies), and office furniture. The company tries to offer a wider range of office supplies at lower cost than other retailers by using just-in-time replenishment and tight inventory control systems. It uses information from a demand forecasting system and point-of-sale data to replenish its inventory in its 1,600 retail stores. Explain how these systems help Office Depot minimize costs and any other benefits they provide. Identify and describe other supply chain management applications that would be especially helpful to Office Depot.

Improving Decision Making: Using Database Software to Manage Customer Service Requests

Software skills: Database design; querying and reporting
Business skills: Customer service analysis

In this exercise, you'll use database software to develop an application that tracks customer service requests and analyzes customer data to identify customers meriting priority treatment.

Prime Service is a large service company that provides maintenance and repair services for close to 1,200 commercial businesses in New York, New Jersey, and Connecticut. Its customers include businesses of all sizes. Customers with service needs call into its customer service department with requests for repairing heating ducts, broken windows, leaky roofs, broken water pipes, and other problems. The company assigns each request a number and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ACCT_ID	NAME	ADDR	CITY	STAT	ZIP	DOLLAR_SIZI	CONTACT_FI	CONTACT_LI	PHONE	Ad
1	Able Association	123 Axion Stre	Albertown	NY	11444-4444	$50,000	Alison	Ableson	(209) 111-1111	
2	Briggs Bakery	123 Boggs Stre	Brimstone	CT	11200-1234	$94,000	Barry	Berryman	(210) 111-1212	
3	Constant Carriers	31 Carmine Le	Carver	NJ	20111-1212	$200,000	Carl	Compress	(202) 123-1222	
4	Darning Drapers	1234 Dante Ave	Dribble	NY	12345-6849	$60,000	Delilah	Dilman	(209) 123-4321	
5	Eagle Engineers	Eagle Park	Edmonton	CT	11222-2313	$45,000	Eddie	Exeter	(210) 212-2233	
(New)						$0				

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writes down the service request number, identification number of the customer account, the date of the request, the type of equipment requiring repair, and a brief description of the problem. The service requests are handled on a first-come-first-served basis. After the service work has been completed, Prime calculates the cost of the work, enters the price on the service request form, and bills the client.

Management is not happy with this arrangement because the most important and profitable clients—those with accounts of more than $70,000—are treated no differently from its clients with small accounts. It would like to find a way to provide its best customers with better service. Management would also like to know which types of service problems occur most frequently so that it can make sure it has adequate resources to address them.

Prime Service has a small database with client account information, which can be found in MyMISLab. A sample is shown above, but the Web site may have a more recent version of this database for this exercise. The database table includes fields for the account ID, company (account) name, street address, city, state, ZIP code, account size (in dollars), contact last name, contact first name, and contact telephone number. The contact is the name of the person in each company who is responsible for contacting Prime about maintenance and repair work.

Use your database software to design a solution that would enable Prime's customer service representatives to identify the most important customers so that they could receive priority service. Your solution will require more than one table. Populate your database with at least 15 service requests. Create several reports that would be of interest to management, such as a list of the highest—and lowest—priority accounts or a report showing the most frequently occurring service problems. Create a report listing service calls that customer service representatives should respond to first on a specific date.

Achieving Operational Excellence: Evaluating Supply Chain Management Services

Software skills: Web browser and presentation software
Business skills: Evaluating supply chain management services

Trucking companies no longer merely carry goods from one place to another. Some also provide supply chain management services to their customers and help them manage their information. In this project, you'll use the Web to research and evaluate two of these business services.

Investigate the Web sites of two companies, UPS Logistics and Schneider Logistics, to see how these companies' services can be used for supply chain management. Then respond to the following questions:

- What supply chain processes can each of these companies support for their clients?

- How can customers use the Web sites of each company to help them with supply chain management?
- Compare the supply chain management services provided by these companies. Which company would you select to help your firm manage its supply chain? Why?

Learning Track Modules

The following Learning Tracks provide content relevant to topics covered in this chapter:

1. SAP Business Process Map
2. Business Processes in Supply Chain Management and Supply Chain Metrics
3. Best-Practice Business Processes in CRM Software

Review Summary

1. *How do enterprise systems help businesses achieve operational excellence?*

   Enterprise software is based on a suite of integrated software modules and a common central database. The database collects data from and feeds the data into numerous applications that can support nearly all of an organization's internal business activities. When new information is entered by one process, the information is made available immediately to other business processes.

   Enterprise systems support organizational centralization by enforcing uniform data standards and business processes throughout the company and a single unified technology platform.The firmwide data generated by enterprise systems helps managers evaluate organizational performance.

2. *How do supply chain management systems coordinate planning, production, and logistics with suppliers?*

   Supply chain management systems automate the flow of information among members of the supply chain so they can use it to make better decisions about when and how much to purchase, produce, or ship. More accurate information from supply chain management systems reduces uncertainty and the impact of the bullwhip effect.

   Supply chain management software includes software for supply chain planning and for supply chain execution. Internet technology facilitates the management of global supply chains by providing the connectivity for organizations in different countries to share supply chain information. Improved communication among supply chain members also facilitates efficient customer response and movement toward a demand-driven model.

3. *How do customer relationship management systems help firms achieve customer intimacy?*

   Customer relationship management (CRM) systems integrate and automate customer-facing processes in sales, marketing, and customer service, providing an enterprise-wide view of customers. Companies can use this knowledge when they interact with customers to provide them with better service or to sell

new products and services. These systems also identify profitable or nonprofitable customers or opportunities to reduce the churn rate.

The major customer relationship management software packages provide capabilities for both operational CRM and analytical CRM. They often include modules for managing relationships with selling partners (partner relationship management) and for employee relationship management.

4. *What are the challenges posed by enterprise applications?*

Enterprise applications are difficult to implement. They require extensive organizational change, large new software investments, and careful assessment of how these systems will enhance organizational performance. Enterprise applications cannot provide value if they are implemented atop flawed processes or if firms do not know how to use these systems to measure performance improvements. Employees require training to prepare for new procedures and roles. Attention to data management is essential.

5. *How are enterprise applications used in platforms for new cross-functional services?*

Service platforms integrate data and processes from the various enterprise applications (customer relationship management, supply chain management, and enterprise systems), as well as from disparate legacy applications to create new composite business processes. Web services tie various systems together. The new services are delivered through enterprise portals, which can integrate disparate applications so that information appears to be coming from a single source. Open source, mobile, and cloud versioins of some of these products are becoming available.

Key Terms

Analytical CRM, 354
Bullwhip effect, 342
Churn rate, 355
Cross-selling, 352
Customer lifetime value (CLTV), 355
Demand planning, 344
Employee relationship management (ERM), 351
Enterprise software, 338
Just-in-time strategy, 342
Operational CRM, 354
Partner relationship management (PRM), 351
Pull-based model, 347
Push-based model, 347
Service platform, 360
Supply chain, 340
Supply chain execution systems, 344
Supply chain planning systems, 344
Touch point, 350

Review Questions

1. How do enterprise systems help businesses achieve operational excellence?

- Define an enterprise system and explain how enterprise software works.
- Describe how enterprise systems provide value for a business.

2. How do supply chain management systems coordinate planning, production, and logistics with suppliers?

- Define a supply chain and identify each of its components.
- Explain how supply chain management systems help reduce the bullwhip effect and how they provide value for a business.
- Define and compare supply chain planning systems and supply chain execution systems.
- Describe the challenges of global supply chains and how Internet technology can help companies manage them better.

- Distinguish between a push-based and pull-based model of supply chain management and explain how contemporary supply chain management systems facilitate a pull-based model.

3. How do customer relationship management systems help firms achieve customer intimacy?
- Define customer relationship management and explain why customer relationships are so important today.
- Describe how partner relationship management (PRM) and employee relationship management (ERM) are related to customer relationship management (CRM).
- Describe the tools and capabilities of customer relationship management software for sales, marketing, and customer service.
- Distinguish between operational and analytical CRM.

4. What are the challenges posed by enterprise applications?
- List and describe the challenges posed by enterprise applications.
- Explain how these challenges can be addressed.

5. How are enterprise applications used in platforms for new cross-functional services?
- Define a service platform and describe the tools for integrating data from enterprise applications.
- How are enterprise applications taking advantage of cloud computing, wireless technology, Web 2.0, and open source technology?

Discussion Questions

1. Supply chain management is less about managing the physical movement of goods and more about managing information. Discuss the implications of this statement.

2. If a company wants to implement an enterprise application, it had better do its homework. Discuss the implications of this statement.

3. Which enterprise application should a business install first: ERP, SCM, or CRM? Explain your answer.

Video Cases

Video Cases and Instructional Videos illustrating some of the concepts in this chapter are available. Contact your instructor to access these videos.

Collaboration and Teamwork: Analyzing Enterprise Application Vendors

With a group of three or four students, use the Web to research and evaluate the products of two vendors of enterprise application software. You could compare, for example, the SAP and Oracle enterprise systems, the supply chain management systems from i2 and SAP, or the customer relationship management systems of Oracle's Siebel CRM and Salesforce.com. Use what you have learned from these companies' Web sites to compare the software packages you have selected in terms of business functions supported, technology platforms, cost, and ease of use. Which vendor would you select? Why? Would you select the same vendor for a small business as well as a large one? If possible, use Google Sites to post links to Web pages, team communication announcements, and work assignments; to brainstorm; and to work collaboratively on project documents. Try to use Google Docs to develop a presentation of your findings for the class.

Border States Industries Fuels Rapid Growth with ERP

CASE STUDY

Border States Industries Inc., also known as Border States Electric (BSE), is a wholesale distributor for the construction, industrial, utility, and data communications markets. The company is headquartered in Fargo, North Dakota, and has 57 sales offices in states along the U.S. borders with Canada and Mexico as well as in South Dakota, Wisconsin, Iowa, and Missouri. BSE has 1,400 employees and is wholly employee-owned through its employee stock ownership plan. For the fiscal year ending March 31, 2008, BSE earned revenues of over US $880 million.

BSE's goal is to provide customers with what they need whenever they need it, including providing custom services beyond delivery of products. Thus, the company is not only a wholesale distributor but also a provider of supply chain solutions, with extensive service operations such as logistics, job-site trailers, and kitting (packaging individually separate but related items together as one unit). BSE has distribution agreements with more than 9,000 product vendors.

BSE had relied on its own legacy ERP system called Rigel since 1988 to support its core business processes. However, Rigel had been designed exclusively for electrical wholesalers, and by the mid-1990s, the system could not support BSE's new lines of business and extensive growth.

At that point, BSE's management decided to implement a new ERP system and selected the enterprise software from SAP AG. The ERP solution included SAP's modules for sales and distribution, materials management, financials and controlling, and human resources.

BSE initially budgeted $6 million for the new system, with a start date of November 1, 1998. Senior management worked with IBM and SAP consulting to implement the system. Although close involvement of management was one key ingredient in the systems' success, day-to-day operations suffered while managers were working on the project.

BSE also decided to customize the system extensively. It wrote its own software to enable the ERP system to interface automatically with systems from other vendors, including Taxware Systems, Inc., Innovis Inc., and TOPCALL International GmbH. The Taxware system enabled BSE to comply with the sales tax requirements of all the states and municipalities where it conducts business. The Innovis system supported electronic data interchange (EDI) so that BSE could electronically exchange purchase and payment transactions with its suppliers. The TOPCALL system enabled BSE to fax customers and vendors directly from the SAP system.

At the time of this implementation, BSE had no experience with SAP software, and few consultants familiar with the version of the SAP software that BSE was using. Instead of adopting the best-practice business processes embedded in the SAP software, BSE hired consultants to further customize the SAP software to make its new SAP system look like its old Rigel system in certain areas. For example, it tried to make customer invoices resemble the invoices produced by the old Rigel system.

Implementing these changes required so much customization of the SAP software that BSE had to delay the launch date for the new ERP system until February 1, 1999. By that time, continued customization and tuning raised total implementation costs to $9 million (an increase of 50 percent).

Converting and cleansing data from BSE's legacy system took far longer than management had anticipated. The first group of "expert users" were trained too early in the project and had to be retrained when the new system finally went live. BSE never fully tested the system as it would be used in a working production environment before the system actually went live.

For the next five years, BSE continued to use its SAP ERP system successfully as it acquired several small companies and expanded its branch office infrastructure to 24 states. As the business grew further, profits and inventory turns increased. However, the Internet brought about the need for additional changes, as customers sought to transact business with BSE through an e-commerce storefront. BSE automated online credit card processing and special pricing agreements (SPAs) with designated customers. Unfortunately, the existing SAP software did not support these changes, so the company had to process thousands of SPAs manually.

To process a credit card transaction in a branch office, BSE employees had to leave their desks, walk over to a dedicated credit card processing system in the back office, manually enter the credit card numbers, wait for transaction approval, and then

return to their workstations to continue processing sales transactions.

In 2004, BSE began upgrading its ERP system to a more recent version of the SAP software. The software included new support for bills of material and kitting, which were not available in the old system. This functionality enabled BSE to provide better support to utility customers because it could prepare kits that could be delivered directly to a site.

This time the company kept customization to a minimum and used the SAP best practices for wholesale distribution embedded in the software. It also replaced TOPCALL with software from Esker for faxing and e-mailing outbound invoices, order acknowledgments, and purchase orders and added capabilities from Vistex Inc. to automate SPA rebate claims processing. BSE processes over 360,000 SPA claims each year, and the Vistex software enabled BSE to reduce rebate fulfillment time to 72 hours and transaction processing time by 63 percent. In the past, it took 15 to 30 days for BSE to receive rebates from vendors.

BSE budgeted $1.6 million and 4.5 months for implementation, which management believed was sufficient for a project of this magnitude. This time there were no problems. The new system went live on its target date and cost only $1.4 million to implement—14 percent below budget.

In late 2006, BSE acquired a large company that was anticipated to increase sales volume by 20 percent each year. This acquisition added 19 new branches to BSE. These new branches were able to run BSE's SAP software within a day after the acquisition had been completed. BSE now tracks 1.5 million unique items with the software.

Since BSE first deployed SAP software in 1998, sales have increased 300 percent, profits have climbed more than 500 percent, 60 percent of accounts payable transactions take place electronically using EDI, and SPA processing has been reduced by 63 percent. The company turns over its inventory more than four times per year. Instead of waiting 15 to 20 days for monthly financial statements, monthly and year-to-date financial results are available within a day after closing the books. Manual work for handling incoming mail, preparing bank deposits, and taking checks physically to the bank has been significantly reduced. Over 60 percent of vendor invoices arrive electronically, which has reduced staff size in accounts payable and the number of transaction errors. Transaction costs are lower.

The number of full-time BSE employees did increase in the information systems area to support the SAP software. BSE had initially expected to have 3 IT staff supporting the system, but needed 8 people when the first ERP implementation went live in 1999 and 11 by 2006 to support additional SAP software and the new acquisition. BSE's information technology (IT) costs rose by approximately $3 million per year after the first SAP implementation. However, sales expanded during the same period, so the increased overhead for the system produced a cost increase of only .5 percent of total sales.

BSE management has pointed out that much of the work that was automated by the ERP systems has been in the accounting department and involved activities that were purely transactional. This has freed up resources for adding more employees who work directly with customers trying to reduce costs and increase sales.

In the past, BSE had maintained much of its data outside its major corporate systems using PC-based Microsoft Access database and Excel spreadsheet software. Management lacked a single company-wide version of corporate data because the data were fragmented into so many different systems. Now the company is standardized on one common platform and the information is always current and available to management. Management can obtain a picture of how the entire business is performing at any moment in time. Since the SAP system makes all of BSE's planning and budgeting data available online, management is able to make better and quicker decisions.

In 2006, Gartner Group Consultants performed an independent evaluation of BSE's ERP implementation. Gartner interviewed top executives and analyzed BSE data on the impact of the ERP system on BSE's business process costs, using costs as a percentage of sales as its final metric for assessing the financial impact of SAP software. Cost categories analyzed included costs of goods sold, overhead and administration, warehousing costs, IT support, and delivery.

Gartner's analysis validated that the SAP software implementation cost from 1998 to 2001 did indeed total $9 million and that this investment was paid back by savings from the new ERP system within 2.5 years. Between 1998 and 2006, the SAP software implemented by BSE produced total savings of $30 million, approximately one-third of BSE's cumulative earnings during the same period. As a percentage of sales, warehouse costs went down 1 percent, delivery costs decreased by .5 percent, and total overhead costs declined by 1.5 percent. Gartner calculated the total return on investment (ROI) for the project between 1998 and 2006 was $3.3 million per year, or 37 percent of the original investment.

BSE is now focusing on providing more support for Internet sales, including online ordering, inventory, order status, and invoice review, all within a SAP software environment. The company implemented SAP NetWeaver Master Data Management to provide tools to manage and maintain catalog data and prepare the data for publication online and in traditional print media. The company is using SAP's Web Dynpro development environment to enable wireless warehouse and inventory management activities to interact with the SAP software. And it is using SAP NetWeaver Business Intelligence software to learn more about customers, their buying habits, and opportunities to cross-sell and upsell products.

Sources: Border States Industries, "Operating System-SAP Software," 2010; Jim Shepherd and Aurelie Cordier, "Wholesale Distributor Uses ERP Solution to Fuel Rapid Growth," AMR Research, 2009; SAP AG, "Border States Industries: SAP Software Empowers Wholesale Distributor," 2008; www.borderstateselectric.com, accessed July 7, 2009; and "Border States (BSE)," 2008 ASUG Impact Award.

CASE STUDY QUESTIONS

1. What problems was Border States Industries encountering as it expanded? What management, organization, and technology factors were responsible for these problems?
2. How easy was it to develop a solution using SAP ERP software? Explain your answer.
3. List and describe the benefits from the SAP software.
4. How much did the new system solution transform the business? Explain your answer.
5. How successful was this solution for BSE? Identify and describe the metrics used to measure the success of the solution.
6. If you had been in charge of SAP's ERP implementations, what would you have done differently?

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