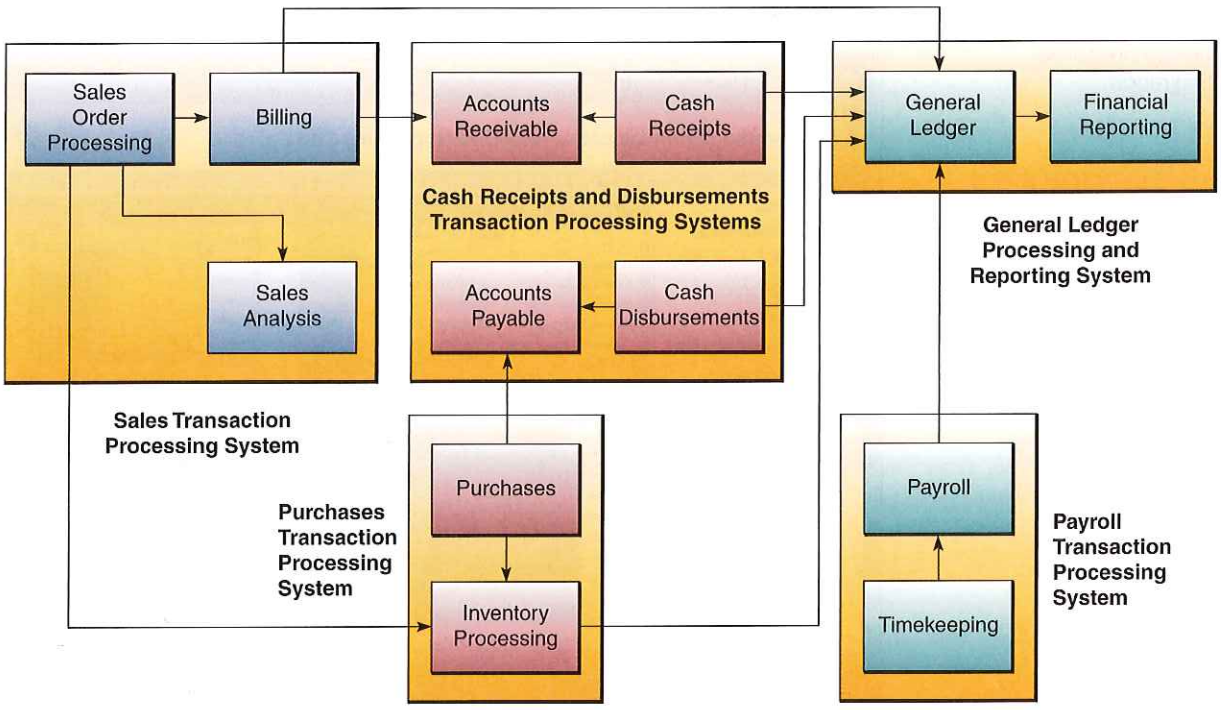


FIGURE 7.18
Important accounting information systems for transaction processing and financial reporting. Note how they are related to each other in terms of input and output flows.

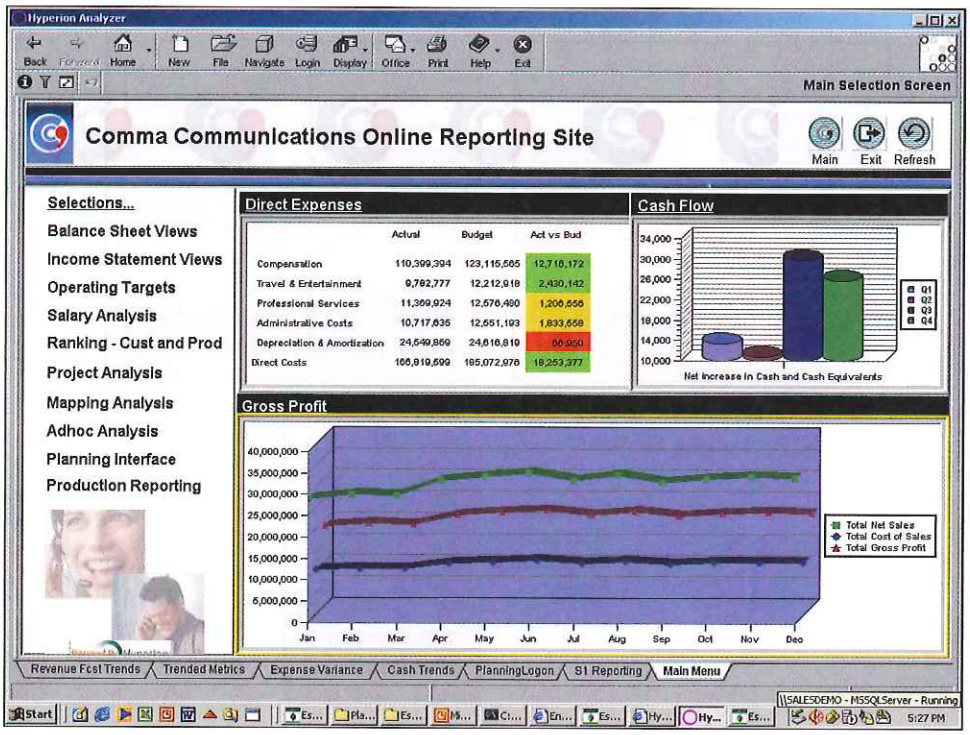
Operational accounting systems emphasize legal and historical record-keeping and the production of accurate financial statements. Typically, these systems include transaction processing systems such as ***order processing, inventory control, accounts receivable, accounts payable, payroll,*** and ***general ledger*** systems. Management accounting systems focus on the planning and control of business operations. They emphasize cost accounting reports, the development of financial budgets and projected financial statements, and analytical reports comparing actual to forecasted performance.

Figure 7.18 illustrates the interrelationships of several important accounting information systems commonly computerized by both large and small businesses. Many accounting software packages are available for these applications. Figure 7.19

Common Business Accounting Systems
• **Order Processing** Captures and processes customer orders and produces data for inventory control and accounts receivable.
• **Inventory Control** Processes data reflecting changes in inventory and provides shipping and reorder information.
• **Accounts Receivable** Records amounts owed by customers and produces customer invoices, monthly customer statements, and credit management reports.
• **Accounts Payable** Records purchases from, amounts owed to, and payments to suppliers, and produces cash management reports.
• **Payroll** Records employee work and compensation data and produces paychecks and other payroll documents and reports.
• **General Ledger** Consolidates data from other accounting systems and produces the periodic financial statements and reports of the business.

FIGURE 7.19
A summary of six essential accounting information systems used in business.

FIGURE 7.20
An example of an online accounting report.



SOURCE: Courtesy of Hyperion.

provides a good summary of the essential purposes of six common, but important, accounting information systems used by both large and small business firms.

Online Accounting Systems

It should come as no surprise that the accounting information systems illustrated in Figures 7.18 and 7.19 are being transformed by Internet technologies. Using the Internet and other networks changes how accounting information systems monitor and track business activity. The interactive nature of ***online accounting systems*** calls for new forms of transaction documents, procedures, and controls. This particularly applies to systems like order processing, inventory control, accounts receivable, and accounts payable. As outlined in Figure 7.18, these systems are directly involved in the processing of transactions between a business and its customers and suppliers. So naturally, many companies are using Internet and other network links to these trading partners for such online transaction processing systems, as discussed in the beginning of the chapter. Figure 7.20 is an example of an online accounting report.

FINANCIAL MANAGEMENT SYSTEMS

Computer-based ***financial management systems*** support business managers and professionals in decisions concerning (1) the financing of a business and (2) the allocation and control of financial resources within a business. Major financial management system categories include cash and investment management, capital budgeting, financial forecasting, and financial planning. See Figure 7.21.

For example, the **capital budgeting** process involves evaluating the profitability and financial impact of proposed capital expenditures. Long-term expenditure proposals for facilities and equipment can be analyzed using a variety of return on investment (ROI) evaluation techniques. This application makes heavy use of spreadsheet models

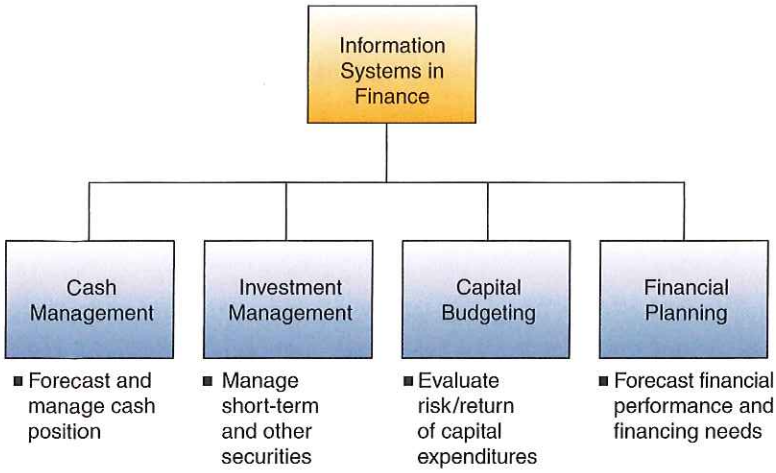
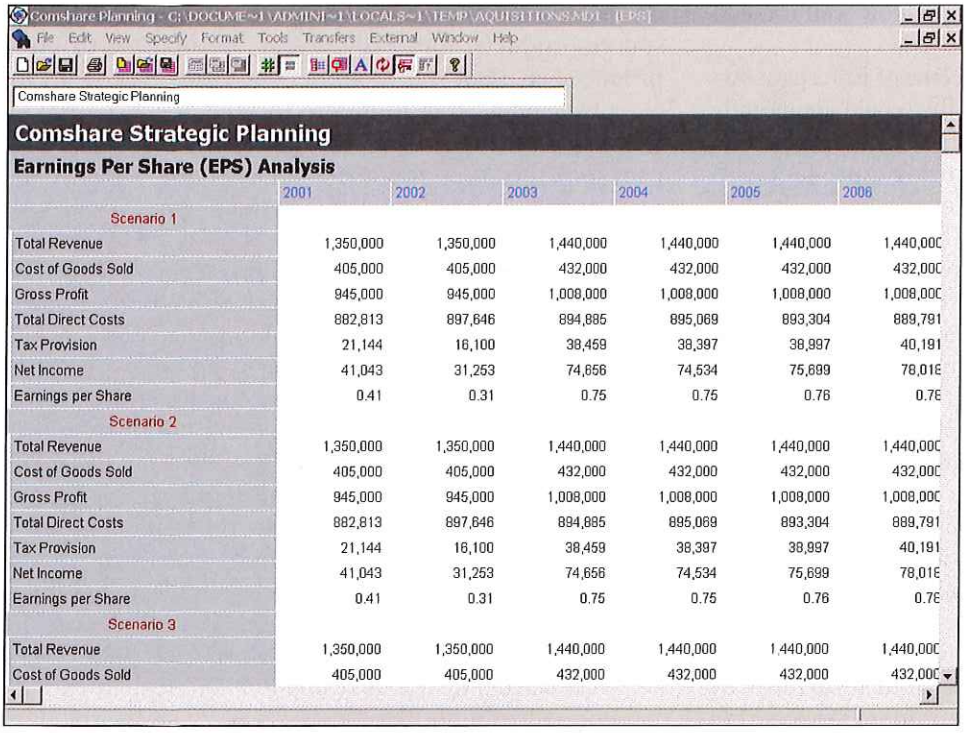


FIGURE 7.21
Examples of important financial management systems.

that incorporate present value analysis of expected cash flows and probability analysis of risk to determine the optimum mix of capital projects for a business.

Financial analysts also typically use electronic spreadsheets and other **financial planning** software to evaluate the present and projected financial performance of a business. They also help determine the financing needs of a business and analyze alternative methods of financing. Financial analysts use financial forecasts concerning the economic situation, business operations, types of financing available, interest rates, and stock and bond prices to develop an optimal financing plan for the business. Electronic spreadsheet packages, DSS software, and Web-based groupware can be used to build and manipulate financial models. Answers to what-if and goal-seeking questions can be explored as financial analysts and managers evaluate their financing and investment alternatives. We will discuss such applications further in Chapter 10. See Figure 7.22.



	2001	2002	2003	2004	2005	2006
Scenario 1						
Total Revenue	1,350,000	1,350,000	1,440,000	1,440,000	1,440,000	1,440,000
Cost of Goods Sold	405,000	405,000	432,000	432,000	432,000	432,000
Gross Profit	945,000	945,000	1,008,000	1,008,000	1,008,000	1,008,000
Total Direct Costs	882,813	897,646	894,885	895,069	893,304	889,791
Tax Provision	21,144	16,100	38,459	38,397	38,997	40,191
Net Income	41,043	31,253	74,656	74,534	75,699	78,018
Earnings per Share	0.41	0.31	0.75	0.75	0.76	0.78
Scenario 2						
Total Revenue	1,350,000	1,350,000	1,440,000	1,440,000	1,440,000	1,440,000
Cost of Goods Sold	405,000	405,000	432,000	432,000	432,000	432,000
Gross Profit	945,000	945,000	1,008,000	1,008,000	1,008,000	1,008,000
Total Direct Costs	882,813	897,646	894,885	895,069	893,304	889,791
Tax Provision	21,144	16,100	38,459	38,397	38,997	40,191
Net Income	41,043	31,253	74,656	74,534	75,699	78,018
Earnings per Share	0.41	0.31	0.75	0.75	0.76	0.78
Scenario 3						
Total Revenue	1,350,000	1,350,000	1,440,000	1,440,000	1,440,000	1,440,000
Cost of Goods Sold	405,000	405,000	432,000	432,000	432,000	432,000

SOURCE: Courtesy of Comshare.

FIGURE 7.22
An example of strategic financial planning using a multiple scenario approach. Note the effect on earnings per share.

real world SOLUTION

Qualcomm–Breaking Down Silos and Integrating Applications

Qualcomm Inc. is a large company that engages in the development, design, manufacture, and marketing of digital wireless telecommunications products and services. The company operates in four segments: Qualcomm CDMA Technologies, Qualcomm Technology Licensing, Qualcomm Wireless and Internet, and Qualcomm Strategic Initiatives, as well as having direct—and in many cases full—ownership of a number of other subsidiaries, such as Qualcomm Atheros, Firethorn Mobile Inc., and Qualcomm Labs.

As in many other large companies whose business models rely heavily on, and are enabled by, information technology, Qualcomm's IT infrastructure results from years of special-purpose applications that were developed independently and that now have a hard time communicating with the other systems in the company—in short, multiple application silos. Although the company had developed a homegrown approach over the years to handling those challenges through hand-coding point-to-point integration between the various systems and databases, the limitations of that approach were starting to show and constrain what the company could and could not do, or how well it could serve the needs of its customers.

At some point, Steve Polaski, director of Enterprise Architecture for Qualcomm, realized that they could significantly reduce all three major costs of integration—development, maintenance, and support—by acquiring a product with the necessary capabilities rather than continuing to develop and maintain the in-house tool they had been working on for years. In addition, they were interested in what services could offer for the company, both as an approach to software development as well as an underlying philosophy for their IT infrastructure and environment. A service orientation requires loose coupling of services with operating systems, and other technologies that underlie applications. This approach to application integration and communication is commonly referred to as Service-Oriented Architecture (SOA). SOA separates functions into distinct units, or services, which developers make accessible over a network in order to allow users to combine and reuse them in the production of applications. These services and their corresponding consumers communicate with each other by passing data in a well-defined, shared format, or by coordinating an activity between two or more services. As a result, specific implementations are hidden behind the communication standards, making it much easier to change one application without needing to change another.

"SOA is a concept and a process and a way of thinking about how to move data and how to allow business functions to interoperate with each other," says Polaski. When Qualcomm started looking at Enterprise Application Integration (EAI) approaches, services were only emerging as a viable alternative for making systems and databases talk to each other effortlessly—at least as effortlessly as possible. However, managers quickly became convinced that services were the way to go, and they started looking for products that would let them expose the different functionality of the applications as services that other applications could access without knowing anything about the other side of the transaction. In the end, Qualcomm management selected products from TIBCO software to create their new application environment.

"We have other pieces in our SOA fabric today," says Polaski. "TIBCO products are a major part of this, and we use a number of tools from Oracle, including Oracle BPEL Process Manager. Plus, we use a number of open-source products. But TIBCO was the first set of SOA products we used."

Qualcomm's transition into the new practice of SOA was very structured and carefully planned. First, the company took the necessary time to implement a robust architecture that defined how the various applications and databases would be integrated by exposing them as a service. As a result, before they did any actual integration, managers already had a clear picture of how they wanted things to look when they were done, and as they say, the rest is just implementation. Between the time Tibco was selected as the main software vendor for this effort and the first few services were up and running, more than four months went by in developing and documenting the architecture. The other key piece of the approach was to take a forward-looking view of how to roll out integration through services. Qualcomm started by first setting up the infrastructure and connecting new applications and functionality to it under the new approach; only then were the existing applications and databases considered.

"We started by not attacking our existing integration, anything already in place," says Norm Fjeldheim, chief information officer at Qualcomm. "We built the SOA

infrastructure around Tibco. And then as new things came up, instead of using what we had been using, we started using Tibco; and that is how we got things established. So it became our new engine around growth."

As Qualcomm engineers gained more experience with both the software tools and the service-oriented approach in general, new components were added from other applications and vendors, as well as slowly going after the legacy point-to-point integration as the opportunity arose. "It was a good approach for us," says Fjeldheim. "We had a lot we needed to get done, and this let us do it a lot quicker and it was less painful. We were pretty religious about not doing things the old way and adding to the problem. We used Tibco and our SOA infrastructure as much as possible for everything new we created." Each time changes or maintenance was needed in the legacy applications or integration points, managers considered whether they could migrate to the new approach. The logic was that, since changes would have to be made and tested to ensure that they would function appropriately, developers might as well eliminate the old approach and convert the exposed functionality of the application to a service that would then communicate with others in the network, as necessary. In some cases it was the right time, and in others it was not. But the question was asked anew each time.

After all was said and done, the service-oriented architecture has been deployed globally throughout the many business divisions and fully owned subsidiaries that make up Qualcomm Inc. More than 150 different messages are sent between a number of different applications, 58 Web services, and other databases using technology from Tibco, Oracle, and some open-source packages. In addition, more than 180 other integration points have been exposed as services, and they are not nearly done with the project.

Exposing applications as services allows IT to make existing systems available as service calls and then build new applications that combine existing functionality, with little or no new coding necessary. The new skill set and capabilities that developers learned from the move to SOA has helped them tackle new challenges more effectively. Where a new IT-based solution to a business problem would have taken a week to implement under the old approach, in some cases it has been up and running in as little as three hours using SOA. Moneywise, IT has benefited as well. The new deployment has eliminated about half a million dollars of annual integration costs: A single point-to-point integration piece that used to cost between $30,000 to $150,000 has been cut by a factor of 5 to 10 as a result of the new approach taken, which frees up money to spend on other things. And IT departments never have a shortage of those.

And what about those business benefits discussed in the opening to this chapter? One major benefit was inching Qualcomm close to the real-time sharing of data they had envisioned. For example, one of the first integration projects under SOA was undertaken so the sales representatives could access the existing CRM application through Smartphones, which would allow them to work remotely while at the same time always stay connected and up-to-date. Other projects include the integration of the product data management application with its ERP package and a legacy manufacturing system. And all those issues with the provisioning of new features have been addressed as well. "By changing the architecture and our integration strategy, the time to add features and functions to wireless devices went down to from three hours or so to five seconds," says Polaski. "Customer satisfaction went way up as a result," notes Fjeldheim. "Our internal and external customers were both happy." Also, says Polaski, "We have agility and flexibility to support our changing business models that we didn't before, because the services are being orchestrated, rather than hardwired to each other."

SOURCE: Daniel Dern, "How One Company Broke Down Silos and Improved Application Integration," *CIO.com*, September 15, 2008; Scot Petersen, "Qualcomm Dials in SOAs," *eWeek*, November 22, 2004, "TIBCO Supports Product Engineering and Business Integration at Qualcomm," *TIBCO Success Story*, 2006; and www.qualcomm.com, accessed May 28, 2011.

QUESTIONS TO CONSIDER

1. How are services different than the existing point-to-point integration approach? Where does their value come from?
2. Consider the approach taken by Qualcomm to roll out services into its IT infrastructure. What were its strong points? Were there any weaknesses? What could they have done differently?

summary

- **Cross-Functional Enterprise Systems.** Major e-business applications and their interrelationships are summarized in the enterprise application architecture of Figure 7.2. These applications are integrated cross-functional enterprise systems, such as enterprise resource planning (ERP), customer relationship management (CRM), and supply chain management (SCM). The applications may be interconnected by enterprise application integration (EAI) systems so that business professionals can more easily access the information resources they need to support the needs of customers, suppliers, and business partners. Enterprise collaboration systems (ECS) are cross-functional systems that support and enhance communication and collaboration among the teams and workgroups in an organization. Refer to Figures 7.4 and 7.8 for summary views of the e-business applications in EAI systems and enterprise collaboration systems.
- **Transaction Processing Systems.** Online transaction processing systems play a vital role in business. Transaction processing involves the basic activities of (1) data entry, (2) transaction processing, (3) database maintenance, (4) document and report generation, and (5) inquiry processing. Many firms are using the Internet, intranets, extranets, and other networks for online transaction processing to provide superior service to their customers and suppliers. Figure 7.6 illustrates the basic activities of transaction processing systems.
- **Functional Business Systems.** Functional business information systems support the business functions of marketing, production/operations, accounting, finance, and human resource management through a variety of e-business operational and management information systems summarized in Figure 7.11.
- **Marketing.** Marketing information systems support traditional and e-commerce processes and management of the marketing function. Major types of marketing information systems include interactive marketing at e-commerce Web sites, sales force automation, customer relationship management, sales management, product management, targeted marketing, advertising and promotion, and market research. Thus, marketing information systems assist marketing managers in e-commerce product development and customer relationship decisions, as well as in planning advertising and sales promotion strategies and developing the e-commerce potential of new and present products and new channels of distribution.
- **Manufacturing.** Computer-based manufacturing information systems help a company achieve computer-integrated manufacturing (CIM), and thus simplify, automate, and integrate many of the activities needed to quickly produce high-quality products to meet changing customer demands. For example, computer-aided design using collaborative manufacturing networks helps engineers collaborate on the design of new products and processes. Then manufacturing resource planning systems help plan the types of resources needed in the production process. Finally, manufacturing execution systems monitor and control the manufacture of products on the factory floor through shop floor scheduling and control systems, controlling a physical process (process control), a machine tool (numerical control), or machines with some humanlike work capabilities (robotics).
- **Human Resource Management.** Human resource information systems support human resource management in organizations. They include information systems for staffing the organization, training and development, and compensation administration. HRM Web sites on the Internet or corporate intranets have become important tools for providing HR services to present and prospective employees.
- **Accounting and Finance.** Accounting information systems record, report, and analyze business transactions and events for the management of the business enterprise. Figure 7.19 summarizes six essential accounting systems including order processing, inventory control, accounts receivable, accounts payable, payroll, and general ledger. Information systems in finance support managers in decisions regarding the financing of a business and the allocation of financial resources within a business. Financial information systems include cash management, online investment management, capital budgeting, and financial forecasting and planning.

key terms and concepts

These are the key terms and concepts of this chapter. The page number of their first reference appears in parentheses.

1. Accounting information systems (308)
2. Accounts payable (309)
3. Accounts receivable (309)
4. Batch processing (295)
5. Computer-aided manufacturing (305)
6. Computer-integrated manufacturing (304)
7. Cross-functional enterprise systems (287)
8. E-business (287)
9. Enterprise application architecture (290)
10. Enterprise application integration (291)
11. Enterprise collaboration systems (296)
12. Financial management systems (310)
13. Functional business systems (299)
14. General ledger (309)
15. Human resource information systems (306)
16. Interactive marketing (301)
17. Inventory control (309)
18. Machine control (306)
19. Manufacturing execution systems (305)
20. Manufacturing information systems (304)
21. Marketing information systems (300)
22. Online accounting systems (310)
23. Online HRM systems (306)
24. Online transaction processing systems (294)
25. Order processing (309)
26. Payroll (309)
27. Process control (306)
28. Real-time processing (295)
29. Sales force automation (302)
30. Targeted marketing (301)
31. Transaction processing cycle (295)

review quiz

Match one of the key terms and concepts listed previously with one of the brief examples or definitions that follow. Try to find the best fit for the answers that seem to fit more than one term or concept. Defend your choices.

____ 1. Using the Internet and other networks for e-commerce, enterprise collaboration, and Web-enabled business processes.

____ 2. Information systems that cross the boundaries of the functional areas of a business in order to integrate and automate business processes.

____ 3. Information systems that support marketing, production, accounting, finance, and human resource management.

____ 4. E-business applications fit into a framework of interrelated cross-functional enterprise applications.

____ 5. Software that interconnects enterprise application systems.

____ 6. Information systems for customer relationship management, sales management, and promotion management.

____ 7. Collaborating interactively with customers in creating, purchasing, servicing, and improving products and services.

____ 8. Using mobile computing networks to support salespeople in the field.

____ 9. Information systems that support manufacturing operations and management.

____ 10. A conceptual framework for simplifying and integrating all aspects of manufacturing automation.

____ 11. Using computers in a variety of ways to help manufacture products.

____ 12. Use electronic communications, conferencing, and collaborative work tools to support and enhance collaboration among teams and workgroups.

____ 13. Using computers to operate a petroleum refinery.

____ 14. Using computers to help operate machine tools.

____ 15. Information systems to support staffing, training and development, and compensation administration.

____ 16. Using the Internet for recruitment and job hunting is an example.

____ 17. Accomplishes legal and historical record-keeping and gathers information for the planning and control of business operations.

____ 18. An example is using the Internet and extranets to do accounts receivable and accounts payable activities.

____ 19. Handles sales orders from customers.

____ 20. Keeps track of items in stock.

____ 21. Keeps track of amounts owed by customers.

____ 22. Keeps track of purchases from suppliers.

____ 23. Produces employee paychecks.

____ 24. Produces the financial statements of a firm.

____ 25. Information systems for cash management, investment management, capital budgeting, and financial forecasting.

____ 26. Performance monitoring and control systems for factory floor operations.
____ 27. Customizing advertising and promotion methods to fit their intended audience.
____ 28. Data entry, transaction processing, database maintenance, document and report generation, and inquiry processing.
____ 29. Collecting and periodically processing transaction data.
____ 30. Processing transaction data immediately after they are captured.
____ 31. Systems that immediately capture and process transaction data and update corporate databases.

discussion questions

1. Refer to the Real World Challenge in the chapter, where the difficulty of making a business case for integration projects is discussed. What could managers do to make the benefits of those projects more clear? Should these be evaluated like any other IT project?
2. Why is there a trend toward cross-functional integrated enterprise systems in business?
3. Which of the 17 tools for enterprise collaboration systems summarized in Figure 7.8 do you feel are essential for any business today? Which ones do you feel are optional, depending on the type of business or other factors? Explain.
4. Other than EAI systems, what are some possible solutions to the problem of incompatibility of information systems in business?
5. What are the most important HR applications a company should offer to its employees via a Web-based system? Why?
6. How could sales force automation affect salesperson productivity, marketing management, and competitive advantage?
7. How can Internet technologies help improve a process in one of the functions of business? Choose one example and evaluate its business value.
8. Refer to the Real World Solution in the chapter. What are some of the prerequisites for a successful implementation of the service-oriented approach, as in Qualcomm's case? Would it work in any organizational environment?
9. What are several e-business applications that you might recommend to a small company to help it survive and succeed in challenging economic times? Why?
10. Refer to the example on virtual worlds in the chapter. How do enterprise collaboration systems contribute to bottom-line profits for a business?

analysis exercises

1. **Hybrid Application Service Providers**
ASP Integrated Applications

Revenue from desktop application sales ends with the sale. Or does it? Companies like Microsoft provide updates, fixes, and security patches to its software while developing the next revenue-generating edition. However, they don't make another dime until they release the next edition. But that isn't the only model.

McAfee charges an annual maintenance fee that includes daily application and virus definition updates. McAfee provides it for one year as part of its license. After the first year, license holders may continue to use the software, but they must pay a subscription fee if they want updates. Customers tend to pay for this subscription service in order to protect themselves from new virus threats. Thus, McAfee generates revenue long after the initial sale. In this way, McAfee behaves like an application service provider.

The following questions will help you explore the many ASP-related services that relocate applications, maintenance, and data from your systems and allow you to focus on your mission.

a. Skype offers audio, video, and instant messaging tools (see the Features link at www.skype.com). Compare the Skype tools to the equivalent Google offerings. Prepare a table in Word or write a one-page paper (at your instructor's request) to compare these competing tools. Place Feature, Skype, and Google as column headers. List individual features under "Feature" in the left-most column. Place the symbol "•" in the cell if it's a current feature for each competitor. Leave the cell blank if it isn't available at all. Give the table a professional appearance.
b. Yahoo and Google are in a heated competition for the same user base. Look up the latest developments for Yahoo at next.yahoo.com and for Google at labs.google.com. Prepare a table in Word to compare current and beta features for Yahoo and Google. Place Feature, Google, and Yahoo as column headers. List individual features under "Feature" in the left-most column. Place the symbol "•" in the cell if it's a current feature for each competitor and the symbol "o" in the cell if it's a beta feature.

Leave the cell blank if it isn't available at all. Give the table a professional appearance.

2. In Search of Talent

Online Job Matching and Auctions

Many opportunities await those who troll the big job boards, the free-agent sites, the reverse auction services, and the niche sites for specialized jobs and skills. Presented below are a diverse sample of employment-related Web sites.

- eLance.com (www.elance.com)
- Guru.com (www.guru.com)
- Monster.com (www.monster.com)
- Virtual Worker (www.vworker.com)

a. Prepare a review for each job site listed above. Include target employers, target employees, and notable Web site features.

b. Which site did you find most useful? Why?

3. Integrating Data Capture

Keys to Better Information

Business systems have long served to automate tasks, facilitate data capture, and enable new opportunities. These processes have crept into virtually all businesses and business processes. RE/MAX real estate agent Rosemary Chiaverini well remembers business 20 years ago and the rather cumbersome process of coordinating key exchanges with fellow agents. "It really limited the number of houses we could show in a day."

A key safe increased productivity by allowing real estate agents to open a key safe at each property. The key locked inside the key safe then provides access to the residence. Showing agents would then leave a business card behind to indicate they had shown a property, but the listing agent would have to retrieve these cards personally. "I just didn't know for certain who was seeing my homes or what they thought of them."

GE Security's Supra iBox has changed that. Rosemary now uses an electronic, infrared key to open GE's new key safe, and the key records the transaction. When she synchronizes her key online to update her key's codes, this information goes up to GE's database and is shared with the listing agent. With most agents in her area subscribing to this system, Rosemary has Internet access information about who visited one of her listed homes and when. She uses this information to follow up on each visit and gain valuable insights. "Before, I would waste a lot of time calling busy agents who had arranged to show a home but hadn't."

a. Use a search engine to look up the Supra iBox. Describe the product's capabilities.

b. Describe the next-generation product you might sell Rosemary once keyless locks become commonplace.

4. Word's Mail Merge

Partner Name Tags

Ms. Sapper, this year's annual partner meeting coordinator for a global accounting firm, faced an interesting challenge. She wanted to provide the 400 partners attending the meeting with the opportunity to mix, mingle, and network. Most partners only knew a handful of their peers, and Ms. Sapper wanted to make everyone feel as comfortable as possible. With a list of partners in hand, she decided to prepare name tags for each participant. Each tag would include the partner's first name, last name, practice area, and region. Arranging them alphabetically by last name at the event's welcome desk would allow each partner to quickly find and use the correct name tag.

Complete the following steps to prepare partner name badges.

a. Download and save "partners.xls" from the MIS 16e OLC.

b. Use Microsoft Word's mail merge feature to generate name tags sorted by last name and then first name. Use a suitable name tag template, and format the name tag as illustrated below. Be sure to include first name, last name, industry, and region. Turn in either the first two pages of the merged names or the merged file as per your professor's preference.

Example:

Christoph Aarns
Audit
Asia Pacific

5. Federated Search

Deep into e-Business

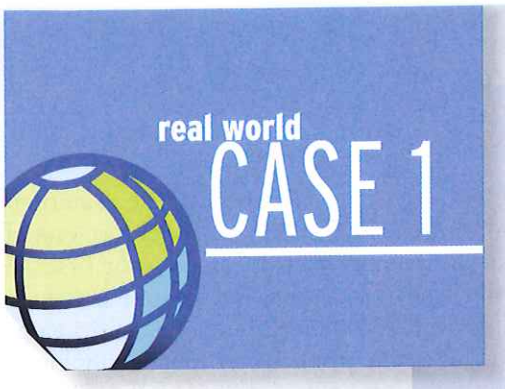
Deep Web Technologies (deepwebtech.com) provides "federated search" capabilities for a client base ranging from government agencies to research institutions. Federated searches aren't like standard Internet searches where users search an index of Web pages. Instead, DWT's tools simultaneously search dozens or even hundreds of online databases in real time. Since online databases tend to have their own customized search tools, DWT's de-duplicated and prioritized results can save users hours of time searching across many online databases.

So how does DWT produce this state-of-the-art software? In short, they rely heavily on e-business tools. For example, to recruit qualified jRuby developers, DWT uses human networking

via social media such as LinkedIn and Facebook. Programmer training consists primarily of e-books, Web-based resources and developer tools, and hands-on mentoring. Developers provide status updates, collaborate, and banter all hands-free with Skype. Skype enables an open-office feel but with all the conveniences of home. They manage software version control through Subversion, another online tool.

On the business end, DWT uses Google Apps for Business for their productivity software (calendaring, scheduling, e-mail, word processing, spreadsheets). Google's online business applications simplify administration and access control, they operate across multiple platforms, and they allow real-time updating and collaboration. These tools are flexible enough that DWTs developers have used them to create work-flow tools to standardize requests for new database connectors. DWT also uses Redmine, an online tool, to manage help desk tickets, host system documentation, and provide the organization with a wiki-style knowledge base. Lastly, employees with a fast and reliable Internet connection have the option to telecommute.

a. Read up on "federated search." List the obvious strengths and weaknesses.
b. Visit DWT's demo page (**http://bit.ly/k31KKb**) and run a couple of searches. Run the same searches through a standard search engine. How does the experience differ? How do the results differ?
c. What advantages do you think DWT gains by using Web-enabled, cloud-based applications to manage its business?



Toyota Europe, Campbell Soup Company, Sony Pictures, and W.W. Grainger: Making the Case for Enterprise Architects

When technology infrastructure lines up with business projects like musicians in a marching band, you know you have a good enterprise architect on staff.

Enterprise architecture focuses on four crucial C's: connection, collaboration, communication, and customers. Imagine needing to manually log onto five different systems to create and track an order, or putting in 20 hours researching a project because you didn't know the information already existed in another department. These situations result from fragmentation and siloed thinking; the goal of enterprise architecture, on the other hand, is to create unity.

Enterprise architecture's goal is IT that enables business strategy today and tomorrow, says Peter Heinckiens, chief enterprise architect at Toyota Europe. "The 'tomorrow' part is especially important," he says. The enterprise architect must map, define, and standardize technology, data, and business processes to make that possible. This means that the architect must have both a macro and micro view: She must understand the business strategy and translate this into an architectural approach (macro view), but she must also be able to work with individual projects and deliver very concrete guidance to these projects that focuses on the successful delivery of the individual project within that macro view. "The enterprise architect transforms tech-speak into the language of business solutions, and he knows what technology is needed to enable business strategy," says Heinckiens.

In other words, an architect knows how to bridge silos. An oft-used metaphor for the enterprise architect's role is that of the city planner, one who also provides the road maps, zoning, common requirements, regulations and strategy—albeit for a company rather than for a city. And this role is increasingly important as enterprise architecture itself becomes more important.

"Enterprise architecture's roots are in the desire to serve what is best for the enterprise versus the individual department or project," says Campbell Soup Company Vice President of IT-Shared Services Andy Croft, who has the enterprise architect role at Campbell's. He speaks of the days when employees within the same company were unable to share information via e-mail, because of incompatible e-mail systems. Each department thought it needed its own brand of PC, even its own network or security system. Finally, Croft says, "People lifted their heads and thought, maybe it's more important to be able to work together rather than me having the 'best.'" Enterprise architecture gained traction from the bottom up.

That siloed view on projects may come in the form of "I want to use this package" or "I want to build this application," according to Heinckiens. As an architect, he advises, it's important to take a step back: Try to understand what problem the proposed project will solve. Is there already a solution that covers the proposed area being researched? Does the proposed project fit into the wider picture? "Structurally, business units are silos—and therefore often have a limited view—but the enterprise architect ensures that the pieces of the wider-picture puzzle fit together," says Heinckiens.

As an illustration, some projects use data that nobody else in the company will be interested in, while other projects use data that are useful and relevant to everyone in the company. It is the enterprise architect's job to figure out how to make the latter type available to the rest of the company, and one part of that task is creating compliance standards. "It is important that this discussion takes place," says Heinckiens. "Then you see other discussions start to happen." For example, who owns this data? Who should receive permission to access this data? What is a customer? For the marketing department, after-sale department, finance department, the definition of customer is totally different, even though they refer to the same person. In many companies this process is ultimately formalized. At Campbell's, it's called a "blueprint." Before a new project can be started, each technology area must review a proposed project to ensure that it fits into the overall strategy.

Achieving that impressive lockstep between business and IT takes time and practice, of course. Not only that, but an enterprise architect must be a voice that many kinds of people can understand, says Tim Ferrarell, chief information officer and senior vice president of enterprise systems at W.W. Grainger, a $6.4 billion distributor of heavy equipment.

Ideally, Ferrarell says, this person "can think at a strategic level and all the way down to the operating level and understand how to move up and down that chain of abstraction," he says. "And know how to deal with conflicts and trade-offs."

Is that all? Actually, no. That person also has to gain the confidence of the senior leadership team, he says. Execs must believe that the enterprise architect comprehends how the company works, where it wants to go and how technology helps or hinders, he says. Then effective working relationships can bloom.

In 2006, Grainger went live with a companywide SAP project—20 SAP modules and 30 additional applications that would touch 425 locations. To help guard against what could go wrong in a big-bang cutover, Ferrarell took his team of about 20 enterprise architects off their regular jobs and assigned them to design and integration roles on the SAP project. The SAP implementation was such an all-encompassing program that it made sense to re-purpose the enterprise architects into key roles in the project. Their broad business and technical knowledge made them very valuable team members, says Ferrarell.

Grainger's senior business-side managers knew these architects and their business savvy firsthand, he explains. The trust was there, which helped get IT the intense cooperation needed during and after the complicated launch. Their architects played a significant role, not only in shaping the need for completion of the ERP project, but in ensuring that its design would enable their business requirements. The SAP project succeeded, Ferrarell says, in part due to the institutional knowledge and business-IT translation skills the EAs brought to it.

Other companies, though, have to be convinced of the enterprise architect's criticality. Sony Pictures Entertainment launched an enterprise architect role modestly in 2002, focused at first only on technology issues, says David Buckholtz, vice president of planning, enterprise architecture, and quality at the media company.

He had to start small: Sony Pictures Entertainment didn't even have a corporatewide IT department until the late 1990s, Buckholtz says. The company grew from acquisitions and other deals that parent company Sony Corp. of America made in the 1980s and 1990s, such as the acquisition of Columbia TriStar movie studio (*The Karate Kid* and *Ghostbusters*) and the acquisition of Merv Griffin Enterprises (*Wheel of Fortune* and *Jeopardy*).

"We're in a creative industry and people made a lot of decisions on their own," he says. Hence, no central IT until relatively recently and no strong belief in the importance of central IT, he says.

Buckholtz was hired from General Electric to start an enterprise architecture team because Sony Pictures wanted more efficiency and savings from IT, he says. At first, he concentrated on classifying existing and future technology investments. Categories include technologies in development where Sony is doing proofs of concept; technologies in pilot; current and supported; supported but older versions; those headed to retirement; and those that are obsolete and no longer supported except "under extreme duress," Buckholtz says, laughing.

He began this way to demonstrate that IT could be businesslike: investing well, conscious of risk, planning for the future. "This is how you plan enterprise architecture when you don't have business support yet. We had to build up to that."

Once the architecture group has the enterprise IT house under control, it can look for ways to work with different business technology groups to build credibility beyond bits and bytes, he says. One technique Buckholtz used was to install architects in different business groups to work on projects on business turf but using IT's budget. A free trial, in a sense.

By 2005, Buckholtz's group had started a high-profile project with the digital media team to map out how Sony Pictures would digitize content for downloading to mobile phones and other devices. He counts it as a success that the digital media group continues to use that road map today. "We identified high-value work and we were all committed to it," he says. "It was not a group off somewhere, passing down standards."

As the economy tightens, Sony Pictures must make its distribution chain as efficient as possible, he adds. Movies, after all, are a discretionary expense for consumers and if they pull back on luxuries, Sony Pictures will feel it. EAs continuously reinforce to business-side counterparts the expected returns on IT projects as the temptation to cut spending grows. "We make sure we close the loop and quantify hard-dollar costs and benefits for the CFO," Buckholtz says.

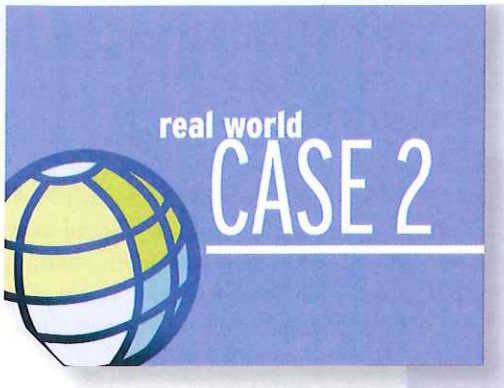
SOURCE: Diann Daniel, "The Rising Importance of the Enterprise Architect," *CIO.com*, March 31, 2007, and Kim S. Nash, "The Case for Enterprise Architects," *CIO.com*, December 23, 2008.

CASE STUDY QUESTIONS

1. What does the position of enterprise architect entail? What qualifications or experiences do you think a good enterprise architect should have? Support your answer with examples from the case.
2. Consider the different companies mentioned in the case and their experiences with enterprise architecture. Does this approach seem to work better in certain types of companies or industries than in others? Why or why not?
3. What is the value derived from companies with mature enterprise architectures? Are there any downsides that you can see? Discuss.

REAL WORLD ACTIVITIES

1. Service-oriented architecture (SOA) is a recent approach to systems development and implementation that has much in common with enterprise architecture, as well as some differences. Go online and research these similarities and differences. Prepare a report to summarize your work.
2. Have you considered a career as an enterprise architect? What bundle of courses would you put together to design a major or a track in enterprise architecture? Break into small groups with your classmates to outline the major areas that should be covered.



Nationwide Insurance: Unified Financial Reporting and "One Version of the Truth"

In a span of three short years, between 2000 and 2002, Nationwide Insurance got a new CEO, CIO, and CFO.

Jerry Jurgensen, elected by Nationwide's board in 2000 to replace the retiring CEO, was hired for his financial acumen and his ability to transform a business's culture. Michael Keller was named the company's first enterprisewide chief information officer the following year. He had 25 years of IT experience managing big infrastructure and systems integration projects. In 2002, Robert Rosholt replaced the retiring chief financial officer and joined the others in Nationwide's Columbus headquarters, bringing along deep experience in all things financial.

The three were old buddies who had worked together at financial giant Bank One. Now they held the reins at Nationwide and their goal was to take its dozens of business units, selling a diverse set of insurance and financial products, to a higher level. In 2001, Nationwide was profitable to the tune of $138 million and board members had billion-dollar aspirations for that line item.

But to get there, Jurgensen needed financial snapshots of how Nationwide was doing at any given moment. And getting them wasn't so easy.

In fact, it was almost impossible.

"When you're dealing with 14 general ledger platforms and over 50 applications," Rosholt says, "it was enormous work to get the financials out."

The problem lay knotted in a tangle of systems and applications, and some 240 sources of financial data flowing in and around Nationwide's business units. The units had always run independently, and that's how financial reporting was handled. "There was a variety of [financial reporting] languages," Rosholt says, which affected Nationwide's ability to forecast, budget, and report. "It was difficult," says Rosholt, to ask, "How are we doing?" Keller's situation was no better.

"One of the first questions I was asked when I joined was, How much money do we spend, total, on IT?" Keller recalls. "The answer was, we didn't know. It took weeks to put that answer together."

Jurgensen wanted to be able to run Nationwide as if it were one unified enterprise. He wanted, in Rosholt's words, "to do things that are common, and respect the things that are different. And that was a big change." Indeed, the transformation the company embarked upon in early 2004 was daunting—a master data management makeover that would alter how every Nationwide business reported its financials, how accounting personnel did their jobs, how data was governed and by whom, and how the company's information systems would pull all that together. The goal was simple: one platform; one version of the financial truth. Simple goal. But a difficult challenge.

Says James Kobielus, principal analyst of data management at market researcher Current Analysis, "In the hyper-siloed real world of enterprise networking, master data is scattered all over creation and subjected to a fragmented, inconsistent, rickety set of manual and automated processes." Good master data governance can happen only when the various constituencies that own the data sources agree on a common set of definitions, rules, and synchronized procedures, all of which requires a degree of political maneuvering that's not for the faint of heart.

Nationwide began its finance transformation program, called Focus, with its eyes wide open. The executive troika of Jurgensen, Rosholt, and Keller had pulled off a similar project at Bank One and thought it knew how to avoid the big mistakes. That, in part, is why Rosholt, who had ultimate say on the project, would not budge on its 24-month time line. "The most important aspect was sticking to discipline and not wavering," he recalls. And that's why the technology piece was, from the outset, the last question to be addressed.

"It wasn't a technology project," insists Lynda Butler, whose vice president of performance management position was created to oversee Focus (which stands for Faster, Online, Customer-driven, User-friendly, Streamlined). She says that Nationwide approached Focus first and foremost as a business and financial project.

Nationwide considers the project, which made its deadline, a success, although everyone interviewed for this article stresses that there's more work to be done. Says Keller: "There's a foundation to build on where there wasn't one before."

"Fourteen general ledgers, 12 reporting tools, 17 financial data repositories and 300,000 spreadsheets were used in finance," says Butler. "That's not real conducive to 'one version of the truth.'"

Early in his tenure as chief executive officer, Jurgensen's concerns about the company's financials weren't limited to the timeliness of the data; he was also worried about its integrity and accuracy. He and other execs knew that faster

access to more comprehensive data sets would allow for better trend analysis and forecasting decisions, and strengthen budgeting, reporting and accounting processes. For example, because Nationwide had such a variety of businesses, the company carried a lot of risk—some easily visible, some not. "So, if equity markets went down, we were exposed," notes Butler. "But we didn't realize that until the markets actually went down. We needed some enterprise view of the world."

Executives also knew that common data definitions among all the business units would provide comparable financial data for analysis—which was difficult, if not impossible, without those definitions. "We needed consistent data across the organization," Rosholt says. "We were looking for one book of record." CFO Rosholt went back to his Bank One roots and recruited Vikas Gopal, who had proven his mettle on similar projects, to lead the IT team.

With no wiggle room on the time line, the team, with Rosholt's encouragement, followed what it refers to as the "80/20" rule. It knew that it wasn't going to get 100 percent of the desired functionality of the new system, so the team decided that if it could get roughly 80 percent of the project up and running in 24 months, it could fix the remaining 20 percent later. "If we went after perfection," says Rosholt, "we'd still be at it."

Keeping in mind that no one would get everything he wanted, the Focus team interviewed key stakeholders in Nationwide's business units to understand where their pain points were. "We went back to basics," says Gopal. "We said, 'Let's talk about your financial systems, how they help your decision making.'" The team then determined where senior management wanted to focus and presented it with a choice of 10 different financial competencies. "Do we want to be the best company that does transaction recording? Or enterprise risk? Or analytics?" Gopal says.

In other words, people were introduced to the concept of making trade-offs, which allowed the Focus team to target the system's core functionalities and keep control over the project's scope.

It was only after the requirements, definitions, and parameters were mapped out that Gopal's group began looking at technologies. Gopal had two rules to guide them: First, all financial-related systems had to be subscribers to the central book of record. Second, none of the master data in any of the financial applications could ever be out of sync. So the Focus team's final step was to evaluate technologies that would follow and enforce those rules.

The team reasoned that it had neither the time nor the inclination to invent technology at Nationwide. "We wanted to start off on the right footing from a TCO (total cost of ownership) perspective; with only 24 months you don't have a ton of time to build a lot of stuff," Gopal says. His team sought out best-of-breed tool sets from vendors such as Kalido and Teradata that would be able to tie into their existing systems. Gopal wasn't overly "worried about [technology] execution" because he had assembled this type of system before and knew that the technology solutions on the market, even in the most vanilla forms, were robust enough for Nationwide's needs.

What did worry him was Nationwide's legion of financial employees who didn't relish the idea of changing the way they went about their work. At the beginning of the program, Nationwide formed a "One Finance Family" program that tried to unify all the finance folks around Focus. Executives were also able to identify those employees who were most affected through weekly "change meetings" and provide support. In addition, executives placed dedicated communications personnel who were responsible for communicating and managing change through the meetings and media channels.

The Focus team had to remain resolute. The overarching theme, that there would be no compromise in data quality and integrity, was repeated early and often, and execs made sure that the gravity of the change was communicated before anyone saw any new software.

Finally, in March 2005, with three waves of planned deployments ahead of it, the team started rolling out the new Focus system. By fall 2005, there was light at the end of the tunnel. The team could see the new business processes and financial data governance mechanisms actually being used by Nationwide employees. And it all was working. "They saw the value they were creating," recalls Butler. "The 'aha' moment came when we finally got a chance to look in the rear-view mirror."

Nationwide execs concede that the system is still evolving but say substantial gains are everywhere. The first benefit of the transformation that Rosholt mentions is something that didn't happen. "You go through a project such as this, in a period of extreme regulatory and accounting oversight, and these things can cough up more issues, such as earnings restatements. We've avoided that," he says. "That doesn't mean we're perfect, but that's one thing everyone's amazed at. We went through all this change and nothing coughed up. Our balance sheet was right."

Nationwide has one less thing to worry about, one more thing to be confident about.

SOURCE: Thomas Wailgum, "How Master Data Management Unified Financial Reporting at Nationwide Insurance," *CIO.com*, December 21, 2007.

CASE STUDY QUESTIONS

1. The project that Nationwide undertook was quite clearly a success. What made this possible? Discuss three different practices that helped Nationwide pull this off. Use examples from the case where necessary.

2. The case notes that Nationwide had in mind a simple goal, but faced a difficult challenge. Why was this so difficult? What was the scenario the three executives faced when they joined Nationwide? How had the company gotten there?
3. What is the business value derived from the successful completion of this project? What can executives at Nationwide do now that they could not do before? Provide some examples.

REAL WORLD ACTIVITIES

1. Technologies and systems involved in financial reporting have received a great deal of attention in the last few years due to renewed regulatory focus on the integrity and reliability of financial information. Go online and research how companies are deploying technology to deal with these issues. Prepare a report to summarize your findings.
2. A number of political and cultural issues were involved in the implementation of the "one version of the truth" approach at Nationwide. Can these obstacles be overcome simply by mandating compliance from top management? What else should companies do to help ease these transitions? Break into small groups with your classmates and brainstorm some possible actions.

chapter 8

BUSINESS ACROSS THE ENTERPRISE

CHAPTER HIGHLIGHTS

Getting All the Geese Lined Up: Managing at the Enterprise Business Level

Introduction

Customer Relationship Management: The Business Focus

REAL WORLD CHALLENGE: Jelly Belly Candy Company—Getting Your Arms around Sales

Introduction
What Is CRM?
The Three Phases of CRM
Benefits and Challenges of CRM
Trends in CRM

Enterprise Resource Planning: The Business Backbone

Introduction
What Is ERP?
Benefits and Challenges of ERP
Trends in ERP

Supply Chain Management: The Business Network

Introduction
What Is SCM?
The Role of SCM
Benefits and Challenges of SCM
Trends in SCM

REAL WORLD SOLUTION: Jelly Belly Candy Company—Competing with CRM

REAL WORLD CASE: Kennametal, Haworth, Dana Holding, and Others: ERPs Get a Second Lease on Life

REAL WORLD CASE: Cisco Systems, Black & Decker, and O'Reilly Auto Parts: Adapting Supply Chains to Tough Times

LEARNING OBJECTIVES

After reading and studying this chapter, you should be able to:

8-1 Identify and give examples to illustrate the following aspects of customer relationship management, enterprise resource management, and supply chain management systems:
   a. Business processes supported
   b. Customer and business value provided
   c. Potential challenges and trends

8-2 Understand the importance of managing at the enterprise level to achieve maximum efficiencies and benefits.