Technology Guide

5

A Technical View of System Analysis and Design

TG5.1 Developing an IT Architecture

An IT architecture is a conceptual framework for the organization of the IT infrastructure and applications. It is a plan for the structure and integration of IT resources and applications in the organization.

A SIX-STEP PROCESS

Once the corporate strategy team or steering committee decides on potential applications, an architecture must be developed.

Step 1: Business goals and vision. This step, in which the system analyst reviews the relevant business goals and vision, is sometimes referred to as "business architecture."

Step 2: Information architecture. In this step a company analyst defines the information necessary to fulfill the objectives of Step 1. Here, one should examine each objective and goal, identify the information currently available, and determine what new information is needed. All potential users need to be involved.

Step 3: Data architecture. Once you know what information must be processed, you need to determine a *data architecture*—that is, exactly what data you have and what you want to get from customers, including Web-generated data. Of special interest is the investigation of all data that flow within the organization and to and from your business partners.

The result of your investigation will probably show that data is everywhere, from data warehouses to mainframe files to Excel files on users' PCs. You need to conduct an analysis of the data, understanding its use, and examine the need for new data. This is when you need to think about how to process this data and what tools to use.

Step 4: Application architecture. At this point, you define the components or modules of the applications that will interface with the required data defined in Step 3. In this step you will build the conceptual framework of an application, but not the infrastructure that will support it. An example is shown in Figure TG5.1.

Many vendors, such as IBM, Oracle, and Microsoft, offer sophisticated IT application platforms that can significantly reduce the amount of code that programmers need to write. These application platforms also explain how the application should be structured.

Other factors that must be considered are scalability, security, the number and size of servers, and the networks. The need to interface with legacy systems and with sales, ERP, accounting, and human resources data must be considered. In addition, the ability to read real-time data is also important.

The major output of this step is to define the software components that meet the data requirements.

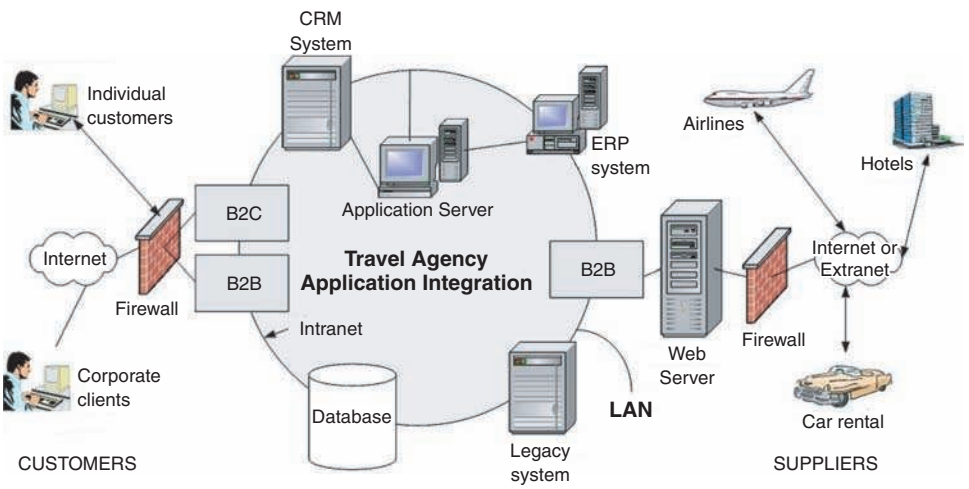

Figure TG5.1 Architecture of an online travel agency.

Step 5: Technical architecture. During the previous steps, designers informally considered the technical requirements. In this step, they must formally examine the specific hardware and software required to support the analysis in the previous steps. An inventory of the existing information resources is made, and an evaluation of the necessary upgrades and acquisitions is performed.

At this stage, designers must also examine the middleware needed for the application. EC applications require a considerable amount of transaction processing software. The more scalability and availability required, the more you need to invest in additional application servers and other hardware and software.

When selecting a programming language, designers may consider Java, Visual Studio, C11, CGI, and even COBOL, depending on the application. Also in this step, the operating systems, transaction processors, and networking devices required to support the applications must be decided on. Obviously, you want to leverage your existing IT resources, but this may not be the optimal approach.

Step 6: Organizational architecture. An organizational architecture deals with the human resources and procedures required by Steps 1 through 5. At this point, the legal, administrative, and financial constraints should be examined. For example, a lack of certain IT skills on your team may require hiring or retraining. Partial outsourcing may be a useful way to deal with skill deficiencies.

In the worst-case scenario, you outsource the entire job, but you can give the architecture to the vendor as a starting point. Also, vendor selection can be improved if the architectures (business, information, data, application, and technical) are considered.

CONCLUSION

Creating IT architecture may be a lengthy process, but it is necessary to go through it. You may want to develop metrics to help you to track the effectiveness of your IT architecture, and you certainly need to document the process and output of each step.

Once the IT architecture has been decided on, a development strategy can be formulated.

TG5.2 Alternative Methods and Tools for Systems Development

Organizations use the traditional systems development life cycle because it has three major advantages: control, accountability, and error detection. An important issue in systems development is that the later in the development process that errors are detected, the more expensive they are to correct. The structured sequence of tasks and milestones in the SDLC thus makes error detection easier and saves money in the long run.

However, the SDLC does have disadvantages. By its structured nature, it is relatively inflexible. It is also time-consuming and expensive, and discourages changes to user requirements once they have been established. Development managers who must develop large, enterprise-wide applications therefore find it useful to mix and match development methods and tools in order to reduce development time, complexity, and costs. These methods and tools include prototyping, rapid application development, component-based development, Web Services, integrated computer-assisted software engineering (ICASE) tools, and object-oriented development. Although all of these methods and tools can reduce development time, none can consistently deliver in all cases. They are perhaps best considered as options to complement or replace the SDLC or portions of it. This section discusses each of these methods and tools.

PROTOTYPING

The **prototyping** approach defines an initial list of user requirements, builds a prototype system, and then improves the system in several iterations based on users' feedback. Developers do not try to obtain a complete set of user

specifications for the system at the outset and do not plan to develop the system all at once. Instead, they quickly develop a prototype, which either contains parts of the new system of most interest to the users or is a small-scale working model of the entire system. Users make suggestions for improving the prototype, based on their experiences with it.

The developers then review the prototype with the users and use the suggestions to refine the prototype. This process continues through several iterations until either the users approve the system or it becomes apparent that the system cannot meet users' needs. If the system is viable, the developers can use the prototype on which to build the full system. Developing screens that a user will see and interact with is a typical use of prototyping. (See Figure TG5.2 for a model that shows the prototyping process.)

The main advantage of prototyping is that it speeds up the development process. In addition, prototyping gives users the opportunity to clarify their information requirements as they review iterations of the new system. Prototyping is especially useful in the development of decision support systems and executive information systems, where user interaction is particularly important.

Prototyping also has disadvantages. Because it can largely replace the analysis and design stages of the SDLC in some projects, systems analysts may not produce adequate documentation for the programmers. This lack of documentation can lead to problems after the system becomes operational and needs maintenance. In addition, prototyping can result in an excess of iterations, which can consume the time that prototyping should be saving.

Inside spiral development there is *prototyping*. The prototype is a model of a system that can be used to communicate the requirements and design of that part of the system between developers and their clients.

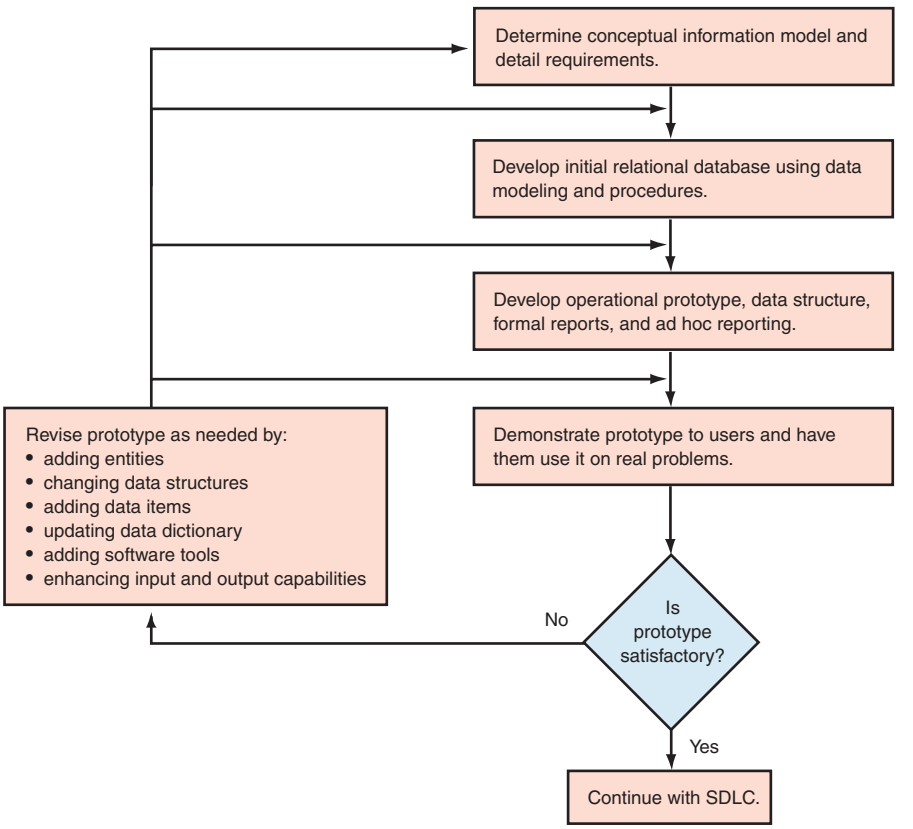

Figure TG5.2 A model of the prototyping process.

JOINT APPLICATION DESIGN

Joint application design (JAD) is a group-based tool for collecting user requirements and creating system designs. JAD is most often used within the systems analysis and systems design stages of the SDLC.

In the traditional SDLC, systems analysts interview or directly observe potential users of the new information system *individually* to understand each user's needs. The analysts will obtain many similar requests from users, but also many conflicting requests. The analysts must then consolidate all requests and go back to the users to resolve the conflicts, a process that usually requires a great deal of time. In contrast, JAD has a *group meeting* in which all users meet simultaneously with analysts. It is basically a *group decision-making process* and can be computerized or done manually. During this meeting, all users jointly define and agree upon systems requirements. This process saves a tremendous amount of time. E-JAD is an extension of JAD whereby the group meeting is done remotely using groupware software.

The JAD approach to systems development has several advantages. First, the group process involves many users in the development process while still saving time. This involvement leads to greater support for the new system and can produce a system of higher quality. This involvement also may lead to easier implementation of the new system and lower training costs.

The JAD approach also has disadvantages. First, it is very difficult to get all users to the JAD meeting. For example, large organizations may have users literally all over the world. Second, the JAD approach has all of the problems caused by any group process (e.g., one person can dominate the meeting, some participants may not contribute in a group setting). To alleviate these problems, JAD sessions usually have a facilitator, who is skilled in systems analysis and design as well as in managing group meetings and processes. Also, the use of groupware (such as GDSS) can help facilitate the meeting.

RAPID APPLICATION DEVELOPMENT

Rapid application development (RAD) is a systems development method that can combine JAD, prototyping, and integrated CASE tools (described next) to rapidly produce a high-quality system. Initially, JAD sessions are used to collect system requirements so that users are intensively involved early on. The development process in RAD is iterative, similar to prototyping, in which requirements, designs, and the system itself are developed with sequential refinements. However, RAD and prototyping use different tools. Prototyping typically uses specialized languages, such as fourth-generation languages (4GLs), Web-based development tools, and screen generators; RAD uses ICASE tools (discussed next) to quickly structure requirements and develop prototypes. As the prototypes are developed and refined, users review them in additional JAD sessions. RAD produces functional components of a final system, rather than limited-scale versions. For more details, see Figure TG5.3. The figure also compares RAD to SDLC.

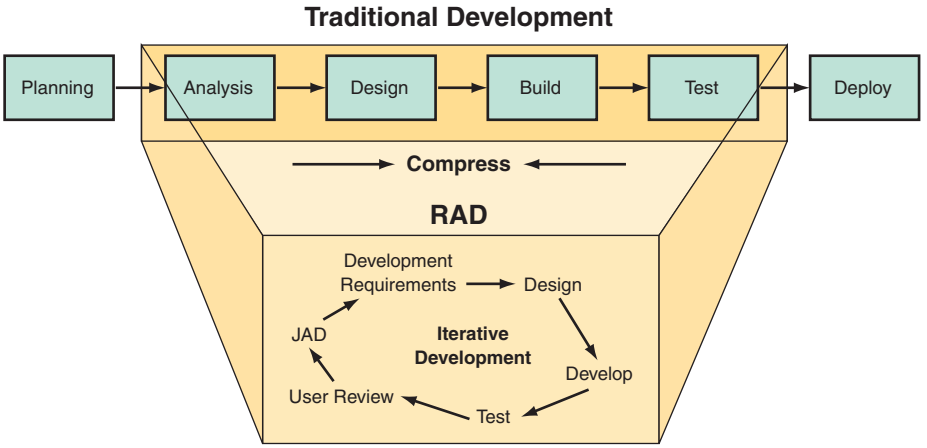

Figure TG5.3 A rapid prototyping development process versus SDLC.

Rapid application development (RAD) methodologies and tools make it possible to develop systems faster, especially systems where the user interface is an important component. RAD can also improve the process of rewriting legacy applications.

INTEGRATED COMPUTER-ASSISTED SOFTWARE ENGINEERING TOOLS

Computer-aided software engineering (CASE) is a development approach that uses specialized tools to automate many of the tasks in the SDLC. The tools used to automate the early stages of the SDLC (systems investigation, analysis, and design) are called upper CASE tools. The tools used to automate later stages in the SDLC (programming, testing, operation, and maintenance) are called lower CASE tools. CASE tools that provide links between upper CASE and lower CASE tools are called **integrated CASE (ICASE) tools.** Some CASE tools can even work backward, modifying the model after modifying the coding. See, for example, IBM's Rational Rose.

CASE tools provide advantages for systems developers. These tools can produce systems with a longer effective operational life that more closely meet user requirements. CASE tools can speed up the development process and result in systems that are more flexible and adaptable to changing business conditions. Finally, systems produced using CASE tools typically have excellent documentation.

On the other hand, CASE tools can produce initial systems that are more expensive to build and maintain. CASE tools do require more extensive and accurate definition of user needs and requirements. Also, CASE tools are difficult to customize and may be difficult to use with existing systems.

OBJECT-ORIENTED DEVELOPMENT

Object-oriented development is based on a fundamentally different view of computer systems than that found in traditional SDLC development approaches. Traditional approaches provide specific step-by-step instructions in the form of computer programs, in which programmers must specify every procedural detail. These programs usually result in a system that performs the original task but may not be suited for handling other tasks, even when the other tasks involve the same real-world entities. For example, a billing system will handle billing but probably will not be adaptable to handle mailings for the marketing department or generate leads for the sales force, even though the billing, marketing, and sales functions all use similar data (e.g., customer names, addresses, and purchases). An object-oriented (OO) system, on the other hand, begins not with the task to be performed, but with the aspects of the real world that must be modeled to perform that task. Therefore, in the example above, if the firm has a good model of its customers and its interactions with them, this model can be used equally well for billings, mailings, and sales leads.

The object-oriented (OO) approach to software development offers many advantages:

- It reduces the complexity of systems development and leads to systems that are easier and quicker to build and maintain because each object is relatively small and self-contained.
- It improves programmers' productivity and quality. Once an object has been defined, implemented, and tested, it can be reused in other systems.
- Systems developed with the OO approach are more flexible. These systems can be modified and enhanced easily by changing some types of objects or by adding new types.
- The OO approach allows the systems analyst to think at the level of the real-world systems (as users do), rather than at the level of the programming language. The basic operations of an enterprise change much more slowly than the information needs of specific groups or individuals. Therefore, software based on generic models (which the OO approach is) will have a longer life span than programs written to solve specific, immediate problems.
- The OO approach is also ideal for developing Web applications.
- The OO approach depicts the various elements of an information system in user terms (i.e., business or real-world terms), and therefore, the users have a better understanding of what the new system does and how it meets its objectives.

The OO approach does have some disadvantages: OO systems, especially those written in Java, generally run more slowly than those developed in other programming languages. Also, many programmers have little skill and experience with OO languages, necessitating retraining.

An object-oriented development environment provides a framework that encourages designers to think in object-oriented terms, to design systems with conceptual integrity and clear separation of function from internal implementation. It also provides substantial assistance to the developer in automating the production of executable software from the object-oriented model. Interface logic, and the underlying middleware, are generated by the component-based development environment.

Object-Oriented Analysis and Design. The development process for an object-oriented system begins with a feasibility study and analysis of the existing system. Systems developers identify the *objects* in the new system—the fundamental elements in OO analysis and design. Each object represents a tangible real-world entity, such as a customer, bank account, student, or course. Objects have *properties*. For example, a customer has an identification number, name, address, account number(s), and so on. Objects also contain the *operations* that can be performed on their properties. For example, customer objects' operations may include obtain-account-balance, open-account, withdraw-funds, and so on.

Therefore, object-oriented analysts define all of the relevant objects needed for the new system, including their properties (called *data values*) and their operations (called *behaviors*). They then model how the objects interact to meet the objectives of the new system. In some cases, analysts can reuse existing objects from other applications (or from a library of objects) in the new system, saving time spent coding. In most cases, however, even with object reuse, some coding will be necessary to customize the objects and their interactions for the new system.

Comparison of the various development methods is shown in Table TG5.1.

INFORMATION SYSTEMS DEVELOPMENT METHODOLOGIES, TECHNIQUES, AND TOOLS

An **information systems development methodology (ISDM)** can be defined as a collection of procedures, techniques, tools, and documentation aids that help systems developers in their efforts to implement a new information system. The methodology consists of phases, themselves consisting of subphases, which guide the systems developers in their choice of the techniques that might be appropriate at each stage of the project, and also help them plan, manage, control, and evaluate information systems projects.

A *methodology* is a set of practices and procedures, with supporting templates and knowledge bases, that systematically organizes the development process. (A methodology is different from a method.) A methodology should specify the training needs of the users and specifically address the critical issue of development philosophy. The objectives of using a methodology are (1) a better end product, (2) a better development process, and (3) a standardized process.

Different methodologies make different assumptions about the business and work environments of the project, and knowing each of their pros and cons allows a team to pick the most efficient methodology for its particular project. Some methodologies emphasize testing, some documentation; others stress code reusability. Certain methodologies are better suited for projects with tight deadlines or unclear and changing requirements.

Executing against a methodology reduces the knowledge and experience required by a development team. However, the team needs to learn the rules and practices of a specific methodology.

Techniques and Tools Features in Each Methodology. A *technique* is a way of doing a particular activity in the information systems development process, and any particular methodology may recommend techniques to carry out many of these activities. Techniques include holistic, data, process, object-oriented, project management, organizational, and people.

TABLE TG5.1 Advantages and Disadvantages of Systems Acquisition Methodologies

Advantages	Disadvantages
Traditional Systems Development (SDLC)	
• Forces staff to be systematic by going through every step in a structured process. • Enforces quality by maintaining standards. • Has lower probability of missing important issues in collecting user requirements.	• May produce excessive documentation. • Users are often unwilling or unable to study the specifications they approve. • Takes too long to go from the original ideas to a working system. • Users have trouble describing requirements for a proposed system.
Prototyping	
• Helps clarify user requirements. • Helps verify the feasibility of the design. • Promotes genuine user participation in the development process. • Promotes close working relationship between systems developers and users. • Works well for ill-defined problems. • May produce part of the final system.	• May encourage inadequate problem analysis. • Not practical with large number of users. • User may not give up the prototype when the system is completed. • May generate confusion about whether or not the information system is complete and maintainable. • System may be built quickly, which may result in lower quality.
Joint Application Development (JAD)	
• Easy for senior management to understand. • Provides needed structure to the user requirements collection process.	• Difficult and expensive to get all people to the same place at the same time. • Potential to have dysfunctional groups.
Rapid Application Development (RAD)	
• Active user involvement in analysis and design stages. • Easier implementation due to user involvement.	• System often narrowly focused, which limits future evolution, flexibility, and adaptability to changing business conditions. • System may be built quickly, which may result in lower quality.
Object-Oriented Development (OO)	
• Integration of data and processing during analysis and design should lead to higher-quality systems. • Reuse of common objects and classes makes development and maintenance easier.	• Very difficult to train analysts and programmers on the OO approach. • Limited use of common objects and classes.
End-User Development	
• Bypasses the information systems department and avoids delays. • User controls the application and can change it as needed. • Directly meets user requirements. • Increased user acceptance of new system. • Frees up IT resources and may reduce application development backlog.	• Creates lower-quality systems because an amateur does the programming. • May eventually require consulting and maintenance assistance from the IT department. • System may not have adequate documentation. • Poor quality control. • System may not have adequate interfaces to existing systems.
External Acquisition (Buy or Lease)	
• Software exists and can be tried out. • Software has been used for similar problems in other organizations. • Reduces time spent for analysis, design, and programming. • Has good documentation that will be maintained.	• Controlled by another company that has its own priorities and business considerations. • Package's limitations may prevent desired business processes. • May be difficult to get needed enhancements if other companies using the package do not need those enhancements. • Lack of intimate knowledge about how the software works and why it works that way.

Each technique may involve the use of one or more *tools* that represent some of the artifacts used in information systems development. Tools include groupware (e.g., GroupSystems), Web site development (e.g., DreamWeaver), drawing (e.g., Microsoft Visio), project management (e.g., Microsoft Project), and database management (e.g., Microsoft Access). Tools used in development can range from simple automation (e.g., a drawing program such as Visio) to fully featured modeling tools such as Rational Rose, which is capable of interfacing to a repository through XML to share data with other tools in a cooperative total development environment.

TG5.3 Component-Based Development and Web Services

COMPONENT-BASED DEVELOPMENT

Object-oriented development, discussed in Section TG5.2, has its downside: Business objects, though they represent things in the rea1 world, can become unwieldy when they are combined and recombined in large-scale commercial applications. What is needed, instead, are *suites* of business objects that provide major chunks of application functionality (e.g., preprogrammed workflow, order placing) that can be "snapped together" to create complete business applications.

This approach is embodied in **component-based development (CBD),** the upcoming evolutionary step beyond object-oriented development. CBD uses pre-programmed components to develop applications. For the purposes of independent deployment, a component needs to be a binary unit.

A component's functionality can be accessed only through its interfaces. Components must have software "plug points" that fit into sockets provided by a component execution environment. The component execution environment is required to provide run-time technical infrastructure services and to hide low-level technology issues from the business solution developer.

Rather than elicit synchronous interactions between components, a component invokes an operation in another component by sending a message. Where integration is needed across architectural domains, loosely coupled integration is more appropriate than a tightly coupled arrangement. In a *tightly coupled* integration, a component needs to know the name of the service it wants to call. In a *loosely coupled* integration with a message broker, an application makes its request by sending a message, in proper standard format, to the message broker. Based on the message content, the message broker forwards the message to the application that accepts the message and acts upon it.

Key Characteristics of Components in Component-Based Development. Components used in distributed computing need to possess several key characteristics to work correctly, and they can be viewed as an extension of the object-oriented paradigm. The two main traits borrowed from the world of object-oriented technology are *encapsulation* and *data hiding*.

Components *encapsulate* the routines or programs that perform discrete functions. In a component-based program, one can define components with various published interfaces. One of these interfaces might be, for example, a data-comparison function. If this function is passed to two data objects to compare, it returns the results. All manipulations of data are required to use the interfaces defined by the data object, so the complete function is encapsulated in this object, which has a distinct interface to other systems. Now, if the function has to be changed, only the program code that defines the object must be changed, and the behavior of the data comparison routine is updated immediately, a feature known as *encapsulation*.

Data hiding addresses a different problem. It places data needed by a component object's functions within the component, where it can be accessed only by specially designated functions in the component itself. Data hiding is a critical trait of distributed components. The fact that only designated functions can access certain

data items, and outside "requestors" have to query the component, simplifies maintenance of component-oriented programs.

Component-Based Development of E-Commerce Applications. Plug-and-play business application components can be "glued together" rapidly to develop complex distributed applications, such as those needed for e-commerce. Component-based EC development is gaining momentum. It is supported by Microsoft and the Object Management Group (OMG), which have put in place many of the standards needed to make component-based development a reality. There are several methods that developers can use for integrating components. A logical architecture for component-based development of e-commerce applications can be described in layers, as shown in Figure TG5.4.

The Role of Component-Based Approach in Software Reuse. The efficient development of software reuse has become a critical aspect in the overall IS strategies of many organizations. An increasing number of companies have reported reuse successes. The traditional reuse paradigm allows changes to the code that is to be reused ("white-box reuse"). Component-based software development advocates that components be reused as is ("black-box reuse"). Taking the black-box reuse concept one step further is the idea of leveraging existing software using Web Services (our next topic). Both component-based development and Web Services are receiving growing interest among members of the IS community.

WEB SERVICES IN SYSTEM DEVELOPMENT

The major application of Web Services is systems integration. Applications need to be integrated with databases and with other applications. Users need to interface with the data warehouse to conduct analysis, and almost any new system needs to be integrated with older ones. Finally, the increase of B2B and e-business activities requires the integration of application and databases of business partners (external integration). Because Web Services can contribute so much to systems integration, their use is growing rapidly.

The original term for Web Services was "application services." They are services that are made available from a business's server for Web users. Because of their great interoperability and extensibility (due to the use of XML), Web Services can be combined in a loosely coupled way in order to achieve complex operations.

Web Services simplify enterprise application integration and create new revenue opportunities by enabling organizations to offer data and services to both customers and partners. Web Services information inquiry has taken a great stride forward because many companies are looking to automate business processes and get products to market faster. The future of Web Services depends on cross-platform interoperability

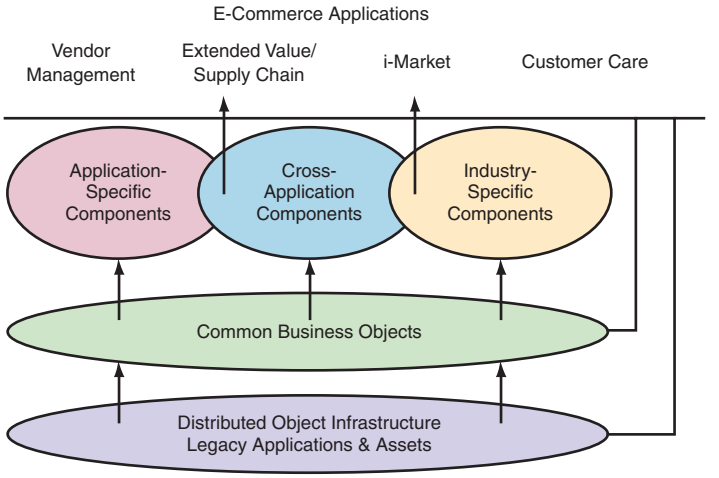

Figure TG5.4 Logical architecture for component-based development of e-commerce.

and the creation of a security standard. The Web Services Interoperability Organization will solve these problems.

Service-oriented architecture (SOA) is a good companion to Web Services. It has the benefit of its capacity for rapid modification. It will become an IT architecture mainstream in the future.

Basic Concepts. There are several definitions of Web Services. Here is a typical one: **Web Services** are self-contained, self-describing business and consumer modular applications, delivered over the Internet, that users can select and combine through almost any device (from personal computers to mobile phones). By using a set of shared protocols and standards, these applications permit different systems to "talk" with one another—that is, to share data and services—without requiring human beings to translate the conversations.

Specifically, a Web Service fits the following three criteria: (1) It is able to expose and describe itself to other applications, allowing those applications to understand what the service does. (2) It can be located by other applications via an online directory if the service has been registered in a proper directory. (3) It can be invoked by the originating application by using standard protocols.

Web Services have great potential because they can be used in a variety of environments (over the Internet, on an intranet inside a corporate firewall, on an extranet set up by business partners) and can be written using a wide variety of development tools. They can be made to perform a wide variety of tasks, from automating business processes, to integrating components of an enterprise-wide system, to streamlining online buying and selling. Key to the promise of Web Services is that, in theory, they can be used by anyone, anywhere, any time, using any hardware and any software, as long as the modular software components of the services are built using a set of key protocols.

The Key Protocols. Web Services are based on a family of key protocols (standards). These protocols are the building blocks of the Web Services platforms. The major protocols are:

- **XML.** *Extensible Markup Language* makes it easier to exchange data among a variety of applications and to validate and interpret such data. An XML document describes a Web Service and includes information detailing exactly how the Web Service can be run.
- **SGML.** *Standard Generalized Markup Language* (SGML) is a general standard for the Internet programming languages. It is known informally as "the mother of all Web programming languages." It sets standards that are independent of any type of computer or of any operating system that sends or retrieves documents. It was developed and standardized by ISO in 1986. It does not specify any formats but rather sets the rules. HTML, XML, and WML are its products.
- **XML.** XML is a WWW Consortium (W3C) standard that translates a company's business documents into a format understandable by another company. It is the universal format for structured documents and data on the Web. It is intended for open computer-to-computer communications, as it permits the efficient integration of e-commerce solutions across both the Internet and private B2B networks.

XML lets developers define the tags used in terms of the *information* that tagged elements contain, rather than their appearance. XML code alone will not display anything on the computer screen: Only the combination of the HTML code and XML code will serve to display lists and tell the browser what the information is.

According to Microsoft, XML Web Services are the fundamental building blocks in the move to distributed computing on the Internet. Open standards and the focus on communication and collaboration among people and applications have created an environment in which XML Web Services are becoming the platform for application integration. Applications are constructed using multiple XML Web Services from various sources that work together, regardless of where they reside or how they were implemented. One of the primary advantages of the XML Web

Services architecture is that it allows programs written in different languages on different platforms to communicate with each other in a standards-based way.

Industry leaders in accounting, financial reporting, and accounting software are working with firms such as Microsoft and IBM to develop a common XML standard for financial reporting. This major initiative, called Extensible Business Reporting Language (XBRL), is an XML-based financial reporting language that supports the transmission of financial reports in a format that can be processed automatically by computers.

- **SOAP.** *Simple Object Access Protocol* is a set of rules that facilitate XML exchange between network applications. SOAP defines a common standard that allows different Web Services to interoperate (i.e., it enables communications, such as allowing Visual Basic clients to access Java server). It is a platform-independent specification that defines how messages can be sent between two software systems through the use of XML. These messages typically follow a Request/Response pattern (computer-to-computer).

- **WSDL.** The *Web Services Description Language* is used to create the XML document that describes tasks performed by Web Services. It actually defines the programmatic interface of the Web Services. Tools such as VisualStudio.Net automate the process of accessing the WSDL, read it, and code the application to reference the specific Web Service.

- **UDDI.** *Universal Description, Discovery, and Integration* allows for the creation of public or private searchable directories of Web Services. It is the registry of Web Services descriptions. UDDI was developed by the Organization for the Advancement of Structured Information Systems (OASIS), which was formed by IBM, Microsoft, Sun, and others.

- **Security protocols.** Several security standards are in development such as *Security Assertion Markup Language (SAML)*, which is a standard for authentication and authorization. Other security standards are XML signature, XML encryption, XKMS, and XACML.

The Notion of Web Services as Components. Traditionally, people view information systems, including the Web, as relating to information (data) processing. Web Services enable the Web to become a platform for applying business services as components in IT applications. For example, user authentication, currency conversion, and shipping arrangement are components of broad business processes or applications, such as e-commerce ordering or e-procurement systems.

A Web Services Example. As a simple example of how Web Services operate, consider an airline Web site that provides consumers with the opportunity to purchase tickets online. The airline recognizes that customers also might want to rent a car and reserve a hotel as part of their travel plans. The consumer would like the convenience of logging onto only one system rather than three, saving time and effort. Also, the same consumer would like to input personal information only once.

The airline does not have car rental or hotel reservation systems in place. Instead, the airline relies on car rental and hotel partners to provide Web Services access to their systems. The specific services the partners provide are defined by a series of WSDL documents. When a customer makes a reservation for a car or hotel on the airline's Web site, SOAP messages are sent back and forth in the background between the airline's and the partners' servers. In setting up their systems, there is no need for the partners to worry about the hardware or operating systems each is running. Web Services overcome the barriers imposed by these differences.

Case 1.1

Diamonds Forever

The gems market is global, with thousands of traders buying and selling about $45 billion worth of gems each year. This age-old business is very inefficient in terms of pricing: seven-tier supply chain intermediaries can jack up the price of a gem 1,000 percent between the mine and final retail prices.

Chanthaburi, Thailand, is one of the world's leading centers for processing gems, and that is where Don Kogen landed, at the age of 15, to search for his fortune. And indeed, he found it there. After failing to become a gem cutter, Kogen moved into gem sorting, and soon he learned to speak Thai. After three years of observing how gem traders haggle over stones, he decided to try the business himself. Having only a small amount of "seed" money, Kogen started by purchasing low-grade gems from sellers who arrived early in the morning and by selling them for a small profit to dealers from India and Pakistan who usually arrived late in the day. Using advertising, he reached the U.S. gem market and soon had 800 potential overseas customers. Using faxes, he shortened the order time, which resulted in decreasing the entire time from order to delivery. These various business methods enabled him to grow his mail-order business to $250,000 per year by 1997.

In 1998, Kogen decided to use the Internet. Within a month, he established a Web site, *thaigem.com,* and sold his first gem online. By 2001, the revenue reached $4.3 million, growing to $9.8 million in 2002. Online sales account for 85 percent of the company's revenue. The buyers are mostly jewelry dealers or retailers such as Wal-Mart or QVC. Kogen buys raw or refined gems from all over the world, some online, trying to cater to the demands of his customers. Then the site merged with NCS group, a large gem wholesaler.

Thaigem's competitive edge is low prices and profit margin. The proximity to gem-processing factories and the low labor cost there enable the company to offer prices significantly lower than those of his online competitors (such as Tiffany's at *tiffany.com*). Payments are made safely, securely, and conveniently using either PayPal or Escrow.com. Delivery to any place is made via Federal Express or the post office.

Dissatisfied customers can return merchandise within 30 days, no questions asked. No jewel is guaranteed, but Thaigem's name is trusted by over 68,000 potential customers worldwide. For example, the company uses eBay to auction gems as an additional selling channel. Customers' comments on eBay are 99 percent positive versus 1 percent negative.

Thaigem.com is the online marketing arm of Thaigem Global Marketing Ltd. (a sister company of NCS Group Ltd; the two merged in 2003), which operates traditional wholesale gem stores, and fulfills orders generated by Thaigem.com, a profitable leader of EC. The company's strategy is to provide the least expensive gems, which they source from 60 countries, by both e-purchasing and traditional purchasing, with the best customer care.

The retail store is hosted by eBay.com, but sales are from e-catalogs (individual items in fixed prices). You can find the Thaigem.com story on eBay.com as well.

Sources: Compiled from *stores.ebay.com/www_thaigem_com/Thaigem_com_story.html* (no longer available online), Meredith (2002), and *thaigem.com* (accessed April 2008).

For Further Exploration: Go to *blackstartrading.com* and compare them to *thaigem.com;* which site do you think is better? What kinds of business and revenue models were used? Were they effective? How is competitive advantage gained in this case?

Reference

Meredith, R., "From Rocks to Riches," *Forbes Global,* September 2, 2002.

Case 1.2

A Digital Hospital Increases Performance and Saves Lives

America's largest industry, health care, is struggling to contain cost and improve service and quality. Thousands of facilities, private and public, attempt to do it. Not all are as successful as Indiana Heart Hospital.

The Problem

Heart disease is the number-one killer in the United States, and in a cardiac crisis each minute matters. Indiana Heart Hospital (IHH) is a relatively new cardiac digital hospital that wants to save lives by radically cutting the time it takes to treat a heart attack. In addition, this for-profit hospital must make sufficient profit for its investors. Decisions are being made constantly by physicians, nurses, administrators, and other employees. Some decisions must be made very quickly, so the necessary data and information must be available at the right time and place in seconds. Also, the hospital must be managed efficiently.

The Solution

IHH is the first wholly *digital hospital* in the United States. At the heart of the hospital information system, there are 18 terabytes (in 2005; today more) of data stored in a network of IBM Shark storage servers. The Shark servers enable the storage of both historical and *real-time* data. When a patient arrives at the hospital, his or her medical records can be on a screen in 15 seconds, so a quick decision can be made on what treatment or tests the patient needs. The results of any new test are immediately added to the patient's medical record. Of the various software tools used for planning and analysis, especially in the financial area, IHH uses software solutions provided by *mezzia.com*. The software also enables improved collaboration and provides support for financial and operational decisions. The data and software tools are accessible to all authorized staff. All doctors, for example, have pocket-size wireless tablet devices for data access, entry, and communication. The digital systems enable doctors to type in and send orders to the pharmacy or to testing laboratories using electronic templates. All records are digital, including X-ray films.

The hospital communications and collaboration systems (Centricity, from GE Healthcare) eliminate delays in the supply chain. Doctors and other employees can consult each other, make quicker joint decisions, and locate experts quickly when needed (even outside the hospital). Centricity runs across 60 Compaq servers with Windows NT and 600 laptops and other devices. Some data can be accessed by touch screens to increase speed. In addition, there is a computer next to each patient room. Medications are tracked by more than 100 wireless barcode scanners.

New devices and technologies are added all of the time (e.g., sensors for vital sign monitoring). The inputs from such devices go directly to the patient's electronic chart (near the bed) as well as to the medical records. The electronic chart enables nurses to enter patient status in real time and also verify the output of the automatic vital signs monitoring. The doctors also enter data into the system when visiting the patients—no more scribbled notes in the hospital.

An example of digital applications is the use of digital pens that overcome the problem of doctors with poor handwriting (see *logitech.com*).

The Results

All of this enables nurses to stay longer with patients, increasing their safety. The digitization contributes to a 40 percent reduction in the length of stay at the hospital, 75 percent reduction in medical errors, and significant increase in the number of patients treated in the hospital (which helps profitability). Also, all computer transactions create an audit trail that increases accountability. In addition, having more consistent data to analyze promotes best practices that make the hospital more efficient and patients safer and healthier. Finally, the system helps the hospital to comply with government regulations.

Sources: Compiled from Nash (2005), and Mezzia.com (2005).

Questions

1. Why is IHH considered to be a digital enterprise?
2. A major environmental pressure in health care is the Health Insurance Portability and Accountability Act (HIPAA) of 1996 regulatory requirements. In what ways can a digital hospital help with compliance?
3. Relate this case to the concept of digital society.
4. Can you identify any ethical issues related to such a high level of automation? (Consult Tutorial #4 on ethics.)

References

Mezzia.com, "Success Story: The Indiana Heart Hospital," May 2005, *mezzia.com/tihh_case_study.pdf* (no longer available online).

Nash, K. M. "Indiana Heart Hospital: Real-Time E.R.," *Baseline*, May 4, 2005, *baselinemag.com/article2/0,1397,1812777,00.asp*.

Case 2.1

Mary Kay's IT Systems

Founded in 1962, Mary Kay (*marykay.com/*) has about 1.8 million consultants (independent sales force people) selling its cosmetics and fragrances in 34 countries. In 2006, the company had about $2.3 billion in wholesale sales.

Because the company has based its reputation on personal contacts in door-to-door visits and home gatherings, it may seem that computerized systems would be the last way the company would benefit. Actually, the opposite is true. Currently, more than 95 percent of Mary Kay's independent sales force people place orders via the Internet, a major change that has occurred since 2003.

Problem and Opportunity

The cosmetics market is very competitive, but it is growing rapidly, especially in developing countries. Mary Kay's business model enables rapid growth into new markets. By the early 2000s it became clear that the then existing information system, a combination of home-grown and packaged applications installed over time, no longer met the users' needs. Also, the consultants faced an increasing demand for Internet use as more and more customers started to shop online. With a long and global supply chain (which offered more products to customers worldwide) and the need to manage almost 2 million consultants, it was clear that a major overhaul of the information systems was needed. The company, over the years, had cobbled together different systems to handle such tasks as incident handling, asset management, and change management. But the systems did not communicate with each other, making a comprehensive picture of the company's IT infrastructure nearly impossible. Finally, it became clear that the emergence of social computing might provide a golden opportunity for Internet marketing by the company.

The IT Solutions

The IT department is split into three divisions: e-commerce, supply chain, and back-office support (for order fulfillment, accounting, and finance). For the makeover, the company focused on e-commerce because of the contact with sales consultants.

The first major IT project was the introduction of a technology called *business service management*. **Business service management (BSM)** is the concept of how to connect IT departments to the ultimate customer. In Mary Kay it became a way to connect with the consultants. To this end, a study of the business processes and the workflow was conducted. This study identified three core areas that have a significant impact on the business: downtime associated with incident and problem management, changes to the IT application systems and other infrastructure components, and the management of the IT assets.

The solution included an electronic service desk that ensures consultants in 30 countries are served in a standardized way. Then a global electronic ordering system called Atlas, between the consultants and the company warehouses, was introduced. A data repository that dynamically maintains a logical model of the IT environment allows Mary Kay IT staff to access a consolidated view of the entire IT environment.

Mary Kay and its consultants are making extensive use of *social computing*. Representative examples are the following:

- The company posts job opening announcements on several sites including MySpace Jobs (*jobs.myspace.com*).
- Movies and videotapes about the company and its products are available on YouTube (*youtube.com*) and on *movies.go.com*.
- Several blogs are available both for and against the company (e.g., *marykayandrews.com/blog*). The company tries to counter the negative comments.
- Auctions and fixed-price items are available for sale on eBay.
- For the millions of shoppers, Mary Kay provides a consultant locator on the Internet at *marykay.com/locator/*.

Extensive hardware and software infrastructure supports all of the above, including a wireless remote management system at the 760,000-square-foot corporate headquarters in Dallas, Texas, an extensive wide area network (WAN), and a large data center. Some of the information systems are used enterprise-wide (e.g., service desk, ticketing system for events, and service requests). Others are functional (e.g., accounting, finance, marketing, and inventory control). The company uses an intranet for its internal communications as well as hundreds of applications.

In addition to providing better IT support to consultants, the IT produced other benefits such as greater efficiency, reduced costs and downtime, and improved service. For example, IT staff members now have a shared language and can view, on a single screen, information that previously required 10 separate reports. The new technology also enabled a reduction in the number of computer servers, which saved money—not only in terms of hardware and maintenance, but also in terms of administrative burdens and data center space. In terms of human resources, it allowed the company to handle its rapid growth without a substantial increase in staffing. The changes also allowed IT personnel to focus on strategic tasks. Mary Kay found that its engineers and technical people now have time to spend on innovative engineering options.

Sources: Compiled from Rubin (2007), *Channel Inside* (2007), *LGC Wireless* (2008), Dubie (2006), and *marykay.com/*.

Case 2.2

Predictive Analysis Can Help You Avoid Traffic Jams

Predictive analysis can now be used to predict traffic congestion levels hours or even days in advance, with almost 90 percent accuracy. Inrix (*inrix.com*) is a startup company that provides such predictions for $20 to $120 per year. The predictive analysis is done with a mass of data obtained from government sources, including:

- Real-time traffic flow and incident information collected by gadgets installed on highways (tool-tag readers, cameras, radar units, and magnetic sensors embedded in the pavement)
- Speed and location data collected by global positioning system (GPS) units of vehicles owned by participating trucking and delivery companies
- Two years of historical traffic flow data
- Weather forecasts and conditions
- Other events (e.g., road construction schedules, school calendars, sports, concerts, other scheduled special events)

Inrix's proprietary predictive algorithms combine these data to create a snapshot of current traffic flows and expected congestion and road conditions over the next hours and days. Obviously, each city requires its own unique model and database (0.2 to 2 terabytes per city). In 2006, Inrix offered this prediction in 30 cities. The service is combined with digital maps (see *teleatlas.com*, the provider of information to GIS companies such as MapQuest). Also, Inrix partners with cell phone operators, traditional satellite broadcasters, and in-car navigation services. In the Seattle area, where Inrix is located, the company delivers traffic information via smart phones and electronic boards on sections of highways, using color codes for signals. The phones also display estimated time for the roads to be either clear or become jammed.

The Inrix system suggests automated decisions such as the following:

- Best route for a delivery van
- Ideal time to go to or leave work (for those on a flex schedule)
- How to reroute a trip to avoid an accident

The following are some of the technologies in use for sensing and controlling traffic:

- Magnetic loop detectors in the road surface (in 32 percent of U.S. cities)
- Closed-circuit TV cameras monitoring traffic conditions (in 29 percent of U.S. cities)
- Information about traffic conditions provided by radio and on the Internet in real time (in 19 percent of U.S. cities)
- Freeway access ramps controlled by the traffic lights (in 9 percent of U.S. cities)

Sources: Compiled from Jonietz (2005/2006) and Barke (2005).

References

Barke, J., "Traffic Taming," *Technology Review*, October 3, 2005.

Jonietz, E., "Traffic Avoidance," *Technology Review*, December 2005/January 2006.

Case 4.1

Handhelds and Portal Tackle Super Bowl Logistics

The National Football League (NFL) (*nfl.com*) designated Florida's Jacksonville Sheriff's Office (JSO) as the lead agency for coordinating and securing local operations for Super Bowl XXXIX. Security at the Super Bowls after 2001 was subject to the authority of the U.S. federal government. The federal government mandated that JSO be capable of in-synch (synchronized) communication and real-time collaboration with federal and national security agencies for terrorism prevention and intervention.

The Problem

Providing logistic support for a Super Bowl is a challenge of scope and scale. JSO had to manage 150,000 spirited fans, provide security at 6,000 events, and coordinate 53 separate agencies at the local, county, state, and federal levels. Those agencies included the Jacksonville Fire and Rescue Department, Florida Highway Patrol, FBI, Federal Emergency Management Agency (FEMA), Secret Service, and Department of Homeland Security (DHS). JSO also had to provide an undisrupted Super Bowl experience for the teams, fans, two former presidents, and megastar Sir Paul McCartney. Movements of the New England Patriots and Philadelphia Eagles had to be monitored by mobile units. That required collaboration of over 4,000 personnel to plan, build, and execute land, sea, and air activities. Business continuity and incident response plans had to be coordinated at 35 venues for 10 days leading up to and including the game.

The Solution

The Information Systems Management (ISM) department implemented a real-time Web-based communication and collaboration portal, called e-Sponder, from Convergence Communications (*convergencecom.com*). More than 1,900 laptop users were connected to the portal.

E-Sponder is accessed through a browser and runs on the Microsoft Office platform. Users learned the system quickly because of its familiar Office interface. E-Sponder uses Microsoft's SharePoint Portal Server for online collaboration. As soon as information is entered into the system, it is instantly available for anyone else. Since users viewed everything that was going on, there was less need to coordinate personnel using radio communication.

The Results

Previously, command staff sat around a table, each listening to radio communications from their ground personnel. Not only did this system create noisy distractions, but it provided individuals only with pieces of information. There was no way to communicate to everyone present the entire picture of what was happening as it was happening, which is something we now take for granted.

The incident command team, including Secret Service and fire and police chiefs, watched events unfold on a wall-sized screen display. Around the room, representatives from 25 agencies sat at computers running e-Sponder. Down the hall in the dispatch room, dispatchers and 911 operators sat at similar terminals. These personnel formed the front line to the command center, listening to radio calls from many police units and undercover agents stationed in various locations around campus and along President Bush's motorcade routes. As information came in, dispatchers entered it into the portal, which updated the screen display in the command center in real time.

When a fire broke out in a house on the president's motorcade route, within seconds the news came into the dispatch center and was recorded on an unplanned incident form that showed up on all 25 desktops in the command center. As dispatchers continued to receive news from on-site supervisors managing ground personnel, it was relayed onto that screen so commanders could make decisions based on what was happening at that moment. Fire trucks were given a police escort to the house and the fire was contained, without having to re-route the president. The networked and collaboration operations were a success.

Sources: Compiled from *Convergencecom.com*, and *e-sponder.com/*.

Questions

Super Bowl's collaboration portal created a real-time view of "what was going on as it was going on." How did this transparency, or real-time awareness, impact operations, logistics, and decision making? The costs of the mobile networks were staggering. In your opinion, how were those costs justified quantitatively and/or qualitatively? What factors were important to the successful outcome of this operation?

Case 4.2

Social Media Collaboration at DrKW

Dresdner Kleinwort Wasserstein (DrKW) is the international investment banking arm of Dresdner Bank. Headquartered in London and Frankfurt, DrKW provides capital market and advisory services employing 6,000 people worldwide—in New York, Paris, Luxembourg, Tokyo, Singapore, and Hong Kong.

Because its employees are culturally diverse and geographically distributed, DrKW wanted them to have a full set of collaboration tools, not only e-mail and telephones. Blogs, wikis, instant messaging, chat, and audio/videoconferencing let workers select and switch communication modes, depending on which is appropriate at the time. DrKW installed a primitive open source wiki in 1997. The company reviewed Socialtext products in March 2004 and ran a small pilot on the hosted service in July 2004. Based on the pilot, DrKW decided to upgrade to Socialtext Enterprise, which was installed in the third quarter of 2004.

DrKW chose Socialtext because it needed strong authentication, permissions, information sharing, and communication among the various company silos. DrKW is highly regulated, requiring that its communications be recorded, archived, searchable, and retrievable for auditors or other investigators. Those communications are business records, which must be retained according to financial regulations such as the Sarbanes-Oxley Act of 2002.

Usage and Benefits

The Information Strategy team was the first group to use Socialtext on a hosted service, followed by IT Security. The teams use it as a communications tool, collective discussion tool, and storehouse for documents and information. The User-Centered Design (UCD) team uses external-facing applications. The wiki allows team members to upload information easily, which encourages collaboration and increases transparency, which is not possible with e-mail messages. UCD also uses the wiki to explain what its function is and why it's important to the entire DrKW community.

The wiki tracks project development so that the team and management know the status of projects and progress, who is doing what, and what actions should follow.

The Equity Delta1 equity financing team is one of the largest users of the wiki. This unit deals with loans, equity swaps, and so on. The wiki eliminates the burden of mountains of e-mails, shows the development of business plans, and stores commonly used information. The team creates an open forum where anyone can post views, comments, and questions on given subjects; publish and share white papers and bulletins; coordinate sales and marketing activities; and organize important team tasks.

One of the most enthusiastic user groups is Digital Markets, the division responsible for developing, deploying, and operating DrKW's online products and services. Digital Markets combines front-office, support, and IT specialists in one unit. It has a wide cross section of users who must all be brought together on the same page.

The E-Capital London Team develops back-end applications for the Digital Markets business line and supports a number of legacy systems. It shares and develops new system specifications and product overviews, and helps with documentation. The wiki provides an instantly editable collaboration platform that simplifies the publication process. The version history function is useful for product specs where it is important to retain a complete audit trail.

Users keep others informed by posting timely notes such as "this is what we're thinking about now." The limitation is that the wiki only works when everyone supports and is comfortable in such an open environment. Wikis fail in organizations where people are frightened to talk and publish. It works in DrKW, especially in Digital Markets, where people willingly say "look, here it is." Their openness stimulates good debate and allows them to generate great ideas.

Sources: Compiled from *SocialText.com/node/80* and BusinessWeek Online.

Questions

1. What are the capabilities of the wiki that are not available in regular e-mail?
2. Why would so many tools—blogs, wikis, instant messaging, chat, and audio/videoconferencing—be needed?
3. How does the wiki increase employee productivity? What types of waste does it reduce?
4. Do a search of the Internet to determine whether content sent via instant messages or posted on wikis is business records that must be preserved. Report what you learned.
5. What are some social, cultural, and ethical issues involved in the use of wikis for business collaboration?

Case 5.1

$55 Million Data Breach at ChoicePoint

ChoicePoint is a leading data broker and credentialing service. It maintains 19 billion public records on more than 220 million U.S. citizens. The company buys personal data, including names, Social Security numbers, birthdates, employment data, and credit histories, and then sells the data to businesses and government agencies. Marketing, human resources, accounting, and finance departments rely on ChoicePoint's data for customer leads, background checks, and verification. Roughly 70 percent of ChoicePoint's revenue is generated by selling consumer records for insurance claim verifications and workplace background screenings.

ChoicePoint was exposing the data to risk by ignoring its policy to verify that potential customers were legitimate before selling data. Disaster was foreseeable. In early 2000, without doing an adequate background check, ChoicePoint provided hackers with customer accounts, which they used to illegally access databases and steal confidential data. By May 2008, that security lapse had cost the company over $55 million in fines, compensation to potential victims of identity theft, lawsuit settlements, and legal fees. Then in June 2008, the company also paid $10 million to settle a class action lawsuit.

Disclosing the Problem Publicly

On February 15, 2005, ChoicePoint reported that personal and financial data of 145,000 individuals had been "compromised." All of the individuals were at risk of identity theft after Olatunji Oluwatosin, a Nigerian national living in California, had pretended to represent several legitimate businesses. Ironically, Oluwatosin's credentials had not been verified, which enabled him to set up over 50 bogus business accounts. Those accounts gave him access to databases containing personal financial data. Oluwatosin was arrested in February 2005, pleaded guilty to conspiracy and grand theft, and was sentenced to 10 years in prison and fined $6.5 million. The state and federal penalties facing ChoicePoint were much larger.

Privacy and antifraud laws required that ChoicePoint disclose what had happened. California's privacy breach legislation requires that residents be informed when personal information has been compromised. Outraged attorneys general in 44 states demanded that the company notify every affected U.S. citizen. At the federal level, ChoicePoint was charged with multiple counts of negligence for failing to follow reasonable information security practices. In 2005, the company was hit with the largest fine in Federal Trade Commission (FTC) history—$15 million. The FTC charged ChoicePoint with violating:

- The Fair Credit Reporting Act (FCRA) for furnishing credit reports to subscribers who did not have a permissible purpose to obtain them and for not maintaining reasonable procedures to verify its subscribers' identities.
- The FTC Act for false and misleading statements about privacy policies on its Web site.

On March 4, 2005, in what was a first for a publicly held company, ChoicePoint filed an 8-K report with the SEC warning shareholders that revenue would be adversely affected by the data breach. In January 2006, with the public announcement of the extent of the fines, ChoicePoint's stock price plunged.

The Solution

When a company violates SEC, federal, or state laws, the solution to its problem is going to be dictated to it. The solution to ChoicePoint's risk exposure was mandated by the FTC. The company had to implement new procedures to ensure that it provides consumer reports only to legitimate businesses for lawful purposes. In addition, the FTC ordered ChoicePoint to establish and maintain a comprehensive information security program and to obtain audits by an independent third-party security professional biyearly until 2026. To reassure stakeholders, ChoicePoint hired Carol DiBattiste, the former deputy administrator of the Transportation Security Administration, as chief privacy officer (CPO).

The Results

ChoicePoint reformed its business practices and data security measures, which were too lax relative to its risk exposure. The company had to stop putting risky business practices that focused on short-term revenues ahead of long-term profitability. This business decision is a necessary and ethical trade-off.

ChoicePoint's data breach brought businesses' security policies to national attention. It signaled the need for improved corporate governance. Although there is no generally accepted definition, corporate governance refers to the rules and processes ensuring that the enterprise adheres to accepted ethical standards, best practices, and laws. Companies that collect sensitive consumer information have a responsibility to keep it secure. Together with high-profile frauds and malware, data breaches have triggered an increase in laws and government involvement to hold companies and their management accountable for lapses in governance. Yet, since ChoicePoint's record-setting data breach, many other infosec incidents and data thefts of greater magnitude have occurred.

Sources: Compiled from *ftc.gov,* Gross (2005), Kaplan (2008), Mimoso (2006), and Scalet (2005).

Questions

1. What was the root cause of the data breach?
2. How could this data breach have been prevented?
3. In your opinion, were the fines imposed on ChoicePoint sufficient (high enough) to deter such an incident from happening again? Explain your answer.
4. In your opinion, how effective are the changes implemented by ChoicePoint at deterring or defending against data breaches? Explain your answer.

Case 6.1

A Decade of E-Government Development in Hong Kong (1998 to 2007)

Since 1998, the Hong Kong (HK) Special Administrative Region (SAR) government has implemented territorywide e-government initiatives, which are pursuant to the Digital 21 Information Technology Strategy (*info.gov.hk/digital21*). Subsequently, the years 1998 to 2007 marked the initial stages of e-government development in HKSAR as information and services were made available online. As a result, an infrastructure where citizens, business organizations, and the government could perform electronic transactions was established by 2007. The city of Hong Kong in 2008 is regarded as a "mature city" in terms of e-government development. The following are some of the key e-government projects in HKSAR which were developed from 1998 through 2008:

Electronic Service Delivery (ESD) Scheme

The ESDlife (*esdlife.com*), which is a Web portal launched under the ESD scheme, has come to host over 200 e-government applications of more than 50 bureaus, departments, and agencies as of May 2008. The average monthly number of visits to all government Web sites reaches 280 million, and over 90% of HKSAR Government services are provided to the public with an e-option. The ESD Scheme employs a variety of customer relationship management (CRM) characteristics into its services. For example, the 200 interactive and transactional services made available to the public are organized around their daily needs under the categories of "Health," "Leisure," "Household," and the like. A life event service index is made available to facilitate the search for services under categories such as "Building a Career," "Establishing a Family," "Having a Baby," "Retiring," and so on. Some public services, such as the "weather report," "air pollution index," and "Government Telephone Directory," are also made available through the mobile network.

The GovHK Web Portal

A new Government Web portal GovHK (*gov.hk*) was launched in early 2007 to replace the government-centric information center (*info.gov.hk*). This new portal serves as the one-stop shop for online government information and services. For instance, related information and services provided by different B/Ds are brought together in service clusters on GovHK, the purpose of which is to serve one or more target customer groups with needs and interests within a particular subject (e.g., environment, employment, education, and transportation) or in a particular age range or role (e.g., business and trade, visitors, and residents). E-government applications hosted on ESDlife have been integrated into GovHK since January 2008. In its inception, the GovHK portal has been developed to provide a citizen-centric way of e-government services delivery.

Smart Identity Card

The HKSAR Government had started issuing smart identity cards to its citizens since June 2003, and by March 2007 the seven-million-strong Hong Kong population had acquired the new generation of smart ID cards. This project has effectively made Hong Kong one of the largest populations in the world to use smart ID cards. The smart ID has facilitated the formation of a communitywide information infrastructure for the government and the private sectors to introduce value-added e-applications.

e-Channels

The Immigration Department of HKSAR has introduced the automated passenger clearance system (e-channels) to members of the public since December 16, 2004. The e-channel system first performs mutual authentication with the smart identity card key before deploying fingerprint verification technology for the authentication of a person's identity. This way, HKSAR residents can use their smart identity cards to perform self-service immigration clearance.

From 1998 to 2008, which has been a decade of intensive project development, the HKSAR has moved to the mature stages of e-government and has placed much emphasis on the clustering of common services and full enterprise reform and collaboration.

Sources: Compiled from *govhk.com*, *esdlife.com*, *smartid.com*, and *info.gov.hk/digital21/e-gov* (all accessed May 2008). Accenture, 2003.

Questions

1. Identify each initiative as G2C, G2B, C2G, or G2e.
2. Visit *info.gov.hk/digital21/e-gov* and identify the goals of the five e-government initiatives.
3. How will the role of the HK government change when the initiatives are fully utilized?

Case 8.1

ZOPA, Prosper, and P2P Lending: Will They Disrupt Banking?

Any industry making a huge profit margin off its customers is a good candidate for disruption. Banking is a classic case—just think of the 19 percent interest you pay on credit cards and the 2 percent you earn on your savings account.

In this section, we will introduce two Web 2.0 companies that are trying to disrupt the banking industry—ZOPA in the United Kingdom and Prosper in the United States.

The Innovation: Person-to-Person Lending

Individuals who want to borrow money may be required to pay 10 to 20 percent interest if they use their revolving credit cards. At the same time, they receive 2 percent to 5.5 percent interest on their savings. The banks take the difference, but they also take the risk from the lenders. Now assume that an individual lender can negotiate directly with an individual borrower. It is likely that each can be better off than with the bank. Suppose they agree on 8 percent interest. The lender will get much more than when putting the money in the bank, while the borrower will pay much less. The problem is how they find each other and negotiate and secure loans. This is where innovative sites such as ZOPA enter the picture. The basic idea is that of **person-to-person lending**, meaning you lend money directly to a consumer rather than "selling" your money to the bank, and the banks then loan their money to consumers.

The Zone of Possible Agreements in Negotiation

Figure 8.1.1 illustrates a typical negotiation situation. Suppose you want to sell your used car. Usually, you have some range of expectation within which you are willing to settle. You know that you will never get more than $10,000 for your car, but in the worst case, you will accept $6,000 (these numbers may be changed with the time and the experience of offers). The buyer also has a settlement range, for example, $5,000 to $7,000.

Notice that in such a case there is an overlap between the ranges, which means that a deal is possible. The seller will start with $10,000 and reduce the price slowly, and the buyer will start with $5,000, increasing it slowly. If the ranges do not overlap, there will be no deal. Otherwise, you will sell your car with a price in the overlapping zone. This overlapping range is called the "Zone of Possible Agreements" (ZOPA), and this is also the name of the pioneering company. Agreement in this zone must also be more beneficial to both sides than what they can get in the bank. Note that ZOPA has a lower limit, which signifies the seller's withdrawal position ($6,000 in our example). If an offer is less than $6,000, the seller will not entertain it. Similarly, the buyer's withdrawal point is $7,000; therefore, he or she will not consider any higher price.

The same idea applies to lending. However, this time you need intermediation, and this is where ZOPA and Prosper enter the picture. These (and similar companies) are using the Web to allow personal lending on a massive scale. ZOPA was the first company to introduce such peer-to-peer lending. What Skype did to telecoms and Amazon.com did to retailers is being done here to traditional banks, namely—disintermediation.

ZOPA Ltd.

ZOPA (*zopa.com*) was founded in London in March 2005, and by January 2007 it had 40 employees and 105,000 registered member users (lenders and borrowers). ZOPA arranges for more than $100,000 loans every day.

Securing the Loans

ZOPA tries to check the background of the borrowers in the following ways:

- Conducting a credit rating investigation at Experion, Equifax, or a similar company
- Checking people's eBay rating (if available)
- Checking the borrower's profile (if available online)
- Permitting only one account for each borrower
- Checking the possibility of identity theft by a borrower by asking questions about past borrowing, demographics, etc.

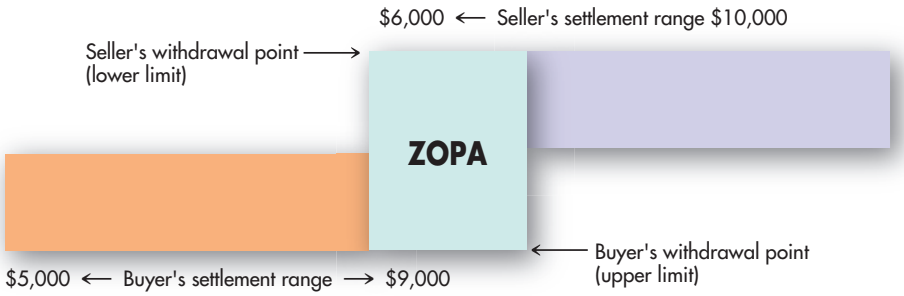

Figure 8.1.1 ZOPA's zone of possible agreements.

In addition, ZOPA advises lenders to spread out the risk by lending from one individual to several borrowers. In addition, if you like to sleep better, you can get insurance (for a fee) on the amount you lend. The risk, however, is not large; the actual bad debt rate is less than 0.05 percent. A possible explanation of the low default rate is that borrowers are more likely to pay back real people than a faceless bank. The unlucky lenders can use a collection agency as in any other unpaid debt.

Finally, ZOPA covers any damage from fraud done to your ZOPA account by intruders provided you have kept your personal account details secure.

The Revenue Model

ZOPA takes 0.5 percent of the loan amount from both the lender and the borrower. There are no hidden fees, and the only other (optional) cost to the lender is the insurance (plus the fees that ZOPA takes for arranging the insurance). At the moment there is no advertisement on the site. But it is likely that, in the future, vendors will try to sell related products or services to either the lenders or the buyers.

The Lending Process

Step 1. Let's say that a lender has $20,000. She transferred it to her ZOPA account, stating her willingness to get a 7.5 percent interest rate from borrowers of top credit rating, for two years.

Step 2. ZOPA organizes a pool of, for example, 40 borrowers with a similar creditworthiness of top rating, one that meets the lender's requirement. Each will get $20,000 divided by 40 = $500.

Step 3. The lender can read the profile of the prospective borrowers and the intended use of the money. The borrowers can read the lender's profile as well. This fosters a personal relationship between borrowers and lenders and helps in reducing default(s).

Step 4. ZOPA arranges the contracts.

Step 5. ZOPA collects interest payments and mails the lender a monthly check.

Step 6. ZOPA arranges repayment of the loan after two years.

Prosper

Prosper (*prosper.com*) is the first U.S. P2P lender. Started in February 2006, it was created to make consumer lending more financially and socially rewarding for everybody. In January 2007, Prosper reported 130,000 members and outstanding loans of $30 million. It operates somewhat similar to ZOPA, but its revenue model is different. Prosper collects a 1–2 percent fee of the funded loan from the borrowers. In addition, lenders pay .5 percent annual loan servicing fees. Because of the higher fees, the company can assume more risk. Thus, they check only credit scores and borrowers' group affiliation.

The way Prosper works is intuitive to people who have used eBay. However, instead of listing (by sellers) and bidding (by buyers) on items, lenders here bid and borrowers list needs, using Prosper's online auction platform. For details, see Steiner (2007). Here are the major steps of the process:

1. Borrowers create a loan listing on Prosper, specifying amount needed, the purpose of the loan, and the interest rate they are willing to pay.
2. Prosper displays borrower credit grade (from AA to higher risk).
3. Borrowers provide photos of themselves, their children, and even of their pets. They also provide the purpose of the required money and how they plan to pay it back.
4. Lenders review loan listings and bid to fund only the ones they choose using a bidding process.
5. Group leaders manage borrower groups and use their reputation to get great rates for borrowers.
6. When a match is found, Prosper arranges for the money transfer and then manages the loan.

Groups on Prosper are formed to bring people together for the common goal of borrowing at better rates. Groups earn reputations according to their members' repayment records. Borrowers who organize groups earn rewards.

Competition

P2P lending competes both with traditional banks and with online banking. Online banking is especially attractive to small investors, with some banks offering online savings accounts of 5 to 6 percent in 2006 through 2007.

Questions

1. Define P2P lending.
2. Define the zone of possible agreements.
3. Describe how ZOPA arranges loans.
4. Describe security measures for lenders.
5. Describe Prosper.

Reference

Steiner, C., "The eBay of Loans," *Forbes*, March 12, 2007.

Case 8.2

Friendster, Will It Survive?

Friendster, a first-generation social networking site created in 2002, had early success as one of the first social networking sites available. It allowed users to host their own profile on a personal page and then develop their own personal network of friends by browsing friend lists of other user profiles. Applications included photo loading and message boards.

A critical point in the infantile life of Friendster came in 2003 when Google offered Friendster's management $30 million for ownership of the site. Like David stepping up to Goliath, then owner and original founder Jonathan Abrams declined the offer, expecting to continue on the site's rate of growth.

This decision has been greatly ridiculed as one of the major blunders of online business; however, with no history to go on, who could have known a site that went from creation to a valuation of $30 million in just one year had topped out? This had been well prior to the blockbuster sales of YouTube and MySpace; therefore, there was little precedent to go on at the time. It was a bold decision, but, ultimately, the wrong one.

Following the offer, Friendster's star began to fall. To explain Friendster's drop in popularity, critics point to the site's server not being large enough to support its increasing traffic and desperately needed capital investment and technical development (two things the Google purchase could easily have provided). Critics also point to the site being out of touch with the average teenager, something that the up and coming MySpace had figured out. It was claimed that Friendster was far too businesslike for the average teenager and targeted an audience far older than it should have.

The better-researched and better-funded MySpace promptly picked up where Friendster faltered. It satiated users' appetites for newer and better applications, such as video and games, as it gathered up users who were frustrated with long load times and frequent server shutdowns. Friendster's market share in the United States has never recovered.

The story of Friendster is comparable to the recent craze of TV game shows where contestants are offered increasingly exorbitant amounts of money and must decide whether to take the money or risk it all in the hope of being offered more. In both cases, the "contestant" enters with nothing, is presented a great deal of money, and ultimately ends up way over his or her head. Some leave happy; others leave frustrated with themselves.

Friendster's outlook today is not so grim. It has reorganized itself in Asia where it is experiencing success in various markets. It is the number one social networking site in the Philippines and number two site in Singapore. It boasts 65 million users worldwide; however, most are in geographic markets far less valuable to advertisers than the United States, where it had once held great appeal but is now not even in the top 10 social networking sites. Friendster is now valued at one thirtieth the price it had been offered by Google back in 2003.

Sources: Wikipedia.org (2008) and Friendster.com (2008).

Questions

1. Provide reasons for and against accepting the $30 million offer from Google back in 2003.
2. What caused the decline of Friendster?
3. Why has Friendster succeeded in other countries?

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Wikipedia.org, "Friendster," *en.wikipedia.org/wiki/Friendster*.

Case 8.3

YouTube and Company—A Whole New World

Free video-sharing Web sites (where users can upload, view, and share video clips) became very popular after the inception of YouTube in February 2005. Many start-ups try to compete with YouTube, which was named by *Time* magazine as the "Invention of the Year 2006." In this section, we will present the company and some of its competitors.

YouTube: The Essentials

YouTube is a consumer media company that enables people to watch and share original videos worldwide through a Web experience. People can see firsthand accounts of current events, find videos about their hobbies and interests, and discover the quirky and unusual. As more people capture special moments on video, YouTube is empowering them to become the broadcasters of tomorrow. Users can rate videos; the site shows the average rating and the number of times users have watched a video. For details, see Sahlin and Botello (2007).

What Is YouTube?

YouTube is a place for people to engage in new ways by sharing videos and commenting on them. YouTube originally started as a small-scale personal video-sharing service and has grown into a huge online entertainment destination where about 70 million people viewed more than 2.5 billion videos in September 2007 alone (comScore, 2007). It is a prime example of information sharing in a social network. With YouTube, people can

- Upload, tag, and share videos worldwide
- Browse millions of original videos uploaded by community members
- Find, join, and create video groups to connect with people who have similar interests
- Customize the experience by subscribing to member videos, saving favorites, and creating play lists
- Integrate YouTube videos on Web sites using video embeds or APIs
- Make videos public or private—users can elect to broadcast their videos publicly or share them privately with specified friends and family upon upload

YouTube is building a community that is highly motivated to watch and share videos. The service is free for everyone. The company always encourages users to contact YouTube with thoughts, suggestions, feedback, or otherwise random ramblings. The site advises users to check out YouTube's blog in order to keep up to date on all of the latest developments.

Brief History and Technology

YouTube's video playback technology is based on Macromedia's (an Adobe company) Flash Player7 (or newer) and uses the Sorenson Spark H.263 video codec. This technology allows users to display videos (including movies, TV clips, music videos, videoblogging, etc.) with quality comparable to more established video playback technologies that generally require their user to download and install a small piece of software called a browser plug-in in order to watch video. Flash itself requires a plug-in, but the Flash 7 plug-in is generally considered to be present on approximately 90 percent of Internet-connected computers. Alternatively, users can access a number of Web sites to download the videos to their own computers. The use of Flash video was most likely a key component of YouTube's success, allowing viewers to watch video instantly without installing software or dealing with a common problem experienced with other Web video technologies—incompatible or varying versions of video players.

YouTube was one of the fastest-growing Web sites on the Internet during 2006–2008, and in December 2007 was ranked as the third most popular Web site on Alexa (a popular rating company), far outpacing even MySpace's growth rate. YouTube's preeminence in the online video market is staggering. By July 2006, 100 million clips were viewed daily on YouTube, and an additional 65,000 new videos were uploaded each day (*en.wikipedia.org/wiki/YouTube*). The site boasts about 20,000,000 visitors per month.

Google purchased YouTube for US$1.65 billion in stock on October 9, 2006. The purchase agreement between Google and YouTube came after YouTube presented three agreements with media companies in an attempt to escape the threat of copyright-infringement lawsuits. YouTube continues to operate independently.

Like many start-ups, YouTube began as an angel-funded (by rich individuals) enterprise in a small office in San Mateo, California. Later on, Sequoia Capital, a venture capital firm, invested more money. It is interesting to note that much of the early publicity for the site has come from the frequent demands to remove material from the site. Also, NBC, which initially demanded the removal of copyrighted material, created a strategic alliance with YouTube. An official NBC channel on YouTube now showcases promotional clips of its videos.

Social Impact of YouTube

The Celebrities. YouTube's popularity has led to the creation of many *YouTube Internet celebrities*, popular individuals who have attracted significant publicity in their home countries through their videos. The most subscribed YouTube member, in fall 2006, was Geriatric 1927, a pensioner from England born in 1927, who gained widespread recognition within a week of making his debut on the site. He is still on the top subscribed list (see *en.wikipedia.org/wiki/Peter_Oakley*). For these users, Internet fame has had various unexpected effects. As an example, a YouTube user and former receptionist, Brooke Brodack, from Massachusetts, has been signed by NBC's Carson Daly for an 8-month development contract. Another example is the blogger known as lonely girl, 15, who ended up being the fictitious character created by New Zealand actress Jessica Rose and some film directors. In 2007, a Dutch vocalist and songwriter named Esmée Denters announced that she would be traveling to the United States for professional recording sessions on

the strength of her YouTube appearances. For a representative list of others who became Internet phenomena, see *en.wikipedia.org/wiki/YouTube*.

Band and Music Promotion. YouTube has also become a means of promoting bands and their music. One such example is the group OK Go, who enjoyed a huge radio hit and performed on the MTV Video Music Awards as a result of their video for "Here It Goes Again." In the same light, a video broadcasting the Free Hugs Campaign with accompanying music by the Sick Puppies led to instant fame for both the band and the campaign. The main character of the video, Juan Mann, who also achieved fame, is now being interviewed on Australian news programs and even has appeared on *The Oprah Winfrey Show*.

Education. UC Berkeley is the first university to make videos of full courses available through YouTube (*youtube.com/ucberkeley*). Over 300 hours of videotaped courses and special events are available on YouTube. The University attempts to provide a public window into university life, as well as open educational content for the larger community.

The Business and Revenue Models

Before being bought by Google, YouTube had an advertising-based business model. Some industry commentators speculated that YouTube's running costs—specifically the bandwidth required—might be as high as US$1 million per month, thereby fueling criticisms that, like many Internet start-ups, it did not have a viably implemented business model (see *en.wikipedia.org/wiki/YouTube*).

The site launched advertisements in March 2006. The following month, YouTube started using Google AdSense. Given its traffic levels, video streams, and page views, some have calculated YouTube's potential revenues could be in the millions per month.

Strategic Advantages of the Business Model

The growth of YouTube has been extremely rapid, fueled largely by referrals from users who alert their friends and family to a favorite video. In addition, viewers who discovered the site and then decided to share their own videos help YouTube expand its content. A steady increase in high-speed Internet connections at home has also helped to propel YouTube's success, making the distribution and consumption of online video more effective. In the next section we examine some typical applications of YouTube.

Typical Applications on YouTube

Here are some examples of how YouTube collaborates with both advertisers and media companies:

- The Sundance Channel announced a strategic alliance with YouTube on January 17, 2007, (YouTube, 2007) for coverage of the 2007 Sundance Film Festival, including a video blog on YouTube. YouTube will show special clips from the festival throughout 2007 (see *youtube.com/sundancechannel*). Also, it will show profiles of competing filmmakers, clips from past festivals, and in-depth daily coverage by YouTube users Arin Crumley and Susan Buice. The partnership also provides advertising for YouTube partners including Sundance.

  The Sundance Channel syndicated a video blog created by Crumley and Buice exclusively for YouTube. Crumley and Buice served as Sundance Channel correspondents during the 2007 Sundance Film Festival and documented their daily experiences from a festival-attendee and independent filmmaker perspective. They pioneered new strategies for independent film distribution through digital technology including podcasts, custom Google maps, and a 2007 screening of their film *Second Life* in the virtual world.

  The Sundance Channel's Festival's minisite includes all content available on YouTube, plus exclusive photos and a blog hosted by Peter Bowen, senior editor of *Filmmaker Magazine*, who follows the buzz around films and acquisitions. Sundance pays fees for the advertisements on YouTube.
- YouTube and Coca-Cola introduced video cards for the 2006 and 2007 holiday seasons (YouTube, 2006a). People were able to send their own personal videos as a holiday greeting card online. Visitors were also able to share their holiday spirit by uploading their own videos, customizing video greetings created by popular YouTube personalities including Geriatric 1927, Boh3m3, TerraNaomi, Renetto, TheWineKone, and LisaNova. Holiday-themed videos were also available to share from Coca-Cola including clips from vintage Coke advertisements. Selected video greetings that users chose to share with the world were featured as part of a video play list on Coca-Cola.com called the Holiday WishCast and were seen by people around the world.

  The Coca-Cola Holiday WishCast gave friends and families a new way to communicate during the 2006 and 2007 holiday seasons. WishCast was a unique way for people to connect, whether it was helping loved ones keep in touch, creating a last minute holiday card, or allowing bands to send personalized greetings to their fans. It was the latest evolution in the development of Coca-Cola.com following the relaunch of the site in July 2006 that included user-generated content and the addition of digital music downloads in August 2006.

  The partnership with Coca-Cola gave the YouTube community the ability to send holiday wishes in a way that truly harnesses the creativity of the users. To send a holiday video greeting, people visited either *youtube.com/wishcast* or *coca-cola.com/wishcast*.
- According to YouTube (2006b), the YouTube Community and Warner Music Group (WMG) artists created "Special New Year's Messages to Share with the World" (sponsored by Chevrolet). The first-ever YouTube New Year's Eve Countdown celebrated New Year's as it happened around the world with new videos featured every hour from dozens of locations worldwide.
- As of January 31, 2007, Plaxo, RockYou.com, Technorati, and three other small companies are putting their versions of Super Bowl ads on the Web. The companies have bundled their ads together in a YouTube channel called SuperDotComAdsXLI; they hope to use their various social networks and corporate blogs to generate audiences for all of the commercials.
- YouTube provides a platform for companies to launch contests, *youtube.com/contests*. For example, in 2007,

McDonalds launched an ad contest—"It's Your Break" campaign—and asked users to submit ads for their new Honey Mustard Snack Wrap. Swiffer launched a contest with an award of US$15,000 and invited users to film videos about how they use Swiffer to clean.

- On YouTube. Users may submit videos in several common-file formats. YouTube automatically converts them to the H.263 variant of Flash Video and makes them available for online viewing. Flash Video is a popular video format among large hosting sites due to its wide compatibility.
- Outside YouTube. Each video is accompanied by the full HTML markup for linking to it or embedding it within another page; a small addition to the markup for the latter will make the video play automatically when the page is accessed. These simple cut-and-paste options are popular particularly with users of social or networking sites. However, members of such sites have cited poor experiences where autoplaying embedded YouTube videos has slowed down page loading time or even caused browsers to crash.
- Downloading Videos. YouTube itself does not make it easy to download and save videos for offline viewing or editing, but several third-party applications, browser extensions, and Web sites exist for that purpose.
- Index Sites. As of 2006, many sites started to bloom while offering an index service, which arranges the content on YouTube through links arranged by order of seasons and episodes of a certain show. Some of the sites, such as TVLinks, NetworkOne Australia, and WikiRemote, gather around them a rather large community of users. These users make requests and report bad links.
- YouTube's voter education initiative YouTube You Choose 08 is designed to allow political candidates to communicate with voters about their campaigns. It features campaign videos, speeches, informal chats, and behind-the-scenes footage. The platform allows potential voters to participate in dialogue with candidates using video responses, text comments, and ratings (Sachoff, 2007).

The various start-ups involved began kicking the idea around January 15, 2007. Plaxo is home to some budding filmmakers, so Mr. McCrea (vice president of marketing at Plaxo) let a small team of employees put something together. He was so impressed with the results that he decided to use the spot to launch Plaxo's new logo and tagline. Now he's considering doing even more video ads solely for the online medium. Because these ads are inexpensive to produce, it makes sense that Web-based companies use that platform to promote themselves.

Sources: Compiled from YouTube (2007), YouTube (2006a), YouTube (2006b), and Sachoff (2007).

Implementation Difficulties: The Copyright Problem

YouTube policy does not allow content to be uploaded by anyone not permitted by U.S. copyright law to do so, and the company frequently removes uploaded infringing content. Nonetheless, a large amount of copyrighted videos continues to be uploaded and viewed. Generally, YouTube only discovers these videos via reports from its viewing community. The primary way in which a user identifies the content of a video is through the search terms that uploaders associate with clips. However, some users have created alternative words as search terms when uploading copyrighted types of files. This makes it difficult to find illegal copyrighted videos.

TV journalist Robert Tur filed the first lawsuit against YouTube in summer 2006, alleging copyright infringement for hosting a number of famous news clips without permission. In August 2007, Tur dropped his individual suit and joined a class action suit that is led by England's Premier Soccer League and a number of new members. That suit was unresolved as of January 2008 (Baage, 2007).

The Brazilian Court Case

Here is an example of how complex the legal issue faced by YouTube can be. In early January 2007, a Brazilian court ordered (for the second time) YouTube to block footage of super-model Daniela Cicarelli and her boyfriend in intimate scenes along a beach in Spain. YouTube removed the clip in September 2006, but the clip still appears periodically on YouTube under different titles. The judge ruled that YouTube must find a way to use filters so the clip stops popping up in Brazil on the Web site. Lawyer Rubens Decousseau Tilkian, who represents Cicarelli's boyfriend, said YouTube had not gone *far enough* to prevent access to the clip because people succeeded in posting it using different names for the video. Can YouTube comply with the court order? If so, at what cost? The Brazilian court has the authority to fine YouTube about $120,000 for each day the video is viewable.

In 2007, big media, such as Viacom, NBC, and News Corp., took YouTube to court (see La Monica, 2007).

The Competition

The success of YouTube drove a large number of companies to compete with it. On the one hand, there were several start-ups completely dedicated to video sharing. On the other hand, several social networks (e.g., MySpace) added video sharing as one of their offerings. A comparison of the following 10 companies—eyespot, Google Video, Grouper, Jumpcut, Ourmedia, Rever, Video Egg, Vimeo, vSocial, and YouTube—is available at *dvguru.com* (posting by Bilsborrow-Koo, 2006). Other competitors are *blip.tv*, *veoh.com*, *videojug.com*, *flurl.com*, Yahoo! Video (*video.yahoo.com*), and Meetcafe. Meetcafe (*meetcafe.com*), a rival of YouTube, launched a new forum of online video content by putting amateur contributors together with professional film makers in 2007. Known as Café Confidential, the new channel is an attempt to introduce higher standards to the often chaotic user-generated content. Meetcafe also rewards amateurs that use this channel. According to *Media Metrix* market news, in September 2006 MySpace accounted for 20 percent of the 7.2 billion video streams across the Web (comScore, 2007). So MySpace may be the major competitor of YouTube. Five major media companies joined MySpace in 2007 (see Lashinsky 2007), who offer free legitimate videos to "kill" YouTube.

To counter the competition, YouTube is offering innovative applications such as video awards to the most creative

and popular original videos (*youtube.com/YTAwards*). YouTube's market share was 50 percent greater than 64 other video sites combined (Prescott, 2007).

Sources: Baage (2007), Bilsborrow-Koo (2006), comScore (2007), La Monica (2007), Nelson (2008), Prescott (2007), YouTube (2006a, 2006b, and 2007).

Questions

1. Define video sharing and describe how it is done at YouTube.
2. What can people do on YouTube?
3. How can YouTube create Internet celebrities?
4. How can YouTube promote music and artists?
5. What are YouTube's revenue sources? How are these revenue models related to Google?

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Case 9.1

Dollar General Uses Integrated Software

Dollar General (*dollargeneral.com*) operates more than 8,000 general stores in 35 states, with sales exceeding $9.5 billion in 2007, fiercely competing with Walmart, Target, and thousands of other stores in the sale of food, apparel, home-cleaning products, health and beauty aids, and more. The chain doubled in size between 1996 and 2002 and has had some problems due to its rapid expansion. For example, moving into new states means different sales taxes, and these need to be closely monitored for changes. Personnel management also became more difficult with the organization's growth. An increased number of purchasing orders exacerbated problems in the accounts payable department, which was using manual matching of purchasing orders, invoices, and what was actually received in the "receiving" department before bills were paid.

The IT department was flooded with requests to generate long reports on topics ranging from asset management to general ledgers. It became clear that a better information system was needed. Dollar General started by evaluating information requirements that would be able to solve the problems that cut into company's profit.

Integration

A major factor in deciding which software to buy was the integration requirement among the existing information systems of the various functional areas, especially the financial applications. This led to the selection of the Financials suite (from Lawson Software). The company started to implement applications one at a time. Before 1998, the company installed the suite's asset management; payroll; and some HR applications, which allow the tens of thousands of employees to monitor and self-update their benefits, 401k contributions, and personal data (resulting in big savings to the HR department). After 1998, the accounts payable and general ledger modules of Lawson Software were activated. The accounting modules allow employees to route, extract, and analyze data in the accounting/finance area with little reliance on IT personnel. During 2001–2003, Dollar General moved into the sales and procurement areas, thus adding the marketing and operation activities to the integrated system.

Here are a few examples of how various parts of the new system work: All sales data from the point-of-sale scanners of some 6,000 stores are pulled each night, together with financial data, discounts, and so on, into the business intelligence application for financial and marketing analysis. Employee payroll data from each store is pulled once a week. This provides synergy with the sales audit system (from STS Software). All sales data is processed nightly by the STS System, broken into hourly journal entries, processed and summarized, and then entered into the Lawson's general ledger module.

The original infrastructure was mainframe based (IBM AS 400). By 2002, the 800 largest suppliers of Dollar General were submitting their bills on the EDI. This allowed instantaneous processing in the accounts payable module. By 2003, service providers, such as utilities, were added to the system. To do all of this, the system was migrated in 2001 from the old legacy system to the Unix operating system, and then to a Web-based infrastructure, mainly in order to add Web-based functionalities and tools.

A development tool embedded in Lawson's Financials allowed users to customize applications without touching the computer programming code. This included applications that are not contained in the Lawson system. For example, an employee-bonus application was not available at Lawson but was added to Financial's payroll module to accommodate Dollar General's bonus system. A customized application that allowed additions and changes in dozens of geographical areas also solved the organization's state sales tax collection and reporting problem.

The system is very scalable, so there is no problem in adding stores, vendors, applications, or functionalities. In 2003, the system was completely converted to Web-based, enabling authorized vendors, for example, to log onto the Internet and view the status of their invoices by themselves. Also, the Internet/EDI enables small vendors to use the system. EDI is too expensive for small vendors, but the EDI/Internet is affordable. Also, the employees can update personal data from any Web-enabled desktop in the store or at home. Future plans call for adding an e-purchasing (procurement) module using a desktop purchasing model.

Sources: Compiled from *lawson.com,* and *dollargeneral.com*.

Questions

1. Explain why the old, nonintegrated functional system created problems for the company. Be specific.
2. The new system cost several million dollars. Why, in your opinion, was it necessary to install it?
3. What other software should Dollar General consider to reduce its costs?
4. Another product of Lawson is *Services Automation*. Would you recommend it to Dollar General? Why or why not?

Case 9.2

Regent Inns: Successful Implementation of E-Procurement

Regent Inns Plc (*regent-inns.co.uk*) operates 79 entertainment establishments in the United Kingdom. Regent Inns has two of the largest UK leisure brands in terms of average sales—Walkabout and Jongleurs Comedy Club.

When Regent Inns set out to implement a corporatewide purchasing solution, the business set an audacious goal: "To implement a best practice procurement model across the Regent Inns brands that manages the process from cradle to grave" for all items and services. The company was not prepared to settle for less than 100 percent fit that included all services and products.

Two core elements of the project goal was the approach of "business process first—then technology." The other vital element of Regent Inns' style is the belief that "people and process excellence underpin business excellence."

The solution includes three components:

- **Back-office solution**—SunSystems from Systems Union Plc (*sunsystems.com*)
- **Procurement software solution**—iPOS from Professional Advantage (*suncompanion.com*)
- **Procurement consultancy service**—Foundation Services (*foundationsystems.co.uk*)

Results

The results were as follows:

- The purchasing cycle was reduced from months to weeks and from days to hours.
- Stock-holding costs were reduced dramatically.
- The number of food suppliers fell from 51 to fewer than 10.
- A single food supplier's products were reduced to 201 from 1,278.
- The number of invoices with PO numbers increased from 20 to 97 percent (target was 95 percent).
- Automated invoice upload increased from 4 percent to 68 percent (target 90 percent).
- Incorrect delivery charges decreased by £50k/year.
- Bottle deposit price errors 0.003p per bottle decreased by £80k/year.
- Fewer deliveries were made.
- Managers spent less time on administration and more time on the business.

The company attributed its success to management support, involvement of all types of users, high commitment from team members, in-depth study of all of the processes, superb communication and collaboration, accurate definitions of all stakeholder requirements, a back-to-basics culture, and working closely with suppliers.

Sources: Compiled from Professional Advantage (2006) and from SunSystems (2004).

For Further Exploration: What are the drivers of e-procurement? Will they persist, and what are the benefits of the new e-procurement system to the company?

References

Professional Advantage, "Regent Inns Plc.: eProcurement Case Study," *pa.com.au/sunsystems/industries/hospitality_leisure/hl_case_studies.htm*.

SunSystems, "Regent Inns Plc: E-Procurement within a Teamwork Culture," May 2004, *sunsystems.com/apps/caseStudies/Long/Regent_Inns_-_Long.pdf*.

Case 9.3

Musco Food Uses IT to Improve Sales and Operations

Musco Food Corp. (*muscofood.com*) is a distributor of food products (meats, cheese, olive oil, and other deli-need products) in Queens, New York. It has only an eight-man sales force who visit customers and, until recently, showed them a paper catalog and took orders orally ("Just give us the same as last time," or "I need fourteen cases of Italian cheese"). The salesman then went to his car and called a customer service employee, who then typed the information into the company's computerized order processing system that generated the order to the warehouse for preparation and delivery, and an invoice for the customer.

The system was in place for about 10 years; however, mistakes occurred about five times a week. The quantity ordered differed from that delivered. Either the customer service employee made a mistake or the salesman forgot the exact number while walking to his car. In either case, customers were unhappy, inventories were incorrect, and expensive rush orders (order corrections) had to be made.

Salesman productivity was low and other expenses were too high. In addition, price changes and promotions that might be of interest to specific customers were not communicated in time. Finally, inventory availability was not known in real time.

Using Treo smart phones (from *Palm.com*) that display product images and order entry e-forms, the salesmen struggled at the beginning to pull up the products and enter orders. However, after a few weeks, the salesmen became experts in locating a product out of more than 1,000 in the e-catalog. Now, an order is punched in the minute it is expressed by the customer. An electronic invoice is generated in seconds and shown to the deli owner for verification on the spot. Also, the customer service representatives who used to enter the orders in the computers are not needed. Instead, they have been retrained to help locate new customers. The wireless Treo enters the order information directly to the corporate computer system. In addition, the Treo provides instant access to pricing changes and promotions. The salesmen can check, in real time, any customer accounts receivable balance. Finally, real-time inventory availability can be checked at the customer's site.

Each salesman now visits six instead of five customers on an average day. Orders get instant attention from the warehouse employees. Most important, errors, correcting trips, and expenses have been reduced by over 50 percent for an annual savings of $25,000. Finally, the process fulfillment time takes one to two instead of three days. The system paid for itself in just a few months.

Sources: Compiled from Barrett (2005) and from *Palm.com* (2006).

Questions

1. Identify the real-time activities.
2. How is customer service improved?
3. Which functional information systems need to be integrated to support the new system?
4. Which types of errors were eliminated?

References

Barrett, L., "Dial-a-Deli," *Baseline,* November 2005.

Palm.com, "Musco Food Corp. Expand Customer Base with Treo Smartphones," 2006, *solutions.palm.com/regac/success_stories/SuccessStoryDetails.jsp?storyId=1258*.

Case 10.1

West Marine: A CPFR Success Story

West Marine is the largest boating-supply company in the United States. It has 400 stores and annual sales of $690 million. The company sells more than 50,000 different products, ranging from stainless-steel propellers and anchors to lifejackets and wetsuits, through its stores, Web site, catalog, and commercial sales arm.

West Marine has a dramatic story when it comes to its effective supply chain, which was guided and directed through its deep, intensive, and effective implementation of CPFR. West Marine is now regarded as having a showcase CPFR implementation; however, it wasn't always that way!

In 1997, West Marine acquired its east coast competitor E&B Marine. As a result of the challenges of integrating the two companies, sales fell by almost 8 percent and during the peak season out-of-stock situations rose by more than 12 percent over the previous year. Income dropped from $15 million in 1997 to little more than $1 million in 1998.

The situation was quite different when in 2003 West Marine purchased its largest competitor, BoatUS. West Marine successfully integrated BoatUS's distribution center in just 30 days. BoatUS's in-store systems were integrated into West Marine in just under 60 days. Further, supply chain performance and the bottom-line were not affected.

So why was this second acquisition so much smoother? The difference was that by 2003 the company had an effective IT-enabled supply chain management system driven by CPFR.

In reviewing the CPFR implementation in West Marine, it is clear that a key success factor was West Marine's commitment to technology enablement. Through the CPFR information systems, data such as seasonal forecasts, promotional stock levels, and future assortment changes are calculated automatically. Joint forecasting and order fulfillment are enabled by information systems that are suitably integrated between supply chain partners. As many similar case studies attest, such information sharing through integrated supply chain systems is one factor in successful supply chain management.

However, West Marine's successful CPFR implementation was not simply about the technology. Significant energy and resources were devoted to collaboration among the key supply chain personnel in West Marine and its supply chain partners. Joint skills and knowledge were developed along with the key elements of trust and joint understanding. These elements were built through joint education and training sessions as well as through the standard CPFR joint planning and forecasting sessions.

West Marine's CPFR program now involves 200 suppliers and more than 20,000 stock items, representing more than 90 percent of West Marine's procurement spending. Further, more than 70 of West Marine's top suppliers load West Marine's order forecasts directly into their production planning systems. In-stock rates at West Marine stores are well over 90 percent, forecast accuracy stands at 85 percent, and on-time shipments are now consistently better than 80 percent. Summing up West Marine's collaborative supply chain journey using CPFR, Larry Smith, Senior Vice President of Planning and Replenishment states, "The results, we believe, speak for themselves."

Sources: Compiled from Lee and Denend (2005) and Smith (2006).

For Further Exploration: Identify the major elements of West Marine's CPFR success and analyze the benefits of the CPFR implementation for West Marine.

References

Lee, H., and L. Denend, "West Marine: Driving Growth through Shipshape Supply Chain Management," *Stanford Graduate School of Business*, Case GS-34, (2005).

Smith, L., "West Marine: A CPFR Success Story," *Supply Chain Management Review*, 10(2), March 2006.

Case 10.2

Northrop Grumman Uses Knowledge Management to Prevent "Brain Drain"

As Northrop Grumman (northropgrumman.com), manufacturers of the B-2 bomber, faced the unpleasant task of firing nearly 12,000 workers in 1997, the company dealt with the disturbing fact that these employees took with them years of experience and in-depth knowledge about what was then considered to be the most complex aircraft ever built. In an attempt to retain the valuable knowledge these workers possessed, Northrop Grumman formed a knowledge management team, which identified top experts and videotaped interviews with them before they left. However, capturing this knowledge in a single interview proved difficult. Northrop Grumman's director of knowledge management (KM) for the Western region of the integrated systems sector, Scott Shaffar, said of this, "We did lose some of that knowledge. In an exit interview, you can capture certain things, but not a lifetime of experience." After frantically attempting to identify experts in key areas related to the program and to create a central repository for project documents, the aerospace giant managed to keep enough knowledge to maintain and move forward with B-2-related upgrade projects.

Eight years later, it is apparent that Northrop Grumman learned some important lessons about preventing a colossal "brain drain" in the future. After researching the issues it faced, the company implemented a variety of tools to retain and transfer knowledge from its engineers—well in advance of retirement. Such tools include document management systems and common work spaces that record, for future reference, how an engineer did his job. Shaffar and his team have also started programs that bring together older and younger engineers across the country to exchange information about technical problems, in addition to using software that helps people find experts within the company.

The atmosphere has changed at Northrop Grumman since its 1997 massive downsizing. Although a large percentage of its workforce is approaching retirement, the company has started hiring more college graduates over the past four years, thereby lowering the average age of employees from the upper forties to the mid-forties. Shaffar is currently working on balancing the more gradual transfer of knowledge from older to younger workers with the need to capture some vital expertise quickly before it's too late. For example, Northrop Grumman engineers are competing on a proposal for a "crew exploration vehicle," which is being designed to replace the space shuttle and travel to the moon (and eventually to Mars). These engineers met in August 2005 with a group of retirees who worked on the Apollo program that sent men to the moon more than 35 years ago. Using Quindi, a computer program, and a camera attached to a laptop, a facilitator recorded retirees telling stories about how they handled the technical problems of sending a man to the moon. Engineers working on this project will be able to view these tales as Web pages. Shaffar admits that employees would rather go to another person than a system for advice, but he says the exercise helped capture knowledge that would otherwise fade away.

Above all, Shaffar acknowledges that the problem surpasses looking at what skills you presently have. "There have always been new generations, and we're not any different in that way," he says. "Mentoring, training and passing on knowledge is not something you can do at the last minute. You have to plan ahead."

Sources: Compiled from Patton (2006) and *cio.com* (accessed June 2008).

For Further Exploration: Is there any way to improve knowledge acquisition in such a case? What role does document management play? What is the impact of corporate culture in this case?

Reference

Patton, S., "Beating the Boomer Brain Drain Blues," *CIO Magazine*, January 15, 2006, *cio.com/archive/011506/boomer.html*.

Case 11.1

BudNet BI

Anheuser-Busch Companies wants to be the life of every party with their beers and theme parks. The Fortune 500 company is one of the world's largest brewers, best known for its Budweiser, Bud Light, and Michelob labels. Heineken, Molson, Coors, and SABMiller are its fiercest competitors. Anheuser-Busch had 48 percent market share in the United States in 2008, which is impressive in any business, but a decline from 49 percent in 2006 and 50 percent in 2005. Each 1 percent represents 1.4 million barrels of beer.

Anheuser-Busch's business strategy can be summed up in one word—*responsiveness*. The ability to respond quickly to opportunities and threats relies on IT applications that support the analysis and interpretation of company, market, and economic data. For example, by monitoring and analyzing sales data as precisely as its ITs allow, the company was first to identify the shift in customer purchasing preferences toward more healthy beverages. Armed with this intelligence, the company responded with and captured the low-carb beer market.

Saturated Beer Market

The beer market had reached saturation by 2005 in much of the developed world. The domestic beer market was particularly mature, with flat U.S. consumption levels for three reasons: greater awareness of problems associated with alcohol, slow population growth, and an aging population. Young adults are the largest beer-drinking segment. There were few options for growth other than winning over customers from rivals or focusing on emerging markets. Stealing from competitors is extremely risky because it triggers hostile retaliation, leading to unprofitable price and advertising wars. Entering emerging markets was the strategy of many brewers.

There were also price constraints and pressures. The industry-wide decline in beer consumption prevented Anheuser-Busch from raising its prices, a strategy that had added to profits in prior years. Both SABMiller and Coors were discounting their brands, and Anheuser-Busch had to follow along or risk losing sales or consumers who might never return to Bud or its other labels. Faced with adverse and uncontrollable conditions, Anheuser-Busch sought to streamline and better manage its business processes to ensure that they met consumer demand.

BudNet

Anheuser-Busch implemented BudNet, a network-based, real-time data warehousing solution capable of collecting data on dozens of its KPIs. BudNet provided the network and data infrastructure for BI and DSS capabilities. As new technologies emerged and became affordable, they were added to BudNet. For example, BudNet was enhanced with wireless network capabilities and data capture via handheld devices. Wireless capabilities and mobile technology provided two-way communication. Company-owned and independent distributors updated sales and inventory data in real time. In the United States, distributors reported critical facts about competitors' shelf space, displays, and pricing, as well as its own inventory levels and shelf situation, using PDAs. And the company sent instructions to the sales reps before they left the store as to how to move displays and tailor promotions to influence market share.

Wireless capabilities provide managers with data they need to gain better insight into the beer distribution chain and to maximize sales. BudNet reduces uncertainty. Managers are informed of relevant details, such as whether a six-pack of Bud Light was warm or cold when it was bought and what it cost at neighboring stores.

The Results

With the BudNet system, data from invoices is transmitted to the network every time a shipment enters a store. Sales data from wholesalers is received promptly; for example, Monday sales data is reported to Anheuser-Busch by Tuesday at 4 PM, but many wholesalers report earlier. The brewer can then correlate the sales data with data on the gender, age, and other characteristics of shoppers in a given area received from third parties on a weekly basis. Anheuser-Busch also integrates data from its distributors' ISs with other key data, such as U.S. census data on the ethnic and economic makeup of neighborhoods, to design local promotions that effectively match their markets.

Anheuser-Busch uses sophisticated data analytics to gain a decisive edge and outsmart its rivals in a competitive mature industry. Its ability to collect, analyze, and act on data is the essence of its competitive advantage and the source of its superior performance. Management has made a science out of monitoring the metrics that allow it to understand when, where, and why consumers buy beer.

Source: Compiled from Garretson (2007) and Schachter (2007).

Questions

1. What business pressures was Anheuser-Busch facing prior to implementing BudNet?
2. How had the beer market and health concerns changed?
3. Why couldn't Anheuser-Busch increase its prices?
4. How did BudNet decrease uncertainty?
5. List BudNet's BI components.
6. What was the business case for BudNet?

Case 11.2

Lexmark International Improves Operations with BI

Lexmark International (*lexmark.com*) is a global manufacturer of printing products and solutions with about 12,000 employees and over 50 sales offices worldwide. Thousands of retail partners sell Lexmark's products in over 160 countries.

The Problem

Being in an extremely competitive business, Lexmark needs detailed, accurate, and timely information for decision support and strategy implementation. This is especially important when it comes to data flow between Lexmark and its retail partners. The most important information is detailed by item, sales volumes, and inventory levels. The old system was slow, inefficient, and error-ridden. Problems occurred both with flows from the partners and with data delivery. In delivering the data, results were often copied from spreadsheets and pasted into reports, typically taking four days or longer to produce answers to common business questions. Sales representatives out in the field had to dial into the intranet. Once a connection was established, analysts and sales representatives had to write SQL queries and navigate the mainframe to generate reports for management, some of which were based on inaccurate, week-old data.

The Solution

Lexmark implemented a BI solution from Microstrategy. The application is a BI adaptation for retailing, known as Retail BI System. The system enables buyers, financial analysts, marketing analysts, regional managers, merchandisers, and field sales representatives to analyze sales and inventory data from their desktop or mobile devices. The system, which is fed by IBM's data warehouse, provides users with the ability to track sales performance and inventory levels of every Lexmark product at each of the thousands of retail stores worldwide. A large number of reporting and analysis tools are available in the software, including extensive reports, statistical models (over 50), and visualization techniques. Using the system, Lexmark's user community can answer queries such as these instantly and easily:

- What are my weekly sales and inventory levels in each of a specific customer's stores throughout the country?
- Who were my top retailers for a given product last week, last month, or this weekend versus last weekend?
- Looking at a given store that reports electronic data interchange (EDI) sales and inventory data to Lexmark, what are the inventory levels of a certain top-selling product?

The Results

Lexmark reported that decision makers now receive timely, accurate, and detailed information. It helped to identify sales opportunities, increased partner loyalty, eliminated inventory problems, and increased profitability. For example, the company identifies that a specific retail location is about to sell out of a certain printer. An automatic *alert* is then sent to the store manager and, within hours, a replenishment order is placed, avoiding a stockout. Overall, $100,000 of potentially lost sales were recovered. The retail stores appreciate Lexmark for this service, making Lexmark a preferred vendor.

Almost all Lexmark employees are using the systems. Novice workers are able to use the information to improve how they do their job. Management can better understand business trends and make appropriate strategic decisions. They have a better understanding of consumer demand by country and store, so they can better decide, for example, on pricing and promotions. Also, customer and partner services have been greatly improved.

Sources: Compiled from *Microstrategy.com* and Valentine (2004).

Questions

1. Identify the challenges faced by Lexmark regarding information flows.
2. How were information flows provided before and after implementation of the BI system?
3. Identify decisions supported by the new system.
4. How can the system improve customer service?
5. Go to Microstrategy's Web site (*microstrategy.com*) and examine the capabilities of BI systems.

Case 11.3

Cigna Uses Business Rules to Support Treatment Request Approval

The Problem

CIGNA is a major health insurance company. Its CIGNA Behavioral Health covers 16 million Americans in all 50 states and internationally. In addition, it supports a network of more than 50,000 professionals who needed a system that quickly and automatically approved requests submitted by providers, such as therapists, for additional patient care. CIGNA Behavioral Health's business processes for making approval determinations were supported in different locations using several different software applications. Certain rules in use sometimes conflicted with each other, and knowledge was lost due to employee turnover. In addition, the rules were in inflexible if-then statements. Accessing and changing the rules was a slow, cumbersome, and expensive process.

The Solution

To reduce the knowledge loss due to employee turnover and to increase consistency and efficiency of rule maintenance, CIGNA Behavioral Health decided to adopt *rule-based intelligent systems* that could automate decision-making situations. CIGNA chose HaleyAuthority knowledge management (KM) software and HaleyRules intelligent system to build a Web-based benefit management system named *Provider eCare Online*. With the eCare system, therapists submit requests for authorization of benefits over the Internet and receive, in many cases, an immediate machine-generated approval. HaleyRules is a software tool that allows an expert to describe knowledge in plain English and convert it into business rules, which can then be incorporated in a rule base for future inferences. CIGNA Behavioral Health compiled the experience and expertise of behavioral health clinicians, then used the software to convert that knowledge into a series of straightforward, easily understood, and modifiable business rules.

The Results

An immediate benefit of the project is that over 30 percent of all requests for authorization of benefits are processed (approved or rejected) automatically through eCare, enabling CIGNA Behavioral Health to handle more requests with its existing staff. By expressing business processes in English using HaleyRules, eCare specialists can implement changes to the rules whenever needed, in hours instead of weeks. The adoption of knowledge-based systems has helped CIGNA enhance operational efficiency and reduce costs. The tools of HaleyAuthority and HaleyRules in combination provide a convenient platform for the implementation of such intelligent systems.

Sources: Compiled from Haley Case Brief (2006), and *cigna.com* (accessed July 2008).

For Further Exploration: Why bother with a system that can determine automatically only 30 percent of the cases? Why was a KM component added (visit *haley.com*)? What are the legal implications or risks of machine authorization?

References

Cigna, cigna.com.

Haley Case Brief, "CIGNA Creates eCare Treatment Request Approval System with Haley Systems' Technology," February 2006.

Case 12.1

Second Life Strategy of American Apparel

American Apparel (*americanapparel.net*) is a vertically integrated manufacturer, distributor, and retailer of branded apparel, based in Los Angeles, California. Recognized as a unique retail brand in the global market, American Apparel operates 190 retail stores in 15 countries, employing over 7,000 people. The company's progressive business strategy and provocative advertising campaigns have set the company apart in the fashion world. One first-mover strategy to set them apart was to enter Second Life.

Second Life

Second Life is an Internet-based 3-D virtual world of elaborate landscapes and cityscapes. Developed by Linden Research, Inc., Second Life (*secondlife.com*) received international attention via mainstream news media in late 2006 and early 2007, emerging as a social network of real promise. Interaction, collaboration, and commerce are brought to a new level. The number of registered users skyrocketed from 100,000 at the beginning of 2005 to more than 1.5 million within 2 years.

In this simulated world, populated by animated cartoon avatars fashioned by their human alter egos, "residents" use Linden dollars to buy and sell things that exist only "in world." About 280 Linden dollars are equivalent to one U.S. dollar. As much as $6.6 million in user transactions changed hands in one month. Avatars pay real money to buy land and buildings from Linden and to shop in virtual stores for virtual clothing and music. In addition to shopping, users role-play, chat, hold jobs, build homes, open restaurants, travel, attend concerts or parties, and push politics. What distinguishes Second Life from some of the other virtual worlds is that players have access to 3-D modeling tools and scripting technology, freeing them to create and sell clothes, homes, and other products, rather than being confined to an established environment designed by a game company's programmers.

Commercial Promise of Second Life

Three-dimensional virtual worlds such as Second Life are becoming a very real component of people's lives. The ability to engage consumers has great appeal. Some firms are using virtual worlds as marketing tools to reach consumers. The demographics are appealing for marketers. According to Linden Lab, the average user is 32 years of age, 57 percent are male, and 40 percent live outside the United States. That's an audience increasingly hard to reach through traditional media such as TV.

Online synthetic worlds are expected to play an increasingly vital role in business-to-consumer relationships, building customer loyalty through time and commitment. Such virtual environments may even come to dominate and drive brand building for major companies.

American Apparel's New Strategy

Recognizing the demographic of Second Life as a prized market segment, American Apparel saw a unique opportunity for marketing, sales, and building customer relationships. Marketing to a youth audience—a broad youth audience, ages 18–30—is more challenging than ever because it is fragmented. Marketers cannot put all of their money into one thing or another, such as television or print. Instead of targeting passive viewers of such advertising, marketers will have to try new channels. American Apparel sees the Second Life world as a platform to actively interact with and sell to engaged users, thereby developing a relationship with them.

Raz Schionning, director of Web services, became convinced that the online role-playing game is the market of tomorrow. These emerging social computing networks of online communities sharing interests and activities hold the potential to redefine customer relationship management. Schionning recalls, "I pitched the idea to the creative team here—the people who handle our print and traditional marketing." American Apparel set out on a bold boundary-pushing experiment to reach a young, tech-savvy audience and to explore what the future of the Internet might mean for business. Schionning commented, "When we think about Web marketing, it makes sense to not just put your money in banner panels." American Apparel took an experimental approach, focusing on long-term added value, "not a profit-making venture."

American Apparel's Virtual Store

American Apparel was the first major real-world company to formally enter Second Life by opening a virtual store on June 21, 2006. Among waterfalls and lights on an idyllic island, American Apparel launched the grand opening of its first virtual megastore. The gala event included music, virtual tacos, virtual goody bags, and virtual beer. Free virtual T-shirts were handed out to avatar shoppers.

American Apparel hired virtual sales clerks from among Second Life's residents. Additional clothing merchandise items were added to the 20 styles offered at the time of opening. Two months before being introduced in physical stores, American Apparel test-marketed its first line of jeans. And, in an effort to drive traffic to both the virtual and the physical stores, anyone purchasing clothes in Second Life after the grand opening party received a coupon for a 15 percent discount on merchandise bought in real-world stores.

Not surprisingly, clothing became one of the hottest items to purchase in Second Life. A few short months later, in August 2006, the 20 best-selling Second Life fashion designers generated a combined $140,466 in sales, according to Linden Labs. The American Apparel store realized sales of 4,000 items. If the retailer can attract and maintain the attention of its online and physical customers, it just might attain the increased sales revenue it is seeking.

American Apparel is not alone in establishing a presence in Second Life. For example, Nissan and Toyota are selling virtual cars. adidas and Reebok sell sneakers, but forming customer relationships, not sales, is the primary goal. Starwood started testing a virtual version of its new Aloft hotel chain. Coca-Cola and Sears have set up virtual stores to market products and test prototypes. Ad agency Leo Burnett built an

"Ideas Hub" where its global staff can meet and interact. Sun Microsystems hosted a "virtual news conference" to tout its new gaming strategy. INSEAD, an international business school based in Fontainebleau near Paris, built a virtual campus and classrooms to supplement in-class learning.

American Apparel's Business Outcome

Schionning admits to some initial ambivalence about the Second Life store and notes, "We know there is a lot to be learned in this arena." In summer 2007, American Apparel chained shut its virtual store in Second Life and posted the following:

> **Sorry, We're Closed**
>
> Last summer [2006] we opened up our Second Life American Apparel store with a grand opening party with tacos, a few cases of beer, and a piñata. We didn't know what to expect or if anybody would even show up.
> Needless to say, it's been quite a year. We've had thousands of visitors from all over the world and made a ton of new friends, seen some interesting things from furry folks to virtual terrorism, caused a bit of a clamor, and sold some virtual t-shirts and it's been great. But we feel like our time is up here. So we're closing our doors on Lerappa Island for now. This doesn't mean we're finished with the virtual world. Stay tuned to see what we do next.

What American Apparel did next was move to the younger, hipper MTV's Virtual Lower East Side (*vles.com*), which opened to the public in January 2008. A new online social network that revolves around New York City's Lower East Side (LES) encourages new visitors to stop by the American Apparel store to "get actual, literal clothes that you can put on your actual, literal body. Then you can get virtual clothes for your avatar too, which is pretty awesome."

Lessons Learned from This Case

Numerous companies have explored synthetic worlds, though many eventually abandoned them. Reebok, adidas, and Starwood Hotels also closed their Second Life stores because they were not making a profit. New cutting-edge technologies require a willingness to experiment. American Apparel has accepted this inevitability in its IT strategy. Virtual worlds may indeed play a significant role in the future of the Internet, but it is yet to be determined what value this new and evolving IT platform holds for American Apparel in particular and business in general.

Sources: Compiled from American Apparel, Inc. (2008), Lardi-Nadarajan (2008), Lavallee (2006), and Ohrstrom (2008).

Questions

1. Did American Apparel fail at its business strategy by closing the virtual store in Second Life?
2. What are the benefits to American Apparel of having opened a store in Second Life?
3. In your opinion, is the Second Life experience in the American Apparel store an effective form of advertising?
4. In your opinion, do Second Life user-experiences develop a relationship between American Apparel and customers that strengthens customer loyalty?

Case 13.1

NCBJ Achieves a 500 Percent + ROI by Rebuilding Its IT Infrastructure

The Problem

National Commercial Bank Jamaica Limited (NCBJ) launched a project to consolidate its back-office systems and processes in 2003. By the end of 2004, the bank had trimmed approximately 150 full-time equivalents (FTEs), primarily as a result of centralizing or outsourcing back-office tasks. Nevertheless, "we did not feel we were fully leveraging our US$52 million investment," Courtney Campbell, the company's general manager of retail banking, reported. "Many branches were complaining that they did not have enough staff to deliver what they'd delivered before," particularly in the crucial areas of service and sales (Horwitt 2006). This was a serious problem, especially given that a central purpose of the consolidation effort was to free up branch employees to focus more on the customer.

The Solution

Campbell and his group recognized the need to take a scientific approach to cutting staff and assigning workloads. They also recognized the need to bring in outside help. After evaluating a number of consulting firms, NCBJ chose Demos Solutions, a Norwell, Massachusetts–based consulting and software company that has done similar projects with other large banks.

Using StaffSmart, Demos's workforce optimization software suite, Demos consultants performed a time study and analysis of current workloads at two of NCBJ's pilot branches. Using handheld devices, they timed daily transactions, such as cashing a check or closing a sale. They used regression models to help determine how much time was taken by nonautomated tasks, such as answering customer queries. Once the baseline was established, Demos used a combination of best practices, benchmarking data, and expertise garnered from past jobs to create a new branch operating model. The model is designed to "improve wait time, reduce costs, and allocate more time for selling," Demos says.

The entire workforce optimization project with Demos, including pilots at two branches, companywide rollout, and software deployment, took about eight months.

The Results

The Demos project enabled NCBJ to reallocate an additional 175 FTEs. In fact, Campbell projects a ROI of more than 500 percent over a two-year period. Less easily quantifiable, but at least as important, are the soft benefits the bank is gaining in customer satisfaction and revenue growth from reallocating FTEs from back-office work to service and sales. At least one dedicated salesperson has been added at each branch. The bank had a record month in loan sales in March, "although we can't attribute that solely" to the workforce optimization effort, Campbell notes.

Another key aspect of the Demos collaboration: bank personnel gained the knowledge, skills, and software tools they need to analyze and optimize workforce allocations and processes on an ongoing basis. "We want to create sustainable ROI," Demos says. "We have a much more scientific basis and a tool to assess staff levels at each branch, instead of having to rely on intuition," Campbell agrees.

NCBJ learned an important lesson from acquiring its IT infrastructure: To realize the big paybacks from such an IT project, you need to do a thorough, up-front analysis of business processes and workloads. Then you can optimize processes and allocate resources where they'll do the most good.

Sources: Compiled from Horwitt (2006) and *jncb.com* (accessed June 2008).

Questions

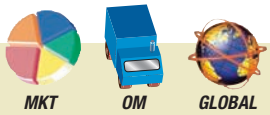
1. What IT acquisition option was selected by National Commercial Bank Jamaica (NCBJ) Limited? Why?
2. Do you think the workforce optimization project at NCBJ is a high-payoff project? Why?
3. Use the Demos project as an example to discuss the relationship between systems acquisition and business process restructuring.
4. What are the wider implications of the Demos project on knowledge management at NCBJ?
5. IT systems developers have to be technical experts as well as management change agents. Discuss the concept of organizational complements to technology changes with reference to the NCBJ case.

Reference

Horwitt, E., "Bank Achieves over 500% ROI in 8 Months," *Techtarget Case Study*, May 3, 2006. *Jncb.com*.

Case 13.2

Con-way, Inc. Implements Innovative Technology and Wins Nationwide Recognition



Con-way, Inc. is a freight transportation and logistics services company headquartered in San Mateo, California. Con-way delivers industry-leading services through its primary operating companies of Con-way Freight, CFI and Con-way Truckload, and Menlo Worldwide Logistics.

Con-way, Inc. and its subsidiaries operate from 460 operating locations across North America and in 17 countries across five continents. Con-way capabilities include:

- Global operations in 17 countries across five continents
- A network of 460 operating locations across North America
- More than 27,000 highly trained personnel
- Con-way Freight: Local, regional, and transcontinental LTL (less than truckload) transportation services
- Menlo Worldwide Logistics: Designs, implements, and manages supply chain solutions, including logistics and transportation management, warehousing, and distribution
- Con-way Truckload and CFI: A network of full truckload services across the United States and Canada

The Problem

Over the years, Con-way had moved from using basic technology to handle its complex logistics problems to the deployment of leading-edge information technologies, including asset management software, a service-oriented architecture (SOA), business intelligence tools, and virtualization technology. These systems improved internal processes, offered innovative new services to its customers, and reduced costs of hardware and service administration.

For example, in 2006, Con-way was experiencing inefficiencies in its dock operations and needed to reduce its planning time and forklift traffic and increase the pounds of freight handled per labor-hour. To accomplish these tasks, Con-way developed a Web-based, interaction Step Saver tool to automate the planning process, enabling dock coordinators to achieve optimal loads. Step Saver has been implemented at 26 facilities and has achieved a 5.2 percent improvement in pounds handled per labor-hour, a 35 percent reduction in planning time, and a 21 percent decrease in forklift travel.

In 2007, the company began testing Wi-Fi systems and RFID technology to track shipments across its North American network of service centers.

One of Con-way's biggest challenges, however, was not related to tracking shipments, but instead centered around recording and transmitting driver payroll data at Con-way Freight. Con-way Freight is the premier provider of regional, interregional, and nationwide LTL service to customers across an integrated North American network of LTL operating locations. These operating units provide high-performance, LTL, full truckload, and intermodal freight transportation; logistics, warehousing, and supply chain management services; and trailer manufacturing. From its facility located in the San Francisco Bay Area, Con-way sends out 46 short-haul pickup and delivery drivers and 16 line-haul truckers, which cover longer-distance overnight and two-day trips, every day. In any 24-hour period, more than 700 shipments are received and dispatched at the Hayward operation, which acts as a staging point for local Bay Area shipments and as a freight assembly center for overnight loads. Hayward is just one of 440 Con-way service centers scattered across North America with a total of 15,000 drivers.

Despite deployment of innovative technology to handle shipping activities, payroll sheets—known as Form 265s—were still being handwritten by its 15,000 drivers. The forms were then collected at individual service centers across the country and sent by courier to Con-way's Portland operations center for manual entry by data clerks. It is ironic that Con-way, a major freight-shipping company, was relying on an outside provider to transport its Form 265s each week and paying nearly $500,000 annually for this service. The problem was that forms were being lost, misplaced, were delivered late, and employee satisfaction and morale were suffering. It was evident that this would not be an easy fix—the Form 265s were complex and difficult to read. Con-way truckers are paid based on time spent on loading and unloading and mileage to and from the destination. They are also paid on filling out paperwork, so a number of different items need to be captured on the payroll sheets. Then the forms have to be put together and shipped to the Portland operations center for entry. Forms 265s were due every Tuesday, consistent with the weekly schedule for paying the truck drivers. Forms were entered all day and the volume often caused the data entry clerks to have to stay late into the night to complete the task. The drivers' handwriting didn't help either, making the information difficult to read. This added to the clerks' frustration and negatively affected morale.

The Solution

The task of "fixing" the broken payroll system was handed to IT manager John Reich. After he studied the complex Form 265s and reviewed various software and hardware solutions, he knew that an off-the-shelf software/scanner combination wouldn't serve the purpose. While some of Con-way's managers felt that the optical character recognition (OCR) scanning systems were up to the task, CIO Jacquelyn Barretta was concerned that the technology was not mature enough to handle the volume and complexity of Form 265s. Con-way CFO Kevin Schick also had reservations: "If it was a 50% solution and we were still having people paw through these forms and determine the drivers' work, it wasn't going to do us any good." (*Informationweek.com,* 2008).

To address these concerns, Reich arranged for three vendors to develop a simple application to demonstrate that their products could accommodate the complexities of the Form 265s. Of these, only one succeeded. Reich recalls, "One of the vendors did it, another tried and gave up, and the third decided not to participate."

The main sticking point was not the content of the forms, but the drivers' illegible handwriting.

The vendor that was able to meet Con-way's requirements was Pegasus Imaging. It demonstrated its SmartScan

Xpress character-recognition software that runs on Panasonic KV-S3065CL and KV-S2026C scanners. At the beginning of implementation, the system achieved an 80 percent success rate, but this soon increased to 99.9 percent after business rules were incorporated to visually highlight fields where missing or incorrect data was likely to occur. The total system cost just a little more than Con-way spent in one year for courier service.

The Results

Since September 2007, the Form 265s have been assembled and scanned at 38 different locations across North America and forwarded to the Portland service center. Focusing on the highlighted fields, the forms can be validated quickly and easily. As a result of the adoption and implementation of the new system, Con-way truckers are paid on time, and morale among the data entry clerks has improved significantly. As a result of the foresight of Reich, Schick, and Barretta, Con-way rose to top rank in the 2007 InformationWeek 500—an annual ranking of the most innovative companies employing information technology in their businesses—and on June 2, 2008, *CIO* magazine announced Con-way, Inc. as the recipient of the 2008 CIO 100 award for its use of innovative technologies to generate business value. As Abbie Lundberg, editor-in-chief of *CIO,* remarked, "Unlike other top lists, it's not just about who's biggest—it's about who's doing the most interesting and relevant things." Clearly Con-way is doing just that, and it isn't finished yet. Barretta and Reich are currently exploring the possibility of using OCR technology to process bills of lading and delivery receipts.

Lessons Learned

Con-way, Inc. illustrates the importance of adopting and implementing IT that closely aligns with all business goals, not just those focused on core competencies. It shows that although Con-way Freight was in the business of moving LTL shipments, its IT needed to address not only trucking but also the broader business goal of maintaining an acceptable level of employee morale.

Although the company was adopting leading-edge technologies to improve operational efficiencies that improved its bottom line, the morale of its data entry clerks and truckers was plummeting because of its antiquated payroll form processes. In addition, the payroll process was incurring huge *shipping* costs for the payroll forms to be delivered from the various service centers to the Portland operations center. Clearly, noncore business functions are not the only areas in which IT can be applied to achieve huge gains by an organization.

Sources: Compiled from *Con-way.com* (2008), *CIO* magazine (2008), and *informationweek.com* (2007).

Case 13.3

Flickr's Application Development 2.0 Model

Flickr (*flickr.com*) is a popular photo-sharing Web community that Yahoo had purchased in 2005. It is considered the best photo-management and -sharing application on the Web, and an excellent example of Web 2.0 functionality. Flickr lets users upload their photos and tag them with descriptive words. Users develop relationships with other users. They can display photos in *sets*, or albums where a single photo can appear multiple times, or *groups* that are organized around special interests. Users can also add photos to Flickr Web pages, RSS feeds, e-mails, and blogs for their friends and family to view. Flickr's active community and addictive sharing features have attracted many millions of users. Developing applications for Flickr, or any other popular user market that is always in flux, requires a fast and agile methodology.

Developing Web 2.0 Applications

On July 18, 2008, Flickr's application developers released the updated Web site. The deployment was the 36th new release within one week where 627 changes had been made by their 21 Web 2.0 developers. Such constant tweaking of an application, called a *perpetual beta*, is common in the Web 2.0 world for a consumer market that is always in flux. Traditionally, a beta version is the first version of a software application that is released while it is still actively being debugged and refined. Beta-level software generally includes all features as well as known nonserious problems or bugs. Quick, incremental updates with close user involvement (similar to how users participate in wiki development) are key characteristics of the emerging software development paradigm championed by Web 2.0 businesses.

Rapid vs. Traditional Systems Development Methods

Rapid development of Web applications can be much more effective and less expensive than traditional systems' development life cycle (SDLC) methods. When applications are developed using SDLC methods, they proceed formally through a series of distinct phases, such as requirements analysis, design, coding and debugging, system testing, and implementation. One major problem with SDLC is that users usually do not participate sufficiently throughout the design phases to ensure that the application meets their needs—resulting in expensive rework and delays. With SDLC, users often do not see the application until implementation, at which time it is fully developed, so changes would be the most expensive.

In contrast to the SDLC, the new Web 2.0 approach is an agile and fast development method during which designers and users interact and participate closely in all of the phases. Applications are better when developers are not insulated from the people who use their applications. When developers hear users' complaints or compliments directly, they are better informed and motivated than when they are detached from users and rely instead on presentation slides and bar charts that represent users' desires in a meeting room.

Benefits of Agile Application Development Processes

Flickr and other Web 2.0 businesses are applying this type of development process, known as **application development 2.0.** This process can bring significant benefits to corporate IT departments if developers are willing to shift their approach away from traditional SDLC methods and to systems design. Constant interaction with users provides developers with almost immediate notification of bugs and users' desires.

Designers who are used to traditional SDLC methods tend to look at Web 2.0-focused designs as lacking discipline or structure. But in reality, designers have built discipline into the process that allows them to be very responsive to enterprises' and users' needs.

Some applications are not a good fit for a Web 2.0 development methodology. However, some enterprises are starting to recognize the value of application development 2.0 compared to SDLC methods. Since user-focused developed techniques could reduce the number of IT development projects that are scrapped before they are completed, we expect growth in application development 2.0 methods.

Sources: Compiled from *developer.yahoo.com/flickr/,* Framingham and Schroeder (2008).