

Teamwork

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What You Will Learn in This Chapter

- How can information systems be used to support teams of workers?
- How many different ways are there to communicate with team members?
- Which method is best for each type of message?
- How can several people work on the same documents?
- How does an organization remember past events?
- Where can you find a system that provides these groupware capabilities?
- What if you do not have a server and want to collaborate?
- What could you accomplish if five people work on the same screen at the same time?
- How do you collaborate and share data if everyone uses different software?

FedEx

How does technology help teams work together? Everyone has heard of FedEx—the company that invented overnight delivery of small packages. But FedEx is not alone; it must compete with several other large companies to earn your business. Being on time and at a reasonable price are important attributes to success. FedEx achieves its success through communication and teamwork. Downstream workers have access to information about incoming packages and can alter their schedules if necessary to provide better service.

Since 2000, with several mergers, FedEx has grown beyond overnight deliveries. The company now controls several package delivery and shipping carriers. It also acquired Kinko's in 2004. Information systems are used to integrate these operations and work closer with customers. Ultimately, to FedEx, teamwork entails identifying customer needs and finding new ways to solve problems.

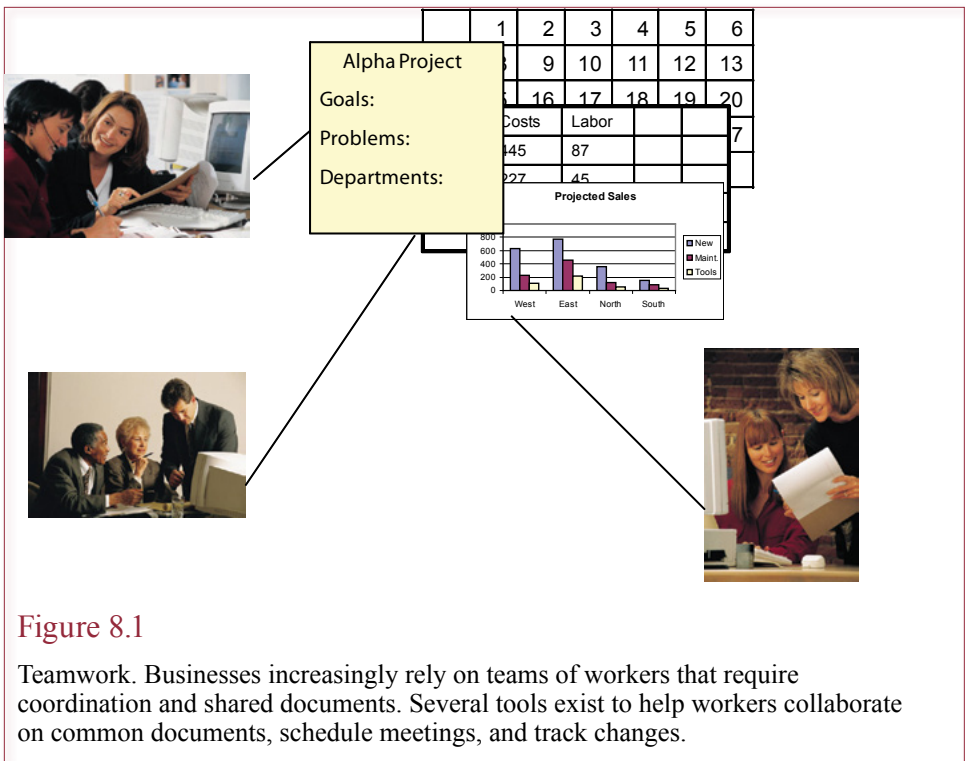
Introduction

How can information systems be used to support teams of workers? Companies are increasingly approaching problems and decisions with teams, often built from members drawn from across the company. Workers can be members of several teams at the same time, and teammates might work in different parts of the country or around the world. Sharing information is a major element of teamwork, and networks are needed to transfer data and share resources. But beyond simple sharing, Figure 8.1 indicates that workers need to work collaboratively on a collection of project documents. Over the past few years, the standard personal productivity tools have gained features to support collaboration and sharing. Additional tools are available to stay in touch with teammates, discuss strategies, schedule meetings, and share research. As a manager, you need to use these tools on a regular basis to become more efficient.

Teamwork is not an invention of the past couple of years. Most teams have developed methods to handle the collaboration needs of the group. Many organizations still use paper-based systems. Paper documents are photocopied and circulated for review. Individuals suggest changes and corrections, which are forwarded to one person. Meetings are held in person—people sometimes fly thousands of miles for meetings, everyone takes notes, and some people dominate the group discussions. Many people still rely on e-mail to send versions of documents. Someday, people will look back and consider these systems to be quaint and inefficient.

Teamwork revolves around two fundamental concepts: communication and collaboration. Teammates need to communicate on many topics, and several communication methods are available today. One challenge is to choose the right communication method for each problem. Collaboration entails working together. Today, that means sharing electronic documents and tracking the revisions made to each document. More than simply combining changes, it also involves discussing why the changes were made. Collaboration also involves scheduling tasks and maintaining project schedules.

Software tools have existed for several years to help with the basic communication and collaboration tasks. The strengths of today's tools are the integra-



tion and focus on teamwork. Today, you can automate the business processes by automatically triggering messages and monitoring the schedules and the flow of documents through the company. One goal of these systems is to track the decisions, documentation, and discussions by everyone involved in a decision. If this knowledge is collected and indexed carefully, it can become the foundation of the organization's memory. If you need to solve a difficult problem, you could turn to this knowledge base to find similar problems, or suggestions from workers who faced the same problems.

Communication

How many different ways are there to communicate with team members? Which method is best for each type of message? Communication is a critical element in teamwork. You need to schedule meetings, discuss options, share and revise documents, and identify opinions. Because communication is so important to teams, several technologies are available. You can choose between simple meetings in the hall, phone calls or voice mail, e-mail and instant messaging, and online conferences, or full-blown team meetings. How do you choose the proper communication method?

As shown in Figure 8.2, one of the issues in organizing your daily work life is to manage the interruptions. Phone calls, e-mail messages, people walking into your office, and IM requests all break your concentration. One question you have to answer is to identify which method works best for you (and your teammates). Having multiple channels of communication gives you flexibility. Your goal is to prioritize each technology and method so that you accomplish your goals, yet still

Trends

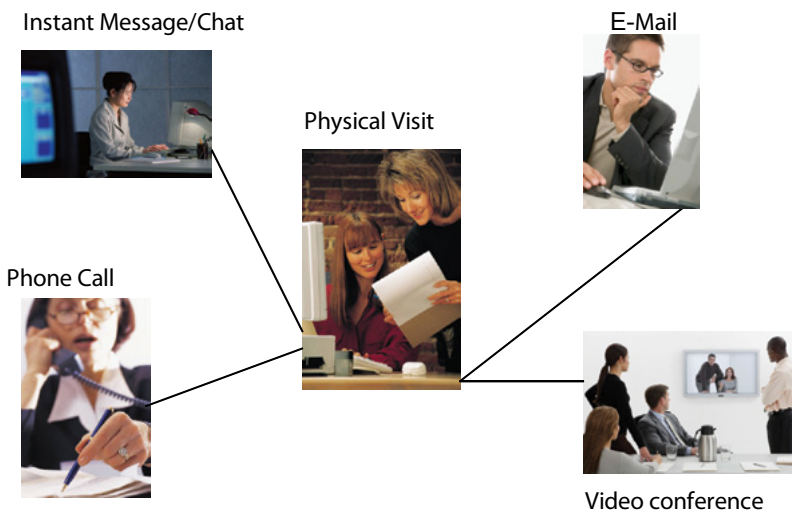
Personal computers originally provided support for basic personal tasks—writing documents, computing totals, and drawing charts. In the 1990s, companies realized the importance of networks for sharing data. In the process, companies realized that networks can change the way managers work. Instead of relying on rigid management hierarchies, small teams can be created to solve problems as they arise. Communication across networks makes it possible for teammates to be located anywhere within the company. Beyond the benefits of communication, can information systems do even more to support teams?

In the 1990s, Lotus Notes revealed the demand for collaboration; but it largely relied on e-mail to transfer copies of documents. In the 2000s, people tried to use Web sites and blogs to communicate and work together, but these tools are difficult to use with multiple contributors and have problems handling office documents.

One of the biggest changes in Office software in the past couple of years has been the introduction of powerful tools to help groups of workers communicate and collaborate. These features were expanded and integrated into Office 2007 which provides SharePoint as a central communication point and SharePoint Workspace/Groove for peer-to-peer sharing. A couple of third-party companies have begun to offer collaboration tools, but they do not yet achieve the integration Microsoft has provided in Office.

Figure 8.2

Communication interruptions. Which type of interruption is the least disruptive for you? Need to finish your work. Need to help the team.



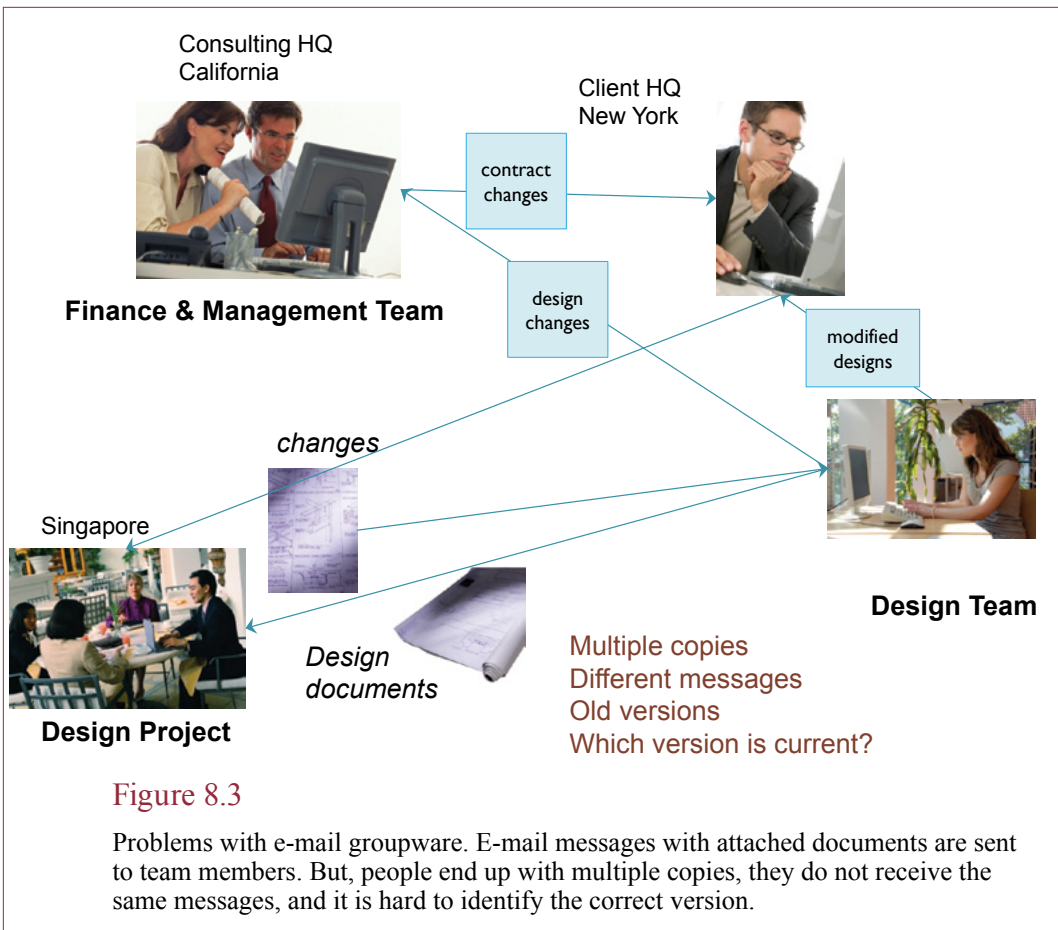


Figure 8.3

Problems with e-mail groupware. E-mail messages with attached documents are sent to team members. But, people end up with multiple copies, they do not receive the same messages, and it is hard to identify the correct version.

have time to work with the group. If possible, you might try to get the group to agree on the priorities of the main methods. Most organizations have a culture that establishes these priorities, but sometimes you need to discuss them so that everyone treats the channels with the same priority.

e-Mail, Instant Messaging, and Voice Mail

E-mail is a relatively common means of communicating. It has the fundamental advantage of being asynchronous, which means that the sender and receiver do not have to be connected at the same time. The recipient can pick up and reply to a message at any time. In a group context, e-mail is even more important because it is easy to send messages to the entire group. Moreover, the messages can be saved and organized so that they create a thread or history of a discussion. E-mail is also used to send documents as attachments.

As shown in Figure 8.3, e-mail systems such as Lotus Notes and Microsoft Exchange were originally advertised as **groupware** tools because of the support provided for attachments. The e-mail systems essentially become moving databases of documents. One of the drawbacks to this approach is that multiple copies of the documents are transferred continually with each message, which makes it

Reality Bytes: Google Apps

Applications to support teamwork are becoming more important every day. The problem is that the applications might not have all of the features people want. Google has been pushing to become a big player in the online market for collaboration with its Web-based Google Apps. In 2010, Google had more than 2 million business customers, including some large companies and several government agencies. The price is attractive to many organizations at \$50 per user per year. Google runs all of the servers, provides 25 GB of e-mail storage per user and promises 99.9 percent uptime with 24/7 customer support. But, Google Apps are not the same as traditional desktop software. Aisle 7, a small health and wellness marketing company switched to Google Apps in early 2009. Although the company has only 32 users, only 10 people initially used Gmail. Within three months, only two people were using Gmail. Aisle 7 also said that over the course of using Google Apps for a year, the company experienced four instances where the servers were down for several hours each. The company eventually switched to Microsoft's online service.

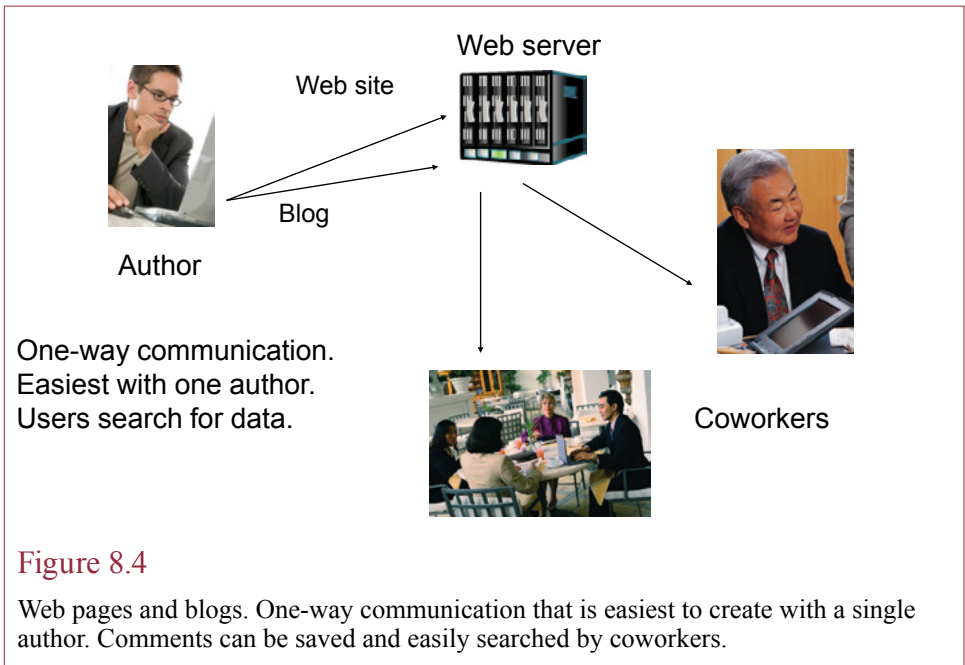
Adapted from Shane O'Neill, "The Trouble with Going Google: 4 Reasons Why I Got Out," *Computerworld*, August 11, 2010.

difficult to track versions and identify the current documents. Plus multiple people might be altering the same documents at the same time, so someone has to merge the final changes into a single document. E-mail is still an important tool for communication, but its drawbacks make it difficult to use as a standalone groupware system.

Texting and other instant messaging tools have become popular in the past few years—particularly with students. However, the technology can also be a time-saver for groups of workers. Each team member can add the others onto the buddy list. The ability to see if someone is online can save considerable time. If you encounter a problem while working, you could immediately see who might be available to answer questions. Yet if you are busy and receive an IM request, you can still choose to ignore it until you have time for a break. But, it is easy for some people to get carried away with text messages; which can make it difficult for others to concentrate on difficult tasks.

Voice mail systems were created so that you can leave phone messages for people who are out of the office or talking to another person. Current voice mail systems have many advanced options, such as the ability to send the same message to multiple people, receive notifications when a message is retrieved, and archive messages for later use. The biggest drawback to voice mail is that some people leave long messages that you have to listen to before they get to the real point of the call. Long e-mail messages are annoying, but at least you can quickly scan the message to find the important elements. It is also difficult to search stored voice mail messages to find particular topics.

E-mail, voice mail, and IM are all push communication technologies. As a message sender, you choose when to place the message and contact the receiver. The other person did not necessarily ask to be contacted, so you are interrupting his or her work. Of the three methods, e-mail is the least intrusive since the recipient has to retrieve the messages and open each one. Because e-mail is less intrusive, you have to remember that any particular message might never actually be read.



It could be buried in a stack of junk messages, or even lost or destroyed. Most systems enable you to ask for receipt confirmation when a message is opened. But these systems are not always automatic. The user can often override this request and tell the computer not to send the confirmation message. Voice mail messages suffer from the same issues and have similar controls. The point is that as the message sender, you need to understand the limitations of the tools. If you need confirmation of a message, it is your responsibility to follow up and make sure the message was received and understood.

Web Pages and Blogs

Web pages were initially created to share information among researchers. As a common platform, you can make files available to anyone on your team—regardless of where they are located or what equipment they are using. Most people are familiar with Web browsers and pages. Several tools help you create Web sites and update documents. Despite these tools, it is challenging to create Web sites and keep updating the pages. As shown in Figure 8.4, Web pages are generally seen as a client-pull technology. You create the Web pages and place them on the site. Team members can view or retrieve the documents, but there is no good mechanism for making changes or replacing the contents. In one sense, Web pages are a broadcast technology, where you can provide the same data to many people. Recognition of this feature makes it clearer when you should use Web sites for communication.

Web logs or blogs were created primarily for individuals to use to create diaries on the Internet. The technology was largely developed to overcome the difficulties in creating and updating Web sites. A blog consists of a site framework that enables others to read your comments. A simple editing tool makes it easy to write daily or hourly comments and immediately post them to the Web. The process is simplified so you can focus on the content. It is also designed to save all of your

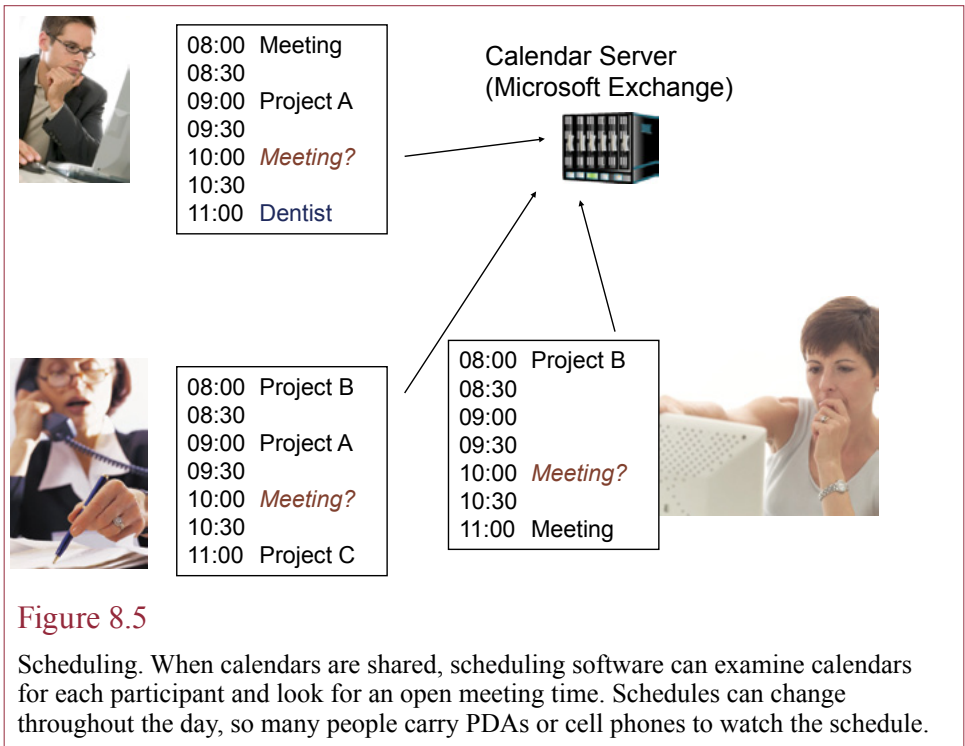


Figure 8.5

Scheduling. When calendars are shared, scheduling software can examine calendars for each participant and look for an open meeting time. Schedules can change throughout the day, so many people carry PDAs or cell phones to watch the schedule.

earlier comments so people can trace the history. These tools could be used in a business or teamwork setting. They would provide a record of the team's actions and decisions. Each person could record current problems, solutions, and describe issues for discussion. Later, if questions arise, you can search the logs to find proposed solutions or learn exactly why a particular decision was made. Of course, you would restrict access to the logs. The big question is whether the team members will take the time to record their thoughts and relevant issues on a regular basis. Blog software is easy to use and you can find shareware implementations that can be installed for little or no cost; so it is relatively inexpensive to test the technology.

Scheduling and Project Management

Scheduling is a challenge with any team project. It is even more complicated when people work on several teams at the same time. Scheduling a meeting or conference is difficult and often requires several messages back and forth just to find a common time. Electronic calendar tools make this process a little easier. Figure 8.5 shows that teammates keep personal calendars that are shared with each other. Each person can check to see if there is an open time slot or use advanced tools to help find the best time for a meeting. Most e-mail systems support shared calendars, but participants generally need to use a common e-mail client. For example, Microsoft Exchange mail server provides tighter integration with the Outlook client software. If you use one of these systems, you need to learn how to mark some items as private, and you need to check the calendar throughout the day as the schedule changes.

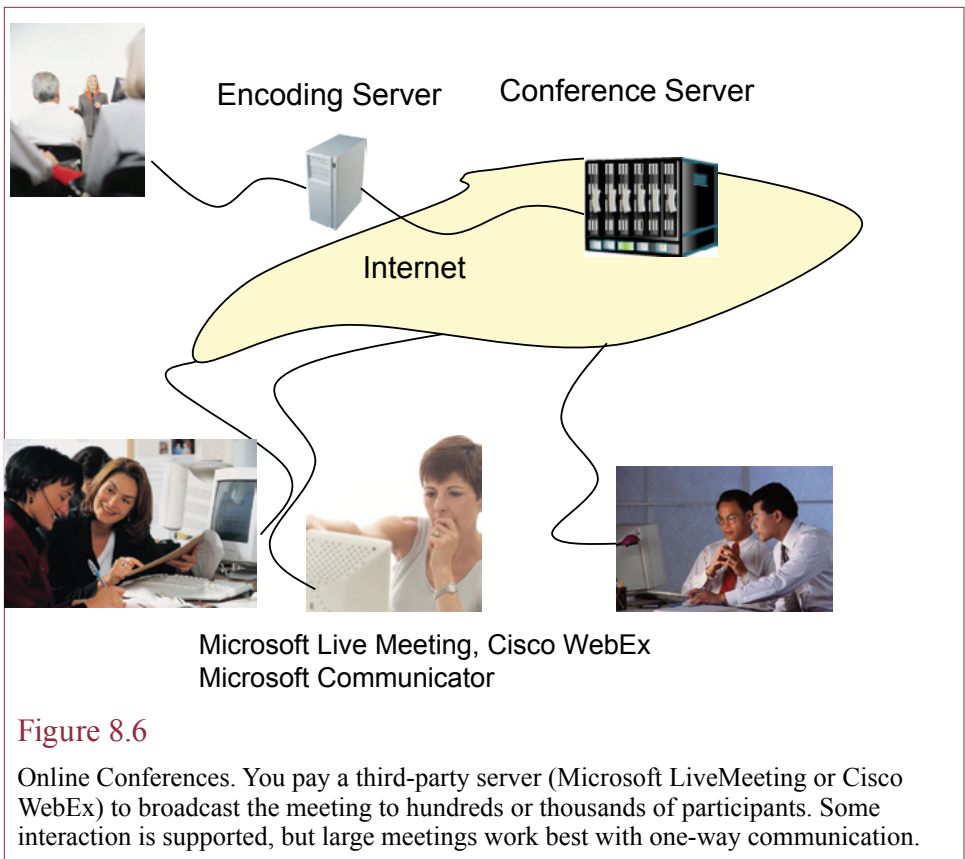


Figure 8.6

Online Conferences. You pay a third-party server (Microsoft LiveMeeting or Cisco WebEx) to broadcast the meeting to hundreds or thousands of participants. Some interaction is supported, but large meetings work best with one-way communication.

However, these tools can also make it harder to plan. If your schedule is constantly changing, you can waste time jumping between projects. For example, you might have a big project presentation scheduled for tomorrow, so you spend time organizing your notes. Then the meeting gets shifted because a higher priority event occurs. You have to rush around trying to collect and organize data for the new meeting.

Project management tools were created to help manage and control groups of workers on large projects. These tools are discussed in more detail in Chapter 13. The basic concept is that you define each task that needs to be accomplished and how these tasks depend on each other. For example, in construction, you must first lay the foundation before you can frame a building. If an earlier task gets delayed, it pushes back all of the dependent tasks. Project management software graphically shows the tasks and their dependencies. As tasks are completed or delayed, the schedule is updated and everyone can see the changes.

Conferences and Meetings

Face-to-face meetings are expensive. Even if everyone on the team works in the same building, a meeting requires everyone to stop their work, organize their presentations, and set aside most other communications during the meeting. If people have to travel to a meeting, the costs are considerably higher. Of course, some-

times the major point of a meeting is to create a deadline that forces everyone to organize their work and meet the project milestones.

As shown in Figure 8.6, several electronic systems have been developed to support online conferences and meetings. At the high end, **videoconference** systems provide real-time voice and video connections so people in different locations can hear and see each other. Videoconference systems require video cameras, microphones, and television displays at each location. For more realistic conferences, some systems use multiple cameras at each location or provide remote control over the cameras. The primary drawback to the systems is the bandwidth required to transmit realistic video data. Early systems used proprietary connections to ensure sufficient bandwidth. Newer systems can run across Internet connections, but require special configurations of routers to ensure the continuous availability of the required bandwidth. The problems multiply if the video signals have to be sent to multiple locations, so most systems operate point-to-point between two locations.

As bandwidth connections improve, lower-cost systems are being developed that enable you to set up videoconferences using personal computers and Web cameras. Be sure to test the systems first because low resolution cameras or slow-speed links can cause more distractions than benefits. While these systems do not give you the remote control capabilities of the big systems, they can support meetings from your desk. They are particularly useful for meetings with two or three participants. For example, systems such as Skype support HD Web cams to provide more realistic images. Cisco and other vendors are using the term **telepresence** to denote high-speed, high-quality connections. But, each side needs a connection with at least 1 mbps transfer rates. For additional fees, the systems can support multiple video connections at the same time. Remember that although broadband connections typically support the speed needed for incoming data, the outgoing data speed can be much lower.

If you do not need video, it is relatively easy to set up a telephone conference. Most phone systems have provisions to connect several people into one conversation. If your company system does not support these connections, you can pay a fee to an external company to host your phone call. Each participant simply calls a special number at the same time to join the conversation. Note that if you have several people in the same room participating in a phone call, you will have to use a special conference telephone. Polycom and Cisco are two of the leading vendors. The phone has a speaker and robust microphone to pick up everyone's conversations. More important, it contains circuitry to eliminate audio feedback. Advanced versions of the phones also support **full duplex** communications, which means that you can interrupt someone speaking—because the phone transmits and receives at the same time.

In part because of the bandwidth problem, several companies have set up special servers with high-speed network connections to enable you to run large conferences online. Microsoft's Live Meeting and Cisco's WebEx are two examples. Essentially, Microsoft or Cisco acts as a hosting company. Your firm pays a fee to use their services—either monthly or one-time, based on the number of participants—which translates to bandwidth demand.

The systems are designed to handle as many as a few thousand participants. The process is oriented to a broadcast approach. A video and audio feed can be viewed by everyone. For reasonably sized groups, you can integrate telephone conferencing to handle interactive questions. The system also includes a standard

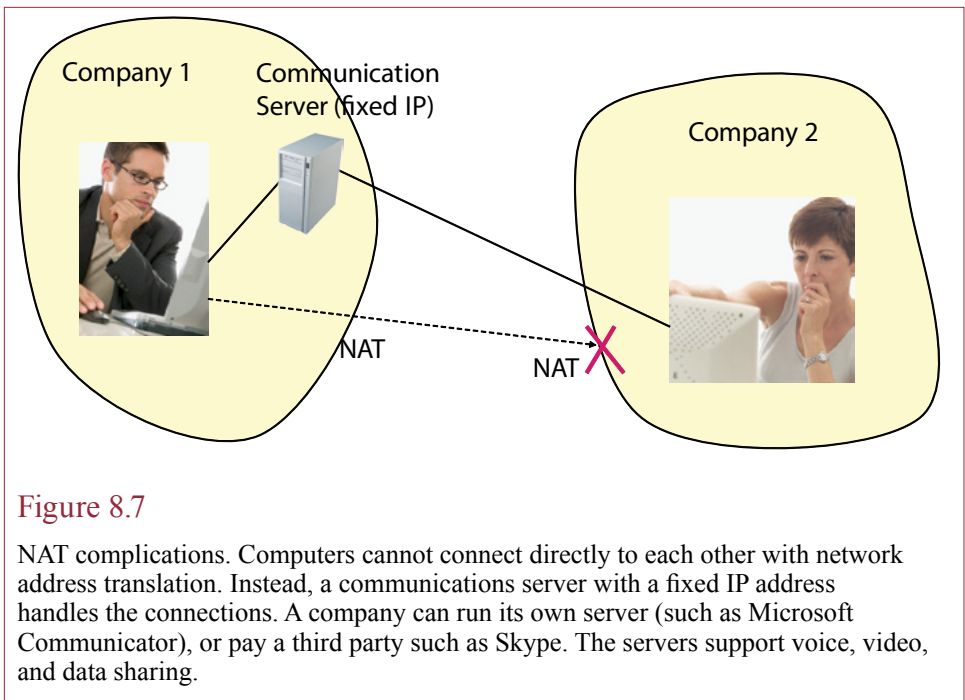


Figure 8.7

NAT complications. Computers cannot connect directly to each other with network address translation. Instead, a communications server with a fixed IP address handles the connections. A company can run its own server (such as Microsoft Communicator), or pay a third party such as Skype. The servers support voice, video, and data sharing.

chat tool if you do not want to deal with the telephone costs. Both systems support Web interaction. The presenter can share applications or the desktop with other participants. Team members can be given control to run an application or annotate a document. You can link in Web sites, where each participant can click on links and fill out forms. A polling tool enables you to quickly create questions and let the audience vote. The system also includes the popular electronic whiteboard where each person can contribute and draw in a different color. Of course, you will probably want to limit these interactive features if you are presenting to hundreds of people.

Microsoft's system also includes a feedback mechanism through a seating chart. At any time, a participant can click the seating chart to request that the presenter slow down or speed up, or to ask a question. The audience notes are displayed to the presenter on a color-coded status board. If you see many requests to slow down (red squares), you know you are going too fast. A useful feature of the system is that it records the presentation so you can save it on your Web site and customers can replay it later.

Peer-to-Peer Network Complications

Chapter 3 explains that most companies use network address translation (NAT) in their routers to isolate their internal networks from the Internet—partly to improve security and partly to conserve the limited number of IPv4 addresses. In summary, each computer within the company's network receives a unique IP address that cannot be accessed by anyone outside the company. As shown in Figure 8.7 although security officers like NAT, it makes it considerably more difficult to establish computer connections to individuals outside the company—including traveling employees, customers, and business partners. In most cases, the best

Reality Bytes: Government Teamwork

In 2010, volcanic ash from Iceland drifted over Europe and shut down air traffic for several days. (High ash concentrations can damage engines.) Jens Stoltenberg, Norway's prime minister was one of the millions of people stranded—he was stuck in a New York airport. So he pulled out his Apple iPad and cell phone and worked remotely. He commented that “There are good means of communication, I have close contacts with my office all the times, and there are a lot of activities in Norway where we try to reduce the consequences of the volcano in Norway.”

Adapted from *CNN Online*, “Stranded Leader Runs Country by iPad,” April 17, 2010.

solution is to establish a server with a fixed IP address that centralizes the communication links. The server has a fixed IP address and does not use NAT, so it is accessible to people both inside and outside of the company. This approach presents problems for small businesses because it requires the purchase, installation, and maintenance of more hardware. Small businesses will probably want to use third-party companies to handle communication needs. NAT is the second reason Microsoft Live Meeting and WebEx have grown in importance. Other companies, such as Skype, offer online voice communications for the same reasons.

To improve security and reduce costs, larger organizations will probably want to install servers to handle communications themselves. For example, Microsoft provides the Communicator server and client software that integrates with Office. The server also centralizes the management and security issues, making it easier for the corporate IT department to monitor and control the connections and use of the technology. Users who have accounts on the Communicator server can make voice calls using their computer or even a telephone. It also supports video connections, instant messaging, and data transfers. Communicator is integrated with Office, so users can quickly determine which team members are online, send chat messages, or make phone calls with the click of an icon.

Mobile Systems

Messaging and conferencing technologies are fairly well established for traditional environments and meetings. Of course, new features are added every year, so you need to keep up with the changes to see which options might be useful for your particular situation. On the other hand, the telecommunications world has changed markedly in the past decade. People now rely on cell phones, tablets, and wireless Internet access, and want the ability to connect as they travel. As the cellular networks improve, mobile devices are gaining the ability to handle voice, data, and even video connections. For example, the iPhone offers a proprietary video chat system, but it initially works only over WiFi connections. As availability of 4G speeds increases, more people will be interested in using the technology over cell phone data connections—but beware of the bandwidth caps and costs.

Collaboration

How can several people work on the same documents? This question forms the heart of collaboration. One teamwork solution is to assign separate

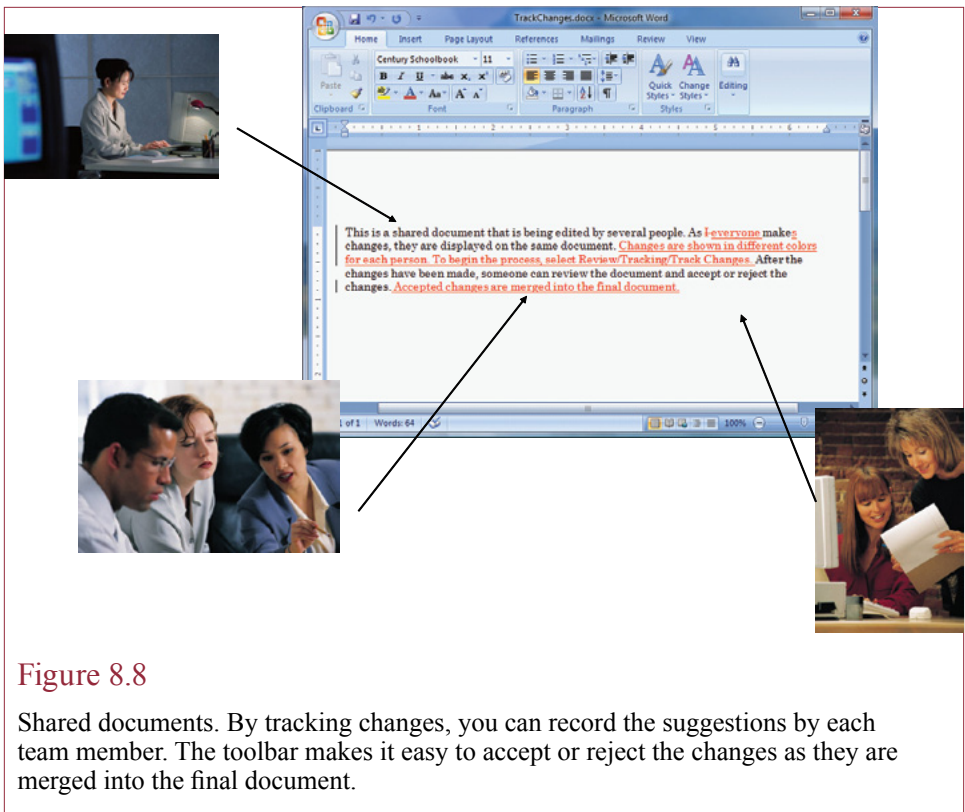


Figure 8.8

Shared documents. By tracking changes, you can record the suggestions by each team member. The toolbar makes it easy to accept or reject the changes as they are merged into the final document.

issues to each person. Working independently, each person creates documents that are then reviewed by the rest of the team. But some projects are not easily divided, and sometimes groups of people have to work together simultaneously.

Networks and e-mail systems make it possible to send documents to each person. But what if you need to identify the changes made by each person? Or what if you need to change directions and revert to an earlier version of a spreadsheet? And how do you handle issues in a hierarchical system where each person reviews a document and approves it before it can be forwarded to the next authority? With paper-based systems, these issues are generally handled by markups and handwritten margin notes. Microsoft Office contains several features that support electronic collaboration.

Documents and Changes

Sharing documents is relatively easy with LANs and the Internet. Keeping track of when changes were made and who made them, or whether you have the current version of a document, is more difficult. One approach is to continually e-mail new versions of documents to everyone in the group, but it is difficult to ensure everyone has the current version—or even knows where the current version is located. Ultimately, the best approach is to store the documents on a central server. These tools are described in the following sections, but you might not have them available; or some people might not be able to access them. Even if you do have centralized tools to handle documents, you might want to track individual changes.

Over the past few years, Microsoft has introduced several changes to the Office software suite. Some of the most important changes have been made to support teamwork. One of the most useful features is the ability to **track changes** in Word documents. Figure 8.8 shows an example. To see the power of this option, begin by creating a new document and typing a couple of sentences. Then choose the Review/Tracking/Track Changes option. Now add a new sentence and delete or replace a few words from an existing sentence. As you make the changes, Word adds markup notes. You can send the document to other people on the team and all changes they make will be marked. When you get the document back, you can quickly see the changes that were made. The Reviewing toolbar contains icons to help you find the changes and accept or reject the changes with a single click. The markup annotations are commonly used for Word documents. For spreadsheets, you need a few more steps because the annotation is different.

The **protect document** options provide additional control over the document. You have the ability to control what changes (if any) other people can make. For instance, if you need to maintain consistency with other documents, you can prevent people from adding styles. You can also limit which team members can edit your document or allow them to edit certain paragraphs or cells in a spreadsheet. Another option is to not allow people to change the actual document but give them the ability to add comments. Adobe Acrobat has similar features that enable you to specify the items that can be changed by other users. You can password-protect the document and limit users to entering form data or allow them to modify the document.

Excel uses the protect document option under the Review ribbon bar to restrict editing to specified people. The Sharing feature also tracks the changes that everyone makes to the spreadsheet. Once you have enabled sharing, you can use the Track Changes option to highlight recent changes. The system also keeps a history of all changes, so you can rollback changes to a prior version—a useful feature if someone makes a major mistake or accidentally deletes important information.

The ability to track changes and restrict changes is a powerful tool for teamwork. At some point in creating work you need to lock down the changes. Even if everyone initially contributes to a document, you need to freeze the changes so everyone can work forward from the same point. If people keep going back and changing costs or plans, it alters the rest of the project planning. The ability to perform these tasks electronically makes it easier to share documents. You no longer have to worry about having multiple copies floating around and trying to find them or trying to identify what changes were made.

Version Control

Version control is a powerful tool both for teams and for individual documents because it automatically saves every revision. Most documents need multiple revisions—whether they are text documents, spreadsheets, or artwork. Have you ever created a spreadsheet, made dozens of changes, and then realized that you were better off with the first version? Multiply this situation by the number of team members and throw in a changing environment. Your manager or client walks in and says that last week's version was much better. Version control systems save multiple copies of every document. As shown in Figure 8.9, each revision is saved independently along with comments and the name of the person who modified the document. At any time, team members can revert back to an earlier version. You can also open an earlier version and copy just a few elements and paste them into the current version.

Region	Sales	Forecast
North	235	312
South	334	416
East	116	268
West	645	879

Monday, initial version, Bob Jackson

Region	Sales	Forecast
North	235	312
South	334	416
East	116	315
West	645	879

Tuesday, new East forecast from marketing

Region	Sales	Forecast
North	235	294
South	334	418
East	116	145
West	645	806

Thursday, marketing implements a new forecasting formula

Region	Sales	Forecast
North	235	312
South	334	416
East	116	315
West	615	798

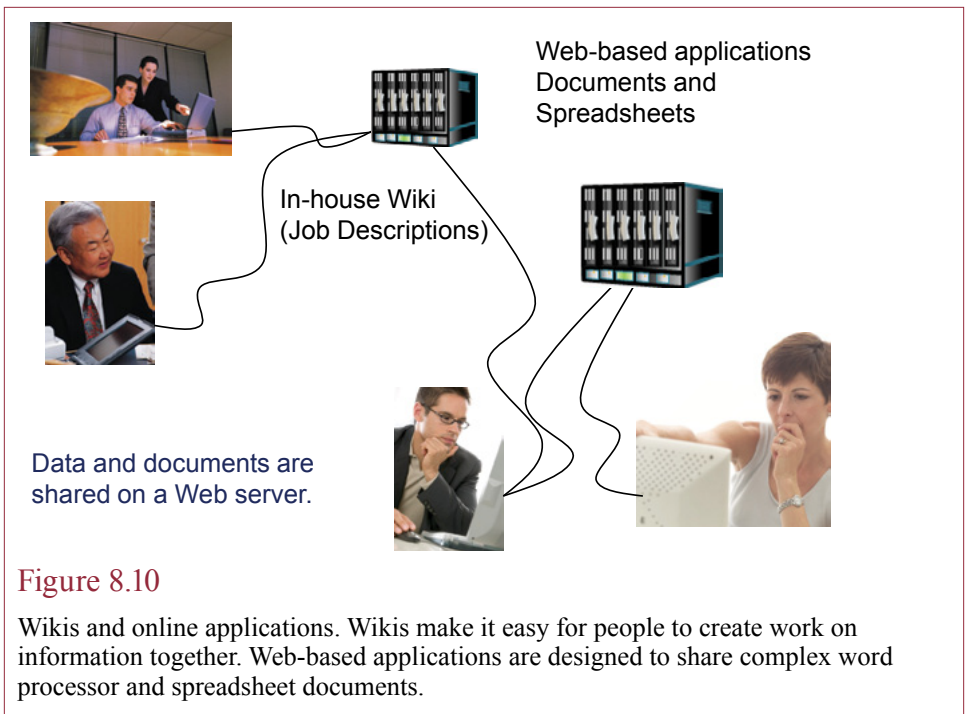
Monday, CEO throws out marketing formula, reverts to old and modifies West

Figure 8.9

Version control. Each revision of the document is saved individually along with comments. At any time, team members can rollback the changes and revert to an earlier version. Or, they might simply refer to an earlier version and copy sections to be pasted into the current version.

Most version control systems work from a database. You **check out** a file when you want to change it. When you are finished making changes, you **check in** the file and add comments about the changes. The comments can be almost anything, but you want to add enough detail so others understand what was changed. The members of the team should discuss the types of comments and level of detail that you expect to see in the version control system. Ideally, the version control system should be integrated into your file server so that versions are automatically maintained, or at least the team members are reminded to check out/check in the documents.

Version control can be provided in multiple ways: (1) Embedding the versions within the file, (2) Windows keeps versions whenever a file is saved, or (3) Using a central database server to save versions. Microsoft Word used to support embedded versions, but the option was dropped with Office 2007. Excel still supports a history of changes when you create a shared workbook. Embedded versions are easy to create, but can be problematic—there are horror stories of companies sending out Word files to clients without removing the prior versions. Windows supports versioning through its System Protection architecture. By default, it is enabled for the main system drive, but you need to manually activate it for additional drives or partitions. With System Protection enabled, Windows automatically keeps a shadow copy of a file whenever you save a new version. You can browse to the file, right-click it, and choose Restore previous version to pick the version you need. SharePoint, described in another section, has a more powerful system for version control, where all copies are archived in a central database and can be retrieved and managed with version control tools.



Wikis and Online Applications

You have probably used the Wikipedia, the free online encyclopedia created by Jimmy Wales and Larry Sanger. The key feature of the encyclopedia is that anyone can create and edit content. What you might not realize is that the underlying Wiki software is available for organizations to use for their own purposes from MediaWiki. Once you install the software, your employees can use Web browsers to create shared content. Drafts can be created and edited by multiple people. Links can be built between projects. Employees can return later to search for information. Effectively, the system can be used much as a giant bulletin board or Web site, but it is easier to create and edit text, images, and video. Depending on the situation, you could even open up the Wiki to your customers, so they can share their stories about how to use your products and services. As another example, the HRM department might use a Wiki to create and manage job descriptions. Managers can share the definitions instead of creating new ones from scratch. Employees could add elements over time, making the descriptions more dynamic and more accurate.

As shown in Figure 8.10, if you need to share more formal documents created by word processors, spreadsheets, and slide shows, you could consider using the online applications, such as those provided by Google. These Web sites enable users to create and share documents on a Web server, where workers use browsers. The Web site maintains the underlying software, so you simply purchase a monthly subscription for each employee. More importantly, the files are stored in one location that can be shared with anyone else in the organization. Because it uses basic Web technologies, authorized employees can read and edit the files from almost anywhere in the world. The application providers (e.g., Google or Microsoft) provide automatic backup and recovery services. Their servers handle

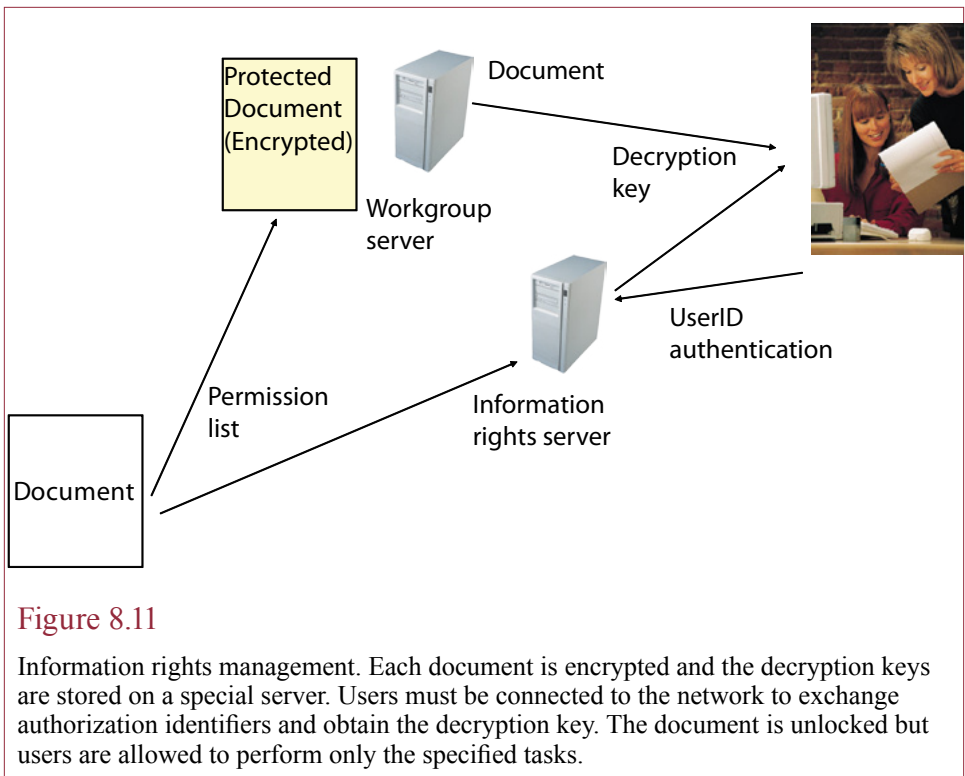


Figure 8.11

Information rights management. Each document is encrypted and the decryption keys are stored on a special server. Users must be connected to the network to exchange authorization identifiers and obtain the decryption key. The document is unlocked but users are allowed to perform only the specified tasks.

most of the traffic, so users can work with fairly simple client computers and moderate-speed Web connections.

Information Rights Management

What would happen if your marketing forecast containing your top customer list and expectations was delivered to your competitors? Or what if your employee list with salaries, bonuses, and manager comments was distributed throughout the company? Obviously, these are dangerous outcomes. How do you prevent them from happening? As explained in Chapter 5, you can store the documents on a server and assign access controls so only certain users can read or change them. But how do you prevent one of the authorized employees from copying the file to his or her laptop or e-mailing it to someone else? The standard solution is to simply trust your employees. But what if you need a more secure solution?

Information rights management (IRM) is one answer to these questions. The technologies are still evolving and few standards exist. The latest versions of Microsoft Office contain some tools to help you control access to documents. As shown in Figure 8.11, essentially every chosen document is protected through encryption, and the encryption keys are stored on a central server. The creator of the document gets to specify the list of people who can open or edit a document. These people are authenticated against the server list, and the server issues the appropriate decryption key to open the document with the specified permissions. Regardless of how the document was obtained (from the server, by e-mail, or a copy on a USB drive), the user must first be authenticated against the information rights server before the decryption key will be issued. Furthermore, you can

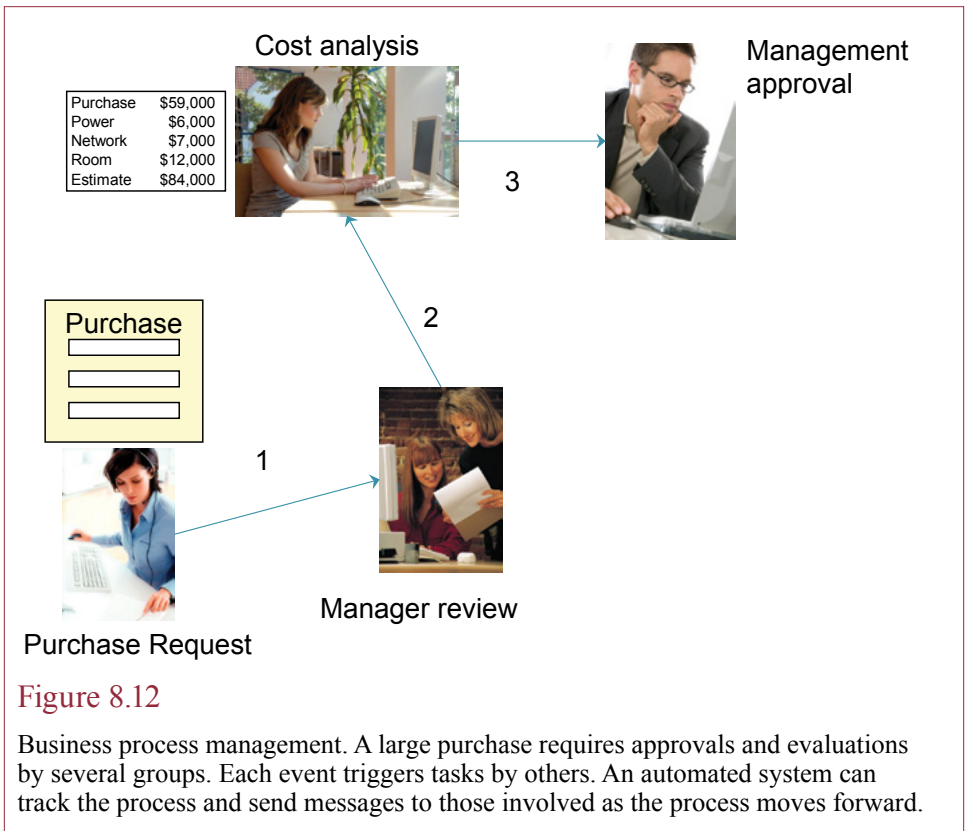


Figure 8.12

Business process management. A large purchase requires approvals and evaluations by several groups. Each event triggers tasks by others. An automated system can track the process and send messages to those involved as the process moves forward.

specify a list of permissions that limit what each user can do with the document. For example, you could prevent the use of cut-and-paste, or disable printing to make it more difficult for authorized users to make copies or spread the document.

The power of information rights management is that the permissions are enforced regardless of how the document was obtained. The main drawback is that you need a server to identify the users and provide the decryption keys. Microsoft provides a trial service to enable you to test the system, but ultimately, you would have to pay to install a Microsoft server to implement their system. To activate the Microsoft system, choose File/Permission within an Office document. You will need a Microsoft Live account or your own IRM server. With independent servers, companies can create detailed customized permission schemes. The IRM scheme also enables you to set an expiration date for content. After the specified date users will not be allowed to decrypt the file.

Workflow

Workflow or **business process management (BPM)** is the concept that some actions have to be performed in a sequence. In particular, documents need to be delivered to and reviewed by various people in sequence. For a simple example, consider a purchase order. You need to purchase some equipment or software for your job. You begin by filling out a requisition form detailing the equipment and how it will be used. You forward the document to your supervisor, who might ask for some revisions or additional data. Once approved, it is forwarded to another

manager or perhaps to the MIS department. With additional revisions and changes, the document is forwarded to purchasing and accounting. These departments create purchase orders and obtain responses and information from vendors. Some of the vendor information might be forwarded to you for verification or approval. Ultimately, the item is ordered, delivered, and installed. Remember that this was a “simple” purchase example. Team projects can be considerably more complex with more interactions and more approvals.

In the past, organizations created workflow systems using paper documents and internal procedures. Each document contained sign-off lines to indicate how the document was supposed to be circulated and to highlight the approvals. As shown in Figure 8.12, electronic workflow systems are being developed that provide similar features for electronic documents. Of course, you could just e-mail the document to everyone for approval, but standard e-mail messages do not provide the desired sequencing or the ability to track the current location of requests. Workflow systems work with e-mail but add the desired sequencing that you provide by filling out a sequenced list of addresses. Each person receives the message with attached documents. When finished with the document, the message is forwarded to the next person on the list. Ideally, the workflow system would provide feedback indicators to everyone on the list, so that you could check on the progress of individual items or get a list of items that are likely to show up on your desk in the next couple of days. Microsoft has embedded workflow features into Office and SharePoint, but more sophisticated controls are available through specialized vendors such as Legato. Chapter 6 explains that workflow processes are also supported within ERP packages, because transactions involve approvals and oversight. Some systems support complex rules with conditions and multiple routing. Some even provide programming languages to handle complex conditions and interactions with other systems.

Group Decision Support Systems

How do groups make decisions? How can dozens of people present their ideas and questions? How can you keep track of the various statements and problems raised? Note taking at meetings is the traditional answer to these questions, but in some cases, there is a better answer. Specialized tools such as a **group decision support system (GDSS)** were created to answer these questions. Most versions of a GDSS use a special meeting room, where each participant is seated at a networked computer. A facilitator operates the support tools and keeps the discussion moving in the right direction. Before the meeting, the primary decision maker meets with the facilitator to establish the objective of the meeting. They set up sample questions and design the overall strategy.

Typical meetings begin with a brainstorming session, where participants are asked to think of ideas, problems, and potential solutions. They type each of these into categories on their computers. The basic ideas and suggestions are stored in a database and shared with the group through the networked computers. In some ways, the sessions resemble online forums—where people respond to comments and ideas.

In terms of discussion and comments, the facilitator can choose individual items and project them on a screen for the entire group to analyze. Participants can write comments or criticisms of any idea at any time. This system is particularly helpful if many participants come up with ideas and comments at the same time.

The computer enables everyone to enter comments at the same time, which is faster than waiting for each person to finish speaking.

Another feature of using the computer for the entry of ideas and comments is that they can be anonymous. Although each comment is numbered, they are not traced back to the original author, so people are free to criticize their supervisor's ideas. Anonymity reduces embarrassment and encourages people to submit riskier ideas.

At various points, the facilitator can call for participants to vote on some of the ideas and concepts. Depending on the software package, there can be several ways to vote. In addition to traditional one-vote methods, there are several schemes where you place weights on your choices. The votes are done on the computer and results appear instantly. Because it is so easy to vote, the GDSS encourages the group to take several votes. This approach makes it easier to drop undesirable alternatives early in the discussion.

One useful feature of conducting the meeting over a computer network is that all of the comments, criticisms, and votes are recorded. They can all be printed at the end of the session. Managers can review all of the comments and add them to their reports.

In theory, a meeting could be conducted entirely on a computer network, saving costs and travel time if the participants are located in different cities. Also, if it is designed properly, a GDSS can give each participant access to the corporate data while he or she is in the meeting. If a question arises about various facts, the computer can find the answer without waiting for a second meeting.

Perhaps the greatest drawback to a GDSS is that it requires participants to type in their ideas, comments, and criticisms. Most people are used to meetings based on oral discussions. Even if they have adequate typing skills, a GDSS can inhibit some managers.

Along the same lines, in a traditional meeting, only one person speaks at a time, and everyone concentrates on the same issues at the same time. With a GDSS, your focus is continually drawn to the many different comments and discussions taking place at the same time. People who type rapidly and flit from topic to topic will find that they can dominate the discussions.

In terms of costs, maintaining a separate meeting room with its own network and several computers can be expensive. Unless the facility is used on a regular basis, the computers will be idle a great deal of the time. When you factor in the costs for network software, the GDSS software, and other utilities, the costs multiply. One way to minimize this problem is to lease the facilities that have been established by a couple of universities and some companies (e.g., IBM).

The use of a GDSS also requires a trained facilitator—someone who can lead discussions, help users, and control the GDSS software on the network. Hiring an in-house specialist can be very expensive if there are only a few meetings a year. Again, using facilities from an outside agency can reduce this cost, but it means that someone outside your company is watching and controlling your meeting. Although most facilitators are scrupulously honest, there might be some topics that you do not want to discuss with nonemployees.

One way to overcome these limitations is to alter the approach to meetings. Instead of requiring everyone to get together at the same time in one room, meetings could be held via network discussion groups. Each participant could read messages, add comments, and vote on issues electronically at any time from any location. Again, the Internet offers possibilities to provide these facilities, but it could be a few years before organizations and managers can accept the changes required.

Reality Bytes: The U.S. Patent Office

Many people have criticized the U.S. Patent and Trademark Office (USPTO) in the past few years. The office has issued several dubious patents that many people argue should not have been granted because other systems already existed to do the same thing. Patents are only supposed to be granted for new, non-obvious inventions. Once a patent is granted, the owner gains a huge benefit in any court fight. Anyone challenging it has the burden to prove that the prior work existed and was significant enough to overturn the patent. The patent examiners are also overwhelmed—facing a backlog of more than 600,000 applications in 2006. Patenting software applications takes four years from the date of submission to resolution. The area of patents for computer code is also troublesome because much of the early work was never published since patents for software have existed for only 20 years, there are few databases, and the examiners have little experience with computer code. Several people and organizations have proposed projects that could help patent investigators. The overall goal is to create a knowledge management system that would create a giant library of existing practices—largely by collecting code and tagging it with searchable notes. Manny Schechter, an associate general counsel for IBM observed that the “[they] need a tool that will enable sifting through the code in such a way that’s useful to the patent examiner. We should be able to have it done this year.” John Doll, commissioner of patents, noted that “there’s a lot within the open source community that’s valid prior art, but because of how it’s stored, it’s not accessible to examiners. We have a hope that if we have a standardized system, we can find it in the future.” Others have suggested using a Wiki approach to enable the development community to contribute knowledge, but Doll noted that “the problem we have is we have a statute and we’re restrained from opening the examination for anyone other than a patent office examiner.” However, he also suggested that it might be possible to allow outside comments between the time the application has been made public and before the patent is awarded. In the meantime, the USPTO is likely to continue granting patents for work that essentially copies things done 30 years ago. The complications are the major reason software was not originally considered patentable, and why Europe does not grant software patents.

Adapted from Eric Hellweg, “The Patent Office's Fix,” *Technology Review*, January 13, 2006.

Knowledge Management

How does an organization remember past events? When an event arises similar to one you dealt with in the past, do the employees use the knowledge gained from the prior experience? What happens if several key managers leave your company? These questions are critical to reducing costs, maintaining continuity, and improving the organization. Every organization operates on some type of business processes. Some firms are highly structured and spell out detailed steps to follow in almost any situation. Other companies evolve implicit procedures over time. Many organizations make the same difficult decisions every month or every year. Difficult decisions can require the participation of dozens of employees and analysis of gigabytes of data. It would be nice if the organization could keep the knowledge gained from every decision and apply it to similar

problems in the future. In the past, maintaining organizational knowledge was a key management factor in retaining and promoting key employees. But in medium-size and large organizations, turnover, distance, and the challenge of finding experts can make it difficult to maintain and share the knowledge. So, some companies have attempted to create **knowledge management (KM)** systems.

A KM is designed to store any type of data needed to convey the context of the decision and the discussion involved in making the decision. While the system might contain rules, it is primarily a giant database of easily accessible data for experts. KM systems are designed to organize information and to assist people in collaborative projects and research. The system can be relatively unstructured and often consists of many individual cases. Decision makers can search the system for cases with features similar to their current issues. The cases are cross-referenced so that a decision maker might research one aspect of a case and find a related issue. The links make it easy to explore the related issues, tying together a variety of concepts and identifying related problems or consequences.

Because the field is relatively new, the definition of KM is somewhat nebulous and many software vendors promote tools as useful for KM. One of the difficulties is that the decisions and knowledge required can be different for each organization. And organizations may approach decisions differently, so it is unlikely that a single tool will be useful to every company. Instead, each company needs to evaluate specific decisions to determine whether it will be useful to explicitly collect the information and process knowledge that was involved in making the decision.

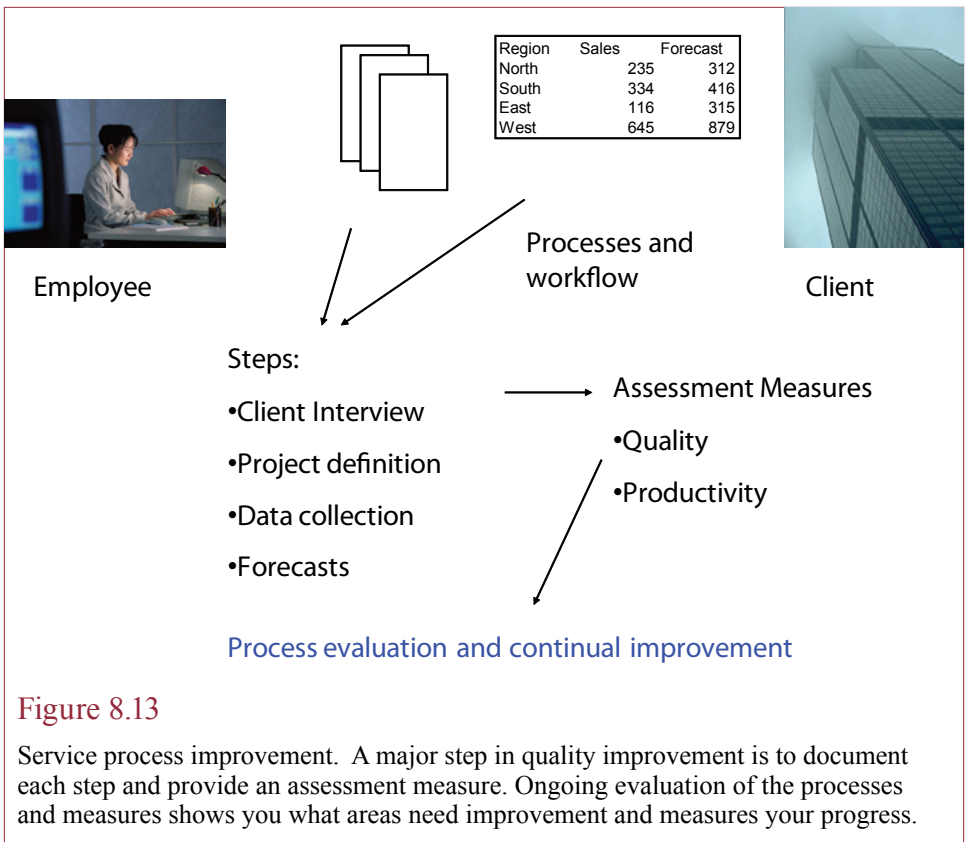
One of the biggest challenges with KM systems is creating an organizational environment that encourages decision makers to store their knowledge in the system. Initially, the system will have little data, and the early decision makers will have to spend a great deal of time organizing their discussions and creating the files and links necessary to make the system valuable in the future. Companies need to give managers enough time to consolidate their information and provide incentives to encourage them to help build the new system.

Organizational Memory

Organizational memory represents the knowledge held within the company and the processes and procedures used to perform the primary tasks. Imagine what would happen to an organization if all of the managers retired on the same day and all of the procedure books and documents were destroyed. All of the business processes would have to be reinvented. Sometimes reinventing new processes can result in more efficient systems (known as process reengineering). But it takes time to re-create all of the knowledge.

Now, think from a more positive perspective. How can information technology be used to improve organizational memory? Perhaps some events occur only rarely and no one remembers them. Or, perhaps employees try to re-create the wheel for every new event. If you can store the organizational memory in a searchable database and make it easy to use, employees can turn to it to obtain fast, accurate answers and even solutions to current problems.

One of the challenges to KM lies in getting everyone to use the system. Many times it is hard enough to solve a current problem. Most workers will complain about the lack of time to enter all of the issues into the computer. For that reason, KM has to become part of the groupware project. Employees need to store the information so that they can share it with teammates. Organizing it for future use is



almost a secondary consideration. By using the system to gain immediate advantages (collaboration and instant access to data), employees will have an incentive to store the information—creating the organizational memory in the process.

Service Processes

Service firms probably have the most to gain from the use of a KM system. Production systems typically already have engineers and support firms testing new ideas and tracking problems. This production knowledge is often saved explicitly or discussed as a professional discipline. Service firms such as lawyers, doctors, and financial institutions, have less specific processes. Often the service is dependent on one or two people within the firm.

As shown in Figure 8.13, documenting the processes makes it possible to improve the quality of the service. For example, a major premise of the ISO 9001 (and related) quality standard is that all processes need to be documented. You also need to assign measures that enable you to identify problem areas and measure your progress when you make changes. Theoretically, you could write all of the documentation and assessment on paper forms and stash them in a file cabinet. A more useful approach is to store all of the documents and assessment measures and comments in a KM system. The electronic system makes them available throughout the company so that everyone can find the appropriate process, can see the reasons and interactions for the process, and can suggest improvements.

Communication	
Contacts	E-mail
Chat	Discussion
Survey	Lists
Project Management	
Tasks	Schedule
Calendar	
Collaboration	
Libraries	Shared documents
Tracked changes	Version control
Wiki	
Workflow	
Routing	
Alerts	

Figure 8.14

Microsoft SharePoint overview. SharePoint Server provides several useful tools to support teams and collaboration. It requires running a server, but it also integrates well with Office.

Microsoft SharePoint

Where can you find a system that provides these groupware capabilities? The benefits of the tools are relatively strong, but will it be expensive and require huge amounts of training to get workers to use these tools? In some cases, the answer is yes. Depending on your needs, you can buy specialized products in most of the groupware categories. On the other hand, Microsoft has integrated groupware tools with Office using the SharePoint product. As shown in Figure 8.14, SharePoint is a set of utilities that reside on a departmental server designed largely to share documents over the Web. Currently, Microsoft offers two versions of SharePoint: (1) SharePoint Server is a “free” add-on with Office and Windows Server, and (2) the enterprise version which must be purchased separately. The discussion and capabilities described here are based on the free version. Although the tools may not be perfect, they are relatively inexpensive and easy to use. Consequently, you can install them and get employees using them fairly quickly. In terms of the cost, keep in mind that you will probably have to install a departmental server.

Most of the SharePoint tools use standard Web protocols, so authorized users can use them even when they are traveling. A special Web site has to be created to support the tools. Generally, this Web site should be run on a company server, using standard security precautions. If you want higher security, you can run the Web site as a secure site and encrypt the data transmissions. Small companies might consider obtaining the service from their ISPs. Participants are required to log in to the system, and security controls can specify detailed access rights.

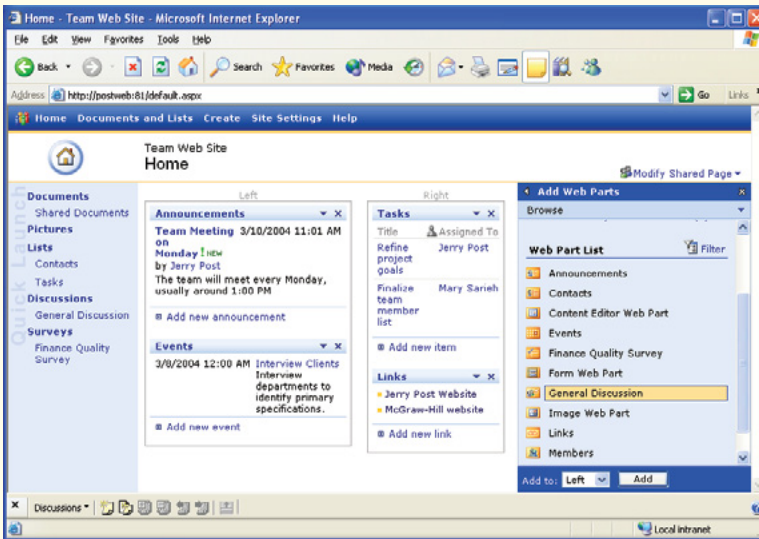
Communication and Scheduling

It is always amazing to learn how difficult it is to contact everyone on a team. People work on many projects, at different times, in different locations. Consequently, even simple information can be hard to share. Basic announcements are useful for these situations. Announcements are short messages that are displayed

Technology Toolbox: Collaborating with SharePoint

Problem: You need to collaborate on a project with several workers.

Tools: Several groupware and collaboration systems have been created in the last decade, but SharePoint is probably the easiest to configure and use since it is integrated with the standard Office suite.



The drawback to SharePoint is that you really need a departmental server running the latest version of Windows Server software. You also have to ensure that everyone has an account either on the server or on Active Directory. These issues are relatively minor in a business setting, but they can be a hurdle in an educational environment. Once you have the server configured with the SharePoint extensions, you use the administration tools to create a new team site and add members. You can specify the role of each participant (browser, contributor, administrator). The system makes it easy to e-mail each person to notify them of the site. When you configure the server, be sure to setup the e-mail server so participants can set alerts for changes.

You can configure the home page of the team website with the Modify options. For example, you can choose which items (Web parts) will be displayed and where they are located. The main page is essentially a portal for the team that organizes all of the work. Each person can also customize the home page with additional options. For example, you can have the page display all of the contacts or provide links to messages. Each day when you log on, you can check for urgent messages or examine the progress on the task list. Programmers can create additional Web parts and customize the data displayed on the site. Microsoft includes some pre-built parts such as weather or stock feeds from MSN. By customizing the home page for each project, workers can focus on the most important tasks and monitor progress. Additional features and the standard tools are only a couple of clicks away for any team site.

Quick Quiz:

1. Why would you want to configure the home page differently for different projects?
2. Is there a limit to the number of people you would want to place on a SharePoint team?
3. Research the two products and list the additional features provided by SharePoint Portal.

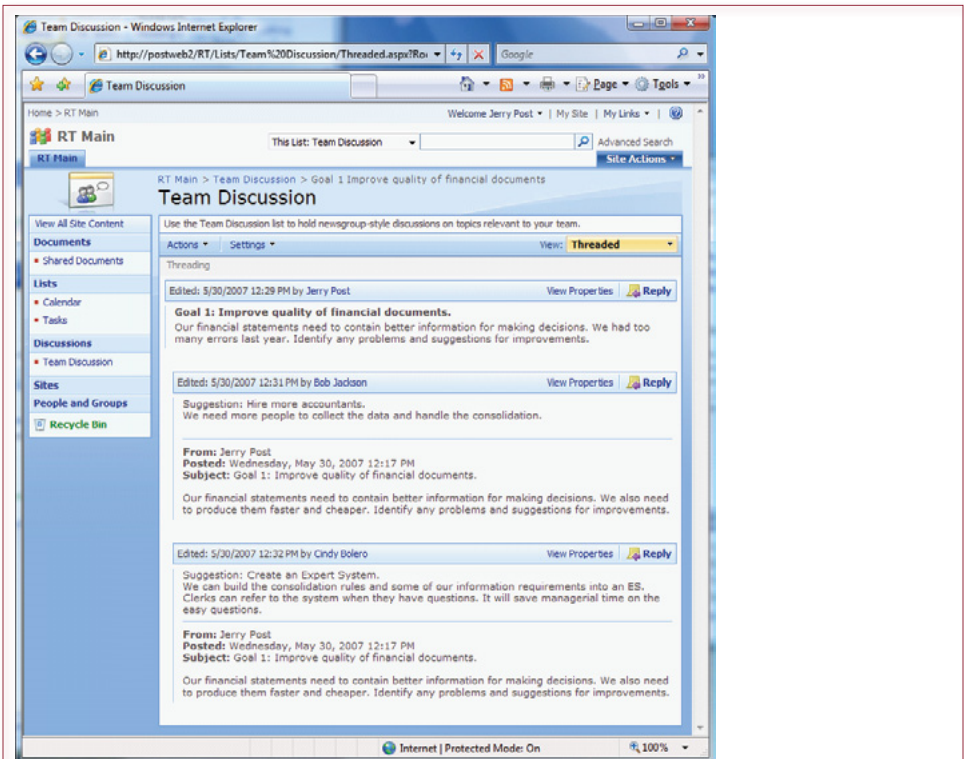


Figure 8.15

Discussion. You can create multiple discussion threads so all comments on a topic are grouped together. The system maintains the group memory so teammates can check on the reasons for various decisions.

to everyone—generally they are displayed prominently on the first page. Lists can be created to display timetables for tasks, contact names, or any other category needed by the group.

The power of sharing lists through a Web site is that members of the team can see the lists at any time. As authorized members make changes, everyone has access to the current data. Moreover, the lists can be organized and searched by various categories, such as deadline, project sponsor, or participant. Some standard lists exist in SharePoint, such as contacts and schedules. Additional lists can be created at any time. SharePoint also maintains e-mail contact lists for teammates and for any other core contacts that you need to share. This address book is easily accessible by everyone, and a single click launches your e-mail editor. If you need more powerful communication capabilities, including the ability to conduct online meetings, you will want to add the Microsoft Communicator server. If you have a messenger service (e.g., Live Messenger or Communicator) installed on your computer, while you are logged into the SharePoint system, it will show you a list of other team members and tell you if they are online. You can click on the name for each person online and send a quick message.

As shown in Figure 8.15, SharePoint includes a discussion system. It runs with the standard system without relying on external tools such as Communicator.

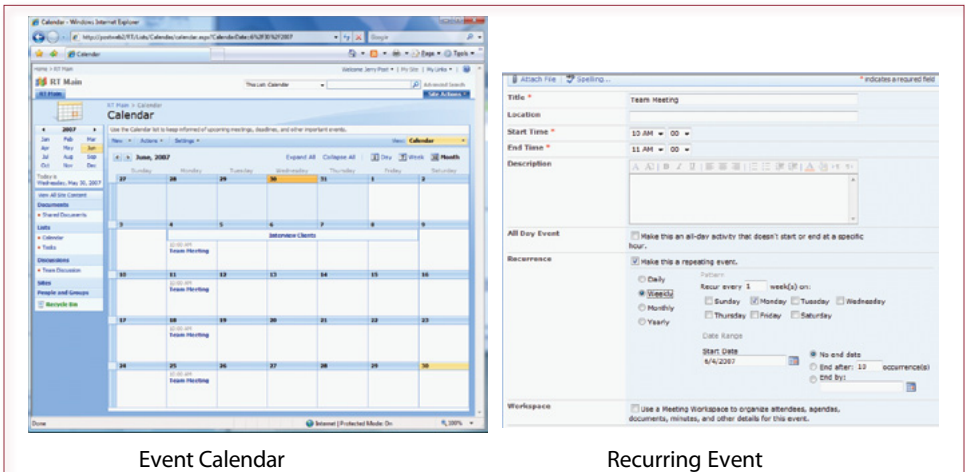


Figure 8.16

Project events. The internal calendar integrates with the event list. You can create tasks and assign them to team members. Recurring events are useful for regularly scheduled meetings.

Most people are familiar with Web-based discussion groups. Discussion administrators establish topics and can specify the roles of the other team members, such as the ability to read or reply to comments. Discussion groups are useful on team projects to discuss issues that arise. The strength of the computer-assisted discussion is that everyone has access to the comments, and the entire record is available if questions arise later. It also makes it easy to search for specific problems. Discussions can be created on any topic. Common business uses include overall comments on scheduling, sharing research information, and discussing problems that arise. You can also attach a Word document or spreadsheet to the original message. Team members can make changes to the document and write comments in the discussion list to explain the changes. However, the attachments can be a little difficult to find, so use this approach when you want to emphasize the discussion, not the document.

As shown in Figure 8.16, SharePoint also maintains a calendar that is tied to the task list. You can use the calendar as a simple project management system. The calendar shows scheduled events. You can define recurring events such as regularly-scheduled meetings that always meet at a certain time. The process of creating events is similar to that used in Microsoft Outlook. In fact, you can integrate the SharePoint calendar with your Outlook calendar. You might want to download the SharePoint events onto a laptop so you can check the calendar while you travel.

The calendar is also tied to a task list that makes it easy to assign and monitor tasks by employees. By scheduling tasks and assigning them to various workers, you can easily see which tasks are on schedule and which are falling behind. You can use the calendar and the task completion list to see if some employees need additional help. The system does not offer all of the features of a true project management system, but it displays the basic schedules and is easy to use.

Surveys are useful for some business applications. In particular, they come in handy when designing new systems. Generally they are used to obtain a quick

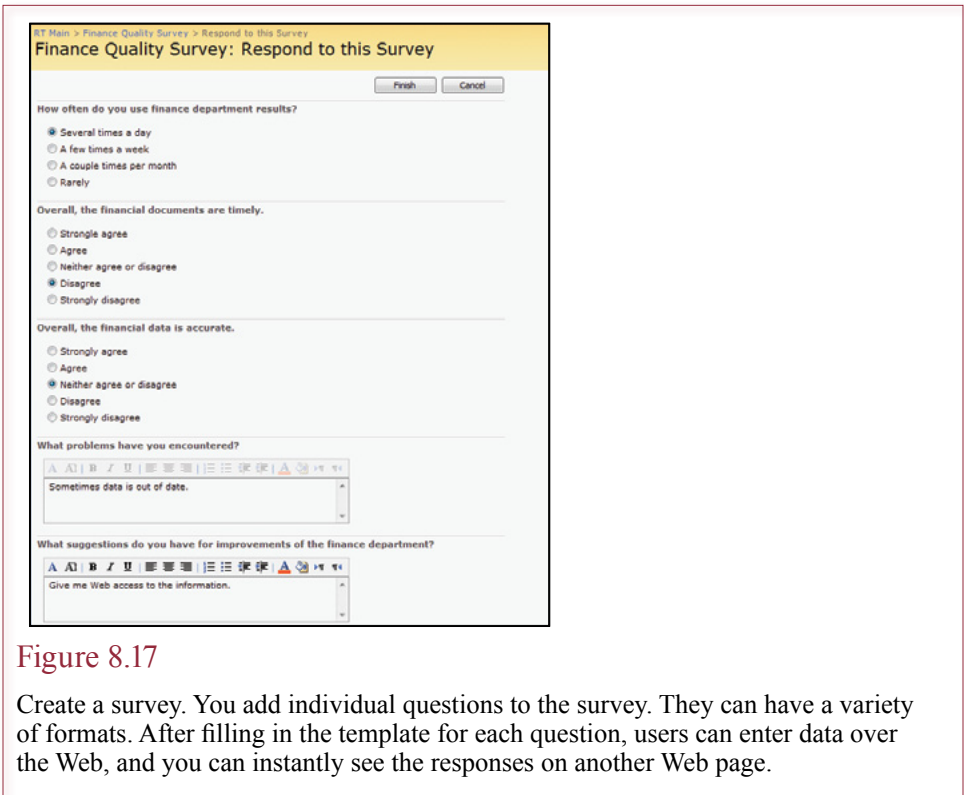


Figure 8.17

Create a survey. You add individual questions to the survey. They can have a variety of formats. After filling in the template for each question, users can enter data over the Web, and you can instantly see the responses on another Web page.

perspective on individual opinions. Paper surveys are a pain. Web-based surveys are easy to change, easy to fill out, and can instantly report the data. As shown in Figure 8.17, SharePoint includes a basic survey-building tool. You simply write the questions by selecting a format, entering the question, and identifying the possible responses. When you post the survey to the SharePoint site, the other members of the team enter their selections. The results are immediately available. One advantage of the system is that the entire process is done through Web forms. Note that the surveys are not available to people unless they are registered in the group, so the technique does not work as well for public surveys. However, SharePoint does support anonymous access, and the configuration system includes templates for building Web sites. So you could use a SharePoint site to interact with public responses, but it takes some effort to configure. On the other hand, professional survey design software is relatively inexpensive and has more features for creating and analyzing surveys.

Collaboration

Until recently, most organizations shared files through shared directories on LANs or via e-mail. Document libraries are simply Web-based folders that hold a related collection of documents—such as all work on a particular project. The files are accessed across the Web, so they are accessible to team members anywhere in the world. Furthermore, the group leader can establish a template so that all documents have the same look.

As shown in Figure 8.18, once the site is set up, accessing the documents is easy—through the familiar File and Open commands. Generally, you will create a

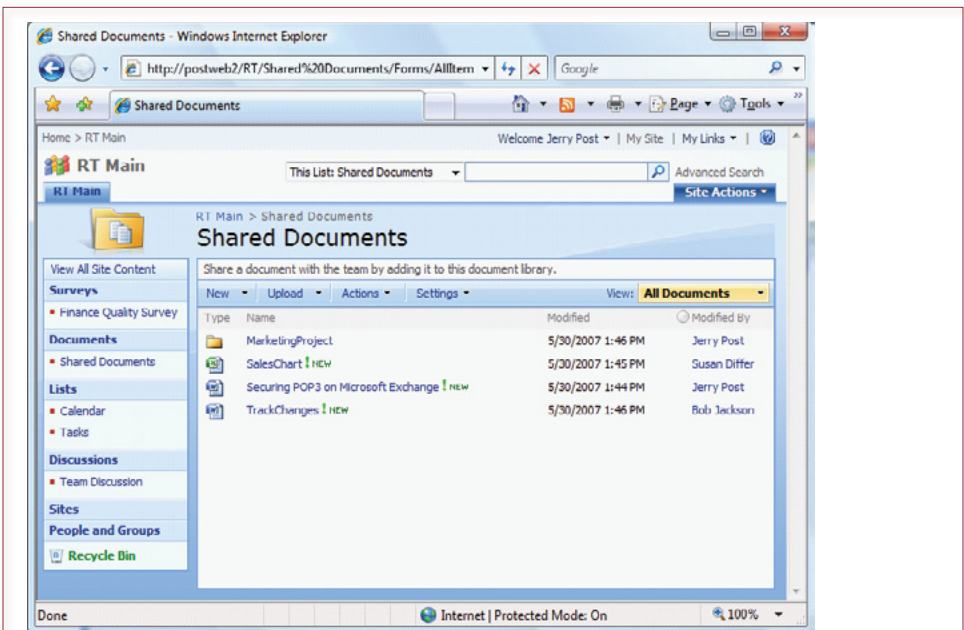


Figure 8.18

Shared documents. You can use the upload link to transfer a file to the server for sharing. You can also use the New Document link to add a Word document directly to the folder. You can open and save any existing document directly over the Web.

link to the directory in “My Network Places” so that you can find the documents with one click. In a team environment, it is important to store your files in a document library—instead of on your personal machine. That way, everyone in the group can read and contribute to the work. Once the documents are stored in the shared library, some other powerful tools and options can be used to coordinate the team, as described in the next sections. Note that direct access to the documents generally requires that each team member have the most recent version of Office installed. You will usually want to protect the document and track changes so that everyone can see the changes that were made by others.

SharePoint can also handle version control. Moreover, version control systems support check in and check out of documents, so that only one person can edit a document at a time—minimizing the problem of needing to determine which change to keep. It also tracks who made the changes and which team member is currently using the document. If you want complete version control including the ability to automatically track changes, you will also need Visual Source Safe, Microsoft’s version control software. As shown in Figure 8.19, you configure version control by setting the properties for the document library: Settings/Document Library Settings/General Settings/Versioning Settings. Other options enable you to specify a default template for new documents to encourage teammates to apply a consistent style so documents look the same. Furthermore, you can require that documents be approved by the owner of the group site before they are made available to everyone.

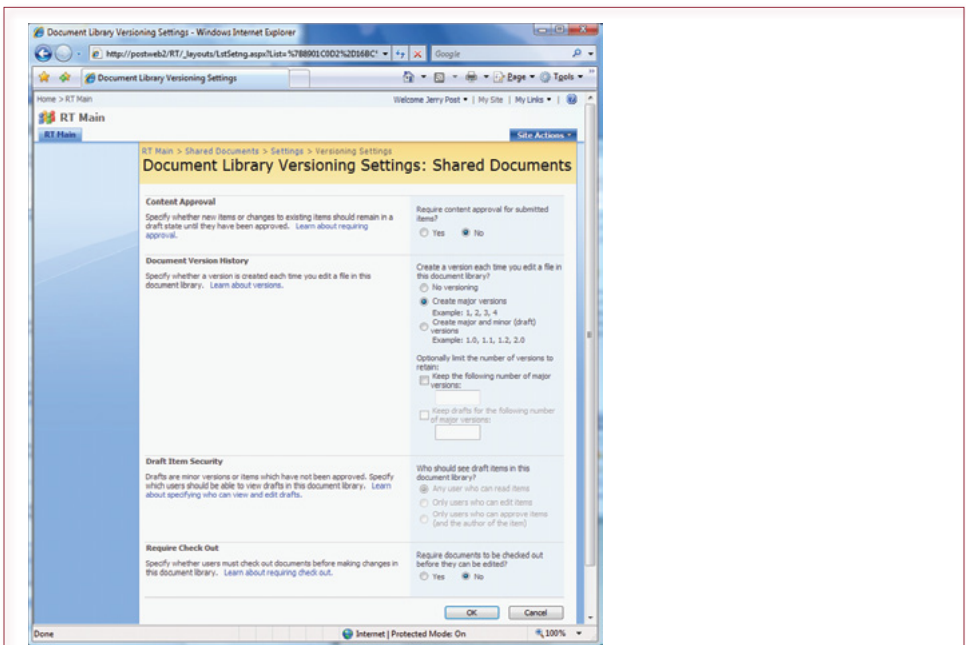


Figure 8.19

Configure library options. Use the server options to set up version control. Additional options are used to specify default templates so all contributed documents follow a standard style. You can require that files be approved before they are made available to the team.

Once version control is configured, the process is automatic. When a team member edits and saves a document, SharePoint automatically creates a new version. From the document library, you can choose the drop-down action list to select versioning. As shown in Figure 8.20, you will see a list of the versions along with dates and optional comments. From this version list, you can open prior versions to copy desired sections. Or you can delete an entire version, including the latest—causing the system to revert to the prior version. However, in general, you should avoid deleting versions—you never know when the changes or data might be useful. Instead, simply copy the older version, make the desired changes, and save it as the new version.

Sharing documents presents additional problems, particularly **concurrent changes**. What happens if two people alter a document at the same time? When the versions are saved, which changes should be kept? One solution to this problem is to use Check-out/Check-in to lock the document. When you check out a document, no one else will be able to edit it until you make your changes and check it back in. If you plan to make major changes to a document and need to ensure that no one else alters it until you are finished, you should use the check-out option. Other users will be notified that you have the document open and will be allowed to read it but not make any changes.

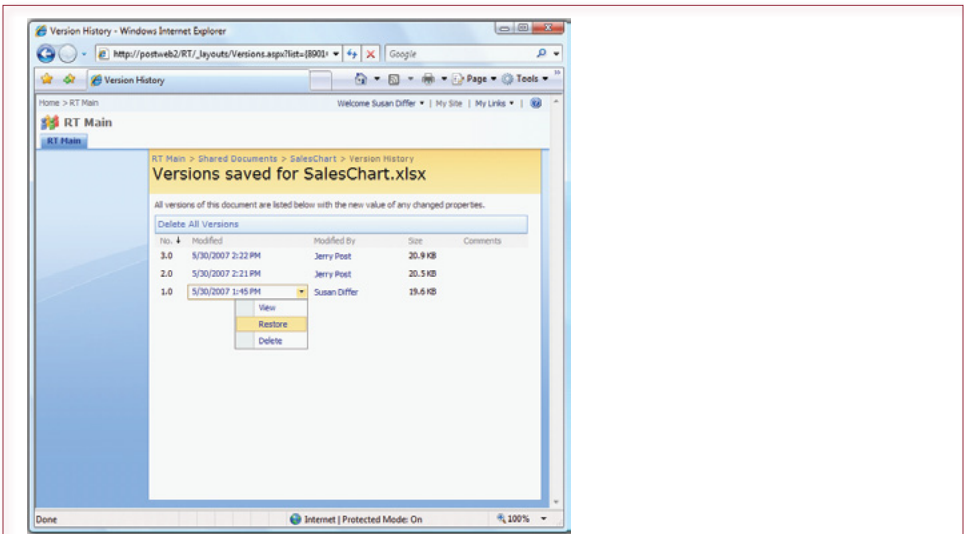


Figure 8.20

Version control. Choosing the version option from the document library screen shows you the prior versions, who edited them, and the comments that were added. You can open prior versions to copy sections or simply revert to the prior version.

Workflow

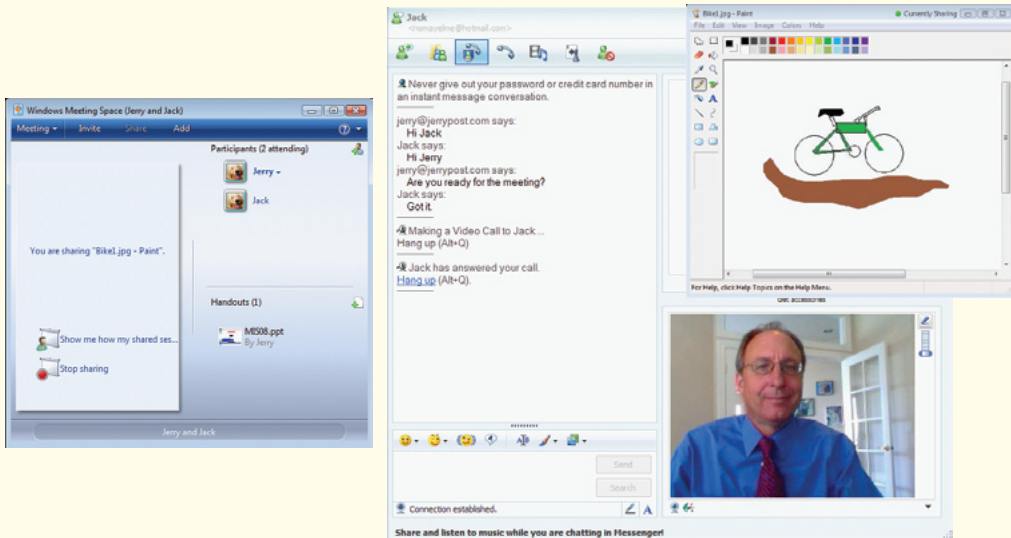
Although it is not as sophisticated as specialized business process management systems, SharePoint provides a couple of tools to help with workflow. These tools integrate the features of communication and collaboration. Routing documents and messages is a useful workflow tool. For example, your manager probably wants to review recommendations that you make, purchasing managers are responsible for approving the purchase of major items, and important documents have to be approved by the legal department. Projects tend to have discrete steps. Sometimes the steps are as simple as obtaining an approval and comments from someone before proceeding.

As shown in Figure 8.21, it is straightforward to establish a workflow process in SharePoint. Simply select the document from the library and choose the Workflow option. In this case, workflow means that the document and your message will be e-mailed to a list of team members in order. The actions offered to each person depend on the type of workflow that you choose. The two main types are shown in the figure. To access the other two, you need to change the site properties. The four types are: (1) Approval, (2) Collect Feedback, (3) Collect Signatures, and (4) Disposition Approval. The Approval method sends the document to each person and gives them options to (a) approve, (b) reject, (c) forward the message to someone else to handle the approval, or (d) request changes. If one of the recipients rejects the document, the process is interrupted and it is returned to the sender. The Feedback option asks each person to enter comments. When the last person has responded, all comments are returned to the originator. Collecting signatures requires that the company have a digital signature system in place, and it is integrated into and requires the use of Office software (such as Word), not just

Technology Toolbox: Meeting Space and IM

Problem: How can you meet with a few people online to discuss a document?

Tools: Several online meeting systems have been created to help you conduct a meeting for a small group. Microsoft Meeting Space is a free tool that is built into Windows Vista. You will also want to use Instant Messenger (IM) or Communicator. More sophisticated systems are available as stand-alone packages or as Web services, but they can be expensive. IM and Communicator support both voice and video connections as long as you have microphones and webcams.



The easiest way to start a meeting is to find the participants and connect through IM first. Otherwise, you can start a meeting and e-mail them an invitation. IM needs to be configured by each person with an e-mail account. Microsoft servers help users find each other. Use Communicator if you need more privacy and security.

Setting up a meeting is as easy as having the host start Meeting Space, and enter a meeting title and password. If the IM connections have already been made, simply click the user's name in the display list. Otherwise, click the link to invite people and follow the instructions to save and e-mail the invitation file.

Once the meeting connections have been established, you can start a program and click the Share option so that others can work on the document or drawing. Everyone sees the changes, but only one person has control at a time. The file and the software remain on the computer of the person who shared it so it works even if only one person has the software installed.

You can also share documents or PowerPoint files as notes. Everyone can see them, but only one person can change them at a time. Remember that you need relatively fast connections (upstream and down) to transfer voice and video. If the connection becomes overloaded, you can stop the video transmission or switch to telephones.

Quick Quiz:

1. What problems are you likely to encounter if more than four or five participants try to use online meeting software?
2. Why is voice communication important in an online meeting?
3. Is a video connection critical to online meetings?

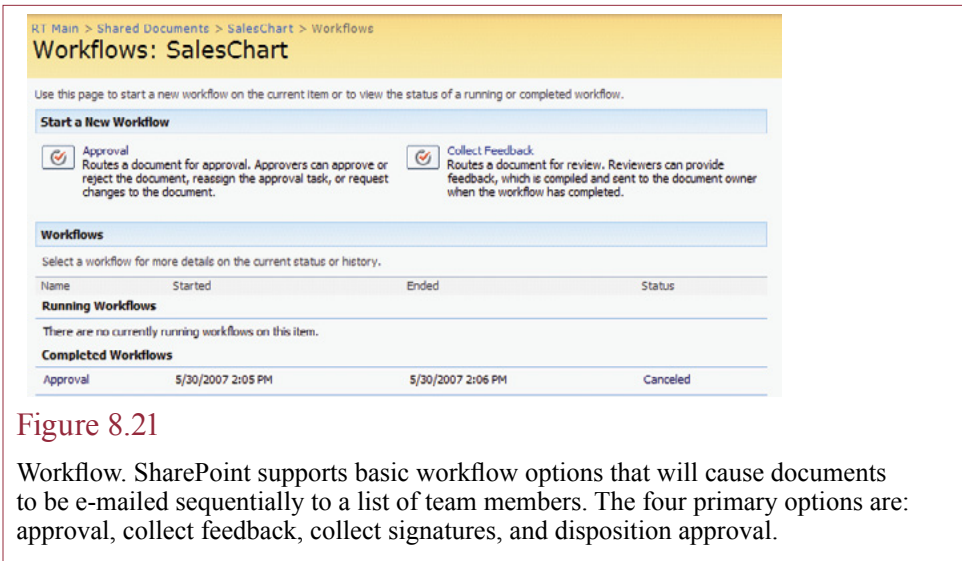


Figure 8.21

Workflow. SharePoint supports basic workflow options that will cause documents to be e-mailed sequentially to a list of team members. The four primary options are: approval, collect feedback, collect signatures, and disposition approval.

the Web browser. The Disposition option is a request sent to a list of people asking if expired content can be deleted.

More complicated workflow rules can be created with InfoPath and Microsoft Project. All of these tools integrate with some minor programming. For example, a list can be created to describe the state of a document (draft, approved, final). Then various conditions and triggers can be applied to specify conditions for each state and how the document must be handled. For instance, two specific people must approve a document before it can leave the draft state and move to the next steps. Or, a document must have three completed and approved figures before it is considered to be complete. These rules require some effort to set up, but once established, the system enforces the basic procedures of the business. Moreover, team members can check on the progress of a project to see what steps remain, or identify which team member is holding up a particular document.

Another powerful workflow technique is to add alerts to the shared items. As shown in Figure 8.22, you can set an alert so that you are notified when a document is changed. For example, you might need to obtain your supervisor's approval before continuing with a document. Save the document in the shared folder, notify the person that it is available, and then attach an alert to the document. When the document is revised, you will be notified by e-mail automatically. You can avoid bothering your manager, or wondering if he or she has gotten to the document yet. Note that you should inform everyone about these capabilities, partly so that they can take advantage of them, but also to minimize privacy issues. You can attach an alert to almost any object in SharePoint, including discussions.

SharePoint Configuration

Because SharePoint has so many options, it takes some time to learn to use SharePoint effectively. Once a site is configured, the basic options are generally accessible through tabs or drop-down menus. Figure 8.23 shows some of the options configured for this particular site. Many of the options can be added or removed by editing the site properties. Additional templates provide other functionality. For example, the Site Directory template indexes all of the subsites and workspaces so

RT Main > Shared Documents > SalesChart > New Alert

New Alert

Use this page to create an e-mail alert notifying you when there are changes to the specified item, document, list, or library.

View my existing alerts on this site.

OK Cancel

Alert Title
Enter the title for this alert. This is included in the subject of the e-mail notification sent for this alert.

Shared Documents: SalesChart.xlsx

Send Alerts To
You can enter user names or e-mail addresses. Separate them with semicolons.

Users:
Jerry Post

Send Alerts for These Changes
Specify whether to filter alerts based on specific criteria. You may also restrict your alerts to only include items that show in a particular view.

Send me an alert when:

- Anything changes
- Someone else changes a document
- Someone else changes a document created by me
- Someone else changes a document last modified by me

When to Send Alerts
Specify how frequently you want to be alerted.

- Send e-mail immediately
- Send a daily summary
- Send a weekly summary

Time:
Wednesday 2:00 PM

Figure 8.22

Change alert. Almost all shared documents and lists support alerts. Whenever a document or folder is altered, an e-mail message will be sent to you. You can use alerts to track the progress of documents as they are revised by various people.

Figure 8.23

Document options. As you customize the site, additional options and actions become available in the tabs and drop-down menus. Users should explore the various options to understand the power and value of each choice.

RT Main > Shared Documents

Shared Documents

Share a document with the team by adding it to this document library.

New Upload Actions Settings View: All Documents

Type	Name	Modified	Modified By	Approval
	MarketingProject	5/30/2007 11:46 PM	Jerry Post	
	SalesChart NEW	5/30/2007 2:22 PM	Jerry Post	Canceled
	Securing POP3 on Micro	5/30/2007 1:44 PM	Jerry Post	
	TrackChanges NEW	5/30/2007 1:16 PM	Bob Jackson	

- View Properties
- Edit Properties
- Manage Permissions
- Edit in Microsoft Office Excel
- Delete
- Send To
- Check Out
- Version History
- Workflows
- Alert Me

Reality Bytes: Teamwork Tools

Several online tools have arisen to help people work as groups. Many people are familiar with the basic file-sharing tools of Google and Microsoft. But more advanced tools exist to support brainstorming, editing, and reviewing.

Tool	Site
Associations/Brainstorming	
Mind Maps	www.mindmapping.com
Bubbl	www.bubbl.us
Mind Meister	www.mindmeister.com
Spinscape	www.spinscape.com
Shared Workspaces and Drawing	
Show Document	www.showdocument.com
Twiddla	www.twiddla.com
Document Creation and Review	
Writeboard	www.writeboard.com
Google Docs	docs.google.com
Zoho	www.zoho.com
Microsoft 365	www.microsoft.com/en-us/office365/online-software.aspx
Review Basics	www.reviewbasics.com
Web Site Creation	
Wikidot	www.wikidot.com
Wikispaces	www.wikispaces.com
Project Planning	
Wrike	www.wrike.com
WizeHive	www.wizehive.com
Basecamp	www.basecamp.com
Meetings	
Adobe	https://acrobat.com/welcome.html
Microsoft Live Meeting	www.livemeetingplace.com
Cisco Webex	www.webex.com
Go to Meeting	www.gotomeeting.com
Log Me In	www.logmein.com

Adapted from Logan Kugler, "Online Collaboration on the Cheap: 20 Free and Low-Cost Tools," *Computerworld*, June 3, 2010.

users can select sites by hierarchy, department, or through a search. You also use the site properties to control security and access permissions.

It is also possible to substantially alter a SharePoint site. In addition to basic templates and color schemes, you can use the SharePoint Designer to integrate additional functionality into any site and to develop new templates and options. SharePoint is built on top of Microsoft ASP .NET, which is a substantial Web server programming language. Using Visual Studio, programmers can develop custom modules and integrate them into SharePoint, or retrieve SharePoint data and perform analyses. The process requires a trained programmer, but it means that almost any type of configuration is possible. For example, you can use forms-based authentication to enable external business partners to contribute to your SharePoint site. SharePoint also provides Web Parts that are modules to integrate some specific complex actions into SharePoint. For example, the Excel Web Part uses SharePoint (.NET) code to programmatically build new Excel worksheets. Users can enter data on forms and your code can transfer that data to a custom worksheet, which can then be added to a document library. These techniques will take time to develop, but they can be used to automate relatively complex tasks.

Peer-to-Peer Collaboration

What if you do not have a server and want to collaborate? SharePoint has many powerful features, but it requires setting up a special server to hold the documents and handle the Web communications. Similarly, the open-source collaboration tools rely on setting up an account with a third-party Web site and adding everyone as users. A central server has some significant strengths; such as version control, automatic backup, searches, and being easy to find. However, sometimes you do not need that much power, and do not want to spend the money and time creating a central system. Also, you might want to use a tool that supports immediate interaction—where everyone can make changes and work on a document simultaneously. However, remember that in any peer-to-peer situation, you are constrained by the limitations of NAT. If a person you want to connect with is outside of your local network, you will need a server at least to find the other computer and establish the connection. Microsoft has released several specialty servers (Communicator Server, One Note Server, and so on), specifically designed to create these connections. If your company does not run these servers, you will need to pay a third-party (e.g., Skype or Microsoft Live) to establish the connection.

Sharing Documents

You can always resort to using e-mail (or USB drives) to share documents if you do not have access to a server. But sometimes you want to share files directly. As shown in Figure 8.24, Microsoft provides a second sharing tool that has features similar to those in SharePoint server. Confusingly, in 2010, the tool was renamed as SharePoint Workspace. The main sharing session is still named Groove. All participants need a copy of SharePoint Workspace installed on their computers. Participants also need to be able to connect their computers. If everyone on the team works for the same company, you should be able to select people from the company network. Otherwise, you will need a server to coordinate users across networks.

The system works by creating a shared workspace on each computer. A computer can handle multiple workspaces—for different projects or teams, but creat-

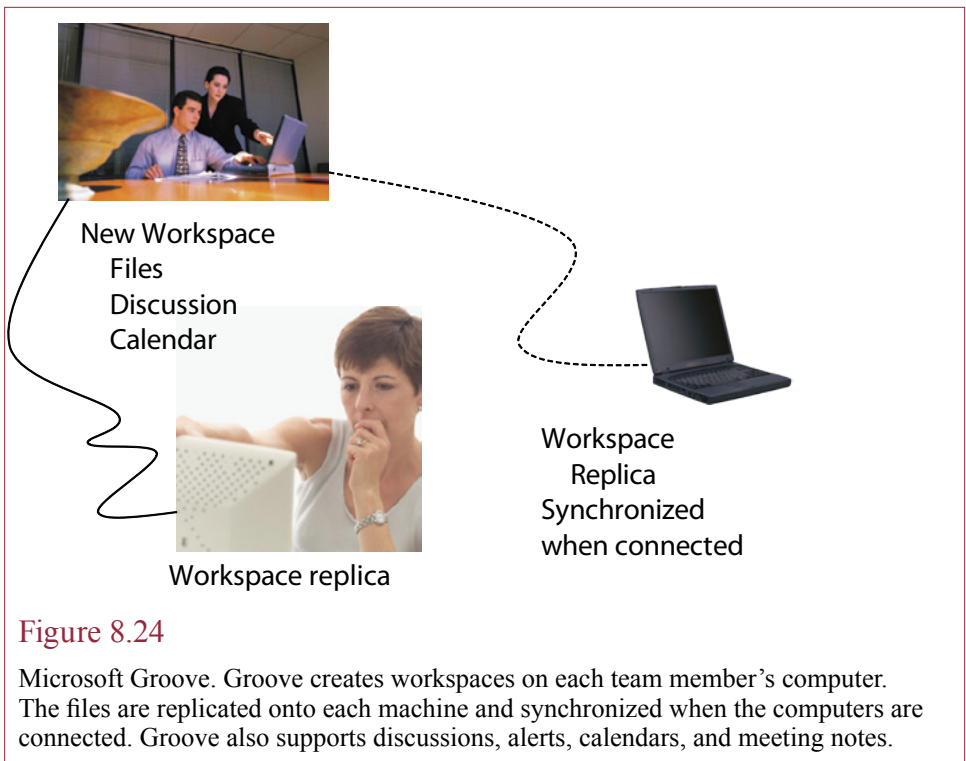


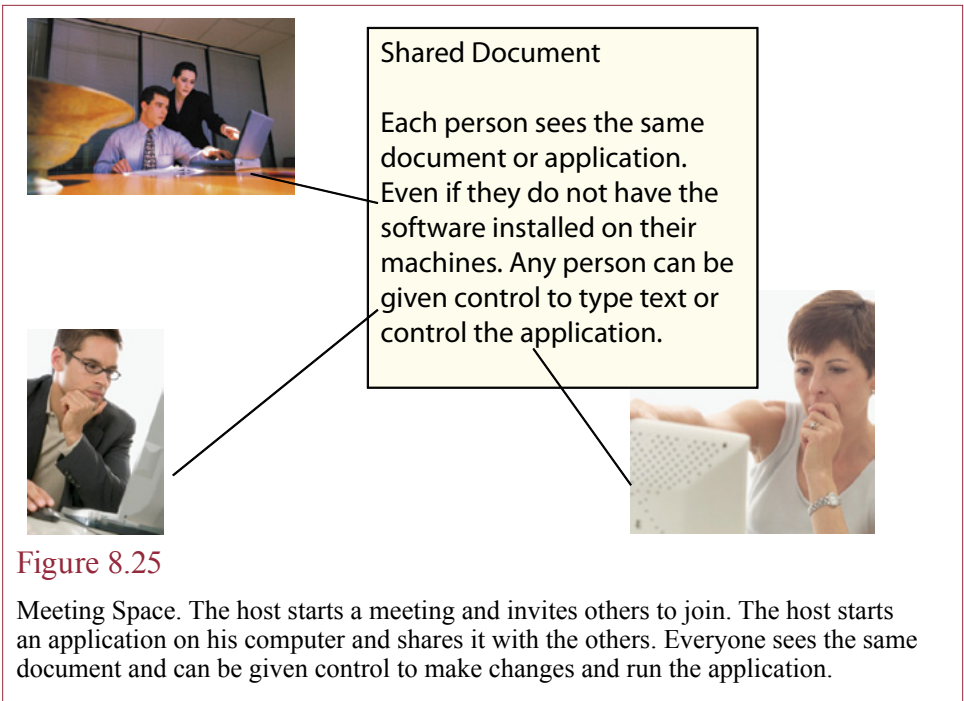
Figure 8.24

Microsoft Groove. Groove creates workspaces on each team member's computer. The files are replicated onto each machine and synchronized when the computers are connected. Groove also supports discussions, alerts, calendars, and meeting notes.

ing too many will slow down communications. One user initiates a new workspace and invites other people to participate in the session. At that point, Groove creates a folder on each of the machines to store shared documents. Any document created on one computer is **replicated** to the folders on all of the other machines. Users who are traveling and not connected to the network can still work on all of the files. When the computer is reconnected to the network files on all machines are **synchronized** by exchanging all of the changed data. Similar to SharePoint, Groove also supports shared calendars, a discussion system, and a meeting tool. It also provides alerts to notify you when a file has been changed. Groove lacks some features, such as version control. However, it includes a SharePoint Files tool that makes it easy to publish the documents to a SharePoint document library. One possibility is to use Groove to work on preliminary versions of documents with a few people on your team, and then publish major versions to the SharePoint server to make them available to a larger team.

Groove also supports several tools for direct communication. For example, it contains a discussion tool that tracks comments and replies. A shared calendar can store tasks and meeting dates. More interestingly, Groove supports an interactive notepad and sketchpad. These tools are shared in real time with participants who are currently connected. For example, with the sketchpad, multiple people can be drawing items at the same time—and all changes will be displayed on everyone's screen.

If you are familiar with the Microsoft One Note application, you should know that it also supports a couple versions of sharing. One Note is a unique application that is designed to provide features similar to a paper notebook. You can



create notes by typing, using a pen on a tablet PC, drawing or importing figures, adding almost any type of file or Web site, or adding audio or video notes. You create pages on which you can put almost any content, and then you organize the pages to make them useful. One Note also makes it easy for you to search your typewritten notes. The Shared Notebook feature makes it relatively easy to share a collection of pages with team members. The key step is that you must create a master copy and place it on a folder that is accessible to all team members. They can download and work on the notebook, and their changes will be synchronized with the master copy. If you have a small office, you can use a shared folder on a desktop to hold the master copy. In larger companies, you should consider using SharePoint to hold the master copy. It is easier for users to find the documents and SharePoint maintains version control.

Immediate Interaction: Microsoft SharedView

Immediate interaction is a second type of peer-to-peer sharing that is more exciting. Simple communication tools, such as instant messenger, count in this category, but more powerful tools exist. For example, Microsoft SharePoint Workspace supports live connections for notepad and sketchpad. Microsoft One Note also supports Live Sharing. Another Microsoft product for interaction is SharedView, which can be downloaded for free. All of these tools enable multiple people to connect to a computer and work on a document at the same time. Changes made by one person are immediately displayed on everyone's computer. Of course, it can get confusing if everyone tries to type or draw at exactly the same time, so people usually take turns. The point is that everyone can see the changes immediately. This process makes it easier to spot mistakes, find new directions, or solidify ideas.

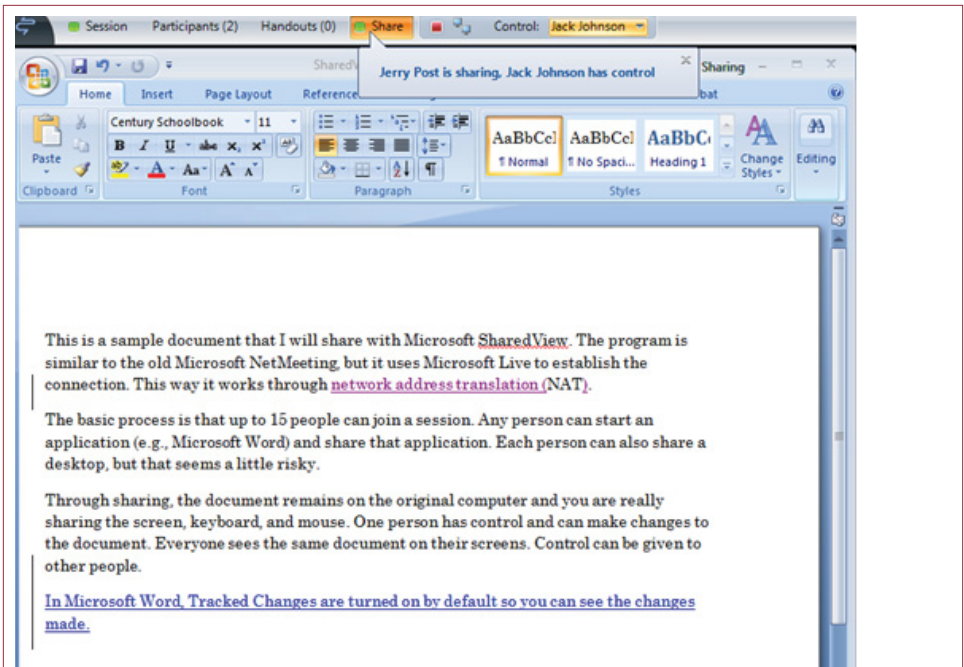


Figure 8.26

Microsoft SharedView. Up to 15 people can work on a single copy of a document, application, or desktop. Only one copy exists, but everyone sees the same screen. You are sharing the screen, keyboard, and mouse.

These tools work the same way, so this discussion will focus on SharedView because it is free and is relatively powerful. When you use these tools, you will also probably want to make a connection with a voice or video communication tool such as Messenger or Skype so that you can talk to the other people while you are making changes.

As shown in Figure 8.25, once the computers are connected through the meeting software, you can share applications, or even your desktop. As a host, you start SharedView and log in. Then you start a new session, which generates a session name and password. The tool also creates a simple invitation with a link to your session that you can e-mail to other people. The link routes them through Microsoft's SharedView server to make the connection.

The entire purpose of SharedView is to enable multiple people to work on the same document at the same time. The nice part is that you can share any application—even if it is not installed on the other computers. You can even share the desktop, so someone else can run your entire computer. Okay, that choice is a little scary, so be careful who you grant permission to run your desktop. It is useful if your project involves multiple applications or if you need help from an expert. Try sharing a drawing application such as Word, PowerPoint, or Paint. Figure 8.26 shows a simple example using Microsoft Word. Note that track changes is enabled to make it easier to see what changes are being made. Each person can draw, add text, or bring in images or other files. Everyone gets to see the changes as they are made. Remember that there is only one copy of the document—the file is stored



Figure 8.27

Microsoft Surface. Multi-touch screens create a new interface for interacting with objects on the screen. They also enable several people to work on objects at the same time. (Photo courtesy of Microsoft).

on the hosting computer. The other computers are working with a simple screen copy. You can always e-mail the final file to everyone. SharedView also lets you share any saved file as a handout which can be retrieved immediately by the other participants.

SharedView works with a relatively small number of people, but if you get too many people working at the same time everyone will interfere with each other. However, note that the system limits control to one person at a time. The person in control has the ability to make changes to the document. The host can select who is in control, but everyone sees the resulting changes. This tool can actually be useful even if everyone is in the same room. Although only one person can enter text or make changes at one time, it is easy to switch among the participants to let people take turns.

Sharing with Multi-Touch Panels

What could you accomplish if five people work on the same screen at the same time? Several companies are developing computers that use an entirely new form of interaction. It is known as a multi-touch panel. Essentially, several video cameras beneath the display observe touches and gestures by multiple fingers, which includes multiple people, at the same time. Professor Jeff Han astounded people with his presentation in February 2006 at an annual technology conference. Search for it on YouTube. The applications were mainly graphical and geographical, but the ideas offer profoundly new ways of interacting with the computer. Basically, users touch the screen and manipulate objects using various motions. From a team perspective, the interesting part is that several people can work on the same display at the same time. As shown in Figure 8.27,

in 2007, Microsoft announced a coffee-table-size computer called Surface based on a similar technology. Essentially, users can sit around the display table, and work on a project together. The system can even recognize (some) objects when they are placed onto the display table. The technology might remain expensive for a few years, because it requires fast computation speeds to make it look good. Other vendors, such as PQ Labs, are now offering glass overlays that can be attached to a standard large panel LCD monitor to enable multi-touch interaction.

Because the technology is new, few people have had the opportunity to work with it. The bad news is that it will take a few years to develop good business and data applications. The good news is that you could invent a new way of having people work together, build the system, and sell it for tons of money. The initial applications are likely to be graphically oriented, because they are easier for people to understand and to have several people contribute at the same time. But, the basic groupware tools described in this chapter could be modified to work with this hardware. People could work on different elements at the same time. For example, one person could work on financial data in a spreadsheet while another works on a presentation slide. Data from the spreadsheet could be dragged over to the presentation when it is complete. Or, perhaps two people could search for information at the same time and combine the results to do a quick comparison.

One drawback that will slow the development of software is that all of the operating systems (Windows) are built to work with only one mouse and one keyboard at a time. The application focus controls where typed data is entered, and Windows and other applications currently support only a single focus point. Eventually, this limitation can be overcome, but it will take time for developers to change the old applications.

File Formats and Standards

How do you collaborate and share data if everyone uses different software? To put it another way, why is this chapter so reliant on Microsoft technologies? The answer to the second question largely comes down to the fact that Microsoft Office has about a 95 percent market share (Business Week, July 3, 2006) and at least 80 percent in businesses (Forrester, 2009: <http://www.networkworld.com/news/2009/060409-forrester-microsoft-office-in-no.html>).

The underlying issue is that if you want to share documents, everyone needs to be able to read the files. Microsoft has largely relied on proprietary file formats. Even though some programs exist to convert files into other formats, the conversions are never perfect; and they are likely to lose the sharing properties in the process. To collaborate with shared documents, all participants need to be able to read and write the files in the exact same format. Historically, this compatibility could be accomplished only if everyone used the same software—and even the same versions.

When programmers develop software, they need to design a way to store the associated data. Historically, most companies have developed proprietary binary file formats that are optimized for their specific purposes. Proprietary formats had the side benefit of encouraging everyone to adopt the same software to avoid the conversion hassles. The problem of transferring binary files is bad enough when everyone uses the same basic hardware. Binary files store data in the underlying format of the processor on which they were created. These formats vary for different types of computer processors. The World Wide Web was actually designed to solve this particular problem. Physicists wanted a way to share their research, so

Reality Bytes: How Do Workers Communicate?

In 2009, Forrester Research conducted a study of 2,001 American workers at medium-to-large organizations in terms of their technology usage. The results showed that several predicted trends have not yet taken root in mainstream corporations. Only one-third used laptops for work and one in nine had a smartphone. Almost 20 percent shared a PC with a coworker. In terms of communication, e-mail was the most frequently used method—with 60 percent of the workers saying they checked e-mail at least hourly. Almost three-fourths said they never use instant messaging at work. Most could simply talk to coworkers or use the phone. Many people blamed lack of IT support for newer tools. Around 70 to 80 percent of the workers never use groupware tools, including Web conferencing, Microsoft SharePoint, social networking, or videoconferencing. Of those who did use these types of systems, less than 20 percent said they were “experts” and about the same number said they were “very satisfied” with the tools. At the same time, 45 percent of them said they spend three or more hours a week looking for important information.

Adapted from Eric Lai, “8 Ways the American Information Worker Remains a Luddite,” *Computerworld*, October 12, 2009.

Web pages are defined as simple text files that can be read by any type of computer, along with the markup language (HTML) to display pages consistently. However, HTML is not powerful enough to handle complex documents, so the world is still searching for a method to share word processing documents.

The International Organization for Standardization (ISO) approved the Open Document Format (ODF) in 2006 as a world-wide standard for storing common office documents. Conceivably, if enough vendors adopt this format, it will be easier for competitors to offer new tools, particularly collaboration tools, that work with documents created from any software. Support for most of the ODF standard is built into Microsoft Office (use File/Save As and pick the Open... format). But these formats simply enable people to read documents with other software. Standardized support for collaboration notes and security are weak. Microsoft has made its file formats more accessible, but it is not clear that other companies will adopt the features.

Cloud-Based Collaboration

Another way to share documents and collaborate is to use one of the online browser-based systems. As browsers gain more power, it has become possible to create relatively complex applications that run on the browsers alone and store the data on a Web server. The two leading sites are Google Docs and Microsoft Live. Both offer free access with a limited amount of storage or you can purchase accounts with more storage capacity and other options. For example, Google Docs offers business accounts for \$50 per person per year. These accounts could be used by one person to create common documents (word processing, spreadsheet, or slide show). However, the real strength comes with the fact that the documents are on a cloud server. With the documents in a central location, multiple people can access them. By relying on Web browsers, it is not necessary for users to install software, and the files can be reached using almost any device from anywhere in the world.

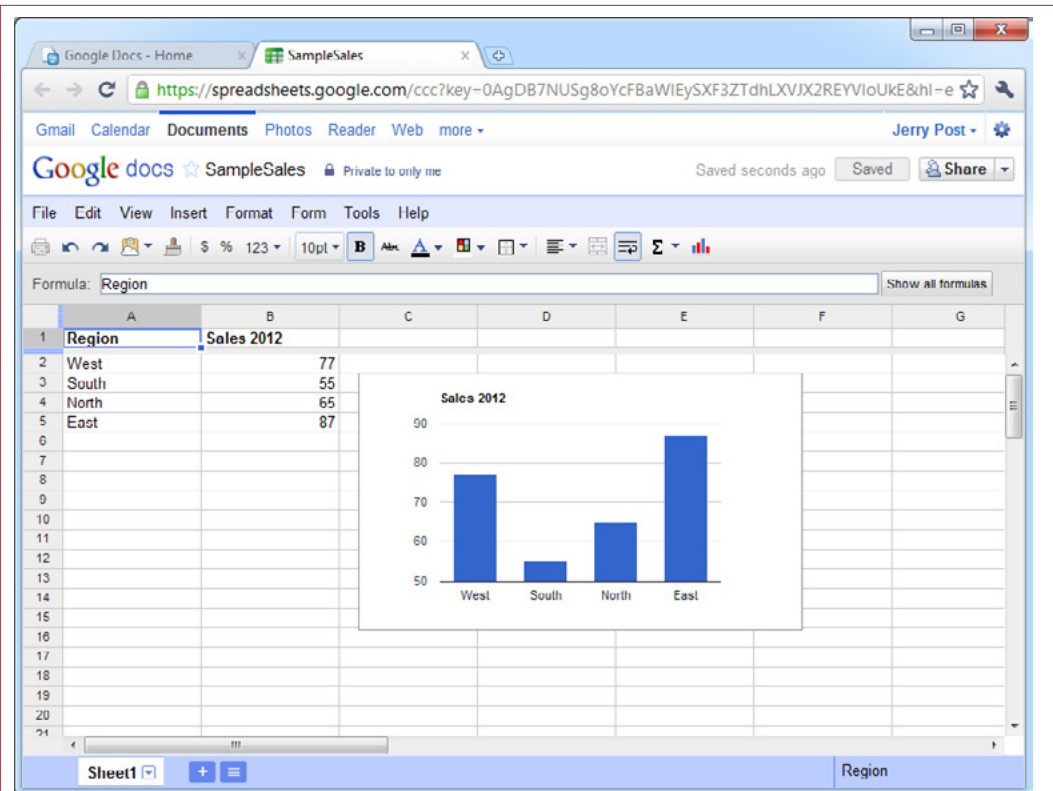


Figure 8.28

Spreadsheet in Google Docs. Spreadsheets and documents support standard features including layout, functions, and charts. Usability and features are somewhat limited because of the reliance on browser capabilities but it is easy to share access to the documents.

Figure 8.28 shows an example of a simple spreadsheet created in Google Docs. The tools provide basic functionality and are built using commands you are already familiar with. The Google system relies on menu commands, which you can browse to see what features are available. Partly because of limitations with browsers, functionality is somewhat limited compared to the PC-based Office programs. For example, there is no simple copy-and-paste operation to move a chart from a spreadsheet into a document. Instead, it has to be saved as an image file.

On the other hand, sharing a document is straightforward. Choose the Sharing option in the document list and you can make the document private, public, or share it with a specific list of users. You can send a link to the document to people who need to review or edit it. Google also supports up to 50 people editing the same document at the same time (10 for presentations). Changes made by each person are updated and pushed out to the other copies in real time. The names of each collaborator are listed at the top of the page and you can open a chat window to share comments.

Microsoft Live also has a set of online editing tools (www.live.com or www.microsoft.com/live). Live started with a focus on communication tools (Hotmail

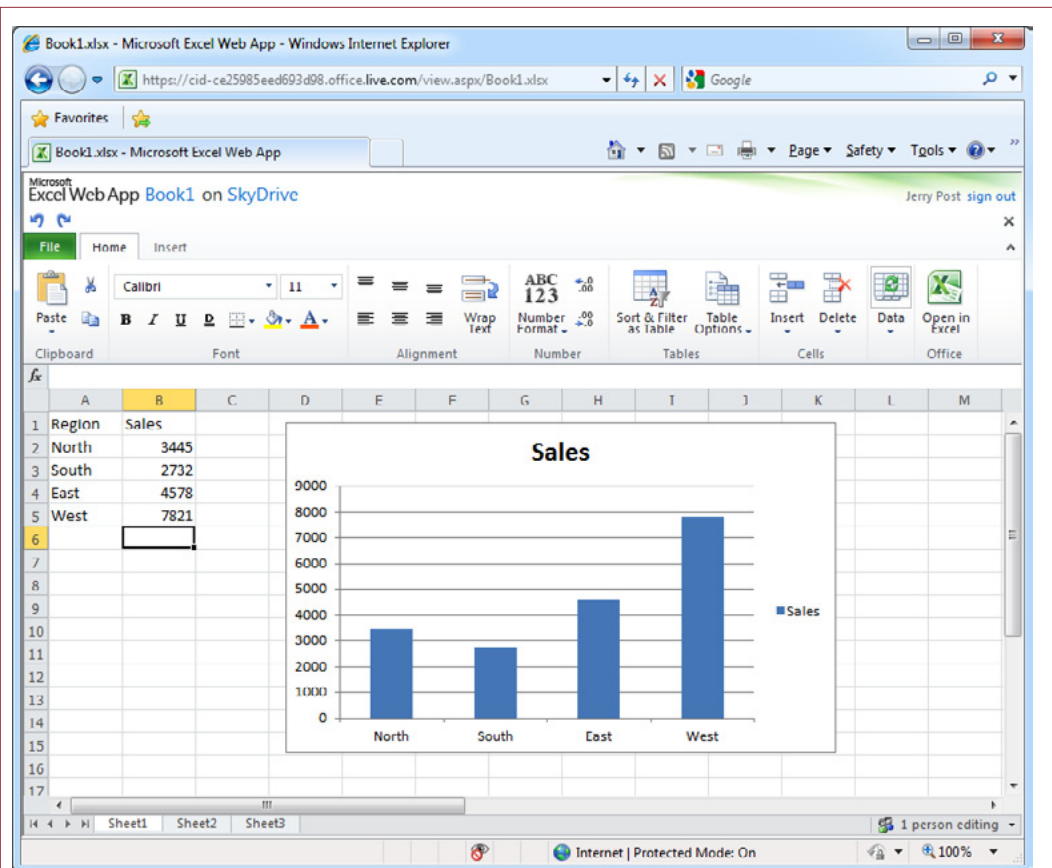


Figure 8.29

Spreadsheet in Office Live. Spreadsheets and documents support standard features and can be downloaded and edited in the PC-based tools. They also can be shared with other users.

and Messenger), so the first page still emphasizes them. Click the Office link to get to the main documents site (office.live.com). Figure 8.29 shows that the tools use a ribbon-based editing system—but there are fewer options than in the PC-based tools. However, there is a button to download the file and edit it with the PC-based software if you are working with a PC that has it installed. So it is easy to move back and forth between your local computer and the server-based copies.

Microsoft Live also makes it straightforward to share the online files with the public or with a select group of friends. The system also keeps versions and automatically saves your work. With the 2010 online version, Microsoft introduced simultaneous editing. Each user must be given edit permissions and open the file (spreadsheet) using the Web browser. Changes made by one person are pushed out and displayed to the other people editing the document. You can test the process with yourself by opening two separate browser windows and editing the same document twice.

The primary features between Google Docs and Office Live are similar, but the Microsoft layout and commands are closer to the PC-based versions so it might be

easier to user. However, as a manager, you should be familiar with and have accounts on both systems in case someone wants you to work with a specific set of tools. Both options are useful if you want to carry around a tablet computer. Most of the early tablets do not have the ability to run common PC-based software, but do support standard browsers. If you want to rely on a tablet, you need to use cloud-based computing to create and store files.

Summary

Working together and sharing data are crucial in today's companies. MIS can help teams work better with tools designed to integrate data across an organization. Managers need to know how to use a variety of tools, from data sharing over networks, to dynamic linking, to groupware products.

Teamwork begins with communication, and information technology provides many ways to communicate, from voice mail, e-mail, text messaging, Web pages, and blogs, to videoconferencing. As a communicator, one of your challenges is to choose the appropriate communication channel for the specific type of message. Teamwork also requires scheduling and task coordination. Electronic calendars and project management tools help everyone identify bottlenecks and keep projects on schedule. Meetings take big blocks of time from all managers, but they are often critical to communication and the success of a project. Electronic meeting systems make it possible to meet regardless of location. They also provide records of the meetings that can be reviewed or searched later.

Collaboration requires sharing documents and knowledge. Shared document features enable you to track changes made by all teammates. They also provide version control so you can recover elements deleted from earlier versions. Workflow software helps you control the sequence of events and when people will receive each document. Information rights management provides tools to limit the distribution of documents and control what people are allowed to do with each document. Ultimately, an important goal of teamwork systems is to collect all of the information used to make decisions and hold it as the organization's memory. This knowledge management system can then be used for future decisions and problem solving.

Microsoft SharePoint and Groove provide several tools to integrate the elements of the Office suite as well as provide communication and collaboration tools. SharePoint makes it easy to share documents across the Web. It also maintains contact lists, events, and task items. All of the features are shared with teammates. Discussions can be created quickly on general topics or on specific documents. Surveys can record votes on critical issues. When you need more interactive tools, you can add communication and meeting tools as well as tools such as SharedView that enable multiple people to work on documents at the same time.

Cloud-based tools including Google Docs and Microsoft Live make it easy to share documents with multiple people—using only Web browsers. The tools work for basic documents, spreadsheets, and presentations. The cloud servers make the files accessible to almost anyone and maintain backups and even version control. Both tools also support simultaneous editing of documents so multiple people can make changes at the same time.

A Manager's View

Teamwork is an increasingly important aspect of management. Integration of business units so they work together is another important issue. Effectively managed, the techniques can cut costs, improve quality, and improve response time. Communication and collaboration are key elements to the success of any team. Groupware tools support messaging and sharing documents. Business process management tools help automate collaborative processes by adding triggers and rules. Ultimately, storing all information on decisions contributes to the organizational memory, and the knowledge management system can help the company make better decisions.




Key Words

business process management (BPM)	knowledge management (KM)
check in	protect document
check out	replicated
concurrent changes	synchronized
full duplex	telepresence
group decision support system (GDSS)	track changes
Groupware	Version control
Information rights management (IRM)	Videoconference
	Workflow

Web Site References


Microsoft Live Meeting	Teamwork Tools	www.microsoft.com/livemeeting
Webex (Cisco meeting)		www.webex.com
Version control comparison		better-scm.berlios.de/comparison/comparison.html
Microsoft SharePoint		www.microsoft.com/sharepoint
	Knowledge Management	
KMWorld		www.kmworld.com
Knowledge Board		www.knowledgeboard.com
KMNews		www.kmnews.com
KMResource		www.kmresource.com

Review Questions

1. What communication channels are available to teams? What are the strengths and weaknesses of each method?
2. Do current communication and groupware tools reduce the need for business meetings? Explain.
-  3. How does network address translation present problems with collaboration? How are these problems solved?
4. Why is it helpful to use collaboration tools when sharing documents instead of just e-mail?
-  5. Why is version control important to teams?
6. How is information rights management different from typical computer access controls?
7. What is workflow processing and how is it supported by collaboration tools?
8. What are common features of a group decision support system?
9. What features are important in a knowledge management system?
10. What are the major features of Microsoft SharePoint?
-  11. How does peer-to-peer collaboration differ from Microsoft SharePoint?
12. Why are file formats so important in collaboration?
13. What are the benefits to using cloud servers for collaboration?
14. What benefits would large multi-touch panels provide for small groups?
15. Briefly explain the main capabilities of the following tools:
 - a. Microsoft SharePoint server
 - b. Microsoft SharePoint workspace/Groove
 - c. Microsoft SharedView
 - d. Google Docs
 - e. WebEx
 - f. Skype

Exercises

1. Can smart phones be used for video conferences? Can they be used with phones on other systems (e.g., AT&T v. Verizon)? Why or why not?
2. Research and compare the meeting capabilities and costs of at least two products (e.g., Microsoft Live Meeting, Cisco WebEx, Skype). What types of meetings (e.g., size) is each best suited for.
3. Research the costs of installing several Microsoft collaboration servers, including Communicator, Groove, and SharePoint.

4. For each of the following business situations, identify the collaboration method you would use and briefly explain why.
 - a. A salesperson wants to demonstrate a complex software package to a customer group in a different city. The customers can meet in one room.
 - b. A corporate vice-president wants to give a two-hour presentation of new products to a local audience of at least 100 people, plus at least 300 company employees in multiple cities, and make it available to authorized reporters.
 - c. A design team consisting of a group of four artists and a programmer, each in a different city, need to create a new design for a large Web site.
 - d. Students in a club need to write a short document and create a slideshow for an upcoming event.
 - e. A group of students and faculty in an investment club need to share data and research with each other and keep records so students can follow the work next year. Outside directors also want to be able to see selected data and reports.
-  5. Most organizations have a process for submitting and approving a business travel request. If possible, interview someone from a company or the university about the steps involved in creating and processing a travel request. Then describe the steps to create that process in SharePoint server.
6. Describe a business situation in which you would need to implement information rights management controls. Describe the specific rights you would assign.
7. How is Skype similar to but different from Microsoft Messenger?



Technology Toolbox

8. As a team project, if you have access to a SharePoint server, have one person create a small document that describes a computer that he or she might wish to purchase. Set change subscriptions on the document for each team member. Then over the next few days, have members make changes to the document, with suggestions for different components. As team members are notified of changes, they should check the suggestions and either accept or reject them by adding additional comments.
9. Use a SharePoint server to discuss a recent movie. Include links to other review sites and if possible upload image files or movie clips. Create a calendar to assign tasks to each team member. The final result should be a formal review of the movie. Be sure to include your instructor as a team member.
10. With at least two people, choose an industry and assign a firm in the industry to each person. Set up a Groove workspace. Have each person retrieve sales and profit data for the assigned firm. Use the workspace to build a spreadsheet that combines the data from each firm to draw charts displaying revenue and profits for each firm.

11. Set up Windows Meeting Space and create a meeting with at least three people. Together, build a short PowerPoint slide show to come up with a new marketing campaign for an automobile manufacturer (pick one).
12. Compare Meeting Space to One Note/Live Sharing. If you do not have access to the software, use the Microsoft documentation to evaluate the features of the two products. Which tool would you prefer to use for a small team project and why? Test both tools if you have access to them.




Teamwork

13. As a group project, assume that each person in the group is a manager of a different department. Each person creates a spreadsheet to list the salespeople in his or her department (4 to 10), their hours worked, total sales, and commissions. Compute the totals for each column. Once the individual spreadsheets have been created and stored on separate computers, the group will create a composite spreadsheet that brings in the data from each individual spreadsheet. Compute the corporate total and draw pie charts for each column. If possible, use dynamic linking across the network to capture the data from the individual spreadsheets.
14. Using SharePoint, have one person write a short document. Use workflow to send it to each of the other team members for feedback. Submit the final document with the feedback to the instructor.
15. Using Groove, (or SharePoint if Groove is not available) configure a workspace for a project to evaluate cell phones. Use the tools to discuss the features and try to agree on a common cell phone that could be purchased by a company for each of the team members. Hand in the final document and recommendation, with the discussion comments.
16. Using SharedView (with PowerPoint) or SharePoint workspace/Groove to create a listing of the name and major of each person in the group. Create a small diagram as a map that shows your current location compared to the campus library.
17. Connect as many people as possible using a single instant messenger or chat room system. As a topic, discuss a current movie. What problems do you encounter? Should you limit these types of meetings to a certain number of people? What would be the maximum?
18. If your team has to work from home on a project for the entire semester that involves drawings, documents, and discussions or meetings, which tools would you choose and why?



Rolling Thunder Database

19. If you have access to a SharePoint server, set up a team site to discuss production issues. Generate queries to show production delays over time. Put the data into a spreadsheet and graph it. Create a discussion group for the spreadsheet and discuss possible reasons for any issues.

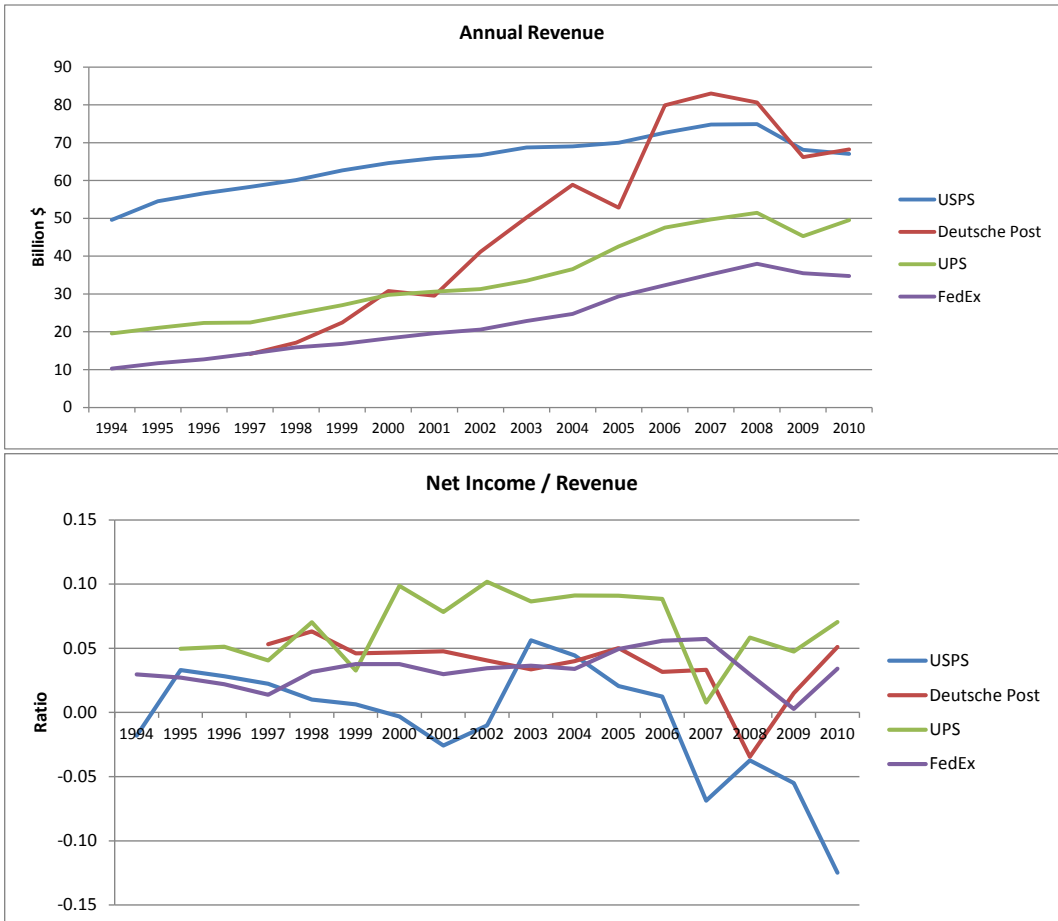
20. (team) If you have the Groove client software, set up a workspace and build a spreadsheet to display and chart U.S. retail sales of bicycles for at least six years. Each person should keep notes on which sites were searched and where data was found. Comment on any differences in data found and produce a best-estimate chart.
21. Describe the hardware and software Rolling Thunder should install so that all employees can coordinate schedules and conduct 15-minute meetings every day.
22. Choose a system that would help Rolling Thunder marketing managers communicate with retail stores to show new designs and products with the goal of reducing the number of physical visits by salespeople.
23. Identify documents that Rolling Thunder should protect with an information rights management system and briefly describe the desired rights.
-  24. What information would you recommend placing in a knowledge management system for Rolling Thunder Bicycles?
25. Explain how version control would be useful for designing the bicycles at Rolling Thunder. Find software that could provide version control.

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Cases: Package Delivery

The Industry



The package delivery industry has changed dramatically over the past few years. In fact, today, it should probably be called the business logistics industry. Several large mergers have altered the industry. The competition among the remaining firms is intensifying. The primary players today are FedEx Corp., United Parcel Service (UPS), the United States Postal Service (USPS), and Deutsche Post (which owns DHL and Airborne).

To understand the changes, you need to understand how businesses operate today. The most important issue is that large companies operate in many locations, within the United States and around the world. This means that companies need to move supplies, assembled components, and finished products. Parts are moved from suppliers to assembly plants, and finished products are shipped to distribution centers and retail stores. Few firms today want to move their own products on their own trucks—it just does not pay. And smaller firms could never afford to own their own fleets. Instead, the large firms have focused on efficiency, time, and price to be able to provide a complete level of delivery services around the world.

Today, that encompasses everything from freight handling (large shipments) to overnight packages (express delivery).

UPS was at the top of the revenue list in 2003 slightly over \$33 billion. DHL was second with \$24 billion, closely followed by FedEx Corp. with \$22.5 billion (Whiting 2003). However, USPS topped all of them with operating revenue of over \$68 billion in 2003; but that includes money from its monopoly position to deliver letters to households (annual reports). The basic rankings had not changed much by 2011 Deutsche Post and USPS had similar sales numbers at the top of the list, followed by UPS and FedEx. Of course, the big difference is that USPS was experiencing billions of dollars a year in losses.

Services and Information

In many ways, UPS was the leader in driving changes in the logistics industry. The company was initially formed to deliver merchandise from manufacturers to retail stores. This third-party service made it possible for manufacturers to increase their sales without having to build their own distribution centers. Even smaller companies now had direct access to sales across the United States. And all companies could use the system to ship short orders in a matter of days.

The industry has changed considerably over time as the firms have introduced new services and combined others. FedEx introduced the concept of next-day delivery. At a time when many people doubted there was demand for such a service, the company owned and then perfected the market. When computers became cheap enough, FedEx introduced package tracking—emphasizing that information was just as important as the package (FedEx Web site) and (Ulfelder 2002). The other carriers struggled to provide the same service, but eventually UPS, USPS, and DHL; as well as a host of other firms moved into next-day shipping. At the same time, FedEx began to move into ground and freight deliveries, shipping larger items across the country and delivering packages to stores and individuals in a few days. FedEx grew largely by acquiring other firms. DHL has an interesting history—largely driven by one man: Larry L. Hillblom, who died in a plane crash in 1995. His focus was air delivery to islands and nations in the South Pacific, and for years, DHL dominated that international market.

Overall, the international market is a challenge for any shipping company, or even any company that wishes to ship packages around the world. Each nation has different customs requirements—in terms of forms, taxes, and even items that are banned. To make it more complex, most nations have their own definitions of items and terms. Complicating it even more, the rules tend to change over time. Now, if you are a manufacturer shipping only a single item to a single nation on a regular basis, you will eventually learn the procedures. But if you want to ship different items to multiple countries, how can you gain the knowledge you need?

Ultimately, the major shipping companies (not including USPS), have created huge online knowledge systems that automate most of the steps in shipping overseas. You simply fill out the declarations properly and their systems produce the necessary forms. UPS and FedEx have special facilities to notify customs agents when packages are arriving and produce detailed information on request. In 2003, the United States Department of Homeland Security (Bureau of Customs and Border Protection) proposed a regulation that all carriers have to notify officials of inbound cargos several hours before they arrive. The notice would have to be electronic so that the bureau could run computerized analyses on shipping data to spot potential terrorist threats or illegal shipments. DHL, UPS, and FedEx gener-

ally already meet this requirement. The DHL system is based on Open Harbor's global trade-management system that has over 8 million trade rules (Chabrow and Bacheldor 2003). Ultimately, it is likely that other major nations will require the same advance notice, and all of the carriers and software vendors are building systems to meet these demands. The key point is that shippers now offer much more advanced services. They are not simply ferrying packages—they are taking responsibility for the entire process.

Many companies today use these shipping firms as the first line of their logistics service. Even internal shipments between factories can be handled and tracked by UPS or FedEx. Particularly with the integration of freight, package, and overnight deliveries, companies can flexibly select and monitor their shipments. UPS and FedEx have divisions and special software to help companies use it as a complete transportation system. They can schedule deliveries for different times and days. They can even have UPS and FedEx integrate shipments. For example, if you buy a computer from Dell, the monitor might have been shipped from Asia, unloaded in a UPS warehouse, and then shipped directly to you—without first having to go to a Dell warehouse. And it would be shipped to arrive at the same time as the rest of the computer, which was shipped from the Dell assembly plant.

In 2006 and 2007, all carriers were hammered by rising fuel prices, both for trucks and airplanes. Faced with increasing costs, IT needs became lower priorities—particularly since no astounding new technology appeared. Rob Carver, CIO, noted that for budget money it is “not a stellar IT year,” and that although the FedEx security team likes features on Windows Vista, they see no need to switch desktop operating systems when Windows XP is working fine (Preston 2007).

Competition

The major firms have consolidated to the point where they now offer essentially the same types of services. The declining costs of technology have made it possible for all of the firms to compete with information systems—for example, they all offer package tracking. The rivalry is fierce—particularly between FedEx and UPS. Both compete on the basis of global reach, quality, and price. Currently, DHL/Deutsche Post is not in the same league within the United States, but dominates in Europe and Asia. So, all firms have to focus on efficiency, and efficiency often requires automation—reducing the number of workers where possible, and cutting times as much as possible. All of them have benefited from the increased level of shipping in the past decade. Will that trend continue? Or will it level off, forcing firms to compete harder to steal market share from each other? Information technology has played an enormous role in many aspects of the competition. From providing information for package tracking, to the knowledge bases for international shipping, to route scheduling, automation, and cost cutting.

Teamwork

These companies are huge, and they operate around the world. Moving packages and information quickly and efficiently in this environment requires tremendous teamwork. A large portion of the information technology is devoted to ensuring that everyone down the line knows exactly what is coming. When customers enter package data on the main Web site, the local driver knows what to pick up. Schedulers communicate in real time with drivers to alter routes as needed. The package data is provided to the central hub, which optimizes the plane loadings and flights. Data is sent to customs as well as to the local destination hubs, so drivers

know the loads and routes for the next day. All through the process, customers are treated as team members and have access to the information. Customers include the shipper as well as the recipient. Firms that ship products can be notified of any problems before they become a disaster.

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Case: FedEx

The history of FedEx (ticker: FDX) is outlined on its Web site. Federal Express began with a paper that Frederick W. Smith wrote in 1965 while at Yale University. After serving in the military, Smith purchased Arkansas Aviation Sales in Little Rock in 1971. It officially began operations on April 17, 1973, with 14 small aircraft and delivered 186 packages to 25 cities. Deregulation of air cargo in 1977 enabled Federal Express to fly larger jets and the company grew rapidly. In 2004, the company had a daily lift capacity of more than 26.5 million pounds and the fleet traveled 500,000 miles a day. The endpoint delivery vans logged 2.5 million miles a day (company Web site). The company reached \$1 billion in sales in 1983—a mere 10 years after start-up.

Mergers

In 1989, Federal Express purchased the Flying Tigers network—largely oriented to flights in the Pacific region, and giving Federal Express expertise in international shipments. In 1995, Federal Express acquired Evergreen International Airlines—largely because the acquisition gave it rights to deliver in China. In 1998, Federal Express expanded into ground deliveries by purchasing RPS (Roadway Package System, renamed Caliber System in 1996). The purchase of Caliber Systems also gave Federal Express Viking Freight. Federal Express expanded its freight system in 2001 by purchasing American Freightways. In 1999, FedEx acquired Caribbean Transportation Services, focusing on shipments to Puerto Rico. FedEx now has a full spectrum delivery system, from air shipping to large freight transfers to package delivery.

In 2000, FedEx acquired TowerGroup and World Tariff. This acquisition provided important knowledge and experience in handling international shipments. It provides customs clearance and electronic filing for all of the other divisions of FedEx, enabling FedEx to provide end-to-end transportation around the world.

The more surprising merger happened in February 2004 when FedEx acquired Kinko’s Office stores. For several years, FedEx had a relationship with Kinko’s,

so that customers could drop off packages at the local stores. All 1,200 stores in 10 countries are digitally connected, making it possible to print documents nationally. The company evolved from neighborhood print shops into local business centers for mobile professionals and small businesses. The company also handles commercial print jobs.

Operations

The essence of package delivery seems easy—when you look at one package: pick up a package, transfer it to a plane, fly it to the nearest airport, put it on a delivery truck, and drop it off at the destination. The problem is that drivers have to pick up many packages, all of them have to be sorted, planes have to be loaded properly and flown to airports where you have landing rights, then packages have to be unloaded, re-sorted into delivery trucks, and the drivers have to get to multiple destinations. Now, you have to do all of that fast and at the lowest possible cost. And the mix of packages and destinations can change every day.

Scheduling and optimizing package handling and deliveries is a key element in the operations. In 1978, FedEx put voice radios in the trucks to assist and direct drivers. Only two years later, in 1980, the company launched a revolutionary proprietary wireless data network called Digitally Assisted Dispatch System (DADS). Dispatchers could send text messages to drivers. By reducing chatter and enabling drivers to check the messages when they needed, the system improved efficiency 30 percent in the first day (Ulfelder 2002). In 1986, the company adopted the wireless handheld SuperTrackers that capture data with bar code readers. The system is the foundation for tracking packages at every step, and uploads data to the Customer Oriented Service and Management Operating System (COSMOS).

Tracking the package at every step in the process is critical to the operations. It provides information for the operations at the next stops, it provides data to the customers, and it makes it almost impossible to lose a package. On average, every FedEx package is scanned 23 times. Once a package is picked up and scanned, the data is transferred to the central computer. At the shipping hub, the computer routes the package to the proper conveyor belt. The package is loaded into an “igloo” container that fits the sloping sides of the plane. The container has a scan that represents all of the items held inside. While being routed to the proper container, each package is weighed and the billing corrected if necessary. The weights are also used to balance the loading of the plane. As the 160 planes land each night at the FedEx hub in Memphis, workers unload them within 20 minutes. Packages in the Memphis hub travel through a giant convey system to be routed to new planes or trucks to the nearest of 22 airports. The system scans 1,000 bar codes per minute. The hub alone generates about 900 MB every two and a half hours (Brewin and Rosencrance 2001). The main FedEx hub in Memphis is a key element in the operations efficiency. FedEx can move 325,000 letters an hour through the hub, along with 125,000 small packages per hour. The average transit time is seven minutes (Brewin April 2004).

In 2003, FedEx rolled out a completely new handheld system. Dropping most of the proprietary technology, the PowerPad was developed by Motorola to run the Microsoft Pocket PC operating system. More important, the system uses the GPRS cellular wireless service from AT&T. It is designed to completely eliminate paperwork, saving couriers 10 seconds at each stop. Which adds up to \$20 million in annual savings when you factor in the 3.5 million packages delivered a day (Brewin November 2002). GPRS has data rates between 20 and 40 kbps,

which exceed the 19 kbps on the older FedEx network (Brewin March 2002). The PowerPad reduces errors by automatically checking Zip codes. It can print labels through a label printer in the truck that is connected by Bluetooth radio. It even checks the weather at the destination so that the driver can notify the shipper of any potential delays. The PowerPad contains a third radio transmitter so that it can connect via WiFi to the networks at the FedEx hub.

FedEx runs several fully automated sorting hubs. Packages are delivered at one end, then passed on conveyor belts through weighing stations and sorted by ZIP code to be delivered at the other side of the DC onto waiting trucks. Ken Spangler, CIO at FedEx Ground, notes that automation is required to handle the 7,500 packages an hour. He also noted that “Over the last five years, we have been on a mission to get faster and faster. We re-engineer and speed up our lanes an average of twice a year, and sometimes more frequently than that. Over 80,000 ZIP-code-to-ZIP-code lanes are at least a day faster now” (King 2011). An interesting twist to the FedEx DC is that vendors are required to provide a standard interface, instead of proprietary connections. That way FedEx can combine systems from different vendors to achieve the best results at the best prices. FedEx developers create the overall software and can control the performance.

Services

Providing global shipping is considerably more complex than simply transferring a package. Each nation has hundreds or thousands of different rules on tariffs and procedures for importing items. Increasingly, FedEx customers were asking for information on how to ship globally. FedEx began a project in 1997 and launched it in August 2000. Originally, the Web-based system arranged shipments between the United States, Canada, the United Kingdom, Hong Kong, and Puerto Rico. It was then expanded to 20 nations. The system runs on an Oracle database and provides the rules and appropriate import and export forms needed. It also lets shippers know about restrictions, embargoes, and licensing requirements. In February 2001, the Global Trade Manager system began computing government fees, duties, value-added tax (VAT), and other charges so that shippers can quickly estimate the total costs. Robert B. Carter, head of the division, notes that “Global Trade Manager makes it easier to ship internationally, which can be an intimidating experience. It allows customers to do import/export documentation in a straightforward fashion....We are giving them [clients] access to technology they wouldn’t otherwise have” (Rosencrance 2002).

In 2003, FedEx partnered with Cap Gemini Ernst & Young to offer detailed logistics services to companies of any size. Many large companies already outsource freight transportation (67 percent), and 42 percent outsource management of their distribution centers. But most firms still maintain control over the rest of the decision aspects of logistics and purchasing (Bacheldor 2003). The new offering from FedEx and Cap Gemini integrates software for transportation-management, fulfillment management, supply chain event management, and business-to-business hub management. With the integrated tools, customers can examine and track shipments and warehouse or distribution center handling at the stockkeeping unit (SKU) or even serial number level. They will be able to see the movement of all products and obtain reports on all aspects of shipping, even though the entire process will actually be handled by FedEx. Douglas Witt, president of FedEx Supply Chain Services, notes that the system is important because “lack of visibility is a major issue for a lot of customers” (Bacheldor 2003).

With the global and domestic presence of FedEx, U.S. government police agencies often turn to the company for information about deliveries and customers. Prior to 2001, FedEx generally declined to cooperate without court orders—fearing retribution against employees and concern about customer privacy. Since the terrorist attacks of 2001, FedEx now encourages its employees to watch for potentially dangerous activity and it works with the FBI and other agencies. FedEx provides access to its international customer databases, including credit-card and payment data. The company also has the legal right to open and inspect any customer package at will—a power not even granted to police. Fred Smith, the founder, ordered the cooperation and sees it as an important service to society. Plus, the cooperation helps prevent delays in package deliveries. FedEx also created a 10-man internal police force that is recognized by the state of Tennessee—giving the company access to police databases and the only private seat on the FBI terrorism task force (Block 2005).

Strategy

Battling head-to-head with UPS and forging entirely new ways of doing business have forced FedEx to focus on strategy. Technology plays a key role in its plans. But Smith is understandably cautious. He shies away from huge projects designed to alter everything. Instead, he says, “We try to do a lot of work on the front end, divide things into bite-size pieces, do things in a more evolutionary way” (Foley February 2, 2004). Exactly how Kinko’s fits into that strategy is not completely clear yet, but it will probably take time for the value to be realized. FedEx CFO Alan Graf notes that “it diversifies our business. Kinko’s is the back office for hundreds of thousands of businesses” (Foley February 9 2002). Fred Smith notes only that it will enable both companies “to take advantage of growth opportunities in the fast-moving digital economy.” Jim McCluskey, a FedEx spokesman, adds that it will enable FedEx to “push information electronically” for its clients (Brewin January 2004). If nothing else, the stores will raise the visibility of FedEx even higher—providing a convenient location for small business services and drop-off points for FedEx shipments. With the stagnant economy, a shift to digital documents, and a tight battle with UPS, the market for overnight delivery has leveled. FedEx is looking to the ground and international shipping to carry its growth forward. Furthermore, the company has to focus on costs to improve profits (Foley January 2004).

In an interesting strategic arrangement, FedEx has two agreements with the USPS that run through August 2008. FedEx uses its planes to help carry Priority, Express, and First-Class Mail as well as the USPS international delivery air service. The second agreement enables FedEx to place 5,000 drop boxes at U.S. Post Offices in 340 metropolitan areas (2006 Annual Report).

Faced with the economic slowdown and rising fuel prices in 2006 and 2007, FedEx made few changes in strategy. However, in 2007 the company announced that it would spend \$3.5 billion in fiscal 2008 to build new shipping hubs in China (Machalaba 2007). Most of the expansion in FedEx has been related to services in China and India (2006 Annual Report). On the Kinko’s side, FedEx has a deal with Adobe to include a button in Acrobat Reader that sends PDF files to any selected Kinko’s store for printing. Users can print documents at an office near a desired U.S. destination and have them delivered for a fee. Initially, 133,000 customers had signed up for the service (Golden 2007).

Teamwork

One of the challenges with growing through mergers is integrating all of the information systems. To maintain the existing efficiencies, FedEx chose to run the new divisions independently. But that means managers do not have a single view of customer data, and customers have to check multiple locations to find their shipping information. In 2004, FedEx began development of its Customer Fusion database. The package will pull data from all of the independent systems and make it available from a single point. The product is a computer messaging system that can talk to all of the individual applications. Larry Tieman, chief architect for the project, notes that “the message bus allows us to loosely couple the business application, apply the proper business rules, and build a unified application layer” (Sullivan 2004).

The company also created an integrated system for international managers in 2001. The international strategic information system (ISIS) uses a Web-based front-end query tool to integrate data from internal legacy systems for marketing, sales, and inventory. It then consolidates information for local agents into an Oracle database. The agents can then query the database and identify patterns such as the amount of shipping by industry. A key aspect of the system is to provide business intelligence data to local agents and FedEx managers. By sharing the same data and analysis, FedEx can better help the agents meet revenue targets (Dash 2001).

Because FedEx develops most of its own applications, it is concerned about software development processes. As it explores options to outsource development and hire teams from off-shore development firms, the company needs a method to test software code. In 2006, FedEx developed a program with the University of Memphis to find new methods of testing software, including multistage system testing, risk-based testing procedures, and an expert system for systems testing (Krill 2006).

FedEx encourages teamwork learning throughout the IT organization. The company has a job swap program, where employees can request to trade jobs for a certain length of time. The swap can include temporary assignments in other countries. The technique provides employees with a broader picture of the business, a chance to see other problems, and to share approaches to solving them (Pratt 2007).

Questions

1. How does FedEx use information technology to improve teamwork and deliver packages more efficiently?
2. How can FedEx integrate data from its diverse companies to improve teamwork, without replacing all of the individual systems?
3. Why is wireless technology so important to FedEx?

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Case: United Parcel Service

The UPS (ticker: UPS) Web site has details on its history and growth. UPS began in Seattle in 1907 as a messenger service, with most deliveries made on foot by teenage boys. In 1913, the fledgling company acquired its first car: a Model T Ford. Merging with a couple of competitors, the company renamed itself Merchants Parcel Delivery and began focusing on delivering merchandise from the retail stores. The company also was the primary carrier of special delivery packages in Seattle for the U.S. Post Office. In 1919, the company expanded to Oakland, California, and adopted its current name: United Parcel Service. After World

War II, retail shopping changed, as customers drove to malls and carried their own packages. UPS fought to provide common-carrier service in new areas, including Chicago. Expanding into competition with the U.S. Post Office raised regulatory issues, and the company fought many legal battles to win the right to deliver packages. In 1953, UPS began shipping cargo on existing airline flights. Yet package delivery had to remain inside a state to avoid regulation by the Interstate Commerce Commission (ICC). Fighting for three decades, the ICC finally granted UPS permission to deliver packages between Montana and Utah—in 1975. By 1985, the company was shipping packages by air to all 48 contiguous states and, in 1988, started its own airline. In 1993, to track the huge number of drivers and deliveries, and to keep up with FedEx, UPS introduced the handheld Delivery Information Acquisition Device (DIAD). In 1999, UPS joined the New York Stock Exchange.

Operations

Fighting competitors from day one, UPS pioneered efficiency in delivery—emphasizing the need to hold down costs and prices. Although UPS headquarters are in Atlanta, it runs its operations through its main Worldport hub in Louisville, Kentucky. The 4 million-square-foot facility handles over 100 planes a night, pushing 600,000 packages a day through the hub. Because of a limited labor pool and the desire to hold wages down, the facility emphasizes automation. It runs on almost 14,000 computer devices, including 30 terabytes of online storage and 5,500 miles of fiber-optic cable. It uses 122 miles of conveyor belts to move packages and sort them by bar code scanners as they fly by (Brewin April 2004). Most of the individual packages (93 percent) are identified by special bar codes. When shippers fill out the shipping labels on the UPS Web site, the system notifies UPS about incoming packages. Twice a day, this incoming information is used to create a sort plan that configures the hub to match the expected packages. The software Flexible Lineup Editor reorganizes the loading and unloading positions to optimize the package transfers. Packages are only touched twice by humans: once to be loaded onto the conveyor belts and once to be taken off and put into shipping containers (Brewin April 2004).

UPS also pays close attention to its drivers and their routes. Drivers are often monitored in terms of performance, and managers share tips on how to improve. In 2003, the company added a new software routing tool to plan the routes. Since most customers provide pickup data early in the day, the computer can plan the optimal route, speeding up the drivers while they make more stops and travel fewer miles. UPS CIO Ken Lacy estimates the system will reduce fleet miles in the United States by more than 100 million miles a year, saving about 14 million gallons of fuel (Brewin September 26, 2003).

UPS had thought about creating a massive routing system since at least the mid-1990s. The catch is that many people thought the problem was too big to solve. In computer science terms, the problem is called NP-complete because there is no perfect solution to analyze the entire delivery problem other than to examine every possible choice. And, with trillions upon trillions of options, no machine could find the perfect solution. Operations research specialists studied the problem and found ways to narrow it down to just examining feasible solutions that are close to optimal. With research and faster machines, they managed to reduce the time to find a solution from 90 days down to three hours. By optimizing its primary routes, UPS was able to cut a day off its guaranteed delivery times for

some routes, such as reducing shipping time from Los Angeles to New York from four days to three (Bacheldor 2004).

In 2003, UPS began redesigning its handheld system to the DIAD IV terminal. The terminal contains a color screen and runs on Windows CE. In addition to the bar code scanner, it includes a global positioning system (GPS) receiver. It uses Bluetooth wireless to connect to a label printer in the van. When parked at the hub, the system connects to the local area network via a WiFi wireless connection. On the road, it uses a built-in cellular modem, so that drivers can connect to the network and provide immediate information to customers. Ultimately, the system will be able to use its Bluetooth radio to connect directly to customer computers. The GPS system will be particularly valuable in Europe, where drivers handle less frequent trips. In the United States, many companies require daily deliveries and pickups to fixed locations. But the GPS system will also help route drivers for last-minute pickup requests (Brewin September 26, 2003). In 2005, after two years of development, the DIAD IV was rolled out to all 70,000 UPS drivers. The company spent \$22 million to develop the new devices based on Symbol technology and said it would spend \$127 million to deploy them globally (Weiss 2005). At the same time, the company reported that it was experiencing problems with its package-flow technology. The analytical system was designed to work with GPS systems to analyze routes and determine the most fuel-efficient directions and loading instructions. Full implementation was projected to be delayed by a couple of years and the system was estimated to save \$50 to 100 million in fuel costs each year—down from the \$700 million originally projected (Rosencrance 2005).

By 2006, UPS was delivering an average of 15 million packages a day around the world. But UPS still focuses closely on keeping up with FedEx. Using the Internet, UPS is working to collect package data earlier and applying it to loading trucks. When customers fill out the online form to generate a package label, the information is sent to one of the UPS hubs. A computer system sets up a delivery route and identifies where each package should be loaded in the truck, with earlier deliveries stored in the front of the truck. UPS reports that drivers have gained enough time to make an additional seven to nine stops per shift—on top of the 100 pickups and deliveries they handled before the tool. Integrated with the new DIAD IV, the system sounds an alarm if a driver forgets a package or stops at the wrong address (Dade 2006). The technology also enabled UPS to introduce a new service in 2007—delivery intercept. For a \$10 fee, senders can use the Web site to stop the delivery of a package or reroute it to a new destination. UPS suggests the service might be useful if a sender realizes at the last minute that the wrong data or package was sent (press release March 26, 2007).

Capital expenditures at UPS were relatively stable over time. In 2006, the company spent \$720 million on buildings and facilities, \$1.15 billion on aircraft and parts, \$831 million on vehicles, and \$384 million on information technology. In total, the company spends about \$1 billion a year on IT costs, including labor (2006 Annual Report).

In 2010, the UPS Web site was processing more than 26 million package tracking requests a day. But technology is also heavily used in operations to set the most efficient package loading and to define routes for delivery trucks. The handheld technology introduced in 2008 includes telematics, or information about the truck including GPS and automotive sensors that include engine RPM, braking, and speed. The goal is to fine-tune routing as well as track maintenance (2010 Annual Report). The new system took 10 years to design and build and focused on

seemingly simple things such as loading trucks more efficiently. The automated system puts tags on boxes so loaders know exactly which order to load them on the truck. Developers also had to find ways to handle poorly-entered data (Mitchell 2008).

Integrated Services

In 2001, UPS purchased the entire chain of 4,000 MailBoxes Etc. stores and renamed them The UPS Store. The chain provides UPS with local contact points for individual and small business pickups. But most of the stores are still run as franchises. The stores are eliminating the need for paper shipping forms. Customers simply enter the data into a kiosk PC (or have the clerk enter it), and it prints out the bar-coded label. In 2003, UPS took the interesting step of testing public-access Wi-Fi in 66 of the retail stores in Chicago. Customers would pay either an hourly or monthly fee to connect their own laptops to the Internet through the WiFi connection. The demand for this service is still uncertain (Brewin September 11, 2003).

In 2002, UPS introduced a Web-based shipping solution to large customers with offices in multiple locations. The system enables employees to ship a package by simply entering the details in a Web site. The system automatically bills the company and provides a comprehensive report to managers. Best Buy is using the system to make it easy for employees in its stores to ship packages to other Best Buy locations or to send them directly to customers. Jim Hay, general transportation manager of small package solutions for Best Buy, observes that because employees do not have to handwrite the labels, “this saves 15 minutes per user per package. The biggest area of savings is in time and (in fewer) lost and misrouted packages due to poor handwriting or a bad address” (Rosencrance March 2002).

UPS began offering a useful service in early 2003 for exporters and importers. The company launched an electronic payment system called UPS Exchange Collect. Basically, UPS collects the money from the recipient/customer. Sellers are free to expand to new markets with unknown customers with minimal risk. UPS drivers will only deliver the product when they receive payment. When the shipper sends an item, the recipient is notified electronically. UPS then collects the money and delivers the package. The money is electronically sent to the seller. The system provides huge gains over the current system. Currently, shippers often wait 90 days for payment—and still run risks that the buyer will not pay. UPS will transfer the funds within 10 days (Rosencrance 2003).

UPS also provides expertise in shipping products internationally—in terms of handling forms and getting packages through customs. By identifying and controlling every package that UPS carries, the company’s Worldport hub qualifies as a controlled building for the customs bureau. More important, the product information database is accessible to customs agents, who can scan it for potential problems. Any suspect packages are instantly rerouted within the Worldport hub to the customs office for detailed inspection (Rosencrance March 11, 2003).

In 2004, UPS introduced new tools for customers to use the system as a complete logistics solution. The Quantum View Manage software makes it easy for customers to identify all shipping information. In particular, customers can see all packages as a group, without needing to enter every tracking number. They can see exactly where packages are located, along with any reasons for delays. The system can even trigger alerts if problems arise and notify customer service automatically, or use automated delivery notices to send electronic invoices (Rosencrance 2004).

UPS demonstrated the true power of its integrated logistics system in 2004 by offering a new service to Toshiba. Toshiba outsources all laptop repairs to UPS Supply Chain Solutions. Broken laptops are sent by UPS to its Louisville hub where UPS engineers diagnose the problem, fix the laptop, and return it to its owner. Mark Simons, general manager of Toshiba's digital products division, notes that diagnosing and repairing computers is actually the easy part. Instead, "moving a unit around and getting replacement parts consumes most of the time. The actual service only takes about an hour" (James 2004). UPS has been helping Toshiba with repairs by performing an initial inspection since 1999. UPS has also been servicing Lexmark and Hewlett-Packard printers since 1996.

Questions

1. Does it make sense for UPS to move into the computer repair business?
2. How does the Quantum View system provide new revenue or profits for UPS?
3. How does UPS use the Internet to reduce costs?

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Case: DHL/Deutsche Post

DHL has an interesting history. The company was started and driven by Larry L. Hillblom who loved to fly—particularly among the Pacific islands. Because of this love, DHL focused largely on international shipments and became a leader in Southeast Asia. After Hillblom died in a plane crash in 1995, a huge number of East Asian and Pacific Island women came forward and claimed that they had had children with Hillblom, and that he promised to support them. After hundreds of lawyers and several court battles, four children were shown to be his heirs by DNA testing, but several others received settlement money as well (Metropolitan News-Enterprise 2003). In 2003, DHL was purchased by Deutsche Post. With its strength in Europe, Deutsche Post and DHL provide a strong international solution to shipping (company Web site). In 2004, DHL announced a major commitment to expanding its operations in the United States. In addition to its international ties, the company wants to focus on competing with UPS and FedEx through highly visible trucks and a national marketing campaign (Press Release 2004).

DHL has one of the largest customs-clearance systems of any of the shipping companies. With over 8 million trade rules, the WorldWide Clearance System (WCS) helps millions of packages clear customs throughout Asia and Europe. The process is largely automatic for the shipper. Most items are shipped without intervention. If a problem arises, the system fires a message back to the shipper to handle it. As a result, the customer does not have to constantly monitor the process (Rosencrance 2003).

By the time the recession hit in 2008, DHL had mostly pulled out of local delivery service in the United States. The company is still big in Europe and Asia and it still delivers packages to and from the U.S., but it no longer runs head-to-head against FedEx, UPS, and the USPS in delivering within the United States.

Teamwork

DHL does not have the huge amount of money to spend on IT that UPS and FedEx do. Consequently, it is rarely a leader. But it has made some smart moves in communications networks, and by waiting for prices to drop, it now has the ability to compete with the giants. Alan Boehme, director of business planning in 1998, noted that “the nice thing is Internet technology and the change it enables—inexpensive communication on an open, standards-based network—is like David’s rock. I’m not going to say that DHL is going to kill the giant, but Internet technology is the great equalizer for any business” (Sliwa 1998). Actually, even before the Internet took off, DHL made some smart investments. In 1988, the company built a TCP UNIX-based network to connect its offices around the world. Their package tracking data is routed on the internal frame-relay based network. It uses object-oriented technology to integrate data regardless of whether it came from the Web site or the automated phone system. The worldwide network also connects programmers and developers so they can share data electronically and work together even when they are scattered around the globe (Sliwa 1998).

In 2004, DHL expanded its operations to provide radio-frequency identification (RFID) technology and support to its customers. By tagging all packages, the company helps suppliers meet RFID requirements throughout Europe. As worldwide standards are developed, the company wants to expand the program globally. Clems Beckmann, managing director of corporate development at Deutsche Post, notes that “Our goal is to become the core logistics supplier for RFID services worldwide” (Sullivan 2004). In 2007, DHL slowed down the move to RFID

in the U.S. noting a lack of demand for the service and the \$1 billion cost. The company is a leader in Europe, providing RFID tags and data tracking for Metro AG. The company believes it can add value to shipments of cold perishables such as seafood, and is trying to convince customers to adopt it (Weier 2007).

Information Technology

One problem that DHL experienced in 2001 was that its pricing was too difficult for customers. It could take days for a sales representative to quote a price, and as long as two to three weeks to get final approval from management. Lacking the resources to develop the system themselves, DHL turned to Metreo Inc to automate the process. Going live in 2002, the system provides sales representatives with real-time customer data and pricing information based on the customer's shipment. Tied to the corporate network, the salesperson can suggest an optimal price and receive approval almost immediately, sealing the deal before the customer can be coaxed away by FedEx or UPS (Rosencrance 2002).

In 2002, DHL realized that it needed a new data center to consolidate its operations. Built in Scottsdale, Arizona, the system connects centers in Kuala Lumpur, Malaysia and London. DHL's CIO, Steve J. Bandrowczak, noted that "DHL wanted to create a seamless single offering to our customers, like a single invoice or a single Web interface. In order to enable that global logistics business vision, we had to consolidate our IT infrastructure, which included the data center, our network backbone and our key global applications" (Rosencrance 2004).

Merging Airbone with DHL in 2003 was a challenge for the IT departments. Airborne's system were designed to handle high data volumes rapidly and reliably. DHL, headquartered in Belgium, focused on ground transportation and the complexities of international shipping. DHL also heavily used India's Infosys to integrate IT systems, ultimately resulting in layoffs on the Airborne development team. The Airborne applications, centered in Seattle, were largely based on legacy IBM CICS and DB2 systems. The DHL Americas systems ran in Scottsdale on Hewlett-Packard servers running Unix and Oracle databases. In the first pass, integration required selecting key applications from each platform to keep the systems running, but ultimately, operations were moved to Scottsdale. In 2006, the company began searching for a new integrated system (Whiting 2006).

In terms of development of applications, because of its global nature, DHL turned to offshore development early on. By hiring programmers in the UK, India, and Asia, it is able to develop critical applications throughout a 24-hour day. Colum Joyce, global e-business strategy manager based in Brussels, observed that "for us, large-scale development is not a hothouse environment, it's an everyday reality" (Gilhooly 2001). Using the time differences around the world, development effectively continues around the clock—something you cannot do very well if everyone is located in the same time zone. Plus, the lower turnover rates and low salaries for skilled overseas programmers help hold costs down. Finally, the multilingual and multicultural programmers can tailor the applications to specific nations.

DHL has generally been behind the curve in adopting technology. For example, it lags UPS and FedEx in providing wireless tracking devices to its drivers. Only in late 2006 did the company provide Web-based tools to customers to enable them to track all of their shipments (Rosencrance 2006).

Similar to many companies, DHL faces challenges in hiring and retaining talented IT workers. The company's 1,200 U.S. IT workers had a turnover rate of

about 9 percent a year. After surveying workers, CIO Steve Bandrowczak was told that they wanted greater recognition of their work. So he created the “carrot a day” philosophy where workers will be rewarded with items from verbal praise by a manager at a staff meeting, to an e-mail from a senior IT executive, to gift certificates (Hoffman 2005). At the end of 2005, Bandrowczak was named CIO of Lenovo and in early 2006, DHL hired Maryann Goebel, formerly from GM, as the CIO for the Americas and Pacific region.

Deutsche Post faced many challenges as it grew through acquisitions. Each company that it acquired had different forms of accounting and different ways of measuring progress. To standardize the accounting and reporting, the company created the Common Reporting System (CREST). Instead of focusing on cutting costs, the CREST system emphasized sharing data in a standardized format. It is based on the SAP platform and uses an Oracle DBMS to handle the data requirements. The Web-based application is used across 200 countries and provides consistent basic financial data to managers in each area and at corporate headquarters (<http://www.cwhonors.org/viewCaseStudy.asp?NominationID=245>).

Questions

1. How do RFID tags help Deutsche Post offer new services to customers?
2. What benefits does Deutsche Post gain by using offshore programmers?
3. How does the Deutsche Post information system make it easy for small businesses to ship internationally? Why is this important?
4. How can the Internet enable DHL to compete equally with FedEx and UPS?

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Case: United States Postal Service

The U.S. Postal Service (USPS) has been around for centuries. Sometimes hailed, sometimes maligned, it has struggled to turn a profit. Technically, it is a government agency, but it is not funded by Congress. In fact, the USPS provides free stamps to members of Congress. In exchange, the USPS has a federally mandated monopoly on delivering mail to individual mail boxes. It is also required to deliver first-class mail to any U.S. address for a fixed price. Letters sent to an address down the street cost the same as letters delivered to a rural town in Alaska. Rate changes must be submitted to and approved by a political Postal board of governors. With the advent of low-cost long-distance phone calls and e-mail, the demand for first-class letters has dropped for several years. In 2005 and 2006, the quantity of junk mail carried surpassed the delivery of first-class items (Hall 2007). In response, the Postal Service has continued to increase the price of first-class stamps—driving demand even lower. Most of the mail carried consists of advertising pieces charged at varying rates below first-class postage, but even those rates were increased by as much as 40 percent in 2007. Those rates have increased to the point where some advertisers are testing hand-delivered flyers (Chabrow 2004 and usps.gov).

In 2010 and 2011, the USPS is still struggling to adapt to a digital world. Demand for mail continues to drop, so revenue is declining, and losses are increasing. To compensate, the USPS continues to increase prices and is contemplating reducing services by dropping Saturday mail delivery. In 2011, the agency suspended its employer contribution to the Federal Employee Retirement System because it did not have enough money. The Postal Service was \$8 billion in the red for 2010 and risked running out of money before the end of 2011. The agency had already reduced staffing by 110,000 and cut costs by \$12 billion, but it was still not enough to keep it alive (Wall Street Journal 2011). From 2001 to 2010, first-class mail volume dropped from 103.7 billion to 78.2 billion pieces (www.usps.com).

Technology

The USPS relies heavily on outside contractors to provide information technology and other infrastructure. For example, for years, the USPS has relied on Lockheed Martin to provide mail handling systems. Several mail-processing centers are run by outside contractors. In October 2004, fearing problems with the bankruptcy filing of MCI, USPS signed a long-term contract with Lockheed Martin to provide telecommunications services as well. At the end of 2006, after some apparently bad experiences, USPS cancelled the contract and returned to MCI as its primary provider (Marsan 2006).

For the most part, the USPS lacks the delivery tools of the giants FedEx and UPS. Workers still sort and deliver individual pieces of mail on fixed delivery

routes. But, the task of the workers is quite different because they almost always have to stop at every mailbox every day. Hence, the potential gains from tracking and scheduling are minor. However, in 2003, the organization spent \$20 million to develop logistics software to aggregate ZIP code data and map out how to load packages on trucks more efficiently (McDougall 2003).

The mail system was the first to support person-to-person messages across the U.S. and eventually the globe. Consequently, it was also a primary method of propagating scams. The Postal Service's Postal Inspection Service was created in 1909 to investigate various levels of fraud and scams. Various federal laws were enacted over the years to make specific scams a federal crime. You might think the Inspection Service would have no role in today's Web-based e-mail scams. However, any activity, such as mailing a check, that uses the mail system falls under its jurisdiction. If someone orders an item via the Web and it is delivered through the Postal Service, its inspectors can take charge—as happens often in pornography and drug cases. The Service has been involved in tracking several major cyber-scams and attacks (Greenemeier 2007).

With 700,000 employees, the USPS needed a way to train its employees on procedures and rules. For years, it used an internally-developed system. In 2003, USPS purchased a commercial testing learning-management system from Thing Learning Solutions. Robert Otto, VP of IT, was primarily impressed with the data-capturing capabilities of the tools that validate an employee has completed the course. He said that “we had a hole in the administrative end of managing our training” (George 2003).

Like any other organization, the USPS needs an accounting system to track expenses and receipts. In 2004, the Postal Service began a process to replace its decades-old custom-built applications with off-the-shelf software. In particular, it chose to install Oracle's ERP system beginning with the general ledger. The USPS had already installed Oracle's Web-based time-and-attendance application in 2001. A Retek Inc. retail accounting software package collects sales data from the 40,000 Postal Service branches and posts them to the Oracle general ledger. Using the Oracle system, the Postal Service was able to reduce its accounting clerical staff by 1,000 positions, reducing expenses between \$300 million to \$1.5 billion annually in 80 districts. The organization planned to implement an SAP HRM application to handle benefits and promotions data in 2007 (Greenemeier 2005).

In October 2009, the government accounting organization (GAO) evaluated the technology for the Post Office Intelligent Mail Full Service Program. This program was created in 2003 to use barcodes to track mail. The basic conclusion was that the program was only partially finished and that the rest of the project was unlikely to be completed (GAO-10-145).

Some people have tried to search for ways to keep the traditional Post Office alive, but the task seems grim. The Postal Regulatory Commission notes that the Postal Service wants to close thousands of post offices. John Callan, a mailing industry consultant organized conference for June 2011 to help find a future for the Postal Service. He noted that “I think we need to stage a serious conversation about the future, so that the folks on the Hill can understand what's going on and those of us in the postal industry can learn how we would do something differently” (O'Keefe 2011). Other people and government oversight agencies are even bleaker. The agency relies on first-class mail to fund its operations, but first-class mail volume is plummeting. Two complicating factors are that the union contract forbids layoffs and Congress will not allow closing a Post Office for economic

reasons. Through privatization, European postal services have used these tactics to survive, but they are not yet an option in the U.S. (Leonard 2011).

A few people still find the Postal Service valuable—particularly for package shipping. The prices are competitive and often lower than the alternatives (FedEx and UPS). The Postal Service also offers electronic postage. It is now relatively easy to purchase postage online and print an electronic “stamp” on an envelope directly from a PC printer (Khechfe 2010, but note he works for a company that creates electronic postage).

Questions

1. How does the USPS use its Web site to sell services?
2. When was the last time you mailed a letter via first-class mail?
3. What happens if USPS goes under?

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Summary Industry Questions

1. What information technologies have helped this industry?
2. Did the technologies provide a competitive advantage or were they quickly adopted by rivals?
3. Which technologies could this industry use that were developed in other sectors?
4. Is the level of competition increasing or decreasing in this industry? Is it dominated by a few firms, or are they fairly balanced?
5. What problems have been created from the use of information technology and how did the firms solve the problems?