



This is “Communication Technologies”, chapter 6 from the book [Beginning Project Management \(index.html\)](#) (v. 1.1).

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Chapter 6

Communication Technologies

Projects require teamwork, and team members must communicate with each other in a variety of ways. The documents they produce must be collected, distributed, and stored in an appropriate manner to assure timely and accurate communication between team members. This process is often assisted by a variety of technologies and computer software products. Communication technology can facilitate faster and better communication, or it can become a barrier if the technologies are not well understood and applied appropriately.

6.1 Types of Communication

LEARNING OBJECTIVES

1. Identify characteristics and examples of synchronous communication.
2. Identify characteristics and examples of asynchronous communication.
3. Identify questions to answer when considering new communications technologies.

Completing a complex project successfully requires good communication among team members. If those team members work in the same building, they can arrange regular meetings, simply stop by each other's office space to get a quick answer, or even discuss a project informally at other office functions. Many projects are performed by teams that interact primarily through electronic communication and are, therefore, called virtual teams. *Business Dictionary*, s.v. "Virtual Team," <http://www.businessdictionary.com/definition/virtual-team.html> (accessed January 27, 2010). To avoid miscommunication that can harm trust and to include team members in a project culture, the project team needs a plan for communicating reliably and in a timely manner. This planning begins with understanding two major categories of communication.

Synchronous Communications

If all the parties to the communication are taking part in the exchange at the same time, the communication is synchronous. A telephone conference call is an example of synchronous communication. When the participants are not interacting at the same time, the communication is not synchronous, or asynchronous.

The following are examples of synchronous communications:

- *Live meeting*. Gathering of team members at the same location.
- *Audio conference*. A telephone call between two individuals or a conference call where several people participate.
- *Computer-assisted conference*. Audio conference with a connection between computers that can display a document or spreadsheet that can be edited by both parties.
- *Video conference*. Similar to an audio conference but with live images of the participants. Some laptop computers have built-in cameras to

facilitate video conferencing, as shown in [Figure 6.1 "Video Conferencing by Laptop"](#).

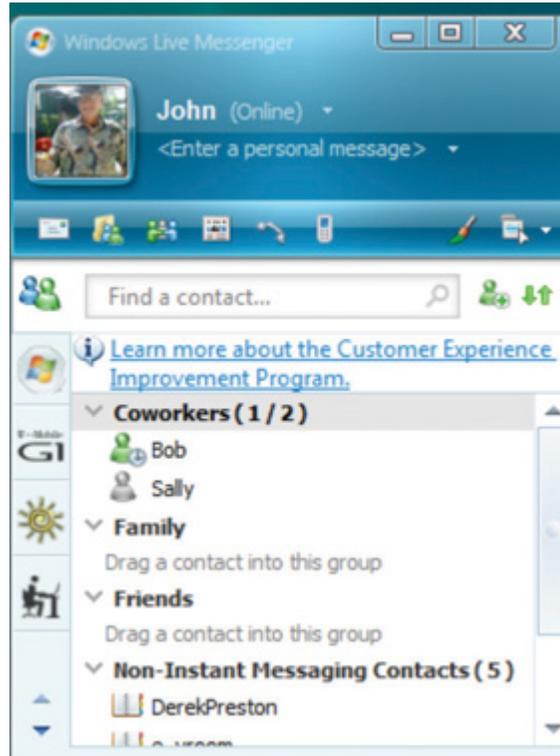
Figure 6.1 Video Conferencing by Laptop



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- *IM (instant messaging)*. Exchange of text or voice messages using pop-up windows on the participants' computer screens, as shown in [Figure 6.2 "Instant Messaging Pop-Up Window"](#).

Figure 6.2 Instant Messaging Pop-Up Window



- *Texting*. Exchange of text messages that are 160 characters or fewer between mobile phones, pagers, or **personal digital assistants (PDAs)**¹—devices that hold a calendar, a contact list, a task list, and other support programs. See Figure 6.3 "Texting via Cell Phone".

1. Device that holds a calendar, a contact list, a task list, and other support programs.

Figure 6.3 *Texting via Cell Phone*

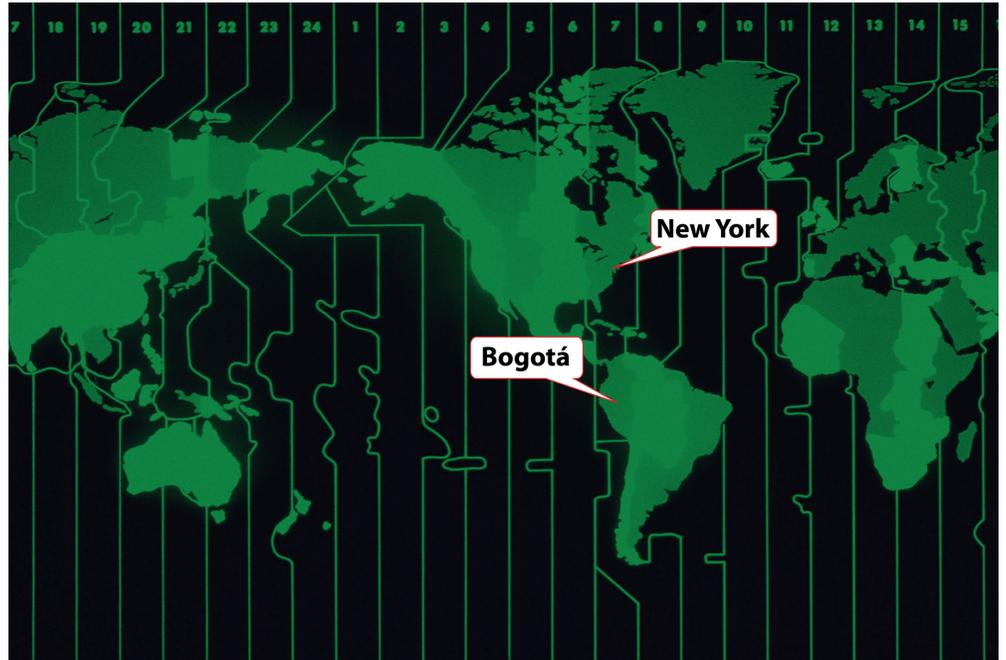


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Time Zones

The worldwide communication network makes it possible to assemble project teams from anywhere in the world. Most people work during daylight hours, which can make synchronous meetings difficult if the participants are in different time zones, where they start, end, and take meal breaks at different times. It can be an advantage in some circumstances. For example, if something must be done by the start of business tomorrow, team members in Asia can work on the problem during their normal work hours while team members in North America get some sleep.

Figure 6.4 World Time Zones



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As the earth turns, the sun appears to move across the sky from east to west. Local noon occurs when the sun is at its highest position in the sky. Cities and countries to the north or south of each other all observe local noon at the same time. For example, noon in New York occurs at the same time as it does in Bogotá, Colombia, in South America. Be aware that many well-educated people in the United States think of South America as directly south of North America. As you can see in [Figure 6.4 "World Time Zones"](#), most of South America is one or two time zones east of the United States.

To prevent confusion between a.m. and p.m., times are given using a twenty-four-hour clock. Noon is 12:00 and 1 p.m. is 13:00, and parts of an hour are divided by colons. For example, 13:25:21 is thirteen hours, twenty-five minutes, and twenty-one seconds.

Local Time

Local time is compared to the time zone that is centered at the historically significant naval observatory at Greenwich, England. The time at that location is

Greenwich Mean Time (GMT)². More recent references use UT for **Universal Time (UT)**³ instead of GMT.

Conference Call between New York and Paris

A project manager in New York is five time zones west of the reference zone, so the time is given as UT -5 (or GMT -5). If it is noon in the reference zone, it is 7 a.m. (five hours earlier) in New York. The manager would like to contact a project team member in Paris, France. Paris is one time zone west of the reference zone (UT +1 or GMT +1). If it is noon (12:00) in the reference zone, it is 13:00 (1 p.m.) in Paris.

This means that there is a six-hour difference between New York and Paris. If the project manager waits until after lunch to place the call (1 p.m. in New York), it might be too late in the day in Paris (7 p.m.) to reach someone.

Asynchronous Communications

Getting a team together at the same time can be a challenge—especially if they are spread out across time zones. Many types of communication do not require that the parties are present at the same time. This type of communication is not synchronous; it is asynchronous. There are several choices of asynchronous communications.

Mail and Package Delivery

Many companies prefer that final contracts are personally signed by an authorized representative of each party to the agreement. If several signatures are required, this can take weeks to get all the signatures if the contracts are transferred by the postal service. If this process is holding up the start of the project, you can use an overnight delivery service to minimize the time spent transferring the documents.

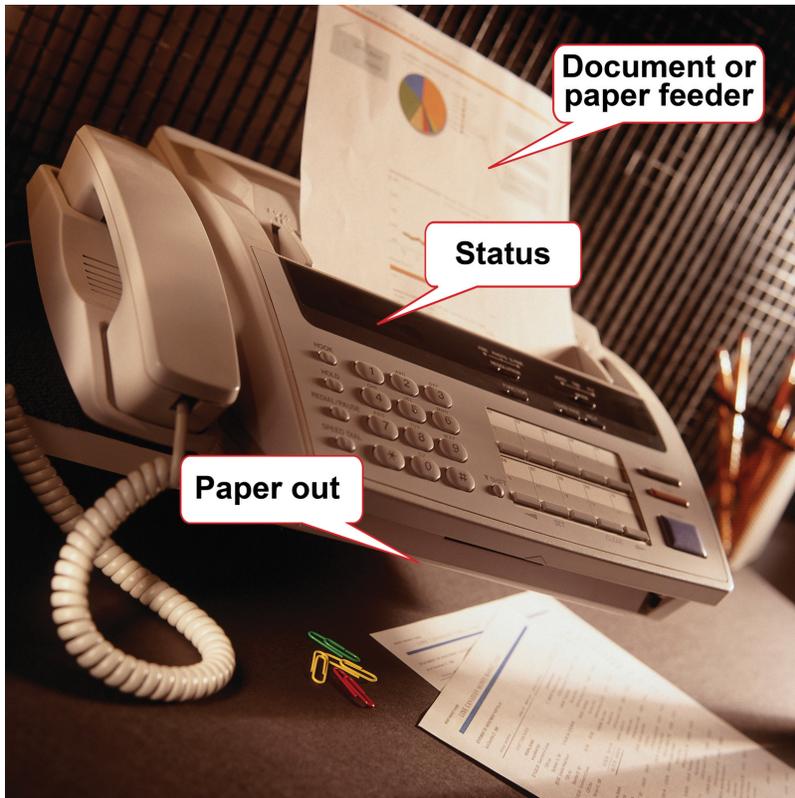
Fax

A **telefacsimile (fax) machine**⁴ is a device that scans a document a narrow band at a time converting it into tones that can be conveyed over traditional telephone lines to a receiving device that reproduces a **facsimile**⁵—exact duplicate—of the document. A fax machine typically has a paper feeder that can be used for feeding

2. Time zone system historically based on the naval observatory at Greenwich, England.
3. Time zone system that is compatible with GMT but without the historical reference.
4. Device that scans a document and converts it to electronic signals that can be transmitted by telephone to another fax machine, which can reproduce the original document.
5. A duplicate (see telefacsimile).

multiple-page documents, a telephone key pad and handset, and a status display, as shown in [Figure 6.5 "Fax Machine"](#).

Figure 6.5 Fax Machine



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Transmission rates of fax machines are typically limited by the use of traditional telephone lines. The data transmission uses the same method as a dial-up computer modem. A **Group 3 fax machine**⁶ has a maximum data rate of 14.4 kilobits per second (Kbps), but if the phone connection is poor, it will drop down to lower speeds automatically until it can establish a reliable connection between machines.

The Group 3 fax machine digitizes data in a form that is compatible with computers and the fax function is often integrated with other computer functions. A multifunction device, such as the one shown in [Figure 6.6 "Multifunction Printer, Scanner, Fax, and Copier"](#), can scan a document and save it as an image, send it as a fax, or print multiple copies.

6. Model of fax machine that uses digital scanning and data compression.

Fax machines have been around a long time and enjoy a high level of trust for transmitting documents accurately. In many countries, a fax of a signed contract is legal, but a computer-scanned image is not.

Figure 6.6 Multifunction Printer, Scanner, Fax, and Copier



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Electronic Mail

Electronic mail (e-mail) is widely used to coordinate projects and to communicate between team members. It has several valuable characteristics for project management:

- Copies can be sent to a list of team members.
- A preconference-call e-mail can list the agenda items of the conference call.
- A postconference e-mail can summarize the results of the discussion on each topic.
- Messages can be saved to document the process in case of a misunderstanding or miscommunication.
- Files can be attached and distributed.

Project Log and Web Log (Blog)

A **Web log**⁷ is typically called a *blog*. It is an online journal that can be private, shared by invitation, or made available to the world. Some project managers keep a journal in which they summarize the day's challenges and triumphs and the decisions they made. They return to this journal at a later date to review their decision-making process after the results of those decisions are known to see if they can learn from their mistakes. Many decisions in project management are made with incomplete knowledge, and reflecting on previous decisions to develop this decision-making skill is important to growth as a project manager.

Really Simple Syndication (RSS)

Some projects are directly affected by external factors such as political elections, economic trends, corporate mergers, technological or scientific breakthroughs, or weather. To keep informed about these factors, you can subscribe to online news sources. A method that facilitates this process is **Really Simple Syndication (RSS)**⁸. To use an RSS feed, team members download a free news reader on the Internet. Web pages with RSS news feeds have labeled links, as shown in [Figure 6.7 "Link to RSS Feed on a Web Page"](#).

7. Online personal journal.

8. Communications technology that allows news to be sent to a computer screen.

If the user clicks on the RSS feed, news from the Web site is automatically sent to the user's news reader. The news reader can be set to filter the news for key words to limit the stories to those that are relevant to the project.

Figure 6.7 Link to RSS Feed on a Web Page



The following are examples of asynchronous communications:

- *Mail and package delivery.* Transfer of objects and contracts that need signatures.
- *Fax.* Document transmittal over telephone. Facsimiles are accepted for some documents.
- *Electronic mail (e-mail).* Text messages with attachments can be distributed and managed by computer programs.
- *Web log (blog).* An online journal may be used to record events, thoughts, and lessons learned.
- *Really Simple Syndication (RSS).* News feeds that push relevant content to a reader to keep the manager informed of new events that could affect the project.

Assessing New Communication Technologies

New technologies for communicating electronically appear with increasing frequency. Using a new technology that is unfamiliar to the team increases the technology complexity, which can cause delays and increase costs. To decide if a new technology should be included in a communications plan, seek answers to the following questions:

- Does the new communication technology provide a competitive advantage for the project by reducing cost, saving time, or preventing mistakes?
- Does the project team have the expertise to learn the new technology quickly?
- Does the company offer support such as help desk and equipment service for new communication technology?
- What is the cost of training and implementation in terms of time as well as money?

KEY TAKEAWAYS

- Synchronous communications take place when all the parties are present at the same time. Examples are telephone calls and video conferencing.
- Asynchronous communications take place when the parties are not present at the same time. Examples are e-mail, fax, package delivery, blogs, and RSS feeds.
- Determine if a new technology can save time, reduce cost, or prevent mistakes and if the increased complexity can be handled by the team and support staff for an affordable cost in time and money.

EXERCISES

1. Communications methods that do not require both parties to participate at the same time are called _____.
2. A telephone call is an example of _____ communication.
3. An exchange of e-mail messages is an example of _____ communication.
4. A _____ is an online journal used to share an individual's thoughts and experiences.
5. A video conference is an example of _____ communications.
6. What are two examples of synchronous communications technologies that you have used?
7. What are two examples of asynchronous communications technologies that you have used?
8. What is a virtual team?
9. Where is the reference time zone and why is it sometimes referred to as both GMT and UT?
10. Why are fax machines still used for legal documents?

Internalize your learning experience by preparing to discuss the following.

If you were managing a functional team that included people from three other countries, which synchronous communications technologies would you include in your communications plan and for what purposes? Which asynchronous technologies would you use and for what purposes? What new technologies would you consider?

6.2 Selecting Software

LEARNING OBJECTIVES

1. Identify the types of software that are appropriate for projects of low complexity.
2. Identify the types of software that are appropriate for projects of medium complexity.
3. Identify the types of software that are appropriate for projects of high complexity.
4. Describe strategies for sharing documents that can be edited by a team.

Part of a communications plan is determining the type of computer software that will be used to create documents, spreadsheets, diagrams, and reports. The choice of software is related to the complexity of the project.

Simple Projects

Basic projects can be managed using some of the features available in general-purpose software that is available in most offices.

Word Processing

Even the most basic project will generate numerous documents using word processing software. A communications plan can specify standards for these documents that makes it easier to create, edit, combine, store, and retrieve the documents. Document standards include the following:

- Specifying the file format
- Using templates for commonly used forms

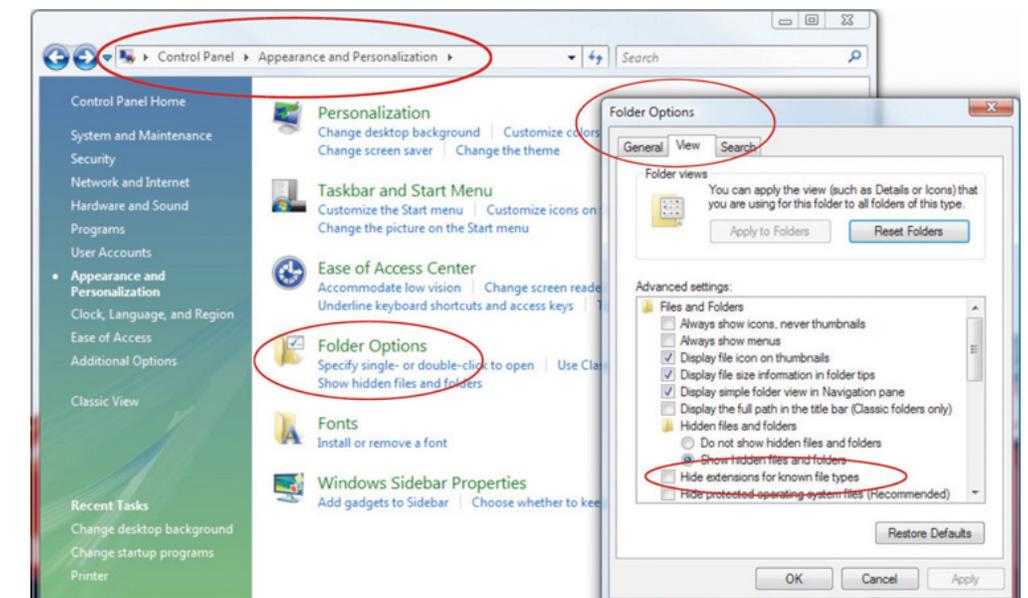
File Format

Word processing software programs display a document on a computer's screen and allow the user to enter and edit text. When the file is saved to a storage device, the text and all the various formatting such as font and font size are converted to a code for efficient storage. The code varies from one word processing program to another and even between releases of the same program.

The most common word processing program, by a wide margin, is Microsoft Word (MS Word). Several releases of MS Word run on the Windows operating system and on the Macintosh operating system. Versions of MS Word released prior to 2007 save files in a proprietary format. The format is indicated by a period and a three-letter extension—.doc—that is automatically attached to the file when it is saved. Beginning with MS Word 2007 for Windows and MS Word 2008 for Macintosh, files are saved using a different format that is indicated by a period and a four-letter extension—.docx—that identify the newer format.

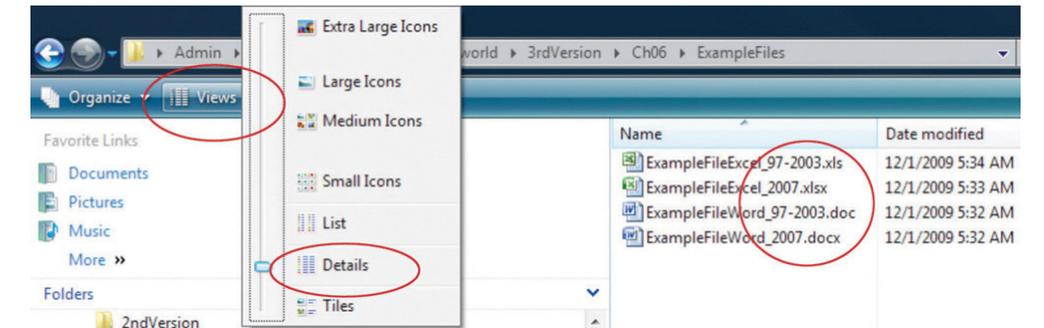
Almost all word processing programs have the ability to save files in the .doc file format, and it is a common standard for word processing files. Newer versions of word processing programs, including MS Word 2007 and MS Word for Mac 2008, can save files in the older .doc format. There are new features in MS Word 2007—such as the ability to format citations in a variety of styles, including APA, MLA, and Chicago—that are lost when the file is saved in the .doc format. Older versions of MS Word can be adapted to read the newer .docx file formats by downloading and installing a compatibility program that is available at no cost from Microsoft’s Web site. Display of document file extensions is hidden by default in the Windows operating system. They can be displayed by turning off this feature. Instructions for displaying the file extensions are available from the operating system’s help menu. In the Windows Vista operating system, the option is found on the Control Panel, in Appearance and Personalization, in Folder Options, on the View tab, under Advanced Settings, as shown in [Figure 6.8 "Displaying File Name Extensions"](#).

Figure 6.8 Displaying File Name Extensions



When a list of files is displayed in a dialog box, choose the Details option. In Windows Vista, the Details option is on the View button, as shown in [Figure 6.9 "File Extensions Displayed in Details View"](#).

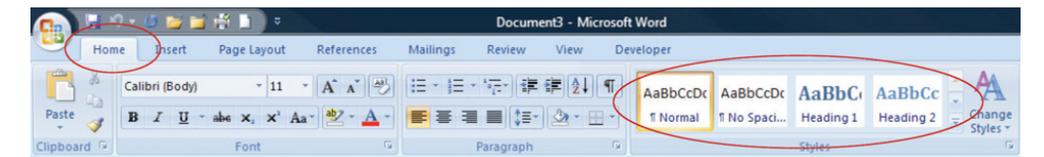
Figure 6.9 File Extensions Displayed in Details View



Styles

The combination of formatting, including font, font size, font color, shading, and other attributes used to display a segment of text and to identify its level of importance, is called a **style**⁹. A style can be given a name and applied repeatedly to different portions of a document. Predefined styles are available in MS Word 2007 on the ribbon, on the Home tab, in the Styles group, as shown in [Figure 6.10 "Style Choices"](#). Users can define their own styles and give them names. Some organizations prefer that all of their documents have similar fonts and styles for headings, body text, and figure captions.

Figure 6.10 Style Choices



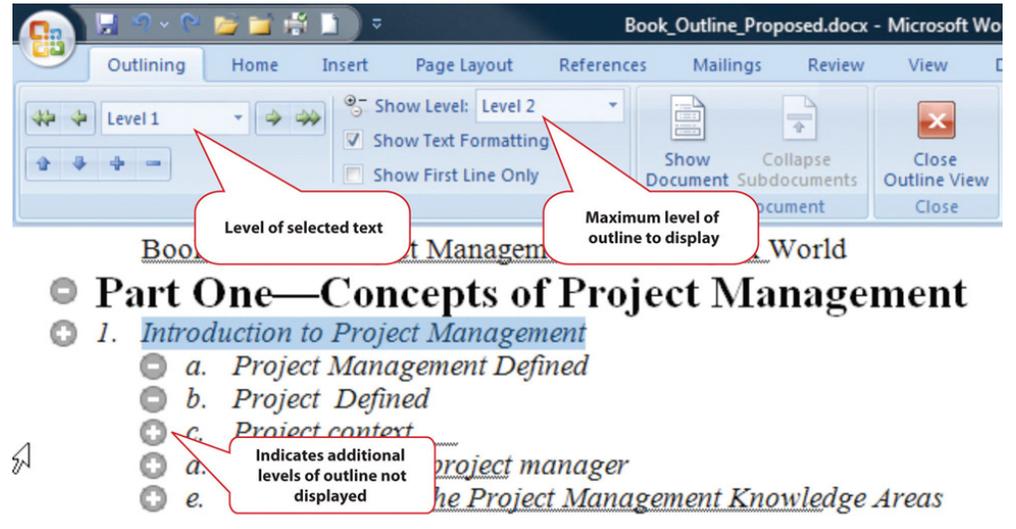
Outlines

An outline of a document consists of topic headings and subheadings, and it is useful when organizing or reorganizing a document. The Styles group in MS Word 2007 includes predefined styles for nine levels of headings. In addition to using different fonts, each heading is assigned a level of importance. A document that uses headings with assigned levels can be viewed in the Outline view, such as the book outline shown in [Figure 6.11 "Outline View in MS Word 2007"](#). In this view, the level of detail displayed in the outline is selected to display the first two levels of

9. Combination of formatting, including font, font size, font color, shading, and other attributes used to display a segment of text and to identify its level of importance.

the outline. The headings and the hidden text associated with each heading can be moved by selecting and dragging headings from one location in the outline to another.

Figure 6.11 Outline View in MS Word 2007



Templates

If a particular type of document will be used repeatedly, it might be worth the time to create an example document—a **template**¹⁰—that is formatted using the appropriate styles with blanks or placeholder text where the user can insert the information that describes a particular situation. A variety of templates are already available for download at no additional cost. For example, when a new document is created in Microsoft Word 2007, there is an option to choose a template such as the invoice template shown in Figure 6.12 "Standardized Document Used as a Template".

10. An example document that uses standard design features that can be completed to create similar documents.

Figure 6.12 Standardized Document Used as a Template

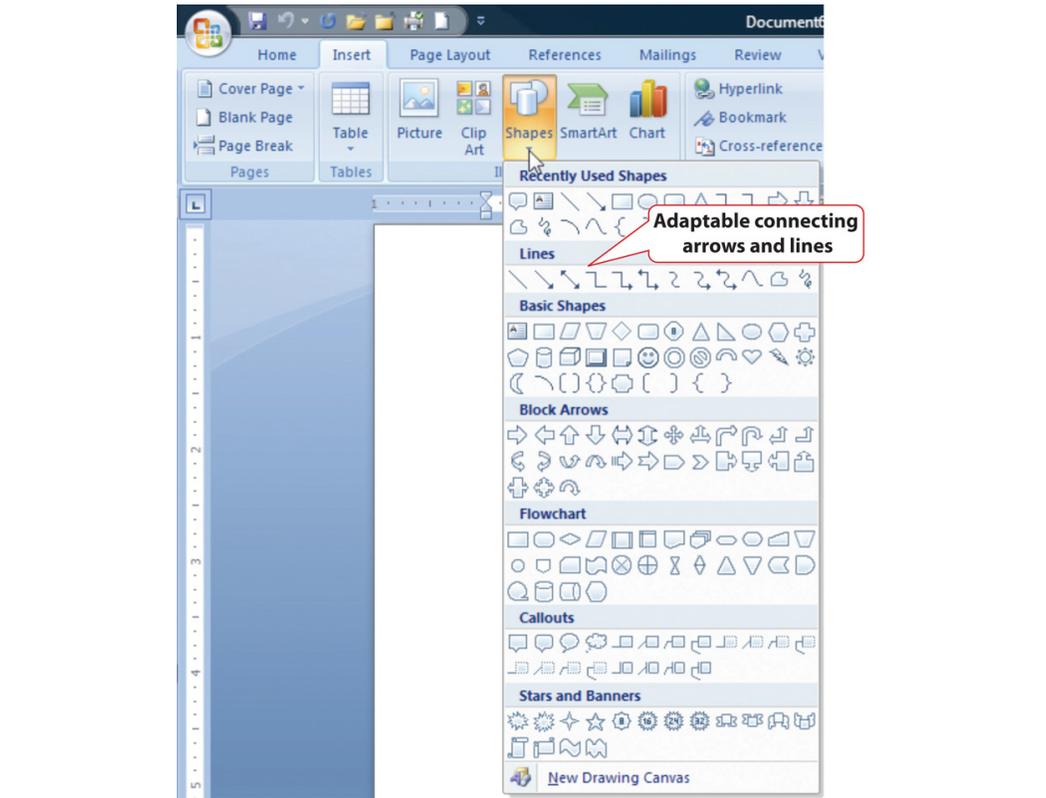
<p>[Your Company Name] <i>[Your Company Slogan]</i></p> <p>[Street Address] [City, ST ZIP Code] Phone [509.555.0190] Fax [509.555.0191]</p> <p>TO: [Name] [Company Name] [Street Address] [City, ST ZIP Code] [Phone]</p> <p>COMMENTS OR SPECIAL INSTRUCTIONS:</p>	<p>INVOICE</p> <p>INVOICE#[100] DATE: DECEMBER 1, 2009</p> <p>SHIP TO: [Name] [Company Name] [Street Address] [City, ST ZIP Code] [Phone]</p>												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">SALESPERSON</th> <th style="width: 15%;">P.O. NUMBER</th> <th style="width: 15%;">REQUISITIONER</th> <th style="width: 15%;">SHIPPED VIA</th> <th style="width: 15%;">F.O.B. POINT</th> <th style="width: 20%;">TERMS</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td style="text-align: center;">Due on receipt</td> </tr> </tbody> </table>		SALESPERSON	P.O. NUMBER	REQUISITIONER	SHIPPED VIA	F.O.B. POINT	TERMS						Due on receipt
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The template may be customized and used repeatedly for all the documents of that type, or the organization can design its own.

Diagrams

Reporting relationships and the flow of work are often described using diagrams that consist of boxes connected by arrows. Recent releases of popular word processing programs include drawing tools that can be used for basic diagrams. In MS Word 2007, a variety of shapes and connectors are available on the Insert tab, in the Illustrations group on the Shapes button, as shown in [Figure 6.13 "Menu of Diagramming Shapes and Connectors in Word 2007"](#).

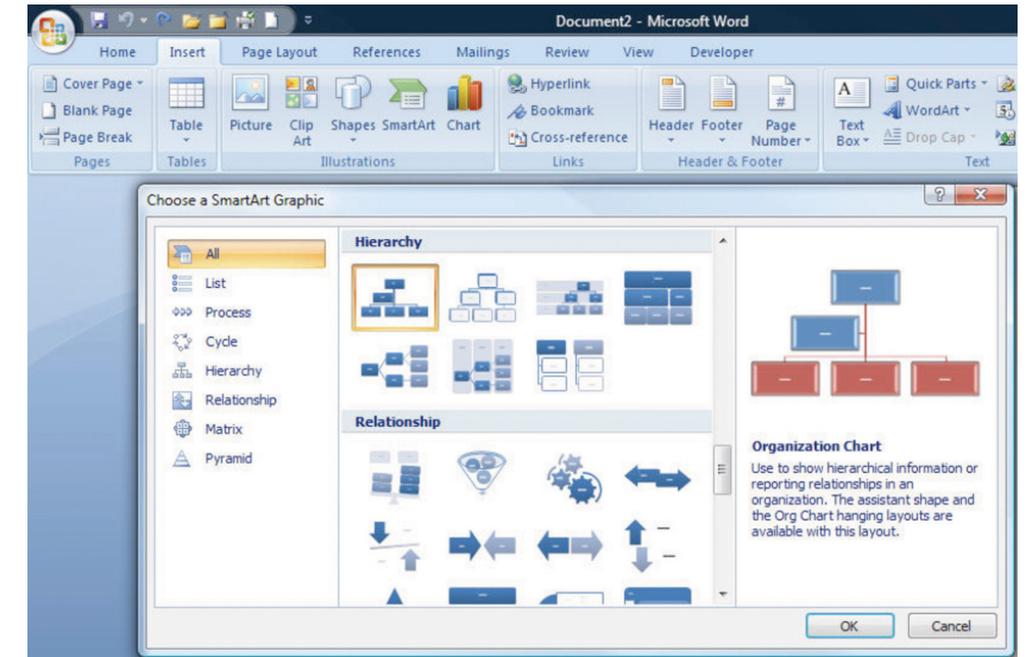
Figure 6.13 Menu of Diagramming Shapes and Connectors in Word 2007



Adaptable connecting lines and arrows can be used that redraw automatically when the shapes are moved. This feature facilitates rapid revisions when the shapes must be moved, because the connecting arrows do not need to be redrawn.

A feature named SmartArt was introduced in Microsoft Office 2007 that has a variety of charts that can be used for displaying organization and relationships that use more sophisticated and artistic graphics, as shown in [Figure 6.14 "SmartArt Feature in Microsoft Word"](#).

Figure 6.14 SmartArt Feature in Microsoft Word



Spreadsheets

Another commonly available software creates a **spreadsheet**¹¹—a display of data in row and column format—in which financial or numerical data can be manipulated. The intersection of the rows and columns are cells into which numbers, text, dates, and formulas can be entered. The formulas can utilize values found in other cells and display the results in the cell in place of the formula. If the value in a cell to which the formula refers is changed, all the formulas that use that cell’s value are immediately recalculated. This feature makes it convenient to examine several options quickly. Spreadsheets are often used to manage data on simple projects instead of a dedicated database or project management software.

Organizing Data in Rows and Columns

If a spreadsheet is used to store data, such as a list of project activities or a list of expenses, it is prudent to arrange the data in some way that would be used by more sophisticated data management software. Most data management programs arrange data in such a way that each type of data is represented by a column with a label at the top and each row contains the specific data for one type of item. A collection of data arranged in rows and columns is a **table**¹². For example, a list of expenses would be arranged so that individual expenses are recorded on each row, and each column would be a type of information related to the expenses, as shown in Figure 6.15 "Expenses Arranged in a Table in a Spreadsheet".

11. Display of data in row and column format.

12. Group of data that is organized in rows and columns, where columns are types of data and rows are individual instances.

Figure 6.15 Expenses Arranged in a Table in a Spreadsheet

	A	B	C	D	E
1	Category	Description	Quantity	Unit Price	Cost
2	Packing Materials	Box tape	2	\$ 3.85	\$ 7.70
3	Packing Materials	Bubble wrap	1	\$ 19.95	\$ 19.95
4	Packing Materials	Extra large boxes	7	\$ 3.75	\$ 26.25
5	Packing Materials	Furniture pads	4	\$ 7.95	\$ 31.80
6	Truck	Gas at 10mpg	200	\$ 2.25	\$ 45.00
7	Packing Materials	Large Boxes	7	\$ 3.00	\$ 21.00
8	Packing Materials	Lift straps/pr	1	\$ 24.95	\$ 24.95
9	Packing Materials	Markers	2	\$ 1.50	\$ 3.00
10	Packing Materials	Mattress/spring bags	2	\$ 2.95	\$ 5.90
11	Packing Materials	Medium Boxes	15	\$ 2.35	\$ 35.25
12	Truck	Rental	2 days	\$ 200.00	\$400.00
13	Packing Materials	Short hanger boxes	3	\$ 7.95	\$ 23.85
14	Packing Materials	Small Boxes	10	\$ 1.70	\$ 17.00

Types of data in columns with a label in the first row

One item per row

File Format

The most common spreadsheet program, by a wide margin, is Microsoft Excel (MS Excel). There have been several releases of MS Excel that run on the Windows operating system and on the Macintosh operating system. Versions of MS Excel released prior to 2007 save files in a proprietary format. The format is indicated by a period and a three-letter extension—.xls—that is automatically attached to the file when it is saved. Beginning with MS Excel 2007 for Windows and MS Excel 2008 for Macintosh, files are saved using a different format that is indicated by a period and a four-letter extension—.xlsx—that identifies the newer format.

Almost all spreadsheet programs have the ability to save files in the .xls file format, and it is a common standard for spreadsheet files. Newer versions of spreadsheet programs, including MS Excel 2007 and MS Excel for Mac 2008 can save files in the older .xls format. There are a few new basic features in MS Excel 2007 that would be lost by saving files to the older file format.

Using a Spreadsheet to Manage Project Data

If the data in the spreadsheet is arranged in simple rows of the same type of data, it can be manipulated to provide reports for basic projects.

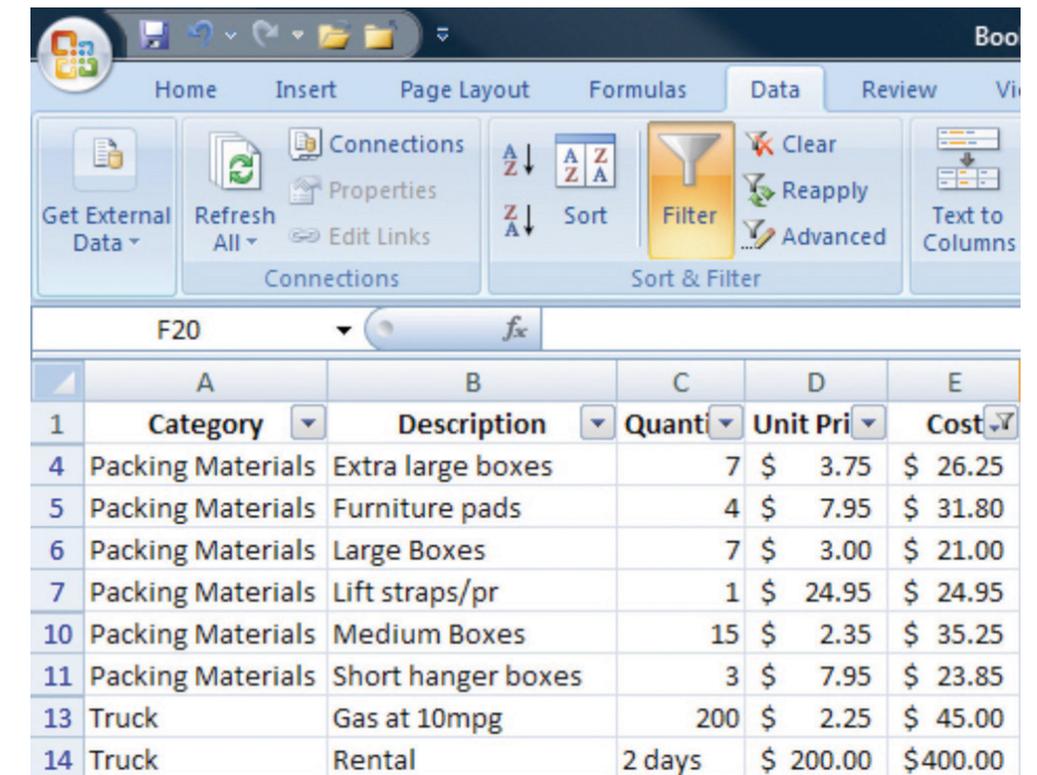
If one or more of the columns in a table contain labels, identification numbers, or other descriptions, those labels can be used to specify sorting and filtering options. For example, if the spreadsheet has a list of expenses, the rows of data can be sorted in decreasing or increasing value by one of the data types such as the due date or the amount of the expense. The display can be restricted—**filtered**¹³—to display

13. Display is restricted to data that meets criteria.

only those rows that meet criteria specified by the user. For example, the table could be filtered to display the expenses for a particular department that were incurred between two dates. This ability facilitates the preparation of monthly progress reports and budgets.

In MS Excel 2007, the sorting and filtering options are on the Data tab, in the Sort and Filter group under the Sort or Filter button. Once a filter is applied, option buttons are placed at the top of each column to facilitate changes in the sorting or filtering options. For example, the list of expenses shown in the previous figure can be sorted by the labels in the Category column and filtered to show only costs that are more than \$20, as shown in [Figure 6.16 "Sorting and Filtering in Microsoft Excel 2007"](#).

Figure 6.16 Sorting and Filtering in Microsoft Excel 2007



Subtotals

If the user wants to find a subtotal of the values that belong in a particular group, the groups must be identified by a label in one of the columns. Finding subtotals is a two-step process. First, the table is sorted by that column to bring all the rows in each group together. Next, the subtotal feature is applied. In Excel 2007, the

subtotal option is found on the Data tab, in the Outline group. A dialog box allows the user to choose the columns to subtotal and the columns that contain the labels of the groups. A subtotal is inserted below the last row for each group, as shown in [Figure 6.17 "Using Subtotals"](#).

Figure 6.17 Using Subtotals

1	2	3	A	B	C	D	E
	1		Category	Description	Quantity	Unit Price	Cost
	2	•	Packing Materials	Box tape	2	\$ 3.85	\$ 7.70
	3	•	Packing Materials	Bubble wrap	1	\$ 19.95	\$ 19.95
	4	•	Packing Materials	Extra large boxes	7	\$ 3.75	\$ 26.25
	5	•	Packing Materials	Furniture pads	4	\$ 7.95	\$ 31.80
	6	•	Packing Materials	Large Boxes	7	\$ 3.00	\$ 21.00
	7	•	Packing Materials	Lift straps/pr	1	\$ 24.95	\$ 24.95
	8	•	Packing Materials	Markers	2	\$ 1.50	\$ 3.00
	9	•	Packing Materials	Mattress/spring bags	2	\$ 2.95	\$ 5.90
	10	•	Packing Materials	Medium Boxes	15	\$ 2.35	\$ 35.25
	11	•	Packing Materials	Short hanger boxes	3	\$ 7.95	\$ 23.85
	12	•	Packing Materials	Small Boxes	10	\$ 1.70	\$ 17.00
	13		Packing Materials Total				\$216.65
	14	•	Truck	Gas at 10mpg	200	\$ 2.25	\$ 45.00
	15	•	Truck	Rental	2 days	\$ 200.00	\$400.00
	16		Truck Total				\$445.00
	17		Grand Total				\$661.65

In a panel at the left of the screen are lines and symbols that indicate the level of detail that is displayed. By clicking on the boxes with minus signs, the rows containing the data can be hidden, leaving the subtotals or grand total, as shown in [Figure 6.18](#) and [Figure 6.19](#). This feature allows a manager to view summary data very quickly without the visual clutter of the details.

Figure 6.18

1	2	3	A	B	C	D	E
	1		Category	Description	Quantity	Unit Price	Cost
	13	+	Packing Materials Total				\$216.65
	16	+	Truck Total				\$445.00
	17	-	Grand Total				\$661.65

Third level details are hidden.

Figure 6.19

	A	B	C	D	E
1	Category	Description	Quantity	Unit Price	Cost
17	Grand Total				\$661.65

All details in rows 2–16 are hidden.

Graphics for Bar Charts and Milestones

Spreadsheets can be used for basic progress reports that show activities, dates, and horizontal bars that represent the duration of an activity. A sequence of dates can be created as column labels by entering the first two dates in the sequence, selecting both dates, and then dragging the fill handle—a small square in the lower right corner of the selected cell, as shown in [Figure 6.20 "Creating a Sequence of Dates"](#)—to extend the pattern.

Figure 6.20 *Creating a Sequence of Dates*

	A	B	C	D	E
1					
2	Type	Description	Duration	3/10	3/11
3	Plan Move	Contact Dion and Carlita	2d		
4	Plan Move	Host planning lunch	0d		
5	Plan Move	Develop and distribute schedule			
6	Plan Move	Make hotel arrangement in Atlanta			
7	Pre-packing	Gather packing material	2d		
8	Pre-packing	Contact three moving van companies and get quotes	1d		
9	Pre-packing	Select company and negotiate final price	0d		
10	Pre-packing	Sign moving contract	0d		
11	Pre-packing	Pack small and delicate items	2d		

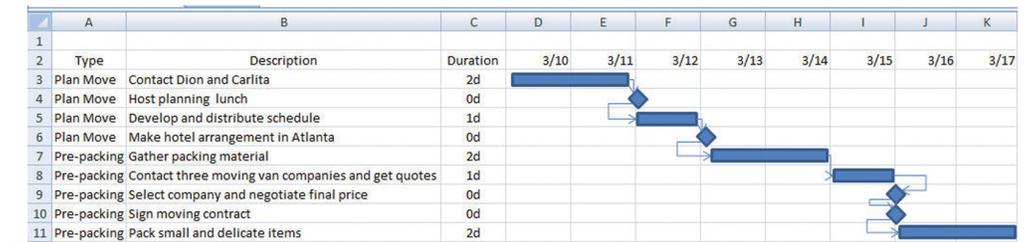
The program is sophisticated enough to correctly fill date sequences between months that have a different number of days and even account for leap years in February. Because more sophisticated project management software uses a table design in which the first two columns are description and duration, a similar structure, in which those two columns are adjacent and in that order will make it convenient to transfer the list of activities in a low-complexity project into the project management software at a later date if the spreadsheet is not sufficient. In the duration column, use the following abbreviations:

- d for days
- wk for weeks

- mons for months

The duration of each activity and the relationships between activities can be illustrated using the drawing shapes. In Excel 2007, the same set of shapes and connector arrows are available as those in Word 2007. A long rectangle can represent a bar whose length represents the duration of the activity. Events or significant dates in the project are identified with a diamond. The diamond can be created by using a small square shape and rotating it. Arrows can be drawn between the shapes to indicate their relationships, as shown in [Figure 6.21 "Diagram of Activities"](#). Unfortunately, the arrows in Excel 2007 connect to handles on the sides of the rotated squares instead of the corners. This detail may be overlooked in a simple project diagram.

Figure 6.21 *Diagram of Activities*



This type of diagram is useful for projects with low complexity where a simple chart of a few activities will suffice.

Software for Moderately Complex Projects

More complex projects involve more people who are often separated geographically and who contribute to the same documents. Complex projects have more tasks with more complex relationships. To manage those tasks and relationships, using dedicated project management software and more sophisticated diagramming software is justified.

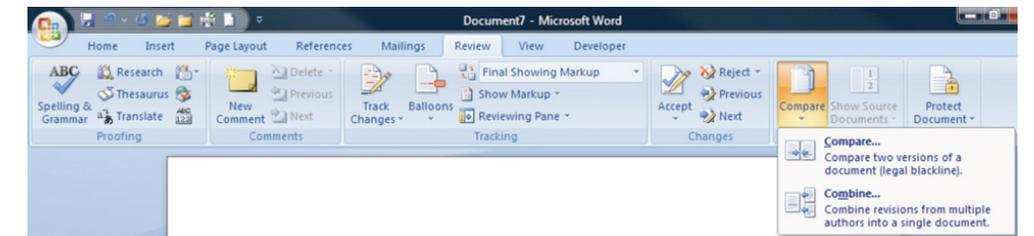
Sharing Team Documents

If more than one person on a team will be contributing to a document, the document must be accessible to them. To manage documents that are created by a team, it is necessary to control the edits so that work is not lost or confused.

Version Control

Files such as word processing documents and spreadsheets may be stored on an individual's computer and copies sent to participants who then make changes and return the revised version to the person who is responsible for the final version of the document. If more than one person is editing his or her own copy of a document at the same time, different versions of the document with different additions or corrections are created. Word processing programs such as MS Word 2007 have a feature that can compare two documents and identify the differences to help bring the two different documents back together. This feature is found on the Review tab, in the Compare group, as shown in [Figure 6.22 "Compare Documents Feature"](#).

Figure 6.22 Compare Documents Feature



Most software programs make periodic backups to protect from accidental power loss. One of the ways that a user can still lose a lot of work is by replacing a newer version of a document with an older version. It is possible to display the date on which the file was last saved using the Details view. If more than one version of the file exists in two different locations, the dates can be compared to determine which is the most recent. These techniques are useful for simple projects with very few participants.

File Storage and Access Control

Managing versions of documents that are edited by more than one person can be done more effectively by placing the file in a location that can be accessed by all the team members. This can be a shared drive on the company's computer or on a document sharing service. People who need to use the document are grouped by their need for access. Three groupings are common:

1. View only
2. Edit only
3. Ownership/administrator

The owner or administrator of the document can set the access levels. These levels of access can be assigned to each individual, or they can be assigned to named groups and the person can be made a member of a group. The owner of the document can choose to accept or reject changes made by those with edit-only permission.

The advantage of this method is that there is only one version of the file. If a file is being edited, it is usually locked so that other team members may view the file but cannot edit it until the first editor closes the file.

If the file is stored on a computer that is on a secure network within an organization, it can be difficult for team members who do not have direct connections to the company's network to get access to the files. To protect the security of the company's network, the network administrator can grant an outside user permission to access the network from anywhere on the Internet using a **virtual private network (VPN)**¹⁴ connection. A VPN uses **encryption**¹⁵—replacing readable content with a code—to protect the communication between the network and the user to make it secure. The VPN connection gets the user onto the company network as if they were directly connected, but they still need the appropriate passwords to access the shared documents.

Tracking Changes and Adding Comments

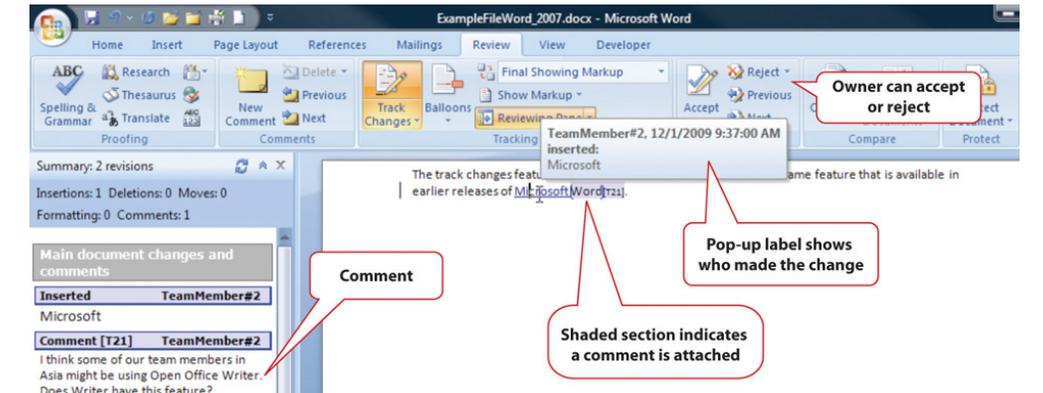
One of the features that is particularly useful for keeping track of the changes made to a document by several users is called Track Changes. In Microsoft Word 2007, it is found on the Review tab, in the Tracking group. Changes may be shown in the document or in balloons at the side.

If a team member wishes to explain a change, it is very important that they do not insert their explanation as text into the document. Such explanations might not be deleted and would end up in the final version of the document with potentially damaging results. Instead, team members can use a form of electronic sticky note to make comments. This feature is found in MS Word 2007 on the Review tab, in the Comments group. A change and a comment are shown in [Figure 6.23 "Tracking Changes and Adding Comments"](#). The document owner must go through the document and accept or reject each change and delete all the comments before the document is released as a finished product. The Next, Accept, and Reject options are found in Microsoft Word 2007 on the Review tab, in the Changes group.

14. Method of connecting to a network from the Internet using a code to protect the communication.

15. Replacing readable content with a code.

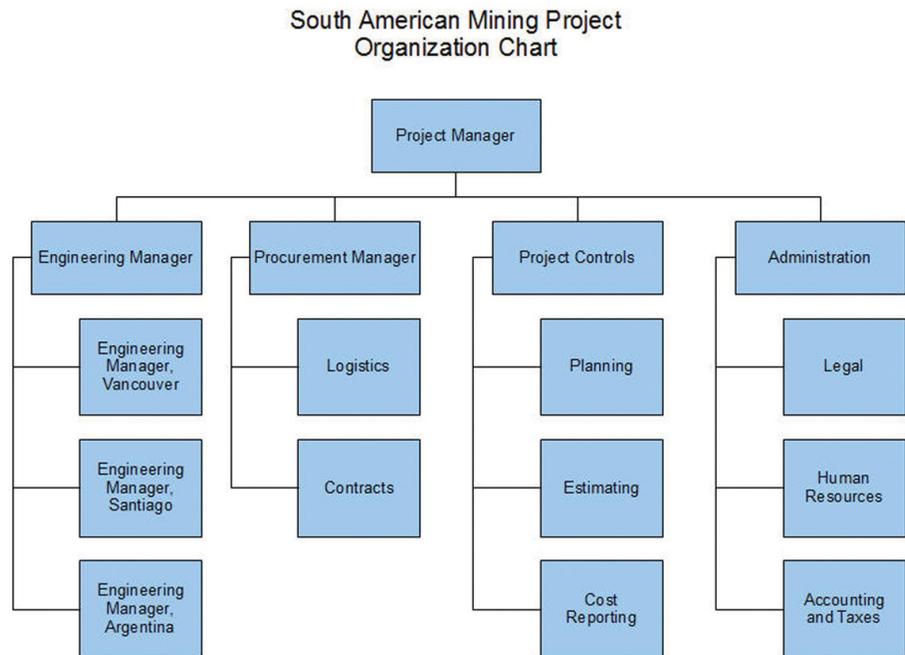
Figure 6.23 Tracking Changes and Adding Comments



Diagramming Software

The processes and relationships in medium- and high-complexity projects usually require more sophisticated software tools for creating reporting diagrams and workflow charts. The market for diagramming software is more diverse than for word processing and spreadsheets, and it is not as likely that most team members will have the same programs that save files in the same formats. Microsoft Visio 2007 is available as a stand-alone program that sells for several hundred dollars. For medium-complexity projects, a free alternative to Visio is Open Office Draw. Open Office is a free software alternative that includes a word processing, spreadsheet, presentation, and drawing programs. The Open Office Draw program, and others like it, can create diagrams such as the one shown in [Figure 6.24 "Diagram Created Using Open Office Draw"](#).

Figure 6.24 Diagram Created Using Open Office Draw

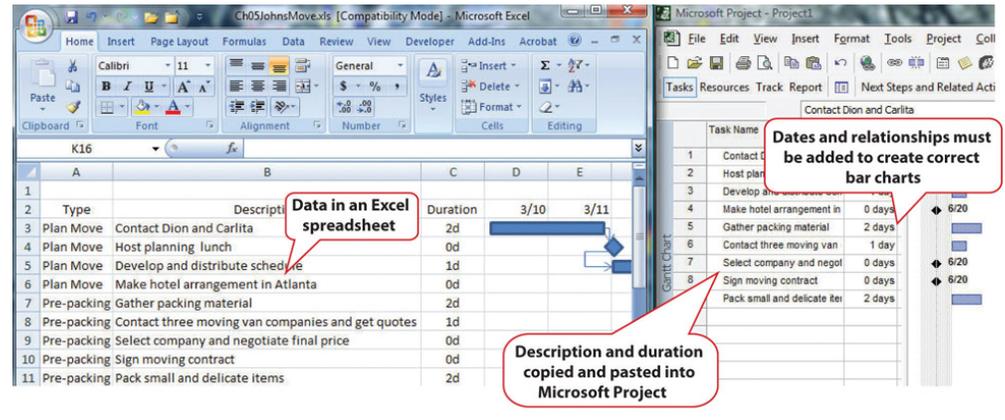


The files created by the various drawing programs might not be compatible with each other, but all the programs can create static image files that can be pasted into word processing documents.

Project Management Software

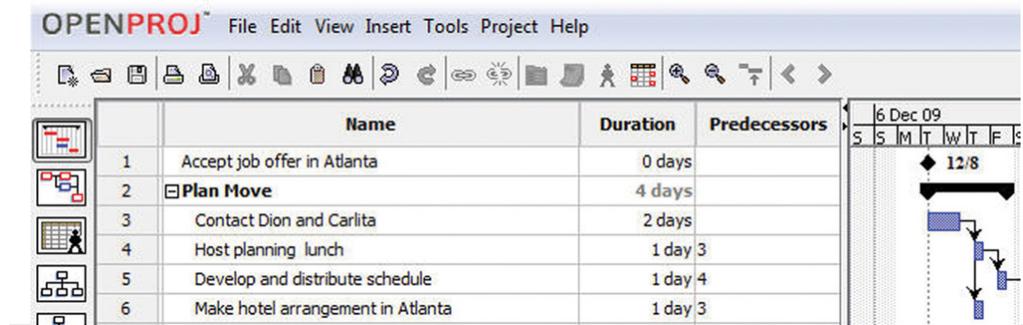
The relationships between project activities can become complicated in medium- and high-complexity projects. Dedicated project management software can compute the sum of activity durations along several different paths through complex relationships and recalculate them immediately if any of the durations or starting times are changed. Similarly, charts and reports are updated automatically based on the new data. The most popular software for medium-complexity projects is Microsoft Project. If a project manager begins work on the project in the belief that it can be managed using a list of activities in a word processing program or in a spreadsheet, the list of activities and their durations can be copied and pasted, or imported, into the project management software's table of activities, if the original document or spreadsheet was designed with that possibility in mind, as shown in [Figure 6.25 "List of Activities Transferred to a Project Management Program"](#).

Figure 6.25 List of Activities Transferred to a Project Management Program



Once the data are placed in the project management software, the relationships can be defined and reports created. Organizations on a tight budget might consider using an **open source**¹⁶ program named OpenProject. Open source software is usually available at no cost for individual users and with fewer restrictions than proprietary software like Microsoft Project. OpenProject is similar to Microsoft Project, as shown in Figure 6.26 "Open Source Project Management Software", and could be used on low- and medium-complexity projects that do not need the more advanced features available in Microsoft Project.

Figure 6.26 Open Source Project Management Software



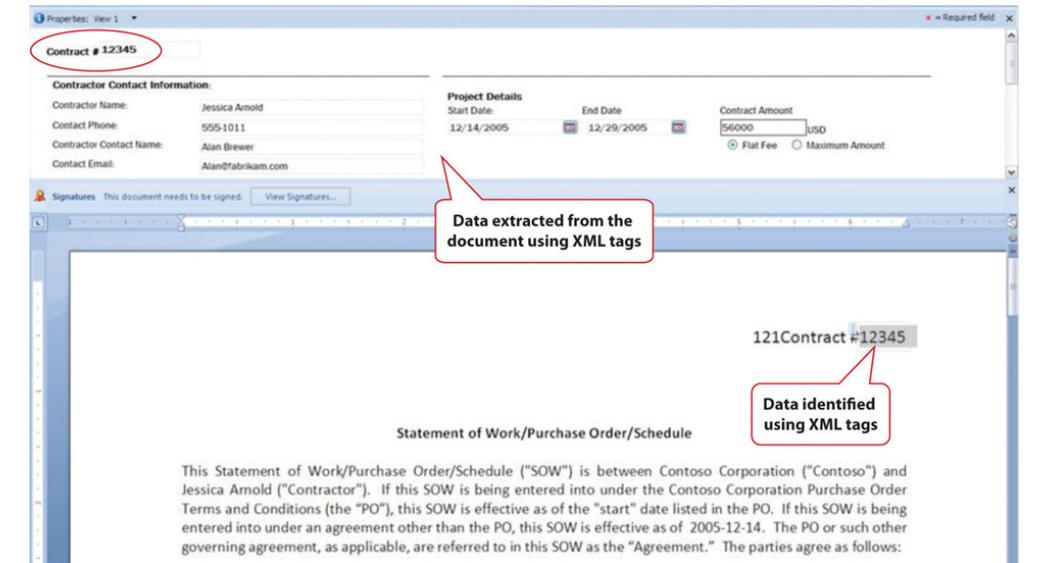
Software for Complex Projects

Complex projects can involve thousands of individual activities and a company might have several projects going at the same time. Large, complex projects are common in the construction industry. A software that is commonly used for complex projects in construction is P3 or P6 from Primavera. It has the ability to produce sophisticated reports that help project managers to anticipate problems and make projections.

16. Available at no cost for individual users and with fewer restrictions than proprietary software.

Word processing documents often contain data that could be aggregated and analyzed. Beginning with Microsoft Word 2007 and the .docx file format, it is possible to insert characters called **tags**¹⁷ on either side of a particular section of a form or document and assign a data label. For example, the name of the supplier on an invoice could be enclosed between two tags: <supplier>Thompson Hardware</supplier>. These tags resemble those used in the hypertext markup language (HTML) to identify how to display text on a Web page, but instead of telling a Web browser how to display the name of the supplier, it identifies Thompson Hardware as the supplier. These tags are can be created by following a set of rules called the **extensible markup language (XML)**¹⁸. Forms created using XML can be scanned for the content that is marked by tags. The data can be imported into a spreadsheet or database for analysis. Creating documents that use XML to identify data in the forms can be done using Microsoft InfoPath. An example that identifies key facts in a document that was prepared using InfoPath is shown in [Figure 6.27 "InfoPath Form with XML Tags"](#). Because it takes extra effort to learn to use InfoPath, or a similar XML authoring program, and to create the forms, this approach is normally limited to complex and sophisticated organizations that have the need to manage large amounts of data.

Figure 6.27 InfoPath Form with XML Tags



17. Labels that enclose text to describe how it is displayed or to give it meaning as data.

18. Rules for defining tags that can identify text as data or for display purposes.

KEY TAKEAWAYS

- Low-complexity projects might be managed using general purpose word processing and spreadsheet software by using the special features for outlining, managing data, and inserting graphic objects
- Medium-complexity projects need special purpose software for managing project activities, such as Microsoft Project, and graphic software such as VISEO. Open source software such as OpenProject and Open Office Draw may suffice.
- High-complexity projects need more sophisticated project management software like P6 from Primavera. Forms can be created using XML tags that allow data to be extracted from the documents.
- Files can be stored at a location that is accessible by all the team members. They can be granted different levels of access, including view only, edit only, and ownership. Features like track changes and compare documents can help manage edits.

EXERCISES

1. General purpose word processing and spreadsheet software might be sufficient for managing _____ (low-, medium-, high-) complexity projects.
2. Three features that are available in spreadsheet programs such as Microsoft Excel to manage tables of data are subtotal, sort, and _____.
3. If outline levels are assigned in a word processing document, the outline may be _____ or expanded to hide or display different levels of detail.
4. _____ - _____ (two words) software is often available at no cost, and its use is less restricted than proprietary software.
5. A VPN connection uses _____ to protect the content of the communication.
6. How are XML tags similar to HTML tags and how are they different?
7. How should activity information be organized in a spreadsheet to make it easier to transfer to a project management program?
8. What are three options for creating a diagram that displays a project's reporting hierarchy for low- or medium-complexity projects?
9. What is an example of a software product that is commonly used for highly complex projects?
10. What are three levels of file access and editing permissions that can be assigned, and what are examples of user groups that would be assigned to each level?

Internalize your learning experience by preparing to discuss the following.

Describe an experience you might have had with editing the same word processing document and how you managed the revisions. If you used some of the features described above, how well did they work? What features were described that might have been helpful?

6.3 Exercises

Exercises at the end of the chapter are designed to strengthen your understanding and retention of the information recently acquired in the chapter.

ESSAY QUESTIONS

Write several paragraphs to provide more in-depth analysis and consideration when answering the following questions.

1. Assume that you are the leader of a virtual team that includes members who are in New York, Bogotá, Honolulu, and Tokyo. You would like to choose a day and time for a weekly conference call to keep the project on track. Choose a day and time and explain your choice and the compromises and problems it might cause for each member. Use the term “synchronous” correctly and identify the specific time zone for each participant.
2. From the list of available templates in your word processing or spreadsheet software, choose a template and describe it. Fill it out and then describe how it could be modified to meet the needs of a particular situation or organization.

DISCUSSION

The exercises in this section are designed to promote exchange of information among students in the classroom or in an online discussion. The exercises are more open ended, which means that what you find might be completely different from what your classmates find, and you can all benefit by sharing what you have learned.

1. Consider the newer synchronous and asynchronous communications technologies with which you are familiar. Describe how they might be used on projects in new and innovative ways. Relate these ideas to what you learned about project cultures—specifically about innovation on projects—and describe how the new communications technologies could be used to innovate.
2. Describe your experience using Excel to manage data such as lists of purchases. Discuss how the features of sorting, filtering, and subtotaling could help answer questions about that list.

6.4 Web Exercise

LEARNING OBJECTIVE

1. Determine the local time for team members in other time zones given GMT or UT zone designations.

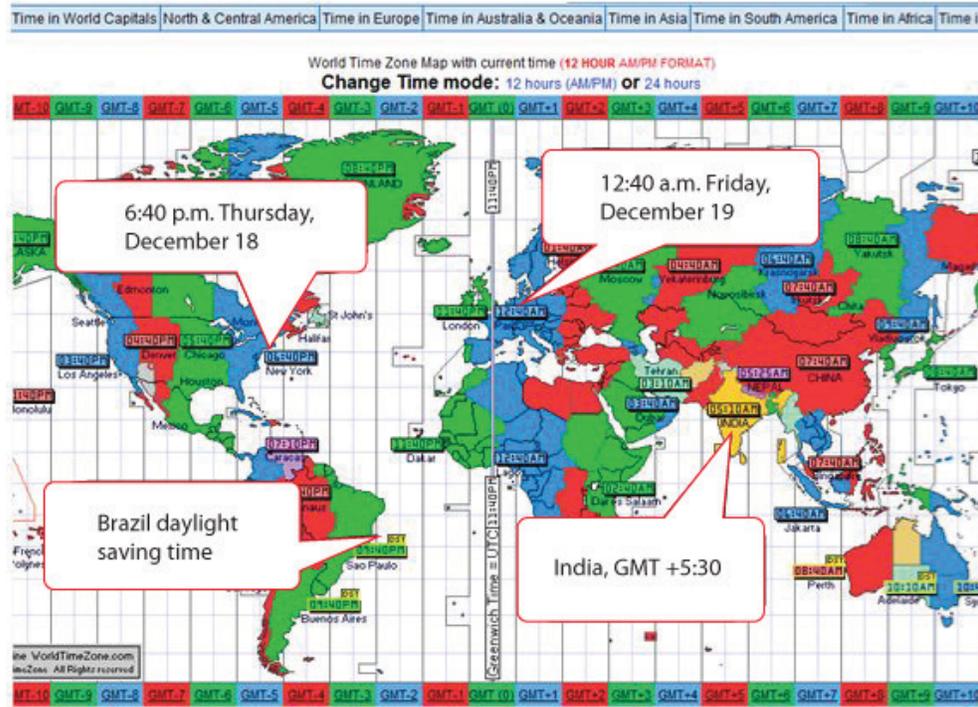
Using an Online Time Zone Map

Fortunately, there are several websites that provide the information you need to schedule a conference call so that all the participants know the correct time and day of the week regardless of where they are in the world.

How to Use a Website to Help Find Local Time

1. Open a word processing document. Save it as *Ch06TZStudentName.doc*. Use the .doc file format.
2. On the first line, type *Chapter 6 study documentation by* and then type your name. Press Enter to move the insertion point to the next line
3. Open a web browser and go to <http://www.worldtimezone.com>.
4. The map will display the world's time zones at the time you visit the site. See [Figure 6.28 "World Times Compared to 6:40 p.m. EST"](#). The example in [Figure 6.28 "World Times Compared to 6:40 p.m. EST"](#) was displayed on the author's computer at 6:40 p.m. EST on Thursday, December 18 (23:40 GMT).

Figure 6.28 World Times Compared to 6:40 p.m. EST



5. Capture the screen that displays the World Time Zone Map with your current time and date.
6. Switch to the word processing document and paste the screen capture below the first line of text.
7. Below the image, type *The time and date in India would be* and then type the time and date in India for your current time and date.
8. Review your work and use the following rubric to determine its adequacy:

Element	Best	Adequate	Poor
File name	Ch06TZStudentName.doc	Ch06TZStudentName.docx	Different name or incompat format
Determine the local time for team members in other time	Title; screen capture with current date and time; correctly calculated day and time in India.	Same as Best	Incomplete or an error in the time or date

Element	Best	Adequate	Poor
zones given GMT or UT zone designations			

9. Save the file and submit it as directed by the instructor.

6.5 Software and Technology Exercises

LEARNING OBJECTIVES

1. Locate the dialing codes for making international telephone calls.
2. Identify dialing techniques used with cell phones to make international telephone calls.
3. Select the appropriate times and methods for making international calls.
4. Subscribe to a news service using a newsreader and RSS.

Placing International Calls

International Telephone Calls Using Wired Phones

The telephone may be used for two-person synchronous communication or in a multipart conference call. Using a telephone to make long-distance and international calls involves using international telephone numbering conventions.

Calls within North America and the Caribbean

The telephone companies in North America use the North American numbering plan (NANP) that includes the United States, its territories, Canada, Bermuda, and sixteen Caribbean nations.

Wired telephones are connected physically to a local switch that can handle up to ten thousand connections represented by the last four-digit numbers in a telephone number from 0000 to 9999. Each switch is identified by a three-digit number such as 555. A local telephone number consists of the switch number and one of the ten thousand four-digit numbers such as 555 0112. This system can provide up to ten million different unique phone numbers, The three-digit area code plus the next four digits make up a seven-digit number. A seven-digit number has ten million possible combinations from 000 0000 to 999 9999. In practice, some area codes are reserved for special purposes such as trouble-shooting, emergencies, directory assistance, and maintenance, so the maximum is less than ten million per area code. For example, numbers 555-0100 through 555-0199 are reserved for fictional use and are

Figure 6.29 Rotary Dial Telephone



not assigned to real customers, but it does not have the capacity to provide service to billions of people.

The switches are grouped into areas and assigned a group number or area code. Area codes in North America were assigned at a time when numbers were converted to a sequence of electrical pulses by inserting your finger in a rotary disc—the dial—and pulling it to a stop on a phone like the one shown in [Figure 6.29 "Rotary Dial Telephone"](#).

As a spring returns the dial to its original position, it opens and closes a set of electrical contacts to create a series of pulses that match the number dialed. Because it takes longer to dial higher numbers like 8 or 9, area codes that could be dialed quickly like 212 and 213 were assigned to densely populated areas like Manhattan (212) and Los Angeles (213). Higher numbers were assigned to rural areas or to newer areas. As a result, it is difficult to determine where a telephone is located by its area code. Do not assume that numbers with similar area codes in North America are located in the same time zone—they may be thousands of miles apart. To initiate a call to a different area code, the number 1 is dialed first. This is the national direct dialing (NDD) code for NANP members.

Calling from North America to a Country outside the NANP

The IDD code for the United States is 011.

To make an international call from an NANP member such as the United States to another country, you need to provide two codes: the international direct dialing (IDD) code and the country code. The IDD code for the United States is 011. For example, if you wanted to place a call to a number in Rio de Janeiro, you would enter 011 55 21 xxx xxxx, where 011 is the IDD code for the United States, 55 is the country code for Brazil, 21 is the area code for Rio de Janeiro, and xxx xxxx represents the final seven digits of the number.

Calling to North America from a Country outside the NANP

The IDD and the country code are not simply reversible. The country code for the United States is 1 (not 011).

If you traveled to Rio de Janeiro for a meeting and wanted to call back to a number in the United States from a local phone, you would have to look up the IDD code for the local service provider in Brazil. In Brazil, there is a different code for each of the five phone companies. The IDD for Brasil Telecom is 0014.

The IDD and the country code are not simply reversible. The country code for the United States is 1 (not 011), so you would enter 0014 1 xxx xxx xxxx, where the last ten digits are the area code and telephone number in the United States.

Reading the Phone Number on a Business Card in North America

It is commonly understood in the United States that you do not enter the hyphens, parentheses, spaces, or periods that are used to make a telephone number more readable and that you dial 1 first—even though it is not included—for a call destined for a different area code. For example, if the phone number on the business card shows (555) 222-1111, you know that you would enter 2221111 if you are calling from within the 555 area code. Some area codes cover large geographic areas, and the NDD code is required to dial a number from within the same area code if they are far apart. or 15552221111 for a call from a different area code, but you would not attempt to enter the parentheses, space, or hyphen. Spaces are used in some instances in the following discussion to make the numbers easier to read in this text, but it will be understood that they are not entered when dialing the number.

Reading the Phone Number on an International Business Card

Unlike those countries participating in the NANP, other countries use different numbers for the national direct dialing (NDD) code and the country code. They might use a different number of digits for the area or city code. A business card from a team member in Rio de Janeiro might be +55 (0)21-xxxx xxxx where 55 is the country code and 0 is the NDD code. To call this team member from the United States on a wired telephone, you would enter 011 55 21 xxxx xxxx, where 011 is the IDD for the United States, 55 is the country code for Brazil, and 21 is the code for Rio de Janeiro.

Notice the zero between 55 and 21 is not included when calling from outside the country. This is the NDD code that is used for calls between areas within the country. For example, if you land in the airport at Sao Paulo, Brazil, and want to call the person in Rio de Janeiro from a local phone, you would enter 0 21 xxxx xxxx (without the spaces) where 0 is the NDD code—like 1 in the United States—and 21 is the area/city code.

Finding International Telephone Codes

1. Open a word processing document. Save it as *Ch06PhoneStudentName.doc*. Use the .doc file format.
2. On the first line, type *Chapter 6 study documentation by* and then type your name. Press Enter to move the insertion point to the next line
3. Open a web browser and go to <http://www.kropla.com>. This site provides information on international dialing codes.
4. Near the middle of the page, click the International Dialing Codes link.
5. On the [CountryCode.org](http://www.countrycode.org) page, in the Country column, scroll down and click *Brazil*. A list of country codes and city codes is displayed next to a map of the country.
6. Use the browser's Back button to return to the [CountryCode.org](http://www.countrycode.org) web page. Add the address for this page to the Project Management folder in your browser's favorites or bookmarks.
7. Switch back to the browser. In the Country column, scroll down and click one of the country names other than Brazil.
8. Capture the screen that shows the country's code and map, paste it into a blank document, and then save the document as *Ch06Exercises6.5.doc*.

Making International Telephone Calls Using a Mobile Phone

To place an international call to a country outside the NANP using a mobile phone, you use the plus sign (+) instead of the IDD code. For example, the number of the British Museum is +44 (0) 20 7323 8000. To call this number from a wired phone in the United States, you would dial 011 44 20 7323 8000. If you make the call from a mobile phone, you dial +44 20 7323 8000. Notice the plus sign takes the place of the IDD code.

Finding the Plus Sign on a Mobile Phone

Wired phones do not have a plus sign on their keypads, but recent model mobile phones include a method to dial a plus sign. Unfortunately, the method varies by brand of telephone.

International Telephone Calls Using a Mobile Phone

1. Open a web browser and go to <http://www.howtocallinternationally.com>. This site has a step-by-step demonstration of how to make calls using wired and mobile phones.

2. At the right of the page under *Shortcuts*, click *From a mobile (cellphone)*. The *How to call internationally from a mobile (cellular) telephone* page displays. Read this page.
3. Scroll down to the video and click the play button.
4. During the video, when a telephone number with a plus sign is displayed on the cell phone, pause the video and capture the screen.
5. Paste the screen into *Ch06PhoneStudentName.doc*.
6. Switch back to the browser window and then watch the rest of the video.
7. Add a link to this web page in your browser's favorites or bookmarks.
8. Capture a screen that shows the links to CountryCode.org and Howtocallinternationally.com in the Project Management folder in your browser's favorites or bookmarks and then paste it into the *Ch06PhoneStudentName.doc*.

Element	Best	Adequate
File name	Ch06PhoneStudentName.doc	Ch06PhoneStudentName.docx
Choose the correct dialing codes for making international telephone calls	Title; screen capture showing the country code and map of one of the countries other than Brazil	Same as Best
Identify dialing techniques used with cell phones to make international telephone calls	A screen capture from the video on how to enter a plus sign on a cell phone; a screen capture that shows the links to CountryCode.org and Howtocallinternationally.com in the Project Management folder in the favorites or bookmarks	Same as Best

9. Save the file and submit it as directed by the instructor.

Practice Using International Dialing Codes

Selecting the appropriate numbers to use from a business card for placing an international call requires practice. In this exercise, you practice using your knowledge of international calling codes to compare your answers to reference answers that are hidden on a spreadsheet.

Using a Spreadsheet for Practice

1. Navigate to the location where the student files for chapter exercises are located and then open [6.3.3 PhonePractice.xls](#). Save the file as *Ch06PhonePracticeStudentName.xls* using the Excel 2003 file format.
2. Use the skills you practiced in this chapter and in previous exercises to answer the first question in cell C2. You are allowed to open a browser and refer to websites for assistance.
3. Notice that if you type and enter the correct answer, in exactly the format indicated, the cell background turns green, as shown in [Figure 6.30 "Background Turns Green If Correct"](#).

Figure 6.30 Background Turns Green If Correct

	A	B	C	E
1	#	Questions	Answers	Analysis
2	1	In what time zone is Atlanta? (use UT code; e.g., UT-x:00 or UT+x:00)	UT-5:00	

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4. Observe that column D is hidden. It contains a set of correct answers. The spreadsheet's conditional formatting feature is used to change the background color if the cell content matches the hidden answer.
5. Use your web references and personal knowledge to answer the remaining questions. Place the answers in column C. If some of the answers do not turn green, check your work. If you cannot determine the error, move on to the next question. Answer all the questions, even if some of the answers are wrong or do not match the reference answer exactly.
6. Select columns C through E. To accomplish this, you may click and drag the column headings from C through E, or you can click the column C heading, hold the Shift key, and click the column E heading. Columns C, D, and E are selected, even though column D is hidden, as shown in [Figure 6.31 "Columns C, D, and E Selected"](#).

Figure 6.31 Columns C, D, and E Selected

	A	B	C	E
1	#	Questions	Answers	Analysis
2	1	In what time zone is Atlanta? (use UT code; e.g., UT-x:00 or UT+x:00)	UT-5:00	

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7. Move the pointer onto either column, then right-click. On the shortcut menu, click *Unhide*. The answers in column D are displayed.
8. Locate any answers that are still displayed in red. Compare your answer to the reference answer. In the Analysis column on the same row, analyze and explain why your answer did not match the reference answer. Use this opportunity to correct misunderstandings.
9. Save the spreadsheet. Check your work to assure that it is complete using the following table:

Element	Best	Adequate
File name	Ch06PhonePracticeStudentName.xls	Ch06PhonePracticeStudent
Select the appropriate times and methods for making international calls	All incorrect answers are analyzed; the cause of the error correctly identified	All correct

10. Save the file and submit it as directed by the instructor.

Using a Newsreader

Some projects are directly affected by external factors such as political elections, economic trends, corporate mergers, technological or scientific breakthroughs, or weather. To keep informed about these factors, you can subscribe to online news sources. A method that facilitates this process is Really Simple Syndication (RSS). To use this service, you need a newsreader so you can subscribe to RSS feeds. For this activity, you need a Google account. If you do not have one, go to Google.com and create one for no cost.