A *handbook*, as we are defining it here, is a combination of concept, instruction, and reference information focused on a specific topic for a specific audience's needs.

**Handbook Basics**

**Concepts**

Conceptual information explains how things work, how things are put together. For more complex instructions, you have to know some concepts, theory, background, and principles to perform the instructions. Consider the example of the software function that enables you to modify or create your own color. Using something like Photoshop, Illustration, CorelDraw or Paint Shop Pro to do this—the actual buttons and sliders—is easy. But understanding how hue, intensity, brightness, saturation, density, contrast, and RGB work—that's hard. You have to know computer color theory to create the color you need.

Consider another example: simple Linux file system commands—ls, cd, cp, mv, pwd. To use these commands, you need to understand what files and directories are, and probably what an operating system is as well as wildcards. You really can't understand how to use these commands—follow instructions using them—unless you understand these basic concepts.

**Instructions**

If you do understand the fundamental concepts, then you can intelligently follow the step-by-step procedures. Instructions are those familiar numbered-list things that carefully walk you through a procedure. Instructions are everywhere, on product packaging, in user guides that come with appliances, and on computers.

**Reference**

The last category of information involves look-up information, or quick-reference information. If you followed the file system example above, you had to study and learn the concepts of files, directory, and wildcards first. Then you could follow and understand the instructions on changing directories, copying, deleting, or moving files. After a while though you no longer need the instructions, but now and then you have special requirements not covered in the instruction section or you can't remember certain procedures that were covered in the instruction section. Now's the time you need basic reference information: you just go to that section and quickly look it up.

And so after more time, you no longer need the concepts section and the instructions section: you gotten so accustomed to those procedures, you know them by heart. But now and then you forget some little detail or you have some special task you've never done before—that's when you go to the reference section. You could probably tear off the concepts and instructions sections and throw them away. All you'll ever need is the reference section.

**Handbook Format and Style**

In creating a handbook, you should adhere to rather specific guidelines for the use of headings, lists, notices, graphics, tables, documentation, and introductions—which of course assumes that you must use these things:

**Handbook prototype**

From the link below you can get a dummy version of the handbook. It includes all the required pages in good format. Included in this Word document are paragraph and character styles that will make your work easier and add some professional skills to your repertoire.

**Contents prototype**
The prototype for the table of contents is particularly useful: it gives you the Word styles to produce a professional-looking TOC. It is tough to get the left- and right-alignments and leader dots right.

Table of contents prototype

Actually, these same prototypes can be used for any formal report.
Titles, Abstracts, Introductions, Conclusions

Title it, summarize it, introduce it, conclude it

Formal technical reports over eight to ten pages contain several components that deserve their own focus because they are important in technical reports and because people are unfamiliar with them:

- **Titles** explores strategies for making document titles specific but not paragraphs long.
- **Abstracts** provide several kinds of summaries of the report contents and conclusions.
- **Introductions** get readers ready to read reports by indicating the topic, purpose, intended audience, contents, and other such matters.
- **Conclusions** shape how readers view and understand the report upon leaving it.

Abstracts

Summarize it

An *abstract* is a summary of a body of information. Sometimes, abstracts are in fact called summaries—sometimes, executive summaries or executive abstracts. The business and scientific worlds define different types of abstracts according to their needs. If you are taking a technical writing course based on this online textbook, your technical report (depending on your instructor) may use two types: the descriptive abstract and the informative abstract.

See examples of abstracts as they occur within technical reports.

Descriptive Abstracts

The descriptive abstract provides a description of the report's main topic and purpose as well an overview of its contents. As you can see from the example, it is very short—usually a brief one- or two-sentence paragraph. In this report design, it appears on the title page. You may have noticed something similar to this type of abstract at the beginning of journal articles.

In this type of abstract, you don't summarize any of the facts or conclusions of the report. The descriptive abstract does *not* say something like this:

```
Problem: Based on an exhaustive review of currently available products, this report concludes that none of the available grammar-checking software products provides any useful function to writers.
```

This is the style of summarizing you find in the informative abstract. Instead, the descriptive abstract says something like this:

```
Revision: This report provides conclusions and recommendations on the grammar-checking software that is currently available.
```
The descriptive abstract is little like a program teaser. Or, to use a different analogy, it is as if the major first-level headings of the table of contents have been rewritten in paragraph format.

Descriptive abstract on report title page.

Informative Abstracts

The informative abstract, as its name implies, provides information from the body of the report—specifically, the key facts and conclusions. To put it another way, this type of abstract summarizes the key information from every major section in the body of the report.

It is as if someone had taken a yellow marker and highlighted all the key points in the body of the report then vacuumed them up into a one- or two-page document. (Of course, then some editing and rewriting would be necessary to make the abstract readable.) Specifically, the requirements for the informative abstract are as follows:

- Summarize the key facts, conclusions, and other important information in the body of the report.
- Equals about 10 percent of the length of a 10-page report: for example, an informative abstract for a 10-page report would be 1 page. This ratio stops after about 30 pages, however. For 50- or 60-page reports, the abstract should not go over 2 to 3 pages.
- Summarize the key information from each of the main sections of the report, and proportionately so (a 3-page section of a 10-page report ought to take up about 30 percent of the informative abstract).
- Phrase information in a very dense, compact way. Sentences are longer than normal and are crammed with information. The abstract tries to compact information down to that 10-percent level (or lower for longer reports). While it's expected that the writing in an informative abstract will be dense and heavily worded, do not omit normal words such as the, a, and an.
- Omit introductory explanation, unless that is the focus of the main body of the report. Definitions and other background information are omitted if they are not the major focus of the report. The informative abstract is not an introduction to the subject matter of the report—and it is not an introduction!
- Omit citations for source borrowings. If you summarize information that you borrowed from other writers, you do not have to repeat the citation in the informative abstract (in other words, no brackets with source numbers and page numbers).
- Include key statistical detail. Don't sacrifice key numerical facts to make the informative abstract brief. One expects to see numerical data in an informative abstract.
- Omit descriptive-abstract phrasing. You should not see phrasing like this: "This report presents conclusions and recommendations from a survey done on grammar-checking software." Instead, the informative abstract presents the details of those conclusions and recommendations.

This last point is particularly important. People often confuse the kinds of writing expected in descriptive and informative abstracts. Study the difference between the informative and descriptive phrasing in the following examples:

| Informative: Based on an exhaustive review of currently available products, this report concludes that none of the available grammar-checking software products provides any useful function to writers. |
| Descriptive: This report provides conclusions and recommendations on the grammar-checking software that is currently available. |

ABSTRACT

Computerized speech recognition takes advantage of the most natural form of communication, the human voice. During speech, sound is generated by the vocal cords and by air rushing from the lungs. If the vocal cords vibrate, a voiced sound is produced; otherwise, the sound is unvoiced. The main problem in speech recognition is that no two voices produce their sounds alike and that an individual voice varies in different conditions. Because voices do vary and because words blend together in a continuous stream in natural speech, most
recognition systems require that each speaker train the machine to his or her
voice and that words have at least one-tenth of a second pause between them.
Such a system is called an isolated word recognition system and consists of
three major components that process human speech: (1) the preprocessor
which removes irregularities from the speech signal and then breaks it up into
parts; (2) the feature extractor which extracts 32 key features from the signal;
and (3) the classification phase which identifies the spoken word and includes
the training mode and reference pattern memory. Spoken words are identified
on the basis of a certain decision algorithm, some of which involve dynamic
programming, zero crossing rate, linear predictive coding, and the use of a
state diagram.

Voice recognition systems offer many applications including data entry, freedom
for mobility, security uses, telephone access, and helpful devices for the
handicapped. However, these same systems also face problems such as poor
recognition accuracy, loss of privacy among those who use them, and limited
vocabulary sizes. The goal of the industry is the development of speaker-
independent systems that can recognize continuous human speech regardless
of the speaker and that can continually improve their vocabulary size and
recognition accuracy.

Informative abstract. This type summarizes the key facts and conclusions in the body of the report. (By the way, speech recognition has come a long way since this report was written in 1982!)

Executive Summary

The executive summary is a hybrid of the descriptive and informative summaries. Written for executives whose
focus is business decisions and whose background is not necessarily technical, it focuses on conclusions and
recommendations but provides little background, theory, results, or other such detail. It doesn't summarize research
theory or method; it makes descriptive-summary statements: for example, “theory of heat gain, loss, and storage is
also discussed.”

To get a sense of the executive summary, study the following example:

**EXECUTIVE SUMMARY** Rural Health Clinics: Requirements The most
important needs of rural health clinics, which require energy resources,
are as follows: Refrigeration. Absorption refrigeration, fueled by
propane or kerosene and common at unelectrified health clinics, is
vulnerable to interruption and is thus inadequate for the vaccines
needed in immunization programs for dangerous diseases including
polio, diptheria, tetanus, pertussis, tuberculosis, measles, yellow fever,
and Hepatitis B. Instead, compression-type refrigerators powered by
12- or 24-volt storage batteries and recharged by photovoltaic panels or
a small wind turbine can meet these needs. Lighting. Instead of
kerosene lighting, common in unelectrified communities and a known
safety hazard and contributor to poor indoor air quality as well,
renewable energy technologies can improve lighting in rural health
clinics for such important functions as emergency treatment, birthing,
maternity care, surgery, and administrative tasks. Communications.
Health care services and emergency medical treatment, in particular,
are greatly facilitated with reliable radio and radio-telephone
communications to other health clinics and facilities in the region. Rural
health clinics can have reliable two-way regional communication via
VHF radio with electricity provided by a single 30-W PV module.
Medical appliances. Small medical appliances that operate on 120-volt
AC electricity require an inverter, which is easily incorporated into wind-
or solar-based systems. Although photovoltaic systems can provide the electricity needed for the high temperatures, approximately 120°C (250°F) needed in sterilization, solar thermal collector systems can produce high temperatures at a lower cost, especially in areas with good solar insolation. Water. Solar and wind power can be used to generate high volumes of potable water in tandem with techniques such as ozone treatment, reverse osmosis, photochemical treatment, also known as ultraviolet or UV, disinfection and carbon filters. Ozone treatment is very suitable to solar- or wind-generated power requiring only 0.3 watt-hours per liter. Clean water can also be provided from deep wells but requires an energy source for pumping significant volumes. Solar or wind power (or both) generated on site can economically meet the broad range of these needs.

Executive summary.

Revision Checklist for Abstracts

As you reread and revise your abstracts, watch out for problems such as the following:

- Make sure that the descriptive abstract does not include informative abstract phrasing; make sure that the informative abstract does not include descriptive abstract phrasing.
- Make sure the descriptive abstract provides an overview of the topics covered in all the major sections of the report.
- Make sure that the informative abstract summarizes all the major sections of the report. (And don't forget—the informative abstract is not an introduction!)
- Make sure the informative abstract summarizes all key concepts, conclusions, and facts from the body of the report (including key statistical information).
- Make sure that the informative abstract excludes general, obvious, deadwood information and that the phrasing is compact and concentrated.
- Make sure that the informative abstract is neither too brief (less than 10 percent) nor too long (more than 15 percent).

Introductions

Get readers ready to read that document

The introduction is one of the most important sections of a report—or, for that matter, any document—but introductions are often poorly written. One reason may be that people misunderstand the purpose of introductions. An introduction introduces readers to the report and not necessarily, or only minimally, to the subject matter. "Introduction" does not equal "background"; it may contain some background but only minimally.

Readers have an understandable need to know some basic things about a report before they begin reading it: such as what is it about, why was it written, what's it for, for whom it written, and what are its main contents. Readers need a basic orientation to the topic, purpose, situation, and contents of a report—in other words, an introduction.

Imagine that, years ago, you were writing a recommendation report about CD-ROM computer devices. You might be tempted to use the introduction to discuss the background of compact disc development or its theoretical side. That might be good stuff to include in the report, and it probably belongs in the report—but not in the introduction, or at least not in much detail or length.

For 10-page reports, introductions might average one half to one full page. On that one page, you might have three paragraphs. One of those paragraphs could be devoted to background information—in other words, to introducing the subject matter. But the other two paragraphs must do the job of introducing the report and orienting the reader to the report, as discussed in the following.
Be sure to check out the additional examples: **introductions to instructions and reports**.

### Common Elements of Introductions

**Note:** If you are writing a brief 1- to 2-page document, be sure to read the following section on **introductions to brief documents**.

Each of the following elements is not required in all introductions, and some elements combine into the same sentence. Rather than mechanically applying these elements, write the introduction that seems good to you, then come back and search for these elements in it.

**Topic.** Early in the introduction, indicate the specific topic of the report. Some introductions seem to want to hold readers in suspense for a while before they indicate the true topic—that's a gamble. Better is to indicate the topic early—such that you could circle the topic words in the first three to four lines.

**Purpose and situation.** A good introduction needs to indicate why it was written, for whom, and for what purpose. If the report provides recommendations on whether to implement a program, the introduction needs to indicate that purpose. You might also consider indicating something of the scope of the report—what it is *not* intended to accomplish.

**Audience.** Indicate who are the appropriate or intended readers of the report—for example, "experienced technicians trained on the HAL/6000." Indicate what level of experience or knowledge readers need to understand the report, if any. If none is needed, say that. If the report was prepared for council members of the City of Utopia, Texas, the introduction needs to express that.

**Overview of contents.** Indicate the main contents of the report. You can do this with an in-sentence list, as the examples illustrate. If you are concerned about readers; exaggerated expectations, indicate what topics the report does *not* cover.

**Background on the topic.** This is everybody's favorite! Some minimal background is usually in an introduction—for example, key definitions, historical background, theory, the importance of the subject. Information like this gets readers interested, motivated to read, grounded in some fundamental concepts. Watch out, though—this discussion can get away from you and fill up more than a page. If it does, that's okay—all is not lost. Move it in to the body of the report, or into an appendix.

**Background on the situation.** Another kind of background is also a good candidate for introductions—the situation that brought about the need for the report. For example, if there were a lot of conflicting data about some new technology, which brought about the need for the research, this background could be summarized in the introduction. For example, if a company needed new equipment of some kind or if the company had some problem or need and some requirements in relation to that equipment—discussion of these matters should go in the introduction.

Notice in the discussion of these elements the word "indicate" keeps getting used. That's because you'd like to avoid heavy-handed language such as "The topic of this report is..." or "This report has been written for..." Notice how the example introductions generally avoid this kind of phrasing.

Example introduction to a lengthy report with contract elements included. (Opens as a popup; resize for better viewing.)

Example of another lengthy report introduction again, with contract elements included. (Opens as a popup; resize for better viewing.)

### Introductions to Brief Documents

Be sure to check out the additional examples: **introductions to instructions and reports**.

If you are writing a brief document of 1 to 2 pages, you don't need all those elements common to report introductions discussed in the preceding section. Here's the subset of what you are likely to need:

**Topic.** If you can circle the topic words somewhere in the first three to four lines of the introduction, you're good.
Purpose and situation. In instructions, it's enough to tell readers that they are going to see how to do something. In a recommendation report, just mention that readers will be seeing conclusions and recommendations.

Audience. Indicate what level of experience or knowledge readers need to understand the document. If none is needed, say that.

Overview of contents. Indicate the main contents of the document. A simple in-sentence list will do.

Background. Always remember that an introduction is not a background discussion; it may contain some, but only minimally.

Example of a brief introduction with most of the key elements present.

Section Introductions

We don't normally think that there is more than one introduction in a report. However, in reports over 8 to 10 or more pages, the individual sections also need some sort of introduction. These can be called section introductions because they prepare readers to read a section of a report—they orient readers to its contents and purpose and show some linkage to the preceding section.

Of course, a section introduction need not have all the elements of a report introduction. However, it does have several that, if handled well, can make a lot of difference in the clarity and flow of a report.

Example section introduction. Notice that this section introduction not only mentions the preceding and upcoming topics but shows how they are related. (From a report written in 1983.)

Topic indication. As with the report introduction, indicate the topic of the upcoming section. But remember—it doesn't have to be the stodgy, heavy-handed "The topic of this next section of the report is..."

Contents overview. Just as in the report introduction, it is a good idea to list the main contents. The in-sentence list serves this purpose well.

Transition. An element that is very useful in section introductions is transitional phrasing that indicates how the preceding section relates to the one about to start. In reports of any length and complexity, it is a good technique—it guides readers along, showing them how the parts of the report all fit together.

Revision Checklist for Introductions

As you revise your introductions, watch out for problems such as the following:

- Avoid writing an introduction consisting of only background information; avoid allowing background information to overwhelm the key elements of the introduction.
- Make sure to indicate the topic early.
- Be sure to indicate the audience and situation—what the readers should expect from the report; what knowledge or background they need to understand the report; what situation brought about the need for the report.
- Make sure there is an overview of the report contents, plus scope information—what the report doesn’t cover.

Conclusions

Get it over with . . . gracefully
We normally use the word "conclusion" to refer to that last section or paragraph or a document. Actually, however, the word refers more to a specific type of final section. If we were going to be fussy about it, the current chapter should be called "Final Sections," which covers all possibilities.

There seem to be at least four ways to end a report: a summary, a true conclusion, an afterword, and nothing. Yes, it is possible to end a document with no conclusion (or "final section") whatsoever. However, in most cases, that's a bit like slamming the phone down without even saying good-bye. More often, the final section is some combination of the first three ways of ending the document.

**Summaries**

One common way to wrap up a report is to review and summarize the high points. If your report is rather long, complex, heavily detailed, and if you want your readers to come away with the right perspective, a summary is in order. For short reports, summaries can seem absurd—the reader thinks "You've just told me that!" Summaries need to read as if time has passed, things have settled down, and the writer is viewing the subject from higher ground.

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**VIII. SUMMARY**

This report has shown that as the supply of fresh water decreases, desalting water will become a necessity. While a number of different methods are in competition with each other, freezing methods of desalination appear to have the greatest potential for the future.

The three main freezing techniques are the direct method, the indirect method, and the hydrate method. Each has some advantage over the others, but all three freezing methods have distinct advantages over other methods of desalination. Because freezing methods operate at such low temperatures, scaling and corrosion of pipe and other equipment is greatly reduced. In non-freezing methods, corrosion is a great problem that is difficult and expensive to prevent. Freezing processes also allow the use of plastic and other protective coatings on steel equipment to prevent corrosion, a measure that cannot be taken in other methods that require high operating temperatures.

Desalination, as this report has shown, requires much energy, regardless of the method. Therefore, pairing desalination plants with nuclear or solar power resources may be a necessity. Some of the expense of desalination can be offset, however . . .

*Summary-type of final section.* From a report written in the 1980s.

**"True" Conclusions**

A "true" conclusion is a logical thing. For example, in the body of a report, you might present conflicting theories and explored the related data. Or you might have compared different models and brands of some product. In the conclusion, the "true" conclusion, you'd present your resolution of the conflicting theories, your choice of the best model or brand—your final conclusions.

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**V. CONCLUSIONS**

Solar heating can be an aid in fighting high fuel bills if planned carefully, as has been shown in preceding sections. Every home represents a different set of conditions; the best system for one home may not be the best one for next door. A salesman can make any system appear to be profitable on paper, and therefore prospective buyers must have some general knowledge about solar products.
A solar heating system should have as many of the best design features as possible and still be affordable. As explained in this report, the collector should have high transmissivity and yet be durable enough to handle hail storms. Collector insulation should be at least one inch of fiberglass mat. Liquid circulating coils should be at least one inch in diameter if an open loop system is used. The control module should perform all the required functions with no added circuits. Any hot water circulating pumps should be isolated from the electric drive motor by a non-transmitting coupler of some kind.

Homeowners should follow the recommendations in the guidelines section carefully. In particular, they should decide how much money they are willing to spend and then arrange their components in their order of importance. Control module designs vary the most in quality and therefore should have first priority. The collector is the second in importance, and care should be taken to ensure compatibility. Careful attention to the details of the design and selection of solar heating devices discussed in this report will enable homeowners to install efficient, productive solar heating systems.

A "true"-conclusions final section. This type states conclusions based on the discussion contained in the body of the report. (From a report written in the 1980s.)

Afterwords

One last possibility for ending a report involves turning to some related topic but discussing it at a very general level. Imagine that you had written a background report on some exciting new technology. In the final section, you might broaden your focus and discuss how that technology might be used, or the problems it might bring about. But the key is to keep it general—don't force yourself into a whole new detailed section.

VII. CONCLUSION: FUTURE TRENDS

Everyone seems to agree that the car of the future must weigh even less than today's down-sized models. According to a recent forecast by the Arthur Anderson Company, the typical car will have lost about 1,000 pounds between 1978 and 1990 [2:40]. The National Highway Traffic Safety Administration estimates the loss of another 350 pounds by 1995. To obtain these reductions, automobile manufacturers will have find or develop composites such as fiber-reinforced plastics for the major load-bearing components, particularly the frame and drivetrain components.

Ford Motor Company believes that if it is to achieve further growth in the late 1980's, it must achieve breakthroughs in structural and semistructural load-bearing applications. Some of the breakthroughs Ford sees as needed include improvements in the use of continuous fibers, especially hybridized reinforced materials containing glass and graphite fibers. In addition, Ford hopes to develop a high speed production system for continuous fiber preforms. In the related area of composite technology, researchers at Owens Corning and Hercules are seeking the best combination of hybrid fibers for structural automotive components such as engine and transmission supports, drive shafts, and leaf springs. Tests thus far have led the vice president of Owen Corning's Composites and Equipment Marketing Division, John B. Jenks, to predict that hybrid composites can compete with metal by the mid-1980's for both automotive leaf springs and transmission supports.
With development in these areas of plastics for automobiles, we can look forward to lighter, less expensive, and more economical cars in the next decade. Such developments might well provide the needed spark to rejuvenate America's auto industry and to further decrease our rate of petroleum consumption.

**Afterword-type final section.** The main body of the report discussed technical aspects of using plastics in main structural components of automobiles. This final section explores the future, looking at current developments, speculating on the impact of this trend.

**Combinations**

In practice, the preceding ways of ending reports often combine. You can analyze final sections of reports and identify elements that summarize, elements that conclude, and elements that discuss something related but at a general level (afterwords).

Here are some possibilities for afterword-type final sections:

- Provide a brief, general look to the future; speculate on future developments.
- Explore solutions to problems that were discussed in the main body of the report.
- Discuss the operation of a mechanism or technology that was described in the main body of the report.
- Provide some cautions, guidelines, tips, or preview of advanced functions.
- Explore the economics, social implications, problems, legal aspects, advantages, disadvantages, benefits, or applications of the report subject (but only generally and briefly).

**Revision Checklist for Conclusions**

As you reread and revise your conclusions, watch out for problems such as the following:

- If you use an afterword-type last section, make sure you write it at a general enough level that it doesn't seem like yet another body section of the report.
- Avoid conclusions for which there is no basis (discussion, support) in the body of report.
- Keep final sections brief and general.
Oral Presentations

A common assignment in technical writing courses—not to mention in the workplace—is to prepare and deliver an oral presentation, a task most of us would be happy to avoid. However, while employers look for coursework and experience in preparing written documents, they also look for experience in oral presentations as well. Look back at the first chapter. Remember how important interpersonal communication skills are in the workplace.

The following was written for a standard face-to-face classroom setting. If you are taking the online version of Sexy Technical Writing, oral reports can be sent in as "scripts," or audio versions can be transmitted live or recorded. The learning management system, Desire2Learn, offers MediaSpace as a tool for students to use for creating presentations, and both the drop box and the discussion forum provide means to upload audio and video. In any case, students may evaluate each other’s oral reports by filling out a form like the one provided at the end of this chapter or responding through the discussion board.

If you can believe the research, most people would rather have root canal surgery without novocaine than stand up in front of a group and speak. It truly is one of the great stressors. But with some help from the resources that follow, you can be a champion presenter.

When you finish this chapter, you should be able to plan and prepare a talk or presentation, deliver the presentation, create presentation materials that reflect standards of effective presentation, and evaluate presentations delivered by others, including classmates.

For additional information on oral presentations and public speaking in general, see:

- Effective Presentations. Part of an online tutorial series provided by Kansas University Medical Center. This section has many resources that will be helpful to you.

Topic and Situation for the Oral Presentation

For the oral report in a technical writing course, imagine that you are formally handing over your final written report to the people with whom you set up the hypothetical contract or agreement. For example, imagine that you had contracted with a software company to write its user guide. Once you had completed it, you’d have a meeting with chief officers to formally deliver the guide. You’d spend some time orienting them to the guide, showing them how it is organized and written, and discussing some of its highlights. Your goal is to get them acquainted with the guide and to prompt them for any concerns or questions. (Your class will gladly pretend to be whomever you tell them to be during your talk.)

As you can see, you shouldn't have to do any research to prepare for this assignment—just plan the details of your talk and get at least one visual ready. If you have a report topic that you’d prefer not to present orally, discuss other possibilities with your instructor. Here are some brainstorming possibilities in case you want to present something else:

- **Purpose:** One way to find a topic is to think about the purpose of your talk. Is it to instruct (for example, to explain how to run a text editing program on a computer), to persuade (to vote for or against a certain technically oriented bond issue), or simply to inform (to report on citizen participation in the new recycling program).
  - **Informative purpose:** An oral report can be primarily informative. For example, as a member of a committee involved in a project to relocate the plant, your job might be to give an oral report on the condition of the building and grounds at one of the sites proposed for purchase. Or, you might be required to go before the city council and report on the success of the new city-sponsored recycling project.
  - **Instructional purpose:** An oral report can be instructional. Your task might be to train new employees to use certain equipment or to perform certain routine tasks.
  - **Persuasive purpose:** An oral report can be persuasive. You might want to convince members of local civic organizations to support a city-wide recycling program. You might appear before city council to persuade its members to reserve certain city-owned lands for park areas, softball and baseball parks, or community gardens.
- **Topics:** You can start by thinking of a technical subject, for example, solar panels, microprocessors, drip irrigation, or laser surgery. For your oral report, think of a subject you’d be interested in talking about, but find a reason why an audience would want to hear your oral report.

- **Place or situation:** You can find topics for oral reports or make more detailed plans for them by thinking about the place or the situation in which your oral report might naturally be given: at a neighborhood association? at the parent–teachers’ association meeting? at a church meeting? at the gardening club? at a city council meeting? at a meeting of the board of directors or high-level executives of a company? Thinking about an oral report this way makes you focus on the audience, their reasons for listening to you, and their interests and background. As in all technical writing situations, identifying and understanding your audience is of the utmost importance.

## Contents and Requirements for the Oral Presentation

The focus for your oral presentation is clear, understandable presentation; well-organized, well-planned, well-timed discussion. You don’t need to be Mr. or Ms. Slick-Operator—just present the essentials of what you have to say in a calm, organized, well-planned manner.

When you give your oral presentation, we’ll all be listening for the same things. Use the following as a requirements list, as a way of focusing your preparations:

- Plan to explain to the class what the situation of your oral report is, who you are, and who they should imagine they are. Make sure that there is a clean break between this brief explanation and the beginning of your actual oral report.
- Make sure your oral report lasts no longer than the time allotted. Your instructor will work out some signals to indicate when the mark is approaching, has arrived, or has passed.
- Pay special attention to the introduction to your talk: Here’s where you tell your audience what you are going to tell them.
  - Indicate the purpose of your oral report
  - give an overview of its contents
  - find some way to interest the audience.
- Use at least one visual—preferably slides using presentation software (such as Powerpoint) or transparencies for the overhead projector. Flip charts and objects for display are okay. But avoid scribbling stuff on the chalkboard or whiteboard or relying strictly on handouts.
- Make sure you discuss key elements of your visuals. Don’t just throw them up there and ignore them. Point out things about them; explain them to the audience.
- Plan to explain any technical aspect of your topic clearly and understandably. Don’t race through complex, technical stuff—slow down and explain it carefully so that we understand it.
- Use "verbal headings"—by now, you’ve gotten used to using headings in your written work. There is a corollary in oral reports. With these, you give your audience a very clear signal you are moving from one topic or part of your talk to the next. Your presentation visual can signal your headings.
- Plan your report in advance and practice it so that it is organized. Make sure that listeners know what you are talking about and why, which part of the talk you are in, and what’s coming next. Overviews and verbal headings greatly contribute to this sense of organization.
- End with a real conclusion. People sometimes forget to plan how to end an oral report and end by just trailing off into a mumble. Remember that in conclusions, you can:
  - **summarize** (go back over high points of what you’ve discussed)
  - **conclude** (state some logical conclusion based on what you have presented)
  - provide some **last thought** (end with some final interesting point but general enough not to require elaboration)
- or some combination of these three
- And certainly, you’ll want to prompt the audience for questions and concerns.
- As mentioned above, be sure your oral report is carefully timed. Some ideas on how to work within an allotted time frame are presented in the next section.

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http://distanceed.hss.kennesaw.edu/technicalcommunication/chapters/2_12OralPresentation/2_12OralPresentation_print.html

2/7
Preparing for the Oral Presentation

Pick the method of preparing for the talk that best suits your comfort level with public speaking and with your topic. However, plan to do ample preparation and rehearsal—some people assume that they can just jump up there and ad lib forso many minutes and be relaxed and informal. It doesn't often work that way—drawing a mental blank is the more common experience. A well delivered presentation is the result of a lot of work and a lot of practice.

Here are the obvious possibilities for preparation and delivery:

- Write a script, practice it; keep it around for quick-reference during your talk.
- Set up an outline of your talk; practice with it, bring it for reference.
- Set up cue cards, practice with them, and use them during your talk.
- Write a script and read from it.

Of course, the extemporaneous or impromptu methods are also out there for the brave and the adventurous. However, please bear in mind that up to 25 people will be listening to you—you owe them a good presentation, one that is clear, understandable, well-planned, organized, and on target with your purpose and audience.

It doesn't matter which method you use to prepare for the talk, but you want to make sure that you know your material. The head-down style of reading your report directly from a script has problems. There is little or no eye contact or interaction with the audience. The delivery tends toward a dull, boring monotone that either puts listeners off or is hard to understand. And, most of us cannot stand to have reports read to us!

For many reasons, most people get nervous when they have to give oral presentations. Being well prepared is your best defense against the nerves. Try to remember that your classmates and instructor are a very forgiving, supportive group. You don't have to be a slick entertainer—just be clear, organized, and understandable. The nerves will wear off someday, the more oral presenting you do. In the meantime, breathe deeply and enjoy.

The following is an example of an introduction to an oral presentation. Use it as a guide for planning your own.
Delivering an Oral Presentation

When you give an oral report, focus on common problem areas such as these:

- **Timing**—Make sure you keep within the time limit. Finishing more than a minute under the time limit is also a problem. Rehearse, rehearse, rehearse until you get the timing just right.
- **Volume**—Obviously, you must be sure to speak loud enough so that all of your audience can hear you. You might find some way to practice speaking a little louder in the days before the oral presentation.
- **Pacing, speed**—Sometimes, oral presentators who are nervous talk too fast. All that adrenaline causes them to speed through their talk, making it hard for the audience to follow. In general, it helps listeners understand you better if you speak a bit more slowly and deliberately than you do in normal conversation. Slow down, take it easy, be clear...and breathe.
- **Gestures and posture**—Watch out for nervous hands flying all over the place. This too can be distracting—and a bit comical. At the same time, don’t turn yourself into a mannikin. Plan to keep your hands clasped together or holding onto the podium and only occasionally making some gesture. Definitely keep your hands out of your pockets or waistband. As for posture, avoid slouching at the podium or leaning against the wall. Stand up straight, and keep your head up.
- **Verbal crutches**—Watch out for too much "uh," "you know," "okay" and other kinds of nervous verbal habits. Instead of saying "uh" or "you know" every three seconds, just don’t say anything at all. In the days before your oral presentation, practice speaking without these verbal crutches. The silence that replaces them is not a bad thing—it gives listeners time to process what you are saying.

The following is an example of how topic headings can make your presentation easy for your listeners to follow.
Excerpts from an oral report

As you can see from the preceding, our fairly average-size city produces a surprisingly large amount of solid waste. What is the cost of getting rid of it? I can tell you from the start that it is not cheap...

[discussion of the costs of disposal]

...Not only are the costs of getting rid of our garbage high, as I have shown, but it’s getting harder and harder for city officials to find areas in which to get rid of it. The geographical problems in disposal ....]

Verbal headings

The first sentence refers to the topic “amount”—what the speaker has just finished talking about.

The next sentence indicates that the speaker is moving on to a new topic (“cost”).

At the beginning of this next section, the first half of the first sentence refers to the previous topic—this time, it’s “costs.” The second half of the same sentence indicates that we are moving on to another new topic—“geographical problems in disposal.”

Examples of verbal headings in an oral presentation.

Planning and Preparing Visuals for Oral Presentations

Prepare at least one visual for this report. Here are some ideas for the "medium" to use for your visuals:

- **Presentation software slides**—Projecting images ("slides") using software such as Powerpoint has become the standard, even though maligned by some. One common problem with the construction of these slides is cramming too much information on individual slides. A quick search on terms like Powerpoint presentation will enable you to read about creating these slides and designing them intelligently. Of course, the room in which you use these slides has to have a computer projector.

- **Transparencies for overhead projector**—The overhead projector used with transparencies seems to have been relegated to antiquity—but not entirely. If you have to use this method, you will design your visual on a sheet of blank paper, then photocopy it, and create a transparency of it.

- **Posterboard-size charts**—Another possibility is to get some posterboard and draw and letter what you want your audience to see. Of course, it's not easy making charts look neat and professional.

- **Handouts**—You can run off copies of what you want your listeners to see and hand them out before or during your talk. This option is even less effective than the first two because you can't point to what you want your listeners to see and because handouts distract listeners' attention away from you. Still, for certain visual needs, handouts are the only choice. Keep in mind that if you are not well prepared, the handouts become a place for your distracted audience to doodle.

- **Objects**—If you need to demonstrate certain procedures, you may need to bring in actual physical objects. Rehearse what you are going to do with these objects; sometimes they can take up a lot more time than you expect.

Avoid just scribbling your visual on the chalkboard or whiteboard. Whatever you scribble can be neatly prepared and made into a presentation slide, transparency, or posterboard-size chart. Take some time to make your visuals look sharp and professional—do your best to ensure that they are legible to the entire audience.

As for the content of your visuals, consider these ideas:
• **Drawing or diagram of key objects**—If you describe or refer to any objects during your talk, try to get visuals of them so that you can point to different components or features.

• **Tables, charts, graphs**—If you discuss statistical data, present it in some form or table, chart, or graph. Many members of your audience may be less comfortable "hearing" such data as opposed to seeing it.

• **Outline of your talk, report, or both**—If you are at a loss for visuals to use in your oral presentation, or if your presentation is complex, have an outline of it that you can show at various points during your talk.

• **Key terms and definitions**—A good idea for visuals (especially when you can't think of any others) is to set up a two-column list of key terms you use during your oral presentation with their definitions in the second column.

• **Key concepts or points**—Similarly, you can list your key points and show them in visuals. (Outlines, key terms, and main points are all good, legitimate ways of incorporating visuals into oral presentations when you can't think of any others.)

During your actual oral report, make sure to discuss your visuals, refer to them, guide your listeners through the key points in your visuals. It's a big problem just to throw a visual up on the screen and never even refer to it.

As you prepare your visuals, look at resources that will help you. There are many rules for using PowerPoint, down to the font size and how many words to put on a single slide, but you will have to choose the style that best suits your subject and your presentation style.

The two videos that follow will provide some pointers. As you watch them, make some notes to help you remember what you learn from them. The first one is funny...**Life After Death by PowerPoint by Don McMillan, an engineer turned comedian.**

You may also have heard about the presentation skills of Steve Jobs. The video that follows is the introduction of the I-Phone...and as you watch, take notes on how Jobs sets up his talk and his visuals. Observe how he connects with the audience...and then see if you can work some of his strategies into your own presentation skills. This is a long video...you don't need to watch it all, but do take enough time to form some good impressions.

Now you are ready! Go to the exercises below as warm ups to help you start working towards that big day!

### Activities and Exercises

1. Ready to get started? Think of a topic that interests you and develop an introduction to a talk about it that follows the guidelines in the chapter for writing an introduction. Try it out on a classmate. Then, take turns asking each other questions about your topic.

2. Design 3 visuals for your topic, including a title page. Use the Styles and Themes feature in PowerPoint to create a consistent theme for a presentation.

3. Find a YouTube video or a tutorial on line on how to make good presentations. Share it with classmates by teaching some of the main points in group discussion.

4. In small groups, develop a list of "rules" to follow when you have to give an oral presentation...then create a class list!

5. In a memo to your teacher (or in an online discussion forum) share some of your" best practices" ideas for getting through a presentation. Also, share some details from the most horrible presentations you've ever seen...or given...maybe you can help a classmate avoid making the the same mistakes! (I once had a friend who introduced his talk on gun control by firing a pistol loaded with blanks right beside his ear...it wasn't actually funny, but yes, yes it was...oh well!)

### Evaluation Form

http://distanceed.hss.kennesaw.edu/technicalcommunication/chapters/2_12OralPresentation/2_12OralPresentation_print.html


Download the evaluation form
Chapter objectives:

At the end of this chapter, students will be able to

1. Define ethics.
2. Analyze a situation with regard to utility, rights, justice, and caring.
3. Explain the importance of ethical behavior.
4. Explain copyright law, why it is important, and how to make ethical decisions regarding it.
5. Explain how to ethically analyze data.
6. Explain how biases can lead to unethical decisions/behavior in technical communication.

Introduction to Ethics

Ethics is one of the most important topics in technical communication. When you can communicate clearly and effectively, and when it is your task to help others to understand an object, process, or procedure, it is your responsibility to do so in an ethical fashion.

After all, good writing isn't just grammatically correct, or even functional. As Zuidema and Bush state, "If we define good writing simply as writing that gets the audience to do or think what the writer wants, we fail to take into consideration the needs or well-being of the audience, and we ignore the ways in which writing may hurt others or cause harm" (Zuidema and Bush 95). But what does it mean to communicate ethically with regard to technical communication? There is a lot of confusion regarding what "ethics" means, and when you drill down to what ethical technical communication means, the answer becomes very complicated.

We might think asking someone if he or she is an ethical person is the same as asking someone if he or she is a good person. Certainly, my Aunt Maudie, who always held herself to be the definitive judge of whether someone was a good person or not, would tell you that a good person does what he or she feels is right in his or her heart. But the human heart can be very complicated. If you find a dollar on the floor, what is the right thing to do?

--run around asking anyone if he or she lost a dollar? What if the person who says "yes" is lying and didn't lose the dollar? Was it right, then, to give the dollar to him or her? What about the person who really lost the dollar? How do you know?

--turn the dollar into lost and found?
--keep the dollar, with the rationalization that you probably lost a dollar in the past, and this is just karma returning that dollar to you?

--give the dollar to charity with the rationalization that by doing so, at least you know it will do some good?

Any of these potential answers might feel right in your heart. Such a criterion really isn't the best to use to judge more complex ethical problems such as you might find in technical communication situations.

Also, note all of these potential answers are legal. Just because something is legal doesn't make it ethical. In the past, in the United States, it was legal for health care insurance companies to deny coverage to persons who had health problems. That is, if a person had a heart attack and did not have insurance, then he or she would not be able to purchase insurance afterward, even though it was clear that he or she would not be able to afford health care without health insurance. Such a practice was common and legal, but it was not at all ethical to deny sick persons the ability to afford the health care they needed.

Key Concepts: Utility, Rights, Justice, and Caring

According to ethicist Manuel G. Velasquez, there are four basic kinds of moral standards: "utility" (61), "rights, justice, and caring" (59). While each of these categories is complex, at the basic level, these categories can be explained as follows:

Utility: "The inclusive term used to refer to the net benefits of any sort produced by an action" (61). This standard favors the solution that yields "the greatest net benefits to society or impose[s] the lowest net costs" (61).

Rights: This standard "look[s] at individual entitlements to freedom of choice and well-being" (68)

Justice: This standard "look[s] at how the benefits and burdens are distributed among people" (68)

Care: With regard to the "ethic of care, . . . . the moral task is not to follow universal and impartial moral principles, but instead to attend and respond to the good of particular concrete persons with whom we are in a valuable and close relationship. Compassion, concern, love, friendship, and kindness are all sentiments or virtues that normally manifest this dimension of morality" (102).

You may have noticed that these standards can quite easily contradict each other. Let's think through a rather silly example.

Let's say you have a face to face technical communication class at a local college or university. It meets twice a week, and you attend the scheduled class periods. One of your classmates, let's call him Percival, likes to sleep in class. More than that, he snores loudly while the professor is trying to teach.

The first class period this problem manifests itself, the professor first tries calling on Percival to keep his attention, and then the professor nicely suggests he go get a drink of water to wake himself up. Percival, however, is having none of this. He evidently prefers to spend classtime sleeping—and snoring. The snoring is really distracting, and everyone is finding it hard to learn in this environment.

The second class period, the drama repeats itself, but the professor has come prepared. At the first loud, earsplitting snore, the professor pulls out a water gun at Percival. She aims, fires, and SPLAT! Percival is awake! The class laughs uproariously, and every time Percival snores, he gets water in the face. It's still kind of hard to concentrate, with the professor watergunning Percival every 15 minutes or so, but it's very entertaining.

This scenario is a little off the wall, but let's evaluate it, anyway. The professor's solution to the problem is effective, at least in this one instance. But how does it stack up to an ethical evaluation?

Rights—people in contemporary societies have a wide variety of rights. For example, students have the right to a conducive learning environment. So on the one hand, students have the right to attend class and not have to fight through Percival's snoring to hear the professor's lectur. On the other hand, students have the right to attend class and not be shot at with a water gun.
Justice—the benefit to the professor's solution to the problem is that it is effective. It stops Percival's plan to snore through class and make learning difficult for the other students. It also seems, at first, to bring the class together against a common distraction and provide some temporary amusement. Everyone is having fun at Percival's expense. But let's think. Students have a right to attend class and not be subjected to abuse. Shooting a student with a water gun is abuse. It's very much outside of the appropriate treatment a student might expect from a professor. And it is humiliating. Kant's categorical imperative has been translated thus: "Act only on that maxim through which you can at the same time will that it should become a universal law," (Kant 24). Granted, all sleeping students will be attacked with a water gun would be a pretty silly maxim. Reasonable people wouldn't even consider such a rule. But if they were to, it would be clear that we wouldn't want to be attacked with a water gun if we accidentally fell asleep and started snoring, and we wouldn't want our loved ones subjected to such treatment, either.

Certainly, Percival never consented to be attacked with a water gun. His rights are being violated in this example.

With regard to justice, sure, at first the water gun accomplishes the goal, but it is also distracting. And how long will it take for students to wonder, who else will get watergunned? Suddenly, the professor's blatant disrespect for Percival can easily move to disrespect for anyone. Morale can drop. The students can lose respect for the professor, and then the learning environment is compromised. The entire class suffers, and the learning outcomes also suffer, because the professor made the decision to employ a water gun.

Utility: One of the ways to look at utility is to ask the question, "Is there a better solution that helps everyone achieve the desired outcomes?" Or at least, is there a solution that minimizes the disadvantages to the larger population? In this case, yes. At most institutions, the professor has a variety of ways to deal with a disruptive student. After informing the student of the consequences of repeating his or her disruptive actions, the professor may call campus security to remove the student. The professor may also contact the student's academic advisor to discuss a solution, and at some institutions, the professor can have the student removed from the class roster. While official solutions may not be as dramatic, as fun, and as quickly effective as watergunning as student, they do protect all students' dignity and right to a safe environment conducive to learning.

Care: At the end of the day, a professor is a human being, too. And he or she may be at wit's end trying to deal with students do not want to be in the class are actively working against the professor's efforts to do his or her job. It is frustrating. And it might even be understandable that he or she wants to pull out a water gun and just solve the problem and blow off a little steam. But the professor has a job, and that job brings in income. It's highly likely that the professor has a family to support. Watergunning a student will bring in negative publicity to the professor, the class, the academic department, and the institution that he or she teaches in. With public scrutiny, the professor might earn a reprimand or, at worst, lose his or her job. How will he or she help to support his or her family?

As we analyze this situation, we quickly see that watergunning the student is unethical. It violates the rights of the student and can impede upon the professor's ability to care for his or her family. Furthermore, it may lower morale in the classroom, which may rob all students in the class of an environment conducive to learning. And finally, there are better, accepted channels to use to deal with this situation.

Such a simple scenario, but so many ways to look at the situation. Analyzing any situation with regard to ethics should take time and care so that the best evaluation can be produced. And here, we have only invoked some of the ethical aspects of Aristotle, Kant, and Velasquez. In this short introduction to ethics, we are only scratching the surface of a much larger and very complicated and fascinating field.

Here are some sample scenarios that you can analyze with regard to rights, justice, utility, and care.

Click here to access the sample scenarios.

Keep going to the next page to learn about faculty communication and real consequences.
Boisjoly’s memo. Russell’s letter stated the facts very plainly. For example, he writes, “If the primary seal were to fail from . . . 330-660 milliseconds the chance of the second seal holding is small. This is a direct result of the o-ring’s slow response compared to the metal case segments as the joint rotates” (Winsor 343). Russell’s memo does not provide any interpretation of the situation, and as such, “did not communicate its intent [as] is shown by the fact that the people who read it were uncertain about what it meant” (343). The important information in the Russell memo, which was quoted above, was buried deep in the letter after such reassurances as “MTI has no reason to suspect that the primary seal would ever fail after pressure equilibrium is reached” (343). While it might seem prudent in the face of bad news to report “just the facts,” if lives are at stake, it is important to communicate clearly. Do not hide or bury the information that there is a problem. Make a clear recommendation to solve the problem, if appropriate and possible. Make clear the perceived consequences if the problem is not dealt with. Of course, no one wants to be wrong or to be perceived as overly dramatic. But at the same time, ethical communication is clear and appropriately detailed so as to prevent disasters such as the Challenger explosion. The Challenger launch was delayed because of the O-ring problem, but on January 28, 1986, the shuttle launched. And exploded.

Of course, no one wants to be the bearer of bad news. And no one wants to point the finger. We all are concerned about how we are perceived by others. And we don’t want to jeopardize our position within a company or organization. Also, we might be asked by someone above us to “fudge the data” a little bit in order to keep a grant or contract. Our working relationships or even our jobs might be on the line. Perhaps a grant might not get funded if certain data are not reported. Or perhaps our company won’t get a contract if we don’t promise that our construction plan can hold the number of cars the client desires. When the pressure is on, the consequences may not seem so dire. But as Kant reminds us, if we don’t wish others to lie about the maximum amount of cars that can use the parking deck safely while we are in the parking deck, then we certainly should not do it, either.

Keep going to learn about appropriate language in technical communication.

Appropriate Language in Technical Communication

To get started, let’s watch a video on using appropriate language in technical writing. Appropriate language becomes an ethical concern if inappropriate languages is imprecise or disrespectful.

If you don’t see a video above, click here: https://youtu.be/NzbFBzOXfM8

To continue to address some specific aspects of ethics in technical communication, Kueffer and Larson remind us that sometimes writers use inappropriate metaphors in technical communication that reduce the credibility of the scientific writing or research that they are trying to communicate to the public. We live in a time when, especially in advertising and popular culture, dramatic language is pervasive. It may be tempting to overstate or dramatize a scientific finding to garner public attention to something very important such as climate change. For example, a letter with the title, “Alien species: Monster fern makes [International Union for Conservation of Nature] invader list” really grabs the attention. But Kueffer and Larson explain, “We consider this choice of words to be undesirable, because it merely expresses a value judgment of the authors (i.e., that the species is like a monster because it is bad) rather than illustrating the science. The metaphor devalues this plant species in its entirety (like a monster that is always bad) rather than specifying which aspects of its behavior are problematic”
(721). Kueffer and Larson continue, "It is better to communicate precisely, and to use appropriate metaphors so that if, for example, later contradictory information becomes available, the public does not dismiss scientific findings. Responsible technical communicators understand that scientific research involves a level of uncertainty which must be made clear to readers" (721).

Kueffer and Larsen offer the following guidelines:

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**Factual Correctness**

Every metaphor simplifies by illustrating certain aspects of a scientific object while neglecting others. Scientific metaphors can nonetheless be interpreted in terms of their factual content, and, in this respect, they can be considered wrong. At the start of the genomic era, for instance, Avise (2001) proposed alternative genetic metaphors to replace prior mechanistic ones (e.g., the blueprint metaphor) that he felt misrepresented new insights about the nature of the genome . . . . Metaphors should be consistent with the state of knowledge to the degree of scientific accuracy required in a particular context (e.g., research, popular science writing, science-based decision making).

**Socially acceptable language**

The same rules that apply to everyday life concerning socially acceptable language also apply to science. Metaphors that are racist, sexist, or in other ways offensive should be avoided. Herbers (2007) for example, condemns references to *slavemaking* and *negro* ants and reference to rape in animal behavior studies.

**Neutrality**

It is often difficult to assess the neutrality of a metaphor. Scientists should, nonetheless, seek in their communication to avoid language that is generally recognized to be loaded with emotion, such as apocalyptic warnings and dramatic hyperbole. This language can distract from the perceived neutrality of a scientist, who is expected to present research results that invite open and critical discussion. One rhetorical function of such metaphors is to convince when evidence is missing or ambiguous; however, this is inadvisable, insofar as it leads to scientific statements' being supported with rhetoric instead of facts.

**Transparency**

When a metaphor is used, it should be introduce das such and its connection with specific aspects of scientific concepts should be illustrated. At least in longer texts, authors should explicitly reflect on the connotations and performativity of their chosen metaphors. When metaphors are replaced by similes (i.e., using an *X is like Y* statement), there is a lower risk that they will be taken literally (Carolan 2006). (Kueffer and Larson 722)

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Go to the next page to learn about ethics and copyright law.

**Ethics and Copyright Law**

Another important aspect of ethics involves awareness of and respect for copyright law.

The information found here is based on materials developed by Jean T. Kreamer and Georgia Harper for the LaCADE (Louisiana Consortium for the Advancement of Distance Education) program.

Copyright has become a widely discussed topic with the advent of the Internet. Images and designs are everywhere. It is so easy to click and save a background, a photograph, even a cartoon from a web site. Many ask "what are the rules?" Here are the answers to some frequently asked questions about copyright laws.
1. Why Do We Have Copyright Laws?

The purpose behind copyright law is the protection of the creator's creation. If you come up with a fantastic new design for Kennesaw State University, for example, you would want credit and compensation for your genius. You would copyright the design and offer it to KSU. KSU might then decide to use it. You might grant KSU exclusive rights for free, or you might require a one time fee for KSU to buy the rights of the design, or you might request a sum of money every time the design is used. All of these negotiations would require you to waive, protect or sell your copyright. However, think about a situation where you sold your design to KSU for a fee each time the design was used or for a percentage of the sales. Then, a large discount chain began marketing shirts with your logo, but without your permission? What if buyers could get your great new design at half the price because you were no longer getting your cut? It's great for the consumer and the discount chain, but you and KSU have been cheated. To prevent such theft and unethical use, there are copyright laws.

2. What Does Copyright Protect?

Copyright does not protect facts, ideas, or descriptions. To use another's facts, ideas, or descriptions in your work you will need to cite properly using an acceptable form of documentation (APA or MLA, for example). Copyright protects creative expression. Creative expression is found in designs (such as Web page designs or layouts, portfolio designs, etc), logos, pictures, icons, and other creative ways to express information. A religious group recently used a cartoon character to deliver their message in a religious tract. Using a well-recognized cartoon character made the tract very popular, and the religious organization was very pleased with the results. However, the religious organization had not contacted the artist and negotiated any agreement for use of the image. The religious organization was stunned when they were sued for copyright infringement. To use an image, photograph, icon, logo, graph, chart, or layout that was not created by the user and for which the user has no agreement or authorization is an infringement of copyright. It does not matter how benign you believe the use is or how beneficial you feel the use might be to the creator. It is an infringement of copyright to use creations that are not your own if you do not have permission from the creator or his or her agent.

3. Is it okay to take an image if I can save it to my desktop?

No. It is a mistake to think that an image is only copyright protected if the web page designer has made it so that the image cannot be copied onto the computer. Just because an image can be taken doesn't mean it is not copyright protected. If you need copyright free images, a great searchable database is located at www.bing.com/images. You can enter a term into the search box, and then you can narrow your search by license, depending upon what you plan to do with the image.
Google images has a similar feature. After you have searched for an image, click on "Search tools" to see more tools. One will be "Usage rights." Use that tool to filter by license.
4. Isn't using images, such as a popular fast food chain logo, actually free advertising?

It may be free advertising, but it is also a violation of copyright. It is a popular myth that linking the image back to the original bypasses copyright laws. The designer can still sue you. Always get written permission to use a design. Some designers announce that designs may be used if the designer is credited and/or if a link is provided back to the home page. In this case, you are given permission to use the graphic as long as you abide by the designer's stipulations.

5. What about fair use laws? Can't I use a graphic if I follow the fair use laws?

Unfortunately, graphics are not covered under fair use laws that apply to students. The limits of copyright exist mainly for libraries and government use. For example, a designer's copyright protection does not prohibit libraries from making copies for interlibrary loan purposes or archiving; does not prohibit book owners from throwing away or reselling books; does not prohibit educational uses in face-to-face teaching and in distance learning; and does not prohibit making copies of a work or altering it to make it available to disabled persons.

Fair use does allow people other than the copyright holder to use part of a copyrighted work in certain circumstances even without permission. To learn more, click here: https://www.teachingcopyright.org/handout/fair-use-faq

6. If I am a student, does that mean I can use another's design in my own papers and presentations?

Because your papers and presentations are an educational use for a restricted audience, you are allowed to use copyrighted designs, under certain conditions. If a chart or graph or logo conveys the message that you want to convey in your paper or presentation, you may use it provided you cite it just as you would any other information that you used. Consult your documentation guide for proper documentation of graphs, charts, graphics, drawings, photographs, icons, symbols, or logos. In addition, if you take the information from a chart but create the chart yourself, you do not need to cite the chart in your paper, but you will still need to cite the information and document it properly in your paper. If you take information from a source and create a graphic explaining that information, you still need to document your use properly. The Conference on Fair Use (CONFU) Educational Fair Use Guidelines for Digital Images decided that "[s]tudents may download, transmit and print out images for personal study and for use in the preparation of academic course assignments and other requirements for degrees" (9). If you are creating work that will be put on the open web—such as in a publicly accessible blog for a class assignment—you will need to search for images that are copyright free or labeled for reuse.

7. What if there's no trademark or copyright symbol on the design?

Stealing another's design is unethical. It is also important to note that an absence of trademark does not mean the design is not copyrighted. Designs that are in the process of copyright approval can win damage awards if an infringement occurs while the design is awaiting an official copyright. And today, copyrighted works are no longer obligated to carry notice of copyright. For works created after March 1, 1989, absence of copyright is no indication of copyright status.

8. Will an international company such as Sony really catch me putting a few of their song lyrics up on my personal web page?

Large companies employ lawyers to surf the web searching for infringements of their copyrights. Many humble college students have been surprised by letters from big-name firms threatening lawsuits if lyrics or logos aren't removed from a personal web page. There are additional penalties if materials in question are not removed quickly enough to suit the offended party.

9. Some of this seems very silly. So what if I use a fast food logo on my web page or in my research paper and don't get permission or proper credit. What does it really matter?

First, if you were the artist, wouldn't you want proper credit for your creative expression? It's just good manners. And it is not difficult to request permission to use designs. Second, copyright laws are in flux right now. There is a lot of debate about what is or is not fair use regarding the Internet (how can you write a movie review on the Internet without making a few movie clips available, for example? Is that fair use? Is that copyright infringement? These issues are being debated). There is debate regarding whether a university can be sued along with a student if a student misuses a corporate logo on a university website. Obviously, everyone is very interested in who is liable. To keep yourself as safe as possible, err on the side of caution and respect copyrights.

10. What about copyright-free images, such as clip art?

If you go to a site that has copyright-free clip art, then that clip art is yours to use as you please. There are no restrictions or royalties involved regarding copyright-free images. But the site must say copyright free clipart. Wikipedia is not copyright free, unless you look at the image and see that it is in the Creative Commons. See the tips in #3 for how to obtain copyright-free clip art.

How well do you understand basic copyright law?
On the next page, you will learn about ethical analysis of data.

Ethical Analysis of Data

As you analyze data, avoid cooking, trimming, and cherry picking data.

Cooking data is the practice of falsifying data. It can also be the practice of deleting data that does not prove a hypothesis in order to present a stronger argument that proves the hypothesis. For example, what if you were ordering pizza for an event, and you really wanted every pizza to have bacon on it. You LOVE bacon. If you surveyed 100 people about whether or not they liked bacon, and 50 people said yes, and 50 people said no, but 25 of the "no's" were vegetarians, then you could report the data truthfully, that half of the people surveyed like bacon. Perhaps half of the pizzas should have bacon on them. Or, you could "cook" the data by excluding the vegetarians from the survey because, as you reason, it's not that they don't like bacon but that they don't EAT bacon, which is completely different from liking it. You could then say that 2/3 of the people surveyed like bacon, or 67%, and therefore you have a rationale to order bacon on all the pizzas.

Trimming data is a method used to lessen the effect of statistical outliers on the results of a study. If you trim data, then you must tell your reader that you trimmed the data, and to what percent you trimmed it. For example, if you were ordering pizza for an event, and you really wanted every pizza to have bacon on it, then you could survey 100 people about whether or not they liked bacon. Your survey also includes a question about what planet people are from (this is a ridiculous example, but I just wanted it to be simple). When you look at the results, you see that 55 people really like bacon. You notice that 45 people say they don't like bacon, but that there are irregularities in that data. For example, 10 of those respondents say that they are from the planet Mercury, so they can't eat any human food at all. So, you will trim the data to omit these irregularities. That means 55 people really like bacon and 35 don't. And you would tell your readers that 10% of the responses were culled for irregularities. You can also state what the irregularities were. It's fine to trim data that is outside the realm of possibility--as long as you tell your readers. It is not okay to trim data simply because it makes it easier for you or supports your argument better.

Cherry picking data is the practice of only using data that supports your hypothesis. A good example, with graphs and humor, of cherry picking is here: http://tamino.wordpress.com/2013/03/04/cherry-picking-is-childs-play/

We see these methods used so often in the presentation of data in the media, that we might come to believe it's okay to cook, trim, and cherry pick data for analysis. It is not.

How well do you understand ethics in data analysis?

Quiz Yourself

On the next page, you will learn about biases and technical communication. You will also have the chance to share your ideas in an activity.
Biases and Technical Communication (An Activity)

As a final discussion of ethics and technical communication, let's look at ways one can "translate" a document to a different audience. The sample document linked below is *The First Citizens' Report*, a document created in India by India's Centre for Science and Environment. Click on the cover of the journal to see a sample item from that document. The sample item, "The Killer Still at Large," explains the impact that baby formula is having on the health of India's children.

The question for you is, how does one "translate" an informative piece written to a certain audience (in this case, Indian) with a certain perspective (concern for the environment and public health) and a certain bias (that commercial formula is inferior to breast milk) into a human interest piece for readers of a small newspaper in the Southern United States? Four writers, below, take on the task.

After reading the original article, linked to the cover, above, read through the four revisions, linked below. Each one was revised to serve as a human interest newspaper story for a small town newspaper the American South.

Article revised by Fenton Harcourt

Article revised by Chandra Mistry

Article revised by Lisa Reed

Article revised by Jerry Rouche

Which writer did the best job of revising the original article to serve the needs of the new audience? Why do you think so? Register your vote here:

If you don't see a poll above, click here: http://micropoll.com/t/KE2OAZVVqy

If you were the editor of this newspaper, what feedback would you provide to the writers? Using your best, professional technical communication skills, provide feedback to the writers in the appropriate boxes on the Lino. Keep in mind that what you post is publicly available. Adhere to all netiquette guidelines: http://kennesaw.edu/elearning/toolbox/netiquette.html

If you need to know how to use a Lino, click here: https://youtu.be/tTnOtv-_gyg

If you don't see the Lino, above, click here: http://linoit.com/users/Tamara_Powell/canvases/Ethics_Opinions

Works Cited


Carolan MS. 2006. The values and vulnerabilities of metaphors within the environmental sciences. Society and Natural Resources 19: 921-930.


http://distanceed.hss.kennesaw.edu/technicalcommunication/chapters/3Ethics/3Ethics_print.html
Report Design

Technical reports (including handbooks and guides) have various designs depending on the industry, profession, or organization. This chapter shows you one traditional design. If you are taking a technical writing course, make sure the design presented in this chapter is acceptable. The same is true if you are writing a technical report in a science, business, or government context.

Technical reports have specifications as do any other kind of project. Specifications for reports involve layout, organization and content, format of headings and lists, the design of the graphics, and so on. The advantage of a required structure and format for reports is that you or anyone else can expect them to be designed in a familiar way—you know what to look for and where to look for it. Reports are usually read in a hurry—people are in a hurry to get to the information they need, the key facts, the conclusions, and other essentials. A standard report format is like a familiar neighborhood.

When you analyze the design of a technical report, notice how repetitive some sections are. This duplication has to do with how people read reports. They don't read reports straight through: they may start with the executive summary, skip around, and probably do not read every page. Your challenge is to design reports so that these readers encounter your key facts and conclusions, no matter how much of the report they read or in what order they read it.

The standard components of the typical technical report are discussed in this chapter. The following sections guide you through each of these components, pointing out the key features. As you read and use these guidelines, remember that these are guidelines, not commandments. Different companies, professions, and organizations have their own varied guidelines for reports—you'll need to adapt your practice to those as well the ones presented here.

Letter of Transmittal

The transmittal letter is a cover letter. It is usually attached to the outside of the report with a paper clip, but it can be bound within the report, as a kind of author's preface. It is a communication from you—the report writer—to the recipient, the person who requested the report and who may even be paying you for your expert consultation. Essentially, it says "Okay, here's the report that we agreed I'd complete by such-and-such a date. Briefly, it contains this and that, but does not cover this or that. Let me know if it meets your needs." The transmittal letter explains the context—the events that brought the report about. It contains information about the report that does not belong in the report.

Use the standard business-letter format for cover letters. If you write an internal report, use the memorandum format instead; in either case, the contents and organization are the same:

First paragraph. Cites the name of the report, putting it in italics. It also mentions the date of the agreement to write the report.

Middle paragraph(s). Focuses on the purpose of the report and gives a brief overview of the report's contents.

Final paragraph. Encourages the reader to get in touch if there are questions, comments, or concerns. It closes with a gesture of good will, expressing hope that the reader finds the report satisfactory.

As with any other element in a report, you may have to modify the contents of this letter (or memo) for specific situations. For example, you might want to add a paragraph that lists questions you'd like readers to consider as they review the report.
If your report is over ten pages, bind it in some way and create a label for the cover.

**Covers**

Covers give reports a solid, professional look as well as protection. You can choose from many types of covers. Keep these tips in mind:

- The best covers use either a spiral (best) or plastic "comb" (second-best) binding and thick, card-stock paper for the covers. These bindings allow reports to lie open by themselves, are inexpensive, and add to the professionalism of your work. Any copy shop can make one for you. (See the simulated example of a spiral binding in the example below.)
- Three-ring binders (also called loose-leaf notebooks) are a decent second choice. They allow your report to lie flat, but they are often too bulky for short reports, and the page holes tend to tear. However, if the audience will want to remove or replace pages, then a three-ring binder is an appropriate choice.
- Three-hole binders that use brads to hold the pages together are a distant third choice. They are less bulky than three-ring binders, but they prevent the pages from lying flat, and readers must either weigh down or crease the pages. If you do use one of these, add an extra half-inch to the left margin to account for the "gutter" between pages.
- Clear (or colored) plastic slip cases with the plastic sleeve on the left edge are never appropriate for a professional report. These are like something out of grade school, and they are aggravating to use. They won’t lay flat, so readers must struggle to keep them open, and they generate static electricity, which makes pages stick together.

**Labels**

Be sure to devise a label for the cover of your report. It's a step that some report writers forget. Without a label, a report is anonymous; it gets ignored.

The best way to create a label is to use your word-processing software to design one on a standard page with a graphic box around the label information. Print it out, then go to a copy shop and have it photocopied directly onto the report cover.

There are no standard requirements for the label, although your company or organization should have its own requirements. Common elements to include are:

- the report's formal title
- the intended recipient
- the authors (or, often, the author's organization)
- a report tracking number
- the date of submission

(An example of a report label is shown below.)
Abstract and Executive Summary

Most technical reports contain a descriptive abstract or an executive summary, and sometimes both. Each element summarizes a report's contents, but they do so in different ways and for different purposes.

Descriptive abstract.
This brief paragraph provides a capsule overview of the report’s purpose and contents. It’s usually a single paragraph. In many report designs, the descriptive abstract appears at the bottom of the title page (not the cover page), as shown in the following example:

![Figure 2: Descriptive abstract.](image)

**Executive summary.**

Another common element in a report’s front matter is an executive summary, which also summarizes the key facts and conclusions contained in the report. Its purpose is to allow a busy executive to absorb the report’s major findings without having to wade through pages of details. A typical executive summary runs from a half-page to two pages, but it can be longer if the report is very long.

See the example shown in Figure 3 below. It’s as if you used a yellow highlighter to mark the key sentences in the report and then siphoned them all out onto a separate page and edited them for readability.
Table of Contents

Any technical document of more than a few pages that includes distinct major sections should include a table of contents (ToC), and each major section should start on a new page.

The ToC should not include the title page or the cover letter/memo. If the proposal includes an abstract and/or executive summary, those sections should appear in the ToC, and it is customary to paginate them with lower-case roman numerals. The ToC should not include itself. Treat it as page zero.

Always include at least the top two levels of headings, but how many subheading levels you include in a ToC is up to you. A long, complex report with multiple subheadings may need a ToC entry for each subheading, but this approach may result in an extremely long and confusing ToC. A potential solution is to create two ToCs, one listing just the top two levels of headings and one listing all levels of headings.

One final note: Make sure the words in the ToC are the same as they are in the text. As you write and revise, you might change some of the headings—don't forget to update the ToC accordingly. See Figure 3 for an example of a ToC and executive summary:
Figure 3: Table of contents and executive summary.

Table of Figures

The table of figures (ToF), sometimes called the "list of figures," has many of the same design considerations as the table of contents. Readers use the ToF to find the illustrations, diagrams, tables, and charts in your report.

Please note that tables and figures are different things. Strictly speaking, figures are illustrations, drawings, photographs, graphs, and charts. Tables are rows and columns of words and numbers; they are not considered figures.
For longer reports that contain multiple figures and tables, create separate lists of figures and tables. Put them on a separate page from the ToC, but put them together on the same page if they fit, as shown in Figure 4 below. You can identify the lists separately, as Table of Figures and Table of Tables.

**Introduction**

In a technical report, the introduction prepares the reader to read the main body of the report. It introduces the report's purpose, specifies the report's intended audience, provides a limited description of the report's context and background, forecasts the report's scope, and previews the report's contents and/or organization.

See Figure 4 for an example of an introduction:
Figure 4: Table of figures, followed by the introduction.

If the introduction, executive summary, and letter of transmittal strike you as repetitive, remember that readers don’t necessarily start at the beginning of a report and read page by page to the end. They skip around: they may scan the table of contents; they usually skim the executive summary for key facts and conclusions. They may read carefully only a section or two from the body of the report, and then skip the rest. For these reasons, reports are designed with massive duplication so that readers will be sure to see the important information no matter where they dip into the report.

Major Design Considerations

This part of the chapter describes several design-related issues that you will likely need to consider when creating a report.

Headings. In all but the shortest reports (two pages or less), use headings to mark off the different topics and subtopics covered. Headings enable readers to skim your report and dip down at those points where you present information that they want.

Bulleted and numbered lists. In the body of a report, also use bulleted, numbered, and two-column lists where appropriate. Lists help by emphasizing key points, by making information easier to follow, and by breaking up solid walls of text.

Symbols, numbers, and abbreviations. Technical discussions ordinarily contain lots of symbols, numbers, and abbreviations. Remember that the rules for using numerals as opposed to words are different in the technical world. The old rule of thumb about writing out all numbers below 10 does not always apply in technical reports.

Graphics and figure titles. In a technical report, you’re likely to need drawings, diagrams, tables, and charts. These not only convey certain kinds of information more efficiently but also give your report an added look of professionalism and authority. If you’ve never put these kinds of graphics into a report, there are some relatively easy ways to do so—you don’t need to be a professional graphic artist.
2.4 Energy Consumption Determination

For the purposes of the study, energy consumption was divided into two main home systems: heating and cooling, and electrical.

2.4.1 Heating and cooling systems. Heating and cooling energy were determined with Energy-10 for SH as well as for EEH. The program calculates the heat required to maintain the internal temperature based on the following factors:

- Average conductivity of the thermal values of the walls, ceiling, floor, floor, etc.
- Internal temperature (includes adjustments for seasonal/daily temperature changes)
- Outside air infiltration through gaps in the forced-air ventilation systems
- Furnace and A/C efficiencies were determined independently from Energy-10 and are presented in the paper.
- Solar heat gains through windows

2.4.2 Electrical systems. Electrical energy used in the house was determined, which contributed significantly to energy consumption.

3.0 CONSUMPTION COMPARISONS

For energy consumption comparisons, resources were broken down into total annual gas and electricity consumption, and then compared for the two homes.

3.1 Gas Consumption

Figure 1 shows annual natural gas use for both SH and EEH. The dramatic decrease in natural gas consumption is due to the greatly improved thermal envelope and much more efficient HVAC system, causing a decrease in heating natural gas consumption of 91.8%

While EEH uses natural gas for the stove and dryer (which is not the case for SH), EEH total annual natural gas use is only 21% that of SH [1]

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**IEEE citation using brackets:** The borrowed information comes from source 5 listed in References.

**Acronym:** On this first use, it is spelled out with the acronym shown in parentheses. The spelled-out version does not use initial caps because it is not a proper noun.

**Second- and third-level headings:** Notice how the system adds a decimal number to each lower-level section heading.

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**Cross-references.** You may need to point readers to closely related information within your report, or to other books and reports that have useful information. These are called cross-references. For example, you can point readers from the discussion of a mechanism to an illustration of it. You can point readers to an appendix where background information is presented.

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Figure 5: Excerpt from the body of a technical report.
on a topic appears (background that just does not fit in the text). And you can point readers outside your report to other information—to articles, reports, and books that contain information related to yours.

**Page numbering.** All pages in the report (excluding the front and back covers, title page, and ToC) are numbered. Use lower-case roman numerals to paginate material that appears before the ToC. Don't number the ToC; it's page zero. Use arabic numerals to paginate material that appears after the ToC.

Longer reports often use the page-numbering style known as folio-by-chapter or double-enumeration (for example, pages in Chapter 2 would be numbered 2-1, 2-2, 2-3, and so on, and pages in Appendix B would be numbered B-1, B2, and so on). Similarly, tables and figures would use this numbering style. This style eases the process of adding and deleting pages.

If page numbers appear in a running header, don't display numbers on pages where a heading or title is at the top of the page (such as chapter or section openers).

**Conclusions**

For most reports, you'll need to include a final section in which you sum up the report's contents and provide a "takeaway" for the reader. When you plan this final section of your report, think about the functions it can perform in relation to the rest of the report.

**Appendices**

An appendix is an "extra" section that appears after the proposal's main body. Any useful content that you feel is too large for the main part of the proposal or that you think would be distracting and interrupt the flow of the proposal should go into an appendix. Common examples of appendix-appropriate material are large tables of data, big chunks of sample code, fold-out maps, background that is too basic or too advanced for the body of the report, or large illustrations that just do not fit in the main body.

Use separate appendices for each item or category of items, and label each one alphabetically, as "Appendix A: (descriptive title of contents)" and so on. If you've got only one appendix, continue the proposal's page numbering scheme. If you have multiple appendices, you can number each appendix's pages separately, as A-1, A-2, and so on.

**Information Sources**

If your proposal quotes, paraphrases, or summarizes information that came from outside sources, cite the sources appropriately in the main text and include bibliographic information in a separate section at the proposal's end. Use whatever citation format is appropriate for your audience's profession and field. Common formats include IEEE, MLA, APA, CSE, Chicago, and Turabian.
Book Design Overview

The following provides an overview of the typical components of a printed technical book and the typical content, format, style, and sequence of those components. Certainly, no single user guide, technical reference manual, quick-reference document, or other such document would actually have all of these components designed and sequenced in precisely the way you are about to read. Instead, this review will give an overview of the possibilities—let's say the range of possibilities.

Before you begin reading the following, grab a number of hardware and software books so that you can compare their content, style, format, and sequencing to what is discussed here.

For even more detail than you see here, consult these two standard industry resources:


Front and Back Covers

Product documents for paying customers usually have nicely designed front covers even if, on the inside, the book is bargain basement in terms of its quality. On the front cover, you will typically see some or all of the following:

- Company name
- Product name
- Product platform or operating system
- Product version and release numbers
- Book title
- Company or product logos
- Trademark symbols
- Artwork
- Book order number
- Company or product slogan

It can be challenging to figure out a good format for the company name, product name, and book title. Sometimes, these can amount to a whole paragraph of text! Companies are quite divided on whether to indicate version and release numbers on front covers—some do; some don't. Almost always, however, you'll see the platform indicated—whether the product is for the Macintosh, the PC, UNIX, and so on.

The back cover of hardcopy user guides and manuals is usually very simple. Typically, it contains the book order number, the name of the company with appropriate trademark symbols, a copyright symbol and phrasing as to the ownership of the book, and a statement as to which country the book was printed in. You'll also find bar codes on the back cover. See if your software can generate a bar code—you just access the bar code utility and type in the book order number, and the utility generates the bar code.

Title Page

The title page is typically a duplicate of the front cover, but with certain elements omitted. Typically omitted are the artwork, company or product logos, and slogans. Some technical publications omit the title page altogether because of the seemingly needless duplication. (And in a print run of 20,000 copies, a single page means a lot!)
Edition Notice

The edition notice is typically the first instance of regular text in a technical publication, although it is typically in smaller type. It occurs on the backside of the title page. If the technical publisher is taking the lean-and-green approach and eliminating the title page, the edition notice will appear on the backside of the front cover.

No one likes to read fine print, but take a look at the statements typically included in an edition notice:

- Date of publication: included not only is the year but sometimes even the month that the book was published.
- Edition number: whether the book is a first, second, or third edition
- Product applicability: the edition notice typically indicates which platform, version, and release number of the product the book applies to.
- Full title of the book: shown in italics
- Disclaimers: shockingly, product manufacturers will make statements to the effect that they do not guarantee the book is technically correct, complete, or free from writing problems or that the product is free from minor flaws or that it meets the needs of the customer. You'll be able to find additional disclaimers beyond these as well.
- Copyright symbol and statement: you'll see the circle-C copyright symbol and some statement warning readers not to copy the book without permission.
- Copyright permissions: the high-tech world often moves so rapidly that instead of creating their own versions of a product component and its corresponding documentation, companies will simply buy the code or design and the rights to reprint the documentation as well. This usually entails copyright acknowledgement in the edition notice (although if a lot of borrowing has happened, publishers must get creative about where to put all these acknowledgements).
- Reader responses: sometimes, the edition notice will include some encouragement to customers to contact the company about product or documentation concerns. Instructions on how to contact the company are sometimes included in the edition notice. Included also is often a rather unfriendly statement that any customer communication becomes the property of the company.
- Trademarks: some technical publications list known trademarks in the edition notice. This includes both the company's own trademarks and the trademarks of other companies referenced in the book. With the explosion of new products in the high-tech world, and thus the explosion of trademarks, some publications essentially throw up their hands and insert a simple statement that any references to trademarked product names are owned by their respective companies.

Disclaimers

See the section on edition notices, where disclaimers are usually tucked away. If a product or its publication needs a whole separate page for its disclaimers, I'm not buying it!

Trademarks

Although many companies do list their own and other companies' trademarks in the edition notice, some prefer to list them on a separate page, just after the edition notice. These placement decisions are almost strictly the province of company attorneys; as a writer, you may have to comply no matter how bad the decision is in terms of book design or writing style. Remember, you list only those trademarked product names that occur in that particular book.

You'll notice that some publications go to extreme measures with trademarks: they'll asterisk or footnote the first, or even every occurrence of a trademarked product name. But again, these are directives of company attorneys unto which technical writers must resign themselves, however sadly.

Warranties

More legal stuff. These are the "guarantees" that the company will support concerning its product. Sometimes these are published in the front matter of the book; but, more appropriately from a book-design standpoint, they are printed on a separate card and inserted in the shrinkwrap of the book or the product. Again, as with edition notices, this is text you simply bring in as "boilerplate" and position in the right place within the book.
However, you should be aware that companies sometimes maintain multiple versions of edition notices, safety notices, warranties, communication statements and other such. As a writer, you must make sure that you are using the right version (and, in finding out which is correct, you'll have a chance to get out and meet lots of new people in the company!). And whatever you do, don't change the text of these boilerplate items, however horribly they are written. Changes typically must be approved by company attorneys (who typically do so begrudgingly and only after many efforts on your part and after much time has passed).

**Safety Notices**

Hardware products typically have a section of safety notices at the front of their books. These may occur as a subsection of the preface, for example, or as a separate section in their own right. These sections typically bring together all of the danger, warning, and caution notices that occur throughout the book and arrange them in some sort of logical way. But even with this up-front alert, hardware books still place the individual notices at the points where they apply.

**Communication Statements**

Hardware books also require communications statements as stipulated by the governments of the countries to which these products are shipped. In the U.S., the FCC requires certain communications statements depending on the "class" of the hardware product. As a writer, you must be careful to use the right communication statement for the product you are documenting—and not to edit the statement in any way (holy legal words!).

**Table of Contents**

The table of contents (TOC) usually contains at least a second level of detail (the first-level headings in the actual text) so that readers can find what they need more precisely. Writers, editors, and book designers typically argue about the sequencing of the TOC. In terms of usability, it's much better to have the TOC as close to the front of the book as possible, if not at the very first of the book. In terms of legalities, however, people worry that all those communication statements, warranties, copyrights, trademarks, and safety notices should come first. In those places where usability wins out, books use every tactic they can to get this legalistic material out of the front matter: warranties are put on separate cards and shrink-wrapped with the book or product; warranties, communication statements, trademarks and other such may be dumped in appendixes.

**List of Figures**

Technical manuals for ordinary users typically don't have lists of figures. In fact, the figures themselves typically do not have full-blown figure titles. But this isn't to say that a list of figures has no place in technical manuals. It all depends on the reader and the reader's needs—and the content of the book as well. If the book contains tables, illustrations, charts, graphs, and other such that readers will want to find directly, the figure list is in order.

**Preface**

The function of the preface is to get readers ready to read the book. It does so by:

- characterizing the content and purpose of the book
- identifying or even briefly describing the product the book supports
- explaining the type of reader for whom the book is meant
- outlining the main contents of the book
- showing any special conventions or terminology used in the book
- providing support and marketing numbers, and other such

In traditional book publishing, the preface comes before the table of contents; but as discussed previously in the table of contents section, technical publishing people want the TOC to come earlier in the book for usability reasons.
Body Chapters

Oh yes, and there is actual text in these books—it isn't all front matter! Little else to say here other than most technical books have chapters or sections, and, in some cases, parts.

Appendixes

As you know, appendixes are for material that just doesn't seem to fit in the main part of a book but can't be left out of the book either. Appendixes are often the place for big unwieldy tables. Some technical publications have things like warranties in the appendixes. In terms of format, an appendix is just like a chapter—except that it is named "Appendix A" or some such, and the headers and footers match that different numbering and naming convention (A-1, A-2, and so on for pages in Appendix A).

Glossary

Some technical publications include a section of specialized terms and their definitions. Notice that most glossaries use a two-column layout. Typically the each term and its definition make up a separate paragraph, with the term lowercased (unless it is a proper name) and in bold, followed by a period, then the definition in regular roman. Notice too that definitions are typically not complete sentences. Multiple definitions are typically identified by arabic numbers in parentheses. Glossary paragraphs also contain See references to preferred terms and See also references to related terms.

Index

Indexes are also typically two-column and also contain See references to preferred terms and See also references to related terms.

Reader-Response Form

Before the rise of the Internet and social media, some technical publications contained a hardcopy form to enable readers to send in comments, questions, and evaluation of the book. Of course, it turns out that these forms more often elicit complaints about faulty function in the product that the book documents. With the rise of the Internet, these forms have gone online, and books merely point to their location online.

Book Design and Layout

Typically, user guides and manuals produced by hardware and software manufacturers are designed in a rather austere and spartan way. High-tech companies develop new versions and releases of their product sometimes every nine months. In this context, sophisticated design is just not practical. Here are some of the typical layout and design features you'll see:

- Page size is often determined by packaging considerations as well as by standard page sizes available with printing companies. When page size is not a constraint, some companies will use the 8.5 × 11-inch page size —this makes production much easier for writers.
- Pages are typically designed with alternating right and left pages. The footer for the left (even) page starts with the page number and ends with the title of the book. The footer for the right (odd) page starts with the title of the chapter and ends with the page number.
- Practice is mixed on whether page numbering is consecutive throughout the book or by-chapter.
- Unless pages are rather small, the hanging-head design of headings in relation to pages is quite common in technical manuals. The hanging indent is usually one inch to one-and-a-half inches.
- Fonts are often 12-point Times New Roman for body text and Arial for headings. Standard line spacing and word spacing are used.
• Margins are fairly standard, one to two inches all the way around. Typically, an extra half-inch is used on inside margins to allow for binding.
• Typically, color is *not* used in these manuals and guides, usually out of cost and efficiency considerations.
Common Page Design

Page design means different things to different people, but here it will mean the use of typography and formatting such as you see in professionally-designed documents.

Our focus here is technical documentation, which implies modest, functional design.

For even more detail than you see here, consult these two standard industry resources:


Headings

The following presents some of the standard guidelines on headings.

- Insert plenty of headings, perhaps one heading for every two to three paragraphs. Avoid overkill, though: lots of headings with only one or two sentences per heading does not work.

- Indicate a heading's level through design. Use type size, type style, color, boldness, italicization, and alignment to make a heading's level obvious. ("Levels" of headings are like levels in an outline: Level 1 corresponds to the large, capitalized roman numerals; Level 2 to the capital letters; Level 3 to the arabic numerals; Level 4 to the lower-case roman numerals; and so on.)

- Limit the levels of heading. Most documents only need three or fewer levels of heading; more levels can confuse your readers.

- Describe the sections' contents with specific language. Vague headings like "Technical Background" don't tell anybody anything.

- Use parallel phrasing. Parallel headings tell readers if the sections are similar to each other.

- Avoid "lone headings." If you have one heading, you should use a second. It's the same concept as having an "A" without a "B" or a "1" without a "2" in outlines.

- Avoid "stacked headings" (two or more consecutive headings without text in between).

- Don't use a pronoun to refer to a heading. If you have a heading like "Configuring the Software," don't follow it with a sentence like "This next phase..."

- Consider the "hanging-head" format for major headings. In this design, some or all of the headings are on the left margin, while all text is indented one to two inches. This format will make headings stand out more and reduce the main text's line length.

- Consider using "run-in" headings for your lowest-level headings. In this design, the heading "runs into" the beginning of a paragraph and ends with a period. You can use some combination of boldness, italics, or color for these headings. This format avoids the problem of lower-level headings blending in with each other.

Lists
Lists are useful tools for emphasizing important points, enabling readers to scan text rapidly, and providing more white space. The following presents some of the standard guidelines on lists. For a more detailed discussion, see the chapter on lists.

- Use numbered lists to show sequence, order, or hierarchy. Use bulleted lists for items that can appear in any order.

- Use standard numbered- and bulleted-list formats. They are built into word-processing programs, and HTML has ordered- and unordered-list tags.

- Use parallel phrasing for lists' contents.

- Introduce all lists with lead-in text; don't start a list immediately after a heading.

- Unless your organization's style overrides, punctuate list items with a period only if they are complete sentences or have embedded dependent clauses.

- Be consistent with using initial caps or lower-case letters on the first words of list items.

- Use different symbols for the second levels of nested lists. For numbered lists, use lowercase letters. For bulleted lists, use bolded en dashes or empty-centered circles. In either case, make sure that nested items align to the text of the previous level.

- Avoid using too many lists or overstuffing lists. Seven to ten items is generally about the maximum number of items.

**Notices**

Notices are specially-formatted chunks of text that alert readers to special points, exceptions, potential problems, or danger. The following presents some of the standard guidelines for notices.

- Make notices more prominent and noticeable as they become more severe.

- Consider using this standard hierarchy:
  - "Danger" for situations that could involve severe injury or death
  - "Warning" for situations that could involve minor injury
  - "Caution" for situations that could involve equipment damage, data loss, or a threat to a procedure's success
  - "Note" for exceptions or situations that do not require the preceding tags

- Whatever notice design you use, avoid using long strings of bold text, italics, capital letters, or combinations of these.

- In addition to telling readers to do or not do something, explain three things:
  - under what conditions they should use the notice
  - what will happen if they ignore the notice
  - how to recover if they ignore the notice

- Make notices' text succinct, but not at the expense of clear writing. Avoid telegraphic writing style (omitting articles like a, an, the) in notices.

- In numbered lists, align notices to the text of the list items they apply to.

- Put notices in two places:
  - before the step in which the potential problem exists
  - at the beginning of the entire procedure

**Figures**

Figures are illustrations, drawings, schematics, photos, and other visual materials. The following presents some of the standard guidelines on figures.

- In the text before each figure appears, provide a cross-reference to the figure.
- If you include a label and caption, place them below each figure.
- Omit labels and captions if they have no vital function and are not needed (for example, in instructions when the figures are closely related to the individual steps).

**Tables**

Tables are like lists, which were discussed previously, but are more structured and formal. In your text, look for repeating pairs, triplets, or quadruplets of items that can be formatted as tables. For example, a series of terms and definitions is a classic use for tables. The following presents some of the standard guidelines for tables.

- Look for repeating groups of items in your text that you can format as tables.
- In the text before each table appears, provide a cross-reference to the table.
- Include a table title unless the content of the table is utterly obvious and the table contains few items. Place the table title above the table, or make it the top row of the table.
- Use column and row headings (or both) to define the contents of the columns and rows. Consider highlighting these headings.
- Left-align text columns (unless the contents are simple alphabetic characters). Left-align text columns with their headings.
- Right-align or decimal-align numerical data, and center it under its heading.
- Put standard measurement units (ft, mm, gal.) in the column or row heading rather than with each item in the column or row.
- Briefly discuss the main trend in the table—what you want readers to notice.

**Highlighting**

Software documentation typically uses a lot of highlighting. Highlighting here refers to bold text, italics, alternate fonts, capital letters, quotation marks, and other typographical tricks used to call attention to text. The following presents some standard guidelines for highlighting.

- Establish a plan for using highlighting, and apply it consistently.
- Use highlighting for specific, functional reasons. Avoid too much highlighting, and avoid complicated highlighting schemes.
- Consider using this fairly standard highlighting scheme:
  - For simple emphasis, use italics.
  - Use bold for commands, on-screen buttons and menu options.
  - Use italics for variables for which users must supply their own words.
  - Use an alternate font for text displayed on screen or text that users must type in.
  - For screen and field names, use the capitalization style shown on the screen but no other highlighting.
  - Use an initial cap for key names but no other highlighting.
  - For extended emphasis, use the notice format.
Margins, Indentation, & Alignment

As mentioned in the section on headings, you may wish to indent main text one to two inches while leaving headings on the left margins. This style does two things: it makes the headings stand out, and it shortens the main text's line length.

Fonts & Color

Here are some suggestions concerning fonts and color:

- Limit the number of main fonts that appear in a document to two. For example, you might use Arial for headings and Times New Roman for body text.

- Use only one alternate font, at most two. For example, you might use Arial for headings, Times New Roman for body text, and Courier New for text that users will see onscreen or that users must type in.

- If you use color, use it minimally and consistently. For example, if you have black text on a white background, you might select another color for headings. You might use that same color for figure and table titles as well as the tags for notices (the actual "Note," "Warning," "Caution," and "Danger" labels on notices).

- Avoid unusual combinations of background and text colors. For example, purple or red text on a black background is unreadable. Stick with black text on a white or gray background unless there is a strong, functional reason for some other color combination.
One of the most useful characteristics of technical writing is the use of headings.

Headings are the titles and subtitles you see within the actual text of much professional scientific, technical, and business writing. Headings are like the parts of an outline that have been pasted into the actual pages of the document.

Headings are an important feature of professional technical writing: they alert readers to upcoming topics and subtopics, help readers find their way around in long reports and skip what they are not interested in, and break up long stretches of straight text. They make text easy to navigate and enable the reader to find information they need quickly.

Headings are also useful for you, the writer. They keep you organized and focused on the topic. When you begin using headings, your impulse may be to slap in the headings after you've written the rough draft. Instead, visualize the headings before you start the rough draft, and plug them in as you write.

When you complete this chapter, you will be able to:

- Identify the uses of headings
- Tell the difference between the different levels of headings
- Evaluate the use of headings in technical documents
- Use the Styles tool in Microsoft Word to create custom headings
- Create and use headings in your own documents

General Guidelines for Headings

In this chapter, you are encouraged to use a specific style of headings. If you want to use a different style, contact your instructor. Here are some specific guidelines on headings (see the figures at the end of this chapter for illustrations of these guidelines):

- Use headings to mark off the boundaries of the major sections and subsections of a report.
- Until you become confident in the use of heading styles, use exactly the design for headings described here and shown in the illustrations in this chapter. Use the same spacing (vertical and horizontal location), capitalization, punctuation, and typography (bold, italics, etc.).
- Try for 2 to 3 headings per regular page of text. Don't overdo headings: for example, a heading for each of a series of one- or two-sentence paragraphs. (Also, you don't need a heading per every paragraph; normally, an individual heading can apply to multiple paragraphs.)
- For short documents, begin with the second-level heading; skip the first-level.
II. PROCESS OF PHOTOSYNTHESIS

Photosynthesis is the process by which green plants use the energy of light to convert carbon dioxide and water into the simple sugar glucose. Plants use much of this glucose as an energy source to build leaves, flowers, fruits, and seeds. A byproduct of photosynthesis is oxygen, which is created during the process of converting carbon dioxide and water into glucose.

Where Photosynthesis Occurs

Photosynthesis occurs in leaves and green stems within specialized cell structures called chloroplasts. A plant leaf is composed of tens of thousands of cells, each cell containing forty to fifty chloroplasts. Embedded in the membranes of leaves are hundreds of molecules of chlorophyll, a light-trapping pigment required for photosynthesis. Each chloroplast will contain millions of the chlorophyll pigment molecules.

How Photosynthesis Works

Photosynthesis can be divided into two stages: first, the light-dependent reaction, in which chloroplasts trap light energy and convert it into glucose; second, the light-independent reaction, which provides the energy used to synthesize glucose into the leaf structures. These two stages reflect the literal meaning of the term photosynthesis to build with light.

Light-dependent reaction. Photosynthesis relies on flows of energy and electrons initiated by light energy. Electrons are minute particles that travel in a specific orbit around the nuclei of atoms and carry a small electrical charge. Light energy causes the electrons in chlorophyll to boost up and out of their orbit, releasing vibrating energy as they go, all in milliseconds of a second. The vibrating energy passes rapidly from one chlorophyll to the next, like the transfer of energy in billiard balls.

Light-independent reaction. The light-independent reaction requires the presence of carbon dioxide molecules, which enter the plant through pores in the leaf called stomata.

Heading style and format standard for courses using this online textbook. If you want to use a different format, contact your instructor.

- Make the phrasing of headings parallel. In the following illustration, notice that the second-level headings use the how, what, when, where, why style of phrasing. The third-levels use noun phrases. (Check out this tutorial on Parallel Structure from the Purdue OWL)
- Make the phrasing of headings self-explanatory; instead of "Background" or "Technical Information," make it more specific, such as "Physics of Fiber Optics."
- Make headings indicate the range of topic coverage in the section. For example, if the section covers the design and operation of a pressurized water reactor, the heading "Pressurized Water Reactor Design" would be incomplete and misleading.
- Avoid "lone" headings—any heading by itself within a section without another like it in that same section. For example, avoid having a second-level heading followed by only one third-level and then by another second-level. (The third-level heading would be the lone heading.)
- Avoid "stacked" headings—any two consecutive headings without intervening text.
- Avoid pronoun reference to headings. For example, if you have a third-level heading "Torque," don't begin the sentence following it with something like this: "This is a physics principle...."
- When possible, omit articles from the beginning of headings. For example, "The Pressurized Water Reactor" can easily be changed to "Pressurized Water Reactor" or, better yet, "Pressurized Water Reactors."
- Don't use headings as lead-ins to lists or as figure titles.
- Avoid "widowed" headings: that's where a heading occurs at the bottom of a page and the text it introduces starts at the top of the next page. Keep at least two lines of body text with the heading, or force it to start the new page.

Headings: Specific Format and Style

The style and format for headings shown in this chapter is not the "right" or the "only" one, just one among many. Many technical writers must write according to a "house" style. Most organizations expect their documents to look a certain way. Using the style and format for headings described here gives you some experience with one of the key requirements in technical writing—writing according to "specifications."
Headings and outlines: headings function like outline elements inserted into the text at those points where they apply.

To see the "house style" for headings—the style and format for headings you will use—see the illustrations in this chapter. Pay close attention to formatting details such as vertical and horizontal spacing, capitalization, use of bold, italics, or underlining, and punctuation. Notice that you can substitute bold for underlining.

Headings occur within the body of a document. Don't confuse headings with document titles. Although titles may look like first-level headings in smaller documents, think of them as separate things. Now, here are the specifications for headings in this chapter.

Note: To make things less complicated, consider the document title as a title not as a first-level heading. They certainly look the same, except that the title could be prefaced by a roman numeral. In short documents such as those you write for technical writing classes, use a centered title and then start with second-level headings in the body of the document.

First-Level Headings

First-level headings are for formal reports with multiple sections (or "chapters"). If you are writing a brief document, start with second-level headings in the body of the document. Follow these guidelines for first-level headings:

- Make first-levels all-caps.
- Use Roman numerals with first-levels.
- Bold the entire heading including the Roman numeral.
- Make first-levels centered on the page.
- Start a new page whenever you have a first-level heading.
- Begin first-levels on the standard first text line of a page.

Note: In short documents such as those you write for technical writing classes, use a centered title and then start with second-level headings in the body of the document.

Second-Level Headings
In smaller documents (such as a two-page set of instructions), first-level headings are too much. Start with second-level headings in the body of these smaller documents. Follow these guidelines for second-level headings:

- Make second-levels headline-style caps (every main word).
- Use bold on second-levels.
- Do not include outlining apparatus such as "A." or "B." or "1." or "2." with second-levels.
- Make second-levels flush left.
- Leave the equivalent of 2 blank lines between previous text and second-levels.
- Leave the equivalent of 1 blank line between second-levels and the following text.

Note: If you prefer to make third-level headings standalone like second-levels, they may not be visually distinct enough from second-levels. If so, put a top border on second-levels, as you can see in this chapter.

### Third-Level Headings

Third-level headings are "run in to" the paragraph they introduce. Follow these guidelines for third-level headings:

- Make third-levels sentence-style caps.
- Use bold for third-levels including the period.
- End third-levels with a period, which is also bold.
- Do not include outlining apparatus such as "A." or "B." or "1." or "2." with third-levels.
- Either indent third-levels standard paragraph indentation, or just start third-levels flush left.
- Do not make third-levels a grammatical part of sentences that follow.
- Whether third-levels are indented or not, start all following lines flush left. Don't indent the entire paragraph.
- Use the standard spacing between paragraphs for paragraphs that contain third-levels.

Note: If you need a fourth level of heading, consider using italics instead of bold on the run-in heading format.

### Using Word-Processing Styles for Headings

If you manually format each individual heading using the guidelines presented in the preceding, you'll find you're doing quite a lot of repetitive work. The styles provided by Microsoft Word, OpenOffice Writer, and other software save you this work. You simply select Heading 1, Heading 2, Heading 3, and so on. You'll notice the format and style are different from what is presented here. However, you can design your own styles for headings. Here's a video tutorial that will show you quickly how to use the Styles feature in Microsoft Word.

### Common Problems with Headings

When you design your own heading style, be careful about going overboard with fancy typographical elements. Also, continue to use the guidelines presented in this chapter; they apply to practically any design. And finally, use your heading design consistently throughout your document.

![Common problems with headings: picture these outline items in the actual text.](http://distanceed.hss.kennesaw.edu/technicalcommunication/chapters/4_4Headings/4_4Headings_print.html)
A few more common heading problems: nonstandard capitalization, incorrect subordination, and "stacked" heads. There's nothing "wrong" about the caps style used in the first version; it's just not the "house" style. Subordination refers to the level of headings. "Stacked" headings occur when there is no text between two consecutive headings.

Want some more information on using headings? The Purdue OWL has a great guide on using APA style to create your headings. This style is also compatible with the styles noted for scientific journals. Check out the APA Headings page!

Practice what you've learned! Complete the following activities to reinforce what you have learned about headings.

Activity 1: Locate a professional journal in your chosen major field, and locate the guidelines for writers who want to submit articles to that journal. What format is given for the use of headings?

Activity 2: In that same journal (you may have to actually visit the library... or use the university's data base) examine the use of headings. Can you explain in your own words how the headings work to organize the article? See if you can find examples of headings that don't reflect the guidelines in this chapter.
Bulleted and Number Lists

Lists are useful because they emphasize selected information in regular text. When you see a list of three or four items strung out vertically on the page rather than in normal paragraph format, you are likely to pay more attention to it. Certain types of lists also make for easier reading. For example, in instructions, it is a big help for each step to be numbered and separate from the preceding and following steps. Lists also create more white space and spread out the text so that pages don't seem like solid walls of words.

Like headings, the various types of lists are an important feature of professional technical writing: they help readers understand, remember, and review key points; they help readers follow a sequence of actions or events; and they break up long stretches of straight text.

Your task for this chapter is to learn about the different types and uses of lists and to learn their specific format and style.

Lists: General Guidelines

In professional technical-writing contexts, you must use a specific style of lists, like the one presented here.

- Use lists to highlight or emphasize text or to enumerate sequential items.
- Use exactly the spacing, indentation, punctuation, and caps style shown in the following discussion and illustrations.
- Make list items parallel in phrasing. See this tutorial from commnet.edu's Guide to Grammar and Writing on Parallel Structures.
- Make sure that each item in the list reads grammatically with the lead-in.
- Use a lead-in to introduce the list items and to indicate the meaning or purpose of the list (and punctuate it with a colon).
- When two items are alternatives, use a bulleted list (with or between). Do not use numbered lists for ORed items. For three or more alternatives, indicate that in the list lead-in.
- When a separate notice or explanatory paragraph follows a item, indent that separate material to the text of the parent list item.

5. Select the Save preview picture check box.
6. Click OK to close the dialogue box.

Note: Keep the properties window open for the next exercise.

Indented material that elaborates on the parent list item.

- Avoid using headings as lead-ins for lists.
- Avoid overusing lists; using too many lists destroys their effectiveness.
- Use similar types of lists consistently in similar text in the same document.
- Use the "styles" function in your software to create vertical lists rather than constructing them manually. See this brief tutorial on using styles for lists.

Note: In-sentence lists could be called "horizontal" lists. All the other lists types presented here are "vertical" lists in that they format the items vertically rather than in paragraph format.

Guidelines for Specific Types of Lists

It's difficult to state guidelines on choosing between the various kinds of lists, but here's a stab at it:

- Most importantly, use numbered lists for items that are in a required order (such as step-by-step instructions) or for items that must be referred to by item number. Use bulleted lists for items that are in no required order.
Bulleted and Number Lists

With in-sentence lists, there are no conventions when to use letters (a), (b), and so on, as opposed to numbers (1), (2), and so on. If you are in a numbered list and need a sublist, use lowercase letters, to contrast with the numbers. Otherwise, there seem to be no widely agreed-upon guidelines—just be consistent!

Use vertical lists as opposed to in-sentence lists when you want the emphasis provided by the vertical presentation. In-sentence lists provide only minimal emphasis; vertical lists provide much more.

Within an individual report, use in-sentence lists and vertical lists consistently for similar situations. For example, if you have topic overviews for each section of a report, use in-sentence or vertical lists for the overview—but don't mix them for that particular use.

Common Problems with Lists

Problems with lists usually include the following:

- Mix-up between numbered and bulleted lists
- Lack of parallel phrasing in the list items
- Use of single parentheses on the list-item number or letter
- Run-over lines not aligned with the text of list items
- Lack of a strong lead-in sentence introducing list items, and lack of a colon to punctuate lead-ins
- Inconsistent caps style in list items
- Unnecessary punctuation of list items
- Inconsistent use of lists in similar text
- Lists that have too many items and need to be subdivided or consolidated

Format for Lists

Use the following for specific details on the capitalization, typography (bold, underlining, different fonts, different types sizes), and spacing for each type of list.

In-sentence lists

Use these guidelines for in-sentence lists:

1. Use a colon to introduce the list items only if a complete sentence precedes the list. In this problem version, the colon breaks right into the middle of a sentence (how dare it!):

   Problem: For this project, you need: tape, scissors, and white-out.
   Revision: For this project, you need tape, scissors, and white-out.

2. Use both opening and closing parentheses on the list item numbers or letters: (a) item, (b) item, etc.
3. Use either regular Arabic numbers or lowercase letters within the parentheses, but use them consistently. (Do not punctuate either with periods.) Use lowercase for the text of in-sentence lists items, except when regular capitalization rules require caps.
4. Punctuate the in-sentence list items with commas if they are not complete sentences; with semicolons, if they are complete sentences.
5. Use the same spacing for in-sentence lists as in regular non-list text.
6. Make the in-sentence list occur at the end of the sentence. Never place an in-sentence list introduced by a colon anywhere but at the end of the sentence, as in this example:

   Problem: The following items: tape, scissors, and white-out are needed for this project.
   Revision: The following items are needed for this project: tape, scissors, and white-out.
The purpose of the How to Collect Minerals Guide is to get you started without overwhelming you with too much information. You can begin mineral collecting after you have learned (1) how to identify the difference between minerals and rocks, (2) how to select mineral collecting tools, (3) how to identify different types of minerals, (4) how to identify a good mineral-collecting location, and (5) how to collect minerals.

Examples of in-sentence lists.

Simple vertical lists

Use these guidelines for simple vertical lists:

1. Introduce the list with a lead-in phrase or clause (the lead-in need not be a complete sentence; the list items can complete the grammar started by the lead-in). Punctuate the lead-in with a colon.
2. Use simple vertical lists when the list items do not need to be emphasized and are listed vertically merely for ease of reading.
3. Use sentence-style capitalization on list items.
4. Begin run-over lines under the text of the list item, not the regular left margin. This format is called the hanging-indent style.
5. Use the equivalent of a blank line above and below vertical lists.
6. Either start list items flush left or indent them no more than half an inch.
7. Use "compact" list format if you have just a few list items only a single line each. In the compact format, there is no vertical space between list items. Use a "loose" format—vertical space between list items—if the list items are multiple lines long.
8. Punctuate list items only if they are complete sentences or verb phrases that complete the sentence begun by the lead-in (and use periods in these two cases).
9. Watch out for lists with more than 6 or 8 list items; for long lists, look for ways to subdivide or consolidate.
10. When possible, omit articles (a, an, the) from the beginning of non-sentence list items.

Now that you know the three types of rocks to look for, it’s time to gather or purchase the necessary tools:

| Collecting bag |
| Gloves |
| Handheld rock pick |
| Hand trowel |
| Hard hat |
| Safety goggles |
| Rock chisel |

Example of a simple vertical list. No numbers or bullets.

Bulleted lists

Use these guidelines for bulleted lists:

1. Introduce the list with a lead-in phrase or clause (the lead-in need not be a complete sentence; the list items can complete the grammar started by the lead-in). Punctuate the lead-in with a colon.
2. Use bulleted lists when the list items are in no necessary order but you want to emphasize the items in the list.
3. Use asterisks or hyphens if you have no access to an actual bullet. Use your software’s list styles for these vertical lists.
4. Use sentence-style capitalization on list items.
5. Begin run-over lines under the text of the list item, not the bullet. This format is called the hanging-indent style.
6. Use 0.25 inches for the hanging-indent (between the bullet and the text of the list item).
7. Use the equivalent of a blank line above and below vertical lists.
8. Either start list items flush left or indent them no more than half an inch.
9. Use "compact" list format if you have just a few list items only a single line each. In the compact format, there is no vertical space between list items. Use a "loose" format—vertical space between list items—if the list items are multiple
10. If you have sublist items in a bulleted list, use a less prominent symbol for a bullet (such as a dash or clear disc), and indent the sublist items to the text of the higher-level list items. (It is certainly possible to have subnumbered items within a bulleted list, in which case indent them the same as subbulleted items.)

11. Punctuate bulleted list items only if they are complete sentences or verb phrases that complete the sentence begun by the lead-in (and use periods in these two cases).

12. Watch out for bulleted lists with more than 6 or 8 list items; for long bulleted lists, look for ways to subdivide or consolidate.

13. Avoid single-item lists. It's just like traditional outlines: if you have a 1 or an a, you need a 2 or a b.

14. When possible, omit articles (a, an, the) from the beginning of list items.

---

Example of a bulleted list. Items not in any required order.

**Numbered lists**

Use these guidelines for numbered lists:

1. Introduce the list with a lead-in phrase or clause (the lead-in need not be a complete sentence; the list items can complete the grammar started by the lead-in). Punctuate the lead-in with a colon.

2. Use numbered lists when the list items are in a required order (for example, chronological) or must be referenced from somewhere else in the text.

3. Type the number followed by a period; do not use parentheses on the number. Use your software’s list styles for these vertical lists.

4. Use sentence-style capitalization on list items.

5. Use "compact" list format if you have just a few list items only a single line each. In the compact format, there is no vertical space between list items. Use a "loose" format—vertical space between list items—if the list items are multiple lines long.

6. Begin run-over lines under the text of the list item, not the number. This format is called the *hanging-indent* style.

7. Use 0.25 inches for the hanging-indent (between the number and the text of the list item).

8. Use the equivalent of a blank line above and below vertical lists.

9. Either start list items flush left or indent them no more than half an inch.

10. If you have sublist items in a numbered list, use lowercase letters, and indent the sublist items to the text of the higher-level list items. (It is certainly possible to have subbullet items within a numbered list, in which case indent them the same as subnumbered items.)

11. If you have sublist items, use a less prominent symbol for a bullet (such as a dash or clear disc) or a lowercase letter for subnumbered items, and indent the sublist items to the text of the higher-level list items.

12. Punctuate numbered list items only if they are complete sentences or verb phrases that complete the sentence begun by the lead-in (and use periods in these two cases).

13. Watch out for numbered lists with more than 8 or 10 list items; for long numbered lists, look for ways to subdivide or consolidate.

14. Avoid single-item lists. If you have a 1 or an a, you need a 2 or a b.

15. When possible, omit articles (a, an, the) from the beginning of list items.
Beginning a Basic Scan

After accepting the default options for ScanDisk, begin your scan by doing the following:

1. Select the drive you want to check for errors by clicking once on the drive.
2. Select the type of test you want to run.
3. Click the Start button.

ScanDisk will begin checking your hard drive for errors and upon completion will display the results of your hard drive scan.

Example of a numbered vertical list. Items are in a required order.

Two-column lists

Use these guidelines for two-column lists:

1. Use two-column lists when you have a series of paired items, for example, terms and definitions.
2. Introduce the list with a lead-in sentence that is a complete sentence. Punctuate the lead-in sentence with a colon.
3. Column headings are optional; if used, align them to the left margin of the text of the columns.
4. Either start list items flush left or indent them no more than half an inch.
5. Use "compact" list format if you have just a few list items only a single line each. In the compact format, there is no vertical space between list items. Use a "loose" format—vertical space between list items—if the list items are multiple lines long.
6. Use sentence-style capitalization for both columns.
7. Punctuate items in the columns only if they are complete sentences.
8. Left-align the items in both columns.
9. When possible, omit articles (a, an, the) from the beginning of list items.

Note: The best way to create a two-column list is to use a table and hide the grid lines. If you use tabs between the columns, you are in for a mess if the text changes at all.

VTS components. For professional-quality video teleconferencing systems (VTS), a number of equipment components, including the following, are usually required:

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadband modem</td>
<td>Connects an office to a high-speed internet service. A standard modem is insufficient; a great deal of bandwidth is required for a VTC.</td>
</tr>
<tr>
<td>Router</td>
<td>Manages the connectivity and traffic that occurs when VTC participants in an office connect to a broadband modem.</td>
</tr>
<tr>
<td>Webcam</td>
<td>Records the video signal that is sent to participants during a live session. Incorporates autofocus capability.</td>
</tr>
<tr>
<td>CODEC</td>
<td>Translates video and audio signals for transmission.</td>
</tr>
<tr>
<td>Monitors</td>
<td>High-quality displays are necessary for conducting professional-level conferencing.</td>
</tr>
<tr>
<td>Speakers and microphones</td>
<td>Good quality speakers and microphones are necessary, both for room-based systems and personal computers.</td>
</tr>
</tbody>
</table>

http://distanceed.hss.kennesaw.edu/technicalcommunication/chapters/4_5Lists/4_5Lists_print.html
Example of a two-column list (pairs of list items). Not illustrated here, column headings are often used to indicate the contents of the two columns (for example, here it might be "Term" as the heading for the column 1 and "Definition" for column 2).

Lists with run-in headings

One last little variation on lists is the vertical list with run-in headings or labels at the beginning of the items. This format is used extensively in this book. It's like another way of doing a two-column list.

You can use bold or italics for the actual run-in heading (italics is used in the figure).

Example of a vertical list with run-in headings. Very useful for indicating the contents of each item in a lengthy vertical list when a two-column list is not quite right for the situation.

Nested lists

A nested list contains two or more level of list items. Nested lists can contain every combination of list type: numbered list items (123...) with lowercase-letter sublist items (abc...), filled-disc bulleted list items with clear-disc or hyphenated sublist items; and other combinations of these.

Example of a nested list. If the sublist items were in a required order, they would be abc....

Now here's another example of a nested list:
Basic manicure steps. Once you have these items at your workstation, you are ready to begin the manicure by following these steps:

Note: Unlike professional nail salons, MMD specialists do not cut the client’s cuticles during the manicure process. MMD abstinens from this process for health and safety reasons, as it can cause the client pain as well as run the risk of infection or inflammation.

1. Remove old polish:
   a. Check to see if your client has any old polish on her nails; you need to remove this polish before you can begin the manicure process.
   b. Pour about 7 drops of acetone (from the acetone bottle) onto a cotton ball.
   c. Beginning at the base of the nail (the part that is farthest from you and closest to the client), press down with the cotton ball and pull it down to the tip of the nail. Repeat until you remove all polish from the nail.

Another example of a nested list. Standard is to use lowercase letters for sublist items that are in a required order.

Now that you are an expert on the types of lists you can use in your documents, check out this tutorial video for using features in your word processing program to create lists that are attractive and formatted appropriately.
Special Notices

Special notices are an important feature of professional technical writing: they highlight special information readers need to know to understand what they are reading, to accomplish what they want to do, to prevent damage to equipment, and to keep from hurting themselves or others.

Your task in this section is to learn the different types of special notices, their uses, and formats.

Guidelines for Specific Types of Notices

In this section, and in this course, you use a specific style of notices. If you want to use a different style, get with your instructor. Otherwise, follow these guidelines in planning and designing special notices—they are your "specs"!

1. Use special notices to emphasize key points or warn or caution readers about damage or injury.
2. Be careful to use the types of special notices precisely for their defined purposes. Use the four types of special notices in the following ways:
   
   **Note**—To emphasize points or remind readers of something, or to indicate minor problems in the outcome of what they are doing.
   
   **Warning**—To warn readers about the possibility of minor injury to themselves or others.
   
   **Caution**—To warn readers about possible damage to equipment or data or about potential problems in the outcome of what they are doing.
   
   **Danger**—To warn readers about the possibility of serious or fatal injury to themselves or others.

Deciding on which type of notice to use is not an exact science. Don't use a danger notice when a warning is more appropriate (the same as "crying wolf"). Also, use notices in a consistent way throughout a report. Do not create your own notices, such as putting "Important" in place of "Warning."

1. Place special notices at the point in text where they are needed. For example, place a caution or danger notice before discussing a step in which readers might hurt themselves.
2. Avoid having too many special notices at any one point in the text. Otherwise, the effectiveness of their special format will be lost. (If you have too many, combine them.)
3. Explain the consequences of not paying attention to the notice. State what will happen if the reader does not heed the notice.
4. Avoid all-caps for the text of any special notice. The examples in this section use bold or italics.

*Note:* Take a look around your garage or kitchen, and look at the special notices you see on products. You will see some variation, but these are likely to be dependent on specific industry standards.
Activity

Take pictures of the special notices around you and share them on the Padlet, below. Please remember that everything you share on the Padlet is public.

If you don’t see a Padlet, above, click here: http://padlet.com/tmmpowell/j1grn75ph3g5

Format for Special Notices

Use the following for specific details on the capitalization, typography (bold, underlining, different fonts, different types sizes), and spacing for each type of special notice.

Note

Use the following format for simple notes:

1. Type the word “Note” followed by a colon. (Although the following examples use bold, consider using italics instead to prevent visual confusion with headings.)
2. Begin typing the text of the note one space after the colon. (But don’t put the text of the note in bold or italics.)
3. Singlespace within the text of the note; skip one line above and below the note.
4. Start run-over lines on the regular left margin.
5. Align the note with the text to which it refers (as illustrated in the second example).

Testing the Drive
To test your new drive by reading a data CD:

1. Open the drive tray and place a CD on the tray.
2. Close the drive and wait a moment for the drive and CD to spin.
3. Click My Computer on your Windows desktop to view the available drives. You should see your new drive and drive letter.
4. Click the new drive to access the files on the CD.

*Note:* The drive letter you see as your new drive may vary depending on the number of hard drives installed on your system.

Example of a simple note

SEO Note Settings
To make general settings before you start working with SEO Note:

1. Open Settings > Settings from the menu. The General tab opens.
2. Define the standard format for your new notes: HTML, text, or RTF (Rich Text Format).
   *Note:* Because most word processors are able to read and write RTF documents, select RTF as standard note format. It allows you to insert HTML formatted text, web links and plain text.
3. Enable the three Auto save options. Your notes will automatically be saved when you switch to another application, minimize the window, or exit the application.
4. Enable Start with Windows if you want SEO Note to always start with Windows.

*Example of a note within a bulleted list (not regular running text).* This same principle (that special notices align to the text they refer to) applies to the other types of special notices as well.

Notes
Use the following format for multiple notes:

1. Use this format when you have so many notes that they would distracting to present individually.
2. Type the word "Notes" followed by a colon. Italicize the word "Notes," if possible.
3. Use a numbered list for the individual notes; in it, follow the rules for numbered lists. (Do not use bold or italics for the individual notes.)
4. Align the notes with the text to which the refer; skip the equivalent of one line above and below the notes.
5. Place the stage monitors center stage and facing the violinist.

6. Set up your microphones and microphone stands in front of the monitors where the vocalists will be standing.

Notes:

1. Avoid problems with the feedback by ensuring the vocalist is not placed in front of the speakers.

2. Consider the length of your microphone cables and the location of your electrical outlets in the room.

This list and the multiple notes occur at the end of a section entitled "Building the Stage."

This multiple note uses numbered-list format, which for many goes against the rule about using numbered lists. Some prefer to use bullets.

Always make sure your lists are parallel.

Example of a multiple note. Use this format if you have lots of notes and want to collect them all in one place to prevent distraction.

Warning

Use the following format for warnings:

1. Type the word "Warning," italicize it, and follow it with a colon.
2. Either tab to beginning of the text of the warning, or use the hanging-indent format (which is much better). Try for 0.25 to 0.5 inches of space between the end of the warning label and the beginning of the text.
3. Use regular body font for the text of the warning notice (no bold, no italics, no all-caps, no color).
4. Align the warning notice with the text it refers to.
5. Skip the equivalent of one line above and below the warning notice.

Prepare for New Brake Shoes. To prepare the rear wheel assembly for the new brake shoes, perform the following tasks:

Warning: Wear a dust mask when cleaning brake components. Brake dust may contain hazardous materials and should not be inhaled.

1. Clean dirt and brake dust from backing plate and brake parts with aerosol brake cleaner.

2. Apply grease to the six flat friction points where the brake shoes touch the backing plate.

Pay attention to these formatting details:

- The notice only italicizes the word "Warning."
- The notice uses the "hanging head" style.
- The notice is indented to the text of the preceding text.

Caution

Use the following format for caution notices:

1. Type the word "Caution," follow it with a colon, and bold both the label and the colon.
2. Skip one line and begin the text of the caution aligned with the start of the caution label.
3. Singlespace the text of the caution; skip one line above and below the notice.
4. Align the caution notice with the text it refers to (in the preceding, the warning notice occurs within a numbered list and is indented accordingly).
1. Pump the brake pedal until firm.

Example of a caution notice. Use this one to alert readers of possible damage to equipment or problems with the procedure.

**Danger**

Use the following format for danger notices:

1. Type the word “DANGER” in all-caps. (Underline it, or use bold.)
2. Align the danger notice with the text it refers to.
3. Singlespace the text of the danger notice; skip one line above and below the danger notice.
4. Use bold on the text of the danger notice if you have it (but never all-caps).
5. If you have graphics capability, draw a box around the danger notice (including the label).

**Lower the Vehicle.** To lower the vehicle, perform the following:

1. Jack up rear of car with a hydraulic jack on a solid part of frame, remove the jack stands, and lower the car to ground.

   **DANGER:** Never work underneath a car that is only supported by a jack. Failure to support vehicle may result in death or severe injury if the vehicle falls from the jack.

2. Pump the brake pedal until firm.

3. Check that the brake fluid level is between the maximum and minimum lines on the reservoir. Add or remove fluid accordingly.

**Danger notice.** Use this one to alert readers of the possibility of serious injury or fatality.

**Other Formatting Issues**

Here are some additional points to consider concerning special notices:

**Special alignment.** Special notices must align to the text to which they refer. For example, if you have a note that adds some special detail to something in a bulleted list item, you must align that note to the text of the bulleted item. Of course, if the note follows a bulleted list but refers to the whole list, then you can use the regular left margin.

**Singlespaced text.** All of the examples and discussion in this unit are based on doublespaced text. For singlespaced text, use your document-design "eye" to decide on spacing. Leave either one blank lines between running text and special notices—depending on what looks best to you. (And of course both running text and the text of the special notices would be singlespaced.)

**Placement of special notices.** The standard rule is to place special notices before the point at which they are relevant. For example, you warn readers to back up all data before you tell them to reformat their hard drive. However, in practice this applies to serious special notices where great harm to data, equipment, or people is likely to ensue.
One technique used by very cautious writers (maybe those who have been burned) is to place all serious notices (warnings, cautions, and dangers) somewhere at the beginning of the document, and then repeat them individually where they apply.

**Multiple special notices.** You run into situations where you have three or four special notices, all jammed together in the same part of the text, each one following another. This is a problem because the whole point of the special formatting of the notices is lost: something is special because it is different from the surrounding. The solution to this problem is to create one identifying heading (for example, "Notes and Warnings"), and then list the notices (either bulleted or numbered) below it.

**Other important things to remember.** In any list, make sure your list is parallel. If you use bullets or numbers, make sure you have more than one bullet or number. That is, if you only need one bullet or one number in a bulleted or numbered list, you don't actually need a bulleted or numbered list.
Tables, Charts, and Graphs

One of the nice things about technical writing courses is that most of the papers have graphics in them—or at least they should. A lot of professional, technical writing contains graphics—drawings, diagrams, photographs, illustrations of all sorts, tables, pie charts, bar charts, line graphs, flow charts, and so on. Graphics are important in technical communication. We learn more from a document when graphics are included (Gatlin, 1988). In fact, people learn about 1/3 more from a document with graphics than without (Levie and Lentz, 1982). A recent study found that readers learn faster and are better able to use the information they learn when the text includes graphics (Große, Jungmann, and Drechsler, 2015). That does not, of course, mean that one should place graphics willy-nilly into every spot possible. On the contrary, graphics should be used carefully and correctly. The information below will help you to make informed decisions regarding graphic creation and placement that will help to make your documents more effective for your readers.

Chapter Objectives

At the end of this chapter, students will be able to

1. Distinguish among tables, charts, and graphs
2. Identify chief characteristics of tables, charts, and graphs
3. Identify and apply best practices in creating tables, charts, and graphs in technical communication

Tables

Tables, of course, are those rows and columns of numbers and words, mostly numbers. They permit rapid access to and relatively easy comparison of information. If the data is arranged chronologically (for example, sales figures over a ten-year period), the table can show trends—patterns of rising or falling activity. Of course, tables are not necessarily the most vivid or dramatic means of showing such trends or relationships between data—that's why we have charts and graphs (discussed in the next section).

Uses for tables.

The biggest use of tables is for numerical data. Imagine that you are comparing different models of laser printers in terms of physical characteristics such as height, depth, length, weight, and so on. Perfect for a table.

However, don't get locked into the notion that tables are strictly for numerical data. Whenever you have situations where you discuss several things about which you provide the same categories of detail, you've got a possibility for a table. For example, imagine that you were comparing several models of a laser printer: you'd be saying the same category of thing about each printer (its cost, print speed, supply costs, warranty terms, and so on). This is ideal stuff for a table, and it would be mostly words rather than numbers (and in this case, you'd probably want to leave the textual discussion where it is and "re-present" the information in table form).

Table format.

In its simplest form, a table is a group of rows and columns of data. At the top of each column is a column heading, which defines or identifies the contents of that column (and often it indicates the unit of measurement). On the left edge of the table may be row headings, which define or identify the contents of that row. Things get tricky when rows or columns must be grouped or subdivided. In such cases, you have to create row or column subheadings. This situation is illustrated here:
Format for tables with grouped or subdivided rows and columns. Notice that the table title goes above the table.

Traditionally, the title of a table is placed on top of the table or is the first row of the table. If the contents of the table are obvious and there is no need to cross-reference the table from anywhere else in the report, you can omit the title.

As for specific style and formatting guidelines for tables, keep these in mind:

- Refer to the table in the text just preceding the table. Explain the general significance of the data in the table; don't expect readers to figure it out entirely for themselves.
- Don't overwhelm readers with monster 11-column, 30-row tables! Simplify the table data down to just that amount of data that illustrates your point—without of course distorting that data.
- Don't put the word or abbreviation for the unit of measurement in every cell of a column. For example, in a column of measurements all in millimeters, don't put "mm" after every number. Put the abbreviation in parentheses in the column or row heading.
- Right- or decimal-align numbers in the columns. If the 123 and 4 were in a column, the 4 would be right below the 3, not the 1.
- Normally, words in columns are left-justified (although you will occasionally see columns of words all centered).
- Column headings are centered over the columns of numerical data (forming a T-shape); left-aligned with columns of text. The alignment of column headings to the actual columnar data is variable. If you have a column of two- or three-letter words, you'd probably want to center the column heading over that data, even those it is words not numbers. (Doing so, avoids an odd-looking L-shaped column.)
- When there is some special point you need to make about one or more of the items in the table, use a footnote instead of clogging up the table with the information.

Producing tables.

Normally, you'll be borrowing information in which a good table occurs. If it's a simple table without too many rows and columns, retype it yourself into your own document (but remember to document where you borrowed it from in the figure title). However, if it is a big table with lots of data, you're justified in scanning, screen-capturing, or photocopying it and bringing it into your report that way.

If you use OpenOffice, Word, or WordPerfect, get used to using the table-generating tools. You don't have to draw the lines and other formatting details.

Occasionally, in rough-draft technical reports, information is presented in regular running-text form that could be better presented in table (or tabular) form. Be sure and look back over your rough drafts for material that can transformed into tables.
It’s startling how many earthquakes are located worldwide per year—between 12,000 and 14,000. However, the magnitude and intensity, as measured on the Richter scale, is such that most don’t make the front page of your local newspaper. The monster earthquakes, those 6.5 and higher, occur only 0.3 times per year—but that’s certainly more than enough! Earthquakes measuring 8.0 to 8.4 are slightly more frequent at 1.1 occurrences per year. Any earthquake 0.0 or over is considered a “great” earthquake. “Major” earthquakes are those between 7.3 and 7.9. In the upper half of that range, 3.1 occur per year, while 15 occur in the 7.0 to 7.4 range. The frequency is considerably higher in the 6.5 to 6.9 range: an average of 56 per year, while 210 occur in the 6.0-6.4 range per year. See wwwneic.cr.usgs.gov/neis/general/handouts/mag_vs_int.html the U.S.

<table>
<thead>
<tr>
<th>Magnitude</th>
<th>EQ/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 - 0.9</td>
<td>0.3</td>
</tr>
<tr>
<td>8.0 - 8.4</td>
<td>1.1</td>
</tr>
<tr>
<td>7.5 - 7.9</td>
<td>3.1</td>
</tr>
<tr>
<td>7.0 - 7.4</td>
<td>15</td>
</tr>
<tr>
<td>0.5 - 6.9</td>
<td>56</td>
</tr>
</tbody>
</table>

Notice that the writer refers readers to the table and gives them a start interpreting it. Since the writer doesn’t refer to this table elsewhere in the document, numbering it is unnecessary.
When you create charts and graphs, keep these requirements in mind (most of these elements are illustrated below):

- **Axis labels**—In bar charts and line graphs, don’t forget to indicate what the x and y axes represent. One axis might indicate millions of dollars; the other, five-year segments from 1960 to the present.

- **Keys (legends)**—Bar charts, line graphs, and pie charts often use special color, shading, or line style (solid or dashed). Be sure to indicate what these mean; translate them in a key (a box) in some unused place in the chart or graph.

![Example of a graph.](image)

**Y-axis**: The increments (0, 50, 100, and so on) are marked; but there is no descriptive label because it's obvious that this axis measures the number of predicted and observed sunspots.

**Legend**: Indicates the meaning of shading, color, dashes, or other symbolism in a chart or graph.

**X-axis**: Every other year is labeled. Again, it’s obvious these years—no descriptive label needed.

**Title**: Notice the title for a chart or graph occurs beneath the item.

**Figure 7. Sunspots, predicted and observed, for an 11-year cycle.**

**Example of a graph.**

Notice that a *figure* title is placed beneath the graph.

- **Figure titles**—For most charts and graphs, you'll want to include a title, in many cases, a numbered title. Readers need some way of knowing what they are looking at. And don’t forget to cite the source of any information you borrowed in order to create the graphic. The standard rule for when to number figures or tables is this: if you cross-reference the figure or table elsewhere in the text.

- **Cross-references**—Whenever you use a chart or graph, don't forget to put a cross-reference to it from the related text. With that cross-reference, provide some explanation of what is going on in the graphic, how to interpret it, what its basic trends are, and so on.
In recent benchmark tests performed by PC Magazine, all three of the systems compared here performed at or near the same levels [1:116-118]. The Micron system comes out on top with slightly better average scores, as shown in Figure 5.

![Graph of benchmark ratings of system performance](http://distanceed.hss.kennesaw.edu/technicalcommunication/chapters/4_7TablesGraphsCharts/4_7TablesGraphsCharts_print.html)

Figure 5. Benchmark ratings of system performance [1:116-118]

It is important to note that the Gateway P5 system used in these tests was equipped with 256K Pipeline Burst cache—a feature not present in the basic configuration noted above (Figure 5). The lack of secondary cache in Pentium systems is widely regarded to result in a decrease in system performance of up to 30%.

- Example of a chart. Notice that text above and below the chart calls attention to the chart and briefly indicates its significance.
- Documentation—When you borrow information to create a graphic, be sure to use the standard format to indicate the source. It does not matter how you import the graphic into your report—it is all borrowed information, which some brave and noble soul worked hard to develop and who deserves credit for that effort.

**Producing charts and graphs.**

As with illustrations, you have these options for creating charts and graphs: screen-capturing, scanning, photocopying, generating your own with software, and drawing your own. You can find helpful information regarding choosing what type of graph to use here: [http://www.tutorial9.net/tutorials/web-tutorials/selecting-the-right-chart-type-for-your-data/](http://www.tutorial9.net/tutorials/web-tutorials/selecting-the-right-chart-type-for-your-data/)

You can find helpful downloads to jumpstart your graph creation here: [http://labs.juiceanalytics.com/chartchooser/index.html](http://labs.juiceanalytics.com/chartchooser/index.html).
As mentioned earlier, it's perfectly legal to borrow tables—to copy, photocopy, scan, or extract subsets of data from them. But you're obligated to cite your sources for tables, charts, and graphs just as you are for the words you borrow. Normally, this is done in either the table title or in a footnote just below the table. Check the example in the table shown previously.

**General Guidelines for Tables, Charts, Graphs: A Review**

The preceding sections state a number of common guidelines that need to be stated all in one place. These are important!

- Watch out for areas in your text where you discuss lots of numeric data in relation to two or more things—that's ideal for tables or even charts or graphs.
- Watch out for areas in your text where you define a series of terms—that's ideal for tables.
- Always discuss tables in preceding text. Don't just throw a table, graph, or chart out there unexplained. Orient readers to it; explain its basic significance.
- Make sure your tables, charts, and graphs are appropriate to your audience, subject matter, and purpose—don't zap beginners with massive, highly technical constructions they can't understand.
- Use a title unless the table, chart, and graph is very informal. Remember that the title goes *just above* the table; for charts and graphs, below.
- Left-align words and phrases in table columns (including the column heading). Right-align numeric data in table columns (but center the column heading). A nice touch to put a bit of right margin on this right-aligned data so that it moves out into the center of the column rather than remaining jammed to the right edge.
- Some believe that it is easier for readers to compare vertically rather than horizontally. If you believe that, format your tables so that your *columns* contain the information to be compared. For example, if you were comparing cars, you'd have *columns* for MPG, price, and so on.
- Indicate the source of tables, charts, and graphs you have borrowed either part of or entirety. This can be done in the title or in a footnote.
- Indicate identifying measurement values in column or row headings—not in each cell.
- Cross-reference all tables, charts, and graphs from the preceding text. In the cross-reference, give the number (if it is a formal table with title), indicate the subject matter of the table, and provide explanatory information as necessary.

**Best Practices for Creating Graphics in Technical Writing: Examples**

What are best practices for creating graphics? How can one mess up when adding a graphic to technical communication? This video will show you how to do things correctly and incorrectly.

If you don't see anything above, click here: https://youtu.be/YatGWqmfgQG

For more information and examples on how NOT to create graphs, please look at C.J. Schwarz' "A Short Tour of Bad Graphs," linked here and shared with permission.

**Bibliography**


