# ONLINE TECHNICAL WRITING



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# Online Technical Writing

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Detailed Licensing


Detailed Licensing

# Licensing

*A detailed breakdown of this resource's licensing can be found in **Back Matter/Detailed Licensing**.*

# CHAPTER OVERVIEW

## 1: Introduction- Technical Writing


1.1: About technical writing

1.2: About technical-writing courses

1.3: Resources

1.4: About the author

1.5: Acknowledgments


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# 1.1: About technical writing

## It's not only about rocket surgery or brain science!

Technical-writing courses introduce you to some of the most important aspects of writing in the worlds of science, technology, and business—in other words, the kind of writing that scientists, nurses, doctors, computer specialists, government officials, engineers, and other such people do as a part of their regular work.

To learn how to write effectively for the world of work, you'll study common types of reports, special format items such as lists and headings, simple techniques for putting graphics into reports, and some techniques for producing professional-looking final copy.

Technical-writing courses build on what you've learned in other writing courses. But there's lots that is new to learn! If you currently have a job in which you do some writing, you'll discover that you can put what you learn in your technical-writing course to immediate use.

## About Technical Writing

You're probably wondering what this "technical writing thing" is. Someone may even have told you, "it's this course where they make you write about rocket science and brain surgery." Well, not really, as you will see in a moment. Actually, the field of technical communication is essential in a wide range of fields and occupations. It is a fully professional field with degree programs, certifications, and—yes!—even theory. It's a good field with a lot of growth and income potential; and an introductory technical-writing course for which this book has been developed is a good way to start if you are interested in a career in this field.

**Workplace writing.** However, the focus for technical-writing courses is not necessarily career as a technical writer but an introduction to the kinds of writing skills you need in practically any technically oriented professional job. No matter what sort of professional work you do, you're likely to do lots of writing—and much of it technical in nature. The more you know about some basic technical-writing skills, which are covered in this guide and in technical-writing courses, the better job of writing you're likely to do. And that will be good for the projects you work on, for the organizations you work in, and—most of all—good for you and your career.

**The meaning of "technical."** Technical communication—or technical writing, as the course is often called—is not writing about a specific technical topic such as computers, but about any technical topic. The term "technical" refers to knowledge that is not widespread, that is more the territory of experts and specialists. Whatever your major is, you are developing an expertise—you are becoming a specialist in a particular technical area. And whenever you try to write or say anything about your field, you are engaged in technical communication.

**Importance of audience.** Another key part of the definition of technical communication is the receiver of the information—the audience. Technical communication is the delivery of technical information to readers (or listeners or viewers) in a manner that is adapted to their needs, level of understanding, and background. In fact, this audience element is so important that it is one of the cornerstones of this course: you are challenged to write about highly technical subjects but in a way that a beginner—a nonspecialist—could understand. This ability to "translate" technical information to nonspecialists is a key skill to any technical communicator. In a world of rapid technological development, people are constantly falling behind and becoming technological illiterates. Technology companies are constantly struggling to find effective ways to help customers or potential customers understand the advantages or the operation of their new products.

So relax! You don't have to write about computers or rocket science—write about the area of technical specialization you know or are learning about. And plan to write about it in such a way that even Grandad can understand!

**Really technical writing.** Keep relaxing, but you should know that professional technical writers do in fact write about very technical stuff—information that they cannot begin to master unless they go back for a Ph.D. But wait a minute! The technical documents have to ship with the product in less than nine months! How do they manage? Professional technical writers rely on these strategies to ensure the technical accuracy of their work:

- Study of books, articles, reports, websites related to the product
- Product specifications: what the product is supposed to do, how it is designed
- Interviews with subject matter experts: the product specialists, developers, engineers

- Product meetings during the development cycle
- Live demonstrations of the product
- Familiarization with similar, competing products
- Experimenting with working models of the product
- Most importantly, subject matter experts' review of technical writers' work for technical accuracy and completeness

Of course, experienced technical writers will tell you that product development moves so fast that specifications are not always possible and that working models of the product are rarely available. That's why the subject matter experts' review is often the most important.

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# 1.2: About technical-writing courses

## About Technical-Writing Courses

In technical-writing courses, the main focus is typically the technical report, due toward the end of the semester. Just about everything you do in the course is aimed at developing skills needed to produce that report. Of course, some technical-writing courses begin with a resume and application letter (often known as the cover letter), but after that you plan the technical report, then write a proposal in which you propose to write that report. Then you write short technical papers where you get accustomed to using things like headings, lists, graphics, and special notices—not to mention writing about technical subject matter in a clear, concise, understandable way that is appropriate for a specific audience.

**Caution:** You should be aware that technical-writing courses are writing-intensive. You will probably write more in your technical-writing course than in any other course you have ever taken. If you are taking physics, calculus, and intermediate accounting and are expecting a baby this semester—well, maybe, this is not exactly the right semester for technical writing.

## About This Free Online Technical Writing Textbook

This text came about in the mid-1980s while I was working at IBM–Austin, Texas, and teaching as an adjunct at Austin Community College. Using a desktop publishing system called Interleaf, I wrote this at a time when most students still used typewriters. There may still be vestiges of this era in these pages. In 1994, I discovered the web and began a mad dash through my lunch hours converting the Interleaf files to HTML using loads of macros I created in Emacs. In 2014, I began extensively overhauling this thing and trying to modernize it. Some of the examples are from my technical writing teaching days in the early 1980s at the University of Texas. They are dated but good examples. Readers are encouraged to send me updates! — *David*

## About the Author

Read about the author of this online textbook.

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# 1.3: Resources

## So much to learn!

- Microsoft Word Resources
- Technical writing landscape
- All our videos and articles. From writethedocs.org
- Technical Communication Resources. Sorry about all the dead links. I'll get to it!

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# 1.4: About the author

## Vita of David A. McMurrey

Here is some information on David A. McMurrey's background:



The IBM Years



Recovering . . .



The ACC Years

- Cruising for Nontextual Possibilities. Article in *Communicator: Institute of Scientific and Technical Communicators*, spring 2022.
- 11 years in publications for new products at IBM Corporation as writer and editor. Freelance writing, online-help authoring, HTML work, indexing, and editing for Dell, Tivoli, Texas Department of the American Legion, and individuals.
- 30 years as full- and part-time instructor in writing courses at the University of Texas at Austin, Baker University in Kansas, Austin Community College, and IBM Corporation and its suppliers.
- Writing-skills seminar presenter for IBM Corporation, Analysts International Corporation, Century Design, Wayne Dresser, Texas Natural Resources Conservation Commission, Tivoli Systems, Broadjump.com, Texas Department of Health, Texas Department of Assistive and Rehabilitative Services, Texas Bureau of Radiation Control, Texas Department of Human Services, Samsung Austin Semiconductor.
- Author of *Processes in Technical Writing* (Macmillan 1988); with M. Sue Campman, co-author of *Writing Fundamentals* (Macmillan, 1985); with David Beer, co-author of *Guide to Writing as an Engineer* (Wiley, 2008–2018); author of *Power Tools for Technical Communication* (Heinle, 2001); author of a free online textbook in technical writing available on the web.
- Instructor and former department chair: Business Government & Technical Communications Program at Austin Community College, teaching courses in technical writing, online and traditional hardcopy documentation of software and hardware computer information.
- Developer of online writing courses presented over the World Wide Web, including:

  Technical & Business Writing Austin Community College (Austin, Texas) version
  Technical & Business Writing Kinneavy modes version
  Technical & Business Writing nontechwriter version
  APIs for for Technical Writers
  AI Prompts for Technical Writers
  Confluence for Content Creation and Collaboration
  Essential Utilities for Technical Writers
  MadCap Flare for Content Creation
  Basic JavaScript for Technical Writers
  Technical Publishing with Adobe FrameMaker
  Training Videos (Camtasia): Technical Writers
  Git/GitHub/Markdown for Technical Writers
  Technical Editing
  Web-Based Content Management (Drupal)
  XML for Structured Authoring (oXygen)
  DITA for Structured Authoring (oXygen)
  DITA for Structured Authoring (Heretto)
  Sublime Text IDE
  Visual Studio Code IDE
- Founder and former coordinator of Austin Community College's Webmaster Certificate Program.

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# 1.5: Acknowledgments

## Contributors

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Ianthe Sarrazin
James Ball
Kim Bravo
Rob Napier
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# CHAPTER OVERVIEW

## 2: Applications of Technical Writing


2.1: Business correspondence and resumes

2.1.1: Overview of business correspondence- format and style

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# 2.1: Business correspondence and resumes

## Get the job; write like a professional

This chapter focus on business correspondence—general format and style for business letters as well as specific types of business letters. Specifically:

- Overview of business correspondence: format and style
- Inquiry letters
- Complaint and adjustment letters
- Application letters
- Resumes

You can access examples of these types of business correspondence from the individual chapters in which they are discussed.

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# 2.1.1: Overview of business correspondence- format and style

## Write a nice professional letter

For related matters:

- See the chapter on resumes.
- See the chapter on application letters.
- See the chapter on inquiry letters.
- See the chapter on complaint and adjustment letters.

**Note:** Do a Google search on "standard business letter format," and you will see that *no* examples use the multiple-spacing format of headings and inside addresses dictated by Microsoft templates. Also, Microsoft business-letter template show a comma punctuating the salutation. A colon is traditional for *business* correspondence.

Non-traditional comma on a business-letter salutation:

> Dear **Recipient Name,**
> To get started, click placeholder text and start typing. Double-click the table cells in the footer to add your contact info (or delete the columns you don't want).

## Common Components

The following is concerned with the mechanical and physical details of business letters. All of the components discussed in the following are illustrated in the following:

6 June 2016

1117 The High Road
Austin, TX 78703

*Heading: date and sender's address*

Mr. David Patricks
3005 West 29th, Suite 130
Waco, TX 77883

*Inside address: name and and address of the recipients of the letter.*

Dear Mr. Patricks:

*Salutation: punctuated with a colon (not a comma)*

I received your June 6th letter requesting my consulting services and recommendations, as provided in the following.

First, let me review my understanding of your inquiry. The question you raise revolves around whether the heating registers should be located in a low sidewall or in the ceiling and, if registers are used, which type—step-down or stamped-face—will deliver the best results. Additionally, the problem concerns whether there is any benefit to having heating registers near the floor, whether moving heated air "down" in ducts negatively affects blower performance, and whether adequate injection can be achieved on the low speed of a two-range furnace.

*Body: singlespaced text within paragraphs, doublespacing between paragraphs. No paragraph indentation.*

My recommendations are as follows:

- I can find nothing in Carrier, Trane, or ASHRAE design manuals that indicates drop as being a factor in duct design any different from normal static losses. If you have different information on this, I would like to have references to it.
- I cannot see any advantage to low sidewall applications. The problem is injection and pattern. I do see an advantage to low sidewall return. *Carrier Design Manual-Air Distribution* is a good reference on both items.
- I recommend step-down diffusers with OBD because they have pattern and volume control that is superior to that of stamped-face diffusers.
- I am opposed to low sidewall diffusers or floor diffusers in the application you describe. The increased static losses that result from trying get the ducts down through the walls will only increase installation cost and reduce efficiency.

*Use of special formatting within the letter: bulleted and numbered lists for readability; even illustrations for comprehension.*

If there is anyone in your organization who is uncomfortable with these reommendations, let me know. I'd be very interested in reviewing any actual documented test results. Let me know if you have any further questions of if I can be of any further assistance.

Sincerely,

*Complimentary close*

Jane A. McMurrey, P.E.
HVAC Consults of Austin, Inc.

*Signature block*

JAM/dmz
Encl.: Invoice for consulting services

*End notations*

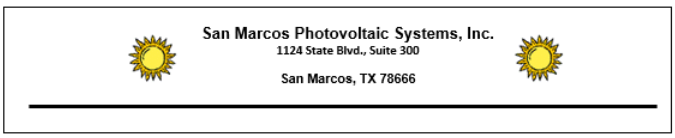
*Common components of business letters*

**Heading.** The heading contains the writer's address and the date of the letter. The writer's name is not included; only a date is needed in headings on letterhead stationery. Remember that if you use letterhead stationery in which the first page contains a fancy masthead and logo, don't use that type of page on following pages. Use the following-page stationery that comes with the logo-page stationery.

If you are in a writing course, why not create your own fancy logo, complete with invented company name and address (if your instructor permits)? Consider these two examples:




*One possibility for invented logo stationery*




*Another possibility for invented logo stationery*

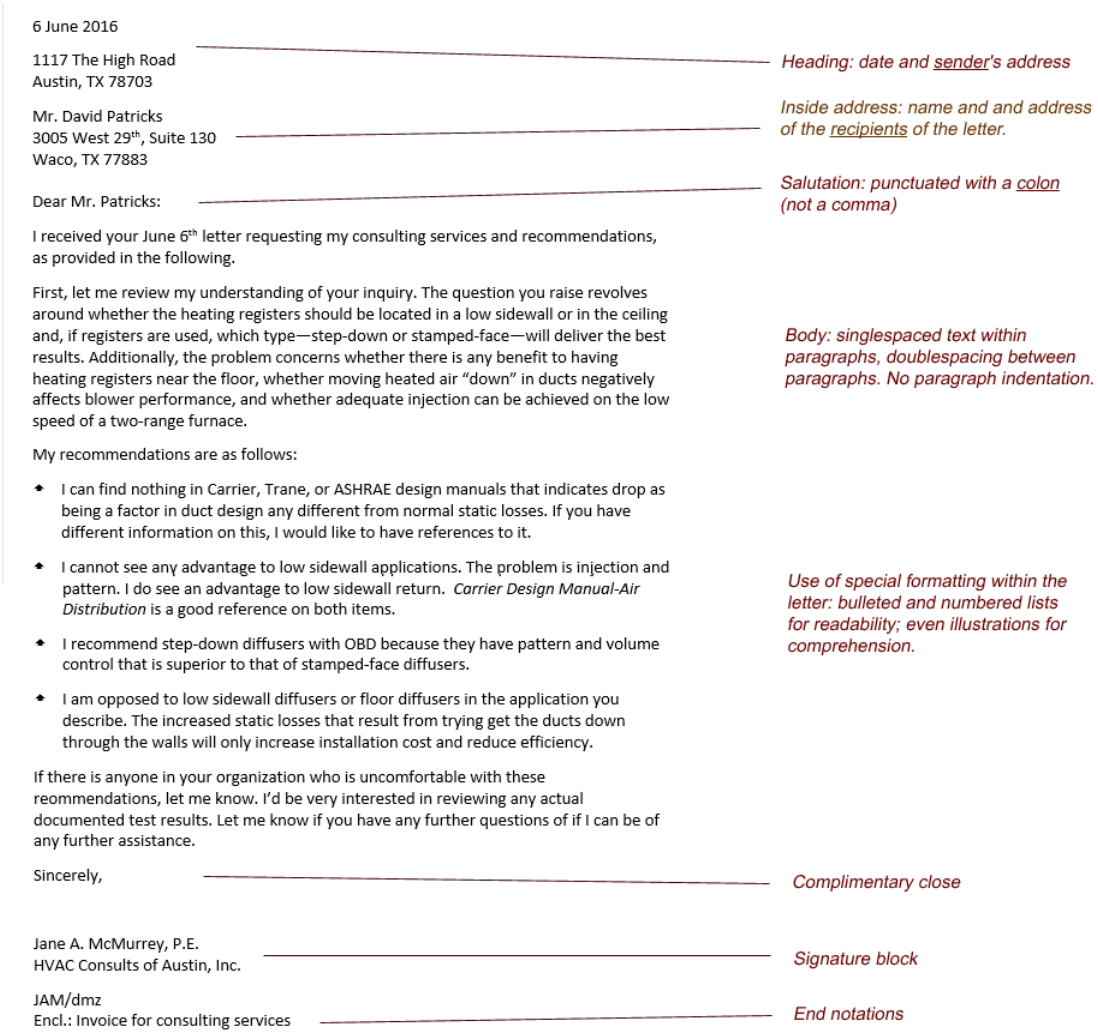
**Inside address.** The inside address shows the name and address of the recipient of the letter. This information can help prevent confusion at the recipient's offices. Also, if the recipient has moved, the inside address helps to determine what to do with the letter. In the inside address, include the appropriate title of respect of the recipient; and copy the name of the company exactly as that company writes it. When you do have the names of individuals, remember to address them appropriately: Mrs., Ms., Mr., Dr., and so on. If you are not sure what is correct for an individual, try to find out how that individual signs letters or consult the forms-of-address section in a dictionary.

**Salutation.** The salutation directly addresses the recipient of the letter and is followed by a colon (except when a friendly, familiar, sociable tone is intended, in which case a comma is used).

*Note:* Start a new document in Microsoft Word, and you'll see that all cover-letter templates punctuate the salutation with a comma. Punctuation with a colon in business letters is firmly stated in *Business Writer's Companion* (2011).

Notice that in the simplified letter format, the salutation line is eliminated altogether. If you don't know whether the recipient is a man or woman, the traditional practice has been to write "Dear Sir" or "Dear Sirs"—but that's sexist! To avoid this problem, salutations such as "Dear Sir or Madame," "Dear Ladies and Gentlemen," "Dear Friends," or "Dear People" have been tried—but without much general acceptance. Deleting the salutation line altogether or inserting "To Whom It May Concern" in its place, is not ordinarily a good solution either—it's impersonal.

The best solution is to make a quick, anonymous phone call to the organization and ask for a name; Or, address the salutation to a department name, committee name, or a position name: "Dear Personnel Department," "Dear Recruitment Committee," "Dear Chairperson," "Dear Director of Financial Aid," for example.




*Block letter format*

*Subject or reference line*. As shown in the order letter, the subject line replaces the salutation or is included with it. The subject line announces the main business of the letter.

**Body of the letter.** The actual message of course is contained in the body of the letter, the paragraphs between the salutation and the complimentary close. Strategies for writing the body of the letter are discussed in the section on business-correspondence style.

**Complimentary close.** The "Sincerely yours" element of the business letter is called the complimentary close. Other common ones are "Sincerely yours," "Cordially," "Respectfully," or "Respectfully yours." You can design your own, but be careful not to create florid or wordy ones. Notice that only the first letter is capitalized, and it is always followed by a comma.

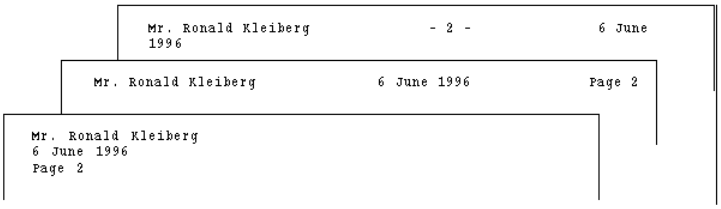
**Signature block.** Usually, you type your name four lines below the complimentary close, and sign your name in between. If you are a woman and want to make your marital status clear, use Miss, Ms., or Mrs. in parentheses before the typed version of your first name. Whenever possible, include your title or the name of the position you hold just below your name. For example, "Technical writing student," "Sophomore data processing major," or "Tarrant County Community College Student" are perfectly acceptable.

**End notations.** Just below the signature block are often several abbreviations or phrases that have important functions.

- *Initials*. The initials in all capital letters in the preceding figures are those of the writer of the letter, and the ones in lower case letters just after the colon are those of the typist.
- *Enclosures*. To make sure that the recipient knows that items accompany the letter in the same envelope, use such indications as "Enclosure," "Encl.," "Enclosures (2)." For example, if you send a resume and writing sample with your application letter, you'd do this: "Encl.: Resume and Writing Sample." If the enclosure is lost, the recipient will know.

- *Copies*. If you send copies of a letter to others, indicate this fact among the end notations also. If, for example, you were upset by a local merchant's handling of your repair problems and were sending a copy of your letter to the Better Business Bureau, you'd write this: "cc: Better Business Bureau." If you plan to send a copy to your lawyer, write something like this: "cc: Mr. Raymond Mason, Attorney."

**Following pages.** If your letter is longer than one page, the heading at the top of subsequent pages can be handled in one of the ways shown below. The information in the following page header is the *name of the recipient*, date and page number:




*Examples of following-page header format.*

If you use letterhead stationery, remember not to use it for subsequent pages. However, you must use blank paper of the same quality, weight, and texture as the letterhead paper (usually, letterhead stationery comes with matching blank paper).

## Business Letter Formats

If you are writing a business letter, select one of the common formats as shown in the example letters listed below. These include the block letter, the semi-block letter, the alternative block letter, and the simplified letter.

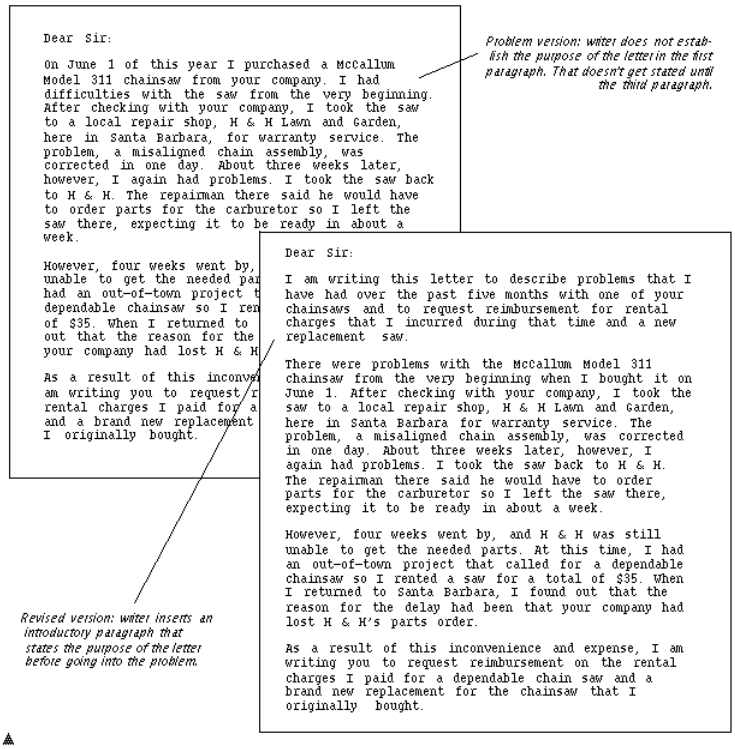
- See the block letter.
- See the semi-block letter.
- See the alternative block letter.
- For the simplified letter.

Which of these formats to use depends on the ones commonly used in your organization or the situation in which you are writing. Use the simplified letter if you lack the name of an individual or department to write to.

## Style in Business Correspondence

Writing business letters and memos differs in certain important ways from writing reports. Keep the following advice in mind when you write and especially when you revise your business letters or memos.

**State the main business, purpose, or subject matter right away.** Let the reader know from the very first sentence what your letter is about. Remember that when business people open a letter, their first concern is to know what the letter is about, what its purpose is, and why they must spend their time reading it. Therefore, avoid round-about beginnings. If you are writing to apply for a job, begin with something like this: "I am writing to apply for the position you currently have open...." If you have bad news for someone, you need not spill all of it in the first sentence. Here is an example of how to avoid negative phrasing: "I am writing in response to your letter of July 24, 1997 in which you discuss problems you have had with an electronic spreadsheet purchased from our company." The following shows an additional example.




*State the main purpose or business of the letter right away*. The problem version just starts flailing away from the very outset. The revised version at least establishes the purpose of the letter (and then starts flailing).

**If you are responding to a letter, identify that letter by its subject and date in the first paragraph or sentence.** Busy recipients who write many letters themselves may not remember their letters to you. To avoid problems, identify the date and subject of the letter to which you respond:

> Dear Mr. Stout:
>
> I am writing in reponse to your September 1, 19XX letter in which you describe problems that you've had with one of our chainsaws. I regret that you've suffered this inconvenience and expense and....

> Dear Ms. Cohen:
>
> I have just received your August 4, 19XX letter in which you list names and other sources from which I can get additional information on the manufacture and use of plastic bottles in the soft-drink industry....

**Keep the paragraphs of most business letters short.** The paragraphs of business letters tend to be short, some only a sentence long. Business letters are not read the same way as articles, reports, or books. Usually, they are read rapidly. Big, thick, dense paragraphs over ten lines, which require much concentration, may not be read carefully—or read at all.

To enable the recipient to read your letters more rapidly and to comprehend and remember the important facts or ideas, create relatively short paragraphs of between three and eight lines long. In business letters, paragraphs that are made up of only a single sentence are common and perfectly acceptable. Throughout this chapter, you'll see examples of the shorter paragraphs commonly used by business letters.

**"Compartmentalize" the contents of your letter.** When you "compartmentalize" the contents of a business letter, you place each different segment of the discussion—each different topic of the letter—in its own paragraph. If you were writing a complaint letter concerning problems with the system unit of your personal computer, you might have these paragraphs:

- A description of the problems you've had with it
- The ineffective repair jobs you've had
- The compensation you think you deserve and why

Study each paragraph of your letters for its purpose, content, or function. When you locate a paragraph that does more than one thing, consider splitting it into two paragraphs. If you discover two short separate paragraphs that do the same thing, consider joining them into one.

**Provide topic indicators at the beginning of paragraphs.** Analyze some of the letters you see in this chapter in terms of the contents or purpose of their individual paragraphs. In the first sentence of any body paragraph of a business letter, try to locate a word or phrase that indicates the topic of that paragraph. If a paragraph discusses your problems with a personal computer, work the word "problems" or the phrase "problems with my personal computer" into the first sentence. Doing this gives recipients a clear sense of the content and purpose of each paragraph. Here is an excerpt before and after topic indicators have been incorporated:

> **Problem:**
> I have worked as an electrician in the Decatur, Illinois, area for about six years. Since 1980 I have been licensed by the city of Decatur as an electrical contractor qualified to undertake commercial and industrial work as well as residential work.
>
> **Revision:**
> As for *my work experience*, I have worked as an electrician in the Decatur, Illinois, area for about six years. Since 1980 I have been licensed by the city of Decatur as an electrical contractor qualified to undertake commercial and industrial work as well as residential work.*(Italics not in the original.)*

**List or itemize whenever possible in a business letter.** Listing spreads out the text of the letter, making it easier to pick up the important points rapidly. Lists can be handled in several ways, as explained in the chapter on lists. For examples of lists in business correspondence, see the block-letter format in the preceding, the inquiry letter, and order letter.

**Place important information strategically in business letters.** Information in the first and last lines of paragraphs tends to be read and remembered more readily. These are high-visibility points. Information buried in the middle of long paragraphs is easily overlooked or forgotten. For example, in application letters which must convince potential employers that you are right for a job, place information on your appealing qualities at the beginning or end of paragraphs for greater emphasis. Place less positive or detrimental information in less highly visible points. If you have some difficult things to say, a good (and honest) strategy is to de-emphasize by placing them in areas of less emphasis. If a job requires three years of experience and you only have one, bury this

fact in the middle or the lower half of a body paragraph of the application letter. The resulting letter will be honest and complete; it just won't emphasize weak points unnecessarily. Here are some examples of these ideas:

**Problem:**
In July I will graduate from the University of Kansas with a Bachelor of Science in Nutrition and Dietetics. Over the past four years in which I have pursued this degree, I have worked as a lab assistant for Dr. Alison Laszlo and have been active in two related organizations, the Student Dietetic Association and the American Home Economics Association. In my nutritional biochemistry and food science labs, I have written many technical reports and scientific papers. I have also been serving as a diet aide at St. David's Hospital in Lawrence the past year and a half. *(The job calls for a technical writer; let's emphasize that first, then mention the rest!)*

**Revision:**
In my education at the University of Kansas, I have had substantial experience writing technical reports and scientific papers. Most of these reports and papers have been in the field of nutrition and dietetics in which I will be receiving my Bachelor of Science degree this July. During my four years at the University, I have also handled plenty of paperwork as a lab assistant for Dr. Alison Laszlo, as a member of two related organizations, the Student Dietetic Association and the American Home Economics Association, and as a diet aide as St. David's Hospital in Lawrence in the past year and a half.

**Problem:**
To date, I have done no independent building inspection on my own. I have been working the past two years under the supervision of Mr. Robert Packwood who has often given me primary responsibility for walk-throughs and property inspections. It was Mr. Packwood who encouraged me to apply for this position. I have also done some refurbishing of older houses on a contract basis and have some experience in industrial construction as a welder and as a clerk in a nuclear construction site. *(Let's not lie about our lack of experience, but let's not put it on a billboard either!)*

**Revision:**
As for my work experience, I have done numerous building walk-throughs and property inspections under the supervision of Mr. Robert Packwood over the past two years. Mr. Packwood, who encouraged me to apply for this position, has often given me primary responsibility for many inspection jobs. I have also done some refurbishing of older houses on a contract basis and have some experience in industrial construction as a welder and as a clerk in a nuclear construction site.

**Find positive ways to express bad news in your business letters.** Often, business letters must convey bad news: a broken computer keyboard cannot be replaced, or an individual cannot be hired. Such bad news can be conveyed in a tactful way. Doing so reduces the chances of an end of business relations with the recipient of the bad news. To convey bad news positively, avoid such words as "cannot," "forbid," "fail," "impossible," "refuse," "prohibit," "restrict," and "deny" as much as possible. The first versions

of the example sentences below are phrased in a rather cold and unfriendly negative manner; the second versions are much more positive, cordial and tactful:

**Problem:**
Because of the amount of information you request in your letter, I simply cannot help you without seriously disrupting my work schedule.

**Revision:**
In your letter you ask for a good amount of information which I would like to help you locate. Because of my work commitments, however, I am going to be able to answer only a few of the questions....

**Problem:**
If you do not complete and return this advertisement contract by July 1, 19XX, you will not receive your advertising space in this year's *Capitol Lines*. If we have not heard from you by this deadline, we will sell you your advertisement space to some other client.

**Revision:**
Please complete the enclosed contract and return it to us by July 1, 19XX. After this deadline, we will begin selling any unrenewed advertisement space in this year's *Capitol Lines*, so I hope we hear from you before then.

**Problem:**
While I am willing to discuss changes in specific aspects of this article or ideas on additional areas to cover, I am not prepared to change the basic theme of the article: the usability of the Victor microcomputer system.

**Revision:**
I am certainly open to suggestions and comments about specific aspects of this article, or any of your thoughts on additional areas that you think I should cover. I do want, however, to retain the basic theme of the article: the usability of the Victor microcomputer system.

**Focus on the recipient's needs, purposes, or interests instead of your own.** Avoid a self-centered focus on your own concerns rather than those of the recipient. Even if you must talk about yourself in a business letter a great deal, do so in a way that relates

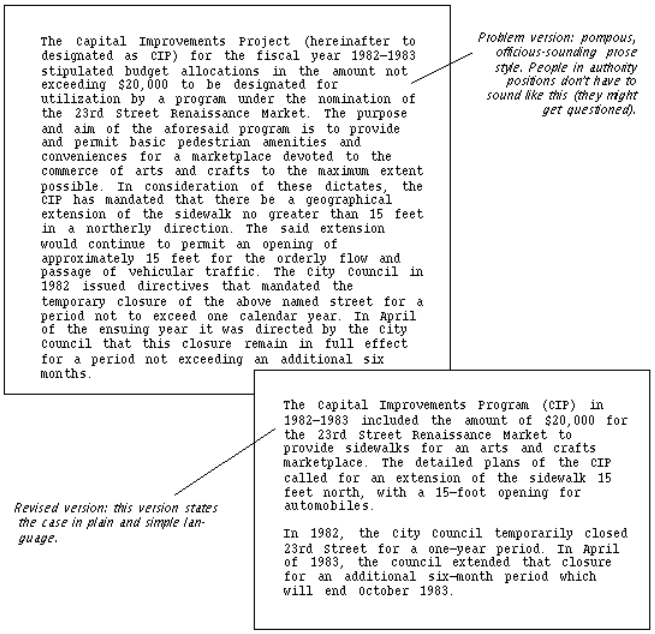
your concerns to those of the recipient. This recipient-oriented style is often called the "you-attitude," which does not mean using more you's but making the recipient the main focus of the letter.

| |
|---|
| **Problem:**<br>I am writing you about a change in our pricing policy that will save our company time and money. In an operation like ours, it costs us a great amount of labor time (and thus expense) to scrape and rinse our used tableware when it comes back from large parties. Also, we have incurred great expense on replacement of linens that have been ruined by stains that could have been soaked promptly after the party and saved.<br><br>**Revision:**<br>I am writing to inform you of a new policy that we are beginning, effective September 1, 19XX, that will enable us to serve your large party needs more often and without delay. In an operation like ours in which we supply for parties of up to 500, turn-around time is critical; unscraped and unrinsed tableware causes delays in clean-up time and, more importantly, less frequent and less prompt service to you the customer. Also, extra fees for stained linens can be avoided by immediate soaking after the party. |
| **Problem:**<br>For these reasons, our new policy, effective September 1, 19XX, will be to charge an additional 15% on unrinsed tableware and 75% of the wholesale value of stained linens that have not been soaked.<br><br>**Revision:**<br>Therefore, to enable us to supply your large party needs promptly, we will begin charging 15% on all unrinsed tableware and 75% of the wholesale value of stained linens that have not been soaked. This policy we hope will encourage our customers' kitchen help to do the quick and simple rinsing and/or soaking at the end of large parties. Doing so will ensure faster and more frequent service. |

**Avoid pompous, inflated, legal-sounding phrasing.** Watch out for puffed-up, important-sounding language. This kind of language may seem business-like at first; it's actually ridiculous. Of course, such phrasing is apparently necessary in legal documents; but why use it in other writing situations? When you write a business letter, picture yourself as a plain-talking, common-sense, down-to-earth person (but avoid slang). Check out the following examples for a serious dose of bureaucratese.

| *Pompous-language version* | *Plain-English version* |
|---|---|
| Teachers must facilitate students in their process of enculturation into electronic conferencing literacy. | Teachers must help students get used to online conferences. |
| Students must learn how this medium constrains and enables their discourse production and exchange. | Students must learn how online conferencing affects their communications. |
| Teachers must co-construct the intellectual, social and political space that is the electronic conference with their students in a dynamic manner. | Teachers must build the atmosphere of the online conference with their students. |
| Students must see that the rhetoricity of constantly shifting roles as discourse producers and consumers in the interactive dynamics of discursive exchange in a rapid electronic-delivery system is the same that occurs between speakers and listeners during oral conversation. | Students must understand that their roles as writers and readers in online conferences rapidly shift much the way that their roles as speakers and listeners do in oral conversations. |

Here's another example—before and after:




*Avoid pompous, officious-sounding writing*. Not only is the tone of the problem version offensive, it is nearly twice as long as the revised version!

**Give your business letter an "action ending" whenever appropriate.** An "action-ending" makes clear what the writer of the letter expects the recipient to do and when. Ineffective conclusions to business letters often end with rather limp, noncommittal statements such as "Hope to hear from you soon" or "Let me know if I can be of any further assistance." Instead, or in addition, specify the action the recipient should take and the schedule for that action. If, for example, you are writing a query letter, ask the editor politely to let you know of his decision if at all possible in a month. If you are writing an application letter, subtlely try to set up a date and time for an interview. Here are some examples:

| |
|---|
| As soon as you approve this plan, I'll begin contacting sales representatives at once to arrange for purchase and delivery of the notebook computers. May I expect to hear from you within the week? |
| I am free after 2:00 p.m. on most days. Can we set up an appointment to discuss my background and this position further? I'll look forward to hearing from you. |

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 2.1.2: Inquiry letters

## Ask for information in a professional manner

This chapter focuses on the inquiry letter or inquiry e-mail; let's call it the inquiry communication. The *inquiry communication* is useful when you need information, advice, names, or directions. Be careful, however, not to ask for too much information or for information that you could easily obtain in some other way—for example, by a quick trip to the library or by an Internet search.

Be sure to check out the examples.

For related matters, see the chapter on general business-letter format and style.

## Inquiry Communications: Types and Contexts

There are two types of inquiry communications: *solicited* and *unsolicited*.

You write a *solicited* inquiry communication when a business or agency advertises its products or services. For example, if a software manufacturer advertises some new package it has developed and you can't inspect it locally, write a solicited letter or e-mail to that manufacturer asking specific questions. If you cannot find any information on a technical subject, an inquiry letter or e-mail to a company involved in that subject may put you on the right track. In fact, that company may supply much more help than you had expected (provided of course that you write a good inquiry communication). If you need to find the names and addresses of businesses related to your report project, see the chapter on finding information in libraries and online.

Your inquiry communication is *unsolicited* if the recipient has done nothing to prompt your inquiry. For example, if you read an article by an expert, you may have further questions or want more information. You seek help from these people in a slightly different form of inquiry letter or e-mail. As the steps and guidelines for both types of inquiry communications show, you must construct the unsolicited type more carefully, because recipients of unsolicited inquiry letters or e-mail are not ordinarily prepared to handle such inquiries.

## Inquiry Letters or E-mail: Contents and Organization

1. Early in the letter or e-mail, identify the purpose—to obtain help or information (if it's a solicited communication, information about an advertised product, service, or program).
2. In an unsolicited letter or e-mail, identify who you are, what you are working on, why you need the requested information, and how you found out about the individual. In an unsolicited letter or e-mail, also identify the source that prompted your inquiry, for example, a journal article.
3. In the communication, list questions or information needed in a clear, specific, and easy-to-read format. If you have a number of questions, consider making a questionnaire and including a stamped, self-addressed envelope. If it's e-mail, just put the questions in the body of the e-mail or attach a separate questionnaire document.
4. In an unsolicited letter or e-mail, try to find some way to compensate the recipient for the trouble, for example, by offering to pay copying and mailing costs, to accept a collect call, to acknowledge the recipient in your report, or to send him or her a copy of your report. In a solicited letter or e-mail, suggest that the recipient send brochures or catalogs.
5. In closing an unsolicited letter or e-mail, express gratitude for any help that the recipient can provide you, acknowledge the inconvenience of your request, but do not thank the recipient "in advance." In an unsolicited letter or e-mail, tactfully suggest to the recipient will benefit by helping you (for example, through future purchases from the recipient's company).

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 2.1.3: Complaint and adjustment letters

## Go ahead and gripe—but in a professional manner

This chapter covers two closely related types of business letters: *complaint letters*, which request compensation for problems with purchases or services, and *adjustment letters*, which are the responses to complaint letters.

Be sure to check out the examples.

For related matters, see the chapter on general business-letter format and style.

## Complaint Letters

A complaint letter requests some sort of compensation for defective or damaged merchandise or for inadequate or delayed services. While many complaints can be made in person, some circumstances require formal business letters. The complaint may be so complex that a phone call cannot effectively resolve the problem; or the writer may prefer the permanence, formality, and seriousness of a business letter. The essential rule in writing a complaint letter is to maintain your poise and diplomacy, no matter how justified your gripe is. Avoid making the recipient an adversary.

Note: Complaints by e-mail may not be as effective as those by regular mail so that option is not included here.

1. Early in the letter, identify the reason you are writing—to register a complaint and to ask for some kind of compensation. Avoid leaping into the details of the problem in the first sentence.
2. Provide a fully detailed narrative or description of the problem. This is the "evidence."
3. State exactly what compensation you desire, either before or after the discussion of the problem or the reasons for granting the compensation. (It may be more tactful and less antagonizing to delay this statement in some cases.)
4. Explain why your request should be granted. Presenting the evidence is not enough: state the reasons why this evidence indicates your request should be granted.
5. Suggest why it is in the recipient's best interest to grant your request: appeal to the recipient's sense of fairness, desire for continued business, but don't threaten. Find some way to view the problem as an honest mistake. Don't imply that the recipient deliberately committed the error or that the company has no concern for the customer. Toward the end of the letter, express confidence that the recipient will grant your request.

## Adjustment Letters

Note: Adjustment communications by e-mail may not be as effective as those by regular mail so that option is not included here.

Replies to complaint letters, often called letters of "adjustment," must be handled carefully when the requested compensation cannot be granted. Refusal of compensation tests your diplomacy and tact as a writer. Here are some suggestions that may help you write either type of adjustment letter:

1. Begin with a reference to the date of the original letter of complaint and to the purpose of your letter. If you deny the request, don't state the refusal right away unless you can do so tactfully.
2. Express your concern over the writer's troubles and your appreciation that she or he has written you.
3. If you deny the request, explain the reasons why the request cannot be granted in as cordial and noncombative manner as possible. If you grant the request, don't sound as if you are doing so in a begrudging way.
4. If you deny the request, try to offer some partial or substitute compensation or offer some friendly advice (to take the sting out of the denial).
5. Conclude the letter cordially, perhaps expressing confidence that you and the writer will continue doing business.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 2.1.4: Application letters

## Show your best stuff—get that interview

This chapter focuses on the application letter (sometimes called a "cover letter"), which together with the resume is often called the "job package." You may already have written one or both of these employment-seeking documents. That's okay. Read and study this section, and then apply the guidelines here to the resumes and application letters you have created in the past.

In many job applications, you attach an application letter to your resume. Actually, the letter comes *before* the resume.

The role of the application letter is to draw a clear connection between the job you are seeking and your qualifications listed in the resume. To put it another way, the letter matches the requirements of the job with your qualifications, emphasizing how you are right for that job. The application letter is not a lengthy summary of the resume—not at all. It selectively mentions information in the resume, as appropriate.

Be sure and check out the examples accompanying this chapter.

For related matters:

- See the section on resumes for the companion to this section.
- See the section on general business-letter format and style.

For questions involving justified vs. ragged-right margins:

- Justified vs. Rag Right. fonts.com, n.d.
- Justified Text Versus Ragged-Right Text. Adams Drafting, 2007.

## Common Types of Application Letters

To begin planning your letter, decide which type of application letter you need. This decision is in part based on employers' requirements and, in part, based on what your background and employment needs are. In many ways, types of application letters are like the types of resumes. The types of application letters can be defined according to amount and kind of information:

- **Objective letters**—One type of letter says very little: it identifies the position being sought, indicates an interest in having an interview, and calls attention to the fact that the resume is attached. It also mentions any other special matters that are not included on the resume, such as dates and times when you are available to come in for an interview. This letter does no salesmanship and is very brief. (It represents the true meaning of "cover" letter.)
- **Highlight letters**—Another type of application letter, the type you do for most technical writing courses, tries to summarize the key information from the resume, the key information that will emphasize that you are a good candidate for the job. In other words, it selects the best information from the resume and summarizes it in the letter—this type of letter is especially designed to make the connection with the specific job.

How do you know which to write? For most technical-writing courses, write the highlight letter. However, in "real-life" situations, try calling the prospective employer; study the job advertisement for clues.

## Common Sections in Application Letters

As for the actual content and organization of the paragraphs within the application letter (specifically for the *highlight* type of application letter), consider the following comon approaches.

**Introductory paragraph.** That first paragraph of the application letter is the most important; it sets everything up—the tone, focus, as well as your most important qualification. A typical problem in the introductory paragraph involves diving directly into work and educational experience. Bad idea! A better idea is to do some combination of the following:

- State the purpose of the letter—to inquire about an employment opportunity.
- Indicate the source of your information about the job—newspaper advertisement, a personal contact, or other.
- State one eye-catching, attention-getting thing about yourself in relation to the job or to the employer that will cause the reader to want to continue.

- If possible mention here or in a following paragraph, someone associated with the organization you are applying to who can serve as reference.

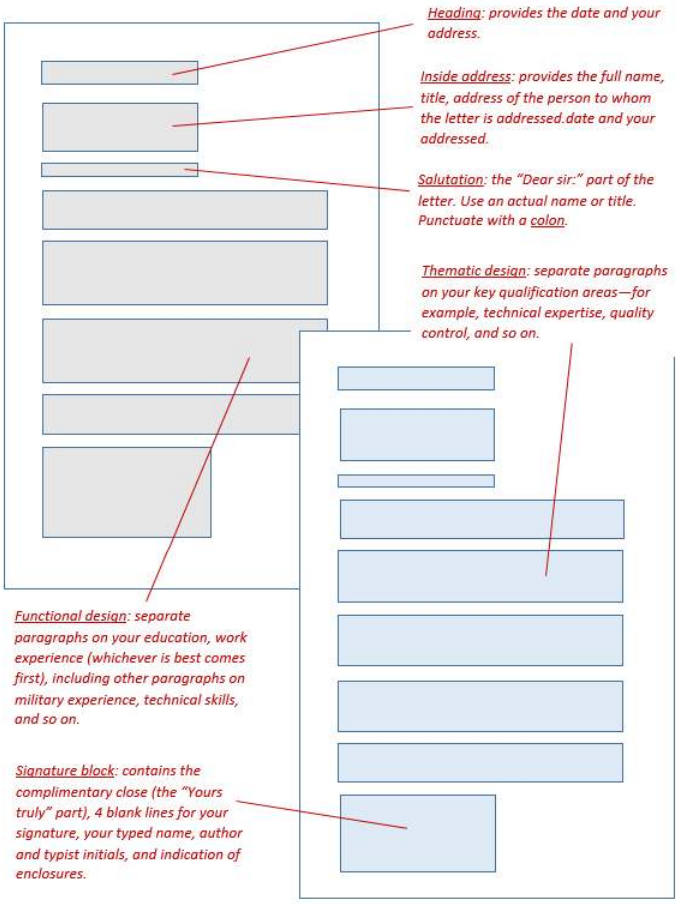
And you try to do all things like these in the space of a very short paragraph—no more than 3 to 4 lines of the standard business letter.

**Main body paragraphs.** In the main parts of the application letter, you present your work experience, military service, education, training—whatever makes that connection between you and the job you are seeking. Remember that this is the most important job you have to do in this letter—to enable the reader see the match between your qualifications and the requirements for the job.

There are two common ways to present this information:

- *Functional approach*—This one presents education in one section, and work experience in the other. If there were military experience, that might go in another section. Whichever of these section contains your "best stuff" should come first, after the introduction.
- *Thematic approach*—This one divides experience and education into groups such as "management," "technical," "financial," and so on and then discusses your work and education related to them in separate paragraphs.

If you read the section on functional and thematic organization of resumes, just about everything said there applies here. Of course, the letter is *not* exhaustive or complete about your background—it highlights just those aspects of your background that make the connection with the job you are seeking.




*Common sections of application letters*. You can organize the letter thematically or functionally the same way that you can the resume.

Another section worth considering for the main body of the application letter is one in which you discuss your goals, objectives—the focus of your career—what you are doing, or want to do professionally. A paragraph like this is particularly good for people just starting their careers, when there is not much to put in the letter. Of course, be careful about loading a paragraph like this with

"sweet nothings." For example, "I am seeking a challenging, rewarding career with a dynamic upscale company where I will have ample room for professional and personal growth"—come on! give us a break! Might as well say, "I want to be happy, well-paid, and well-fed."

**Closing paragraph.** In the last paragraph of the application letter, you can indicate how the prospective employer can get in touch with you and when are the best times for an interview. This is the place to urge that prospective employer to contact you to arrange an interview.

## Specific Details in the Application Letter

One of the best ways to make an application letter great is to work in details, examples, specifics about related aspects of your educational and employment background. Yes, if the resume is attached, readers can see all that details there. However, a letter that is overly general and vague might generate so little interest that the reader might not even care to turn to the resume.

In the application letter, you work in selective detail that makes your letter stand out, makes it memorable, and substantiates the claims you make about your skills and experience. Take a look at this example, which is rather lacking in specifics:

> As for my experience working with persons with developmental disabilities, I have worked and volunteered at various rehabilitation hospitals and agencies in Austin and Houston [say which ones to inject more detail into this letter]. I have received training [where? certificates?] in supervising patients and assisting with physical and social therapy [which specific therapies?]. Currently, I am volunteering at St. David's Hospital [doing what?] to continue my education in aiding persons with developmental disabilities [which specific disabilities?].

Now take a look at the revision:

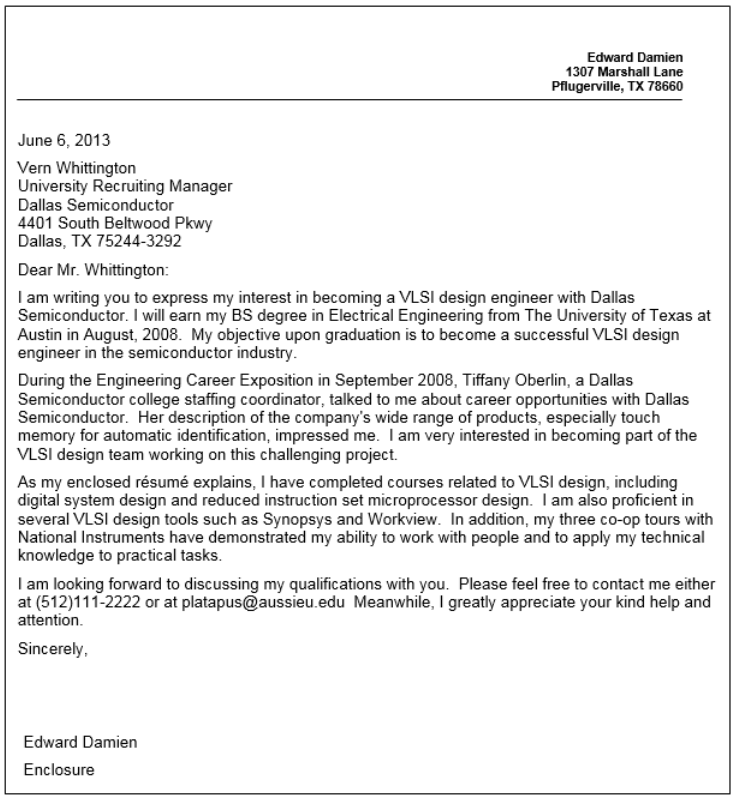
> As for my experience working with persons with developmental disabilities, I have worked and volunteered at Cypress Creek Hospital in Houston and Capital Area Easter Seals/ Rehabilitation Center and Health South Rehabilitation Hospital in Austin. I have received CPR, First Aid, and Crisis Intervention certificates from Cypress Creek Hospital. Currently, I am volunteering at St. David's Hospital assisting with physical therapy to persons with developmental disabilities in the aquatics department.

## Early-Career Application Letters

In the past and in the examples here, you may seen some rather impressive application letters. But what if you don't have all that experience—how do you construct a respectable application letter?

- Cite relevant projects (both in academia and community) you've worked on, even if they are not exactly related to the career that you pursue.
- Spend extra time describing college courses and programs you have been involved in. What about team projects, research projects, or reports?
- Include volunteer work that has had any trace of technical in it. (If you've not done any volunteer work, get to volunteering!)
- List any organizations you have been a member of and describe any of their activities that have any trace of technical in them. (If you've not belonged to any technically oriented organizations, get to belonging!)
- As with the resume, you can use formatting to spread what information you have to fill out the resume page.

In the example student application letter below, notice that the writer describes his coursework and the applications that he used. His reference to a professional exposition shows an active interest in a particular technical area. Moreover, his visit with an employee of the company with which he seeks employment is a crafty form of name dropping. In general, the letter expresses enthusiasm about working in the VLSI area.



Edward Damien
1307 Marshall Lane
Pflugerville, TX 78660

June 6, 2013

Vern Whittington
University Recruiting Manager
Dallas Semiconductor
4401 South Beltwood Pkwy
Dallas, TX 75244-3292

Dear Mr. Whittington:

I am writing you to express my interest in becoming a VLSI design engineer with Dallas Semiconductor. I will earn my BS degree in Electrical Engineering from The University of Texas at Austin in August, 2008. My objective upon graduation is to become a successful VLSI design engineer in the semiconductor industry.

During the Engineering Career Exposition in September 2008, Tiffany Oberlin, a Dallas Semiconductor college staffing coordinator, talked to me about career opportunities with Dallas Semiconductor. Her description of the company's wide range of products, especially touch memory for automatic identification, impressed me. I am very interested in becoming part of the VLSI design team working on this challenging project.

As my enclosed résumé explains, I have completed courses related to VLSI design, including digital system design and reduced instruction set microprocessor design. I am also proficient in several VLSI design tools such as Synopsys and Workview. In addition, my three co-op tours with National Instruments have demonstrated my ability to work with people and to apply my technical knowledge to practical tasks.

I am looking forward to discussing my qualifications with you. Please feel free to contact me either at (512)111-2222 or at platapus@aussieu.edu Meanwhile, I greatly appreciate your kind help and attention.

Sincerely,

Edward Damien

Enclosure

*Early-career application letter*. Use the strategies suggested here to fill your letter with good specific information.

## Checklist of Common Problems in Application Letters

- **Readability and white space**—Are there any dense paragraphs over 8 lines? Are there comfortable 1-inch to 1.5-inch margins all the way around the letter? Is there adequate spacing between paragraphs and between the components of the letter?
- **Page fill**—Is the letter placed on the page nicely: not crammed at the top one-half of the page; not spilling over to a second page by only three or four lines?
- **General neatness, professional-looking quality**—Is the letter on good quality paper, and is the copy clean and free of smudges and erasures?
- **Proper use of the business-letter format**—Have you set up the letter in one of the standard business-letter formats? (See the references earlier in this chapter.)
- **Do you punctuate the salutation with a colon?** The Microsoft Office template erroneously punctuates it with the friendly comma:

  Dear **Recipient Name,**
  To get started, click placeholder text and start typing. Double-click the table cells in the footer to add your contact info (or delete the columns you don't want).

- **Overt, direct indication of the connection between your background and the requirements of the job**—Do you emphasize this connection?
- **A good upbeat, positive tone**—Is the tone of your letter bright and positive? Does it avoid sounding overly aggressive, brash, over-confident (unless that is really the tone you want)? Does your letter avoid the opposite problem of sounding stiff, overly reserved, stand-offish, blasé, indifferent?

- **A good introduction**—Does your introduction establish the purpose of the letter? Does it avoid diving directly into the details of your work and educational experience? Do you present one little compelling detail about yourself that will cause the reader to want to keep reading?
- **A good balance between brevity and details**—Does your letter avoid becoming too detailed (making readers less inclined to read thoroughly)? Does your letter avoid the opposite extreme of being so general that it could refer to practically anybody?
- **Lots of specifics (dates, numbers, names, etc.)**—Does your letter present plenty of specific detail but without making the letter too densely detailed? Do you present hard factual detail (numbers, dates, proper names) that make you stand out as an individual?
- **A minimum of information that is simply your opinion of yourself**—Do you avoid over-reliance on information that is simply your opinions about yourself. For example, instead of saying that you "work well with others," do you cite work experience that proves that fact but without actually stating it?
- **Grammar, spelling, usage**—And of course, does your letter use correct grammar, usage, and spelling?

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 2.1.5: Resumes

## Show 'em how good you are

A *resume* is a selective record of your background—your educational, military and work experience, your certifications, abilities, and so on. You send it, sometimes accompanied by an application letter, to potential employers when you are seeking job interviews.

A resume should be easily readable, effectively designed, and adapted to audience expectations. If you are taking a technical writing course, your instructor may be okay with your making up a few details in your resume to represent what you'll be when you graduate. However, if you're just starting your college education and have little work experience, why not try using the techniques and suggestions here to create a resume that represents your current skills, abilities, and background? Developing a decent-looking resume based on what you are now is a challenge that you have to deal with at some point—so why not now?

**Note:** Take a look at some published research on how employers read resumes and what works with resume design.

Front-end developer. Take a look at a new resume format that has become popular in the last few years.

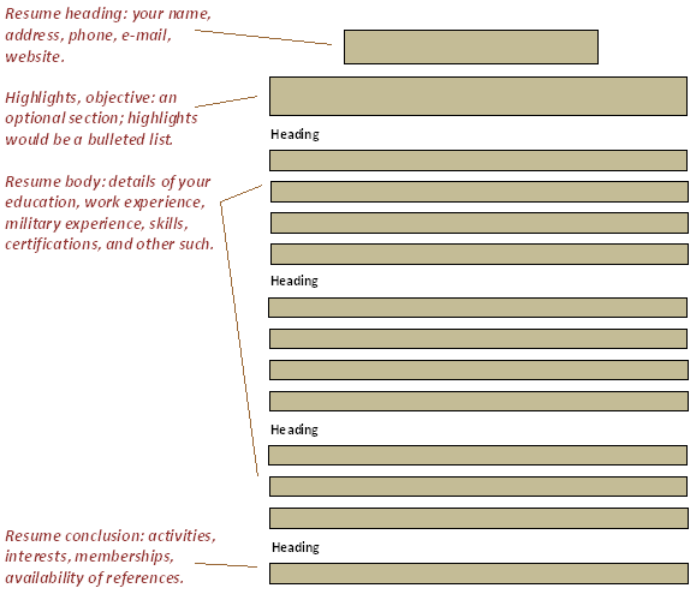
## Resume Design—An Overview

With desktop publishing and high-quality printing, people sometimes rewrite their resumes for every new job they go after. For example, a person who seeks employment both with a community college and with a software-development company would use two different resumes. The content, organization, format, and emphases would be quite different.

You are probably aware of resume-writing software and templates (such as provided by Microsoft Word): you feed your data into them and they churn out a prefab resume. Resume-writing services will create your resume for you for a hundred dollars. If you are in a time bind or if you are extremely insecure about your writing or resume-designing skills, these services might help. But often they take your information and put it into a computer database that then force it into a prefab structure. They often use the same resume-writing software just mentioned; they charge you about what the software costs. The problem is that these agencies simply cannot be that sensitive or perceptive about your background or your employment search. Why not learn the skills and techniques of writing your own resume here, save the money, and write better resumes anyway?

There is no one right way to write a resume. Every person's background, employment needs, and career objectives are different, thus necessitating unique resume designs. Every detail, every aspect of your resume must start with who you are, what your background is, what the potential employer is looking for, and what your employment goals are—not with from some prefab design. Therefore, use this chapter to design your own resume; browse through the various formats; play around with them until you find one that works for you.

Be sure and check out the examples accompanying this chapter.




*Basic sections of a resume*. Whichever format you use, the information generally divides up as shown here.

## Sections in Resumes

Resumes can be divided into three sections: the heading, the body, and the conclusion. Each of these sections has common contents.

**Heading.** The top third of the resume is the *heading*— your name, phone numbers, e-mail address, and other details such as your occupation and titles. Some resume writers include the name of their profession, occupation, or field. In some examples, you'll see writers putting things like "CERTIFIED PHYSICAL THERAPIST" very prominently in the heading. Headings can also contain a goals and objectives subsection and a highlights subsection. These two special subsections are described later in "Special Sections in Resumes."

**Body.** In a one-page resume, the body is the middle portion, taking up about half of the total space of the resume. Here, you present the details of your work, education, and military experience—arranged in reverse chronological order. You might also include your accomplishments, publications, certifications, equipment you are familiar with, and so on. There are *many* ways to present this information:

- You can divide it *functionally*—into separate sections for work experience and education.
- You can divide it *thematically*—into separate sections for the different areas of your experience and education.

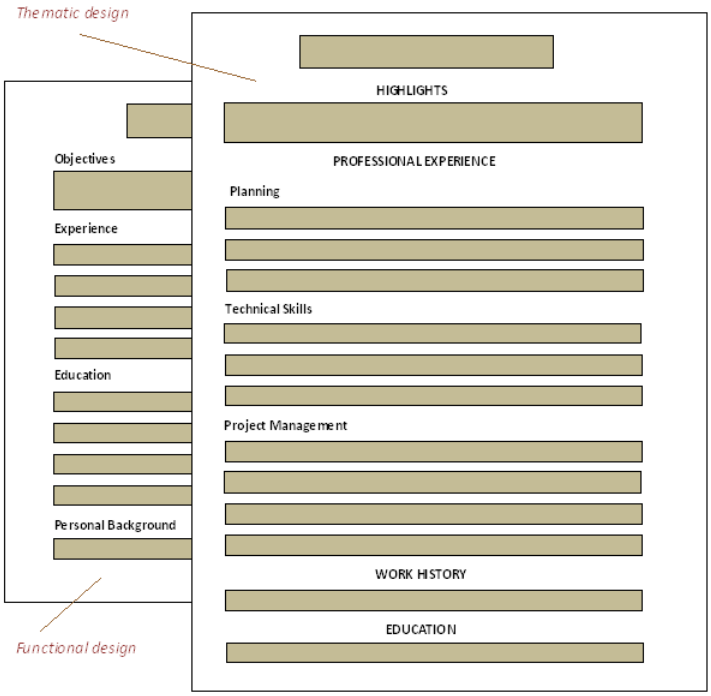
**Conclusion.** In the final third or quarter of the resume, you can present other related information on your background. For example, you can list activities, professional associations, memberships, hobbies, and interests. At the bottom of the resume, people often put "REFERENCES AVAILABLE ON REQUEST" and the date of preparation of the resume. At first, it might seem that listing personal, nonwork information would be totally irrelevant and inappropriate. Actually, it can come in handy—it personalizes you to potential employers and gives you something to chat while you're waiting for the coffee machine or the elevator. For example, if you mention in your resume that you raise goats, that gives the interviewer something to chat with you about during those moments of otherwise uncomfortable silence.

## Resumes—Types and Design

To begin planning your resume, decide which type of resume you need. This decision is in part based on requirements that prospective employers may have, and in part based on what your background and employment needs are.

**Type of organization.** Resumes can be defined according to how information on work and educational experience is handled. There are several basic, commonly used plans or designs you can consider using.

- **Functional design:** Illustrated schematically below, the functional design starts with a heading; then presents either education or work experience, whichever is stronger or more relevant; then presents the other of these two sections; then ends skills and certifications and with personal information. Students who have not yet begun their careers often find this design the best for their purposes. People with military experience either work the detail in to the education and work-experience sections as appropriate; or they create separate section specifically for military experience at the same level as education and work experience.




*Two basic organizational approaches to resume design*. Functional and thematic. (The "hanging-head" format is used in the functional-design version.)

- **Thematic design:** Another approach to resumes is the *thematic* design, illustrated schematically in the preceding. It divides your experience and education into categories such as project management, budgetary planning, financial tracking, personnel management, customer sales, technical support, publications—whichever areas describe your experience. Map these categories directly to specific employment advertisements. If the job advertisement says that Company ABC wants a person with experience in training, customer service, and sales, then it would be a smart move to design thematic headings around those three requirements.

  If you want to use the thematic approach in your resume, take a look at your employment and educational experience—what are the common threads? Project management, program development, troubleshooting, supervision, maintenance, inventory control? Take a look at the job announcement you're responding to—what are the three, four, or five key requirements it mentions? Use these themes to design the body section of your resume. These themes become the headings in the body of the resume. Under these headings you list the employment and educational experience that applies. For example, under a heading like "FINANCIAL RECORDS," you might list the accounting and bookkeeping courses you took in college, the company-sponsored seminars on Excel you took, and the jobs where you actually used these skills.

**Type of information.** Types of resumes can be defined according to the amount and kind of information they present

- **Objective resumes:** This type just gives dates, names, titles, no qualitative salesmanship information. These are very lean, terse resumes. In technical-writing courses, you are typically asked not to write this type. The objective-resume style is useful in resumes that use the thematic approach or that emphasize the summary/highlights section. By its very nature, you can see that

the thematic approach is unclear about the actual *history* of employment. It's harder to tell where the person was, what she was doing, year by year.

- **Detailed resumes:** This type provides not only dates, titles, and names, but also details about your responsibilities and statements about the quality and effectiveness of your work. This is the type most people write, and the type that is the focus of most technical-writing courses. The rest of the details in this section of this chapter focus on writing the detailed resume.

## Layout, Detail Formats, and Details in Resumes

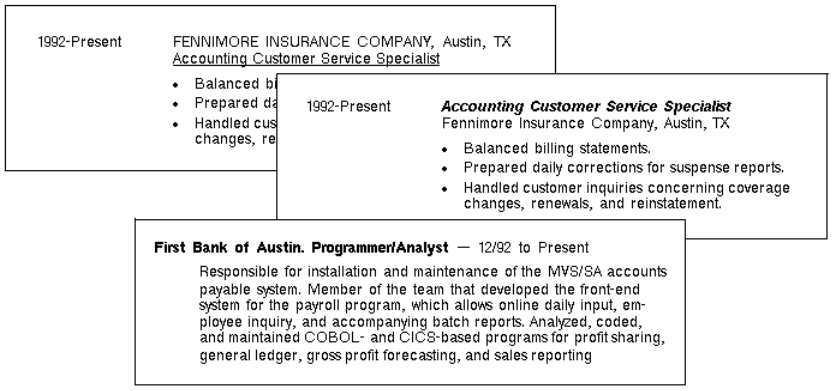
At some point in your resume planning, think schematically about the layout and design of the thing. General layout has to do with the design and location of the heading, the headings for the individual sections, and the orientation of the detailed text in relation to those headings. Detail formats are the way you choose to arrange and present the details of your education and work experience.

**Layout.** Look at resumes in this book and in other sources strictly in terms of the style and placement of the headings, the shape of the text (the paragraphs) in the resumes, and the orientation of these two elements with each other. Some resumes have the headings centered; others are on the left margin. Notice that the actual text—the paragraphs—of resumes typically does not extend to the far left margin. Full-length lines are not considered as readable or scannable as the shorter ones you see illustrated in the examples here.

Notice that many resumes use a "hanging-head" format. The heading starts on the far left margin while the text is indented an inch or more. This format makes the heading stand out more and the text more scannable. Notice also that in some of the text paragraphs of resumes, special typography is used to highlight the name of the organization or the job title.

**Detail formats.** Make the fundamental decision about how you present the details of your work and education experience. Several examples of typical presentational techniques are shown below. The elements you work with include:

- Occupation, position, job title
- Company or organization name
- Time period you were there
- Key details about your accomplishments and responsibilities while there.




*Examples of detail formats*. Use combinations of list or paragraph format, italics, bold, all caps on the four main elements: date, organization name, job title, and details.

There are many different ways to format this information. It all depends on what you want to emphasize and how much or how little information you have (whether you are struggling to fit it all on one page or struggling to make it fill one page). Several different detail formats are shown above.

**Details details details!** As the application letter chapter emphasizes, to make an application letter great is to work in details, examples, specifics about related aspects of your educational and employment background. Same goes for resumes.

**TECHNICAL SKILLS**

- Experience with building web applications
- Experience with technology integration and automation
- Knowledge of backend technologies
- Experience with data science tools
- Some experience with cloud servers and databases

**TECHNICAL SKILLS**

- Experience with building web applications with MVC model (Model View Controller) and MERN stack (MongoDB, Express, React/Redux, NodeJS)
- Experience with technology integration and automation using webhooks, third-party APIs, Python, and Javascript
- Knowledge of backend technologies such as NodeJS, MySQL, PL-SQL, ExpressJS, Python Flask, and Django
- Experience with data science tools including Pandas, Matplotlib, Numpy, and Pytorch
- Some experience with Cloud Servers and databases specifically Google Cloud and Azure

*Levels of detail in resumes*. Notice how the brief general version at the top says practically nothing. The version below provides plenty of persuasive eye-catching detail.

## Special Sections in Resumes

Here are some ideas for special resume sections, sections that emphasize your goals or qualifications.

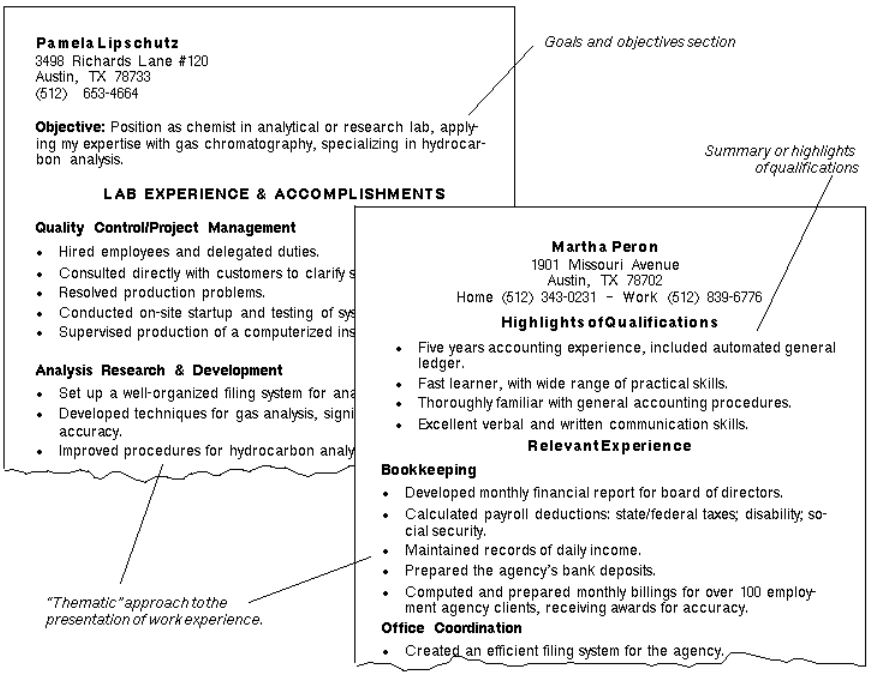
**Highlights, summary section.** In the illustration below, you'll notice the "Highlights" section that occurs just below the heading (the section for name, address, phone number, etc.) and just above the main experience and education sections. This is a popular section in resumes. Resume specialists believe that the eye makes first contact with a page somewhere one-fourth to one-third of the way down the page—not at the very top. If you believe that, put your very "best stuff" at that point. People commonly list their most important qualifications, their key skills, their key work experience in that space on the page. Actually, this section is useful more for people who have been in their careers for a while. It's a good way to create one common spot on the resume to list those key qualifications about yourself that may be spread throughout the resume. Otherwise, these key details about yourself are scattered across your various employment and educational experience—in fact, buried in them.

**Note:** This is a good point to discuss the inclusion of "sez-who" information. Here are some examples:

Highly organized, proactive, strong knowledge of security tools
Excellent interpersonal and communication skills
Computer savvy
Positive Attitude
Adapt quickly to change
Highly organized

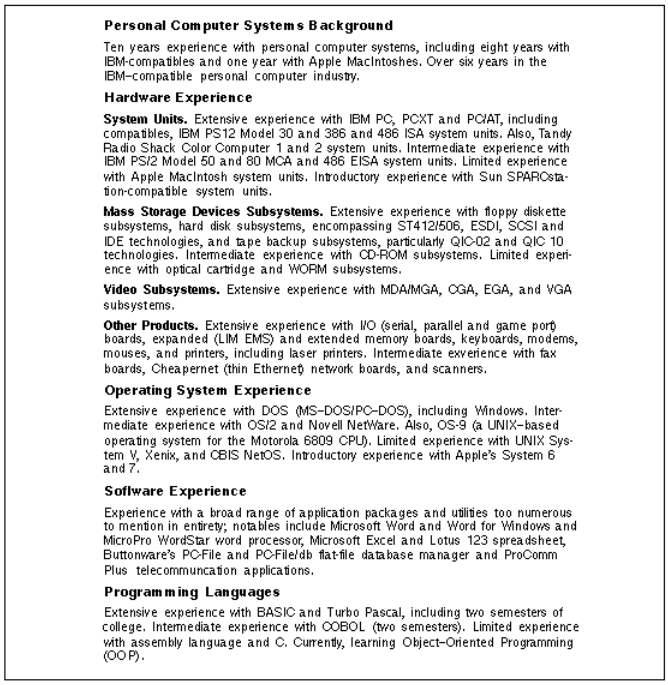
These are simply love-notes-to-self. Avoid them! The reader wants to ask "sez who?" with the answer being the writer of those love notes. A less wordy approach would be to proclaim "I am wonderful!" A legitimate way to express these values would be examples where they were observably in play.

**Objectives, goals.** Also found in some resumes is a line just under the heading in which you list key goals or objectives. Some resume writers shy away from including a section like this because it might cause some employers to stop reading.




*Special sections in resumes*. Summary or highlights of qualifications, and goals and objectives section.

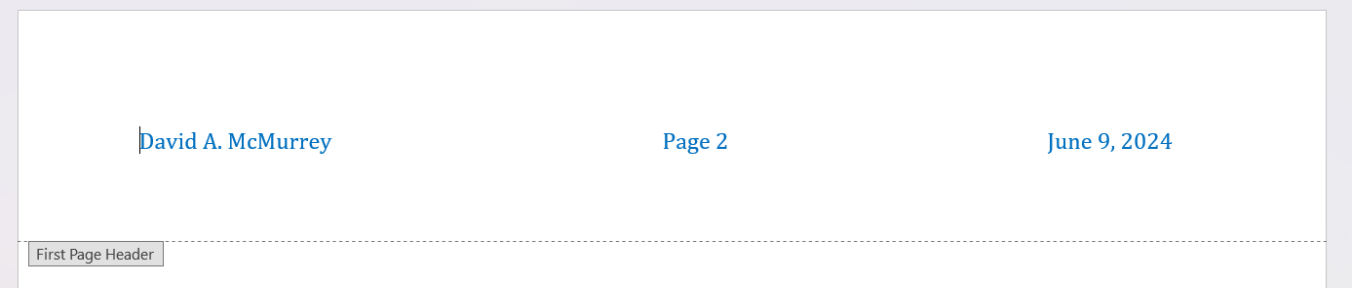
**Amplifications page.** Some people have a lot of detail that they want to convey about their qualifications but that does not fit well in any of the typical resume designs. For example, certain computer specialists can list dozens of hardware and software products they have experience with—and they feel they must include it all. To keep the main part of the resume from becoming unbalanced and less readable, they shift this detail to an amplications page. There, the computer specialist can categorize and list all that extensive experience in many different operating systems, hardware configurations, and software applications. Similarly, some resume writers want to show lots more detail about the responsibilities and duties they have managed in past employment. The standard formats for resume design just do not accommodate this sort of detail; and this is where the amplifications page can be useful.




*Amplifications page in a resume*. If you have lots of detail about what you know, this approach on page 2 of the resume may work.

On the first page of this resume, the writer divides the presentation into experience and education sections and takes a chronological approach to each. On the first page, he only provides company names, job titles, dates, and discussion of duties.

**Following pages.** If your resume is longer than one page, the heading at the top of subsequent pages can be handled imilar to what is shown below. The information in the following page header is the *name of the resume writer*, page number, and date:




*Example of a following-page header in a resume. (Editing within the header area.)*

If you use letterhead stationery, remember not to use it for subsequent pages. However, you must use blank paper of the same quality, weight, and texture as the letterhead paper (usually, letterhead stationery comes with matching blank paper).

## Early-Career Resumes

If you are at the beginning of your career, all the advice and examples to this point may seem fine and good, but what if you have very little experience? Careers must start somewhere—and so must resumes. You can use several strategies to fill out your resume so that you appear to be the promising entry-level candidate that we all know you are.

- Cite relevant projects (both in academia and community) you've worked on, even if they are not exactly related to the career that you pursue.
- Spend extra time describing college courses and programs you have been involved in. What about team projects, research projects, or reports?
- Include volunteer work that has had any trace of technical in it. (If you've not done any volunteer work, get to volunteering!)
- List any organizations you have been a member of and describe any of their activities that have any trace of technical in them. (If you've not belonged to any technically oriented organizations, get to belonging!)

In the student resume shown below, notice how much space that details about education take up. This resume writer could have included even more: Descriptions of key courses and projects could have been provided under a subheading such as "Essential Coursework."

**Rilke Dietche**

2009 Thistle Bluff | Austin, TX 78713 | (000)000-0000 | egibbon@rome.ece.utexas.edu

**Objective**

Employment as an entry-level engineer in research and development.

**Education**

The University of Texas–Austin GPA: 3.9/4.0
Electrical and Computer Engineering
Bachelor of Science degree expected August 20XX
*Related Courses*: Digital system design using VHDL, operating system development using MC68340, computer-aided VLSI design using Magic, and DLX RISC microprocessor design using Compass.

**Skills**

Proficient in assembly language (MC6800 family), C++, and VHDL. Proficient in UNIX and system administration. Skilled in simulation tools including Workview, PSPICE, and Compass.

**Experience**

09/04 – 12/04 *Engineering Co-op*, *National Systems*, Austin, Texas
- Analyzed and documented customer problems.
- Designed and verified hardware parts.
- Tested Windows 7 device driver.

9/03 – 12/03 *Assistant System Administrator, University of Texas–Austin*
- Administrated a network with over 40 users.
- Upgraded operating system from SunOS to Solaris.
- Designed homepage for the Telecommunication Laboratory.

9/02 – 12/02 *Engineering Co-op*, *National Systems*, Austin, Texas
- Developed and implemented verification plan for new General Purpose Interface Bus hardware product andsoftware application.

9/01 – 7/02 *Grader*, *The University of Texas–Austin*
- Assisted professor in grading student homework in entry-level circuit theory class.

01/01 – 5/01

**Honors & Activities**

Recipient of Engineering Scholar Award
Member of Tau Beta Pi Engineering Society
Member of Eta Kappa Nu Electrical Engineering Honor Society

**References**

Available on request

*Early-career resume*. Use the strategies suggested here to fill out your resume with good information.

Notice too that the resume above includes plenty of co-op and part-time work. The bulleted-list format extends the length of the resume so that it fills up the page. At the bottom of the resume, the writer lists awards and organizations. These too could be amplified if necessary. Details as to what the award is about, why this writer received it, and what those organizations are—these are examples of good information that could be added.

Here's another example that provides lots of detail about courses taken. Detail like this can help overcome a lack of work experience.

***Selected Relevant Courses and Concepts***

*Fundamentals of Design* *Spring 2007*
- Introduction to elements and principles of design as applied to residential and non-residential spaces.
- Learned techniques to create spatial and theme-oriented design concepts.

*Photography I & II* *Fall 2008/Spring 2009*
- Introduced to proper preparation in the darkroom, 35mm camera systems and black and white film.
- Operated and initiated the creative and successful use of lighting techniques both in studio and on location.
- Learned digital techniques such as retouching images, experimenting with different styles and techniques.
- Applied learned skills in multiple genres of imagery including: surrealism, montages and portraiture.

*Digital Imaging* *Fall 2008*
- Created conceptually sound and digitally manipulated images to gain practice working with different styles.
- Acquired the knowledge and experience to manipulate and make tonal corrections to photographic images.

*Technical and Business Writing* *February 2010-May 2010*
- Introduction to principles, techniques and skills needed in business writing; stressing clarity, conciseness, accuracy of expression.
- Instruction on techniques, information design, effective use of graphics, and the preparation and presentation of oral reports.

*Business and Professional Communication* *February 2010-May 2010*
- Application of theories and practice of speech communication in business and professional situations.
- Will build speaking and delivery skills, as well as gain critical thinking and analytical skills for the organization of a presentation.

*Another early-career resume.*

Subtle changes in format can also help make your resume fill a page. Top, bottom, left, and right margins can all be pushed down, up, and in from the standard 1.0 inch to 1.25 inches. You can add extra space between sections. To do so, don't just press Enter.

Instead, put 6 or 9 points, for example, below the final element of each section. Line spacing is a another subtle way to extend a resumechange the default 13.6 points of line spacing for Times New Roman 12 point text to exactly 15.0 points, for example.

## Resume Checklist

As you plan, write, or review your resume, keep these points in mind:

- **Get your resume online!** Use LinkedIn or Facebook to show off your resume. And while you're at it, set up an online portfolio.
- **Details, details, details.** Are additional details, specifics, examples possible? Numerical, quantifiable details, proper names such as product names, standards, formal organization names, volumes, dates—these add so much power to a resume.
- **Readability: keep paragraphs under 5 lines?**. Imagine your prospective employer sitting down to a two-inch stack of resumes. Do you think she's going to slow down to read through big thick paragraphs. Probably not.
- **White space.** Picture a resume crammed with detail, using only half-inch margins all the way around, a small type size, and only a small amount of space between parts of the resume. Our prospective employer might be less inclined to work through that also. "Air it out!" Find ways to incorporate more white space in the margins and between sections of the resume. The "hanging-head" design herer is useful.
- **Special format.** Make sure that you use special format consistently throughout the resume. For example, if you use a hanging-head style for the work-experience section, use it in the education section as well.
- **Consistent margins.** Most resumes have several margins: the outermost, left margin and at least one internal left margin. Typically, paragraphs in a resume use an internal margin, not the far-left margin. Make sure to align all appropriate text to these margins as well. Avoid unnecessary multiple margins: they give your resume a ragged messy look.
- **Terse writing style.** It's okay to use a rather clipped, terse writing style in resumes—up to a point. The challenge in most resumes is to get it all on one page (or two if you have a lot of information to present). Instead of writing "I supervised a team of five technicians..." you write "Supervised a team of five technicians..." However, you don't leave out normal words such as articles.
- **Bold, italics, different type size, caps, other typographical special effects.** Use special typography such as bold, italics, different fonts, and different type sizes. Don't go crazy with it! Too much fancy typography can be distracting (plus make people think you are hyperactive). Also, be consistent with typography throughout. If some job titles are italics, make them all italics. Avoid all-caps text—it's less readable.
- **Page fill.** Do everything you can to make your resume fill out one full page and to keep it from spilling over by 4 or 5 lines to a second page. At the beginning of your career, it's tough filling up a full page of a resume. As you move into your career, it gets hard keeping it to one page. If you need a two-page resume, ensure that the second page is full or nearly full.
- **Reverse chronological order.** Remember to list your education and work-experience items starting with the current or most recent and working backwards in time.
- **Consistency of phrasing.** Use the same style of phrasing for similar information in a resume—for example, past tense verbs for all descriptions of past work experience.
- **Consistency of punctuation style.** For similar sections of information use the same kind of punctuation—for example, periods, commas, colons, or nothing.
- **Translations for "inside" information.** Don't assume readers will know what certain abbreviations, acronyms, or symbols mean—yes, even to the extent of "GPA" or the construction "3.2/4.00." Take time to describe special organizations you may be a member of.
- **Grammar, spelling, usage.** Watch out for these problems on a resume—they stand out like a sore thumb! Watch out particularly for the incorrect use of *its* and *it's*.

## Resume Published Research and Advice

The following links open in a separate browsesr.

- How to Rock Your CV with a Soft Skills Section [Tips, Examples, 2022 Advice]. StudyCorgi, 2022.
- F pattern reading research. Serious research on how people look at and read resumes. Nielsen Norman Group, 2022.
- The Complete Resume Format Guide For 2018. Trade and workplace "best practices" according to The Interview Guys, 2018
- 14 Tips for Writing a Rockstar Resume. Best practices according to glassdoor.com, 2018.
- 10 Resume Writing Tips for 2018. Best practices according to Jessica Hernandez, LinkedIn, 2022.

- 4 Things Employers Look For In Resumes. According to glassdoor.com, 2018.
- What Employers Seek on a Resume. National Association of Colleges and Employers, 2022.
- How to Write a CV: 11 Useful Tips. Yvonne McQuarrie, IvyPanda Blog, 2019.
- General Guidelines for Creating Job Application Forms (With Template). Audience is employers. indeed.com

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 2.2: Types of technical reports- an overview

## Which one is your type?

For the final report in some technical-writing courses, you can write one of (or even a combination of) several different types of reports. If there is some other type of report that you know about and want to write, get with your instructor to discuss it.

This chapter briefly defines these different report types; some are covered in full detail elsewhere in this book; the rest are described here. But to get everything in one place, all the reports are briefly defined here, with cross-references to where their presentations occur:

- **Standard operating policies and procedures.** These are the operating documents for organizations; they contain rules and regulations on how the organization and its members are expected to perform. Policies and procedures are like instructions, but they go much further. Standard operating procedures (SOPs) are more for procedures in which a process is performed—for example, taking a dental impression. See the chapter on standard operational policies and procedures for full discussion and examples.
- **Recommendation, feasibility, evaluation reports.** This group of similar reports does things like compare several options against a set of requirements and recommend one; considers an idea (plan, project) in terms of its "feasibility," for example, some combination of its technical, economical, social practicality or possibility; passes judgement on the worth or value of a thing by comparing it to a set of requirements, or criteria. See the chapter on recommendation reports for complete discussion.
- **Technical background reports.** This type is the hardest one to define but the one that most people write. It focuses on a technical topic, provides background on that topic for a specific set of readers who have specific needs for it. This report does not supply instructions, nor does it supply recommendations in any systematic way, nor does it report new and original data. See the content, organization, and format guidelines for the technical background report in the following.
- **Technical guides and handbooks.** Closely related to technical report but differing somewhat in purpose and audience are technical guides and handbooks. See the discusion of these types in the technical guides and handbooks in the following.
- **Primary research reports.** This type presents findings and interpretation from laboratory or field research. See the content, organization, and format guidelines for the primary research report in the following.
- **Business plans.** This type is a proposal to start a new business. See content, organization, and format guidelines in the chapter on business plan.
- **Technical specifications.** This type presents descriptive and operational details on a new or updated product. See the content, organization, and format guidelines for technical specifications in the following.

## Technical Background Reports

The technical background report is hard to define—it's *not* a lot of things, but it's hard to say what it *is*. It doesn't provide step-by-step directions on how to do something in the way that instructions do. It does not formally provide recommendations in the way that feasibility reports do. It does not report data from original research and draw conclusions in the way that primary research reports do.

So what does the technical background report do? It provides information on a technical topic but in such a way that is adapted for a particular audience that has specific needs for that information. Imagine a topic like this: renal disease and therapy. A technical background report on this topic would *not* dump out a ten-ton textbook containing everything you could possibly say about it. It would select information about the topic suited to a specific group of readers who had specific needs and uses for the information. Imagine the audience was a group of engineers bidding on a contract to do part of the work for a dialysis clinic. Yes, they need to know about renal disease and its therapy, but only to the extent that it has to do with their areas of expertise. Such a background report might also include some basic discussion of renal disease and its treatment, but no more than what the engineers need to do their work and to interact with representatives of the clinic.

Take a look at the examples of technical background reports.

One of the reports is an exploration of global warming, or the greenhouse effect, as it is called in the report. Notice that it discusses causes, then explores the effects, then discusses what can be done about it.

Typical contents and organization of technical background reports. Unlike most of the other reports discussed in this course guide, the technical background report does not have a common set of contents. Because it focuses on a specific technical topic for specific audiences who have specific needs or uses for the information, it grabs at whatever type of contents it needs to get the job done. You use a lot of intuition to plan this type of report. For example, with the report on renal disease and treatment, you'd probably want to discuss what renal disease is, what causes it, how it is treated, and what kinds of technologies are involved in the treatment. If you don't fully trust your intuition, use a checklist like the following:

- **Definitions**—Define the potentially unfamiliar terms associated with the topic. Write *extended* definitions if there are key terms or if they are particularly difficult to explain.
- **Causes**—Explain what causes are related to the topic. For example, with the renal disease topic, what causes the disease?
- **Effects**—Explain what are the consequences, results, or effects associated with the topic. With the renal disease topic, what happens to people with the disease; what effects do the various treatments have?
- **Types**—Discuss the different types or categories associated with the topic. For example, are there different types of renal disease; are there different categories of treatment?
- **Historical background**—Discuss relevant history related to the topic. Discuss people, events, and past theories related to the topic.
- **Processes**—Discuss mechanical, natural, human-controlled processes related to the topic. Explain step by step how the process occurs. For example, what are the phases of the renal disease cycle; what typically happens to a person with a specific form of the disease?
- **Descriptions**—Provide information on the physical details of things related to the topic. Provide information about size, shape, color, weight, and so on. For the engineering-oriented report, this would mean size, power requirements, and other such details about the treatment technologies.
- **Comparisons**—Compare the topic, or some aspect of it, to something similar or something familiar. With the renal disease example, you could compare renal disease to some other disease; the treatment to some treatment; the functions of the kidney to something familiar (an analogy); or even the treatment to something familiar, for example, the filter system for a swimming pool.
- **Applications**—Explore how some aspect of your topic can be used or applied. If it's some new technology, what are its applications?
- **Advantages and disadvantages**—Discuss the advantages or disadvantages of one or more aspects of your topic. In the renal disease topic, for example, what are the advantages of one treatment over another?
- **Economic considerations**—Discuss the costs of one or more aspects associated with your topic. How much does treatment for renal disease cost? How much does the equipment and personnel cost?
- **Social, political, legal, ethical implications**—Explore the implications or impact of your topic or some aspect of it in relation to social, political, legal, or ethical concerns. The renal disease example doesn't lend itself much to this area, but imagine the possibilities with a topic like cryogenics—suspended animation of human beings. Often, new technologies have profound impact in these areas.
- **Problems, questions**—What problems or questions are there associated with your report topic or some aspect of it?
- **Solutions, answers**—What solutions or answers can you offer on those problems or questions raised by your topic or some aspect of it?

We could add many other categories to a checklist like this, but maybe this is enough to get you started planning the contents of your technical background report. And remember that each of these checklist items may represent a full section in the report—not a sentence or two.

As for the organization of these parts of the report, again, your intuitions are in order. Some subtopics logically come before others. See the chapter on organizational patterns and applying them.

Typical format of technical background reports. See the format for technical background reports. That chapter takes you from the front cover all the way to the last page in this type of report, showing the expected contents and format. Remember that in most technical-writing courses, you are expected to use a format like this exactly and precisely—unless you work out some other arrangements with your instructor.

## Technical Guides and Handbooks

There's a distinction to be made between reports, on the one hand, and guides and handbooks, on the other. However, it's difficult to distinguish between the two latter types. A *report*, as the preceding section explains, is simply a collection of information on a topic—its background. For example, your boss might call you in and bark out this order: "Jones, our architectural firm needs to catch up with this green roof thing. See if you can pull some basic information together for me. How about in two weeks?"

A guide or handbook, on the other hand, has a somewhat different purpose. A *guide* would "guide" its readers in determining the feasibility of a green roof, planning, and constructing one. A *handbook* might contain little or no guidance but have lots of reference information about green roofs: associations supporting them, case studies, specifications, vendors, government ordinances, and so on.

But, frankly, the distinction between these two is difficult. And, in terms of format, style, and structure, there is very little difference. The abstract and executive summary have no logical place in a guide or handbook. If you are taking a technical writing course, check with your instructor about whether you still should include an abstract or executive summary.

For more detail, see handbooks.

## Primary Research Reports

*Primary research report* is our name for that kind of report that presents original research data—no matter whether that data was generated in a laboratory or out in the "field." A *secondary research report* then would be a report (such as the technical background report) that presents information gained largely from printed or online information sources or from other sources such as interviews or direct observation.

You're probably already familiar with this type of report as the "lab report." The contents and organization of this type of report have a basic logic: you present your data and conclusions, but also present information on how you went about the experiment or survey. In other words, you enable the reader to replicate (the fancy scientific word for *repeat*) your experiment, or at least, visualize quite specifically how you went about it.

See the examples of primary research reports.

One of the examples is an experiment to see whether production of rainbow trout can be increased by varying water temperature. While there is not a one-to-one correspondence between the typical sections in primary research reports and the sections you see in the actual rainbow trout report, you'll find that most of the functions are carried out. Instead of a full paragraph, sometimes all that is needed is a single sentence. And sometimes certain functions are combined into a single sentence.

Contents of primary research reports. To enable readers to replicate your experiment or survey, you provide information like the following (each normally in its own section):

- **Introduction**—The introduction to the primary research report needs to do what any good introduction to a report needs to do—get readers ready to read the report. It may provide some background, but not more than a paragraph. Common elements, such as background, can be handled in the introduction. If they require a lot of discussion, however, they may need their own sections. For details, see the full discussion of introductions.
- **Problem, background**—One of the first things to do, either in the introduction, or in a separate section of its own, is to discuss the situation that has led to the research work. For example, you may have noticed something that contradicts a commonly accepted theory; you may have noticed some phenomenon that has not been studied, and so on. Explain this somewhere toward the beginning of a primary research report.
- **Purpose, objectives, scope**—Also toward the beginning of this type of report discuss what you intended to do in the research project—what were your objectives? Also, explain the scope of your work—what were you *not* trying to do?
- **Review of literature**—After you've established the basis for the project, summarize the literature relevant to it—for example, books, journal articles, and encyclopedias. If you are doing a study on speech recognition software, what articles have already been written on that subject? What do they have to say about the merits of this kind of software? All you do is summarize this literature briefly and enable readers to go have a look at it by providing the full bibliographic citation at the end of your report. In the context of this type of report, the review of literature shows where the gaps or contradictions are in the existing literature.

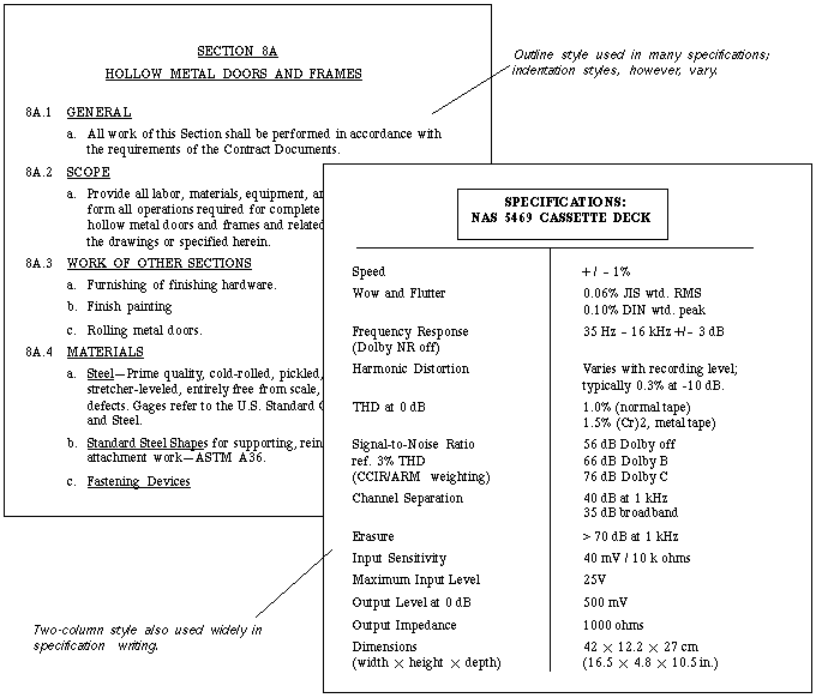
- **Materials, equipment, facilities**—Remember that one of your goals in writing this type of report is to enable the reader to replicate the experiment or survey you performed. Key to this is the discussion of the equipment and facilities you used in your research. Describe things in detail, providing brand names, model numbers, sizes, and other such specifications.
- **Theory, methods, procedures**—To enable readers to replicate your project, you must also explain the procedures or methods you used. This discussion can be step by step: "first, I did this, then I did that...." Theory and method refer more to the intellectual or conceptual framework of your project. These explain why you used the procedures that you used.
- **Results, findings, data**—Critical to any primary research report is the data that you collect. You present it in tables, charts, and graphs (see the chapter on creating, formatting, and incorporating graphics into your reports). These can go in the body of your report, or in appendixes if they are so big that they interrupt the flow of your discussion. Of course, some results or findings may not be presentable as tables, charts, or graphs. In these cases, you just discuss it in paragraphs. In any case, you do not add interpretation to this presentation of data. You merely present the data, without trying to explain it.
- **Discussion, conclusions, recommendations**—In primary research reports, you interpret or discuss your findings in a section separate from the one where you present the data. Now's the time to explain your data, to interpret it. This section, or area of the report, is also the place to make recommendations or state ideas for further research.
- **Bibliography**—The ideal of the primary research report is build upon or add to the knowledge in a particular area. It's the vehicle by which our knowledge advances for a specific topic. Your primary research report rests on top of all the work done by other researchers on the same topic. For that reason, you must list the sources of information you used or consulted in your project. This list occurs at the end of the report. For guidelines and format, see the chapter on documentation.

As for the organization of a primary research report, the typical contents just listed are arranged in an actual primary research report in just about the same order they were just discussed. Loosely, it is a chronological order. First, you discuss set-up issues such as the problem and objectives, then you discuss the procedures, then the data resulting from those procedures, then your conclusions based upon that data.

Typical format of primary research reports. In most technical-writing courses, you should use a format like the one shown in the chapter on report format. (The format you see in the example starting on page is for journal articles). In a primary research report for a technical-writing course, however, you should probably use the format in which you have a transmittal latter, title page, table of contents, list of figures, and abstracts and in which you bind the report.

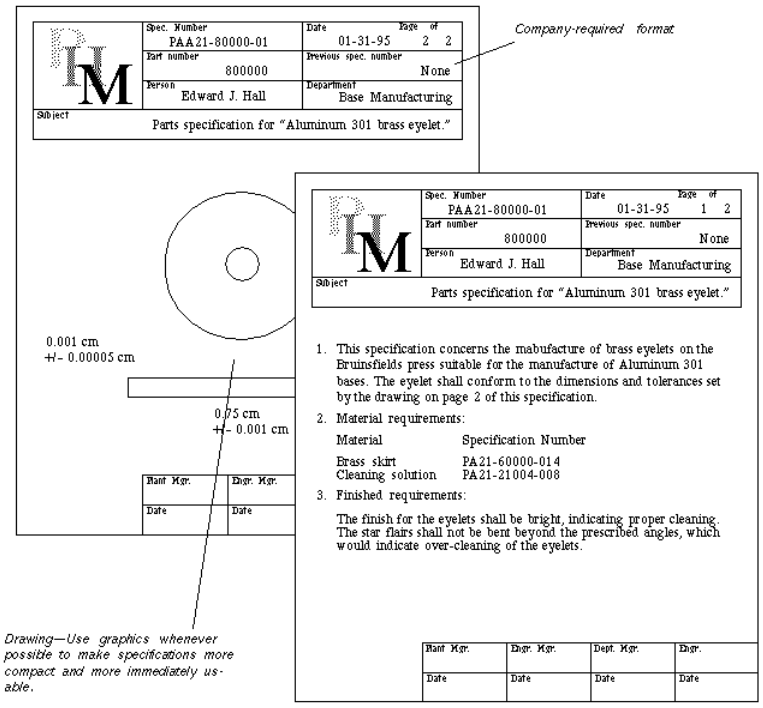
## Technical Specifications

Specifications are descriptions of products or product requirements. They can provide details for the design, manufacture, testing, installation, and use of a product. You typically see specifications in the documentation that comes in the package with certain kinds of products, for example, CD players or computers. These describe the key technical characteristics of the item. But specifications are also written as a way of "specifying" the construction and operational characteristics of a thing. They are then used by people who actually construct the thing or go out and attempt to purchase it. When you write specifications, accuracy, precision of detail, and clarity are critical. Poorly written specifications can cause a range of problems and lead to lawsuits.




*Outline and two-column style used to present information in specifications*. Graphics, tables, and lists are heavily used, but some details can only be provided through sentences and paragraphs. For these reasons then, specifications have a particular style, format, and organization:

- Make every effort to find out what the specific requirements are for format, style, contents, and organization. If they are not documented, collect a big pile specifications written by or for your company, and study them for characteristics like those described in the following.
- Use two-column lists or tables to lists specific details. If the purpose is to indicate details such as dimensions, materials, weight, tolerances, and frequencies, regular paragraph-style writing may be unnecessary.
- For sentence-style presentation, use an outline style similar to the one shown in the illustration above. Make sure that each specification receives its own number–letter designation. In sentence-style specifications, make sure each specific requirement has its own separate sentence.
- Use the decimal numbering system for each individual specification. This facilitates cross-referencing.




*Graphics and tables used to for present information in specifications.*

- Use either the open (performance) style or the closed restrictive style, depending on the requirements of the job. In the open or performance style, you can specify what the product or component should do, that is, its performance capabilities. In the closed style, you specify exactly what it should be or consist of.
- Cross-reference existing specifications whenever possible. Various goverment agencies as well as trade and professional associations publish specifications standards. You can refer to these standards rather than include the actual specifications details.
- Use specific, concrete language that identifies as precisely as possible what the product or component should be or do. Avoid words that are ambiguous—words that can be interpreted in more than one way. Use technical jargon the way it is used in the trade or profession.
- Test your specifications by putting yourself in the role of a bumbling contractor—or even an unscrupulous one. What are the ways a careless or incompetent individual could misread your specifications? Could someone willfully misread your specifications in order to cut cost, time, and thus quality? Obviously, no set of specifications can ultimately be "foolproof" or "shark-proof," but you must try to make them as clear and unambiguous as possible.
- For specifications to be used in design, manufacturing, construction, or procurement, use "shall" to indicate requirements. In specifications writing, "shall" is understood as indicating a requirement. (See the outline-style specifications in the first illustration on specifications for examples of this style of writing.)
- Provide numerical specifications in both words and symbols: for example, "the distance between the two components shall be three centimeters (3 cm)."
- Writing style in specifications can be very terse: incomplete sentences are acceptable as well as the omission of functions words such as articles and conjunctions that are understood.
- Exercise great caution with pronouns and relational or qualifying phrases. Make sure there is no doubt about what words such as "it," "they," "which," and "that" refer to. Watch out for sentences containing a list of two or more items followed by some descriptive phrase—does the descriptive phrase refer to all the list items or just one? In cases like these, you may have to take a wordier approach for the sake of clarity.
- Use words and phrasing that have become standard in similar specifications over the years. Past usage has proven them reliable. Avoid words and phrases that are known not to hold up in lawsuits.
- Make sure your specifications are complete—put yourself in the place of those who need your specifications; make sure you cover everything they will need.

Contents and Organization of Specifications. Organization is critical in specifications—readers need to be able to find one or a collection of specific details. To facilitate the process of locating individual specifications, use headings, lists, tables, and identifying numbers as discussed previously. But a certain organization of the actual contents is also standard:

- **General description**—Describe the product, component, or program first in general terms—administrative details about its cost, start and completion dates, overall description of the project, scope of the specifications (what you are not covering), anything that is of a general nature and does not fit in the part-by-part descriptions in the following.
- **Part-by-part description**—In the main body, present specifications part by part, element by element, trade by trade—whatever is the logical, natural, or conventional way of doing it.
- **General-to-specific order**—Wherever applicable, arrange specifications from general to specific.

Graphics in specifications. In specifications, use graphics wherever they enable you to convey information more effectively. For example, in the specifications for a cleanroom for production of integrated circuits, drawings, diagrams, and schematics convey some of the information much more succinctly and effectively than sentences and paragraphs. See the example of a graphics used in specifications writing in the second illustration on specifications. For details, see the chapter on graphics.

## Literature Reviews

A literature review summarizes what is known about a specific research topic, narrates the milestones of the research history, indicates where current knowledge conflicts, and discusses areas where there are still unknowns.

A literature review can be a standalone document or a component of a primary research report (as discussed previously). Research journals often contain articles whose sole purpose is to provide a literature review. As a component of a research report, a literature review can be as long as a whole chapter in book, only a paragraph in a research article, or as short as a few sentences in an introduction. In all cases, the function of the literature review is the same: to summarize the history and current state of research on a topic.

As you know from the preceding section, a primary research report (such as those in engineering research journals) focuses on a question: for example, the effect of weightlessness on growing vegetables. The literature-review section of that report would summarize what is known about this topic, indicate where current knowledge conflicts, and discuss areas where there are still unknowns.

A well-constructed literature review tells a story. It narrates the key events in the research on a particular question or in a particular area:

1. Who were the first modern researchers on this topic? What were their findings, conclusions, and theories? What questions or contradictions could they not resolve?
2. What did researchers following them discover? Did their work confirm, contradict, or overturn the work of their predecessors? Were they able to resolve questions their predecessors could not?

You narrate this series of research events in a literature review. You can consider this research as similar to the thesis–antithesis–synthesis process. You start out with a thesis, then along comes an antithesis to contradict it, and eventually some resolution of this contradiction called a synthesis is achieved, which is actually a step forward in the knowledge about that topic. But now the synthesis becomes a thesis, and the process starts all over again.

Hilton Obenzinger of Stanford University in "How to Research, Write, and Survive a Literature Review?" (no link>"http://www.stanford.edu/dept/undergr...iewHandout.pdf) calls this type of literature review a "road map." He identifies several other types, most importantly those that review the methodology of the research as well as or instead the the research findings. Obenzinger emphasizes that the literature review is not just a passive summary of research on a topic but an evaluation of the strengths and weaknesses of that research—an effort to see where that research is "incomplete, methodologically flawed, one-sided, or biased." In any case, as the following examples show, a literature review is a discussion of a body of research literature not an annotated bibliography. Notice in the following examples that literature reviews use standard bracketed IEEE textual citation style and end with a bibliography (called "References").

Consider the following excerpt, which shows the beginning of the review of literature, found in A. S. Tolba, A.H. El-Baz, and A.A. El-Harby, "Face Recognition: A Literature Review." *International Journal of Signal Processing*, vol. 2, no. 2, 2005:

> Face recognition, in additional to having numerous practical applications such as bankcard identification, access control, mug shots searching, security monitoring, and surveillance system, is a fundamental human behavior that is essential for effective communications and interactions among people.
>
> A formal method of classifying faces was first proposed in [1]. The author proposed collecting facial profiles as curves, finding their norm, and then classifying other profiles by their deviations from the norm. This classification is multi-modal, i.e., resulting in a vector of independent measures that could be compared with other vectors in a database.

As you can see, the first paragraph establishes the topic and its importance; the second paragraph goes back to the beginning of modern research that provided a foundation for computer-based face recognition. This literature review moves on to the current status of research in this field:

> Progress has advanced to the point that face recognition systems are being demonstrated in real-world settings [2]. The rapid development of face recognition is due to a combination of factors: active development of algorithms, the availability of a large databases of facial images, and a method for evaluating the performance of face recognition algorithms.

Notice how this next excerpt describes an important advance in the research on this topic, but then points out its deficiencies:

The literature review of face-recognition research examines many different methods used in computer-based face recognition. For each, it summarizes the method, the results, and the strengths and weaknesses of that method. This example is not so much the thesis-antithesis-synthesis pattern mentioned above but rather a collection of efforts all striving toward a common goal, increased accuracy of computer-based face recognition. Here's how the summary of that process ends in this literature review:

> In [83], a combined classifier system consisting of an ensemble of neural networks is based on varying the parameters related to the design and training of classifiers. The boosted algorithm is used to make perturbation of the training set employing MLP as base classifier. The final result is combined by using simple majority vote rule. This system achieved 99.5% on Yale face database and 100% on ORL face database. To the best of our knowledge, these results are the best in the literatures.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 2.3: Business plans

## Get your new business funded!

A *business plan* is a document used to start a new business or get funding for a business that is changing in some significant way. Business plans are important documents for business partners who need to agree upon their plans, government officials who need to approve that plan, and of course potential investors such as banks or private individuals who may fund the business.

A business plan is very much like a proposal, except for at least one big difference. The business plan seeks to start a new business or significantly expand an existing business. A proposal, on the other hand, seeks approval to do a specific project. For example, a business plan might seek funding to start a software company to create computer games. A proposal, on the other hand, might bid to do the development work for some specific computer game.

**Caution:** In a technical writing course, treat a business-plan project as a *writing* project, not as a real-world business plan. This chapter should *not* be viewed as a definitive guide for writing a real-world business plan.

## Common Sections in Business Plans

Many of the elements of the plans resemble those of the proposal—particularly the qualifications and background sections. Remember that these sections are only typical and not necessarily in any required order. For your plan, you'll need to think about the best sequencing of the sections and about other sections that might also be necessary. And see the links at the end of this chapter.

- **Product or service to be offered**—One of the most important sections of the business plan is the description of the actual product or service to be offered. If it is a description of a product—a physical object—you need to use the techniques for technical description. If a service is to be offered, explain it and take readers on a step-by-step tour of how the service will be handled.
- **Technical background on the product or service**—If your product or service involves technologies or technical processes potentially unfamiliar to your readers, explain these. Remember that business plans often go to nonspecialists who, despite their lack of technical expertise, have the investment funds or the legal understanding to get your business going.
- **Market for the product or service**—Critical also to any business plan is the exploration of the existing marketplace into which your product or service fits. What other companies exist that offer the same thing you plan to offer? How much business do they do? How are they different from each other? How will your business differ from them?
- **Process by which the product or service is produced**—If applicable, explain how the product or service will be produced. Explain how the proposed business will operate on a day-to-day basis.
- **Facilities and personnel needed for the operation**—Plan to discuss the facilities (storefronts, warehouses, production facilities, vehicles) your business will require as well as the personnel that will be needed.
- **Projected revenues from the operation**—Of obvious importance in any business plan is the discussion of the revenues you project for your business. If you know the estimate of total revenues for the market area in which you plan to operate, what percentage do you expect to win? Obviously, in your first few years, you may operate at a loss—at what point in time do you project to break even?
- **Funding necessary for startup and operation**—The plan should also discuss the funding you'll need to get the business started as well as the operating costs—the funding needed to run the business on a daily basis.
- **Legal issues related to the proposed business**—Your business plan may also need to discuss your business, its products, or its services in relation to government regulations—for example, environmental restrictions.
- **Qualifications and background of the personnel**—Important too is the section that presents your qualifications to start and operate the business you are proposing. Of course, "you" can mean a number of people with whom you are working to start the business. This section can be very much like a collection of resumes, although you want to write an introduction in which you describe your group's qualifications as a whole.
- **Discussion of feasibility and investment potential**—You'll want to include in your plan a discussion of the likelihood of the success of your business. Obviously, you believe that it will be a success, but you must find a way to support this belief with facts and conclusions in order to convince your readers. Also, you must discuss what sort of return on investment readers can expect.

- **Investment offering**—And finally, you may need to present what kinds of investment apparatus you are actually offering.

In planning your business plan, remember that you try to provide whatever information the audience may need to consider your idea. Your goal is to convince them you have a good idea and to encourage them to invest in it (or to approve it in some way). It's okay to provide marginal information—information you're not quite sure that readers will want. After all, you section off the parts of a business plan with headings; readers can skip over sections they are not interested in.

## Format for Business Plans

You can use the format for the formal report, the format for proposals, or some combination of the two. Business plans, even those for small operations, can run well over 15 pages—in which case you'll want to bind the plan (see the suggestions in the section on formal reports). You'll also need a cover letter—examples of this are also in the section on report formatting.

As you plan the format of your business plan, think about designing it so that readers can find and read essential information quickly. This means setting up an abstract, but calling it "Executive Summary."

Also plan to group similar sections. In the preceding section that lists the various kinds of information to include in a plan, some of suggestions should be combined—for example, the sections on financial aspects of the proposed business.

And finally, make use of appendixes for unwieldy, bulky information. Enable readers to quickly find the main sections of the plan, without having to wade through tables and charts that go on for pages and pages.

## Resources for Business Plans

Here are some additional resources on business plans:

- 20+ resources every veteran small business owner should know. Clover.com

- Entrepreneurâ€™s guide to starting a small business. ooma.com
- A Guide to Writing Your First Business Plan
- How to Write a Business Plan. Noah Parsons, bplans.com, 2018.
- Starting a Business and Writing a Business Plan. Lots of good detail and links. From DiscoverBusiness.us.
- The Ultimate Guide to Business Plans. Focus on ecommerce. From Ecommerce University.
- bplans.com. Samples available.
- Business Plan Guide. Made available by Miller Consulting, this site contains good information on business plans plus numerous links to other sites on the same topic.
- How to write a lean business plan: 9 easy steps. Debroah Sweeney, Deluxe Enterprise Operations, 2018.
- How to Start an LLC in Maryland: Step-by-Step Guide. https://learningcamp.com/
- Teneric Business and Marketing Plans. This is a commercial venture that wants to write business plans for you or teach you how, but it does include a sample business plan and a template for business plans.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 2.4: Proposals

## Get your project approved and funded

This chapter focuses on the *proposal*—the kind of document that gets you or your organization approved or hired to do a project.

Be sure to check out the examples.

## Some Preliminaries

As you get started, make sure you understand the definition we're using for proposals. Also, if you are taking a technical writing course, make sure you understand the proposal assignment—not to write just any proposal but one that, at least in part, proposes to write something.

**Real proposals.** To begin planning a proposal, remember the basic definition: a proposal is an offer or bid to do a certain project for someone. Proposals may contain other elements—technical background, recommendations, results of surveys, information about feasibility, and so on. But what makes a proposal a proposal is that it asks the audience to approve, fund, or grant permission to do the proposed project.

If you plan to be a consultant or run your own business, written proposals may be one of your most important tools for bringing in business. And, if you work for a government agency, nonprofit organization, or a large corporation, the proposal can be a valuable tool for initiating projects that benefit the organization or you the employee-proposer (and usually both).

A proposal should contain information that would enable the audience of that proposal to decide whether to approve the project, to approve or hire you to do the work, or both. To write a successful proposal, put yourself in the place of your audience—the recipient of the proposal—and think about what sorts of information that person would need to feel confident having you do the project.

It's easy to get confused about proposals, or at least the type of proposal you'll be writing here. Imagine that you have a terrific idea for installing some new technology where you work and you write up a document explaining how it works and why it's so great, showing the benefits, and then end by urging management to go for it. Is that a proposal? No, at least not in this context. It's more like a feasibility report, which studies the merits of a project and then recommends for or against it. Now, all it would take to make this document a proposal would be to add elements that ask management for approval for you to go ahead with the project. Certainly, some proposals must sell the projects they offer to do, but in all cases proposals must sell the writer (or the writer's organization) as the one to do the project.

**Types of proposals.** Consider the situations in which proposals occur. A company may send out a public announcement requesting proposals for a specific project. This public announcement—called a request for proposals (RFP)—could be issued through newspapers, trade journals, Chamber of Commerce channels, or individual letters. Firms or individuals interested in the project would then write proposals in which they summarize their qualifications, project schedules and costs, and discuss their approach to the project. The recipient of all these proposals would then evaluate them, select the best candidate, and then work up a contract.

But proposals also come about much less formally. Imagine that you are interested in doing a project at work (for example, investigating the merits of bringing in some new technology to increase productivity). Imagine that you visited with your supervisor and tried to convince her of this. She might respond by saying, "Write me a proposal and I'll present it to upper management." As you can see from these examples, proposals can be divided into several categories:

- *Internal, external*. A proposal to someone within your organization (a business, a government agency, etc.) is an *internal* proposal. With internal proposals, you may not have to include certain sections (such as qualifications) or as much information in them. An *external* proposal is one written from one separate, independent organization or individual to another such entity. The typical example is the independent consultant proposing to do a project for another firm.
- *Solicited, unsolicited*. A *solicited* proposal is one in which the recipient has requested the proposal. Typically, a company will send out requests for proposals (RFPs) through the mail or publish them in some news source. But proposals can be solicited on a very local level: for example, you could be explaining to your boss what a great thing it would be to install a new technology in the office; your boss might get interested and ask you to write up a proposal that offered to do a formal study of the idea.

*Unsolicited* proposals are those in which the recipient has not requested proposals. With unsolicited proposals, you sometimes must convince the recipient that a problem or need exists before you can begin the main part of the proposal.

**Other options for the proposal assignment.** It may be that you cannot force your report-project plans into the proposal context. Another option is to write an academic proposal—you address it to your instructor and make no pretense of realism. See an example of this type of proposal.

## Typical Scenarios for the Proposal

It gets a bit tricky dreaming up a good technical report project and then a proposal project that proposes at least in part to write that report. Here are some ideas:

- Imagine that a nonprofit organization focused on a particular issue wants an expert consultant to write a handbook or guide for its membership. This document will present information on the issue in a way that the members can understand.
- Imagine that a company has some sort of problem or wants to make some sort of improvement. It sends out a request for proposals; you receive one and respond with a proposal. You offer to come in, investigate, interview, make recommendations—and present it all in the form of a report.
- Some organization wants a seminar in your expertise. You write a proposal to give the seminar—included in the package deal is a guide or handbook that the people attending the seminar will receive.
- You want to write a business prospectus for the kind of business you intend to start up. Imagine that you want a top-quality prospectus and don't have the time or expertise to prepare one; therefore, *you* send out request for proposals to professional consultants. You change hats and pretend you are Business Startup Consultants, Inc., and send your other self a proposal to do the job. Your proposal accepted, you (as Business Startup Consultants, Inc.) write the prospectus.
- Some agency has just started using a fancy desktop-publishing system, but the documentation is giving people fits. You receive a request for proposals from this agency to write some sort of simplified guide or startup guide.

Consider using this planning guide for report-oriented proposals.

## Requests for Proposals (RFP)

Consider the situations in which proposals occur. A company may send out a public announcement requesting proposals for a specific project. This public announcement—called a request for proposals (RFP)—could be issued through newspapers, trade journals, Chamber of Commerce channels, or individual letters. Firms or individuals interested in the project would then write proposals in which they summarize their qualifications, project schedules and costs, and discuss their approach to the project. The recipient of all these proposals would then evaluate them, select the best candidate, and then work up a contract.

But proposals come about much less formally—and so do RFPs. Imagine that you are interested in doing a project at work (for example, investigating the merits of bringing in some new technology to increase productivity). Imagine that you visited with your supervisor and tried to convince her of this. She might respond by saying, "Write me a proposal and I'll present it to upper management." Or your supervisor could initiate the project, suggesting or directing an informal RFP To you.

## Common Sections in Proposals

The following is a review of the sections you'll commonly find in proposals. Don't assume that each one of them has to be in the actual proposal you write, nor that they have to be in the order they are presented here—plus you may discover that other kinds of information not mentioned here must be included in your particular proposal.

As you read the following on common sections in proposals, check out the example proposals listed at the start of this chapter. Not all of the sections discussed in the following will show up in the examples, but most will.

**Introduction.** Plan the introduction to your proposal carefully. Make sure it does all of the following things (but not necessarily in this order) that apply to your particular proposal:

- Indicate that the document to follow is a proposal.
- Refer to some previous contact with the recipient of the proposal or to your source of information about the project.
- Find one brief motivating statement that will encourage the recipient to read on and to consider doing the project (if it's an unsolicited or competitive proposal) and you to do the project.

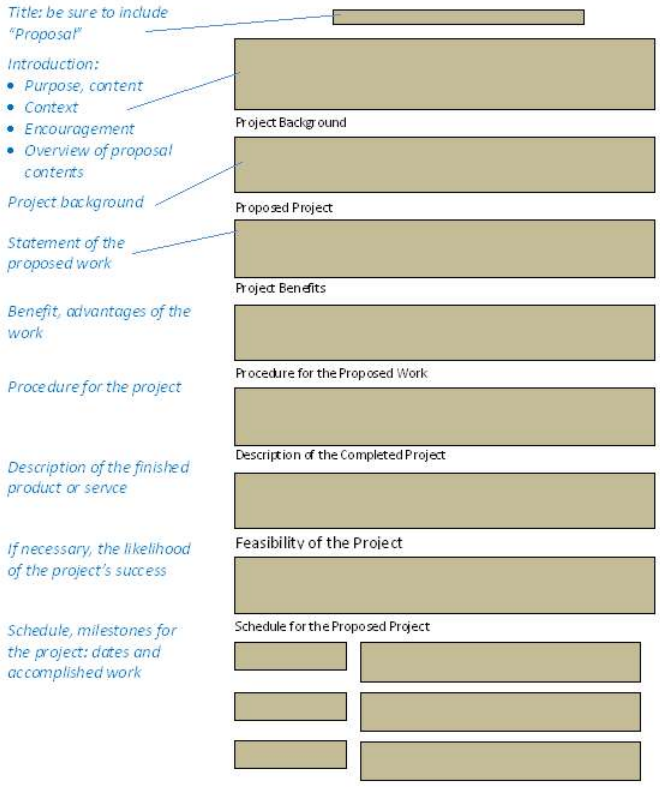
- Give an overview of the contents of the proposal.

Take a look at the introductions in the first two example proposals listed at the beginning of this chapter, and try to identify these elements.

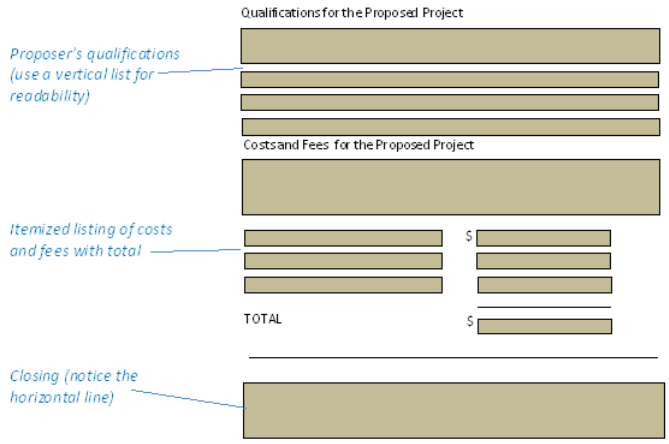
**Background on the problem, opportunity, or situation.** Often occurring just after the introduction, the background section discusses what has brought about the need for the project—what problem, what opportunity there is for improving things, what the basic situation is. For example, management of a chain of daycare centers may need to ensure that all employees know CPR (maybe new state guidelines have been enacted about CPR certification). An owner of pine timber land in east Texas may want to get the land productive of saleable timber without destroying the ecology.

It's true that the audience of the proposal may know the problem very well, in which case this section might not be needed. Writing the background section still might be useful, however, in demonstrating your particular view of the problem. And, if the the proposal is unsolicited, a background section is almost a requirement—you will probably need to convince the audience that the problem or opportunity exists and that it should be addressed.

**Benefits and feasibility of the proposed project.** Most proposals discuss the advantages or benefits of doing the proposed project. This acts as an argument in favor of approving the project. Also, some proposals discuss the likelihood of the project's success. In the forestry proposal, the proposer recommends that the landowner make an investment; at the end of the proposal, he explores the question of the potential return on that investment. In the unsolicited proposal, this section is particularly important—you are trying to "sell" the audience on the project.




*Schematic view of proposals*




*Schematic view of proposals—continued*

**Description of the proposed work (results of the project).** Most proposals must describe the finished product of the proposed project. In a technical writing course, that means describing the written document you propose to write, its audience and purpose; providing an outline; and discussing such things as its length, graphics, binding, and so forth. In the scenario you define, there may be other work such as conducting training seminars or providing an ongoing service. Add that too.

**Method, procedure, theory.** In some proposals, you'll want to explain how you'll go about doing the proposed work. This acts as an additional persuasive element; it shows the audience you have a sound, well-thought-out approach to the project. Also, it serves as the other form of background some proposals need. Remember that the background section (the one discussed above) focused on the problem or need that brings about the proposal. However, in this section, you discuss the technical background relating to the procedures or technology you plan to use in the proposed work. For example, in the forestry proposal, the writer gives a bit of background on how timber management is done. Once again, this gives you the proposal writer a chance to show that you know what you are talking about and to build confidence in the audience.

**Schedule.** Most proposals contain a section that shows not only the projected completion date but also key milestones for the project. If you are doing a large project spreading over many months, the timeline would also show dates on which you would deliver progress reports. And if you can't cite specific dates, cite amounts of time for each phase of the project.

**Qualifications.** Most proposals contain a summary of the proposing individual's or organization's qualifications to do the proposed work. It's like a mini-resume contained in the proposal. The proposal audience uses it to decide whether you are suited for the project. Therefore, this section lists work experience, similar projects, references, training, and education that shows familiarity with the project.

**Costs, resources required.** Most proposals also contain a section detailing the costs of the project, whether internal or external. With external projects, you may need to list your hourly rates, projected hours, costs of equipment and supplies, and so forth, and then calculate the total cost of the complete project. Internal projects of course are not free, but you should still list the project costs: for example, hours you will need to complete the project, equipment and supplies you'll be using, assistance from other people in the organization, and so on.

**Conclusions.** The final paragraph or section of the proposal should bring readers back to a focus on the positive aspects of the project (you've just showed them the costs). In the final section, you can end by urging them to get in touch to work out the details of the project, to remind them of the benefits of doing the project, and maybe to put in one last plug for you or your organization as the right choice for the project.

**Special project-specific sections.** Remember that the preceding sections are typical or common in written proposals, not absolute requirements. Always ask yourself what else might my audience need to understand the project, the need for it, the benefits arising from it, my role in it, my qualifications to it. What else might my readers need to be convinced to allow me to do the project? What else do they need to see in order to approve the project and to approve me to do the project?

## Organization of Proposals

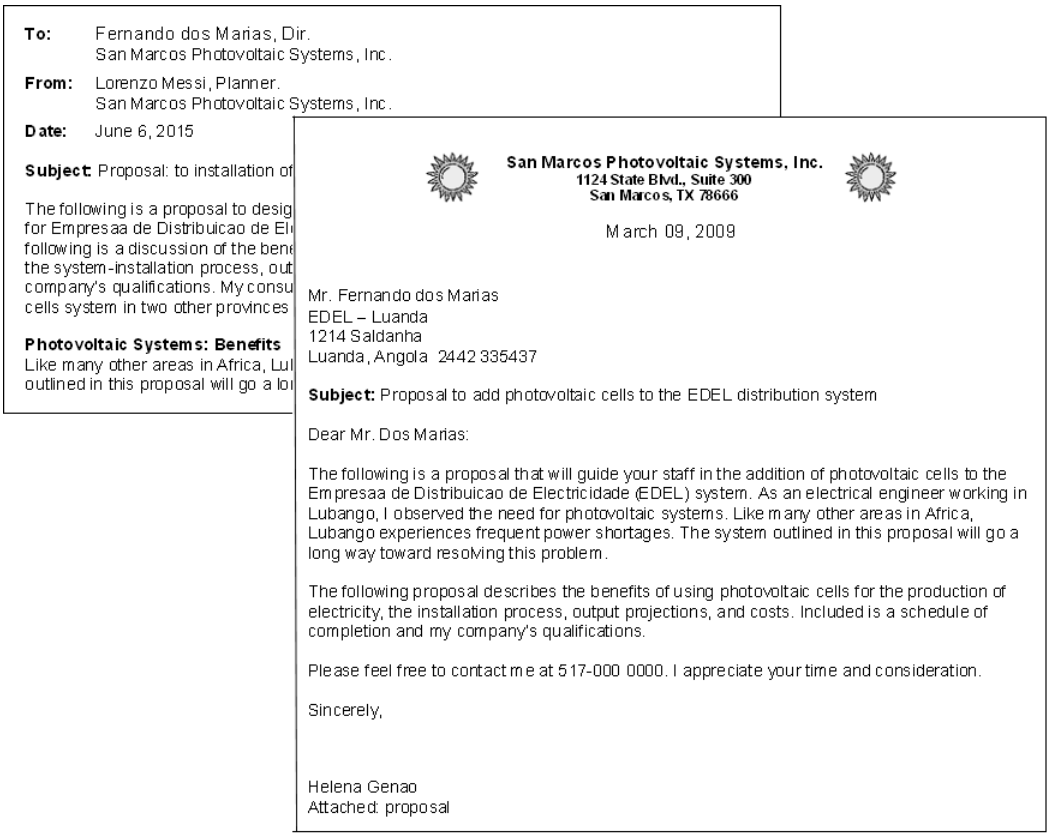
As for the organization of the content of a proposal, remember that it is essentially a sales, or promotional kind of thing. Here are the basic steps it goes through:

1. You introduce the proposal, telling the readers its purpose and contents.
2. You present the background—the problem, opportunity, or situation that brings about the proposed project. Get the reader concerned about the problem, excited about the opportunity, or interested in the situation.
3. State what you propose to do about the problem, how you plan to help the readers take advantage of the opportunity, how you intend to help them with the situation.
4. Discuss the benefits of doing the proposed project, the advantages that come from approving it.
5. Describe exactly what the completed project would consist of, what it would look like, how it would work—describe the results of the project.
6. Discuss the method and theory or approach behind that method—enable readers to understand how you'll go about the proposed work.
7. Provide a schedule, including major milestones or checkpoints in the project.
8. Briefly list your qualifications for the project; provide a mini-resume of the background you have that makes you right for the project.
9. Now (and only now), list the costs of the project, the resources you'll need to do the project.
10. Conclude with a review of the benefits of doing the project (in case the shock from the costs section was too much), and urge the audience to get in touch or to accept the proposal.

Notice the overall logic of the movement through these section: you get them concerned about a problem or interested in an opportunity, then you get them excited about how you'll fix the problem or do the project, then you show them what good qualifications you have—*then* hit them with the costs, but then come right back to the good points about the project.

## Format of Proposals

You have the following options for the format and packaging of your proposal. It does not matter which you use as long as you use the memorandum format for internal proposals and the business-letter format for external proposals.




*Proposal that uses the consolidated memo format (left) and a proposal that is separate from its cover letter (right)*

- *Cover letter or memo with separate proposal*: In this format, you write a brief "cover" letter or memo and attach the proposal proper after it. The cover letter or memo briefly announces that a proposal follows and outlines the contents of it. In fact, the contents of the cover letter or memo are pretty much the same as the introduction (discussed in the previous section). Notice, however, that the introduction to the proposal proper that follows the cover letter or memo repeats much of what preceded. This is because the letter or memo may get detached from the proposal or the recipient may not even bother to look at the letter or memo and just dive right into the proposal itself.
- *Consolidated business-letter or memo proposal*: In this format, you consolidate the entire proposal with a standard business letter or memo. You include headings and other special formatting elements as if it were a report. (This consolidated memo format is illustrated in the left portion of the following illustration.)

## Special Assignment Requirements

Remember that, in a technical writing course, the proposal assignment serves several purposes: (1) to give you some experience in writing a proposal; (2) to get you started planning your term report; (3) to give your instructor a chance to work with you on your report project, to make sure you've got something workable. For the second and third reasons, you need to include certain specific contents in (or with) your proposal, some of which may not seem appropriate in a real-world proposal. If it doesn't fit in the proposal proper, put it in a memo to your instructor as is done in first example proposal listed at the beginning of this chapter.

Here's a checklist of what to include somewhere in the proposal or in an attached memo to the instructor:

- *Audience*: Describe the audience of the proposal and the proposed report (they may be different) in terms of the organization they work for, their titles and jobs, their technical background, their ability to understand the report you propose to write.
- *Situation*: Describe the intended audience of the proposal: who they are, what they do, what their level of knowledge and background on the proposal topic is. Describe the situation in which the proposal is written and in which the project is needed: what problems or needs are there? who has them, where are they located?

- *Report type*: Explain what type of report you intend to write: is it a technical background report? a feasibility report? Provide enough explanation so that your instructor can see that you understand the type of report. See the chapter on types of reports.
- *Information sources*: List information sources; make sure you know that there is adequate information for your topic; list specific books, articles, reference works, other kinds of sources that you think will contribute to your report.
- *Graphics*: List the graphics you think your report will need according to their *type* and their *content*. (If you can't think of any your report would need, you may not have a good topic—do some brainstorming with your instructor.)
- *Outline*: Include an outline of the topics and subtopics you think you'll cover in your report.

## Revision Checklist for Proposals

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

- Make sure you use the right format. Remember, the memo format is for internal proposals; the business-letter format is for proposals written from one external organization to another. (Whether you use a cover memo or cover letter is your choice.)
- Write a good introduction as discused in the preceding.
- Make sure to identify exactly what you are proposing to do.
- Make sure that a report—a written document—is somehow involved in the project you are proposing to do. Remember that in a technical writing course we are trying to do two things: write a proposal and plan a term-report project.
- Make sure the sections are in a logical, natural order. For example, don't hit the audience with schedules and costs before you've gotten them interested in the project.
- Break out the costs section into specifics; include hourly rates and other such details. Don't just hit them with a whopping big final cost.
- For internal projects, don't omit the section on costs and qualifications: there will be costs, just not direct ones. For example, how much time will you need, will there be printing, binding costs? Include your qualifications—imagine your proposal will go to somebody in the organization who doesn't know you.
- Be sure and address the proposal to the real or realistic audience—not your instructor. (You can use your instructor's name as the CEO or supervisor of the organization you are sending the proposal to.)
- Watch out for generating technobabble. Yes, some of your proposal readers may know the technical side of your project—but others may not. Challenge yourself to bring difficult technical concepts down to a level that nonspecialists can understand.
- Be sure to include all the information listed in "Special assignment requirements." If it doesn't logically or naturally fit in the proposal itself, put it in a memo to your instructor.

## Related Information

How to write a business proposal (The modern way). Yauhen Zaremba, PandaDoc

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 2.5: Progress reports

## Tell 'em how it's going—or not going

You write a progress report to inform a supervisor, associate, or customer about progress you've made on a project over a certain period of time. The project can be the design, construction, or repair of something, the study or research of a problem or question, or the gathering of information on a technical subject. You write progress reports when it takes well over three or four months to complete a project.

## Functions and Contents of Progress Reports

In the progress report, you explain any or all of the following:

- How much of the work is complete
- What part of the work is currently in progress
- What work remains to be done
- What problems or unexpected things, if any, have arisen
- How the project is going in general

Progress reports have several important functions:

- Reassure recipients that you are making progress, that the project is going smoothly, and that it will be complete by the expected date.
- Provide recipients with a brief look at some of the findings or some of the work of the project.
- Give recipients a chance to evaluate your work on the project and to request changes.
- Give you a chance to discuss problems in the project and thus to forewarn recipients.
- Force you to establish a work schedule so that you'll complete the project on time.
- Project a sense of professionalism to your work and your oganization.

Be sure to check out the example reports.

## Timing and Format of Progress Reports

In a year-long project, there are customarily three progress reports, one after three, six, and nine months. Depending on the size of the progress report, the length and importance of the project, and the recipient, the progress report can take the following forms:

- **Memo**—A short, informal report to someone within your organization
- **Letter**—A short, informal report sent to someone outside your organization
- **Formal report**—A formal report sent to someone outside your organization

Take a look at the discussion in Format of Proposals. You can use the same format for progress reports as you can for proposals: memo, letter, separate report.

## Organizational Patterns for Progress Reports

The recipient of a progress report wants to see what you've accomplished on the project, what you are working on now, what you plan to work on next, and how the project is going in general. To report this information, you combine two of these organizational strategies: time periods, project tasks, or report topics.

**Time periods**. A progress report usually summarizes work within each of the following:

- Work accomplished in the preceding period(s)
- Work currently being performed
- Work planned for the next period(s)

**Project tasks**. Practically every project breaks down into individual tasks:

| Project | Individual tasks |
|---|---|
| Building municipal ball parks on city-owned land | Measuring community interest<br>Locating suitable property<br>Clearing the property<br>Designing the bleachers, fences, etc. |
| Writing a report | Studying the assignment<br>Selecting a topic<br>Identifying the audience of the report<br>Narrowing the topic<br>Developing a rough outline<br>Gathering information<br>Writing one or more rough drafts<br>Documenting the report<br>Revising and editing the report draft<br>Typing and proofreading the report<br>Putting the report in its final package |

*Project tasks*. One organizational approach to progress reports.

**Report topics.** You can also organize your progress report according to the work done on the sections of the final report. In a report project on cocombusting municipal solid waste, you would need information on these topics:

| Topics to be covered in the final report |
|---|
| 1. The total amount of MSW produced<br>—locally<br>—nationally<br>2. The energy potential of MSW, factors affecting its energy potential<br>3. Costs to modify city utilities in order to change to cocombustion |

*Topics to be covered in a final report*. An organizational approach to a progress report about the progress on a report.

For each of these topics, you'd explain the work you have done, the work you are currently doing, and the work you have planned.

A progress report is actually a combination of two of these organizational strategies. The following outline excerpts give you an idea of how they can combine:

| Progress report A | Progress report B | Progress report C |
|---|---|---|
| *Task 1* | *Work Completed* | *Topic 1* |
| Work completed | Task 1 | Work completed |
| Current work | Task 2 | Current work |
| Planned work | Task 3 | Planned work |
| *Task 2* | *Current Work* | *Topic 2* |
| Work completed | Task 1 | Work completed |
| Current work | Task 2 | Current work |
| Planned work | Task 3 | Planned work |
| *Task 3* | *Future Work* | *Topic 3* |
| Work completed | Task 1 | Work completed |
| Current work | Task 2 | Current work |
| Planned work | Task 3 | Planned work |

*Combination of organizational strategies for progress reports*

The following illustration shows an example of the project-tasks approach with subheadings for time periods:

**Brine Drainage Tube Modifications**

During this period, we have continued to work on problems associated with the brine drainage tubes.

**Previous period.** After minor adjustments during a month of operation, the drainage tubes and the counterwasher have performed better but still not completely satisfactorily. The screen sections of these tubes, as you know, are located at variable distances along the height of the washer.

**Current period.** The screen portion of the brine drainage tubes have been moved to within 5 feet of the top of the pack. So far, no change in counterwasher performance has been observed. Production statistics at the end of this month (February) should give us a clearer idea of the effect of this modification.

**Next period.** Depending on the continued performance of the screen in its current position in relation to the top of the pack, we may move the screen to within 3 feet of the top of the pack in the next period of testing. Although the wash ratio was greater with greater screen height, the washing efficiency seems to remain relatively constant; the production vs. compressor KW data for all screen locations so far has seemed to follow the same linear curve.

*Example progress reports organized by time periods*

These two outlines show progress reports organized by project tasks:

| WORK COMPLETED | |
|---|---|
| As of this time, I have completed almost all of the research work and am putting the sections of the final report together. Here is a breakdown of the work that I have done so far.<br><br>**Development of the Bottle**<br><br>In the development section of my report, I have written a technical description of a typical PET soft-drink bottle. It is complete and gives the reader a good idea of what the product should look like and able to accomplish.<br><br>**Favorable Properties**<br><br>The section of the report describing the properties of PET is finished. I have chosen four physical properties that many raw materials containers are tested for, and I have shown how PET withstands these tests.<br><br>**Manufacturing Processes**<br><br>For the section on manufacturing processes, I have done research to help me recommend one particular production method for PET bottles. Here, I have described this chosen method and have explained exactly how a plastic bottle is produced on an assembly line.<br><br>**Economics**<br><br>I have finished work on half the economics section of this report. So far, I have written an economic comparison of the use of plastic and glass bottles. | **PRESENT WORK**<br><br>Right now I am mainly involved in determining just which areas of my report are lacking information. Also, I am continuing my work in locating financial information on PET bottles.<br><br>**Manufacturing Processes**<br><br>In the manufacturing section, I am currently . . . |

*Example progress reports organized by project tasks*

## Other Parts of Progress Reports

In your progress report, you also need (a) an introduction that reviews the purpose and scope of the project, (b) a detailed description of your project and its history, and (c) an overall appraisal of the project to date, which usually acts as the conclusion.

Introduction. Review the details of your project's purpose, scope, and activities. This will aid recipients who are unfamiliar with the project, who do not remember certain details, or who want to doublecheck your approach to the project. The introduction can contain the following:

- Purpose of the project
- Specific objectives of the project
- Scope, or limits, of the project
- Date the project began; date the project is scheduled to be completed

- People or organization working on the project
- People or organization for whom the project is being done
- Overview of the contents of the progress report

> I am now submitting to you a report on the progress that I have made on my research for your company, Ginseng Cola. Immediately following the January 15 acceptance of my firm's bid to study the advantages of bottling your soft-drink product in plastic bottles, I began investigating all areas of the project.
>
> In the following sections of this progress report, you will be informed on the work that I have already accomplished, the work I am now involved in, the work left to do, and finally an overall appraisal of the how the project is going.

*Example introduction to a progress report*

Project description. In most progress reports, include a project description to review the details of your project for the recipients:

> **PROJECT DESCRIPTION**
>
> Here is a review of the purpose and scope of this project.
>
> **Purpose.** The original investment plan of this corporation included only long-term, low-risk investment in corporate bonds and U.S. securities. This project was designed to answer questions about the potential of short- term, high-dollar investments, particularly those suited to the future expansion of this company's investment plan.
>
> **Scope.** The report will cover basic definitions of stocks and options as well as reasons for and against these two investment strategies. The report will be broken down into four areas:
>
> - Mechanics of stocks and options
> - Comparisons of stocks and options
> - Example investment scenarios
> - Recommendations for an investment plan

*Example project description from a report*

Conclusion. The final paragraph or section usually reassures audiences that all is going well and on schedule. It can also alert recipients to unexpected changes or problems in the project.

**OVERALL APPRAISAL**

The project to recommend PET production is coming along well. I have not run into any major problems and have found plenty of material on this subject. However, I have not heard from Mr. Simon Juarez of PET Mfg., who is sending information on PET production methods used in several plants in the Southwest.

I can foresee no major problems that will keep me from submitting my report to you on the contract date. In fact, I may be able to get it to you a few days earlier than planned. In general, I am finding that the PET bottle is an even more attractive packaging idea than had seemed in our earlier discussions. Full details on this, however, will appear in the final report.

Sincerely,

Steven C. Crosswell
Process Engineer
C & S Engineering

*Overall appraisal used as conclusion to a progress report*

## Revision Checklist for Progress Reports

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

- Make sure you use the right format. Remember, the memo format is for internal progress reports; the business-letter format is for progress reports written from one external organization to another. (Whether you use a cover memo or cover letter is your choice.)
- Write a good introduction—in it, state that this is a progress report, and provide an overview of the contents of the progress report.
- Make sure to include a description of the final completed project.
- Use one or a combination of the organizational patterns in the discussion of your work.
- Use headings to mark off the different parts of your progress report, particularly the different parts of your summary of work done on the project.
- Use lists as appropriate.
- Provide specifics—avoid relying on vague, overly general statements about the work you've done on the final report project.
- Be sure and address the progress report to the real or realistic audience—not your instructor.
- Assume there will be nonspecialists reading your progress report. But don't avoid discussion of technical aspects of the project—just bring them down to a level that nonspecialists can understand.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 2.6: Instructions

### Tell them how to do it!

The focus for this chapter is one of the most important of all uses of technical writing—instructions. As you know, *instructions* are those step-by-step explanations of how to do something: how to build, operate, repair, or maintain things.

Be sure to check out the examples.

## Writing Instructions

One of the most common and one of the most important uses of technical writing is instructions—those step-by-step explanations of how to do things: assemble something, operate something, repair something, or do routine maintenance on something. But for something seemingly so easy and intuitive, instructions are some of the worst-written documents you can find. Like me, you've probably had many infuriating experiences with badly written instructions. What follows in this chapter may not be a fool-proof, goof-proof guide to writing instructions, but it will show you what professionals consider the best techniques.

Ultimately, good instruction writing requires:

- Clear, simple writing
- A thorough understanding of the procedure in all its technical detail
- Your ability to put yourself in the place of the reader, the person trying to use your instructions
- Your ability to visualize the procedure in great detail and to capture that awareness on paper
- Finally, your willingness to go that extra distance and test your instructions on the kind of person you wrote them for.

By now, you've probably studied headings, lists, and special notices—writing a set of instructions with these tools probably seems obvious. Just break the discussion out into numbered vertical lists and throw in some special notices at the obvious points and you're done! Well, not quite, but that's a great start. This chapter explores some of the features of instructions that can make them more complex. You can in turn use these considerations to plan your own instructions.

## Some Preliminaries

At the beginning of a project to write instructions, it's important to determine the structure or characteristics of the particular procedure you are going to write about.

Audience and situation. Early in the process, define the audience and situation of your instructions. Remember that defining an audience means defining its level of familiarity with the topic as well as other such details. See the discussion of audiences and steps to use in defining audiences.

Most importantly, if you are in a writing course, you'll need to write a description of your audience and attach that to your instructions. This will enable your instructor to assess your instructions in terms of their rightness for the intended audience. And remember too that in a technical-writing course it is preferable to write for nonspecialist audiences—much more of a challenge to you as a writer.

Number of tasks. How many tasks are there in the procedure you are writing about? Let's use the term *procedure* to refer to the whole set of activities your instructions are intended to discuss. A *task* is a semi-independent group of actions within the procedure: for example, setting the clock on a microwave oven is one task in the big overall procedure of operating a microwave oven.

A simple procedure like changing the oil in a car contains only one task; there are no semi-independent groupings of activities. A more complex procedure like using a microwave oven contains plenty of such semi-independent tasks: setting the clock; setting the power level; using the timer; cleaning and maintaining the microwave, among others. (The instructions on using a camera are organized by tasks.)

Some instructions have only a single task, but have many steps within that single task. For example, imagine a set of instructions for assembling a kids' swing set. In my own experience, there were more than a 130 steps! That can be a bit daunting. A good approach is to group similar and related steps into phases, and start renumbering the steps at each new phase. A *phase* then is a group of similar steps within a single-task procedure. In the swing-set example, setting up the frame would be a phase; anchoring the thing in the ground would be another; assembling the box swing would be still another.

Best approach to the step-by-step discussion. Another consideration, which maybe you can't determine early on, is how to focus your instructions. For most instructions, you can focus on tasks, or you can focus on tools (or features of tools).

Use task orientation. Focus on the tasks your readers want to perform; use how to or –ing phrasing on headings.

In a *task approach* (also known as task orientation) to instructions on using a phone-answering service, you'd have these sections:

- recording your greeting
- playing back your messages
- saving your messages
- forwarding your messages
- deleting your messages, and so on

These are tasks—the typical things we'd want to do with the machine. For further discussion, see the chapter on task analysis.

On the other hand, in a *tools approach* to instructions on using a photocopier, there would be these unlikely sections:

- copy button
- cancel button
- enlarge/reduce button
- collate/staple button
- copy-size button, and so on

If you designed a set of instructions on this plan, you'd write steps for using each button or feature of the photocopier. Instructions using this tools approach are hard to make work. Sometimes, the name of the button doesn't quite match the task it is associated with; sometimes you have to use more than just the one button to accomplish the task. Still, there can be times when the tools/feature approach may be preferable.

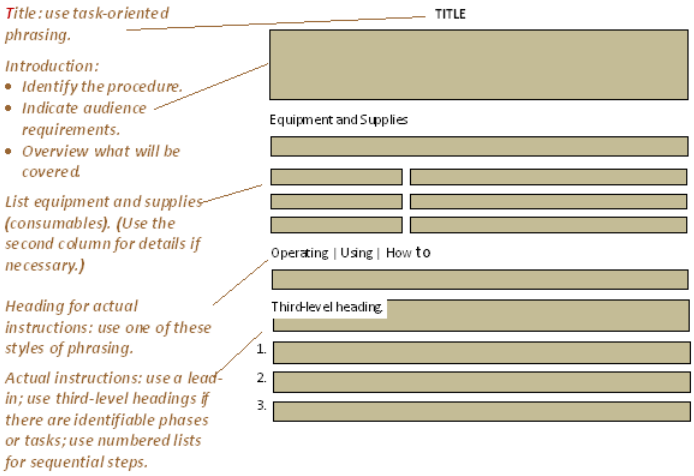
Groupings of tasks. Listing tasks may not be all that you need to do. There may be so many tasks that you must group them so that readers can find individual ones more easily. For example, the following are common task groupings in instructions:

1. unpacking and setup tasks
2. installing and customizing tasks
3. basic operating tasks
4. routine maintenance tasks
5. troubleshooting tasks; and so on

## Common Sections in Instructions

The following is a review of the sections you'll commonly find in instructions. Don't assume that each one of them *must* be in the actual instructions you write, nor that they have to be in the order presented here, nor that these are the only sections possible in a set of instructions.

As you read the following on common sections in instructions, check out the example instructions.




*Schematic view of instructions*. Remember that this is a typical or common model for the contents and organization—many others are possible.

Introduction. Plan the introduction to your instructions carefully. Make sure it does any of the following things (but not necessarily in this order) that apply to your particular instructions:

- Indicate the specific tasks or procedure to be explained as well as the scope of coverage (what *won't* be covered).
- Indicate what the audience needs in terms of knowledge and background to understand the instructions.
- Give a general idea of the procedure and what it accomplishes.
- Indicate the conditions when these instructions should (or should not) be used.
- Give an overview of the contents of the instructions.

See the section on introductions for further discussion.

General warning, caution, danger notices. Instructions often must alert readers to the possibility of ruining their equipment, screwing up the procedure, and hurting themselves. Also, instructions must often emphasize key points or exceptions. For these situations, you use special notices—note, warning, caution, and danger notices. Notice how these special notices are used in the example instructions listed above.

Technical background or theory. At the beginning of certain kinds of instructions (after the introduction, of course), you may need a discussion of background related to the procedure. For certain instructions, this background is critical—otherwise, the steps in the procedure make no sense. For example, you may have had some experience with those software applets in which you define your own colors by nudging red, green, and blue slider bars around. To really understand what you're doing, you need to have some background on color. Similarly, you can imagine that, for certain instructions using cameras, some theory might be needed as well.

Equipment and supplies. Notice that most instructions include a list of the things you need to gather before you start the procedure. This includes *equipment*, the tools you use in the procedure (such as mixing bowls, spoons, bread pans, hammers, drills, and saws) and *supplies*, the things that are consumed in the procedure (such as wood, paint, oil, flour, and nails). In instructions, these typically are listed either in a simple vertical list or in a two-column list. Use the two-column list if you need to add some specifications to some or all of the items—for example, brand names, sizes, amounts, types, model numbers, and so on.

Discussion of the steps. When you get to the actual writing of the steps, there are several things to keep in mind: (1) the structure and format of those steps, (2) supplementary information that might be needed, and (3) the point of view and general writing style.

*Structure and format*. Normally, we imagine a set of instructions as being formatted as vertical numbered lists. And most are in fact. Normally, you format your actual step-by-step instructions this way. There are some variations, however, as well as some other considerations:

- *Fixed-order steps* are steps that must be performed in the order presented. For example, if you are changing the oil in a car, draining the oil is a step that *must* come before putting the new oil. These are numbered lists (usually, vertical numbered lists).
- *Variable-order steps* are steps that can be performed in practically any order. Good examples are those troubleshooting guides that tell you to check this, check that where you are trying to fix something. You can do these kinds of steps in practically any

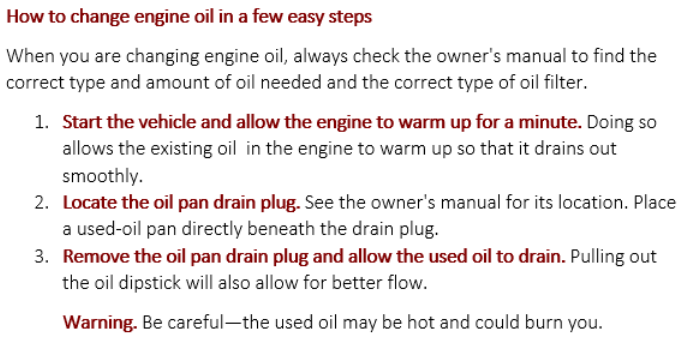
order. With this type, the bulleted list is the appropriate format.

- *Alternate steps* are those in which two or more ways to accomplish the same thing are presented. Alternate steps are also used when various conditions might exist. Use bulleted lists with this type, with OR inserted between the alternatives, or the lead-in indicating that alternatives are about to be presented.
- *Nested steps*. In some cases, individual steps within a procedure can be rather complex in their own right and need to be broken down into substeps. In this case, you indent further and sequence the substeps as a, b, c, and so on.
- *"Stepless" instructions*. And finally there exist instructions that really cannot use numbered vertical list and that do little if any straightforward instructional-style directing of the reader. Some situations must be so generalized or so variable that steps cannot be stated.

See the chapter on lists for the style and format of these possibilities.

*Supplementary discussion*. Often, it is not enough simply to tell readers to do this or to do that. They need additional explanatory information such as how the thing should look before and after the step; why they should care about doing this step; what mechanical principle is behind what they are doing; even more micro-level explanation of the step—discussion of the specific actions that make up the step.

The problem with supplementary discussion, however, is that it can hide the actual step. You want the actual step—the specific actions the reader is to take—to stand out. You don't want it all buried in a heap of words. There are at least two techniques to avoid this problem: you can split the instruction from the supplement into separate paragraphs; or you can bold the instruction.



**How to change engine oil in a few easy steps**

When you are changing engine oil, always check the owner's manual to find the correct type and amount of oil needed and the correct type of oil filter.

1. **Start the vehicle and allow the engine to warm up for a minute.** Doing so allows the existing oil in the engine to warm up so that it drains out smoothly.
2. **Locate the oil pan drain plug.** See the owner's manual for its location. Place a used-oil pan directly beneath the drain plug.
3. **Remove the oil pan drain plug and allow the used oil to drain.** Pulling out the oil dipstick will also allow for better flow.

   **Warning.** Be careful—the used oil may be hot and could burn you.

*Bolding actual user steps in instructions*. Bold text helps distinguish the actual action from the supplementary information.

Avoid telegraphic writing—omitting "understood" articles (the, a, an). True, robots write that way, but we don't have to.)

*Writing style*. The way you actually write instructions, sentence by sentence, may seem contradictory to what previous writing classes have taught you. However, notice how "real-world" instructions are written—they use a lot of imperative (command, or direct-address) kinds of writing; they use a lot of "you." That's entirely appropriate. You want to get in your reader's face, get her or his full attention. For that reason, instruction-style sentences sound like these: "Now, press the Pause button on the front panel to stop the display temporarily" and "You should be careful not to ..."

A particular problem involves use of the passive voice in instructions. For some weird reason, some instructions sound like this: "The Pause button should be depressed in order to stop the display temporarily." Not only are we worried about the Pause button's mental health, but we wonder who's supposed to depress the thing (are you talkin' to me?). Or consider this example: "The Timer button is then set to 3:00." Again, as the person following these instructions, you might miss this; you might think it is simply a reference to some existing state, or you might wonder, "Are they talking to me?" Almost as bad is using the third person: "The user should then press the Pause button." Again, it's the old double-take: you look around the room and wonder, "Who me?" (For more detail, see passive-voice problem.)

Another of the typical problems with writing style in instructions is that people seem to want to leave out articles: "Press Pause button on front panel to stop display of information temporarily" or "Earthperson, please provide address of nearest pizza restaurant." Why do we do this? Do we all secretly want to be robots? Anyway, be sure to include all articles (*a*, *an*, *the*) and other such words that we'd normally use in instructions.

## Graphics in Instructions

Probably more so than in any other form of writing (except maybe for comic books), graphics are crucial to instructions. Sometimes, words simply cannot explain the step. Illustrations are often critical to readers' ability to visualize what they are supposed to do.

In a technical writing course, instructions may require you to include illustrations or other kinds of graphics—whatever would normally be used in the instructions. The problem of course may be that you don't have access to graphics that would be suitable for your particular instructions, and that you don't feel wildly confident in your artistic abilities. There are ways to overcome these problems! Take a look at the suggestions in graphics. In that chapter, you'll see not only suggestions for creating graphics, but also requirements on their format.

## Format in Instructions

Headings. In your instructions, make good use of headings. Normally, you'd want headings for any background section you might have, the equipment and supplies section, a general heading for the actual instructions section, and subheadings for the individual tasks or phases within that section. Take a look at the examples at the beginning of this chapter. See headings for common requirements.

Lists. Similarly, instructions typically make heavy use of lists, particularly numbered vertical lists for the actual step-by-step explanations. Simple vertical lists or two-column lists are usually good for the equipment and supplies section. In-sentence lists are good whenever you give an overview of things to come. See lists for common requirements.

Special notices. In instructions, you must alert readers to possibilities in which they may damage their equipment, waste supplies, cause the entire procedure to fail, injure themselves or others—even seriously or fatally. Companies have been sued for lack of these special notices, for poorly written special notices, or for special notices that were out of place. See special notices for a complete discussion of the proper use of these special notices as well as their format and placement within instructions.

**Replace the Guitar Neck**

If you've followed the previous steps, your fretboard is now scalloped. The only thing left to do is put your guitar back together. To put it back together, follow these steps:

1. Remove the tape from the frets.
2. Insert the neck back into the body.
3. Put the metal panel back in its place and put in the screws.

   *Note:* Make sure that you put each screw firmly back in place. The screws keep the neck secure inside the body. If the screws are not installed correctly, the guitar could develop intonation problems.
4. Restring the guitar.

**Mounting the NID.** Follow these instructions to mount the network interface device (NID) on the wall:

*Warning:* Always wear safety glasses when using hand tools. Misuse of the tool or ricochet from power tools can result in eye injury.

1. Select the location for the NID. This should be close to an electrical ground and located in a place where the ISP's wire will reach the NID. The electrical ground can be identified as a copper wire coming from the electric company's equipment on the exterior of your home.
2. Drill the NID into place using the screws. You will need to drill screws into the slots on the top and bottom of the NID.

*Indentation of notices in instructions.* In the first example, notice how the notice is indented to the *text* of the preceding step. In the second example, notice that the severe notice is placed at the beginning before any of the steps.

Number, abbreviations, and symbols. Instructions also use plenty of numbers, abbreviations, and symbols. For guidelines on these areas.

## Revision Checklist for Instructions

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

- Make sure you provide real instructions—explanations of how to build, operate, or repair something.
- Write a good introduction—in it, indicate the exact procedure to be explained, indicate audience requirements, and provide an overview of contents.
- Make sure that you use the various types of lists wherever appropriate. In particular, use numbered vertical lists for sequential steps.
- Use headings to mark off all the main sections and subheadings for subsections. (Remember that no heading "Introduction" is needed between the title and the first paragraph. Remember not to use first-level headings in this assignment; start with the second level.)
- Use special notices as appropriate.
- Make sure you use the style and format for all headings, lists, special notices, and graphics as presented in these chapters. If that's a problem, get in touch with your instructor.
- Use graphics to illustrate any key actions or objects.
- Provide additional supplementary explanation of the steps as necessary.
- Remember to create a section listing equipment and supplies, if necessary.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 2.7: Technical reports

## Provide a structure and design that is expected

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 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.

Be sure and see the example reports.

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 either attached to the outside of the report with a paper clip or is bound within the report. 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.

Alan Chekhov
1203 Wood Dr
Hero, TX 7800
(512)000-000

10/31/2023

Senator David McMurrey, Chair
Texas Legislative Council
Robert E. Johnson Building
1501 N. Congress Ave.
Austin, Texas 78701

**SUBJ**: Proposal to legalize recreational use of psilocybin mushrooms in the state of Texas.

This proposal will outline the benefits of psilocybin mushrooms in relation to mental health, economic benefits, and the reduction of criminalization. Included will be an outline, a timeframe of completion, references from cities of the United States that have legalized recreational use, references from countries that have legalized recreational use, and charts.

Thank you for your examination of this proposal. I may be reached anytime between 8:00 a.m.-10:00 p.m. at (512) 000-0000.

Sincerely,

Alan Chekhov
Enclosure

In the example of the transmittal letter in the following, notice the standard business-letter format. 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**. 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 another paragraph, listing questions you'd like readers to consider as they review the report.

## Cover and Label

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:

- Totally unacceptable are the clear (or colored) plastic slip cases with the plastic sleeve on the left edge. These are like something out of freshman English; plus they are aggravating to use—readers must struggle to keep them open and hassle with the static electricity they generate.
- Marginally acceptable are the covers for which you punch holes in the pages, load the pages, and bend down the brads. If you use this type, leave an extra half-inch margin on the left edge so that readers don't have to pry the pages apart. Of course, this

type of cover prevents pages from lying flat: readers must grab available objects or use various body parts to keep the pages weighted down.

- By far the best covers are those that allow reports to lie open by themselves (see the illustration in the next section). What a great relief for a report to lie open in your lap or on your desk. This type uses a plastic spiral for the binding and thick, card-stock paper for the covers. Check with your local copy shop for these types of bindings; they are inexpensive and add to the professionalism of your work. See the simulated example of a plastic spiral bnding in the following.

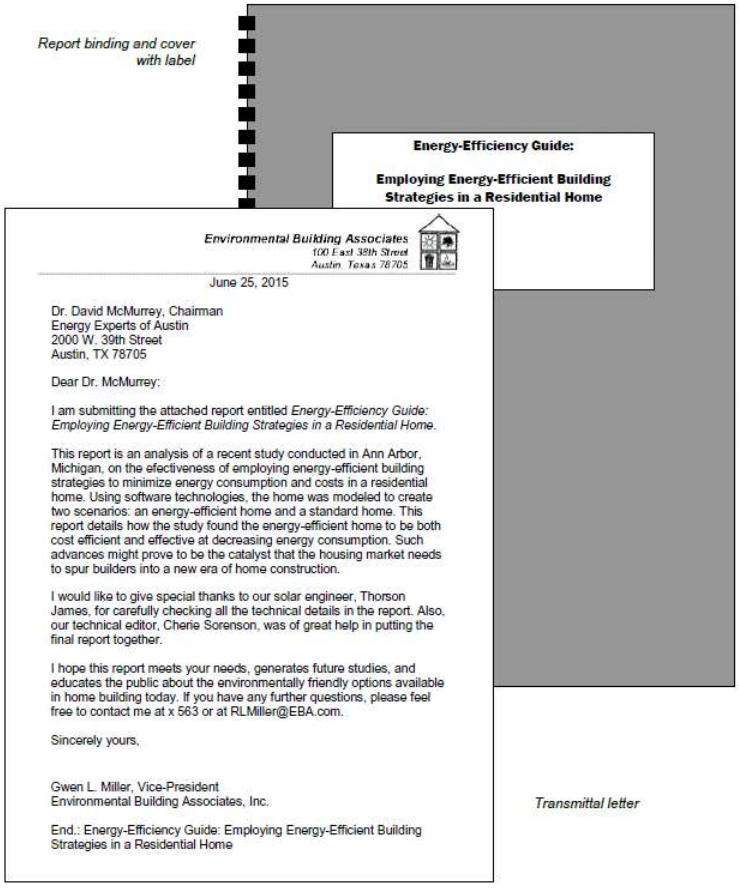
Generally less preferable are loose-leaf notebooks, or ring binders. These are too bulky for short reports, and the page holes tend to tear. Of course, the ring binder makes changing pages easy; if that's how your report will be used, then it's a good choice. At the "high end" are the overly fancy covers with their leatherette look and gold-colored trim. Avoid them—keep it plain, simple, and functional.

## 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.

Not much goes on the label: the report title, your name, your organization's name, a report tracking number, and a date. There are no standard requirements for the label, although your company or organization should have its own requirements. (An example of a report label is shown below.)

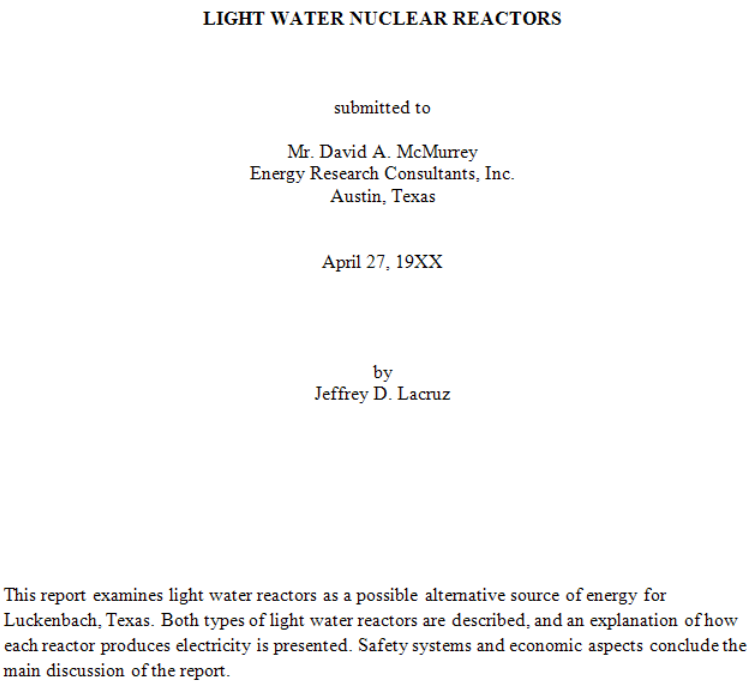



*Transmittal letter and report cover (with cover label).*

## Abstract and Executive Summary

Most technical reports contain at least one abstract—sometimes two, in which case the abstracts play different roles. Abstracts summarize the contents of a report, but the different types do so in different ways:

- **Descriptive abstract**. This type provides an overview of the purpose and contents of the report. In some report designs, the descriptive abstract is placed at the bottom of the title page, as shown in the following:



LIGHT WATER NUCLEAR REACTORS

submitted to

Mr. David A. McMurrey
Energy Research Consultants, Inc.
Austin, Texas

April 27, 19XX

by
Jeffrey D. Lacruz

This report examines light water reactors as a possible alternative source of energy for Luckenbach, Texas. Both types of light water reactors are described, and an explanation of how each reactor produces electricity is presented. Safety systems and economic aspects conclude the main discussion of the report.

*Descriptive abstract*. Traditionally, it is placed on the title page (not the cover page).

- **Executive summary**. Another common type is the executive summary, which also summarizes the key facts and conclusions contained in the report. See the example shown in the following. 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. Typically, executive summaries are one-tenth to one-twentieth the length of reports ten to fifty pages long. For longer reports, ones over fifty pages, the executive summary should not go over two pages. The point of the executive summary is to provide a summary of the report —something that can be read quickly.

If the executive summary, introduction, and transmittal letter 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 some duplication so that readers will be sure to see the important information no matter where they dip into the report.

## Table of Contents

You're familiar with tables of contents (TOC) but may never have stopped to look at their design. The TOC shows readers what topics are covered in the report, how those topics are discussed (the subtopics), and on which page numbers those sections and subsections start.

In creating a TOC, you have a number of design decisions:

- **Levels of headings to include**. In longer reports, consider including only the top two levels of headings. This keeps the TOC from becoming long and unwieldy. The TOC should provide an at-a-glance way of finding information in the report quickly.
- **Indentation, spacing, and capitalization**. Notice in the illustration below that items in each of the three levels of headings are aligned with each other. Although you can't see it in the illustration, page numbers are right-aligned with each other. Notice also the capitalization: Main chapters or sections are all caps; first-level headings use initial caps on each main word; lower-level sections use initial caps on the first word only.
- **Vertical spacing**. Notice that the first-level sections have extra space above and below, which increases readability.

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 change the TOC accordingly. See the example of a table of contents:

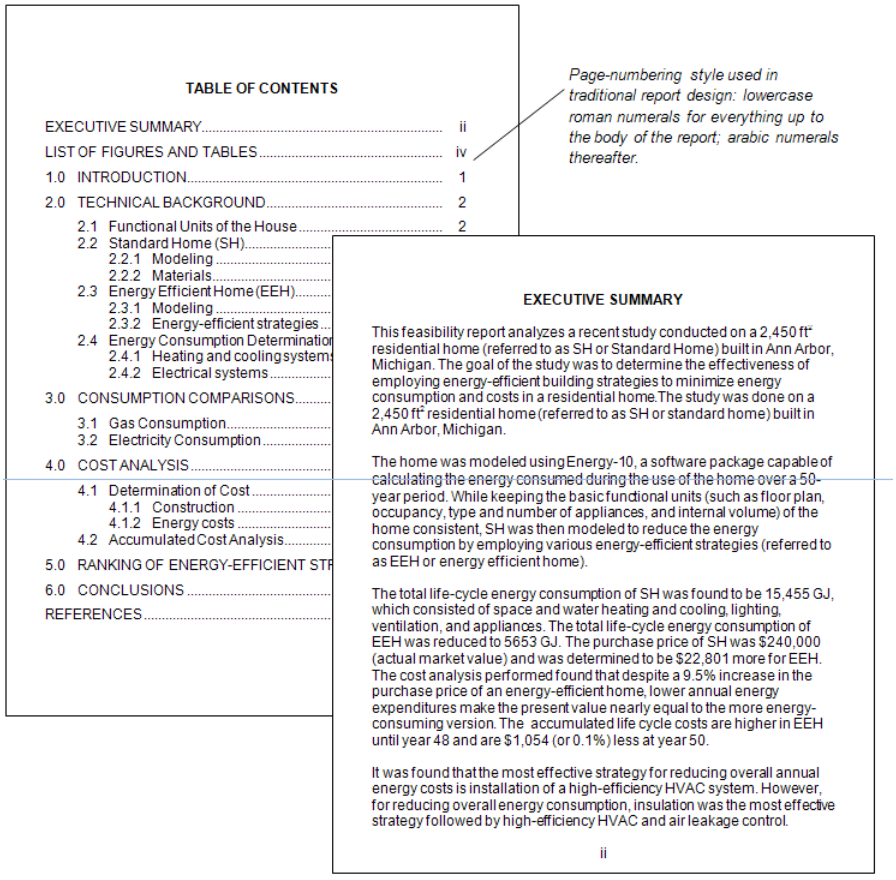



*Table of contents (which comes first) then the executive summary*. This TOC uses decimal-numbering style for the chapter and section numbers, which is common in reports. Others in this book use the uppercase roman-numeral style for the top-level chapters only (see DVD report).

## List of Figures and Tables

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

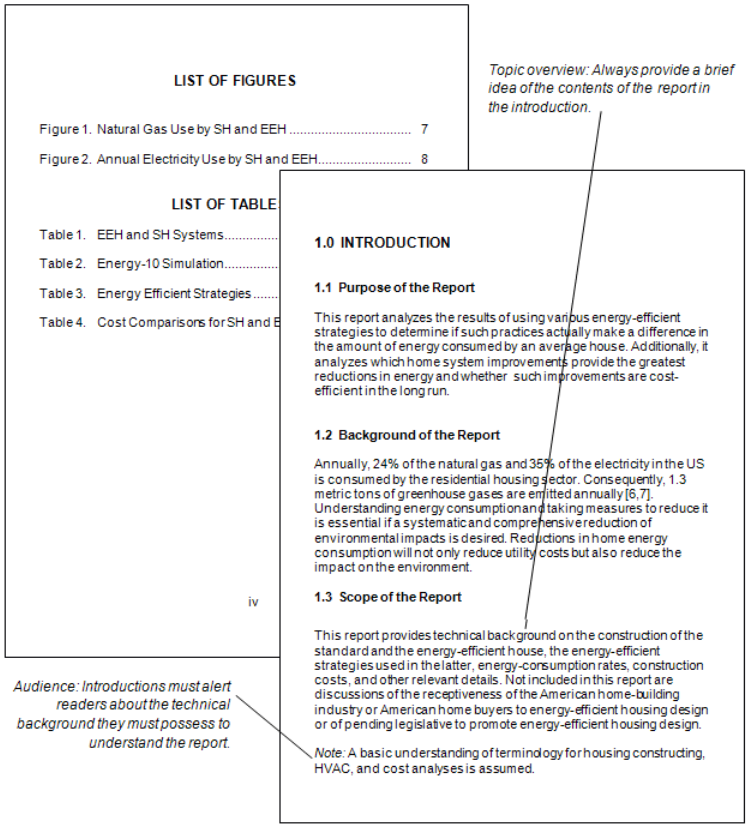
Complications arise when you have both tables and figures. Strictly speaking, figures are illustrations, drawings, photographs, graphs, and charts. Tables are rows and columns of words and numbers; they are not considered figures.

For longer reports that contain dozens of figures and tables each, create separate lists of figures and tables. Put them together on the same page if they fit, as shown in the illustration below. You can combine the two lists under the heading, "List of Figures and Tables," and identify the items as figure or table as is done in the illustration below.

## Introduction

An essential element of any report is its introduction—make sure you are clear on its real purpose and contents. In a technical report, the introduction prepares the reader to read the main body of the report. See introductions for a discussion of writing introductions.

See this example of an introduction:




*List of figures and tables followed by the introduction*. If there are no tables, make it "List of Figures." In a technical writing course, ask your instructor if the decimal-numbering style for headings is required.

## Body of the report

The body of the report is of course the main text of the report, the sections between the introduction and conclusion. Illustrated below are sample pages.

### 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. See headings for guidelines on headings.

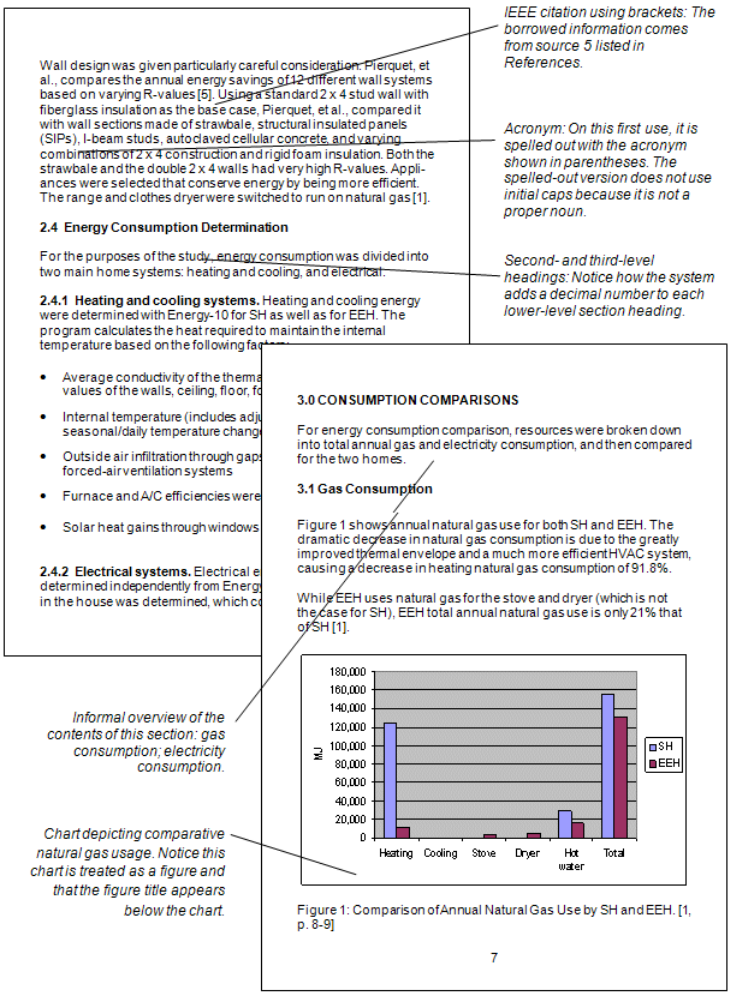
### Bulleted and Numbered Lists

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. See lists for guidelines on lists.

### 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 about writing out all numbers below 10 does not always apply

in technical reports. (See numbers vs words for guidelines.)




*Excerpt from the body of a technical report*. In a technical writing course, ask your instructor if the decimal-numbering style for headings is required. Also, a different documentation system may be required—not the IEEE, which is for engineers.

## Graphics and Figure Titles

In 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. For strategies for adding graphics to reports, see graphics. For strategies for adding tables to reports, see tables.

## 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, they can point readers from the discussion of a mechanism to an illustration of it. They can point readers to an appendix where background on a topic is given (background that just does not fit in the text). And they can point readers outside your report to other information—to articles, reports, and books that contain information related to yours. When you create cross-references, follow these guidelines presented in cross-references.

## Conclusions

For most reports, you'll need to include a final section. When you plan the final section of your report, think about the functions it can perform in relation to the rest of the report. Ideas for final sections are presented in conclusions.

## Appendixes

Appendixes are those extra sections following the conclusion. What do you put in appendixes?—anything that does not comfortably fit in the main part of the report but cannot be left out of the report altogether. The appendix is commonly used for 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 body of the report. Anything that you feel is too large for the main part of the report or that you think would be distracting and interrupt the flow of the report is a good candidate for an appendix. Notice that each one is given a letter (A, B, C, and so on).

## Information Sources

Documenting your information sources is all about establishing, maintaining, and protecting your credibility in the profession. You must cite ("document") borrowed information regardless of the shape or form in which you present it. Whether you directly quote it, paraphrase it, or summarize it—it's still borrowed information. Whether it comes from a book, article, a diagram, a table, a web page, a product brochure, an expert whom you interview in person—it's still borrowed information.

Documentation systems vary according to professionals and fields. Engineers use the IEEE system, examples of which are shown throughout this chapter. Another commonly used documentation system is provided by the American Psychological Association (APA). See documentation for details.

## Page Numbering

Page-numbering style used in traditional report design differs from contemporary report design primarily in the former's use of lowercase roman numerals in front matter (everything before the introduction).

- All pages in the report (within but excluding the front and back covers) are numbered; but on some pages, the numbers are not displayed.
- In the contemporary design, all pages throughout the document use arabic numerals; in the traditional design, all pages before the introduction (first page of the body of the report) use lowercase roman numerals.
- On special pages, such as the title page and page one of the introduction, page numbers are not displayed.
- Page numbers can be placed in one of several areas on the page. Usually, the best and easiest choice is to place page numbers at the bottom center of the page (remember to hide them on special pages).
- If you place page numbers at the top of the page, you must hide them on chapter or section openers where a heading or title is at the top of the page.

**Note**: 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). Similarly, tables and figures would use this numbering style. This style eases the process of adding and deleting pages.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 2.8: User guides

## Tell em how to build it, operate it, fix it!

A *user guide* is essentially a book-length document containing instructions on installing, using, or troubleshooting a hardware or software product. A user guide can be very brief—for example, only 10 or 20 pages or it can be a full-length book of 200 pages or more. While this definition assumes computers, a user guide can provide operating instructions on practically anything—lawnmowers, microwave ovens, dishwashers, and so on.

The more complex the product, the greater the page count. When this happens, some elements of the user guide get split out into their own separate volumes—especially the installation procedures, troubleshooting procedures, and the commands. A user guide can even contain a brief tutorial—for example, getting users started using the product—but if there is too much tutorial, it too goes into a separate book.

See examples of user guides.

## Style and Format for User Guides

A user guide is a combination of many things presented in this online textbook. At its core is instruction writing; you need to be good at the writing style, headings, lists, notices, highlighting, tables, graphics commonly used in instructions. (For an overview of these elements, see the page-design chapter in this online textbook.) As a set of instructions, a user guide should use the style and format that is presented elsewhere in this online textbook:

- **Headings.** Use headings to mark off key contents of the information so that readers can find it quickly. See the chapter on headings for details on planning and designing headings.
- **Lists.** Use numbered and bulleted lists to help readers scan information quickly. See the chapter on lists for details on planning and designing lists.
- **Special notices.** Use special notices such as warnings, cautions, and notes to alert readers to potential problems or emphasize special points. See the chapter on notices for details on planning and designing notices.
- **Instructional design.** In general, use the standard design of instructions; primarily, this means task-oriented headings and sections and numbered vertical lists for actual steps that readers are to perform. See the chapter on instructions for details on planning and designing instructions.

Instructions—and therefore user guides—also make abundant use of:

- **Graphics.** Show readers key components of the objects they will be working with, before and after views, and illustrations of key actions that readers must perform. See the chapter on graphics for details on planning and designing graphics.
- **Tables.** Provide statistical information and other such details in easy-to-access table form. In user guides, tables are particularly useful whenever reference-type information must be presented. See the chapter on tables for details on planning and designing tables.
- **Highlighting.** Use a consistent and standard scheme of highlighting (bold, italics, alternate fonts, color, caps, and so on). See the chapter on highlighting for details on planning and designing highlighting guidelines.

## Components of User Guides

As a *book*, a user guide must have some combination of the standard book-design components such as the following:

- Front and back covers
- Title page
- Edition notice
- Trademarks
- Disclaimers
- Warranties
- License agreements
- Safety notices
- Preface

- Appendixes
- Glossary
- Index
- Reader-comment form

There is no standard combination or sequence of these elements; every company does it differently. Details on the contents, format, and design of these elements can be found in the book-design chapter.

## Information Included in User Guides

Here's review the common contents of user guides:

- **Instructions.** The most obvious are those step-by-step directions on how to assemble, operate, or troubleshoot the product. Instructions in user guide should generally be *task-oriented*—that is, written for specific tasks that users must perform. Instructions should generally use *vertical numbered lists* for actions that must be performed in a required sequence. Similar or closely related instructions in user guides should be grouped into chapters.
- **Precautionary information.** You'll see notes, warning, caution, and even danger notices in user guides. These represent liability concerns for the manufacturer of the product.
- **Reference information.** User guides typically contain plenty of reference information, but only up to a certain point. For example, if there are numerous commands, a separate book for commands is necessary. Reference information in user guides is often presented in tables: columnar lists of settings, descriptions, variables, parameters, flags, and so on.
- **Getting-started information.** Some user guides will actually include brief tutorials that will help new users get acquainted with using the product.
- **About the product.** User guides also provide some description of the product, a review of its essential features or its new features. Sometimes this information also gets put into a separate volume, if it is extensive. Typically, the volume will be called something like "Introducing New Product...."
- **Technical background.** Sometimes, users guides will include technical explanations of how the product works, what physical or chemical principles are essential to its operation, and so on. For example, you will see considerable background in user guides for graphic or audio programs—you can't operate them without understanding the concepts of brightness, saturation, and hue; μ law, A law, and other such.

## Descriptive Examples of User Guides

Consider these examples.

Note: Not all of the following styles and formats are not necessarily recommended. Get in touch using the e-mail address at the bottom of this page if you have questions.

**Delarina WinFax LITE User's Guide.** This book is 5.5 × 8.5 inches and under 150 pages. It uses by-chapter pagination, with new chapters and sections beginning on a righthand page.

- **Covers:** On the front cover, you see the full book title, a version number, the company name with its logo, and warning that the book is not for retail sale. The back cover contains advertising material—rather atypical for user guides—on the product's best features, special offers on the full version, a 1-800 number to call, and the book number.
- **Title page:** The first page inside this user guide is the title page, which includes the product name, the book title, the book edition number, the date of the edition, the company logo (which includes its name), several addresses for the company, and the not-for-retail-sale warning. The company name has a registered trademark symbol beside it; the product name has the trademark letters beside it. No trademark symbols are shown on the front or back covers. A greener approach is to omit the title page, since it is practically a duplicate of the front cover, and put the edition notice on the back of the front cover.
- **Edition notice:** On the back of the title page is the edition notice. This edition notice includes the book title, a copyright notice, legal statements concerning copying the book, list of trademarked product names occurring in the book, and the document number.
- **License agreement:** On the next page is the software agreement, a two-page thing that outlines permitted uses of the software and related warranties.
- **Table of contents:** The TOC begins on a right-hand page numbered "i" and lists up to level of headings within the chapters.

- **Headers and footers:** The book title is used for both the left and right footers: on the left page, the title is right-aligned; on the right page, the title is left-aligned. The page number appears opposite of both footers, and a solid ruled line is placed just above both footers. The chapter title is used for the inside header on each page; the current heading is used for the outside header on each page. A solid ruled line is placed just beneath these headers.
- **Preface:** The overview which is treated as chapter 1. It contains some promotion of the product, a diagram of the product's many uses, hardware and software requirements on its use, an overview of the manual contents, and instructions on how to get help.
- **Body chapters:** Chapters use the following design features:

    - Chapter title—Large bold Arial letters with the chapter title on the left margin and the chapter number on the right and a double ruled line below.
    - Headings—First-level headings are about 1 point smaller than chapter titles, left aligned, with a solid ruled line just below. Second-level headings are about 2 points smaller, left aligned, with no ruled line. Third-level headings are the same size as body text but use bold italic Arial and are placed on the left margin.
    - Text—Body text is a serif font about 10 points in size. This manual does not use hanging-head format; run-over text extends to the same left margin as do headings.
    - Graphics—Numerous screen captures are used through the book; they are all centered.
    - Lists—Numbered lists are used for items in sequence such as steps. Open squares are used for bulleted items that have a subhead. Otherwise standard filled disks are used as bullets.
    - Highlighting—Text that users must type uses a sans serif type (probably Arial) as do screen buttons, options, field names, and system messages. Bold is used for simple emphasis.
    - Notices—Only notes and hints are used. The word "Note:" or "Hint" uses bold-italics. The text of the notice is regular body font indented an inch.
    - Appendixes—The book ends with two appendixes: Appendix A addresses common problems with a situation–solution format; Appendix B addresses fonts. These pages are numbered A–1, A–2, . . . B–1, B–2, and so on.
    - Index—The book ends with a 10-page index whose page are numbered with lowercase roman numerals starting at i. The index uses the standard but does something unusual with entries. It uses a table-of-contents format for the entries and their page references, connecting them with the sort of leader dots you'd see in TOCs.

**IBM Aptiva Reference Guide.** This book is also 8.5 × 5.5 inches. It is uses consecutive page numbering throughout the book and is about 120 pages long.

- **Covers:** The front cover has a graphic design with stylized numbered 1, 2, and 3 along with large grid pattern and various sorts of shading. The three elements of the book title are placed at the top, upper third and bottom of the area, respectively. You also see the words "information," "getting help," and "troubleshooting" which seems to float between the second and third title elements, giving readers a more detailed sense of the book's contents. The back cover continues the grid pattern and includes the IBM logo with the part number of the book, its print date, a statement that the book was printed in the "USA" and a bar code for the book number.
- **Title page:** This page contains the words "Aptiva Reference Guide" in large serif letter in the upper right of the page—and that's it!
- **Edition notice:** The edition notice occurs on the back of the title page. It is pushed to the bottom of the page and uses a smaller type size, probably 7-point, for its body text. The heading for the edition notice is the edition number followed by the month and year of the edition. The paragraphs of the edition notice states that the book is provided "as is" without any warranty, that the book is for multiple models of the product and that portions of it may not refer to the reader's own particular model. Also included are an address where comments can be sent, a 1-800 number to request additional copies, and the standard copyright line.
- **Table of contents:** The TOC is an unusual design in which all entries are left aligned in the center of the page, with the page numbers to the left about an inch. First-level entries use bold. TOC begins on page iii.
- **Notices section:** The first body section of this manual is for notices—specifically, trademarks, highlighting conventions used in the book, safety notices, and regulatory (communications) notices. The section begins with its own title page on which is

displayed the word "Notices" in a large serif font in the upper right corner and with a grid and shading design similar to that on the front cover. The text of the notices section begins on a right-hand page as does the chapter title page.

- **Body text:** Here are the key design features of the body text:

  - Text—Text for this book is indented nearly 2 inches. Body text is a rather small sans serif font, probably Helvetica, probably 9 or 10 points. The hanging-head format is used.
  - Headings—First-level headings align to to the far left margin, use a blocky bold sans serif font with a solid ruled line above. Chapter titles use a large gray serif font in the upper right corner of the first page of the chapter. Second-level heading align with body text, use sentence-style caps (as do first-level headings) and use the same font as do first-level headings but about 2 points smaller.
  - Highlighting—In stepwise instructions, the following elements are bold: buttons, tabs, menu options, menu names, keyboard key names, icon names, parameter settings. Names of disks supplied with the product are in italics. System messages are in regular roman and double quotation marks.
  - Steps—Instructions sequences are introduced with a gerund-phrased heading in the bold font. Substeps or alternate subtasks use infinitive phrasing with the same font but smaller and are punctuated with a colon. Actual steps use a number in the same smaller font without a period.

- **Headers and footers:** Only footers are used. Bold page numbers (using the same font as the first-level heading but much smaller) are on the outside; the current heading, not chapter title, is centered and in a serif italics font using sentence-style caps.
- **Special notices:** This book uses a light gray box with a white checkmark in it to call attention to special notices. The text of the special notices is the same as the footers: small italic serif font. Usually, the checkmark box is located on the far left margin and the notice text is aligned to the normal body text. Where possible, the checkmark box and the notice text are in the open area between the far left margin and the body text.
- **Troubleshooting section:** The body of this section begins with a flowchart that must be meant to orient a user to the overall process of troubleshooting and to the different troubleshooting resources available. The next section consists of common questions with actions to take depending on yes or no answers. The text of the actions is bulleted or numbered depending on the content and contains cross-references to other areas of the troubleshooting information. The next section is designed in two columns, the left column with the heading "If the problem is..." and the right column with the heading "Here's what to do..." The problem statement in the left column is in bold. the next section is similar except that it lists error codes that are displayed on the computer and actions to take.
- **Index:** The book has a 6-page index formatted in 3 column. Two levels of index entries are used. The page references are set about a half inch away from the text entries.

## Process and Internal Documents for User Guides

An important part of user guides—in fact, of almost any technical document—is the process that produces it:

1. **Initial planning.** Early planning on a user guide involves *needs assessment* (is any documentation needed at all?), *audience analysis* (who will be using the user guide; what are their needs?), *task analysis* (what will users use the product for; what are their common tasks?), *library plan* (what books and media, in addition to a user guide, are needed to support the product?), and so on.
2. **Documentation proposal.** If you are working freelance or as part of an independent documentation firm, you may have to write a documentation proposal in an effort to win a contract to do a certain technical documentation project.
3. **Documentation plan.** User guides need documentation plans, which are internal supporting documents that specify content, audience, design, format, production team members, schedule, and other such information about a documentation project and its "deliverables." The documentation plan resembles the documentation proposal in certain ways, but the plan represents an established plan agreed upon by everybody involved in the production process (and that means both the user guide and the product it documents).
4. **Prototype and specifications.** Important planning tools, which also serve as useful reference tools during a documentation project, include the prototype of the user guide and the specifications for the user guide. The *prototype* is a dummy version of the book with all planned components of the book (see the list on book-design components) and all planned elements (see the list under format and style). However, the prototype uses "greeked" text (also known as Lorem ipsum like the following, instead

of real text:

> Lorem ipsum dolor sit amet, consectetuer adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore magna aliquam erat volutpat. Ut wisi enim ad minim veniam, quis nostrud exerci tation ullam corper suscipit lobortis nisl ut aliquip ex ea commodo consequat. Duis autem vel eum iriure dolor in hendrerit in vulputate velit esse molestie consequat, vel illum dolore eu feugiat nulla facilisis at vero eros et accumsan.

Typically, the prototype of the user guide is very brief: it need include only as many pages as it takes to illustrate every unique textual component and textual element that will be used in the user guide.

*Specifications* are descriptions of a book design in table form. Specifications describe every unique component or element of a book, so that it can be recreated by someone who might not have access to the electronic files, templates or styles of that book.

5. **Template and style catalog.** A well-designed user guide, and a well-designed process to produce that user guide, should include templates and style catalogs. A *template* is an electronic file that defines such aspects of the user guide as page size, headers and footers, page-numbering style, regular and special page layout, and other such detail.

   A *style catalog* is also an electronic thing that defines the format and style of textual elements such as headings, headers, footers, lists, paragraphs, tables, and so on. For example, a style for a "heading 1" might specify 24-point Arial bold with 24 picas above and 12 picas below. Styles help you create a user guide more efficiently; styles also help you maintain consistency in the format and style of that user guide.
6. **Multiple review drafts & sign-off.** A good process for the production of a user guide also includes several drafts that editors, technical experts, usability testers, and documentation team members can review and provide comments on. You as writer then implement those comments and produce a new draft for these same people to review again. When everybody is satisfied with the draft of the user guide (or worn out or out of time), they sign off on the user guide, and it can then go into "production," which means producing the finished bound copies or the PDF that is made available to users.

As you can see, a user guide brings together many of the topics covered in this online textbook. If you are taking a technical writing course, you probably cannot implement all these features and phases of a user guide. Get with your instructor to see which are required.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 2.9: Standard operational policies and procedures

## Tell 'em how to do it, how to behave.

This chapter introduces you to policies and procedure documents and to standard operating procedure documents. However, it does not provide definitive details on how to plan, write, format, and complete these documents. It does provide links to web pages that do, along with some advice on maintaining a reasonable scope for a policies and procedures project if you are in a technical or business writing course.

See these examples of policies and procedures.

## Standard Operating Policies and Procedures: Overview

Standard operating procedures and policy-and-procedure documents are roughly the same: they establish standards for doing things and present specific step-by-step procedures for doing those things. Although these distinctions blur in practice, a policy-and-procedure document focuses more often on behavior expected of employees (for example, policies and procedures on smoking, substance abuse, sexual harrassment). Standard operating procedures focus more standard expectations for performing specific procedures such as hand-washing by health care professionals or taking a dental implant in a dental lab.

Organizations use policies and procedures documents to record their rules and regulations: attendance policies, substance-abuse policies, work-flow procedures, and so on. Once recorded, the policies and procedures are there for everybody in the organization to refer to, and these documents become the means of settling most disputes within the organization. To distinguish between these two terms, policies are rule statements. *Policies* are like laws: for example, most organizations have antiharassment policies, which mimic actual government-legislated laws. *Procedures*, on the other hand, are the step-by-step methods of carrying out those policies. Of course, some policies do not require procedures. If the organization has a no-smoking policy, that's all that need be said. However, if someone breaks that policy, a procedure is needed for handling that situation.

## Standard Operating Policies and Procedures: Writing Projects

If you are enrolled in a course associated with this page, you are in a *writing* course, not a business management course. Our focus is on good writing, well-designed documents, documents that accomplish their purpose, and documents that meet common expectations as to their content, organization, and format. Standard operating procedure and policy-and-procedure documents are obviously an important application of writing and can contain substantial technical information about an organization's operations. But don't view this chapter as the last word on these topics.

## Standard Operating Policies and Procedures: Structure

As you can see from the two standard operating procedures and policy-and-procedure documents in the links above, there are some standard contents and format. Notice that:

- Decimal numbering system—This enables policies or procedures to be "cited." For example, if an employee smokes at a building entryway, you can cite admin policy 23.1.4 (or just give a warning and forget the whole thing this once).
- Heavy use of predicates and imperatives ("Establish" this, "promote" that).
- Distinction between policies and procedures in the hand-washing example. Policies tell employees what to do; procedures tell them exactly how to do it.
- Tracking numbers to enable ease of reference.
- Ownership and approval names are specified.
- Revision dates, to enable employees to know whether they are looking at the most current version.
- Definitions to establish the precise meanings of key terms.
- Use of "will" to indicate a requirement (older style uses "shall").

## Standard Operating Policies and Procedures: Resources

Here are some resources for standard operating procedures:

- How to Write Standard Operating Procedure (SOP)

- Policies and Procedures. From Wikipedia.
- Standard Operating Procedure. From Wikipedia.
- How to Write a Standard Operating Procedure. From wikiHOW.
- Standard Operating Procedures (SOP): What, Types and How to Write. Bit Tech Labs Inc
- How to Write Standard Operating Procedures. From NCSU.
- www.bizmanualz.com/blog/how-to-write-standard-operating-procedures-sop.html. Provided by bizmanualz.com.
- See one of these two examples in the online textbook: Welding and Brazing Cleaning Requirements.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 2.10: Recommendation and feasibility reports

## State and support your opinion...professionally

In this chapter, you study a loosely defined group of report types that provide a studied opinion or recommendation, and then, if you are in a technical writing course, you write one of your own.

Be sure to check out the example reports.

## Some Fine Distinctions...

The reports in this loosely defined category are variously called feasibility reports, recommendation reports, evaluation reports, assessment reports, and who knows what else. They all do roughly the same thing—provide carefully studied opinions and, sometimes, recommendations. There are some subtle differences among some these types, and there are absolutely no universally agreed-upon names for them:

- Feasibility report: This type studies a situation (for example, a problem or opportunity) and a plan for doing something about it and then determines whether that plan is "feasible"—whether it is practical in terms of current technology, economics, social needs, and so on. The feasibility report answers the question "Should we implement Plan X?" by stating "yes," "no," but more often "maybe." Not only does it give a recommendation, it also provides the data and the reasoning behind that recommendation. Here's a video on a feasibility study concerning the Missouri Hyperloop (opens in a separate browser).
- Recommendation report: This type starts from a stated need, a selection of choices, or both and then recommends one, some, or none. For example, a company might be looking at grammar-checking software and want a recommendation on which product is the best. As the report writer on this project, you could study the market for this type of application and recommend one particular product, a couple of products (differing perhaps in their strengths and their weaknesses), or none (maybe none of them are any good). The recommendation report answers the question "Which option should we choose?" (or in some cases "Which are the best options?) by recommending Product B, or maybe both Products B and C, or none of the products.
- Evaluation report: This type provides an opinion or judgment rather than a yes-no-maybe answer or a recommendation. It provides a studied opinion on the *value* or *worth* of something. For example, for over a year the city of Austin had free bus transportation in an attempt to increase ridership and reduce automobile traffic. Did it work? Was it worthwhile?—These are questions an evaluation report would attempt to answer. This type of report compares a thing to a set of requirements (or criteria) and determines how well it meets those requirements. (And of course there may be a recommendation—continue the project, scrap it, change it, or other possibilities.)

As you can see, these distinctions are rather fine; and they overlap. In real-world writing, these types often combine—you might see elements of the recommendation report combine with the feasibility report, for example. Of course, the writers of these reports don't care which type they are writing—and well they shouldn't! They're trying to get a job done.

## Typical Contents: Recommendation and Feasibility Reports

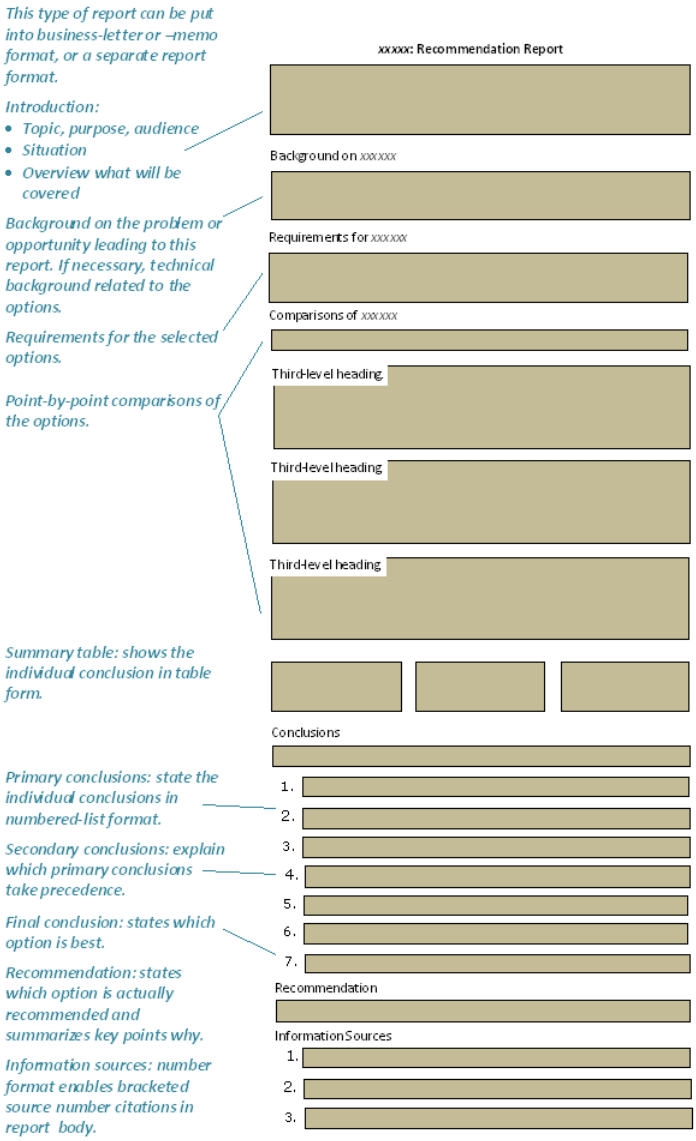
Whatever shade of feasibility or recommendation report you write, whatever name people call it—most of the sections and the organization of those sections are roughly the same.

The structural principle fundamental to this type of report is this: you provide not only your recommendation, choice, or judgment, but also the data and the conclusions leading up to it. That way, readers can check your findings, your logic, and your conclusions and come up with a completely different view. But, more likely, they will be convinced by all your careful research and documentation.

Introduction. In the introduction, indicate that the document that follows is a recommendation or feasibility report (or whatever it is called). Instead of calling the report by name (which might not mean anything to most readers), you can indicate its purpose. Also, provide an overview of the contents of the report.

For some of these reports, you'll also be able to discuss the situation and the requirements in the introductions. If there is little to say about them, you can merge them with the introduction, or make the introduction two paragraphs long.

Technical Background. Some recommendation or feasibility reports may require technical discussion in order to make the rest of the report meaningful. The dilemma with this kind of information is whether to put it in a section of its own or to fit it into the comparison sections where it is relevant. For example, a discussion of power and speed of tablet computers is going to necessitate some discussion of RAM, megahertz, and processors. Should you put that in a section that compares the tablets according to power and speed? Should you keep the comparison neat and clean, limited strictly to the comparison and the conclusion? Maybe all the technical background can be pitched in its own section—either toward the front of the report or in an appendix.




*Schematic view of recommendation and feasibility reports*. Remember that this is a typical or common model for the contents and organization.

Background on the Situation. For many of these reports, you'll need to discuss the problem, need, or opportunity that has brought them about. If there is little that needs to be said about it, this information can go in the introduction.

Requirements and Criteria. A critical part of feasibility and recommendation reports is the discussion of the requirements you'll use to reach the final decision or recommendation. Here are some examples:

- If you're trying to recommend a tablet computer for use by employees, your requirements are likely to involve size, cost, hard-disk storage, display quality, durability, and battery function.

- If you're looking into the feasibility of providing every student at Austin Community College with an ID on the ACC computer network, you'd need define the basic requirements of such a program—what it would be expected to accomplish, problems that it would have to avoid, and so on.
- If you're evaluating the recent program of free bus transportation in Austin, you'd need to know what was expected of the program and then compare its actual results to those requirements.

Requirements can be defined in several basic ways:

- *Numerical values*: Many requirements are stated as maximum or minimum numerical values. For example, there may be a cost requirement—the tablet should cost no more than $900.
- *Yes/no values*: Some requirements are simply a yes-no question. Does the tablet come equipped with Bluetooth? Is the car equipped with voice recognition?
- *Ratings values*: In some cases, key considerations cannot be handled either with numerical values or yes/no values. For example, your organization might want a tablet that has an ease-of-use rating of at least "good" by some nationally accepted ratings group. Or you may have to assign ratings yourself.

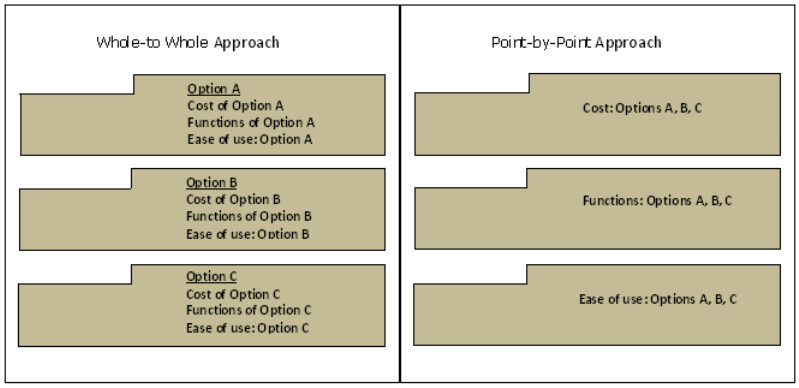
The term "requirements" is used here instead of "criteria." A certain amount of ambiguity hangs around the latter word; plus most people are not sure whether it is singular or plural. (Technically, it is plural; "criterion" is singular, although "criteria" is commonly used for both the singular and plural. Try using "criterion" in public—you'll get weird looks. "Criterias" is not a word and should never be used.)

The requirements section should also discuss how important the individual requirements are in relation to each other. Picture the typical situation where no one option is best in all categories of comparison. One option is cheaper; another has more functions; one has better ease-of-use ratings; another is known to be more durable. Set up your requirements so that they dictate a "winner" even in situations where there is no obvious winner.

Discussion of the Options. In certain kinds of feasibility or recommendation reports, you'll need to explain how you narrowed the field of choices down to the ones your report focuses on. Often, this follows right after the discussion of the requirements. Your basic requirements may well narrow the field down for you. But there may be other considerations that disqualify other options—explain these as well.

Additionally, you may need to provide brief descriptions of the options themselves. Don't get this mixed up with the comparison that comes up in the next section. In this description section, you provide a general discussion of the options so that readers will know something about them. The discussion at this stage is not comparative. It's just a general orientation to the options. In the tablets example, you might want to give some brief, general specifications on each model about to be compared.

Point-by-point Comparisons. One of the most important parts of a feasibility or recommendation report is the comparison of the options. Remember that you include this section so that readers can check your thinking and come up with different conclusions if they desire. This should be handled comparative point by comparative point, rather than option by option.




*Schematic view of the whole-to-whole and the point-by-point approaches to organizing a comparison.* Unless you have a very unusual topic, use the point-by-point approach.

If you were comparing tablets, you'd have a section that compared them on cost, another section that compared them on battery function, and so on. You *wouldn't* have a section that discussed everything about option A, another that discussed everything about option B, and so on. That would not be effective at all, because the comparisons must still be made somewhere—probably by the poor reader. (See above for a schematic illustration of these two approaches to comparisons.)

With the point-by-point approach, each of these comparative sections should end with a conclusion that states which option is the best choice in that particular point of comparison. Of course, it won't always be easy to state a clear winner—you may have to qualify the conclusions in various ways, providing multiple conclusions for different conditions.

**Note:** When would you ever use the whole-to-whole approach? It might be that the comparisons don't break down logically into points—categories. The options being compared might have different advantages and disadvantages that are not comparable. Two products being compared might have different but overlapping sets of features. So which do you prefer—an apple or an orange?

**Equipment price**. The price of the highest functioning portable satellite radio/MP3 player offered by XM was $399.99 for the Pioneer Inno [2]. The price for Sirius' highest functioning satellite radio/MP3 player was $259.99 for the Sirius S50 [3]. The price range for the XM plug-and-play radios is $49.99 to $119.99 [2]. The price range for Sirius plug-and-play radios is $39.99 to $124.99 [3]. In terms of equipment prices, both XM and Sirius offer similar products from high functioning to low functioning. Because Sirius only offers one portable/MP3 player, it holds a lower average price than XM. **XM has more options for the lower priced plug-and-play radios than Sirius does, so it holds a lower average price than Sirius.**

*Section devoted to just one point of comparison: equipment price*

*Both options compared on equipment price*

*Conclusion on this one point of comparison: equipment price*

*Individual comparative section*. Notice that this section compares only one point and ends with an overtly stated conclusion regarding that one point.

If you were doing an evaluation report, you obviously wouldn't be comparing options. Instead, you'd be comparing the thing being evaluated against the requirements placed upon it, the expectations people had of it. For example, Capital Metro had a program of more than a year of free bus transportation—what was expected of that program? did the program meet those expectations?

Summary table. After the individual comparisons, include a summary table that summarizes the conclusions from the comparison section. Some readers are prone to pay attention to details in a table rather than in paragraphs. That does not get you off the hook from writing the paragraphs!

**Table 1. Testing results of XM and Sirius Satellite Radio**

| Category | XM Satellite Radio | Sirius Satellite Radio |
|---|---|---|
| *Music channels* | 4 | 3 |
| *Sports channels* | 4 | 2.5 |
| *Talk & entertainment channels* | 3.5 | 4 |
| *Subscription price* | 4 | 3.5 |
| *Portable radio/Mp3 player price* | 2.5 | 3.5 |
| *Plug-and-Play radio price* | 4 | 2.5 |
| *Signal* | 3 | 4 |
| *Portable radio/Mp3 player features* | 4 | 4 |
| *Plug-and-Play radio features* | 3 | 4 |
| *TOTAL* | 32 | 31 |

*Note:* 1 – Poor, 2 – Good, 3 – Very Good, 4 – Excellent

*Summary table*. Some readers prefer table data to data contained in paragraphs.

Conclusions. The conclusions section of a feasibility or recommendation report is in part a summary or restatement of the conclusions you have already reached in the comparison sections. In this section, you restate the individual conclusions, for example, which model had the best price, which had the best battery function, and so on.

But this section has to go further. It must untangle all the conflicting conclusions and somehow reach the final conclusion, which is the one that states which is the best choice. Thus, the conclusion section first lists the *primary conclusions*—the simple, single-category ones. But then it must state *secondary conclusions*—the ones that balance conflicting primary conclusions. For example,

if one tablet is the least expensive but has poor battery function, but another is the most expensive and has good battery function, which do you choose, and why? The secondary conclusion would state the answer to this dilemma.

And of course, the conclusions section ends with the *final conclusion*—the one that states which option is the best choice.

Recommendation or Final Opinion. The final section of feasibility and recommendation reports states the recommendation. You'd think that that ought to be obvious by now. Ordinarily it is, but remember that some readers may skip right to the recommendation section and bypass all your hard work! Also, there will be some cases where there may be a best choice but you wouldn't want to recommend it. Early in their history, laptop computers were heavy and unreliable—there may have been one model that was better than the rest, but even it was not worth having.

The recommendation section should echo the most important conclusions leading to the recommendation and then state the recommendation emphatically. Ordinarily, you may need to recommend several options based on different possibilities. This can be handled, as shown in the examples, with bulleted lists.

**Summary**

The following is a summary of the comparisons of XM Satellite Radio and Sirius Satellite Radio:

1. XM and Sirius are the only two competitors when is comes to satellite radio.
2. XM has a higher total number of music and sports channels than Sirius.
3. XM has overall lower costs for monthly and yearly subscriptions than Sirius.
4. Sirius has the best signal and satellite coverage.
5. Although XM offers more than four portable satellite radios/MP3 players, they are all much higher priced than Sirius' one option.
6. The price range for the Sirius plug-and-play radios start lower than XM, but XM offers more options of lower priced plug-and-play radios than Sirius.
7. The features of the XM and Sirius portable radios/Mp3 players are all very similar, but the XM Pioneer Inno is the highest price option at $399.99.
8. The features of the XM and Sirius plug-and-play radios are also similar but the Sirius Streamer Replay is the best. It's also the same price as XM's highest priced radio—Delphi SKYFi2 at $119.99.
9. The best option for satellite radio is XM radio because it has more options to choose from at lower prices than Sirius.

*Primary conclusions*

*Secondary conclusions*

*Final conclusion*

*Primary, secondary, and final conclusions*. Notice that in conclusion 6 two categories of comparison are weighed against each other, with more options winning out over lower cost—a secondary conclusion.

In an evaluation report, this final section would state a final opinion or judgement. Here are some possibilities:

- Yes, the free-bus-transportation program was successful, or at least it was, based on its initial expectations.
- No, it was a miserable flop—it lived up to none of its minimal expectations.
- Or, it was both a success and a flop—it did live up to some of its expectations, but did not do so in others. But in this case you're still on the hook—what's your overall evaluation? Once again, the basis for that judgment has to be stated somewhere in the requirements section.

## Organizational Plans for Feasibility and Recommendation Reports

This is a good point to discuss the two basic organizational plans for this type of report:

- Traditional plan: This one corresponds to the order that the sections have just been presented in this chapter. You start with background and requirements, then move to comparisons, and end with conclusions and recommendations.
- Executive plan: This one moves the conclusions and recommendations to the front of the report and pitches the full discussion of background, requirements, and the comparisons into appendixes. That way, the "busy executive" can see the most important information right away, and turn to the detailed discussion only if there are questions.

| Executive Organization | Traditional Organization |
|---|---|
| **Introduction**<br>Factual Summary<br>Conclusions<br>Recommendations<br><br>**Appendixes**<br>**A. Shiner Facilty Background**<br>Energy consumption<br>Alternative fuel sources<br>**B. Existing Heating System**<br>Heat production<br>Fuel consumption and costs<br>Replacement costs<br>**C. Proposed Wood-Fired System**<br>Design Basis<br>System description<br>Boiler system<br>HVAC<br>Costs<br>Investment costs<br>Replacement costs<br>Operation and maintenance costs | Abstract<br>**I. Introduction**<br>**II. Shiner Facilty Background**<br>Energy consumption<br>Alternative fuel sources<br>**III. Existing Heating System**<br>Heat production<br>Fuel consumption and costs<br>Replacement costs<br>**IV. Proposed Wood-Fired System**<br>Design Basis<br>System description<br>Boiler system<br>HVAC<br>Costs<br>Investment costs<br>Replacement costs<br>Operation and maintenance costs<br>**V. Conclusions**<br>**VI. Recommendations** |

*Example outlines of the same report*. Notice in the executive approach that all the key facts, conclusions, and recommendations are "up front" so that the reader can get to them quickly. In large reports, there are tabs for each appendix.

## Revision Checklist for Feasibility and Recommendation Reports

As you reread and revise your feasibility or recommendation report, be mindful of the following:

- Write a good introduction in which you indicate the situation and the audience and provide an overview of the contents.
- Provide technical background, if necessary for understanding the comparative discussion.
- Discuss the background on the problem or opportunity—what brought about the need for the report.
- State requirements—those factors that influence the decision or the choice of options. (And remember to state how important the requirements are in relation to each other.)
- Indicate how the field of options was narrowed to the ones being compared.
- Organize the comparison of the options using the point-by-point approach. Don't use the whole-to-whole approach unless there is a strong, obvious reason to do so.
- At the end of each comparative section, state the best choice in terms that point of comparison.
- Include a summary table, if possible, in which you summarize all the key data in table form.
- Include a conclusions section where you restate all the key conclusions from the comparison section.
- State secondary conclusions in the conclusions section—and based them on requirements that you state in the requirements section of the report.
- State a final conclusion in the conclusions section—one that states which is the best choice.
- Include a recommendation section where you make the recommendation. Briefly mention the key factors influencing the recommendation.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 2.11: Handbooks

## One reference book for all their needs

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.

Be sure to check out the examples.

## Handbook Basics

If you are taking a technical writing course using this book, your handbook project *must* include in some shape or fashion each of these three elements. Moreover, these elements should be a natural, logical "fit" for your handbook project. Brainstorm with your instructor to adjust your topic or to find practical useful reasons to include all three elements in your handbook.

Concepts. Conceptual information explains how things work, how things are put together. For more complex instructions, you have to know some concepts, theory, background, 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, RGB—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 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, 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 either the concepts section or 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 your handbook for this course, you must 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.

Handbook prototype

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.

## Handbook Examples

Here are some links to handbook examples. Be aware that there are some problems in the examples, problems most of which I have commented on. Some of these are borderline handbooks. What makes a handbook for me is the presence of conceptual discussion, instructions, and references to other resources.

Be sure to check out the examples.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 2.12: Titles, abstracts, introductions, and 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 orther such matters.
- Conclusions shape how readers view and understand the report upon leaving it.

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# 2.12.1: Titles

## Oh, for a nice specific title that's not too long

### Problem Titles

A common problem with technical documents involves overly general, vague titles: for example:

Report on Nanotechnology
Report on Ebola
Report on Smart Phones
Report on Solar Power
Report on Graphene

Just think of all the things that a writer could say about each of these topics! Important too is the fact that readers are just not going to know from such a title what the writer is really going to cover.

### Elements of Titles

When you craft a title for your document, consider indicating these elements but without creating a title that is a paragraph long:

- *Topic:* The topic of your document can be similar to those examples above. But don't stop there—you've got more work to do.
- *Scope:* Scope refers to how broad or how narrow your focus will be on the topic. Scope and overview are not always easy to distinguish. The element overview indicates a general review of some aspect of the topic.
- *Overview:* As the term is used here, overview refers to an itemization of the main subtopics to be covered. True, it is contradictory to how the term is used to define scope. Not to worry—this is not science. A good example of this use of the term is this: Ebola: Transmission, Symptoms, Treatment. The final three words are the itemization.

Notice that the process of creating a specific, focused title is similar to the process of narrowing a topic, covered elsewhere.

### Title Examples

Consider this title: Nanotechnology: Overview of Medical Applications. The giant topic nanotechnology is indeed stated, but notice it is narrowed down to medical applications and a scoping element is applied—overview.

Notice the use of the colon in the preceding example. It enables you to cut down in words. Another possibility is Medical Applications of Nanotechnology: Overview.

More to come!

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 2.12.2: 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.

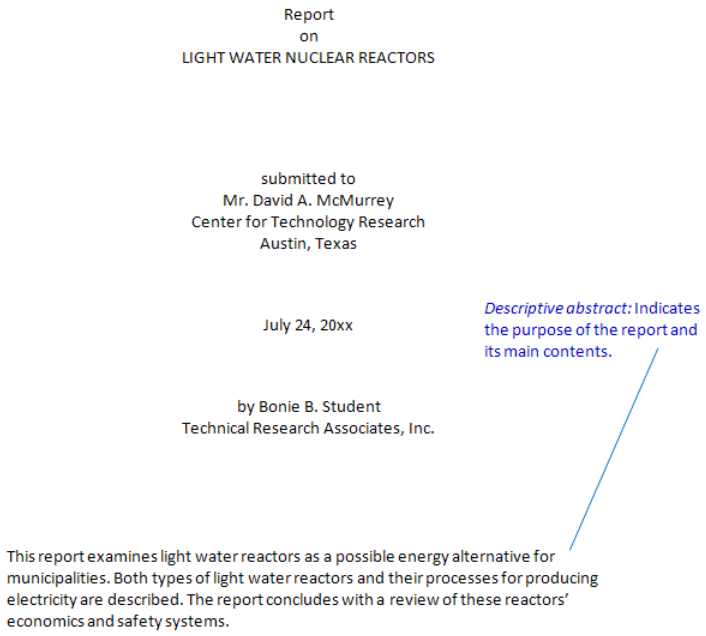
In this type of abstract, you don't summarize any of the facts or conclusions of the report. The descriptive abstract does *not* say something like this:

**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 vaccuumed 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. Sentence 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 Hepatitus 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).

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# 2.12.3: 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 is 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.)

## Grouping and Sequencing Elements in Introductions

**Grouping.** A common problem is to scatter background information in different parts of an introduction. While there may be good reasons for splitting up background information in disparate parts of an introduction, keeping it all in one place is usually best:

> MMX technology lends itself to portable computers because of the added internal processor cache, graphics acceleration, and lower power usage. The first two features add to the speed of the machine and the last to the travelling lifetime. Of the many perspective computers, only several brands have been selected for this comparison. Those that have been selected are Pentium computers that boast the new MMX technology.
>
> This report will compare laptop computers on the basis of the following: (1) features, (2) performance in hardware tests, and (3) price. The purpose of this comparison is to help prospective laptop purchasers in their decision.
>
> In today's mobile climate, the average person needs a reliable portable computer. This report is designed to help in the search for a reliable portable computer.

*Disorganization in an introductory paragraph.*

Notice the the red-highlighted sentence is background information. However, background information occurs in the first paragraph. Move it to the first paragraph, and rephrase it with "reliable" for transition.

**Sequencing.** Another way of analyzing introductions is to consider the sequence of information types occurring within them. With the out-of-place sentence moved to the first paragraph, a reasonable sequence of information types might be this:

> Background information
> Topics to be covered
> Intended audience
> Scope: what's not ccvered

*Commonly used sequence of information types in an introductory paragraph.*

## 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:

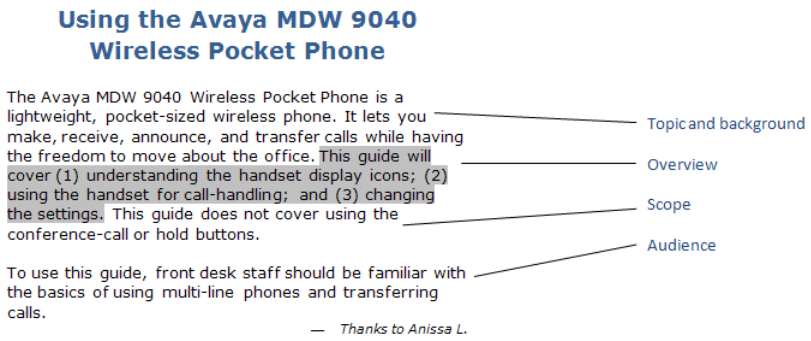
**Topic.** If you can circle the topic words somewhere in the first three to four lines of the introduction, you're good.

**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.*

## Introductions in Outlines

When you develop an outline for a report-length document, you may find yourself using that roman numeral I section for background information. Not a good idea. Remember the guideline: *Introductions get readers ready to read the document*. With that in mind, outlining the introduction to a report-length document is pretty easy. Here's an example:

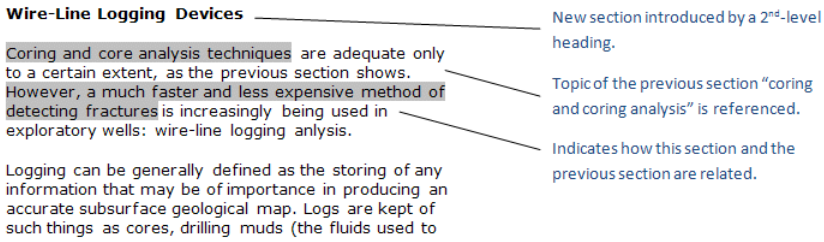
```
I. INTRODUCTION
   A. Purpose
   B. Scope
   C. Overview (brief list of what will be covered)
   D. Situation and audience
II. BACKGROUND . . .
```

You need not include all of these elements nor in this exact order, and you should be able to deftly combine some of these elements in the same sentence.

## 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.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 2.12.4: 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.

**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 adavantage 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.

**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.

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# 2.13: Oral presentations

## Stand up and tell 'em how it is!

A common assignment in technical writing courses—not to mention in the workplace—is to prepare and deliver an oral presentation. You might wonder what an *oral* report is doing in a *writing* class. Employers certainly look for coursework and experience in preparing written documents, but they also look for some experience in oral presentations as well. That's why the real name of courses like these ought to be "Introduction to Technical Communication."

The following was written for a standard face-to-face classroom setting. If you are taking the online version of technical writing, oral reports can be sent in as "scripts," or with the right equipment, audio versions can be transmitted live or recorded. In any case, students evaluate each other's oral reports by filling out a form like the one provided at the end of this chapter.

Be sure to check out the examples.

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

- Effective Presentations< -- no link. Part of an online tutorial series provided by Kansas University Medical Center.

## 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 aquainted with the guide and to prompt them for any concerns or questions. (Your class will gladly pretend to be whoever 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 primarily 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 primarily 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.

## 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 maximum stipulated by the event organizers or your instructor. If you are in a technical-writing class, ask your instructor to use signals to indicate when the maximum is approaching, has arrived, or has past.
- Pay special attention to the introduction to your talk:
    - Indicate the *purpose* of your oral report
    - give an *overview* of its contents
    - find some way to *interest* the audience.

  (See the example text of an introduction to an oral report.)
- 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 "spoken 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. (See the examples of spoken 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 spoken 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 according to the maximum allowed. Some ideas on how to do this are presented in the next section.

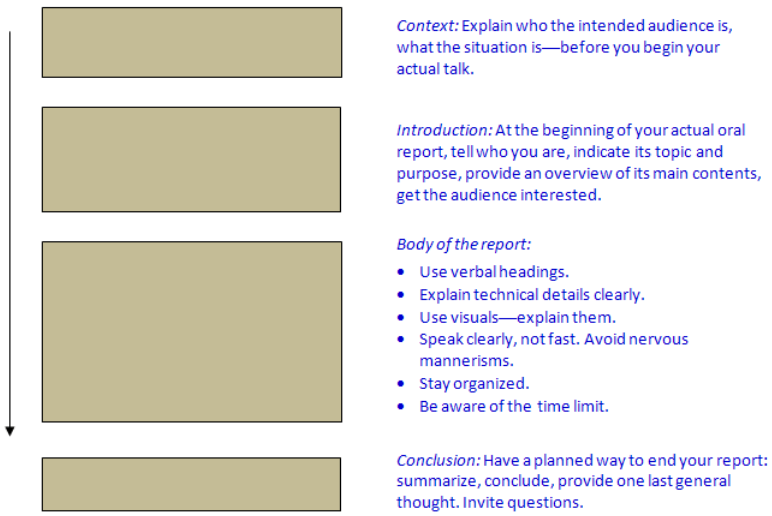



*Diagram of the oral presentation.*

## 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, do some sort of preparation or rehearsal—some people assume that they can just jump up there and ad lib for the expected time frame and be relaxed, informal. It doesn't often work that way—drawing a mental blank is the more common experience.

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 (preferably, occasionally glance at 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. Of course the head-down style of reading your report directly from a script has its problems. There is little or no eye contact or interaction with the audience. The delivery tends toward a dull monotone that either puts listeners off or is hard to understand.

For some reason, people tend to get nervous if they are new to oral presentations. 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.

## Getting the Presentation Started: the Introduction

To get your presentation off to a good start, plan on doing the following:

1. Introduce yourself and say a bit about yourself.
2. Indicate the topic and purpose of your presentation.
3. Find some brief way to indicate the importance of your topic—spark some interest.
4. Provide a brief in-sentence list of what your presentation will cover; provide a roadmap.

Take a look at how these elements are handled in the following example:

**Oral Presentation: Enhancement of the Recycling Program**

Valerie and I represent the Austin Coalition for Recycling, a group that was founded in the late 1960s, partly in response to rising utility bills and partly out of a concern for the environment and its resources. High utility bills not only hurt each of us in our pocketbooks but also hurt the quality of life of our city as a whole. We are all particularly proud of what a fine city we live in and what wonderful citizen involvement there is here in a whole range of civic activities. These things make our city special and ought to be the force that enables us to make a recycling program an integral part of the city's waste management program. Backed by the City, a new powerful recycling program will contribute enormously to keeping Austin the wonderful place it is.

*Opening:* establishes who they are, what they represent, and why they are here.

Attempts to build some interest and identification with the audience.

Valerie and I want to talk to you about how recycling works currently, how it will work once integrated with the city's waste management program, how this integration will benefit our city, and what you can do to support this plan.

*Purpose and scope:* explains the purpose of the presentation and provides an overview of the topics to be covered—all in one sentence.

*Introductory remarks in an oral presentation.*

## Using Spoken Headings in a Presentation

Plan the *spoken headings* you will use in your presentation. These indicate you are moving from one subtopic to the next, or they announce a new subtopic. These are like verbal signposts that help your listeners maintain a sense of how your presentation is organized. This is exactly the same idea as presented in the chapter on headings in printed documents. Some speakers use a series of questions to indicate new subtopics. Take a look at the spoken headings (called "verbal" headings) in the following:

*Excerpts from an oral report*

*Verbal headings*

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....

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").

*[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 ....

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 spoken headings in an oral presentation.*

## 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 expected time limit. Anything way under is also a problem. Do some rehearsal, write a script, or find some other way to 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 a bit nervous talk too fast. All that adrenaline causes them to speed through their talk. That makes it hard for the audience to follow. In general, it helps listeners to 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.
- **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. As for posture, avoid slouching at the podium and leaning against the wall.

- **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.

## 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. In this method, you design your visual on a sheet of blank paper, then photocopy it, and then get 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 take listeners' attention away from you. Still, for certain visual needs, handouts are the only choice.
- **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.

## Evaluation Form

Download the evaluation form

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# CHAPTER OVERVIEW

## 3: Document Design


3.1: Report design overview
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3.7: Tables, graphs, charts
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# 3.1: Report design overview

## Provide a structure and design that is expected

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 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.

Be sure and see the example reports.

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 either attached to the outside of the report with a paper clip or is bound within the report. 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.

Alan Chekhov
1203 Wood Dr
Hero, TX 7800
(512)000-000

10/31/2023

Senator David McMurrey, Chair
Texas Legislative Council
Robert E. Johnson Building
1501 N. Congress Ave.
Austin, Texas 78701

**SUBJ**: Proposal to legalize recreational use of psilocybin mushrooms in the state of Texas.

This proposal will outline the benefits of psilocybin mushrooms in relation to mental health, economic benefits, and the reduction of criminalization. Included will be an outline, a timeframe of completion, references from cities of the United States that have legalized recreational use, references from countries that have legalized recreational use, and charts.

Thank you for your examination of this proposal. I may be reached anytime between 8:00 a.m.-10:00 p.m. at (512) 000-0000.

Sincerely,

Alan Chekhov
Enclosure

In the example of the transmittal letter in the following, notice the standard business-letter format. 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.** 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 another paragraph, listing questions you'd like readers to consider as they review the report.

## Cover and Label

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:

- Totally unacceptable are the clear (or colored) plastic slip cases with the plastic sleeve on the left edge. These are like something out of freshman English; plus they are aggravating to use—readers must struggle to keep them open and hassle with the static electricity they generate.
- Marginally acceptable are the covers for which you punch holes in the pages, load the pages, and bend down the brads. If you use this type, leave an extra half-inch margin on the left edge so that readers don't have to pry the pages apart. Of course, this

type of cover prevents pages from lying flat: readers must grab available objects or use various body parts to keep the pages weighted down.

- By far the best covers are those that allow reports to lie open by themselves (see the illustration in the next section). What a great relief for a report to lie open in your lap or on your desk. This type uses a plastic spiral for the binding and thick, card-stock paper for the covers. Check with your local copy shop for these types of bindings; they are inexpensive and add to the professionalism of your work. See the simulated example of a plastic spiral bnding in the following.

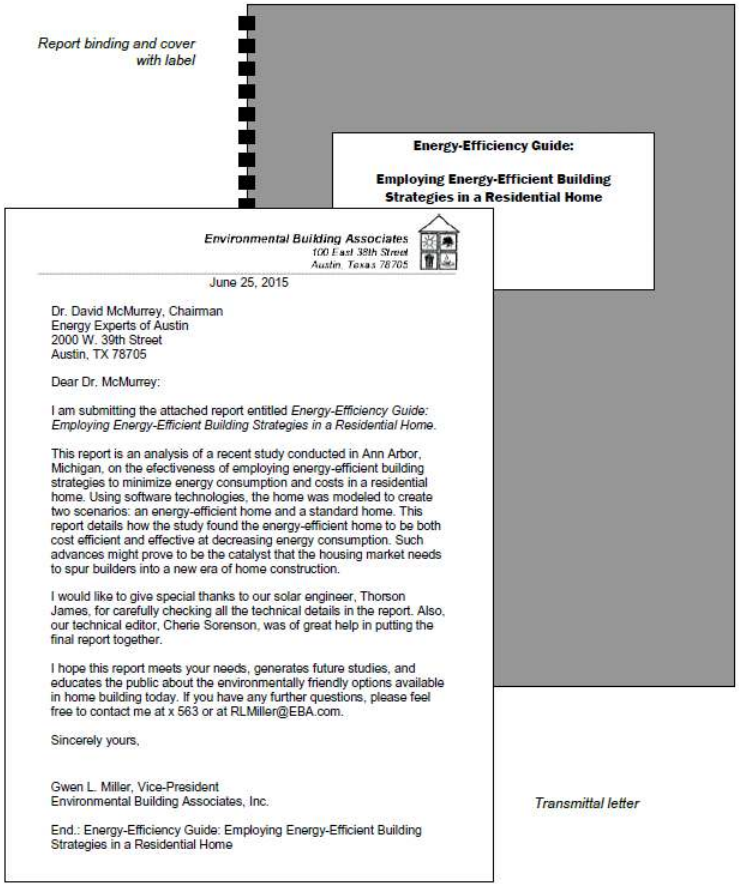
Generally less preferable are loose-leaf notebooks, or ring binders. These are too bulky for short reports, and the page holes tend to tear. Of course, the ring binder makes changing pages easy; if that's how your report will be used, then it's a good choice. At the "high end" are the overly fancy covers with their leatherette look and gold-colored trim. Avoid them—keep it plain, simple, and functional.

## 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.

Not much goes on the label: the report title, your name, your organization's name, a report tracking number, and a date. There are no standard requirements for the label, although your company or organization should have its own requirements. (An example of a report label is shown below.)

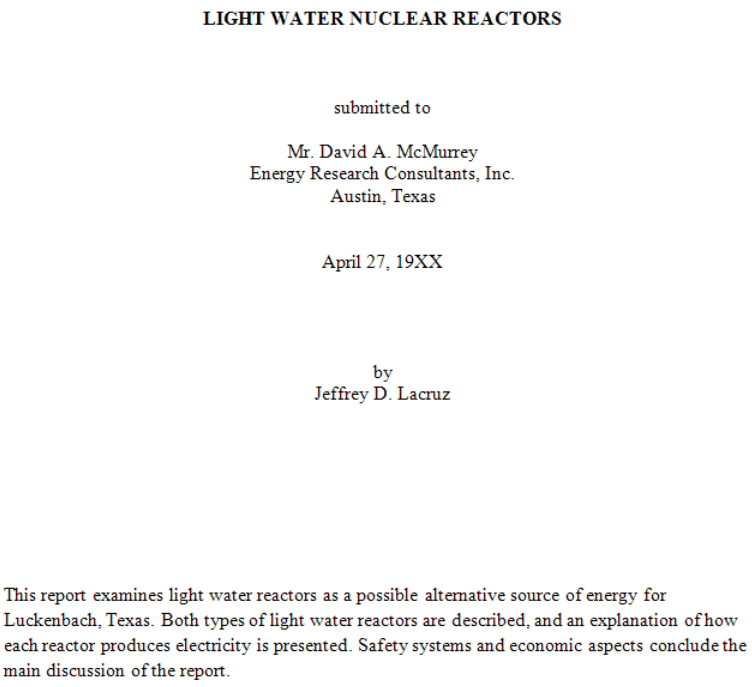



*Transmittal letter and report cover (with cover label).*

## Abstract and Executive Summary

Most technical reports contain at least one abstract—sometimes two, in which case the abstracts play different roles. Abstracts summarize the contents of a report, but the different types do so in different ways:

- **Descriptive abstract.** This type provides an overview of the purpose and contents of the report. In some report designs, the descriptive abstract is placed at the bottom of the title page, as shown in the following:



LIGHT WATER NUCLEAR REACTORS

submitted to

Mr. David A. McMurrey
Energy Research Consultants, Inc.
Austin, Texas

April 27, 19XX

by
Jeffrey D. Lacruz

This report examines light water reactors as a possible alternative source of energy for Luckenbach, Texas. Both types of light water reactors are described, and an explanation of how each reactor produces electricity is presented. Safety systems and economic aspects conclude the main discussion of the report.

*Descriptive abstract*. Traditionally, it is placed on the title page (not the cover page).

- **Executive summary.** Another common type is the executive summary, which also summarizes the key facts and conclusions contained in the report. See the example shown in the following. 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. Typically, executive summaries are one-tenth to one-twentieth the length of reports ten to fifty pages long. For longer reports, ones over fifty pages, the executive summary should not go over two pages. The point of the executive summary is to provide a summary of the report —something that can be read quickly.

If the executive summary, introduction, and transmittal letter 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 some duplication so that readers will be sure to see the important information no matter where they dip into the report.

## Table of Contents

You're familiar with tables of contents (TOC) but may never have stopped to look at their design. The TOC shows readers what topics are covered in the report, how those topics are discussed (the subtopics), and on which page numbers those sections and subsections start.

In creating a TOC, you have a number of design decisions:

- **Levels of headings to include.** In longer reports, consider including only the top two levels of headings. This keeps the TOC from becoming long and unwieldy. The TOC should provide an at-a-glance way of finding information in the report quickly.
- **Indentation, spacing, and capitalization.** Notice in the illustration below that items in each of the three levels of headings are aligned with each other. Although you can't see it in the illustration, page numbers are right-aligned with each other. Notice also the capitalization: Main chapters or sections are all caps; first-level headings use initial caps on each main word; lower-level sections use initial caps on the first word only.
- **Vertical spacing.** Notice that the first-level sections have extra space above and below, which increases readability.

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 change the TOC accordingly. See the example of a table of contents:

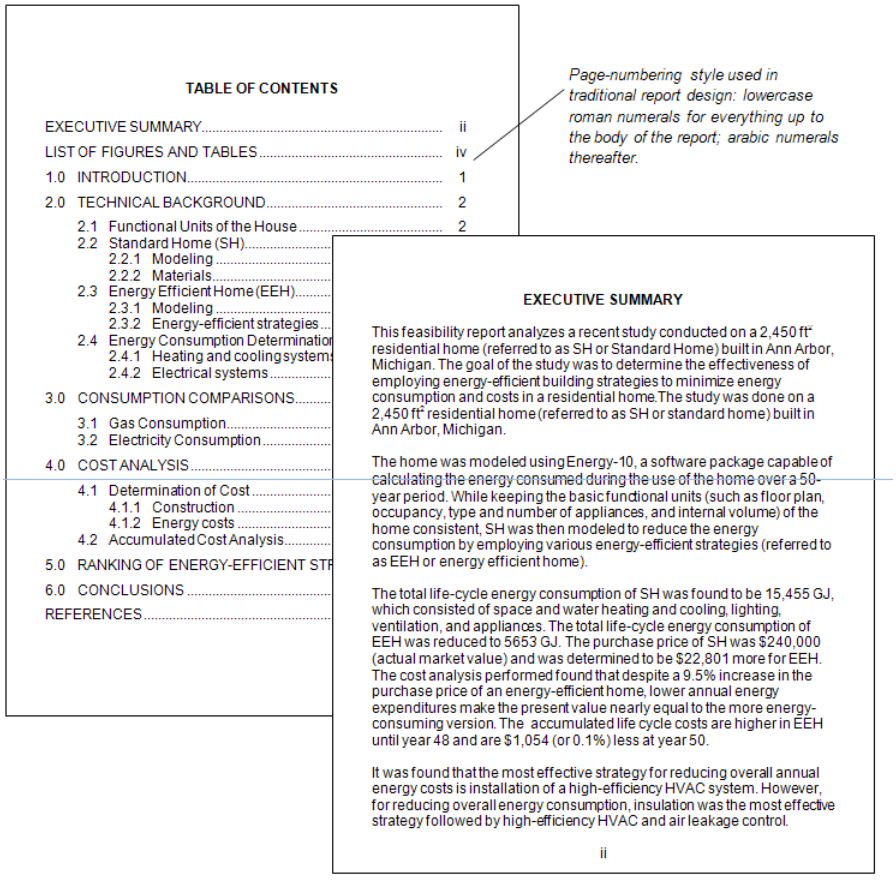



*Table of contents (which comes first) then the executive summary*. This TOC uses decimal-numbering style for the chapter and section numbers, which is common in reports. Others in this book use the uppercase roman-numeral style for the top-level chapters only (see DVD report).

## List of Figures and Tables

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

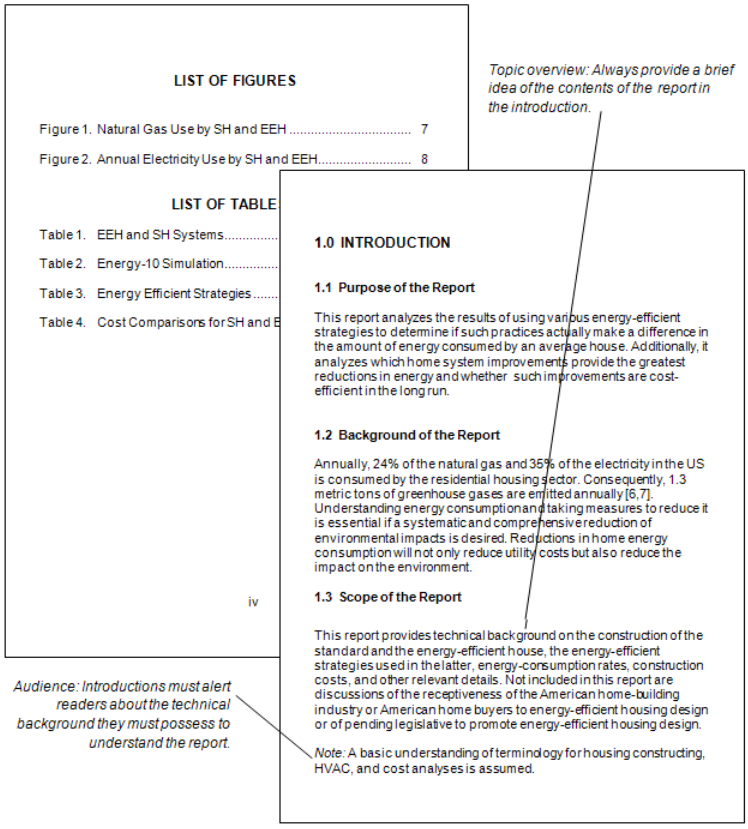
Complications arise when you have both tables and figures. Strictly speaking, figures are illustrations, drawings, photographs, graphs, and charts. Tables are rows and columns of words and numbers; they are not considered figures.

For longer reports that contain dozens of figures and tables each, create separate lists of figures and tables. Put them together on the same page if they fit, as shown in the illustration below. You can combine the two lists under the heading, "List of Figures and Tables," and identify the items as figure or table as is done in the illustration below.

## Introduction

An essential element of any report is its introduction—make sure you are clear on its real purpose and contents. In a technical report, the introduction prepares the reader to read the main body of the report. See introductions for a discussion of writing introductions.

See this example of an introduction:




*List of figures and tables followed by the introduction*. If there are no tables, make it "List of Figures." In a technical writing course, ask your instructor if the decimal-numbering style for headings is required.

## Body of the report

The body of the report is of course the main text of the report, the sections between the introduction and conclusion. Illustrated below are sample pages.

### 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. See headings for guidelines on headings.

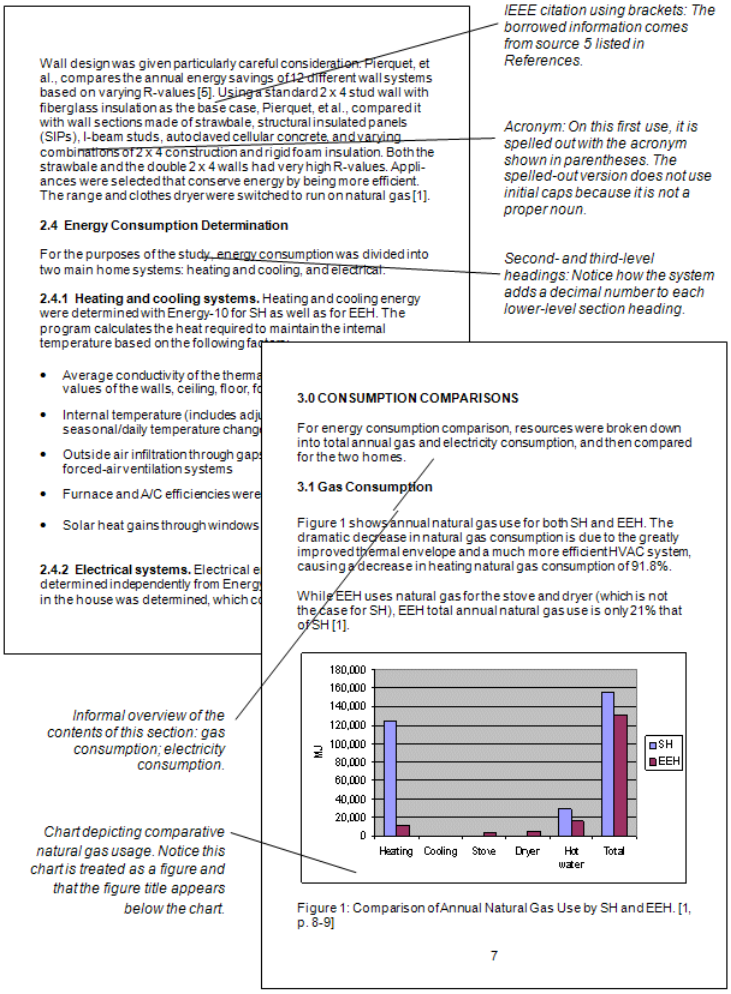
### Bulleted and Numbered Lists

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. See lists for guidelines on lists.

### 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 about writing out all numbers below 10 does not always apply

in technical reports. (See numbers vs words for guidelines.)




*Except from the body of a technical report.* In a technical writing course, ask your instructor if the decimal-numbering style for headings is required. Also, a different documentation system may be required—not the IEEE, which is for engineers.

## Graphics and Figure Titles

In 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. For strategies for adding graphics to reports, see graphics. For strategies for adding tables to reports, see tables.

## 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, they can point readers from the discussion of a mechanism to an illustration of it. They can point readers to an appendix where background on a topic is given (background that just does not fit in the text). And they can point readers outside your report to other information—to articles, reports, and books that contain information related to yours. When you create cross-references, follow these guidelines presented in cross-references.

## Conclusions

For most reports, you'll need to include a final section. When you plan the final section of your report, think about the functions it can perform in relation to the rest of the report. Ideas for final sections are presented in conclusions.

## Appendixes

Appendixes are those extra sections following the conclusion. What do you put in appendixes?—anything that does not comfortably fit in the main part of the report but cannot be left out of the report altogether. The appendix is commonly used for 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 body of the report. Anything that you feel is too large for the main part of the report or that you think would be distracting and interrupt the flow of the report is a good candidate for an appendix. Notice that each one is given a letter (A, B, C, and so on).

## Information Sources

Documenting your information sources is all about establishing, maintaining, and protecting your credibility in the profession. You must cite ("document") borrowed information regardless of the shape or form in which you present it. Whether you directly quote it, paraphrase it, or summarize it—it's still borrowed information. Whether it comes from a book, article, a diagram, a table, a web page, a product brochure, an expert whom you interview in person—it's still borrowed information.

Documentation systems vary according to professionals and fields. Engineers use the IEEE system, examples of which are shown throughout this chapter. Another commonly used documentation system is provided by the American Psychological Association (APA). See documentation for details.

## Page Numbering

Page-numbering style used in traditional report design differs from contemporary report design primarily in the former's use of lowercase roman numerals in front matter (everything before the introduction).

- All pages in the report (within but excluding the front and back covers) are numbered; but on some pages, the numbers are not displayed.
- In the contemporary design, all pages throughout the document use arabic numerals; in the traditional design, all pages before the introduction (first page of the body of the report) use lowercase roman numerals.
- On special pages, such as the title page and page one of the introduction, page numbers are not displayed.
- Page numbers can be placed in one of several areas on the page. Usually, the best and easiest choice is to place page numbers at the bottom center of the page (remember to hide them on special pages).
- If you place page numbers at the top of the page, you must hide them on chapter or section openers where a heading or title is at the top of the page.

**Note**: 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). Similarly, tables and figures would use this numbering style. This style eases the process of adding and deleting pages.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 3.2: Book design overview

## Turn it into a traditional printed book

In this chapter, *book design* means the content, style, format, design, and sequence of the various typical components of a book. "Components" here refers to actual sections or pages of a book such as the edition notice, the preface, the index, or the front or back cover. In the page-design chapter, the term *element* refers to things that can occur multiple times practically anywhere in a book, such as headers, footers, tables, illustrations, lists, notices, highlighting, and so on.

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.

**Note:** Currently, we have only example user guide developed in FrameMaker then output to PDF. It lacks a glossary, but all other pieces of a typical user guide are in place. (I can't figure out that "d" in "Filepad"!) Be aware that it does not use some of font and margin requirements listed below.

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:

- Sun Technical Pubs. *Read Me First!* Any recent edition. Prentice Hall.
- Microsoft Corporation. *Microsoft Manual of Style for Technical Publications*. Any recent edition. Microsoft Press.

## 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 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. (For more information, see special notices.)

## 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 head 1s 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 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. See the chapter on page design for format, style, and design issues for elements such as headers, footers, headings, lists, notices, tables, graphics, cross-references, and highlighting.

## 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. Good glossary definitions should use the formal-sentence definition technique as described in the definition chapter of this online text. 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. See the chapter on indexing for processes and guidelines for creating good indexes.

## 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. See the chapter on highlighting for other typographical issues.
- 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.

**Note:** This concludes the discussion of print-book *components*. To complete this overview of the design of printed books, see the chapter on page design, which covers *elements* such as headers and footers, headings, lists, special notices, tables, graphics, highlighting, cross-references, and more.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response.

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# 3.3: Page design overview

## Make it accessible, professional

*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.

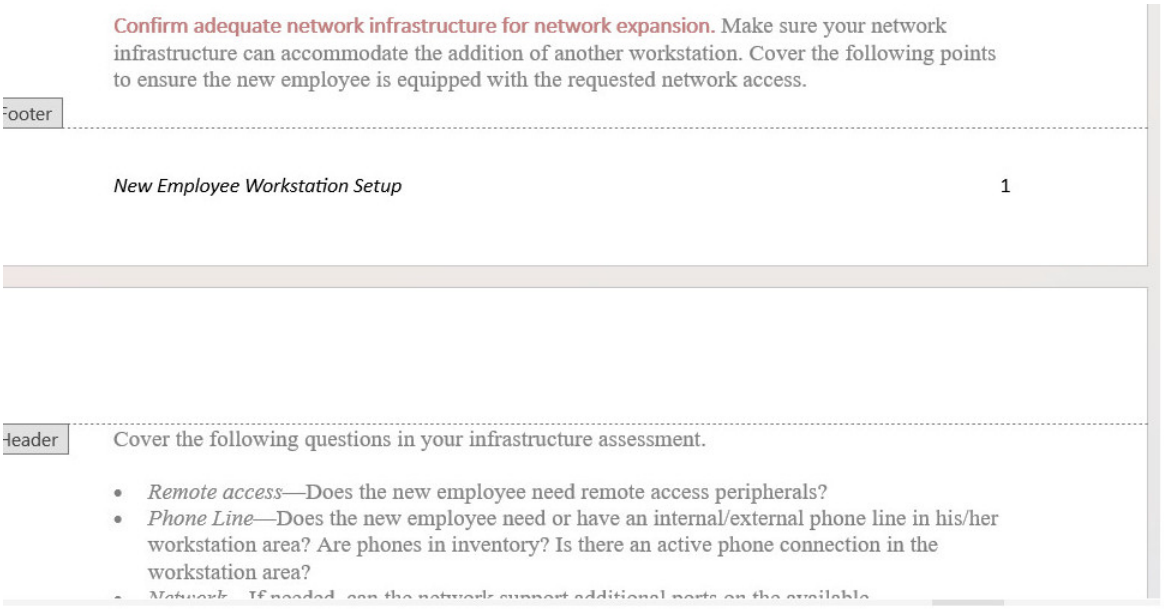
For even more detail than you see here, consult these two standard industry resources:

- Sun Technical Pubs. *Read Me First!* Any recent edition. Prentice Hall.
- Microsoft Corporation. *Microsoft Manual of Style for Technical Publications*. Any recent edition. Microsoft Press.

## Headers and Footers

People often confuse headers with headings. Headings, covered in headings are those phrases occuring *within the body area* of a document. Headers are those phrases and possibly page numbers occuring *within the header area* of a document. Footers are those phrases and possibly page numbers occuring *within the footer area* of a document. A common mistake, and a big one, is to put the title of a document in the header area, which causes it to appear to appear at the top of every subsequent page.

Take a look at a diagram of a typical document page:




Botom of preceding page; top of following page

One common page design is to place the document title and the page number in he footer area. In an alternating format, the left page might display the page number and document title, in that order; the right page might display the document title and page number, in that order.

## Headings

The following presents some of the standard guidelines on headings. For a more detailed discussion, see the chapter on headings in the online textbook.

- Make liberal use of headings, perhaps one heading for every two to three paragraphs. Of course headings can be overdone: lots of headings with only one or two sentences per heading does not work.
- Design headings so that they clearly indicate their level. Use type size, type style, color, bold, italics, alignment in such a way that the level of the heading is obvious. ("Levels" of headings are like levels in an outline: first level would correspond to the

roman numerals; second level, to the capital letters; and so on.)

- Make headings descriptive of the sections they introduce. Headings like "Technical Background" don't tell anybody anything.
- Make headings parallel in phrasing. Parallelism sends readers important clues as to whether the section in similar in nature to the preceding ones.
- Avoid "lone headings"—it's the same concept as having an "A" without a "B" or a "1" without a "2" in outlines.
- Avoid "stacked headings"—that's two or more consecutive headings without intervening text.
- Avoid referring to headings with pronouns in the text following headings. If you have a heading like "Configuring the Software," don't follow it with a sentence like "This next phase..."
- Consider using the "hanging-head" format to make headings stand out more and to reduce the length of regular-text lines. In the hanging-head design, some or all of the headings are on the left margin, while all text is indented one to two inches.
- Consider using "run-in" headings for your lowest-level heading. It can be difficult to rely solely on type style and size to indicate heading levels. A run-in heading "runs into" the beginning of a paragraph and ends with a period. You can use some combination of bold, italic, or color for these headings.

## Lists

Lists are useful tools for emphasizing important points, enabling rapid scanning of text, 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 for items that are in a required order or that must be referred to by number. Use bulleted lists for items in no required order.
- Use standard numbered- and bulleted-list format available in the paragraph styles of word-processing software, HTML tags, and other.
- Make the phrasing of list items parallel.
- Introduce all lists with a lead-in; don't use headings as lead-ins to lists.
- Unless your organization's style overrides, punctuate list items with a period only if they are complete sentences or have embedded dependent clauses.
- Use either initial cap or lowercase on the first word of list items, but do so consistently.
- For nested lists, use a bolded en dash for the bullet symbol in second-level list items; use lowercase letters for second-level numbered list items. Make sure that nested items align to the *text* or the previous level.
- Avoid excessive use of lists or lists with too many items. Seven to ten items is generally considered about the maximum for lists.

## Notices

Notices are those 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. For a more detailed discussion, see the chapter on notices.

- Use a standard hierarchy of notices in which notices are more prominent and noticeable as they become more severe.
- Consider using this hierarchy:
    - danger notices for situations involving potential severe injury or fatality
    - warnings for situations involving minor injury
    - cautions for situations involving damage to equipment or data or threat to the success of the procedure
    - notes for points of exception or emphasis not involving the preceding situations.
- Whatever notice design you use, avoid extended text in all bold, all italics, all-caps, or combinations thereof.
- In addition to telling readers to do or not to do something, explain what will happen if they ignore the warning, under what conditions to make use of the statement, how to recover if the statement is ignored.
- Make the text of notices succinct, but not at the expense of clear writing. Avoid telegraphic writing style (omission of articles like *a*, *an*, *the*) in notices.
- In numbered lists, align notices to the *text* of the list item they apply to.

- The standard wisdom of placing notices *before* the step in which the potential problem exists can cause problems in formatting. If possible, state warnings, cautions or dangers at the beginning of the entire procedure.

## Figures

Figures are all manner of illustrations, drawings, schematics, photos and so on. See graphics for detailed discussion. Meanwhile, here are some important points:

- In the text before the figure, provide a cross-reference to the figure.
- While it is not absolutely necessary to include a figure caption (title) for each figure, when you do, place it *below* the figure.
- For example, in instructions when the figures are closely related to the individual steps, figure titles have no vital function and are not needed.

## Tables

Tables are like vertical lists, discussed previously, but 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. For a more detailed discussion, see the chapter on tables.

- Look for repeating groups of items in your text that you can format as tables.
- In the text before the table, provide a cross-reference to the table.
- Use 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 using some sort of highlighting for these column and row headings.
- Left-align text columns (unless they are simple alphabetic character items). 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.
- Provide a brief discussion of 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, italics, alternate fonts, caps, quotation marks, and other such typographical tricks used to call attention to text. The following presents some standard guidelines for highlighting. For a more detailed discussion, see the chapter on highlighting.

- Establish a plan for use of highlighting, and apply it consistently. Use highlighting for specific, functional reasons. Avoid too much highlighting; 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, a nice touch is to indent 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 line length of regular text.

## Fonts & Color

Here are some suggestions concerning fonts and color:

- 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 displays on screen or that users must type in.
- If you use color, use it minimally. 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 horrible to read. Stick with black text on a white or gray background unless there is strong functional reason for some other color combination.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response.

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# 3.4: Headings

## Make your text scannable

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.

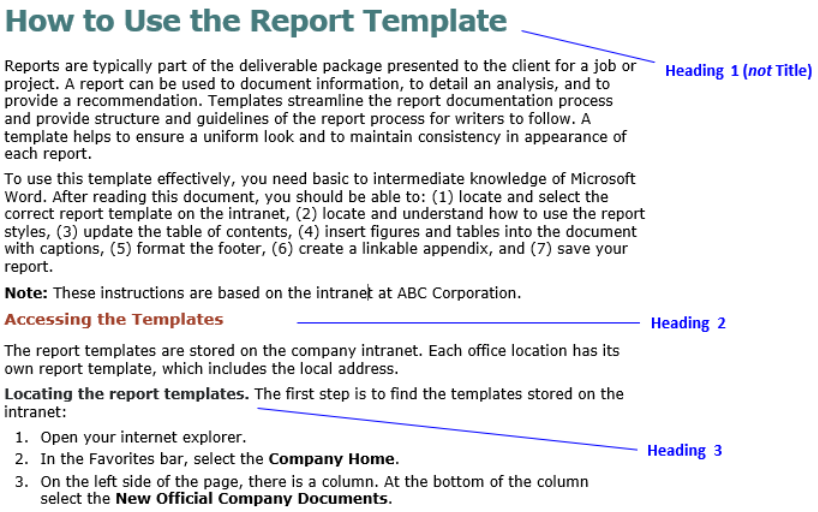
Headings are also useful for writers. They keep you organized and focused on the topic. When you begin using headings, your impulse may be to slap in the headings *after* you've written the rough draft. Instead, visualize the headings *before* you start the rough draft, and plug them in as you write.

Your task in this chapter is to learn how to use headings and to learn the style and format of a specific design of headings.

## General Guidelines for Headings

"Well-designed headings can help not only readers but also writers understand the organization of a document."

In this chapter, you use a specific style of headings. This style is the standard, required format if you take a course that uses this online textbook. If you want to use a different style, contact your instructor, lead writer, or graphic designer. Here are some specific guidelines on headings (see the figures at the end of this chapter for illustrations of these guidelines):



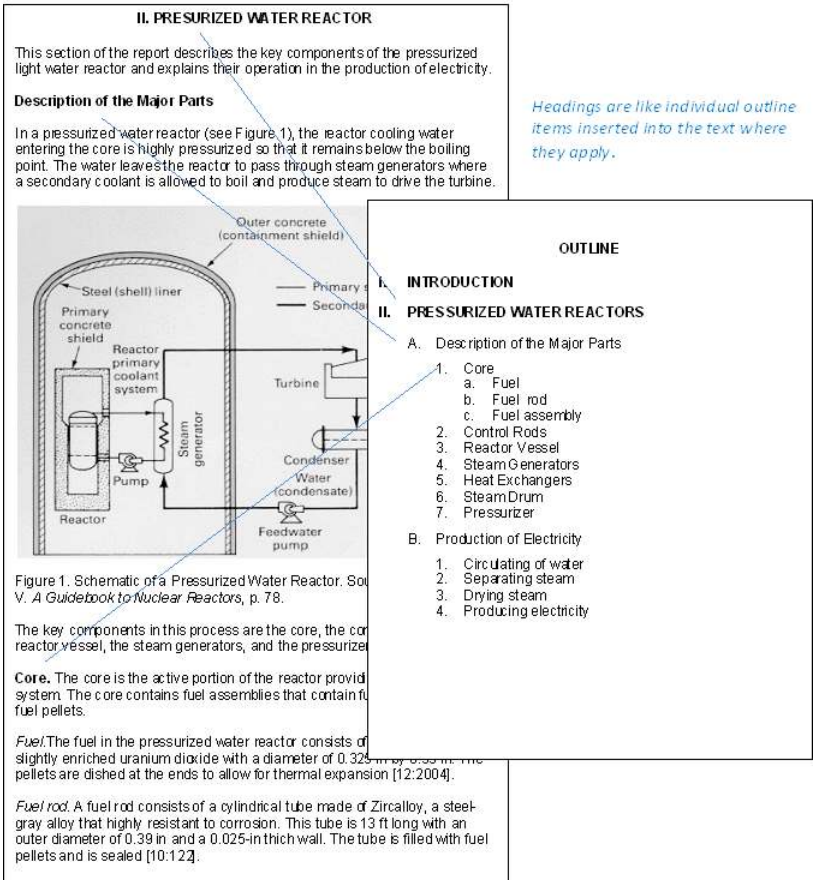

*Heading style and format, standard for courses using this online textbook*. If you want to use a different format, contact your instructor, lead writer, or graphic designer.

- Use headings to mark off the boundaries of the major sections and subsections of a report.
- Use exactly the design for headings described here and shown in the illustrations in this chapter. Approximate 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 single-chapter documents (short documents), apply the first-level heading (Heading 1 in most styles-based applications such as Microsoft Word) to the first heading in the document (traditionally the Title syle, which should not be used).
- For multi-chapter documents (like big reports), apply the first-level heading as the first heading in each chapter.
- 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. (See the section on parallelism for details.)
- 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 are not the "right" or the "only" one, just one among many. It's important to use this style, however, because that's the way it is for many technical writers—they 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:** In the following, notice that the emphasis is on using standard paragraph styles for headings—in sequence and as named. You can change the *settings* of the styles, but *not their names*. Why? Technical writers are often tasked with converting documents created in applications like Microsoft Word to other applications such as Adobe FrameMaker, to MadCap Flare, or to systems such as HTML, DITA, or XML. These conversions are greatly facilitated by the functions in the applications that are designed to handle Heading 1, Heading 2, and so on.

### First-Level Headings

As mentioned above, use the paragraph style usually named **Heading 1** for the title heading in short documents. Similarly, use the Heading 1 style for the title heading for each "chapter" in large documents (such as reports). Follow these *suggested* guidelines for first-level headings:

- Don't use the Title paragraph style; instead, use Heading 1 (or whatever your application calls it).
- Make first-levels all-caps. (All-caps style is viewed by some as yelling at readers. This guideline can be safely ignored.)
- Use Roman numerals with first-levels. (Use of Roman numerals on headings may seem antiquated; *Chicago Manual of Style* thinks so. You can safely disregard this guideline.)
- Bold the entire heading including the Roman numeral (if a Roman numeral is used).
- 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:** Quite likely, you will not like the way the headings look "straight out of the box." Modify the style rather than each instance in your document. For details, see Character and Paragraph Styles,

### Second-Level Headings

No matter whether you are writing short document or multi-chapter document, the next heading after the first-level should be a Heading 2 (or whatever your software application calls it). Follow these guidelines for second-level headings:

- Make second-levels headline-style caps (also called "title case"). See title case.
- Put the second-level heading all alone by itself (standalone).
- 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 more vertical space *above* this level of heading than *below* it. For example, use the equivalent of 2 blank lines between previous text and second-levels and the equivalent of 1 blank line between second-levels and the following text. Notice that the default margins Microsoft Word uses is 10 pts between a regular paragraph and a second-level heading (Heading 2) and 2 pts below.

**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. These ideas follow the concepts as presented in Robin Williams's *Non-Designer's Design Book*.

### Third-Level Headings

There are two ways you can format third-level headings. Whichever you choose, use the Heading 3 paragraph style (or whatever your application calls it).

*Run-in headings:*

- Make third-levels sentence-style caps (init-cap only the first word and any proper nouns).
- 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.

*Stand-alone headings:* Apply the guidelines above except:

- Ensure that the format characteristics of your third-level heading make it distinct from your second-level headings, even when seen alone on a page.

  For example, if your Heading 1 is a size of 18 points, and your Heading 2 is 14 points, make your standalone Heading 3 12 points.
- Do *not* end a stand-alone heading with a period.

**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. See Customizing Styles for Headings.

## 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.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*

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# 3.5: Lists

## Provide emphasis and sequence

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 naturally notice it more and 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.

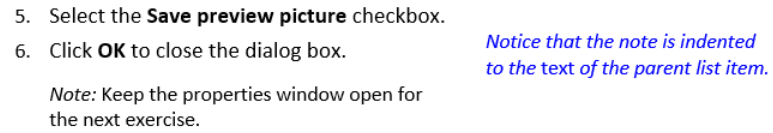
Your task for this chapter is to learn about the different types and uses of lists and to learn their specific format and style.

## Lists: General Guidelines

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

"Lists emphasize important points and help readers follow a sequence."

- 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.
- 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 items connected by *or*. Booleans would call these ORed items. Indicate this OR relationship 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.




*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. For example, if you have two areas of text that present steps for doing a task, *both* should use the same list format—in this case, numbered lists.
- Use the "hanging indent" format for list items two or more lines long. This format is illustrated in the section on hanging indents.
- 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 pesented 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.

- 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 (in other words, 1) or (1)
- 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.

*No colon after "learned"—the sentence is completed by the list items.*

*Both sides of the parenthesis are used.*

*List items are parallel in phrasing. (They could have been "identifying..., selecting...," and so on.)*

*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 clauses or 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.

Two of the utility-scale wind turbines sponsored by DOE are commercially available:

- Advanced Wind Turbines AWT-26
- Zoned Systems Z-40.
- New World Power Technology Company
- New World Grid Power
- Flowind Corporation

*Lead-in to the list punctuated with a colon*

*Vertical space between regular text and the list*

*No punctuation on list items unless they are complete sentences*

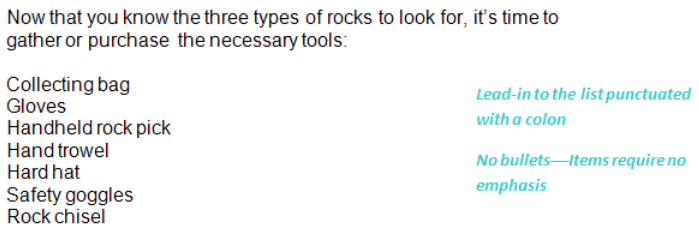
*Example of a simple vertical list.* No numbers or bullets.

## Bulleted lists

Use these guidelines for bulleted lists (also referred to as *unordered* 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 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 lines long.
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.)

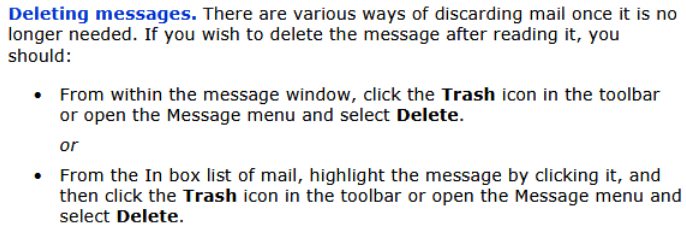
11. End bulleted list items with a period only if the list item is a complete sentence or contains a dependent clause.
12. Watch out for bulleted lists with more than 6 or 8 list items; for long bulleted lists, look for ways to subdivide or consolidate.
13. Avoid single-item lists. It's just like traditional 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.

## ORed lists

Computer developers like to use the Boolean OR as a verb. If two elements are logically joined by "or," they are said to be "ORed." An ORed list is simply a bulleted list with an "or" between the list items for emphasis. True, you can end the first item with with "or," but ORed advocates think that is not visually emphatic enough. Here's an example:



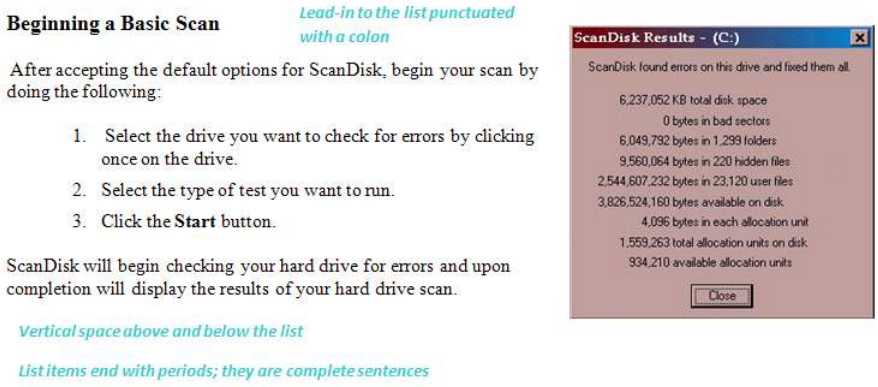

*Example of an ORed list*. The *or* between adds emphasis.

## Numbered lists

Use these guidelines for numbered lists (also referred to as *ordered* 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.



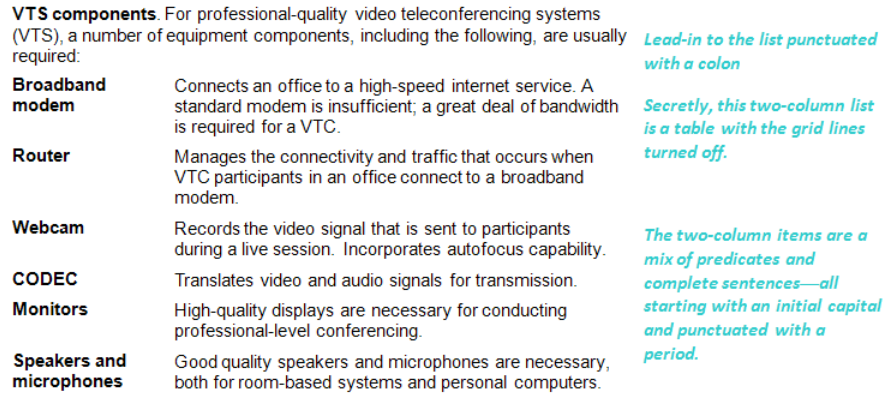

*Example of a numbered vertical list.* Items are in a required order.

## 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.

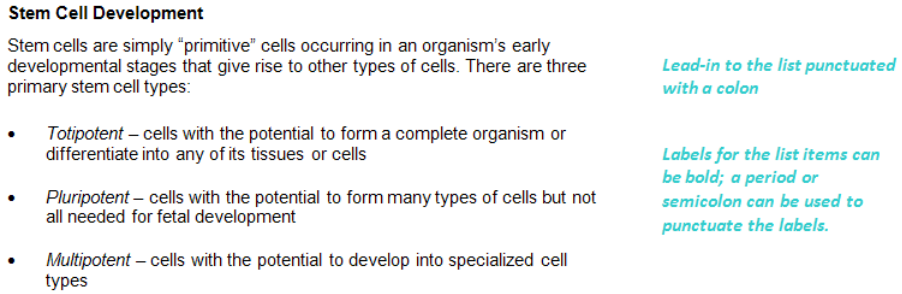



*Example of a two-column list* (pairs of list items). Not illustrated here, column headings are often used to indicate the contents of the two columns (for example, here it might be "Term" as the heading for the column 1 and "Definition" for column 2).

## Lists with labels

One last little variation on lists is the vertical list with 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.

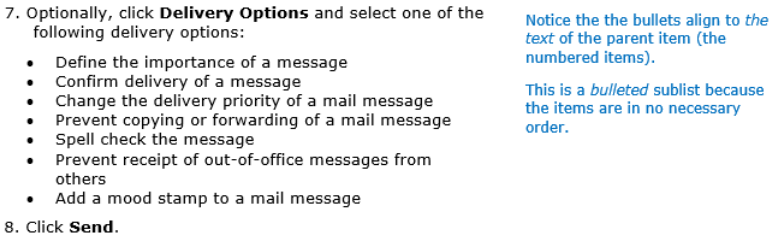
You can use bold or italics for the actual label (italics is used in the figure).




*Example of a vertical list with labels*. 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.

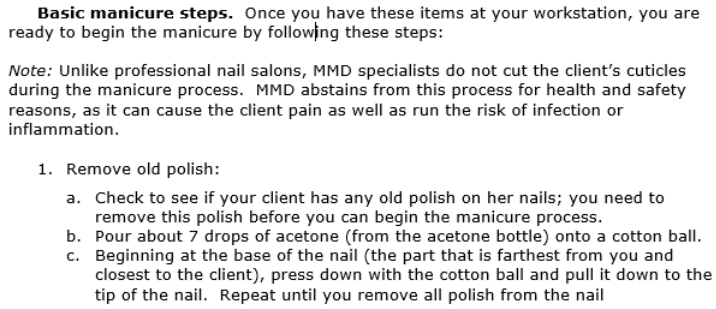
## Nested lists

A *nested* list contains two or more levels 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:




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

Now here are two final examples of nested lists:

- Deuteranomaly is reduced sensitivity to green light.
  - Green tones have reduced saturation and brightness.
  - Red, orange and yellow tones look redder than normal.
  - Purple is perceived as blue.
- Deuteranopia is a lack of sensitivity to green light.
  - Red, orange yellow and green are perceived as the same color.
  - Purple is perceived as blue.

*Nested list:* Notice the lower-level list items use a clear disc.

- Deuteranomaly is reduced sensitivity to green light.
  - Green tones have reduced saturation and brightness.
  - Red, orange and yellow tones look redder than normal.
  - Purple is perceived as blue.
- Deuteranopia is a lack of sensitivity to green light.
  - Red, orange yellow and green are perceived as the same color.
  - Purple is perceived as blue.

*Nested list:* Notice the lower-level list items use an em dash.

*More nested lists*. If the sublist items are in no required order, try using the clear disc (standard in Word and Open Office) or the en dash.

## Hanging Indents

Notice that all of the list-item "run-over" lines in this text and examples use a "hanging-indent" format. That's where any second and additional lines of a list item align to the *text* of the first list item. Not a good idea to use tabs or spaces to achieve this format.

In most versions of Microsoft Word, create this format by selecting hanging indent in Format > Paragraph and specifying an indent of 0.25 inches. Experiment with other indents.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

## Read-With Lists

List items must read grammatically with their lead-in. In this example, notice that you can read the lead-in Each disbursement request must with the first list item Contain payment authorization... as well as with the other three items:

> Disbursement requests must be properly documented for payment processing. Each disbursement request must:
>
> - contain payment authorization and invoices signed by the approving department.
> - contain a receiving copy of the purchase order and other receipts such as shipping documents, plus a remittance for any merchandise returned.
> - allow some unique purchases on a case-by-case basis. For example, hardware maintenance outside our standard maintenance contracts requires a copy of the estimate and final bill.
> - include proof-of-service for any advertising such as a copy of the advertisement, the order, and authorization.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*

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# 3.6: Special notices

## Keep readers safe, productive, and well-informed

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.

Very special notices. State-of-the-art notices with clever comments.

## Guidelines for Specific Types of Notices

This chapter presents a a specific style of notices. Be very aware that other styles and formats exist.

"Notices alert readers to the possibility of error, damage, or injury. They can also provide extra emphasis."

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 reminders, or to indicate minor problems in a procedure.

   **Caution**—To warn readers about possible damage to equipment or data, about potential problems in the outcome of what they are doing, or potential negative experiences (such as embarrassment).

   **Warning**—To warn readers about the possibility of minor injury to themselves or others.

   **Danger**—To warn readers about the possibility of serious or fatal injury to themselves or others.

*Note:* Take a look around your garage or kitchen, and look at the special notices you see on products. You will see plenty of variation, which is likely to be dependent on specific industry or corporate standards.

Deciding on which type of notice to use is not an exact science. Just 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 document. 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 *just before* or *just after* 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. With warnings, cautions, and danger notices, explain the consequences of not paying attention to the notice. State what will happen if the reader does not heed the notice.
4. The examples in this section use bold. Avoid all-caps for the text of any special notice.

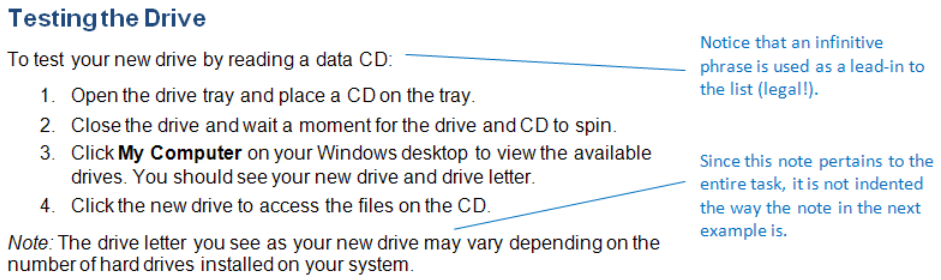
*Note:* In a properly set up publishing area, tech writers would not have to decide which type of notice to use or even craft notice language. That should be the job of organization attorneys. Still, those attorneys might be too busy to review your notices, and so the burden may still be on you the technical writer or editor.

## Format for Special Notices

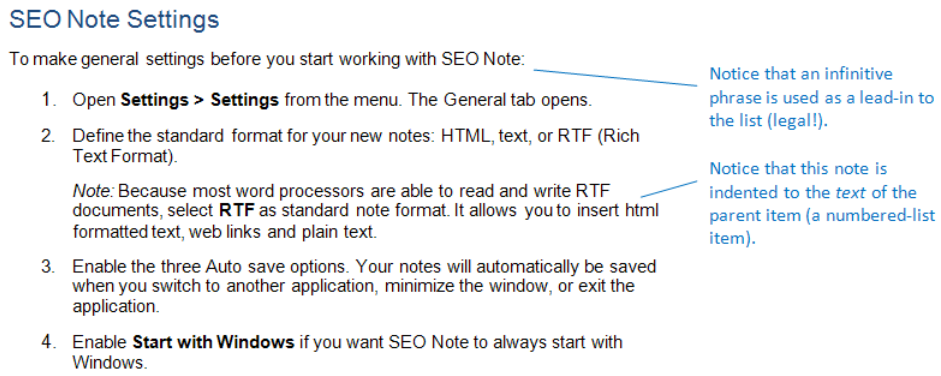
Use the following for specific details on the capitalization, typography (bold, underlining, different fonts, different types sizes), and spacing for each type of special notice.

### Note

Use the following format for simple notes:




*Example of a simple note*

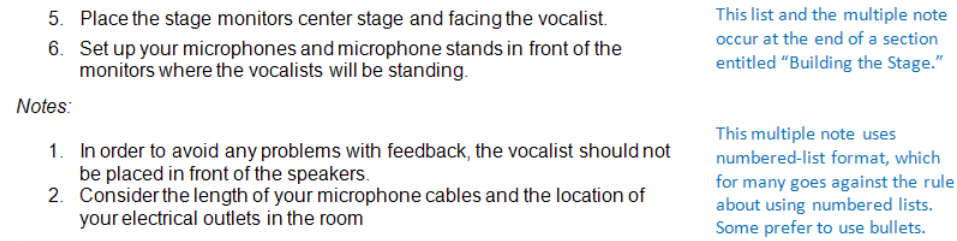



*Example of a note within a bulleted list (not regular running text)*. This same principle (that special notices align to the text they refer to) applies to the other types of special notices as well.

1. Type the label "Note" followed by a colon. (Although some of the following examples use bold, prefer italics 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).

## Notes

Use the following format for multiple notes:




*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.

1. Use this format when you have so many notes that they would distracting to present individually.
2. Type the label "Notes" followed by a colon. (Although some of the following examples use bold, prefer italics to prevent visual confusion with headings.)
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.

## Caution

Use the following format for caution notices:

1. Pump the brake pedal until firm.
2. Check that the brake fluid level is between the maximum and minimum lines on the reservoir. Add or remove fluid accordingly.

   **Caution:**
   Keep brake fluid from getting on painted surfaces as it can cause damage to the paint.
3. Perform test drive.

*Caution notice:* Alerts people to problems with the procedure or damage to equipment

*Format:* notice the following:

- Only the word "Caution" is bold and is displayed on a line separate from the text of the notice.
- The notice is indented to the *text* of the preceding step.

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

1. Type the label "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).

## Warning

Use the following format for warnings:

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

*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.

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

*Warning notice:* Alerts people to the possibility of minor injury.

*Format:* notice the following:

- Only the word "Warning" is italicized.
- The notice uses the "hanging head" style.
- The notice is indented to the *text* of the preceding text.

*Example of a warning notice*. Use this one to alert readers to the possibility of minor injury.

1. Type the label "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). The hanging-indent format for the warning in the example below uses 0.63 inches for both the tab and the hanging indent, but font sizes will cause this value to vary.

   *Note:* See Create a hanging indent for a video on creating the hanging-indent format in Microsoft Word.
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.

## Danger

Use the following format for danger notices:

**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:* Some standards require that this type of notice *precede* the step in which the danger occurs.

*Format:* notice the following:

- The danger notice is enclosed within a box
- Only the word "DANGER" is all-caps. All-caps for the entire notice would decrease redability.
- The notice is indented to the *text* of the preceding step.

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

1. Type the label "DANGER" in all-caps 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).

## Notice Images (Icons)

Please see common notice images.

## 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.

"Notice formats eliminate garish unreadable combinations of bold, italics, color, and all caps."

**Single spaced text.** All of the examples and discussion in this unit are based on single spaced text. Leave either one blank line 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 single spaced.)

Placement of special notices. Place special notices *just before* or *just after* the point at which they are relevant. For example, you can warn readers to back up all data *before* you tell them to reformat their hard drive. However, in practice serious special notices are placed at the very beginning of a procedure where great harm to data, equipment, or people is likely to occur.

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. An organization is likely to have a style guide that states requirements on placement of notices.

**Chart of special-notice meanings.** User guides often place a chart for the meanings of the different types of notices in the preface, as partially illustrated in the bottom of this figure:

The following font conventions have been used in this book:

*Italic*

Is used to introduce new terms, as well as for email addresses and URLs.

`Constant width`

Is used for code examples and fragments, as well as for functions and properties.

**`Constant width bold`**

Is used to highlight a section of code being discussed in the text.

*`Constant width italic`*

Is used for replaceable elements in code examples.

> **TIP**
> This icon indicates a tip, suggestion, or general note.

> **WARNING**
> This icon indicates a warning or caution.

**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.

## Related Information

ANSI Definitions for Danger, Warning, Caution or Notice Signs. Includes downloadable images.

1910.145 - Specifications for accident prevention signs and tags. OSHA

OSHA Safety Sign Categories (50487). Lots of downloadable images.

What do different colors of safety signs mean?. includes downloadable images. Creative Safty Supply

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 3.7: Tables, graphs, charts

## Show me the data

One of the nice things about technical writing courses is that most of the papers have tables, charts, and graphs in them—or at least they should. A lot of professional, technical writing contains all sorts, tables, pie charts, bar charts, line graphs, flow charts, and so on. Once you get the hang of putting these things into your writing, you should consider yourself obligated to use them whenever the situation would naturally call for them.

## Additional Resources

Almost Everything You Wanted to Know About Making Tables and Figures. A fantastic resource from Department of Biology, Bates College, Lewiston, ME, 2012.

## 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 is illustrated here:

**Table 3. Energy production by major source from 1960 to 1980[1]**

| Year | Total production (quad Btu) | Percent production | | | |
|---|---|---|---|---|---|
| | | Coal | Petroleum | Natural gas | Other[2] |
| 1960 | 41.5 | 26.1 | 36.0 | 34.0 | 3.9 |
| 1970 | 62.1 | 23.5 | 32.9 | 38.9 | 4.7 |
| 1980 | 64.8 | 28.7 | 28.2 | 34.2 | 8.9 |

[1] *Source:* U.S. Energy Information Administration, *Annual Energy Review*
[2] Includes hydropower, nuclear power, geothermal power, and others.

*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:

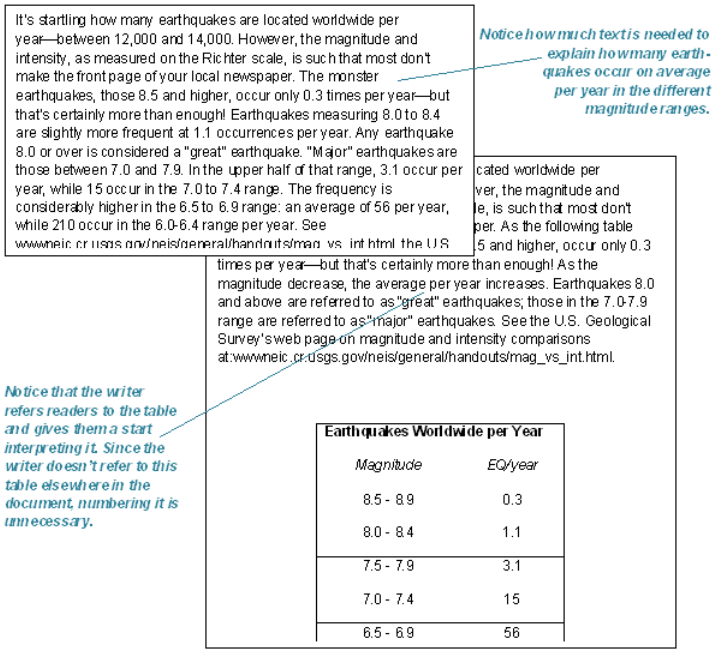
- Refer to the table in the text just preceding the table. Explain the general significance of the data in the table; don't expect readers to figure it out entirely for themselves.
- Don't overwhelm readers with monster 11-column, 30-row tables! Simplify the table data down to just that amount of data 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.

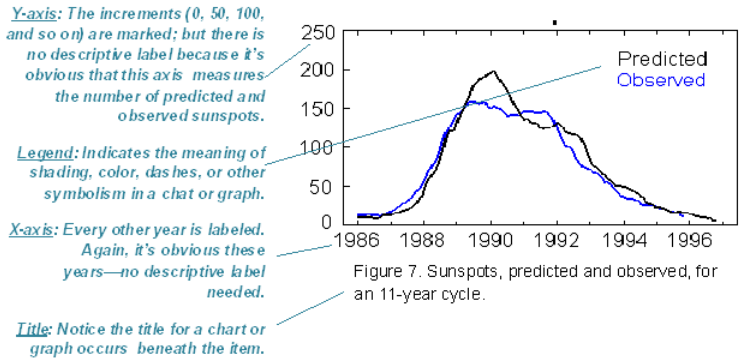



*Format for tables*. Watch for opportunities to convert text to table as in this example.

## Charts and graphs

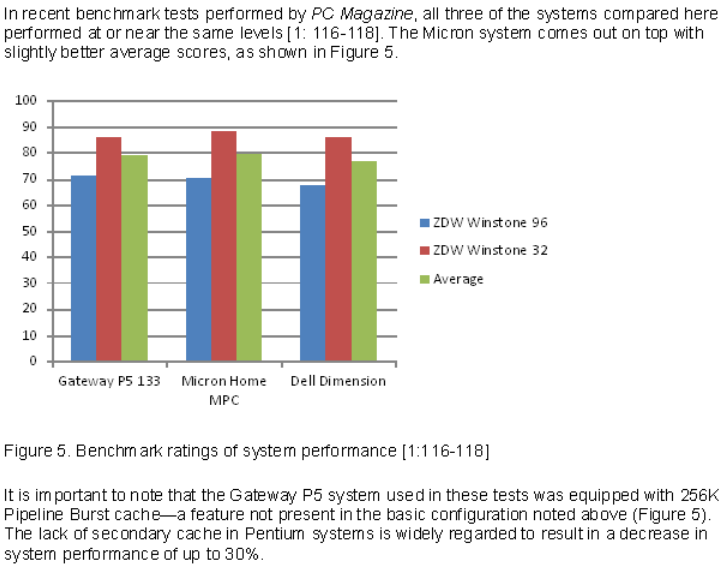
Charts and graphs are actually just another way of presenting the same data that is presented in tables—although a more dramatic and interesting one. At the same time, however, you get less detail or less precision in a chart or graph than you do in the table. Imagine the difference between a *table* of sales figures for a ten-year period and a *line graph* for that same data. You get a better sense of the overall trend in the graph but not the precise dollar amount.

Formatting requirements. When you create charts and graphs, keep these requirements in mind (most of these elements are illustrated below):

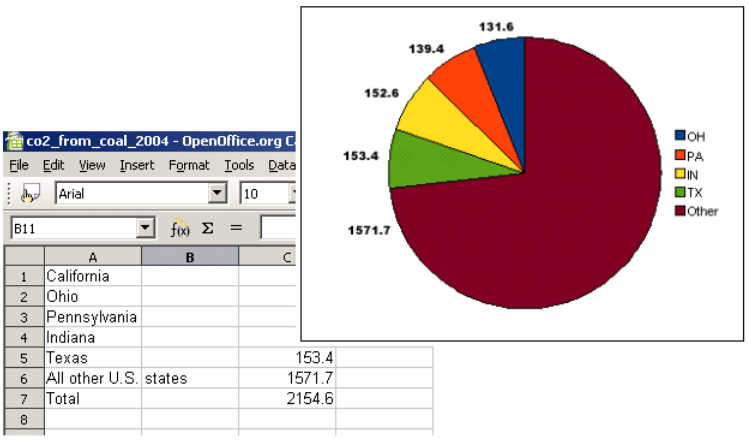



*Example of a graph*. Notice that a *figure* title is placed beneath the graph.

- **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.
- **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.




*Example of a column chart*. Notice that text above and below the chart calls attention to the chart and briefly indicates its significance.




*Example of a pie chart*. Notice that the the slices go clockwise from largest to smallest (roughly). *Source:* Municipal Solid Waste Generation, Recycling, and Disposal in the United States, U.S. Environmental Protection Agency, Office of Resource Conservation and Recovery, 2014.

- **Documentation**—When you borrow information to create a graphic, be sure to use the standard format to indicate the source. See the section on documenting borrowed information (either textual or graphic). 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.

## Citing sources of tables, charts and graphs: indicating sources

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. For details on the contents of the source citation, see the section documentation.

## 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. This is explained in the section on documentation and is illustrated here in this chapter.
- 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.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 3.8: Graphics

## Picture this

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. Once you get the hang of putting graphics like these into your writing, you should consider yourself obligated to use graphics whenever the situation naturally would call for them.

Unlike what you might fear, producing graphics is not such a terrible task—in fact, it's fun. You don't have to be a professional graphics artist or technical draftsperson to produce graphics for your technical writing. There are ways to produce professional-looking graphics with tape, scissors, white-out, and a decent photocopying machine.

## Graphics—an overview

Before getting into details on creating, formatting, and incorporating graphics, consider the types and their functions. You can use graphics to represent the following elements in your technical writing:

- *Objects* — If you're describing a fuel-injection system, you'll probably need a drawing or diagram of the thing. If you are explaining how to graft a fruit tree, you'll need some illustrations of how that task is done. Photographs, drawings, diagrams, and schematics are the types of graphics that show objects.
- *Numbers* — If you're discussing the rising cost of housing in Austin, you could use a table with the columns being for five-year periods since 1970; the rows could be for different types of housing. You could show the same data in the form of bar charts, pie charts, or line graphs. Tables, bar charts, pie charts, and line graphs are some of the principal ways to show numerical data.
- *Concepts* — If you want to show how your company is organized, the relationships of the different departments and officials, you could set up an organization chart-boxes and circles connected with lines that show how everything is hierarchically arranged and related. This would be an example of a graphic for a concept: this type depicts nonphysical, conceptual things and their relationships.
- *Words* — And finally graphics are used to depict words. You've probably noticed how textbooks put key definitions in a box, maybe with different color. The same can be done with key points or extended examples. Not the sexiest form of graphics, but it still qualifies, and it's good to keep in mind as a useful technique in certain situations.

## Drawings, diagrams, photos

To depict objects, place, people and relationships between them, you can use photos, drawings, diagrams, and schematics.

**Uses of illustrations and photos.** In the realm of illustrations and photographs, the types run from minimal detail to maximal. A simple line drawing of how to graft a fruit tree reduces the detail to simple lines representing the hands, the tools, the graft stock, and graft. Diagrams are a more abstract, schematic view of things, for example, a wiring diagram of a clock radio; it hardly resembles the actual physical thing at all. And of course photographs provide the most detail of all. These graphics, supplying gradations of detail as they do, have their varying uses. Here are some examples:

- In instructions, simple drawings (often called line drawings because they use just lines, without other detail such as shading) are the most common. They simplify the situation and the objects so that the reader can focus on the key details.
- In descriptions, you would want to use drawings, but in this case drawings with more detail, such as shading and depth perspectives.
- In feasibility, recommendation, and evaluation reports, photographs are often used. For example, if you are recommending a photocopier, you might want to include photos of the leading contenders.

**Formatting requirements.** When you use an illustration in a report, there are several requirements to keep in mind (most of these are shown in the schematic illustration):

- *Labels* — Just about any illustration should contain labels — words and phrases — with pointers to the parts of the things being depicted.
- *Keys* — If the illustration has certain shadings, colors, line styles, or other such details that have a special meaning in the illustration, these should be indicated in a key — an area in an unused corner of the illustration that deciphers their meaning.

- *Titles* — Except in special cases, illustrations should have titles, and these titles should be numbered (Figure 1, Figure 2, and so on). The exceptions are these: if you have lots of illustrations (for example, in certain instructions, there are illustrations practically after every paragraph) and if there is no benefit from the titles; if you only have one or two illustrations and they are not cross-referenced; if you do not cross-reference your illustrations. In some of these cases, you might want to keep the title but discard the word "Figure" and the number following it.
- *Cross-references* — Almost all illustrations should be referred to from the relevant point in the discussion. And, do more than just tossing in a "(See Figure 2.)"; discuss the illustration a bit — focus readers' attention on the key details of the illustration.
- *Location within the report* — Ideally, you place illustrations just after the point where they are needed. However, sometimes because of the pagination (the way the text falls on the pages) and the size of the illustrations, this close placement is not possible. No problem — just put the illustration at the top of the next page; that is what the figure-numbering system is for.
- *Size of illustrations* — Again, ideally, you want illustrations to be between one-half to one-quarter of the vertical size of the page. You want them to fit on the page with other text. In fact, that's what you really want — to interperse text and graphics in a report. What you do *not* want is to append the illustration to the back of the report! When you have a large illustration, use a photocopier to reduce it.
- *Placement within margins* — Make sure that your illustrations fit neatly and comfortably within standard margins. You don't want the illustration spilling over into the right or left margins. You want to allow the equivalent of at least 2 blank lines above and below the illustration.
- *Level of technical detail* — And, rather obviously, you want illustrations to be at the right technical level for your readers. No chip circuitry diagrams for computer beginners!

**Producing illustrations.** Now for the question we're all waiting to ask — how to create graphics? There are several options: photocopying, scanning, clip art, and hand-drawing. (And now most mainstream word-processing applications enable you to generate various kinds of graphs and charts, not to mention graphics and business software.) In all of these production methods, don't forget that you must indicate the source of the borrowed graphic.

- *Photocopying* is the easiest solution to creating graphics — and it's legal (if you do it right)! Find the illustrations that you want, make good high-quality photocopies of them, trim off the figure titles and other unnecessary or inappropriate textual material (leave the labels and keys), and then leave space in your own document so that the trimmed photocopy will fit with at least 2 blank lines above and below it. Remember to reduce or enlarge the copy so that it fits nicely on the page. Also remember that ideal graphics are one-half to one-quarter the size of the page. Intersperse graphics with text! When you make the final copy of your document, tape in the copied graphics, photocopy the *entire* document, and hand in the photocopy (*not* the original).
- *Scanning* is a neat way to pull graphics into your document files. You don't have to tape them to a copy then photocopy the document — they are there, fully integrated. However, there are some pretty cheap scanners that produce blurry, low-quality images/. They're adequate for our technical writing course, but not for serious professional work.
- Lots of *clip art* is becoming available with software programs and on the Internet. For fairly common objects such as computers, telephones, and such, you can insert these into your document and add labels to them.
- *Hand-drawing* may not be as out of the question as you might think. Take a blank sheet of paper and start sketching lightly with a soft-leaded pencil. Keep working until you have the drawing the way you like. Then use a black marker to ink in the lines that you want, and erase the stray pencil markings. Now, treat this drawing the way you would any photocopied image. Cut it out, tape it in your document, photocopy it as well as all other pages, then hand in the photocopy.

See the discussion on indicating the source of borrowed information and the examples in the schematic illustration.

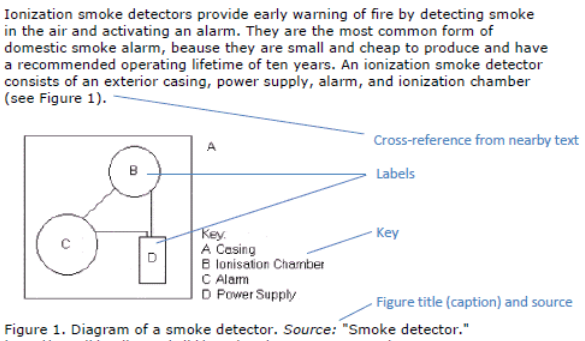



Figure 1. Diagram of a smoke detector. *Source:* "Smoke detector." http://en.wikipedia.org/wiki/Smoke_detector. Accessed June 6, 2014.

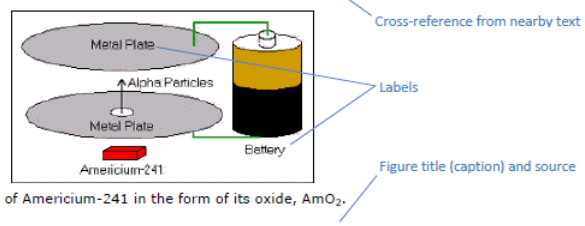



Figure 2. Ionization chamber of a smoke detector. *Source:* "Ionization chamber." http://en.wikipedia.org/wiki/Ionization_chamber. Accessed June 6, 2014.

*Elements of a pictorial graphic.* Notice that you can use a simpler means of indicating the source by using the same format as in regular number-system citations.

## Documenting graphics—indicating sources

As mentioned earlier, it's perfectly legal to borrow graphics—to trace, photocopy, scan, or extract subsets of data from them. But you're obligated to cite your sources for graphics just as you are for the words you borrow. Normally, this is done in the figure title of the graphics. Check the examples in the schematic illustration. For details on the contents of the source citation, see the section documentation.

## Guidelines for graphics—a review

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

- Use graphics *whenever* they would normally be necessary—don't wimp out because it seems like too much trouble! But at the same time, don't get hung up about creating perfect graphics (photocopies work just fine for our purposes as long as you cite your source). This course is a writing course, not a graphic-arts course.
- Always discuss graphics in nearby text preceding the graphic. Don't just throw a graphic out there unexplained. Orient readers to the graphic; explain its basic meaning.
- If a certain graphic is difficult to produce, discuss the problem with your instructor (you might be able to leave a blank with a descriptive note in the middle).
- Make sure your graphics are appropriate to your audience, subject matter, and purpose — don't zap beginners with advanced, highly technical graphics they can't understand.
- Intersperse graphics and text on the same page. Don't put graphics on pages by themselves; don't attach them to the end of documents.
- Use figure titles for graphics (only a few exceptions to this rule).
- Indicate the source of any graphic you have borrowed — this includes tables, illustrations, charts, and graphs. Whenever you borrow a graphic from some other source, document that fact in the figure title. This is explained in the section on documentation and is illustrated here in this chapter in the schematic illustration.
- Include identifying detail such as illustration labels, axis labels, keys, and so on. But don't hand-write them in — use the labels from the original photocopy or type them.

- Make sure graphics fit within normal margins—if they don't, enlarge or reduce the copies. Leave at least 2 blank lines above and below graphics.
- When you tape graphics in to your report, photocopy your *entire* report, not just the pages on which the tape-ins occur. Hand in the entire photocopied document, *not* the original and *not* a mixture of original and photocopied pages.
- Don't manually add color or other detail on the pages of the final copy that you intend to submitin other words, don't draw on the final copy. Any details like these should be added before photocopying. If you must have color, use color photocopying equipment.
- Place graphics as near to the point in the text where they are relevant as is reasonable. However, if a graphic does not fit properly on one page, put it at the top of the next, and continue with regular text on the preceding page. Don't leave half a page blank just to keep a graphic near the text it is associated with.
- Except for graphics that need no figure title, cross-reference all graphics from the appropriate text. In the cross-reference, give the figure number (figure title and page are optional), indicate the subject matter of the graphic, and provide explanatory information as necessary.

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# 3.9: Report format and final packaging

## Provide a structure and design that is expected

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 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.

Be sure and see the example reports.

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 either attached to the outside of the report with a paper clip or is bound within the report. 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.

Alan Chekhov
1203 Wood Dr
Hero, TX 7800
(512)000-000

10/31/2023

Senator David McMurrey, Chair
Texas Legislative Council
Robert E. Johnson Building
1501 N. Congress Ave.
Austin, Texas 78701

**SUBJ**: Proposal to legalize recreational use of psilocybin mushrooms in the state of Texas.

This proposal will outline the benefits of psilocybin mushrooms in relation to mental health, economic benefits, and the reduction of criminalization. Included will be an outline, a timeframe of completion, references from cities of the United States that have legalized recreational use, references from countries that have legalized recreational use, and charts.

Thank you for your examination of this proposal. I may be reached anytime between 8:00 a.m.-10:00 p.m. at (512) 000-0000.

Sincerely,

Alan Chekhov
Enclosure

In the example of the transmittal letter in the following, notice the standard business-letter format. 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.** 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 another paragraph, listing questions you'd like readers to consider as they review the report.

## Cover and Label

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:

- Totally unacceptable are the clear (or colored) plastic slip cases with the plastic sleeve on the left edge. These are like something out of freshman English; plus they are aggravating to use—readers must struggle to keep them open and hassle with the static electricity they generate.
- Marginally acceptable are the covers for which you punch holes in the pages, load the pages, and bend down the brads. If you use this type, leave an extra half-inch margin on the left edge so that readers don't have to pry the pages apart. Of course, this

type of cover prevents pages from lying flat: readers must grab available objects or use various body parts to keep the pages weighted down.

- By far the best covers are those that allow reports to lie open by themselves (see the illustration in the next section). What a great relief for a report to lie open in your lap or on your desk. This type uses a plastic spiral for the binding and thick, card-stock paper for the covers. Check with your local copy shop for these types of bindings; they are inexpensive and add to the professionalism of your work. See the simulated example of a plastic spiral bnding in the following.

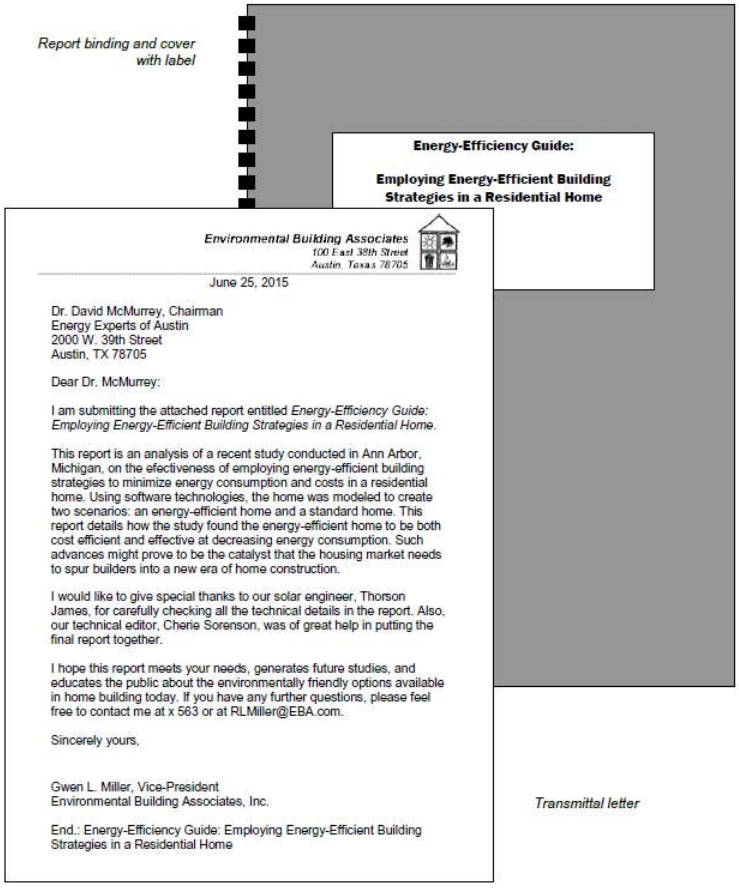
Generally less preferable are loose-leaf notebooks, or ring binders. These are too bulky for short reports, and the page holes tend to tear. Of course, the ring binder makes changing pages easy; if that's how your report will be used, then it's a good choice. At the "high end" are the overly fancy covers with their leatherette look and gold-colored trim. Avoid them—keep it plain, simple, and functional.

## 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.

Not much goes on the label: the report title, your name, your organization's name, a report tracking number, and a date. There are no standard requirements for the label, although your company or organization should have its own requirements. (An example of a report label is shown below.)

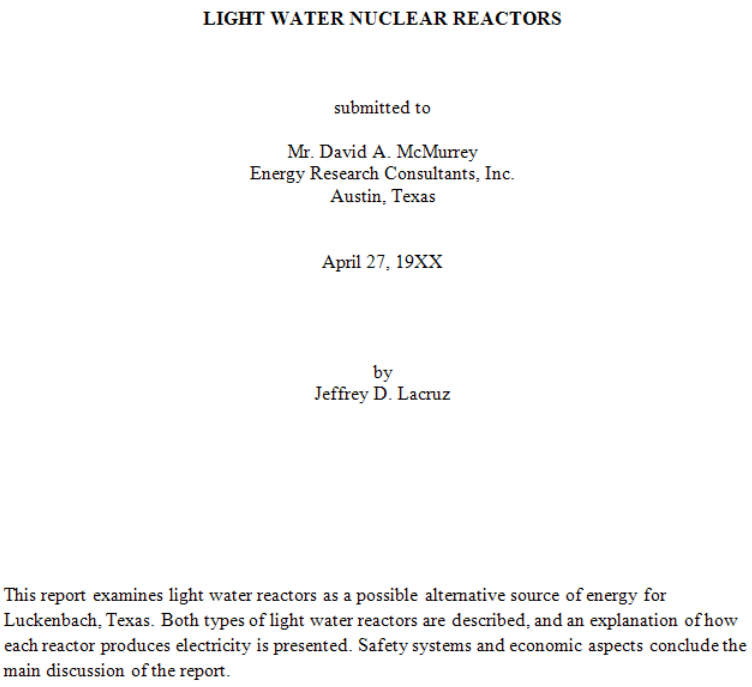



*Transmittal letter and report cover (with cover label).*

## Abstract and Executive Summary

Most technical reports contain at least one abstract—sometimes two, in which case the abstracts play different roles. Abstracts summarize the contents of a report, but the different types do so in different ways:

- **Descriptive abstract.** This type provides an overview of the purpose and contents of the report. In some report designs, the descriptive abstract is placed at the bottom of the title page, as shown in the following:



LIGHT WATER NUCLEAR REACTORS

submitted to

Mr. David A. McMurrey
Energy Research Consultants, Inc.
Austin, Texas

April 27, 19XX

by
Jeffrey D. Lacruz

This report examines light water reactors as a possible alternative source of energy for Luckenbach, Texas. Both types of light water reactors are described, and an explanation of how each reactor produces electricity is presented. Safety systems and economic aspects conclude the main discussion of the report.

*Descriptive abstract*. Traditionally, it is placed on the title page (not the cover page).

- **Executive summary.** Another common type is the executive summary, which also summarizes the key facts and conclusions contained in the report. See the example shown in the following. 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. Typically, executive summaries are one-tenth to one-twentieth the length of reports ten to fifty pages long. For longer reports, ones over fifty pages, the executive summary should not go over two pages. The point of the executive summary is to provide a summary of the report —something that can be read quickly.

If the executive summary, introduction, and transmittal letter 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 some duplication so that readers will be sure to see the important information no matter where they dip into the report.

## Table of Contents

You're familiar with tables of contents (TOC) but may never have stopped to look at their design. The TOC shows readers what topics are covered in the report, how those topics are discussed (the subtopics), and on which page numbers those sections and subsections start.

In creating a TOC, you have a number of design decisions:

- **Levels of headings to include.** In longer reports, consider including only the top two levels of headings. This keeps the TOC from becoming long and unwieldy. The TOC should provide an at-a-glance way of finding information in the report quickly.
- **Indentation, spacing, and capitalization.** Notice in the illustration below that items in each of the three levels of headings are aligned with each other. Although you can't see it in the illustration, page numbers are right-aligned with each other. Notice also the capitalization: Main chapters or sections are all caps; first-level headings use initial caps on each main word; lower-level sections use initial caps on the first word only.
- **Vertical spacing.** Notice that the first-level sections have extra space above and below, which increases readability.

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 change the TOC accordingly. See the example of a table of contents:

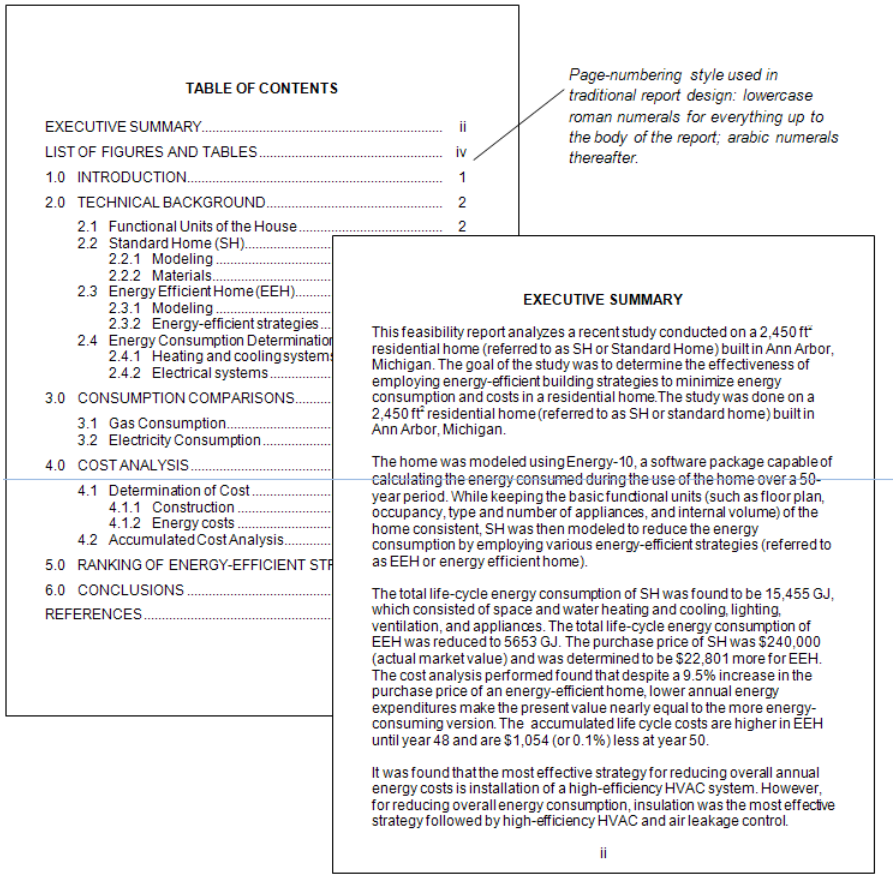



*Table of contents (which comes first) then the executive summary*. This TOC uses decimal-numbering style for the chapter and section numbers, which is common in reports. Others in this book use the uppercase roman-numeral style for the top-level chapters only (see DVD report).

## List of Figures and Tables

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

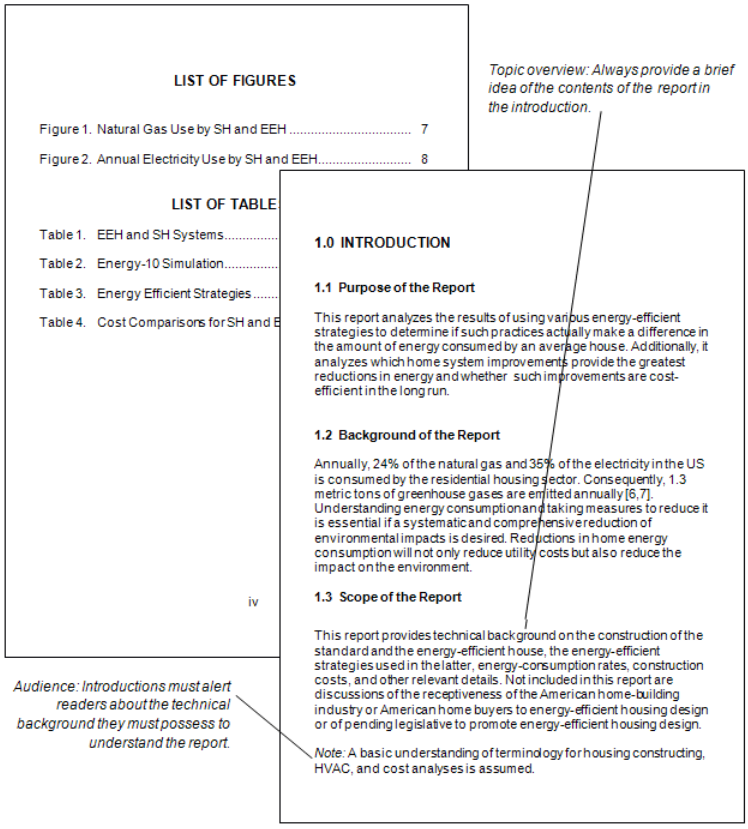
Complications arise when you have both tables and figures. Strictly speaking, figures are illustrations, drawings, photographs, graphs, and charts. Tables are rows and columns of words and numbers; they are not considered figures.

For longer reports that contain dozens of figures and tables each, create separate lists of figures and tables. Put them together on the same page if they fit, as shown in the illustration below. You can combine the two lists under the heading, "List of Figures and Tables," and identify the items as figure or table as is done in the illustration below.

## Introduction

An essential element of any report is its introduction—make sure you are clear on its real purpose and contents. In a technical report, the introduction prepares the reader to read the main body of the report. See introductions for a discussion of writing introductions.

See this example of an introduction:




*List of figures and tables followed by the introduction*. If there are no tables, make it "List of Figures." In a technical writing course, ask your instructor if the decimal-numbering style for headings is required.

## Body of the report

The body of the report is of course the main text of the report, the sections between the introduction and conclusion. Illustrated below are sample pages.

### 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. See headings for guidelines on headings.

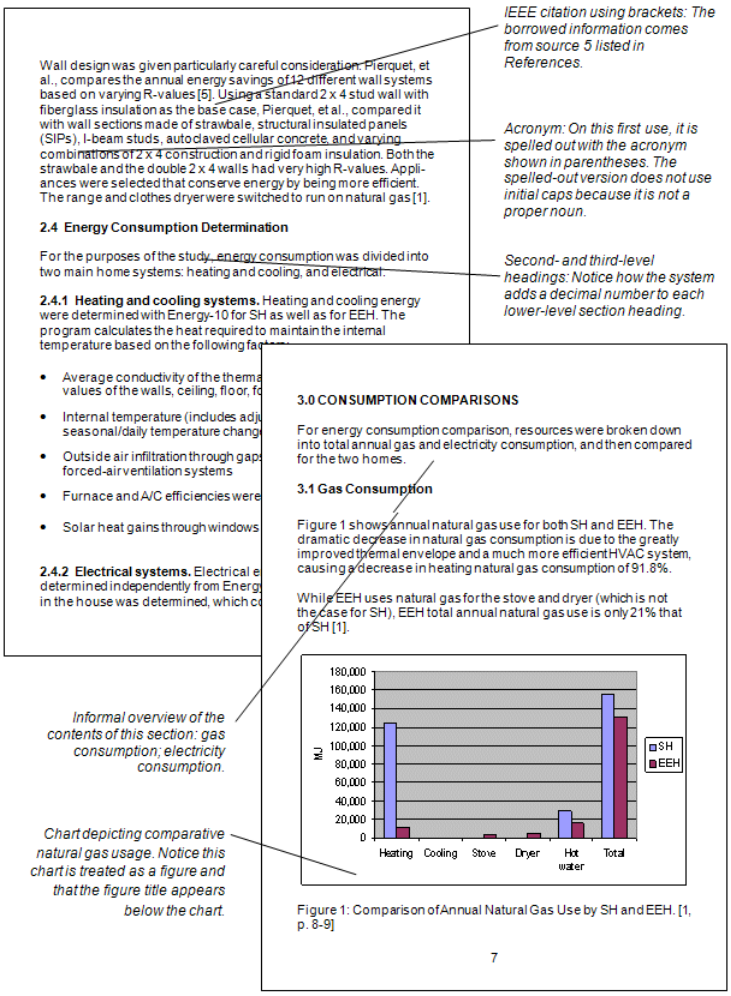
### Bulleted and Numbered Lists

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. See lists for guidelines on lists.

### 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 about writing out all numbers below 10 does not always apply

in technical reports. (See numbers vs words for guidelines.)




*Except from the body of a technical report.* In a technical writing course, ask your instructor if the decimal-numbering style for headings is required. Also, a different documentation system may be required—not the IEEE, which is for engineers.

## Graphics and Figure Titles

In 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. For strategies for adding graphics to reports, see graphics. For strategies for adding tables to reports, see tables.

## 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, they can point readers from the discussion of a mechanism to an illustration of it. They can point readers to an appendix where background on a topic is given (background that just does not fit in the text). And they can point readers outside your report to other information—to articles, reports, and books that contain information related to yours. When you create cross-references, follow these guidelines presented in cross-references.

## Conclusions

For most reports, you'll need to include a final section. When you plan the final section of your report, think about the functions it can perform in relation to the rest of the report. Ideas for final sections are presented in conclusions.

## Appendixes

Appendixes are those extra sections following the conclusion. What do you put in appendixes?—anything that does not comfortably fit in the main part of the report but cannot be left out of the report altogether. The appendix is commonly used for 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 body of the report. Anything that you feel is too large for the main part of the report or that you think would be distracting and interrupt the flow of the report is a good candidate for an appendix. Notice that each one is given a letter (A, B, C, and so on).

## Information Sources

Documenting your information sources is all about establishing, maintaining, and protecting your credibility in the profession. You must cite ("document") borrowed information regardless of the shape or form in which you present it. Whether you directly quote it, paraphrase it, or summarize it—it's still borrowed information. Whether it comes from a book, article, a diagram, a table, a web page, a product brochure, an expert whom you interview in person—it's still borrowed information.

Documentation systems vary according to professionals and fields. Engineers use the IEEE system, examples of which are shown throughout this chapter. Another commonly used documentation system is provided by the American Psychological Association (APA). See documentation for details.

## Page Numbering

Page-numbering style used in traditional report design differs from contemporary report design primarily in the former's use of lowercase roman numerals in front matter (everything before the introduction).

- All pages in the report (within but excluding the front and back covers) are numbered; but on some pages, the numbers are not displayed.
- In the contemporary design, all pages throughout the document use arabic numerals; in the traditional design, all pages before the introduction (first page of the body of the report) use lowercase roman numerals.
- On special pages, such as the title page and page one of the introduction, page numbers are not displayed.
- Page numbers can be placed in one of several areas on the page. Usually, the best and easiest choice is to place page numbers at the bottom center of the page (remember to hide them on special pages).
- If you place page numbers at the top of the page, you must hide them on chapter or section openers where a heading or title is at the top of the page.

Note: 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). Similarly, tables and figures would use this numbering style. This style eases the process of adding and deleting pages.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

---

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# 3.10: Highlighting and emphasis

## Cue readers about what to do, what's important

*Highlighting*, as the term is used here, is the use of typographical effects to call attention to text. These effects can include italics, bold, all-caps, quotation marks, color, and so on. Highlighting calls readers' attention—or "cues" them"—to actions they must take or to information they must consider carefully.

One of the problems in technical writing—in particular, technical writing about computers—involves the use of the various techniques for emphasis. Unfortunately, some technical texts go overboard on the use of the various emphasis techniques which are discussed here.

## Highlighting Fundamentals

Consider a few fundamental principles of emphasis:

"Highlighting cues readers when they are to press something, enter something verbatim, or pay special attention to something."

- Practically any special textual effect that is different from regular body text can function as an emphasis technique. Things like italics, bold, underscores, caps, different size type, alternate fonts, color, the various graphical ingenuities (showing, reverse color, outline fonts) can act as emphasis techniques.
- Used in excess, any emphasis technique or combination of emphasis techniques can lose their ability to emphasize and become busy and distracting. Used in excess, any emphasis technique or combination of emphasis techniques can cause readers to be reluctant to read a text, if not avoid it altogether. Notice how unreadable the overly highlighted version of the notice is in this popup; also notice that it does not use the notice type recommended in notices.
- When extended text must be emphasized, use the special-notice format (rather than creating all-bold or all-caps paragraphs, for example).
- A carefully planned functional relationship must exist between the text that is emphasized and the emphasis technique that is used.
- Emphasis techniques must be used consistently to prevent readers from becoming confused.
- To promote consistency, you must use a style guide or style sheet, which records and then dictates all of your decisions about how you are going to use emphasis techniques.
- To help your readers understand your highlighting scheme, you can include a brief section somewhere in your document (usually in the preface) explaining how you're going to be using the emphasis techniques.

In the following discussion, you'll notice that any system of emphasis techniques can get quite complicated and hard to remember for writers and editors. You'll notice that there are many equally valid ways of using emphasis techniques: for example, in some cases, it's arbitrary whether you use bold or italics for simple emphasis. To address this problem, you must document your highlighting guidelines in a style guide that writers and editors (or just you) can refer to. A style guide is simply a record of the decisions you and your documentation team have made about how you want your documents to look.

Your readers also need to be informed as to the highlighting scheme you plan to use. This can be handled in the preface: include a section called "Highlighting" or "Typographical Conventions" where you list how you use italics, bold, fonts, and other such effects. For an example, see the discussion of prefaces in the chapter on standard components of technical books

## Specific Emphasis Techniques

This next section goes one by one through the various emphasis techniques, explaining the common practices.

**Note:** To keep things simple, highlighting issues for tables, figures, headings, lists, and notices are presented in those sections.

### Bold

In publishing, technical publishing in particular, usage is mixed as to whether to use bold or italics for basic emphasis. For example, if you want to emphasize that readers should not turn off the computer without first shutting it down, the "not" can be bold or italics. Traditionally, italics has been used, but, perhaps because of computers, bold is commonly used as well.

Whichever technique you use, use it consistently throughout your text or library of related texts. By the way, readers are not likely to be able to distinguish between levels of emphasis: for example, using italics for important text and bold for very important text is likely to be lost on most readers.

If you are tempted to make an entire paragraph bold, remember one of the principle of emphasis discussed above: using too much of an emphasis technique causes the effect of the technique to be lost. Not only that, but too much emphasis makes readers less inclined to read. Instead of carefully reading an all-bold paragraph, readers may just ignore it entirely!

Instead of creating an all-bold paragraph, use the special-notice format. In it, a key word (for example, Important, Note, Danger, Caution, Warning) is bolded, while the rest of the text is left regular roman (that is, the same font and style as the regular body text).

Legitimate use of bold in technical texts varies widely. As long as you develop a scheme that is directly related to the reader's need and to the characteristics of the text (or technology) and that does not lead to overkill, your use of bold should work fine.

Here are some common, standard uses of bold:

- **Simple emphasis.** As discussed in the preceding, some technical texts use bold for simple emphasis instead of the traditional italics. For example, "Do **not** turn off the computer before shutting it down."

- **Commands.** Computer texts commonly use bold for commands, for example, "Use the **move** command to rename UNIX files." See the section on highlighting computer text for a review of the complete set of emphasis techniques.

- **Buttons that initiate commands.** In a graphical user interface, some of the buttons initiate commands. For example, "press the **Exit** button to exit the application."

- **Field labels.** While some computer text bolds field labels, it is not general practice because it leads to highlighting overkill. For example, "In the **Indentation** area of the dialog box, click on **Left**." More common is to use the cap style used on the screen. It's preferable to write this: "In the Indentation area of the dialog box, click on **Left**."

- **Icons or keyboard or mouse buttons.** While not universally observed, another highlighting technique that follows this system logically is to bold the name of a keyboard key or mouse button. For example, "Press the **Q** key or the **left** mouse button." In keeping with this system too is to use bold on icons: "Click the **Start** icon."

- **Labels on hardware.** Another practice that is common in computer publishing is to bold the name of a hardware label. For example, "Press the **Reset** button to reboot the computer."

You'll notice that the preceding discussion stated no absolute rules. That's the way it is—technical publishing practice is quite varied. The main idea is to develop a logical, controlled system of highlighting, use it consistently, and document it in a style guide so that you and your documentation team members can refer to it.

### Italics

Here are some of the standard uses for italics:

- **Simple emphasis.** As mentioned earlier, usage is mixed on whether to use bold or italics for simple emphasis, although italics has been traditional: for example, "Do *not* turn off the computer before shutting it down." Whichever you use, be consistent with it, and document it in your style guide or style sheet so that everybody on your document team can see it. If you're not sure which to use, use italics for simple emphasis: it's less busy.

- **Variables .** In computer publishing, one of the most common uses of italics is for variables. For example:

  `copy` *`oldfile newfile`*

  Users know not to type `oldfile` or `newfile` but to substitute their own file names instead.
- **Definitions in definition (two-column) lists.** While bold is more common for the items in the left column of a two-column list, italics is also used. (See the discussion of two-column lists in the preceding section on bold.)
- **Terms where the term is defined.** A nice touch is to italicize a word where it is defined in regular body text.

### Underscores

There is almost no reason for using underscores in technical text. In the days of typewritten text, there certainly was. However, in these times, when bold, italics and other such typographical effects are readily available, underscores look obsolete. If you want to emphasize something, use your standard guidelines—for example, use italics or bold. Don't try to create gradations of emphasis: for example, a scale of increasing importance ranging from italics to bold to underscore will be lost on your readers.

If you see good use of underscores in technical text, it will probably occur in heading design.

### Capitalization

In technical publishing, there seems to be a running battle between technical writers and technical experts over capitalization. Technical experts like to use initial caps for practically every component and process in a system. Also, technical experts (and management) typically use all caps for text they consider important and want readers to attend to. Meanwhile, technical writers and editors (rightly) insist on using caps for proper names only.

As a technical writer, hold the line against capitalization. Capital letters are distracting; all-caps text is uncomfortable to read. Capital letters create a busy text, which sends lots of unnecessary signals. Capital letters are traditionally intended for proper names such as Microsoft, Netscape, Gateway, Dell Computers, WordPerfect, and so on. The classic guideline in technical publishing is to capitalize the names of *separately orderable products* only. However, the politics of organizations bends this guideline considerably. If a company is proud of a certain feature in its new release, for example, EnergyMiser, it will capitalize it, even though you can't order it separately.

Here are some typical guidelines for capitalization:

- Use the exact capitalization style of messages shown on the computer screen, menu or screen names, field names, hardware labels, and so on. (In rather old interfaces, all-caps was used for things like field, menu, and screen names. A common practice in these cases is to use initial-caps for references to these things in the regular text. The principle here is that unnecessary all-caps in regular text is distracting.)
- Do **not** use capital letters for emphasis; use italics or bold instead.
- Do not use all-caps for any extended text; use the special-notice format instead.
- Do not capitalize the names of the components or processes of a product. Capitalize only the names of products, that is, components that are separately orderable.

  For example, your product may be called WordStuff and of course it must be capitalized according to the style dictated by the marketing and product planners. However, one of WordStuff's features called "spell checker" shouldn't be capitalized—just about everybody has one of those. However, WordStuff may have a feature called "ZippyFormat" and another called "Image Worker." Even though these are not separately orderable, you will want to use the initial-cap style because of their special style and their marketing value. "Image Worker" is obviously something WordStuff, Inc., wants to show off—therefore, the caps.

But when you have to break rules like this, the exceptions need to go in the style guide or style sheet.

### Single or double quotation marks

Quotation marks are often mistakenly used as emphasis techniques in technical text. As a technical writer, limit quotation marks to the traditional usage, which includes quoted speech; numbers, letters, or words referred to as such. Quotation marks, like capital letters, tend to create a busy, distracting text and therefore should be avoided.

One legitimate use of double quotation marks is odd, quirky, nonstandard use of words (called "scare quotes" by *Chicago Manual of Style*). For example:

```
In a core dump, the computer "barfs" all data into a single file.
```

Well-designed computer text avoids quotation marks rather vigorously. One of the primary reasons is that some readers might mistakenly assume that they must include the quotation marks in the commands they enter.

| | |
|---|---|
| *Instead of* | Use the "move" command. |
| *Write* | Use the **move** command. |
| | |
| *Instead of* | Enter "copy install installnow." |
| *Write* | Enter `copy install installnow` |

Note: While some technical texts have well-defined uses for single quotation marks, in general there is no standard use for single quotation marks, other than the traditional quotation-within-a-quotation rule and the quirky-usage rule. When you see single quotation marks within technical text, there is usually no more rationale for their use than there is for double quotation marks.

### Alternate fonts

One of the most common styles involving alternate fonts is to use Courier or some similar monospaced, old-typewriter-style font in contrast to the standard body font (such as Times New Roman or Helvetica). You can create this effect in a 1web page by using a CSS style like . For example, "type `install` to install the program."

Here's a review of the common uses of alternate fonts:

- *Example text*. To signal that an example rather than a required entry is being shown, an alternate font like Courier is often used:

  > For example, if you want to copy a file, type `copy yourfile.txt myfile.txt`. A file called `myfile.txt` will be created, and its contents will be the same as `yourfile.txt`.

- *Displayed text*. Computers and other equipment typically display things such as warnings or status codes or error messages. These appear on monitor or in LCD panels and the like. When you refer to this displayed text, you can use an aternate font such as Courier. For example, "If the directory does not exist, the system will respond with `No such file or directory`." Or, "As the computer boots up, the digital read-out window will display `8888`."
- *Extended code samples*. In computer programming texts, extended programming samples are often shown in Courier, for

example:

```
#check for mean hackers
if ($address1 eq "" & $address2 eq "") { &wicked_address (500, "Search Error",
"Please enter a name."); } elsif ($address1 =~ /[;<>&\*`\|]/ | $address2 =~ /[;
<>&\*`\|]/) { &wicked_address (500, "Search Error", "Malformed e-mail address.
Please do not destroy our poor, humble, one-virtual-room schoolhouse!."); }
```

### Color

Color is used in technical text but it is expensive and hard to manage through the publishing cycle.

However, color is easy to use in online information. It's common to see hypertext links, for example, using color. Online helps typically use green while web pages typically use blue for new links and purple for links the user has already explored.

The tendency to use color indiscriminately in online information is much like the tendency to go wild with bold, italics, type sizes, and alternate fonts in hardcopy information. The feeling must be something like, "It's there, it's cool, so let's use it!"

If you want to use color, plan it carefully. Don't expect readers to remember that red signals one idea, blue another idea, and green still some other idea. Just stick to one color. In general, avoid using color for extended text. Instead of making an entire warning notice red, just make the Warning label red and leave the warning text regular roman (text like the regular body text).

Better still, read some of the standard literature on color in the technical communication field. There are general design issues and international issues:

- Using color. Provided by the U.S. Web Design System (USWDS).
- An International Guide to the Use of Color in Marketing and Advertising. Different significations that red, for example, has internationally. Check out its International Color Symbolism Chart. Source: Six Degrees, LLC
- Remember that, according to an article in Wikipedia, "About 8% of males, and 0.4% of females, are red–green color blind in some way or another, whether it is one color, a color combination, or another mutation."

### Combinations of the preceding

In general, it's a bad idea to combine emphasis techniques, for example, bold and italics. In nonprofessional technical text, you'll see such garish combinations as all all-caps bold-italics or all-caps bold-italics with double quotation marks. Avoid these!

One legitimate combination is to use italics with alternate fonts. For example, when you show the syntax of a command, you want the entire text to be in Courier, but you also want the variables to be in italics:

`copy` *`OldFileName NewFileName`*

## Functional Names for Character Styles and Tags

If you have ever been around the publishing industry, you may have encountered something called *semantic markup*. This means naming sections of text according to the structural role they play in the document—for example, `heading`. The reader does not see these names, but they play an important role in how the document is formatted and how it can be reused.

This same idea applies to words in phrases within text. For example, in the HTML for a web page, you can use the `<b>bolded word</b>` tags to make a word bold. But bold does not indicate the function of the word or phrase. Instead, `command` would or `interface_label` would. Therefore in semantic markup using HTML CSS, things are more functional if they look like this: `<span class="command">bolded word</span>`.

Files using HTML and CSS are typically converted to other media such as PDF or even to and from XML. Using *functionally* named highlighting styles, as described just above, can greatly ease the conversion process.

## Further Explorations

Once you've read the preceding, a good thing to do next is to explore technical publications to see what highlighting schemes they use. Watch for the way things like bold, italics, caps, alternate fonts, and other such effects are used. Most likely, you'll see very different usage than what you've read about here. As you explore, think about the logic of the emphasis techniques you see being used; try to formulate the rules that the writers seem to be using; watch for inconsistencies in highlighting; and think critically about the usage you see—is it logical? overkill? "underkill?"

After you've done some exploring like this, the next logical step is to read the chapter on style guides, if you've not already done so. Highlighting schemes must be documented in style guides so that you won't forget them and so that your documentation team members can refer to them.

## Highlighting Scheme

If all the options and alternatives discussed previously have you overwhelmed, consider using the following highlighting scheme. It's based on highlighting you'll find in many UNIX, Windows,and Linux documents.

| | |
|---|---|
| Names of fields, folders, dialogs (boxes), menus (any interface object that users do *not* click on) | Cap style on screen; regular roman |
| Names of icons | Cap style on screen; bold |
| Buttons (or functional equivalent if not so labeled) | Cap style on screen; bold |
| Menu selections, selectable options | Cap style on screen; bold |
| Commands entered verbatim with no parameters or flags | Bold |
| Text entered or displayed | Courier New (if necessary, 1-point size smaller than body font) |
| Variables | Italics; regular roman |
| Programming code | Courier New; regular roman; if necessary, 1-point size smaller than body font |
| Labels on hardware | Courier New; bold; if necessary, 1-point size smaller than body font |

"Avoid highlighting overkill. Use notices to eliminate garish unreadable combinations of bold, italics, color, and all caps."

*Notes:*

1. *Regular roman* refers to whatever the font and font size that is used for body text.
2. While these suggestions recommend "cap style on screen," developers sometimes have an unfortunate tendency to use all caps. Because an all-caps style cuts down on readability, use initial caps (title case).
3. If you show users how to enter a command including example text, don't bold the command that occurs in the example text:

   Use the **mv** comand to change the name of location of a file, for example:
   `mv thisfile.txt thatfile.txt`.

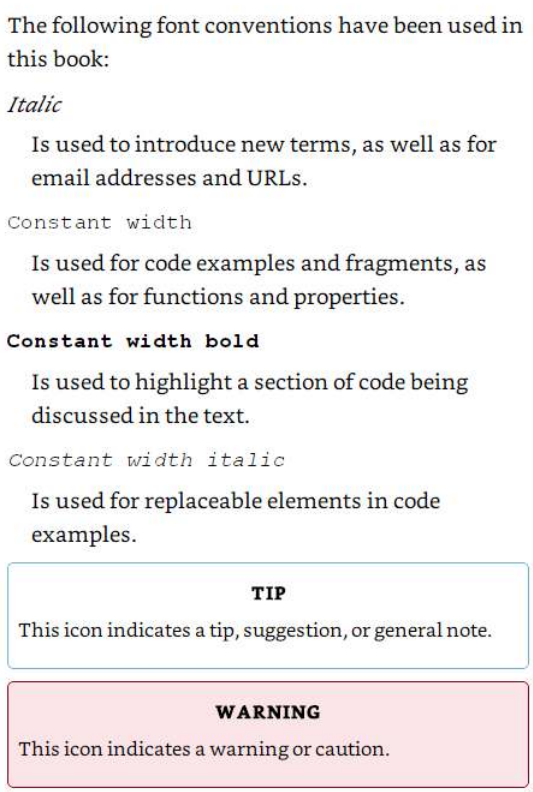
4. If you show users how to enter a command including example text, and include variables in the example text, use italics on the variables.

   Use the **mv** comand to change the name of location of a file:
   `mv` *`my_file.txt your_file.txt`*.

5. If you simply refer to the name of a screen or menu that is not clicked or initiates any event, use cap style on screen and regular roman.

6. Some styles bold the action that users are to take (for example, **press**, **enter**, **delete**). That certainly is an option, but for me it's too much highlighting.

User guides often place a chart for the meanings of highlighting fonts, colors, and typography in the preface:



The following font conventions have been used in this book:

*Italic*

Is used to introduce new terms, as well as for email addresses and URLs.

`Constant width`

Is used for code examples and fragments, as well as for functions and properties.

**`Constant width bold`**

Is used to highlight a section of code being discussed in the text.

*`Constant width italic`*

Is used for replaceable elements in code examples.

**TIP**

This icon indicates a tip, suggestion, or general note.

**WARNING**

This icon indicates a warning or caution.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response.

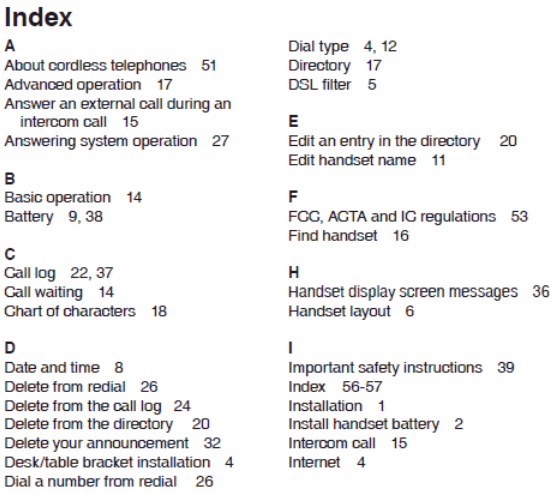
---

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# 3.11: Indexing

## Pointing readers to the right stuff

As a technical writer, you'll typically have to create indexes for the print books and for online helps you develop. The type of index we mean here is the classic back-of-book index that shows page numbers on which topics and subtopics occur within the book. An online index is much the same except that you supply hypertext links rather than page numbers.



**Index**


**A**
About cordless telephones 51
Advanced operation 17
Answer an external call during an intercom call 15
Answering system operation 27

**B**
Basic operation 14
Battery 9, 38

**C**
Call log 22, 37
Call waiting 14
Chart of characters 18

**D**
Date and time 8
Delete from redial 26
Delete from the call log 24
Delete from the directory 20
Delete your announcement 32
Desk/table bracket installation 4
Dial a number from redial 26
Dial type 4, 12
Directory 17
DSL filter 5

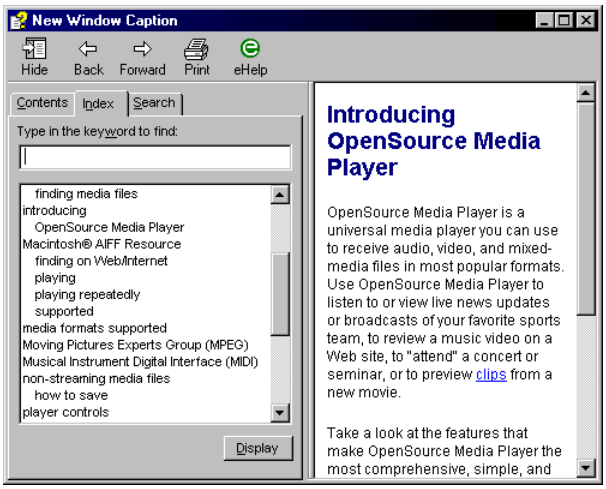
**E**
Edit an entry in the directory 20
Edit handset name 11

**F**
FCC, ACTA and IC regulations 53
Find handset 16

**H**
Handset display screen messages 36
Handset layout 6

**I**
Important safety instructions 39
Index 56-57
Installation 1
Install handset battery 2
Intercom call 15
Internet 4


*Index in a print document*




*Index in an online-help system (left panel)*

## Rough-Drafting an Index

As with any writing project, there is a rough-drafting phase for indexing. And of course, you need to think about your audience—who they are, how they'll use the index, why they'll use it, and what sorts of terminology they might be accustomed to. After that, here's what to do next:

1. **Convert each heading into multiple index entries.** Headings are a good place to start: they indicate topics and subtopics—precisely what an index does. However, don't just copy headings directly into an index and walk away. As you will see below, you need to cross-list heading-based entries in as many ways as practically possible.
2. **Cross-list each entry.** Rearrange each of your heading-based entries in as many practical ways as you can. For example, a heading such as "Changing screen resolution" can be indexed as "screen resolution, changing" as well as "changing screen resolution." You might also include "resolution, changing screen." These cross-listed entries attempt to anticipate all the likely

ways a reader might look for this topic in an index: "screen," "resolution," or "changing."

Here are some additional examples:

| Heading | Index entries |
|---|---|
| Optimizing Video Display | video display, optimizing<br>optimizing video display<br>display, optimizing video |
| Playing Streaming Multimedia | streaming multimedia, playing<br>playing streaming multimedia<br>multimedia, playing streaming |
| Networking Basics | networking<br>networks |
| Introducing Streaming Multimedia | streaming multimedia<br>multimedia, streaming |

Notice that you can't always cross-list index entries on every word. For example, "introducing streaming multimedia" in the preceding just wouldn't work. Would any reader ever look for this topic starting with "introducing"?

3. **Create synonym entries.** Readers don't necessarily use the same terminology as you do in your documentation. They may call a diskette drive a "floppy drive." They may refer to a display as a "monitor." As an indexer, you must anticipate these common variations in terminology. In the preceding entries, it would be a good idea to have a synonym for "video display" such as "monitor." But instead of repeating the page numbers, use a *See* reference. That way, you point readers to the preferred term. (Of course, if there is only one page number, just repeat it with the synonym entry.)

   Here are some additional examples:

| Index entry | Synonym entries |
|---|---|
| volume, adjusting | loudness, adjusting |
| transmission rate | speed, transmission |
| capturing video | copying video |

4. **Review the text for additional index entries.** It's ordinarily not enough just to index by headings. You have to dig down in the text for concepts, terms, and tasks that are not represented by the headings. For example, under the heading "Creating a Multimedia Stream," you might see definitions of "capturing" and "encoding." These are important terms, but they appear nowhere in the headings—index them too! In this case, you'd want to create these additional index entries: "capturing streams" and "encoding streams."
5. **Index front and back matter.** Don't forget to dig around in the preface, safety notices, appendixes, and other such peripherals for additional index entries. Typically, technical-support numbers and addresses are shown in the preface. Index them—and

don't forget to create cross-listed entries and synonym entries for them as well.

| Index entry | Cloned and synynom entries |
|---|---|
| technical support | support, technical<br>help desk<br>problems |

## Revising and Finetuning an Index

Once you've brainstormed all the index entries that you can think of, it's time to see what the index looks like and start working it over. To revise a rough-draft index:

1. **Build a first-draft index.** Once you've created as many index entries, cross-listings, and synonyms as you can, it's time to "build" a first draft of the index. Unless you are working the old-fashioned way with index cards, you can get your software application to do this for you. For example, if you work in a desktop publishing system, you've gone through your text inserting index entries. The same process applies to help-authoring tools. When you build the first-draft index, don't be dismayed. It's just a rough draft, to which you'll need to apply several kinds of revision.
2. **Toss useless entries.** In the preceding steps, you've been rough-drafting the index. In that phase, you don't get hung up about the exact phrasing of entries or the likelihood that anybody would ever use them. But now is the time to start weeding out the entries that no reader would ever use. For example, first-level entries beginning with "introducing," "using, "about" are not likely to be useful. Delete them! But don't delete them from the built index. Go back into your document and get rid of the original index entry.
3. **Consolidate entries with similar phrasing.** You'll also find lots of entries that have only minor variations in phrasing. For example:

| Rough-draft entries | Revised entries |
|---|---|
| technology, streaming multimedia<br>technologies, streaming multimedia | technologies, streaming multimedia |
| video display<br>video displays | video displays |
| change screen resolution<br>changing screen resolution | changing screen resolution |

   As you can see in these examples, singular/plural entries and verb variations are the most common causes of similar phrasing in index entries. Your house style may dictate using singulars as opposed to plurals. Whichever way you handle these, just be consistent.
4. **Group similar entries.** You'll also see entries that need to be grouped and subordinated. For example, they may all begin with the same word, but have different modifiers. Here's an example:

| Similar entries | Grouped and subordinated entries |
|---|---|
| projector, defined<br>projectors, compiling<br>projectors, considerations<br>projectors, creating<br>projectors, troubleshooting | projectors<br>compiling<br>considerations<br>creating<br>defined<br>troubleshooting |

5. **Rework entries with excessive page entries.** Some organizations have actual style-guide rules concerning how many page references following an index entry are allowable. Three is a common maximum; two is aggressive, ambitious. For example, "programming syntax, 12, 45, 74, 122, 219, 222." A string of anonymous page references like this helps no one. Instead, identify the subtopic for these page references. Here's a example:

| Too many unidentified page references | Subordinated and labeled entries |
|---|---|
| projectors, 124, 136, 154-155, 156 157 | projectors<br>compiling, 154-155<br>considerations, 156<br>controls, 136<br>defined, 124, 136, 157 |

A very good touch you don't often see in indexes is the page range on which a topic is discussed—even if there are subentries. If it were accurate, you could have entry like this: "projectors, 126–137"

6. **Look for entry groupings.** A nice useful touch in indexes is to hunt for ways that you can group entries. For example, imagine a user guide that explains the various dialog boxes that pop up in the application. There's the Password dialog box, the New User dialog box, the Delete User dialog box, and so on. How about repeating all those entries under "dialog boxes"?

| Entries | Grouped entries |
|---|---|
| *(entries are scattered throughout the index)* | |
| Add User dialog box<br>...<br>Delete User dialog box<br>...<br>New User dialog box<br>...<br>Password dialog box | Add User dialog box<br>...<br>Delete User dialog box<br>...<br>dialog boxes<br>Add User<br>Delete User<br>New User<br>Password<br>...<br>New User dialog box<br>...<br>Password dialog box |

7. **Look for shift-up entries.** In your indexing work, you may have some subentries that need to be copied out as main entries.

| **Entries** | **Shifted-up entries**<br>*(entries are scattered throughout the index)* |
|---|---|
| batteries<br>disposing, 33<br>explosion warning, 34<br>manufacturer recommendation, 34<br>polarity, 33-34<br>purchasing, 33<br>replacing, 33-34<br>tabs, 33(illus) | batteries<br>disposing, 33<br>explosion warning, 34<br>manufacturer recommendation, 34<br>polarity, 33-34<br>purchasing, 33<br>replacing, 33-34<br>tabs, 33(illus)<br>disposing, batteries, 33<br>...<br>polarity, batteries, 33-34<br>...<br>warning, battteries, 34<br>... |

In this example, the indexer thought some (probably not many) readers would look up "polarity" first as opposed to "batteries, polarity." Similarly, the indexer thought people might look up "disposing" first. Even though possibilities like these are small, put them in the index anyway.

8. **Look for *See also* and additional *See* references.** Toward the end of your revising phase, take a look at your index for the possibility of *See also* references. *See also* references are for closely related terms that readers might choose by mistake. For example, in the old DOS systems, there was the **copy** command and the **xcopy** command. The two commands are so closely related in name and in function that you'd want to put *See also* references to each other. And don't forget the *See* references: those point readers from synonym terms to the terms you prefer to use and index by in your book.
9. **Check the style and mechanics of index entries.** The organization for which you work may have its own house style guide or refer you to some standard style such as the *Chicago Manual of Style*. Look at these very carefully for how they tell you to capitalize and punctuate index entries. Indexes commonly use lowercase on all nonproper-noun entries, but a certain percentage do use initial caps on first-level entries. Most styles have you put a comma just after the index term and before the page numbers; but a few do not. Some styles require you to use the same highlighting in the index as you do in the main text. If something is bold in the main text, they want it bold in the index too.

*Note:* This chapter uses a variety of punctuation and capitalization styles—not to confuse you, but to make you aware of stylistic variability.

| **One common index style** | **Another common index style** |
|---|---|
| projectors, 123<br>compiling, 154-155<br>considerations, 156<br>controls, 136<br>defined, 124, 136, 157<br>project profiles, 451-461 | projectors<br>compiling 154-155<br>considerations 156<br>controls 136<br>defined 124, 136, 157<br>Project profiles 451-461 |

Notice in the righthand example that there is no comma between the index term and the page references. Also, you'll find that some indexing standards and styles disapprove of having a page reference on an index entry that has subentries: for example, "projectors, 123" in the lefthand example. Why isn't the page 123 reference down amongst the subentries? Just what is the subtopic on page 123?

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response.

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# CHAPTER OVERVIEW

## 4: Processes and Guidelines in Technical Writing


- 4.1: Writing process- from audience to rough draft
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# 4.1: Writing process- from audience to rough draft

## Let there be method in your madness

The *writing process* takes you from the very beginning of a writing project—finding topics and analyzing audience and purpose—all the way to the end—writing and revising the rough draft. The following chapters focus on some of the key phases of that process:

- Strategies for team-writing
- Audience analysis
- Topic ideas
- Brainstorming and invention
- Narrowing
- Outlining
- Information-collecting strategy
- Libraries, documentation, cross-referencing
- Strategies for peer-reviewing and team writing
- Power-revision techniques

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# 4.1.1: Topic ideas

## What to write about?

As a writer in a technical writing course, you may need some strategies for finding topics for writing projects, which are provided in this section.

By definition, technical-writing courses are opportunities to focus on practical uses of your writing skills. In the ideal technical-writing course, you would have a work-related writing project every two to three weeks: for example, instructions for that pesky fax machine down the hall or recommendations on home alarm systems. However, technical-writing courses are also great opportunities for exploring science and technology: latest advances in nanotechnology, latest theories about the origin of the universe, latest methods for hydroponic gardening. If your instructor encourages you to find your own topics, take a look at the following suggestions.

| Cutting-Edge Technologies<br>*How ambitious and daring are you? The link below takes you to some amazing, crazy inventions and discoveries.* |
| --- |
| Gizmag.com clippings |

| Volunteer Opportunities<br>*Find a service-learning opportunity that involves some writing!* |
| --- |
| Read about Service Learning. In particular, take a look at the volunteer opportunities |

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| Topic Ideas for Technical-Writing Courses<br>*Peruse these topics—see if any possibilities for projects come to mind.* | | | |
|---|---|---|---|
| | Mind-controlled devices | Water supply | Gut, gut bacteria |
| Graphene | Driverless autos | Water purification | Computer face recognition |
| Wormholes | Superstrings | 3D printing | High-definition TV |
| Anthropocene era | Unmanned avionics (drones) | Green roofs | WiFi |
| Global warming | Deforestation | Acid rain | Ozone depletion |
| Rain forests | Continental drift | Greenhouse effect | Endangered species |
| Industrial waste disposal | Mount St. Helens eruption | Solar energy devices | Nuclear power |
| Plate tectonics | Solar automobiles | Petroleum-based energy | Thermal power |
| Wind energy | Freon | Mass transportation | Nuclear fusion |
| Microwave technologies | Bomb detection methods | High-tech weaponry | Advances in automotives |
| Xeriscaping | Soil analysis | Hybridization techniques | Hydroponics |
| Recycling | Drip irrigation | Alternative agriculture | Desalination methods |
| Genetic engineering | World Wide Web | Computer video | Multimedia |
| Computer memory | Computer animation | Fiber optics | Computer audio |
| Virtual reality | Artificial intelligence | Telecomputing | Telecommuting |
| Advanced compact disks | Cellular telephones | Personal digital assistants | Videoconferencing |
| Digital interactive TV | UFOs | Satellite TV | Object-oriented programming |
| Digital imaging | Cable TV | Computer-aided education | Neural networks |
| Teleconferencing | Advances in telephony | CD-ROM technology | Computer graphics |
| Distance education | Computer crime | DVD technology | Robotics |
| Tech Prep | Virtual classroom | Expert systems | Devices for diabetics |
| Advanced prostheses | Artificial heart | Diabetes | Artificial limbs |
| Kidney transplants | Alzheimer's disease | Hypoglycemia | AIDS |
| Ebola | Encephalitis | Knee/hip replacements | Carcinogens |
| Hyperkinetic behavior | Caffeine | Saccharine | Psychosomatic disorders |
| Nicotine | Genetic engineering | Vitamin therapies | Magnetic resonance imaging |
| Recombinant DNA | Gulf War Syndrome | Ultrasound | Sickle cell anemia |
| Agent Orange | Inflation | Recession | Capital-punishment methods |
| Dream research | Balanced budget | Abortion methods | Handwriting analysis |
| Dyslexia | Biorhythms | Pheromones | Wellness programs |

| | | | |
|---|---|---|---|
| Acupuncture | Big Bang Theory | Life on Mars | Saturn expedition |
| Extraterrestrial intelligence | Gout | Supernova | Mars expedition |
| Halley's Comet | Universe | Space shuttles | Uranus expedition |
| Black holes | The Moon | Volcanoes | Sink holes |
| Venus | Tornadoes | Hurricanes | Earthquakes |
| Monsoons | Droughts | Whales | Boa constrictors |
| Rattlesnakes | Sharks | Geckoes | Panda bears |
| Black widows | Iguanas | Wolves | Eagles |
| Dolphins | Scorpions | Coyotes | Dinosaurs |
| Influenza | Panic attacks | Heart attacks | Breast cancer |
| Lung cancer | Bioengineered foods | Migraines | Nanotechnology |

| Ideas for Audiences<br>*See if the following list of audiences brings to mind technical-writing projects.* | | |
|---|---|---|
| City council members | Parent-teacher association | Downtown renovation commission |
| Neighborhood association | City transportation board | Rural utilities cooperative |
| Recycling special interest group | Student parking action group | Student housing board |
| City mass transportation agency | Business secretary association | Pet owners society |
| Save-our-trees action group | Citizens antipornography league | City beautification commission |
| Alternative energy-resource investors | Friends of sidewalk artists | Housing for the homeless society |
| Computer animators society | Alternative-transportation action group | College solar-automobile club |
| High-school science teachers association | City busriders support group | Drug-rehab center board |
| Citizens-against-crime league | Computer-game design society | Your local government representative |
| City mayor | County commissioners | Home-brewers and microbrewers club |
| Organic foods cooperative | Student housing cooperative | Local wine makers society |
| | Student services director | |

| Academic and Workplace-Oriented Majors<br>*Consider interesting courses or projects related to your major or any of the following.* | | | |
|---|---|---|---|
| Accounting | Air conditioning technology | Aerospace technology | Refrigeration technology |
| Astronomy | Automotive technology | Biology | Biotechnology |
| Engineering | Chemistry | Child development | Computer science |
| Culinary arts | Diagnostic medical imaging | Electronics | Building construction technology |
| Emergency medical service technology | Engineering design graphics | Information records management | Physical fitness technology |
| Geomatics (land surveying technology) | Fire protection technology | Medical lab technology | Meteorology |
| Molecular genetics | Urban studies | Engineering | Marine biology |
| Molecular biology | Biochemistry | Petroleum engineering | Geosystems engineering |
| Neurobiology | Mechanical engineering | Electrical engineering | Biomedical engineering |
| Military science | Civil engineering | Chemical engineering | Nursing |
| Occupational therapy | Office systems technology | Pharmacy technology | Photography |
| Geology | Physics | Printing technology | Quality assurance |
| Surgical technology | Technical communication | Welding technology | X-ray operations |

| Interesting Magazines and Journals<br>*Go to your local library or newsstand and flip through some of the following.* | | |
|---|---|---|
| *Flying* | *Mother Earth News Magazine* | *Popular Photography* |
| *Issues in Medical Ethics* | *Wood Magazine* | *4 Wheel & Off Road magazine* |
| *Air & Space Magazine* | *Audio Magazine* | *Smithsonian* |
| *Home Improver Magazine* | *Family Business Magazine* | *PC Magazine* |
| *Byte Magazine* | *Family* | *Handyman Magazine* |
| *Anthropological Linguistics* | *Nature* | *Astronomy Magazine* |
| *Scientific American* | *National Geographic* | *Cogeneration* |
| *Energy Research News* | *Lab Animal* | *Molecular Vision* |
| *Neuron* | *Petroleum Equipment & Technology* | *BBC News: Science and Technology* |
| *Electronic Journal of Biotechnology* | *American Naturalist* | *Nuclear Plant Journal* |
| *Garden and Forest* | *Water, Air, and Soil Pollution* | *Forest Ecology and Management* |
| *Weed Research* | *Wetlands Ecology and Management* | *Conscious Choice: The Journal of Ecology & Natural Living* |
| *Issues in Science and Technology* | *Technology & Culture* | *Electric Vehicle World* |
| *Discover Magazine* | *Distant Star* | *GEO Magazine* |
| *Gene Therapy Weekly* | *Home Power Magazine* | *Physics World* |
| *Robot Science & Technology* | *UFO Digest* | *Sea Technology* |
| *UFO Magazine* | *NanoTechnology Magazine* | *Popular Mechanics* |
| *Popular Science* | *Technology Review* | *Cyberspace Today* |
| *Wired* | *Space Business International* | *Amateur Astronomy Magazine* |
| *Sky & Telescope* | *CNN: Sci-Tech* | *Brain & Mind* |
| *Journal of Prisoners on Prisons* | *Electronic House Online* | *Home Energy* |
| *Popular Home Automation* | *Hazardous Materials Management Magazine* | *Professional Boatbuilder Magazine* |
| *Practical Hydroponics & Greenhouses* | *Progressive Farmer Today* | *Potato Grower* |
| *Pest Control Technology (PCT)* | *Goat Farmer Magazine* | *Disaster Recovery Journal* |
| *Upholster Magazine* | *CleanRooms* | *Worm Digest* |
| *Recycling Today Magazine* | *American Waste Digest* | *American Small Farm Magazine* |
| *Pacific Fishing* | *Urban Transportation Monitor* | *Advanced Rescue Technology* |
| *Pit and Quarry Magazine* | *Corrections Technology & Management* | *Wireless Access Technologies* |

| | | |
|---|---|---|
| | *Magazine* | |
| *Journal of Emergency Medical Services* | | |


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| Interesting Websites<br>*Browse some these websites for ideas.* | |
|---|---|
| Artificial Intelligence and Robotics. Provided by the Georgia Tech Mobile Robot Lab http://www.cc.gatech.edu/ai/robot-lab/links.html | |
| Robotics. From the Seattle Robotics Society http://www.seattlerobotics.org/gettingstarted.php | Virtual Reality Society. News, software, links, introductory information about virtual reality http://www.vrs.org.uk |
| Solar Car Page. Lots of information about and links to solar-powered cars http://www.seattlerobotics.org/gettingstarted.php | -- |
| Introduction to Artificial Intelligence. A free course provided by udacity.com. https://www.udacity.com/course/intro-to-artificial-intelligence--cs271 | |
| Virtual Worlds at MIT. Symposium: Learning environments, Global communities, Second Life, Wonderland, Google Earth, and more. http://web.mit.edu/oeit-projects/IAP-VW/ | |
| | |
| | American Association for Wind Engineering. An organization for promoting the research and professional practice of as well as for distributing information on wind engineering http://aawe.org |
| Cold Fusion Times. Journal on the scientific aspects of loading isotopic fuels into materials as well as related topics http://world.std.com/~mica/cft.html | |
| -- | Scientists for Global Responsibility. Web site promoting socially responsible and ethical uses of science and technology<br>dead link |
| The Future of Food. Provided by the American Museum of Natural History | -- |
| GreenerCars Ratings. Provided by greenercars.org, part of the American Council for an Energy-Efficient Economy (ACEEE) | -- |
| -- | -- |
| Hybrid Electric Vehicles. Provided by the U.S. Department of Energy's Clean Cities program | -- |
| -- | -- |
| American Cryonics Society. Preserving the whole body, head, or brain, of persons recently declared legally dead, in the hope of revival at some time in the future. Available at Wikipedia.org | The Visible Human Project. MRI cross-sections of the human body with explanations |
| -- | |
| -- | -- |
| Superluminal Motion: Concerning faster-than-the-speed-of-light travel. | -- |

| | |
|---|---|
| Provided by scienceworld.wolfram.com superluminal motion | |
| -- | -- |
| Human Genome Organisation. Human Genome Organisation (HUGO), the international organization with the global initiative to map and sequence the human genome | -- |
| | |

| Work Place: Ideas for Technical-Writing Projects<br>*What's going on at work? Are the projects there, just waiting for you? Browse some of these ideas:* |
|---|
| Does the office need a new photocopy machine? |
| Are you considering a fax machine? a CD writer? a digital camera? |
| Is the staff expected to use a new software application for which there is no user guide? |
| Are you and other employees interested in telecommuting (using electronic and computer methods to work at home)? |
| Is management considering putting all operating procedures and other administrative materials online? |
| Has your agency been challenged to go "paperless"—to get all files stored and searchable electronically? |
| Have you been tasked with recommending a personal digital assistant, cell phone, or notebook computer for all employees in your company? |

| Problems, Problems, Problems . . .<br>*A good source for volunteer projects is Idealist at www.idealist.org, a site run by Action Without Borders, a non-profit foundation. It lists 10,000 Web sites for non-profit organizations, information on volunteering, jobs, and projects.* | | |
|---|---|---|
| Inadequate public transportation | Lack of parking | Overflowing land fills |
| Smog and otherwise dirty air | Crowded streets and highways | Crime, vandalism |
| Homeless people | Lack of daycare facilities | Unemployment |
| Lack of low-cost housing | Dwindling water supplies | Expensive electricity |
| Natural areas threatened by urban development | Lack of parks and recreational facilities | Lack of facilities for the elderly |
| Rodent infestations | Mosquitoes | Lack of vegetation (trees, shrubbery, etc.) |
| Projects for nonprofits | Lack of facilities for young people | Expensive water |

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 4.1.2: Brainstorming and invention

## Bring on a tsunami of ideas!

If you have a topic for your writing project (if not, see topics) , the next step is to think about subtopics related to it. During this

stage, the "invention" or "brainstorming" stage, use the following suggestions to explore your writing project topic:

| Subject | Possible topics |
|---|---|
| The sun | its temperature<br>its composition<br>its unusual phenomenon<br>its relative size |
| Ultrasound in medicine | its physical properties<br>equipment used<br>medical uses<br>advantages |

*Prompt:* What topics can I write for a technical report on plastic pollution?

*Response:* Here are some topics and subtopics you can consider for your report:

**Introduction to Plastic Pollution**

- Definition of plastic pollution
- Historical context and the rise of plastic usage
- The environmental and health impacts of plastic pollution

**Sources of Plastic Pollution**

- Plastic production and consumption trends
- Single-use plastics
- Microplastics
- Plastic waste in oceans, rivers, and other ecosystems
- Land-based sources of plastic pollution

**Plastic Types and Their Environmental Impact**

- Different types of plastics (e.g., PET, HDPE, PVC)
- How plastic degrades and breaks down
- Chemical pollutants associated with plastics

**Effects on Wildlife**

- The impact of plastic ingestion and entanglement on marine and terrestrial animals
- Case studies of species affected by plastic pollution

**Human Health Implications**

- Microplastic ingestion through food and water
- Potential health risks associated with exposure to plastic pollutants

**Monitoring and Assessment**

- Methods for measuring and tracking plastic pollution
- The role of citizen science and technology in data collection

**Legislation and Regulations**

- International and national laws addressing plastic pollution
- Successes and challenges in implementing these regulations

**Waste Management and Recycling**
Strategies for reducing plastic waste
Advancements in recycling technologies
Circular economy approaches

**Future Trends and Predictions**
Forecasts for plastic production and pollution rates
Emerging technologies and research to address plastic pollution

——openai.com, ChatGPT-3.5, October 2023

- Let the subject of your writing project itself suggest subtopics; for example:
- Use generative-AI to suggest subtopics. For example, ChatGPT-3.5 suggests these subtopics for plastic pollution:
- Use an invention checklist like the following. If you ask yourself the questions listed below, you'll be less apt to overlook important subtopics; and, with use, these questions eventually become almost automatic.

**A Checklist of Invention Questions**

| | |
|---|---|
| *Problems or needs* | Does your writing project concern itself with a problem or a need? |
| *Solutions and answers* | Should your writing project discuss potential solutions or answers to the problems or questions presented in the project? |
| *Historical events and natural phenomena* | Does your writing project concern itself with some historical event or natural (or mechanical) phenomenon? |
| *Causes and effects* | Should your writing project discuss the causes, effects, or both related to the phenomenon, historical event, or problem you are discussing? |
| *Descriptions* | Which aspects of your writing project require description? |
| *Processes* | Does your writing project involve processes, procedures, routines, or repetitive events that must be discussed in steps? |
| *Classes* | Can the main topic or any subtopic within your writing project be divided into classes or types? |
| *Comparisons to similar or familiar things* | Can similar things in your writing project be compared to each other? Can you compare something complex in your writing project to something familiar or common? |
| *Illustrative examples* | Will a discussion of examples related to your writing project be effective? |
| *Theoretical background (definitions)* | Are there unfamiliar terms in your writing project? Should you include them in your project and define them? |
| *Applications* | Can you discuss the applications related to your writing project? |
| *Advantages and benefits* | Should you discuss the advantages or benefits related to your subject? |
| *Disadvantages and limitations* | Are certain disadvantages, problems, limitations, or drawbacks associated with your subject? |
| *Warnings, cautions, and guidelines* | Does your writing project need cautionary or guideline statements? |
| *Economics or financial considerations* | Should you discuss cost factors, purchase expenses, maintenance and operation costs, production or output costs, or savings? |
| *Importance of the topic* | Should you discuss the importance of your subject, why people should concerned about it or interested in it? |
| *Historical background and important names* | Is there some important historical background—events and names—that should be discussed in your project? |
| *Future developments* | Should your writing project speculate about future developments or possibilities related to the subject? |
| *Social, political, legal, or ethical implications* | Does the topic of your writing project raise certain social or ethical questions—as, for example, certain medical technologies do? |
| *Reasons for or against* | In your writing project, should you try to convince readers to take certain actions or think a certain way concerning your topic? |

| | |
|---|---|
| *Conclusions* | Should your writing project draw certain conclusions about what it discusses? |
| *Recommendations* | Should your writing project make certain recommendations to its readers? |
| *Alternatives or choices* | Should your writing project discuss several alternatives or choices related to your subject matter? |
| *Criteria, requirements* | Will your writing project use certain criteria to draw its conclusions or to make its recommendations? |
| *Tests and methods used* | Should you have a section on the tests you perform, the methods or theories you use, or the procedures and equipment you use? |
| *Statistical presentations and analyses* | Should you include a section that summarizes and analyzes the data you collect in your project? |
| *Legal and administrative demands* | Should your writing project discuss which agencies to apply to, which forms to fill out, or which steps to take in order to accomplish the purpose of your project? |
| *Business or professional contexts* | Should you describe the specific business or professional situation, for example, a supervisor's orders, that generates the need for your project? (This applies if you invent a writing situation also.) |

Here is an excerpt of a brainstorming session in which these questions were used:

| Example of a topic list developed with the invention checklist |
| --- |
| How does a wind-powered electrical system (WPES) work? what are the steps in its operation? |
| Savings: discuss the amount of money that can be saved using WPES. |
| Relationship between average windspeeds and electrical output: what happens when there's no wind, only very light breezes? too much wind? |
| Basic parts: rotor, generator, tail assembly, tower |
| Different manufacturers of WPES: how to get a good system and avoid being ripped off. |
| Dimensions, materials, construction of common models of WPES; sensitivity to low wind speeds |
| Historical background on WPES: the time when more WPES were being used, just before rural electrification in the 1930s; who were the first developers? when has interest in WPES reappeared? why? |
| Two general class of wind machines: lift and drag machines |
| Lightning protection of WPES |
| Aerodynamic principles as they apply to WPES |
| Understanding weather patterns and seasonal and geographical factors affecting wind |
| Principles of electricity: circuits, generators, types of current, meanings of terminology |
| Local, state, federal tax credits and research support in wind systems research and WPES purchase by consumers |

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# 4.1.3: Narrowing

## Narrow That Topic!

For a writing project in a technical-writing course, the ideal starting place is a workplace problem requiring some writing as part or all of the solution. With such a project, the audience and problem are there to help you narrow the topic. However, if you begin with a topic, it's harder to narrow. You are likely to end up trying to write a ten-pound textbook on automotive plastics, residential solar energy in the home, or La Niña. Narrow the topic and do some careful research—the result will be a practical, useful document that doesn't go on forever.

*Narrowing* means selecting a portion of a larger topic: for example, selecting a specific time period, event, place, people, type, component, use or application, cause or effect, and so on. Narrowing also means deciding on the amount of detail to use in discussing those topics.

**Note:** In the following example of the narrowing process, you may wonder how all those subtopics seem to come to mind so effortlessly. If that's not the way it is for you, try some brainstorming and invention first.

## Following the Narrowing Process

Let's walk through a typical narrowing exercise to see how it works. This particular example works "backward" from a topic to a realistic audience and purpose. In a "real world" situation, you'd begin with a workplace situation.

1. Imagine that you want to write something about gardening. You have a backyard vegetable garden that you grow as a hobby, and of course for the vegetables it produces:

```
gardening >>
```

2. What can you do with a topic like gardening? You know you want to focus on vegetable gardening, but that's only a first timid step at narrowing. There are still dozens and dozens of topics related to vegetable gardening:

```
gardening >> vegetable gardening
```

3. What are the possibilities related to vegetable gardening? Obviously, there are topics like planting techniques, pest control, fertilization and irrigation topics, perhaps even special-focus reports on individual vegetables—tomatoes, onions, butter beans, peppers. Among these, you lean more to gardening methods or techniques—such as drip irrigation, raised-bed gardening, organic pest control, and so on:

```
gardening >> vegetable gardening >> special gardening techniques
```

4. Now you are getting somewhere! But you can't write on all those techniques— pick one! Recently, you were reading about how NASA's plans for the human exploration of Mars includes growing food there on the planet—specifically by using hydroponic methods. This sparks your curiosity; it's the right topic for a technical document of some kind:

```
gardening >> vegetable gardening >> special gardening techniques >> hydroponic
gardening
```

5. You're all done with narrowing, right? Sorry, you're barely half-way there. Hydroponics, the science and craft of growing plants without soil, is a big topic in its own right. What specifically interests you about hydroponics: Interested in setting up a hydroponics system in your garage? Curious whether the claims about hydroponically grown foods are true? Wondering what it takes to run a hydroponics system? Interested in finding a commercially available hydroponic system that meets your needs and price range? Yes—something about practical realities of hydroponics! Your real interest here is the feasibility of hydroponic gardening, recommendations, or both:

```
gardening >> vegetable gardening >> special gardening techniques >> hydroponic
gardening >> feasibility/recommendations relating to hydroponic gardening
```

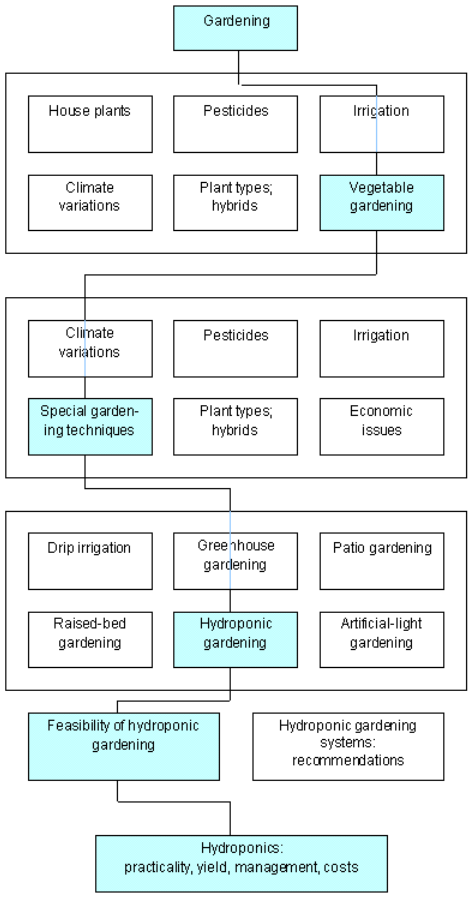
6. Now you have a choice: (a) focus on the feasibility of hydroponics or (b) focus on commercially available systems to determine which is best and which will fit in your garage. At this stage, you are not ready to pick a system; instead, you must convince yourself that the whole concept is practical. Therefore, let's focus on the general feasibility:

```
gardening >> vegetable gardening >> special gardening techniques >> hydroponic
gardening >> feasibility/recommendations relating to hydroponic gardening >>
general feasibility of hydroponics gardening
```

7. Another chapter in this book presents several kinds of feasibility: practical feasibility, whether it works; economic feasibility, whether it's too expensive and whether it pays for itself or offers economic advantages; implementation feasibility, whether it's too much trouble, whether you have to remodel your entire garage; and feasibility in terms of the yield and quality— whether hydroponically grown vegetables are any good.
8. So what's it going to be? You know that you want answers to these questions: does hydroponic gardening work? what's the yield? is it any good? how much of a hassle is it? how expensive and how difficult is it to build your own system? and what do you need—in general terms—to build a system? Is this too much for a semester report in a technical-writing course?

```
gardening >> vegetable gardening >> special gardening techniques >> hydroponic
gardening >> feasibility/recommendations relating to hydroponic gardening >>
general feasibility of hydroponics gardening >> hydroponic gardening:
practicality, yield, management, and costs
```

9. You've come a long way from "gardening," but you may still need to keep going. Actually, you've done one other narrowing operation without noticing: the focus is small-time, hobbyist, or "home" hydroponic gardening—not commercial hydroponic gardening. In any case, you have four main questions: (a) how does it work, (b) how well does it work, (c) how much work is it, and (d) and what are the costs? These translate into the subtopics you see at the very bottom of this flow chart:




10. To this point, you've been operating in a vacuum, not considering audience and situation, focusing instead on *your interests* in this topic. Now it's time to get real—to define a real or realistic audience and situation. Who wants this document? Who would hire you (hydroponics expert) to write it? How would people obtain this document? Imagine that a hydroponics association, club, or special-interest group sends out a request for proposals (RFP). Its members want a technical writer to develop an overview guide on hydroponics: not a how-to, not a parts list—just an introduction answering people's questions and concerns. The organization will ship your overview to anybody who inquires about the topic—and the organization will pay you for all of this great work.
11. Are we there yet? Not quite. Narrowing means two things: zooming in on progressively smaller and smaller subtopics; but also deciding on level and amount of detail. In this hydroponics overview, must you cover the four subtopics in excruciating detail? No, at most you'll want to cover practicality in moderate detail: readers need enough detail to see that the method actually works. Use the same amount of detail for yield, perhaps citing some comparative studies. But use only light detail for management and costs. You must keep this overview relatively brief and readable. Notice that these four main topics are not in the best sequence; we'll get to that in the outlining phase:

| **Home hydroponics system: topics** | |
|---|---|
| *Costs*—how expensive to build and run a system? | light detail |
| *Practicality*—do they really work? | moderate detail |
| *Management*—how much hassle? | light detail |
| *Yield*—how much and how good is the produce? | moderate detail |

## Finishing the Process

In the end, try to produce something that is integrated with a real or realistic situation like this:

| | |
|---|---|
| What does the RFP that you are responding to request? | An avid association of US hydroponic gardeners wants to spur interest in this method by being able to distribute some sort guide regarding the method. |
| Describe the organization or individual making the request. | American Home Hydroponics Association is an advocacy group seeking to spur interest in this gardening method and to support current membership with techniques and troubleshooting advice. |
| How will the organization or individual use the requested document? | The AHHA will advertise this guide in gardening magazines and send hardcopy to people who are interested but without Internet connection. Also, it will post links to the PDF guide on its website. |
| If the requesting organization will make the document available to others, who are those people and how will they get the document? | The requested guide will be aimed at an audience of gardeners but assume nothing about their knowledge of hydroponics. It will seek to spur their interest. |
| What kind of document is requested? What is the purpose of the document? | It will be a guide enabling people to get interested in hydroponics and see how to get started. |
| What are the characteristics of the target readers of the document (knowledge, background, experience)? | The requested guide will be aimed at an audience of gardeners but assume nothing about their knowledge of hydroponics. It will seek to spur their interest. |

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 4.1.4: Outlining

## Create entries and get them in a logical order

When you write a technical report, not only must you think of the right information to include (or exclude); you must also find a good way to arrange it. This is a two-part chapter: this part focuses on generating outline items and sequencing them; the second part focuses on turning a rough outine into a good, polished outline.

Outlines for technical reports are usually hard to handle solely in your mind; it's a little like trying to add a list of large numbers mentally. You must get report outlines in print in order to think about the arrangement of the topics within them. A good working outline serves you in at least four important ways:

- It shows you which areas of information to investigate and gather information on.
- It shows you which areas you can safely ignore (thus saving you plenty of time).
- It enables you to schedule your work into manageable units of time.
- It gives you a "global" view of your report project, an overall sense of the contents, parts and organization of the report.

## Generating outline elements

If you go through a brainstorming process, you have generated a rough list of topics that you can start working with. The topic list below concerns cocombustion, which is the incineration of municipal solid waste (MSW) with conventional fuels to reduce conventional fuel consumption costs and related MSW disposal problems. Imagine that you had developed a topic list on this subject and then had narrowed the list to these topics:

Advantages of cocombustion
Steps in cocombusting MSW
Disadvantages of cocombustion
Historical background on cocombustion
Economics of cocombustion
Special components for cocombustion
Composition of MSW
Cocombustion power plant construction costs
Cocombustion power plant operating costs
Economic advantages of cocombustion
Environmental advantages of cocombustion
Characteristics of municipal solid waste (MSW)
Environmental disadvantages of cocombustion
Methods of MSW disposal

## Grouping, combining and subordinating outline elements

You can tell that the list above needs serious help:

- You can see that a number of topics involve advantages and disadvantages; these might be combined in a more general outline called Advantages and Disadvantages of Cocombustion. The specific related topics would be *subordinated* beneath this more general topic:

  Advantages and Disadvantages of Cocombustion
  Advantages of cocombustion
  Disadvantages of cocombustion
- But wait a minute! One of the advantages has to do with economics. So we could create another group:

  Economics of cocombustion
  Economic advantages of cocombustion
  Cocombustion power plant construction costs
  Cocombustion power plant operating costs
- So what do we do with Environmental advantages of cocombustion and Environmental disadvantages of cocombustion? It might be best to create a higher-level heading Environmental aspects of cocombustion and subordinate those other two beneath it. And so that means we no longer need Advantages and Disadvantages of Cocombustion. It has been split into an economics group and an environment group.

- Looking further at the rough list of topics, you can probably see that Steps in cocombusting MSW, Special components for cocombustion, Composition of MSW, Characteristics of municipal solid waste (MSW) are related to each other and should exist in their own area of the outline.

So this is how the business of generating, grouping, combining and subordinating works early in the outlining process. Outlining is a messy process so you'll probably come back to this phase again.

## Sequencing outline elements

The next step in outlining is to sequence the items appropriately. There are so many different patterns of sequencing that only most common ones can be reviewed here. And, frankly, these are all pretty obvious. If they are obvious to you, skip to Elaborating the rough outline.

- **Chronological sequencing.** One of the most common patterns in outlining is the chronological one. In a historical background section of an outline, the chronological approach is just about the only one you can use. Here is an outline excerpt concerning the historical background of nuclear research:

```
II. Historical background of nuclear research
    A. Becquerel's theory of radition in uranium (1896)
    B. The work of the Curies                              (far
    C. The work of Rutherford                              past)
       1. Demonstration of the internal structure of
          the atom (1911)
       2. Transmutation of atoms (1919)
    D. Development of technology to study atomic
       structure
       1. Cascade transformer (1928)
       2. Linear accelerator (1931)
       3. Cyclotron (1932)
       4. Betatron (1940)
    E. Hahn-Strassmann discovery of uranium fission
       (1938)
    F. Oppenheimer work on nuclear chain reactions        (near
      (1940s)                                             past)
    G. Explosion of the first atomic bomb (1945)
```

In some outlines, however, you almost don't notice the chronological pattern. For example, effects come after causes; solutions, after problems; or findings, after research method. The chronological pattern is most important in a research proposal outline:

```
 I. Introduction
      A. Historical background on caffeine studies    (past)
      B. Objectives of the study
      C. Limitations of the study
      D. Plan of development
 II. Review of the literature on caffeine
III. Experimental method to be used
 IV. Results of the tests
  V. Discussion of the results
 VI. Summary and conclusions
VII. Implications for further research             (future)
```

Chronologically, the researcher first defines the problem, the reviews the literature on the problem, plans a research method, conducts the research and gathers data, analyzes the data and draws conclusions from it. Afterward, she may consider areas for further research on the problem.

- **At-rest to in-motion sequence.** Another common outlining pattern is to start with an object at rest, motionless as if in a photograph, and then to move to a discussion of it in operation, in action as if in a motion picture.

```
II. Basic Components of Wind-Powered
     Electrical Systems
     A. Rotor                                (motionless)
     B. Generator
     C. Tower
III. Basic Operation of Wind-Powered
     Electrical Systems
     A. Wind energy into mechanical energy
     B. Mechanical energy into electrical    (in motion)
        energy
     C. Stabilization of electrical energy
     D. Conversion to household current
```

- **Specific to general sequence.** Some outlines move from a specific, close-up focus to a more general, panoramic focus. They seem to start with a microscope, examining the minute details of a subject, and end with a telescope, considering the subject from a distance in relation to other things. (This pattern can also be reversed.)

```
  I. Introduction
 II. Characteristics of municipal
     solid waste (MSW)
III. Methods of disposal of MSW              (microscope)
 IV. Processing municipal solid
     waste
  V. Plant modifications for
     cocombustion
 VI. Advantages of cocombusting MSW
     A. Environmental advantages
     B. Economic advantages                   (telescope)
VII. Case studies of three
     cocombustion plants
```

In this next outline, the focus broadens after part III, changing to aspects related to computerized voice recognition technology:

```
  I. Introduction
 II. Human voice production
     A. The generation of sound
     B. Factors affecting the human          (microscope)
        voice
III. Components of the isolated word recognition
     system
     A. The preprocessor
     B. The feature extractor
     C. Components in the
        classification phase
     D. Decision algorithms
 IV. Problems with computerized speech recognition
     A. Accuracy
     B. Limited vocabulary size
     C. Privacy
  V. Applications of voice recognition systems
     A. Data entry
     B. Mobility
     C. Security
     D. Telephone access
     E. Devices for the handicapped          (telescope)
 VI. Current availability of speech
     recognition systems
VII. The future of the computerized
     speech recognition industry
```

- **Rhetorical sequence.** Elements in outlines can also be arranged rhetorically, in other words, according to what is most effective for the reader. Here are some examples of rhetorical patterns:
  - Simple to complex
  - Least important to most important (or vice versa)
  - Least controversial to most controversial
  - Most convincing to least convincing (or vice versa)
  - Most interesting to least interesting

This list is by no means complete: but you can see that elements in it are arranged according to impact on the reader—that is, the impact the writer would like to have. Here are some excerpts of outlines where these patterns are used.

If you have ever studied computer programming, you know that commands like PRINT are simple; variable assignment commands (like LET A = 30), less simple; and FOR-NEXT loop statements, rather complex. If you were outlining a report on fundamental BASIC commands for

the beginner, you'd probably start with the simple ones and work your way to the complex:

*Simple-to-complex order*

```
III. USEFUL BASIC COMMANDS
     A. PRINT
     B. LET
     C. IF-THEN
     D. FOR-NEXT
     E. DIM
```

If you were writing a report on cocombustion of municipal solid waste (MSW) for a city concerned about skyrocketing coal costs, you could arrange your advantages section two ways: (a) save the "reduction of coal consumption" for last in order to build up to a climax, or (b) introduce it right away to grab the citizens' attention:

*Climax order (least-most important)*

```
A. Recovery of revenue from
   recyclable MSW
B. Reduction of landfill
   use, costs, and other re-
   lated problems
C. Reduction of coal use
   and related costs
```

*Attention-getting order (most-least important)*

```
A. Reduction of coal use and
   and related costs
B. Reduction of landfill
   use, costs, and other re-
   lated problems
C. Recovery of revenue from
   recyclable MSW
```

- An obvious outlining principle is to avoid creating interruptions within an outline sequence. Here's an example:

*Outline excerpt with interruption*

I. Municipal solid waste generated in the US
   A. Total amounts of MSW
      1. Increases since 1950
      2. Projected increases to the year 2000
   B. Processing MSW for cocombustion
      1. Primary storage
      2. Grinding
      3. Air sorting
      4. Magnetic separating
      5. Screening
      6. Secondary storage
   C. Characteristics of MSW
      1. Composition of MSW
         a. food waste
         b. paper and other rubbish
         c. noncombustibles
      2. Factors affecting enery content
         a. moisture content
         b. areas of MSW origination
II. Power plant modifications for cocombustion

*Revised outline excerpt*

I. Municipal solid waste generated in the US
   A. Total amounts of MSW
      1. Increases since 1950
      2. Projected increases to the year 2000
   B. Characteristics of MSW
      1. Composition of MSW
         a. food waste
         b. paper and other rubbish
         c. noncombustibles
      2. Factors affecting enery content
         a. moisture content
         b. areas of MSW origination
II. Processing MSW for cocombustion
   A. Primary storage
   B. Grinding
   C. Air sorting
   D. Magnetic separating
   E. Screening
   F. Secondary storage
III. Power plant modifications for cocombustion

In the problem version, the municipal solid waste discussion is interrupted by the MSW-processing discussion. A better arrangement would be to discuss MSW fully before going on to the discussion of how it is processed.

Use these common arrangement principles to get your topic list into an initial rough order. The rearranged version of the topic list shown previously might look this way:

```
  I. Historical background
     A. Rising energy, utility costs
     B. Search for alternatives (review)
 II. Composition of MSW
III. Special components of the cocombustion plant
 IV. Steps in the cocombustion of MSW
  V. Economics
     A. Cost to build or convert
     B. Cost to operate
     C. Cost of produced electricity
 VI. Advantages
     A. Less coal used
     B. Reduction of utility rates
     C. Less landfill used
     D. Reduction of landfill costs and needs
VII. Disadvantages
     A. Expense of converting existing facilities
     B. Handling MSW
     C. Increased emissions
```

## Elaborating the rough outline

When you "elaborate" a rough outline, you divide and subdivide the items already listed. Even without having done much research, you'll have a fair idea of what these second- and third-level items will be.

```
 I. Historical background
    A. Rising costs of conventional fuels
    B. Problems with coventional MSW disposal
    C. Alternatives
II. Composition of MSW
    A. Properties
    B. Sources
    C. Energy content
    ...
III. Special components of the cocombustion plant
    A. Component 1
    B. Component 2
    C. Component 3
    ...
IV. Steps in the process of cocombustion with coal
    A. Step 1
    B. Step 2
    C. Step 3
    ...
```

Notice how the basic kinds of writing and organizational patterns (covered previously) are used in elaborating the rough outline. With an elaborated outline, you can begin to read and take notes: each item represents a question mark that you need to get information on. As you get this information, you can make the wording of outline items more specific: for example, Component 1 would change to Collection receptacles. Here's an excerpt of the same outline above, but much further along:

```
3. Special components of the cocombustion plant
   a. collection receptacles
   b. power compaction unit
   c. storage pits
   d. incinerator feed system
      1. gravity chute
      2. ram feeder
      3. hopper
      4. furnace
      5. charging gate
```

Elaborating the rough outline is essentially a process of dividing that outline using two basic principles:

- *Division into similar elements.* Many elements in a rough outline can be divided into groups of similar elements:

| *Elements of discussion* | *Subdivisions* |
|---|---|
| An object or mechanism | Parts, components, or characteristics |
| A process or event | Steps, phases, or stages |
| A classification | Types, kinds, or sorts |
| A comparison | Points of similarity or difference |
| Causal discussions | Causes, effects, benefits, problems, or solutions |

Thus, a discussion of the main element "incinerator feed system" in a rough outline could be elaborated this way—into parts:

| *Rough outline* | *Elaborated outline* |
|---|---|
| 3. Special components of cocombustion plant | 3. Special components of a cocombustion plant<br>a. collection receptacles<br>b. power compaction unit<br>c. storage pits<br>d. incinerator feed system |

- *Division into elements related topically.* Elements in an outline can subdivide by topics that are all related but that are not similar to each other as above:

| *Rough outline* | *Elaborated outline* |
|---|---|
| (D. Incinerator feed system)<br>4. Furnace<br>5. Charging gate | (D. Incinerator feed system)<br>4. Furnace<br>a. purpose<br>b. main types<br>c. main components<br>d. materials<br>e. dimensions<br>f. design problems<br>5. Charging gate |

As a result of elaborating procedures like these, an excerpt of a more detailed outline of the cocombustion report might look like this:

```
  I. Municipal solid waste generated in the US
     A. Total amounts of MSW
        1. Increases since 1950
        2. Projected increases to the year 2000
     B. Characteristics of MSW
        1. Composition of MSW
           a. food waste
           b. paper and other rubbish
           c. noncombustibles
        2. Factors affecting enery content
           a. moisture content
           b. areas of MSW origination
 II. Processing MSW for cocombustion
     A. Primary storage
     B. Grinding
     C. Air sorting
     D. Magnetic separating
     E. Screening
     F. Secondary storage
III. Power plant modifications for cocombustion
     A. Storage areas
     B. Conveyor lines
     C. Boiler modifications
     D. Air control equipment
 IV. Advantages of cocombusion
     A. Environmental advantages
         1. Reduction of landfill needs
         2. Reduction of coal use
         3. Recovery of recyclable materials
     B. Economic advantages
         1. Reduction of MSW disposal costs
         2. Revenue from recyclables
         3. Reduction of utility bills
  V. Disadvantages of cocombustion
     A. Potential for increased air pollution
     B. Problems with processing MSW
```

## Adjusting items in an outline

You should also make sure that items in your outline are on the right level. Here is an example of this problem and a revision:

| *Unadjusted outline* | *Revised outline* |
|---|---|
| A. Plant Modifications for Coc-combustion | A. Plant modifications for Co-combustion |
| 1. Storage areas | 1. Storage areas |
| 2. Conveyor lines | 2. Conveyor lines |
| 3. Boiler modifications | 3. Boiler modifications |
| 4. Air control equipment | 4. Air control equipment |
| B. Economic Benefits | B. Benefits of Cocombustion |
| C. Environmental Benefits | 1. Economic benefits |
| | 2. Environmental benefits |

In this revision, the problem was solved by adding a more general item (Benefits of Cocombustion) and downshifting the original "B" and "C" items. Now, here's another example:

| *Unadjusted outline* | *Revised outline* |
|---|---|
| B. Environmental Benefits | B. Environmental benefits |
| C. Reduction of Landfill Needs | 1. Reduction of landfill needs |
| D. Economic Benefit | 2. Reduction of Coal Consumption |
| | C. Economic benefits |

Here, Reduction of Landfill Needs is really a subdivision of Environmental Benefits. Downshifting it to a "1" creates a single-item entry, however. Therefore, we might add a second item like Reduction of Coal Consumption.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

## Related Information

Creating an Outline. Indiana University of Pennsylvania

Why and How to Create a Useful Outline. Purdue OWL.

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# 4.2: Audience analysis

## Just who are these guys—what do they need?

*Usage for the word guy has evolved from having a strictly masculine reference to a gender-neutral reference. –AskAnAmerican'*

The audience of a technical document—or any piece of writing for that matter—is the intended or potential reader or readers. For most technical writers, this is *the most important* consideration in planning, writing, and reviewing a document. You "adapt" your writing to meet the needs, interests, and background of the readers who will be reading your writing.

The principle seems absurdly simple and obvious. It's much the same as telling someone, "Talk so the person in front of you can understand what you're saying." It's like saying, "Don't talk rocket science to your six-year-old." Do we need a course in that? Doesn't seem like it. But, in fact, lack of audience analysis and adaptation is one of the root causes of most of the problems you find in professional, technical documents—particularly instructions where it surfaces most glaringly.

**Notes:**

- Once you've read the section on audiences, try using the audience planner. You fill in blanks with answers to detailed questions about your audience and then e-mail it to yourself and, optionally, to your instructor.
- Also, this chapter includes a section on situation planner. Try using the situation planner to develop an idea of the situation in which your audience finds itself.

## Types of Audiences

One of the first things to do when you analyze an audience is to identify its type (or types—it's rarely just one type). The common division of audiences into categories is as follows:

- Experts: These are the people who know the theory and the product inside and out. They designed it, they tested it, they know everything about it. Often, they have advanced degrees and operate in academic settings or in research and development areas of the government and technology worlds. The nonspecialist reader is least likely to understand what these people are saying—but also has the least reason to try. More often, the communication challenge faced by the expert is communicating to the technician and the executive.
- Technicians: These are the people who build, operate, maintain, and repair the stuff that the experts design and theorize about. Theirs is a highly technical knowledge as well, but of a more practical nature.
- Executives: These are the people who make business, economic, administrative, legal, governmental, political decisions on the stuff that the experts and technicians work with. If it's a new product, they decide whether to produce and market it. If it's a new power technology, they decide whether the city should implement it. Executives are likely to have as little technical knowledge about the subject as nonspecialists.
- Nonspecialists: These readers have the least technical knowledge of all. Their interest may be as practical as technicians', but in a different way. They want to understand the new power technology enough to know whether to vote for or against it in the upcoming bond election. Or, they may just be curious about a specific technical matter and want to learn about it—but for no specific, practical reason.

## Audience Analysis

It's important to determine which of the four categories just discussed the potential readers of your document belong to, but that's not the end of it. Audiences, regardless of category, must also be analyzed in terms of characteristics such as the following:

- Background—knowledge, experience, training: One of your most important concerns is just how much knowledge, experience, or training you can expect in your readers. If you expect some of your readers to lack certain background, do you automatically supply it in your document? Consider an example: imagine you're writing a guide to using a software product that runs under Microsoft Windows. How much can you expect your readers to know about Windows? If some are likely to know little about Windows, should you provide that information? If you say no, then you run the risk of customers' getting frustrated with your product. If you say yes to adding background information on Windows, you increase your work effort and add to the page count

of the document (and thus to the cost). Obviously, there's no easy answer to this question—part of the answer may involve just how small a segment of the audience needs that background information.

- Needs and interests: To plan your document, you need to know what your audience is going to expect from that document. Imagine how readers will want to use your document; what will they demand from it. For example, imagine you are writing a manual on how to use a new smart phone—what are your readers going to expect to find in it? Imagine you're under contract to write a background report on global warming for a national real estate association—what do they want to read about; and, equally important, what do they *not* want to read about?
- Different cultures: If you write for an international audience, be aware that formats for indicating time and dates, monetary amounts, and numerical amounts vary across the globe. Also be aware that humor and figurative language (as in "hit a home run") are not likely to be understood outside of your own culture. Texas A&M University makes available Chapter 6, "Writing for International Readers," of *Reporting Technical Information*, Elizabeth Tebeaux, et al. For standards, see List of style guides from Wikipedia. (Thanks to the anonymous guest who contributed these important ideas.)
- Other demographic characteristics: And of course there are many other characteristics about your readers that *might* have an influence on how you should design and write your document—for example, age groups, type of residence, area of residence, gender, political preferences, and so on.

Audience analysis can get complicated by at least two other factors: mixed audience types for one document, wide variability within audience, and unknown audiences.

- More than one audience. You're likely to find that your document is for more than one audience. For example, it may be seen by technical people (experts and technicians) and administrative people (executives). What to do? You can either write all the sections so that all the audiences of your document can understand them (good luck!). Or you can write each section strictly for the audience that would be interested in it, then use headings and section introductions to alert your audience about where to go and what to avoid in your document.
- Wide variability in an audience. You may realize that, although you have an audience that fits into only one category, there is a wide variability in its background. This is a tough one—if you write to the lowest common denominator of reader, you're likely to end up with a cumbersome, tedious book-like thing that will turn off the majority of readers. But if you don't write to that lowest level, you lose that segment of your readers. What to do? Most writers go for the majority of readers and sacrifice that minority that needs more help. Others put the supplemental information in appendixes or insert cross-references to beginners' books.

## Audience-Analysis Example

If you are taking a technical-writing course, you may be expected to append an audience description to your technical documents. Here's an example:

> *Note to Instructor:* These instructions are intended for individuals who want to streamline their calculations using Microsoft Excel using macros to efficiently compute their data. They understand how to input data into Microsoft Excel and have basic knowledge of the Microsoft Office Suite. They are comfortable using Windows software and are comfortable with basic arithmetic abilities to verify their calculations and check for logic errors in computing.

## Audience Adaptation

Okay! So you've analyzed your audience until you know them better than you know yourself. What good is it? How do you use this information? How do you keep from writing something that will still be incomprehensible or useless to your readers?

The business of writing *to* your audience may have a lot to do with in-born talent, intuition, and even mystery. But there are some controls you can use to have a better chance to connect with your readers. The following "controls" have mostly to do with making technical information more understandable for nonspecialist audiences:

- Add information readers need to understand your document. Check to see whether certain key information is missing—for example, a critical series of steps from a set of instructions; important background that helps beginners understand the main discussion; definition of key terms. (See the chapter on ideas on content for details.)
- Omit information your readers do not need. Unnecessary information can also confuse and frustrate readers—after all, it's there so they feel obligated to read it. For example, you can probably chop theoretical discussion from basic instructions.
- Change the level of the information you currently have. You may have the right information but it may be "pitched" at too high or too low a technical level. It may be pitched at the wrong kind of audience—for example, at an expert audience rather than a technician audience. This happens most often when product-design notes are passed off as instructions.
- Add examples to help readers understand. Examples are one of the most powerful ways to connect with audiences, particularly in instructions. Even in noninstructional text, for example, when you are trying to explain a technical concept, examples are a major help—analogies in particular.
- Change the level of your examples. You may be using examples but the technical content or level may not be appropriate to your readers. Homespun examples may not be useful to experts; highly technical ones may totally miss your nonspecialist readers.
- Change the organization of your information. Sometimes, you can have all the right information but arrange it in the wrong way. For example, there can be too much background information up front (or too little) such that certain readers get lost. Sometimes, background information needs to be consolidated into the main information—for example, in instructions it's sometimes better to feed in chunks of background at the points where they are immediately needed. (See the chapters on structure and organization of information in a document.)
- Strengthen transitions. It may be difficult for readers, particularly nonspecialists, to see the connections between the main sections of your document, between individual paragraphs, and sometimes even between individual sentences. You can make these connections much clearer by adding *transition words* and by echoing *key words* more accurately. Words like "therefore," "for example," "however" are transition words—they indicate the logic connecting the previous thought to the upcoming thought. You can also strengthen transitions by carefully echoing the same key words. In technical prose, it's *not* a good idea to vary word choice—use the same words so that people don't get any more confused than they may already be. (See the chapter on transitions.)
- Write stronger introductions—both for the whole document and for major sections. People seem to read with more confidence and understanding when they have the "big picture"—a view of what's coming, and how it relates to what they've just read. Therefore, make sure you have a strong introduction to the entire document—one that makes clear the topic, purpose, audience, and contents of that document. And for each major section within your document, use mini-introductions that indicate at least the topic of the section and give an overview of the subtopics to be covered in that section. (See the chapter on introductions both for whole reports and for sections within reports.)
- Create topic sentences for paragraphs and paragraph groups. It can help readers immensely to give them an idea of the topic and purpose of a section (a group of paragraphs) and in particular to give them an overview of the subtopics about to be covered. Roadmaps help when you're in a different state! (See the chapter on using overviews and topic sentences.)
- Change sentence style and length. How you write—down at the individual sentence level—can make a big difference too. In instructions, for example, using imperative voice and "you" phrasing is vastly more understandable than the passive voice or third-person phrasing. For some reason, personalizing your writing style and making it more relaxed and informal can make it more accessible and understandable. Passive, person-less writing is harder to read—put people and action in your writing. Similarly, go for active verbs as opposed to *be* verb phrasing. All of this makes your writing more direct and immediate—readers don't have to dig for it. (See the chapter on common sentence-style problems for details.)

  And obviously, sentence length matters as well. An average of somewhere between 15 and 25 words per sentence is about right; sentences over 30 words are to be mistrusted.
- Work on sentence clarity and economy. This is closely related to the previous "control" but deserves its own spot. Often, writing style can be so wordy that it is hard or frustrating to read. When you revise your rough drafts, put them on a diet—go through a draft line by line trying to reduce the overall word, page or line count by 20 percent. Try it as an experiment and see how you

do. You'll find a lot of fussy, unnecessary detail and inflated phrasing you can chop out. (See the chapter on common sentence-style and clarity problems for details.)

- Use more or different graphics. For nonspecialist audiences, you may want to use more graphics—and simpler ones at that. Graphics for specialists are more detailed, more technical. In technical documents for nonspecialists, there also tend to be more "decorative" graphics—ones that are attractive but serve no strict informative or persuasive purpose at all. (See the chapter on graphics for details.)
- Break text up or consolidate text into meaningful, usable chunks. For nonspecialist readers, you may need to have shorter paragraphs. Maybe a 6- to 8-line paragraph is the usual maximum. Notice how much longer paragraphs are in technical documents written for specialists.
- Add cross-references to important information. In technical information, you can help nonspecialist readers by pointing them to background sources. If you can't fully explain a topic on the spot, point to a section or chapter where it is. (See the chapter on cross-references for details.)
- Use headings and lists. Readers can be intimidated by big dense paragraphs of writing, uncut by anything other than a blank line now and then. Search your rough drafts for ways to incorporate headings—look for changes in topic or subtopic. Search your writing for listings of things—these can be made into vertical lists. Look for paired listings such as terms and their definitions—these can be made into two-column lists. Of course, be careful not to force this special formatting—don't overdo it. (See the chapters on headings and lists for details.)
- Use special typography, and work with margins, line length, line spacing, type size, and type style. For nonspecialist readers, you can do things like making the lines shorter (bringing in the margins), using larger type sizes, and other such tactics. Certain type styles are believed to be friendlier and more readable than others. (Try to find someone involved with publishing to get some insights on fonts.)

These are the kinds of "controls" that professional technical writers use to finetune their work and make it as readily understandable as possible. And in contrast, it's the accumulation of lots of problems in these areas—even seemingly trivial ones—that add up to a document being difficult to read and understand. Nonprofessionals often question why professional writers and editors insist on bothering with such seemingly picky, trivial, petty details in writing—but they all add up! It reminds me of the ancient Chinese execution method called "death by a thousand cuts." However, in this case, it would be "perplexity by a thousand minor problems."

## Audience Situation

It is not enough merely to define a specific audience for a technical-writing project. You need to know the *situation* in which this audience operates—what its goals are: solve a problem, enable improvement, support decision making? Situations for report writing are probably as infinite as human social relations. A report situation involves an audience needing or requesting a certain type of report (document) for its specific needs and uses.

**Summary of latest developments.** In this situation, an organization (for-profit company or government entity) or individual needs a summary of the "latest" on research and development in some field (technological, medical, architectural, astronomical, etc.). The information must be readable by people not specialized in the field and not slanted for or against the research and development. The information must enable the recipients to make decisions.

**Guide on task performance.** In this next situation, an organization needs some sort of guide for staff doing certain tasks. The situation might include doing a seminar at the organization and leaving the guide for staff future reference. (This should not be a typical company policy and procedures.)

**Special-interest promotion.** In this situation, a national or state interest group wants to promote something about its special interest (for example, green roofs). They need good writers to develop a guide or white paper to present their information convincingly.

**Understandable technical summary for students.** In this next situation, high school teachers or college teachers of introductory science, medical technology, engineering courses need a unit developed that will be effective with non-majoring freshmen and sophomores.

**Understandable technical summary for clients.** In this situation, counselors and advisers (high school, college, government agencies) need in-depth but understandable information on a topic so thay can knowledgeably advise clients (students, citizens).

**Understandable technical summary for citizens.** Similar to the preceding situation, legislators (local, state, national) need in-depth but understandable information on a topic so thay can speak on this topic intelligently and knowledgably to citizens and other legislators.

## Using AI to Develop Situations

*Here's an example of how you can use GenAI to think of realistic situations for your technical-writing projects:*

**Prompt:** Hello, Chat. I want my tech writing students to find or imagine realistic situations for their researched technical documents. Example I use is that I want to write about plastic pollution and that an entrepreneur wants a report on possibilities for recycling plastic, thinking he could make millions doing so. Okay, using that example, what situation would you recommend to a student wanting to write about global warming?

**Response:** For a student wanting to write about global warming, a realistic situation could be a local government considering the implementation of policies to reduce carbon emissions in their city. They might ask for a technical document that analyzes different strategies such as green building practices, renewable energy adoption, urban green spaces, and public transportation enhancements. The student could frame the document as a report to assist the city council in determining the most effective and economically feasible approaches to mitigate the impact of global warming on their community while also considering potential long-term environmental and financial benefits. This scenario allows the student to explore a range of topics related to global warming while contributing to a real-world application of knowledge.

**Prompt:** That was great! How about thinking of another situation?

**Response:** Certainly! Another realistic situation for a student writing about global warming could involve a corporate scenario. Imagine a multinational corporation that is looking to enhance its brand image and sustainability practices by aiming to become carbon neutral over the next decade. The companyâ€™s board has requested a technical document that outlines various pathways to achieve this goal. The student could focus on researching and comparing carbon offset programs, investment in renewable energy, energy efficiency improvements in manufacturing processes, and sustainable supply chain practices. This document would serve to guide the corporation in making informed decisions about implementing environmentally responsible strategies that align with both their sustainability goals and financial considerations. This scenario allows the student to delve into corporate sustainability efforts and the role businesses can play in combating global warming.

**Prompt:** Very good too. I think I'll ask my tech writing students to seek your help with imagining situations! -- David McMurrey

**Response:** Thank you, David! I'm glad to hear that you found the scenarios helpful. Encouraging students to think creatively about real-world applications can significantly enhance their technical writing skills and engagement with the material. I'd be happy to help them brainstorm more scenarios or assist in any other way. If there's anything else you'd like to explore or discuss, feel free to reach out!

---

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*

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# 4.3: Task analysis

## Show 'em how to do the tasks they want to perform

When you write instructions, procedures, and "guide" or user-guide information, you normally must use a task approach. That means providing steps and explanations for all the major tasks that users may need to perform.

Of course, some instructions involve only one task—for example, changing the oil in a car. But we are concerned here with more complex procedures. While this chapter uses computer software as an example, these techniques can apply to any multi-task procedure—for example, operating a microwave oven.

## Identifying Tasks

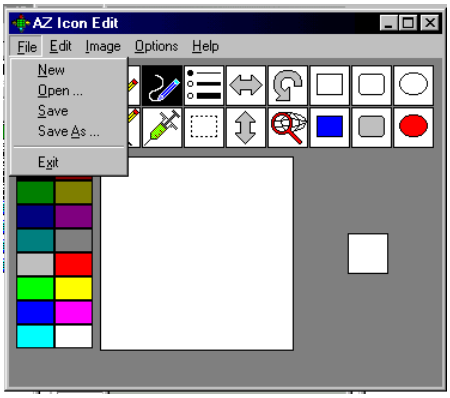
To write in a task-oriented manner, you first have to do some task analysis. That means studying how users use the product or do the task, interviewing them, and watching them. It can also mean interviewing marketing and product development people. If you can get your hands on the kinds of questions that help-desk people receive, that helps too.

But sometimes, you may not be in a position to do a thorough task analysis. Typically, product developers don't think about documentation until rather late. In these cirucumstances, it's often difficult to get marketing, development, engineering, and programming people to spend enough time with you to explain the product thoroughly. And so you end up doing a certain amount of educated guesswork. The developer is more likely to review your draft and let you know if your guesswork is right.

To develop your own task analysis, you can study the user interface (buttons, menus, options, etc.) of the product. This goes for both hardware and software. Consider the interface for an icon editing tool shown to the right:

From just this snippet of the interface, you can identify several obvious tasks:

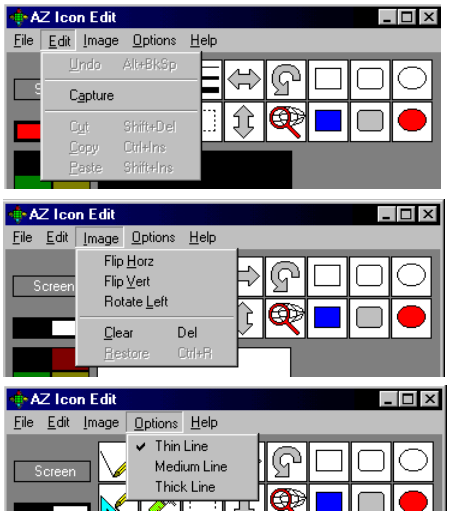
- Start a new icon project
- Open an existing icon project for editing
- Rename an icon project (Save As)
- Exit AZ Icon Edit




*Interface for AZ Icon Edit*

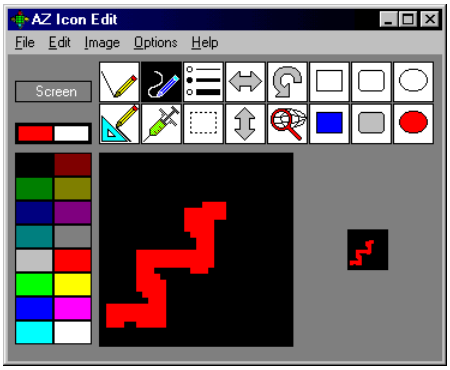
Now, look at the menu options for the next parts of the menu. You can see that when people are using this icon editor, they'll also most likely be doing these tasks:

- Undo a mistake
- Capture an image or some part of it
- Cut something out of an icon project
- Copy something out of an icon project
- Paste something into an icon project
- Flip the entire image horizontaly or vertically
- Rotate the image left
- Clear the project, which probably means start over
- Restore, which you'll have to ask around, experiment with, or dig into the programming spec to find out about
- Draw with a thick, medium, or thin line.



But now look at the interface without the menu options hanging down. What additional tasks can you see? As with a lot of graphical user interfaces, some of the icons duplicate the menu options. For example, the bulleted-list icon enables you to select a thin, medium, or thick line the same way clicking on **Options** does. However, there are some new tools here, not available elsewhere in the interface:

- Draw straight lines (you'll have to experiment to see the difference between the two pencil icons)
- Draw freehand lines (the wavy-line icon)
- Draw unfilled rectangles (sharp edges) and unfilled rectangles (rounded edges)
- Draw unfilled ovals and filled ovals
- Fill with color (the hypodermic needle)
- Select portions of the image to move, cut, or rotate (the dotted-line icon)
- Capture images—or parts of images—(the net, but how does it work?)
- Draw filled rectangles (sharp edges) and filled rectangles (rounded edges)
- Select background color (the Screen button)
- Select line or fill color (the double-box icon)




There's a lot you still don't know about this software, but you've already done a lot of guesswork toward defining the major tasks. You'd want to group and consolidate things much more tightly than above, perhaps like the following:

- Creating, editing, renaming, and saving icons
- Selecting foreground and background color
- Drawing lines, rectangles, and ovals
- Cutting, pasting, and copying objects
- Moving, flipping, and rotating objects

You can see that in this rough task list, there is no trace of tasks such as filling an object with color, capturing images, clearing the workspace, undoing a mistake, or restoring. But as you work, these details will begin to find their place in your scheme. Now, stand back from the details of the interface and put yourself in the place of an icon software user. What questions is that individual likely to ask? How do I change the color of the background? We've got that covered. How do I change the thickness of the lines I draw? Got that one covered too. How do I make the background transparent? Hmmm . . . that will be an issue for the color section, but it will take some research.

## Different Approaches to Documentation

When you write for users, you have a choice of two approaches, *function orientation* and *task orientation*, the latter of which is by far the better choice.

Writing with a function orientation. It ought to be obvious how to proceed after a task analysis, but apparently not. Computer publications—if not technical publications in general—often seem to stray into a non-task-oriented style of writing. But, no! That just doesn't work!

Another reason why some user guide instructions are not task oriented can be blamed on product specifications. Product specifications, which are written by and for programmers, engineers, developers, are written in terms of required function:

| | |
|---|---|
| **File menu button** | Enables user to create a new file, open an existing file, rename a file, etc. |
| **Crop icon** | Enables user to cut selected segment of image. |

You might call this approach *function-oriented* writing because it systematically explains each function, feature, or interface element of a product. Unfortunately, this approach shows up in user guides meant for nontechnical readers—perhaps because the writers are inexperienced, untrained, or untechnical; or else the writers have been called in too late to do much else but polish the developers' spec.

The function-oriented approach almost works sometimes. But "almost" and "sometimes" are not good enough. It almost works because the names of interface elements and functions sometimes match the tasks they support. For example, the **Open** menu option is pretty intuitive: open an existing file. Others are not. For example, what do you suppose is restored by the **Restore** button in the AZ Icon Edit interface? Also, some interface elements don't accomplish tasks all by themselves. In Photoshop, for example, you can't crop text by pressing the **Crop** menu option. You have to first click the text-selection button, then draw a selection box around the part of the image you want to keep, then press the **Crop** button.

Writing with a task orientation. Instead of the function-oriented approach, use the task-oriented approach. Identify the tasks users will need to perform with the product, and then structure your document accordingly. Make your headings and subheadings *task oriented* in their phrasing. Task-oriented phrasing means phrasing like "How to adjust the volume, "Adjusting the volume," or "Adjust the volume." It does not mean phrasing like "Volume" or "Volume Adjustment." Here are some additional examples:

| **Problem phrasing** | **Task-oriented phrasing** |
|---|---|
| Capture | Capturing images |
| Screen button | Selecting background or foreground objects |
| Rectangles | Drawing rectangles |
| Oval icon | Drawing ovals and circles |

When you have defined user tasks, organized them into logical groups, and have defined task-oriented headings, you're ready to write! Here's an excerpt:

> **Drawing Rectangles and Ovals**
>
> You can use the icon editor to draws squares, rectangles, ovals, and circles.
>
> **Draw a rectangle.** To draw a rectangle:
> 1. Ensure that you have selected the foreground color you want. (See "Selecting foreground color.")
> 2. Click the rectangle icon.
> 3. Position the mouse pointer in the drawing area where you want to the rectangle to appear, hold down the left mouse button, and drag to create the rectangle.
>
> **Draw an oval.** To draw an oval:
> 1. Ensure that . . .

In this excerpt, you can see that an overall task-oriented approach is taken and that task-oriented phrasing is used for the headings (Drawing). Notice too that numbered lists are used to guide readers step by step through the actions involved in the task.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response.

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# 4.4: Translating technical information

## Say it in plain language, please?

The ability to explain complex, technical matters with ease, grace, and simplicity so that nonspecialist readers understand almost effortlessly is one of the most important skills you can develop as a technical writer. This ability to "translate" difficult-to-read technical discussions is important because so much of technical writing is aimed at nonspecialist audiences. These audiences include important people such as supervisors, executives, investors, financial officers, government officials, and, of course, customers.

This chapter provides you with some strategies for "translating" technical discussions, that is, specific strategies you can use to make difficult technical discussions easier for nonspecialist readers to understand.

You use your understanding of your audience to decide

- What information to include in the document
- What information to exclude from the document
- How to discuss the information you do include in the document

Translating is particularly important because it means supplying the right kinds of information to make up for the reader's lack of knowledge or capability. Translating thus enables readers to understand and use your document. Some combination of the techniques discussed in this chapter should help you create a readable, understandable translation:

| | |
|---|---|
| Defining unfamiliar terms | The "in-other-words" technique |
| Comparing to familar things | Posing rhetorical questions |
| Elaborating the process | Explaining the importance or significance |
| Providing description | Providing illustration |
| Reviewing theoretical background | Providing historical background |
| Providing examples and applications | Providing the human perspective |
| Shorter sentences and paragraphs | Stronger transitions |

This list by no means exhausts the possibilities. Other techniques include:

- *Headings.* See the section on using headings that break up text and emphasize points and on how to construct headings that guide readers from section to section.
- *Lists.* See the section on constructing lists that break up text and emphasize points and on how to construct headings that guide readers from section to section.

*Note to readers:* Move your mouse pointer over the thin dotted line links in the following examples to see discussion.

## Definitions of unfamiliar terms

Defining potentially unfamiliar terms in a report is one of the most important ways to make up for readers' lack of knowledge in the report subject.

**Facial Characteristics of FAS Victims**

Taken as a whole, the face of patients with fetal alcohol syndrome (FAS), is very distinctive. Structural deficiencies are thought to be the result of reduced cellular proliferation in the developing stages of the embryo because of the direct action of the alcohol. The face has a drawn-out appearance with characteristics that include short palpebral fissures, epicanthic folds, low nasal bridge, a short upturned nose, indistinct philtrum, small midface, and a thinned upper vermilion.

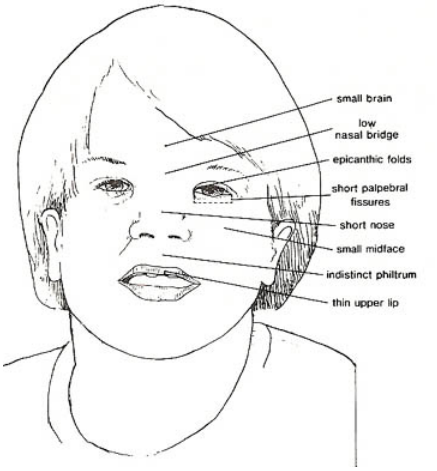



Figure 2. Facial features characteristic of FAS
palpebral features is term being defined.')">Palpebral features are the longitudinal openings between the eyelids. In FAS victims, they tend to be short possibly because the eye size is so small. Most deficiency of the eye is reflected in these shortened palpebral fissures. epicanthic folds.')">Epicanthic folds are the vertical folds of skin on either side of the nose, sometimes covering the inner corner of the eye. They are present as a normal characteristic in persons of certain races and also occur as a congenital malformation in patients with FAS. philtrum is term being defined.')">The philtrum is the vertical groove in the middle of the upper lip and below the nose region. It tends to be smooth in patients with fetal alcohol syndrome, and as a consequence the upper lip may lack its usual indentation bow. vermilion could have been much better defined.')">The upper, red portion of the upper lip is the vermilion; it is often very thin in patients with FAS. The thinned vermilion is a major feature in contributing to the overall drawn-out appearance of the face....

*Using definitions to translate technical discussion*

## Comparisons to familiar things

Comparing technical concepts to ordinary and familiar things in our daily lives makes them easier to understand. For example, things in the world of electronics and computer—a downright intimidating area for many people—can be compared to channels of

water, the five senses of the human body, gates and pathways, or other common things. Notice how comparison (highlighted) is used in these passages:

> The helical configuration of the DNA strands is not haphazard. The nitrogen bases on each strand align themselves to form nitrogen base pairs. The pairs are T-A and C-G. Each pair is held together by hydrogen bonds. The pairing of the bases serves to fasten the two helical nucleotide strands together in much the same way as the teeth of a zipper hold the zipper together. The existence of the complementary base pairs explain the constant ratios of T/A and C/G. For every T there must be a complementary A and for every G there must be a complementary C.
>
> David S. Newman, *An Invitation to Chemistry* (New York: Norton, 1978), pp. 380-381.

> All the death and all the misery from a virus so small that 2-1/2 million of them in a line would take up one inch. Flu viruses fall into three types: A, B, and C. Type A, the most variable, causes pandemics as well as regular seasonal outbreaks; type B causes smaller outbreaks and is just now receiving greater attention; type C rarely causes serious health problems.
>
> In appearance, a flu virus somewhat resembles the medieval mace—a ball of iron studded with spikes; moreover, individual part of the flu virus are compared to indivdual parts of the mace. These spikes are two surface proteins called hemagglutinin (HA) and neuraminidase (NA). Inside the virus is a thick tangle of genes. In many other viruses, a number of different genes fit onto one strand of nucleic acid; but each flu gene is a separate segment of ribonucleic acid (RNA)—eight threads in all.
>
> The mace metaphor provides a crude but vivid picture of the influenza virus at work. Hemagglutinin is the substance that in effect bashes into a cell during infection and allows the virus access to the cell interior where it can replicate. Neuramindase permits all the viral offspring to break free of the host cell once replication is complete.
>
> Stephen S. Hall, "The Flu," *Science 83*, (November 1983), pages 56-57.

*Comparison used for translation*

## Elaborating the process

Explaining in detail the processes involved in the report subject can also help readers. Consider a paragraph like this one, containing only a sketchy reference to the process:

> The Video Alert and Control dashboard system, a newly developed system to help drivers avoid accidents, graphically projects an image of hazards in the road.

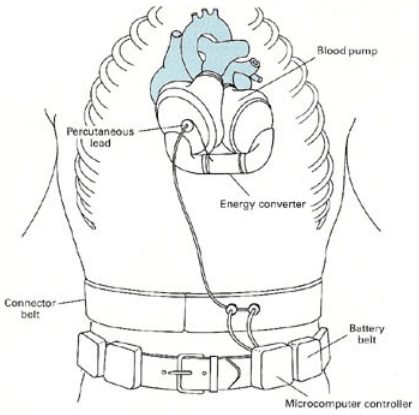
This brief reference can be converted into a more complete explanation as is illustrated here:

> The Video Alert and Control dashboard systems uses a number of components to help drivers avoid accidents. The infrared detector is the key detecting device in that it searches for warm objects in or near the path ahead of the car. The infrared detector senses the upcoming trouble well before the driver by sensing warm-bloodedness and then alerts the driver. The infrared detector also senses the heat of oncoming traffic.
>
> All of these objects are shown graphically on the video screen. To differentiate wildlife from other cars, the x-ray unit is used to check for metal in the object ahead. Thus, if a warm object is detected with metal in it, the computer reads it as a car and shows it on the screen as a yellow dot. On othe other hand, if no metal is detected in the warm object, it is read as an animal and plotted as a red dot....

*Elaborating the process as a way of translation*

## Providing descriptive detail

Descriptions also help nonspecialist readers by making the report discussion more concrete and down-to-earth:

> Jarvik and his colleagues have been working on other designs, such as a portable artificial heart, which they think will be ready for a patient within the next two years.
>
> **Electrohydraulic Heart**
>
> Jarvik has been developing electric-energy converters and blood pumps during the past year. The electrohydraulic energy converter has only one moving part. The impeller of an axial-flow pump is attached to the rotor of a brushless direct-current motor, with the impeller and the rotor supported by a single hydrodynamic bearing. Reversing the rotation of the pump reverses the direction of the hydraulic flow. The hydraulic fluid (silicone oil of low viscosity) actuates the diaphragm of a blood pump just as compressed air does in the Jarvik-7 heart design. This hydraulic fluid is pumped back and forth between the right and left ventricles.
>
> The energy converter is small and simple and therefore can be implanted without damaging vital structures. It weighs nearly 85 grams and occupies nearly 30 cubic centimeters. The converter requires an external battery and an electronics package, which is connected to the heart by a small cable through the patient's chest. The batteries weigh 2 to 5 pounds and can be worn on a vest or belt. The battery unit requires new or recharged batteries once or twice a day. The cable through which the power is transmitted from the battery to the heart also carries control signals from the microcomputer controller.
>
> 
> 
>
> Figure 12. Electrically driven artificial heart system. Source: Jarvik, Robert K. "The Total Artificial Heart," *Scientific American*, January 1981, p. 80.
>
> Jacqueline R. Mudd, *Report on Artificial Methods of Combating Heart Disease*, University of Texas at Austin, May 6, 1983.

*Description used to translation technical discussion*

## Providing illustrations

Illustrations—typically, simple diagrams—can help readers underatand technical descriptions and explanations of processes. You can see the use of illustration in the FAS example above: epicanthic folds and the philtrum are labels in the diagram.

## Providing examples and applications

Equally useful in translating complex or abstract technical discussions are examples or explanations of how a thing can be used. For example, if you are trying to explain a LINUX command, showing how it is used in an example program helps readers greatly. If you are explaining a new design for a solar heating and cooling system, showing its application in a specific home can help also.

> **Continuous Speech**
>
> Continuous speech causes many problems in computerized speech recognition. In fluent speech, many words overlap. For example, when the "t" in "cat" combines the "y" in "your," the phrase, "You gave the cat your dinner," sounds like, "You gave the catcher dinner" [8:69].
>
> Some words have built-in pauses that are often longer than word boundaries. For example, the word "vector" has a natural pause between the "c" and the "t." In an actual experiment, a machine listened to the phrase, "recognize speech," and printed, "wreck a nice beech" [5:57].
>
> As vocabularies increase, words are more likely to become confused. Some words are subparts of others, such as "plea" and "please," while some words have similar acoustics, such as "what" and "watt" [23:151].
>
> Heidi E. Cootes, *Report on Computers that Recognize Speech*, University of Texas at Austin, May 6, 1983.

*Examples used in translation*

Now here is a passage with a longer, extended example:

> ...The user "scrolls" the worksheet right and left or up and down to bring different parts of it into view. Each position (that is, each intersection of a column and a row) on a screen corresponds to a record in memory. The user sets up his own matrix by assigning to each record either a label, an item of data or a formula; the corresponding position on the screen displays the assigned the label, the entered datum or the result of applying the formula.
>
> Consider a simple example. A company comptroller might enter the label Cash in the record corresponding to Column B, Row 1 (position B1), Reserves at C1 and Total at D1. He might then enter $300,000 at B2, $500,000 at C2 and the formula +B2+C2 at position D2. The screen will show $800,000 at D2. If the comptroller changes the B2 entry to $200,000, the program will reduce the total displayed at D2 to $700,000. Moreover, what is entered in records B2 and C2 need not be primary data; it can be a function of data held in other records
>
> Hoo-Mi D. Toong and Amar Gupta, "Personal Computers," *Scientific American*, (December 1982), pp. 99-100.

*Discussion of applications used to translate technical discussion*

## Shorter sentences and paragraphs

As simple a technique as it may seem, reducing the length of sentences can make a technical discussion easier to understand. Consider the following pairs of example passages, the second versions of which contain shorter sentences. (The passage still needs other translating techniques, particularly definitions, but the shorter sentences do make it more readable.) Notice too that shorter paragraphs can help in the translation process, not only in the example below but throughout this chapter.

### Original version: longer sentences

> UV-flourescence was determined on aliquots of the hexane extracts of subsurface water using the Perkin-Elmer MPF-44A dual-scanning flourescence spectrophotometer upon mousse sample NOAA-16, considered the best representative of cargo oil. Every day that samples were processed, a new calibration curve was developed from serial dilutions of the reference mousse (NOAA-16) at an emission wavelength of ca. 360 nm, and other samples were compared to it as the standard. Emission was scanned from 275-500 nm, offset 25 nm from the excitation wavelength, with the major peak occurring at 360 nm for the reference mousse solutions. In each sample, the concentration of flourescent material, a total oil estimate, was calculated from its respective flourescence, using the linear relationship of flourescence vs. concentration of the reference mousse "standard," with a correction factor applied to account for the reference mousse containing only about 30 percent.

### Revised version: shorter sentences

> UV-flourescence was determined on aliquots of the hexane extracts of the subsurface water. These measurements were performed using a Perkin-Elmer MPF-44A dual-scanning flourescence spectrophotometer. Mousse sample NOAA-16 was used as the best representative of cargo sample. Other samples were compared to it as the standard.
>
> Every day that samples were processed, a new calibration curve was developed from serial dilutions of the reference mousse (NOAA-16). Tests were run at an emission wavelength of ca. 360 nm. Emission was scanned from 275-500 nm, offset 25 nm from the excitation wavelength. The major peak occurred at 360 nm for the reference mousse solutions.
>
> In each sample, the concentration of flourescent material, a total estimate, was calculated from its respective flourescence. The linear relationship of flourescence vs. concentration of the reference mousse "standard." A correction factor was applied to account for the reference mousse containing only about 30 percent oil.

*Shorter paragraphs and sentences for translation purposes*

## Stronger transitions and overviews

Transitions and overviews guide readers through text. In difficult technical material, transitions and overviews are important. (For in-depth discussion, see transitions.)

- *Repetition of key words.* As unlikely as it may seem, using the same words for the same ideas is a critical technique for comprehension in technical discussions. In other words, don't refer to the hard drive as a "fixed-disk drive" one place and as "DASD" (an old IBM term meaning direct access stationary drive) in another. Same goes for verbs: stick with either "boot up" or "system reset," and don't vary.

- *Arrangement of key words.* Equally important is how you introduce keywords in sentences. If your focus stays on the topic in each sentence of a paragrah, place the keyword at or near the beginning of the second and following sentences. However, if the topic focus shifts from one sentence to the next, use the old-to-new pattern: start the following sentence with the old topic and end the sentence with the new topic. For more detail, see the discussion of topic strings.
- *Transition words and phrases.* Examples of transition words and phrases are "for example," "however," and so on. When the discussion is particularly difficult and when repetition and arrangement of keywords is not enough, use transition words and phrases. See transitions.
- *Reviews of topics covered and topics to be covered.* At certain critical moments within and between paragraph (or groups of paragraphs) occurs a transitional device that either captures what has been discussed in a short phrase, previews what is to be discussed in the following paragraphs, or both. The latter device is also called a topic sentence.

## The "in-other-words" technique

Another way of translating technically difficult content is to give the reader two "looks" at the same idea by restating the difficult-to-understand version in simpler terms. The second, simpler explanation is often preceded by a phrase such as "in other words" (IOW). Here are two examples of this IOW technique:

> With no electric field present, semiconductor electrons are quite happy to remain bonded in their valence bands. Only when an electric field is applied or the temperature is raised (heat can also increase electron energy) do the valence electrons begin to break their bonds, jump the energy band gap and become conduction electrons.
>
> When a bond is broken, a vacancy or hole is left. The region in which this vacancy exists has a net positive charge. The area where the freed electron exists has a net negative charge. In a semiconductor, both electrons and holes contribute to electrical conduction. If a valence electron from another bond fills the hole without ever gaining sufficient energy to become free, the vacancy appears in a new place. It is as if a positive charge (equal to that on a electron) has moved to a new location. In other words, conduction in semiconductors is the result of two separate and independent particles carrying opposite charges and moving opposite directions under the influence of an applied electric field.
>
> David Oakley, *Introduction to Semiconductor Theory*, University of Texas at Austin, December 12, 1983.

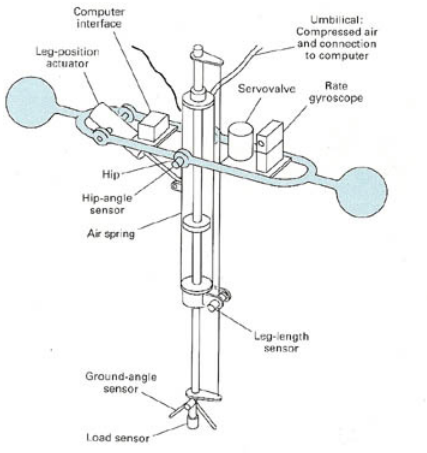
---

> **Fatigue**
>
> Fatigue is a phenomenon that has plagued engineers for years. It is especially bothersome when metals are involved. Simply stated, fatigue is the slow growth of a crack that ultimately leads to failure after a number of load reversals. A paperclip breaking after repeated bending is an example of fatigue. The process by which fatigue leads to failure can be divided into three stages: initiation, propagation, and failure. The nature of the second stage, propagation, is what enables composites to be immune to failure.

*The "in-other-words" technique*

## Posing rhetorical questions

In technical writing, you occasionally see questions posed to the readers. Such questions are not there for readers to answer; they are meant to stimulate readers' curiosity, renew their interest, introduce a new section of the discussion, or allow for a pause:

> When an animal runs, its legs swing back and forth through large angles to provide balance and forward drive. We have found that such swinging motions of the leg do not have to be explicitly programmed for a machine but are a natural outcome of the interactions between the controllers for balance and attitude. Suppose the vehicle is traveling at a constant horizontal rate and is landing with its body upright. What must the attitude controller do during the stance to maintain the upright attitude? It must make sure that no torques are generated at the hip. Since the foot is fixed on the ground during stance, the leg must sweep back through an angle in order to guarantee that the torque on the hip will be zero while the body moves forward.
>
> On the other hand, what must the balance servo do during flight to maintain balance? Since the foot must spend about as much time in front of the vehicle's center of gravity as behind it, the rate of travel and the duration of stance dictate a forward foot position for landing that will place the foot in a suitable spot for the next stance period. Thus during each flight the leg must swing forward under the direction of the balance servo, and during each stance it must sweep backward under the control of the attitude servo; the forward and back sweeping motions required for running are obtained automatically from the interplay of the servo-control loops for balance and attitude.
>
> 
> 
>
> Two-Dimensional Hopping Machine
>
> Marc H. Raibert and Ivan E. Sutherland, "Machines that Walk," *Scientific American*, (January 1983), p. 50.

*Asking rhetorical questions as a translating technique*

## Explaining the importance

Some translating techniques work because they motivate readers. Sometimes readers need to be talked into concentrating on difficult technical discussion: one way is to explain to them or to remind them of the importance of what is being discussed. In this

example, the last paragraph emphasizes the importance):

> It was Linus Pauling and his coworkers who discovered that sickle cell anemia was a molecular disease. This disease affects a very high percentage of black Africans, as high as 40 percent in some regions. About 9 percent of black Americans are heterozygous for the gene that causes the disease. People who are heterozygous for sickle cell anemia contain one normal gene and one sickle cell gene. Since neither gene in this case is dominant, half the hemoglobin molecules will be normal and half sickled. The characteristic feature of this disease is a sickling of the normally round, or platelike, red blood cells under conditions of slight oxygen deprivation. The sickled red blood cells clog small blood vessels and capillaries. The body's response is to send out white blood cells to destroy the sickled red blood cells, thus causing a shortage of red blood cells, or anemia.
>
> The sickle cell gene originated from a mistake in information. A DNA molecule somehow misplaced a base, which in turn caused an RNA molecule to direct the cell to make hemoglobin with just one different amino acid unit among the nearly 600 normally constituting a hemoglobin molecule. So finely tuned is the human organism that this tiny difference is enough to cause death.
>
> Since the disease is nearly always fatal before puberty, how can a gene for a fatal childhood disease get so widespread in a population? The answer to this question gives some fascinating insight into the mechanism and purposes of evolution, or natural selection. The distribution of sickle cell anemia very closely parallels the distribution of a particularly deadly malaria-causing protozoan by the name of *Plasmodium falciparum*, and it turns out that there is a close connection between sickle cell anemia and malaria. Those people who are heterozygous for the sickle cell gene are relatively immune to malaria and, except under reasonably severe oxygen deprivation such as that found at high altitudes, they experience no noticeable effects due to the sickle cell gene they carry. Half the hemoglobin molecules in the red cells of heterozygous people are normal and half are sickled. Thus, under ordinary circumstances the normal hemoglobin carries on the usual respiratory functions of blood cells and there is little discomfort. On the other hand, the sickled hemoglobin molecules precipitate, in effect, when the malaria-causing protozoan enters the blood. The precipitated hemoglobin seems to crush the malaria protozoan, thus keeping the malaria from being fatal.
>
> The significance of all this should be pondered. Nature is willing to sacrifice approximately half the children in the malaria-infested regions of Africa so that the species can survive. The reason half the children die is that, on the average, approximately one-quarter of the children will be homozygous for abnormal hemoglobin and will die of sickle cell anemia, while one-quarter will be homozygous for normal hemoglobin and will likely die of malaria. The half of the population that is heterozygous will survive to reproduce. This means that the species, not the individual, is the ultimate unit of Darwinian evolution.
>
> David S. Newman, *An Invitation to Chemistry*, pages 387-388.

*Explaining the importance as a way of translating technical discussions*

## Providing historical background

Discussion of the historical background of a technical subject helps readers because it gives them less technical, more general, and sometimes more familiar information. It gives them a base of understanding from which to launch into the more difficult sections of the discussion:

> Now that alcohol is being used in more and more social settings, it extremely important to recognize its teratogenic effects. Teratogenic, or malforming, agents produce an abnormal presence or absence of a substance that is required in physical development. Although Sullivan first reported on the effects of maternal drinking during pregnancy in 1899, the serious implications of his findings were virtually ignored for the next 50 years. It was not until the dramatic identification of a pattern of malformations, termed the fetal alcohol syndrome (FAS) by Jones et al in 1973, that the scientific community acknowledged the potential dangers of heavy maternal alcohol use. Since then, there has been increasing recognition that alcohol may be the most common drug in causing problems of malformations in humans.

---

> Each morning in the soft, coral flush of daybreak, a laser dawns on Mars. Forty miles above frigid deserts of red stone and dust, it flares in an atmosphere of carbon dioxide. Infrared sunlight kindles in this gas a self-intensifying radiance that continuously generates as much energy as a thousand nuclear reactors. Our eyes are blind to it, but from sunrise to sunset Mars bathes in dazzling lasershine.
> The red planet may have lased in the sun for eons before astronomers identified its sky-high natural laser in 1980. The wonder is that its existence was unknown for so long. In 1898, in *The War of the Worlds*, H.G. Wells scourged earth with Martian invaders and a laserlike death ray. Pitiless, this "ghost of a beam of light" blasted brick, fired trees, and pierced iron as if it were paper.

---

> In 1917 Albert Einstein speculated that under certain conditions atoms or molecules could absorb light or other radiation and then be stimulated to shed their borrowed energy. In the 1950s Soviet and American physicists independently theorized how this borrowed energy could be multiplied and repaid with prodigious interest. In 1960 Theodore H. Maiman invested the glare of a flash lamp in a rod of synthetic ruby; from that first laser on earth he extorted a burst of crimson light so brilliant it outshone the sun.
>
> Allen A. Boraiko, "The Laser: 'A Splendid Light,'" *National Geographic*, (March 1984), p.335.

*Historical background as a translation technique*

## Reviewing theoretical background

To understand some phenomena, technologies, or their applications, readers must first understand the principle or theory behind them. Theoretical discussions need not be over the heads of nonspecialist readers. Discussion of theory is often little more than

explanation of the root causes and effects at work in a phenomenon or mechanism. In this example, the writer establishes the theory and then can go on to discuss the findings that have come about through the use of NMR on living tissue.

> To the extent that objections persist about the validity of modern biochemistry, they continue to be about reducing the processes of life to sequences of chemical reactions. "The reactions may take place in the test tube," one hears, "but do they really happen that way inside the living cell? And what happens in multicellular organisms?"
>
> One technique is beginning to answer these questions by detecting chemical reactions as they occur inside cells, tissues and organisms including those of human beings. The technique is nuclear-magnetic-resonance (NMR) spectroscopy. It relies on the fact that atomic nuclei with an odd number of nucleons (protons and neutrons) have an intrinsic magnetism that makes each such nucleus a magnetic dipole: in essence a bar magnet. Such nuclei include the proton (H-1), which is the nucleus of 99.98 percent of all hydrogen atoms occurring in nature, the carbon-13 nucleus (C-13), which is the nucleus of 1.1 percent of all carbon atoms, and the phosphorus-31 nucleus (P-31), which is the nucleus of all phosphorus atoms.

*Theoretical background as a translation technique*

## Combining the translating techniques

This last section concludes the techniques for translating difficult technical prose to be presented here. However, take a look at writing in fields you know about, and look for other kinds of translating techniques used there. Now, here are several extended

passages of technical writing that combine several of these strategies.

**Fine-tuning the spectrum**

To know lasers, one must first know the electromagnetic spectrum, which ranges from long radio waves to short, powerful gamma rays.

The narrow band of the spectrum we know as visible, or white, light is made up of red, orange, yellow, green, blue, and violet light. These frequencies, as well as all radiation waves, are jumbled or diffused, much as noise is a collection of overlapping, interfering sounds. Laser light is organized and concentrated, like a single, clear musical note.

In lasers, nature's disorder is given coherence, and photons—the basic units of all radiation—are sent out in regular ranks of one frequency. Because the waves coincide, the photons enhance one another, increasing their power to pass on energy and infomation.

The first devices to emit concentrated radiation operated in the low-energy microwave frequencies. Today, laser technology is extending beyond ultraviolet toward the high-energy realms of x-rays. Each wavelength boasts its own capacities as a tool for man.

A laser's beam can be modulated into an infinite number of wavelengths using flourescent dyes like those produced at Exciton Chemical Company in Ohio. At Hughes Research Laboratories in California, a blue-green laser reflected at an acute angle aneals silicon microchips, while a low-energy red laser monitors the process.

**Harnessing light**

As a bow stores energy and releases it to drive an arrow so lasers store energy in atoms and molecules, concentrate it, and release it in powerful waves.

When an atom expands the orbits of its electrons, they instantly snap back, shedding energy in the form of a photon. When a molecule vibrates or changes its geometry, it also snaps back to emit a photon.

In most lasers a medium of crystal, gas, or liquid is energized by high-intensity light, an electric discharge, or even nuclear radiation. When a photon reaches an atom, the energy exchange stimulates the emission of another photon in the same wavelength and direction, and so on, until a cascade of growing energy sweeps through the medium.

The photons travel the length of the laser and bounce off mirrors—one a full mirror, one partially silvered—at either end. Photons, reflected back and forth, finally gain so much energy that they exit the partially silvered end, emerging as powerful beam.

**Out of the darkness: laser eye surgery**

Sight-saving shafts of light able to enter the eye without injuring it, lasers are revolutionizing eye surgery.

Using techniques of New York opthalmologist Frances L'Esperance, eye surgeons employ four levels of laser energy. Exposure time ranges from 30 minutes for low-energy photoradiation to several billionths of a second for photodisruption.

With microscopic focus, beams weld breaks in the retina or seal leaking blood vessels by photocoagulation. A painless 20-minute operation call an irridectomy relieves this excess fluid buildup of glaucoma.

When an artificial lens is placed behind the iris, the supportive membrane often grows milky. A laser beam is pinpointed on the taut tissue in a series of minute explosions. This photodisruption causes the tissue to unzip and part like a curtain. Bloodless scalpels, lasers can make extremely delicate incisions, cauterize blood vessels, and leave tissue unaffected only a few cell widths away.

**Beams that heal**

Surgical trauma, the jarring aftermath of the surgeon's knife, may one day be consigned to the annals of primitive medicine—thanks to a procedure called "least invasive surgery" by its growing number of practitioners. Using an endoscope, surgeons can view the interior of the body and operate with the least amount of damage.

An end view of the flexible tube ... shows a large optical fiber to light the way. Smaller openings facilitate fluid suction and gas suction. A forceps, controlled by a cable near the microscope viewing lens, extracts tissue for analysis. A laser, controlled by dials to the left of the eyepiece, streams from another tube, ready to perform wherever the doctor directs it. Twisting and probing wit the end of the scope, he can identify and coagulate a bleeding ulcer in the stomach or blast tumors in the esophagus. The beam is fed through the scope by an optical fiber from a laser machine ... that might cost the hospital from $20,000 to $150,000.

Allen A. Boraiko, "Lasers: A Splendid Light," *National Geographic*, (March 1984), pp. 338-346.

*Translating techniques used in combination*

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 4.5: Power-revision techniques

## Get the important stuff right

The linked chapters here cover some of the most important aspects of writing—what's more important than the information you put in a document, how you organize it, how you link it all up together? Writing teachers tend not to do much with this sort of stuff in their classrooms because it's just plain old hard and tedious. Yet, if we were to find a way to make these revision concepts and techniques easier (or even fun?) to learn, practice, and apply, we might have achieved one of the most important breakthroughs in the teaching of writing.

When you look at all these powerful ways you can review (looking for potential problems) and then revise (fixing those problems), you're likely to be put off by how tedious and time-consuming it is. This stuff can become second nature rather quickly though. If you spend some time analyzing writing in the ways outlined in these chapters, the way you write and the way you review what you write will change. You'll start operating—and not even be fully aware of it—with these ideas in mind.

Specifically, this chapter covers these paragraph- and higher-level elements:

- Overview of structure-level revision
- Contents
- Structure
- Organization
- Topic sentences and overviews
- Transitions

This next chapter covers these sentence-style problems:

- Overview of sentence-level revision
- Weak be verbs
- Overnominalization ("noun stacks")
- Redundant phrasing
- Weak use of expletives (there is, it is)
- Weak use of the passive voice
- Subject-verb mismatch
- Sentence length

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# 4.6: Libraries, documentation, cross-referencing

## Find it, cite its source, cross-reference related information

This sections in this appendix focuses on:

- Libraries—Finding information libraries
- Documentation—Indicating sources of borrowed information
- Cross-referencing—Pointing to other information in your own documents and those of others.

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# 4.6.1: Information Search

## Know where the best information is on your topic

This section focuses on finding information for your technical-documentation projects online and in physical libraries. Your job is to get good, specific, up-to-date information for your formal report project. You may not be able to read it all—you're not writing a dissertation, nor is your knowledge about your topic expected to be anywhere close to that level. But at least you know what's out there.

Here's a great resource: Library Services at Austin Community College.

Also see this useful site Finding the Library You Need For Your Research. From html.com.

When you've found information sources you think you'll need in your writing project, read documentation on how to cite those sources when you borrow them in your documents.

## Beware of the Internet—Get Thee to a Library

To begin, be aware that instructors of technical writing still require your information search to take you to one or more phsyical libraries. The best information for your topic may not be online, and you can't trust a lot of online information. In the following, you'll see some strategies for evaluating the information you find.

## Find a Topic, Narrow It, Brainstorm It

Before you head for the library or its Internet equivalent, you need a topic, some idea of the specific aspect of the topic you want to focus on, and some ideas about what to say about that narrowed topic. Problems finding a topic and thinking of what to say about it are often called the dreaded *writer's block*.

A virtual ocean of topics is here in topic ideas.

*Narrowing* a topic is that process in which you go from an impossibly huge topic such as nanotechnology to something more manageable such as applications of nanotechnology in brain surgery. You can find a nice system for this process in narrowing topics.

*Brainstorming* a topic is that process in which you think of everything you can that you might write about in relation to your topic. You can find a nice system for this process in brainstorming and invention.

## Know Your Booleans

An important tool to have when you go searching for information—either in libraries or in the Internet—has to do with Booloean operators: AND, OR, NOT and a few esoteric other.

| Technique | What it does | Example |
|---|---|---|

| | | |
|---|---|---|
| Truncation — adding a symbol to the root of the word to retrieve related terms and variant endings for the root term. Some databases have left- and right-hand truncation. | Expands your search | structur* finds structure, structuring, structures, etc. *elasticity will find elasticity, aeroelasticity, viscoelasticity |
| Boolean AND — retrieves only those records containing all your search terms | Narrows your search | finite AND element AND methods |
| Boolean OR — retrieves records containing any of your search terms; especially useful for synonyms, alternate spellings, or related concepts | Broadens your search | energy OR fuel pollut* OR contaminat* sulfur OR sulphur |
| Boolean NOT, AND NOT — attempts to exclude a term that is not useful or relevant | Narrows your search | "Advanced Materials" AND composite NOT wood |
| Proximity — retrieves terms within a specified distance of one another; variations of proximity searches are phrase searches, where the terms must be retrieved exactly as entered; NEAR, ADJACENT, WITH, and WITHIN searches | Narrows your search | "Styrenic Block Copolymers" (quotation marks ensure that the multiple-word term is searched as a phrase, but are not required for all databases) |
| Parentheses ( ) — groups terms with Boolean for more complex searches | Combines searches | "mechanical engineering" AND (handbook OR dictionary) |

## Types of Resources for Information Research

### Encyclopedias and Other Reference Works

If you are beginning at ground zero with your technical report topic, a good strategy would be to read some articles in general encyclopedias:

www.britannica.com/. An individual subscription costs under $100 US per year, but membership in your library is likely to give you free access.
www.accessscience.com/ for online access to the *McGraw-Hill Encyclopedia of Science and Technology*. Again, paid subscription required, but membership in a library is likely to give you access.

Can you build a legitimate technical report based on encyclopedia articles that you summarize and paraphrase? Ask your instructor. Using just these resources, you may not be able to gather enough information to create a report of any reasonable length.

You can find reference books like encyclopedias by typing in a couple of words of the title in an online library catalog (for example, mechanical engineer* handbook, "encyclopedia engineering", or "encyclopediaandengineering"), truncating any words that could have variant endings, and eliminating any prepositions or articles (*of*, *for*, *the*, *a*, *an*).

Here are some examples of what you might find:

- *Prentice-Hall Encyclopedia of Information Technology*
- *McGraw-Hill Dictionary of the Life Sciences*
- *Robotics Sourcebook and Dictionary*
- *Energy: A Guide to Organizations and Information Resources in the United States*
- *McGraw-Hill Yearbook of Science and Technology*

### Books

Books can provide excellent background, a historical treatment of your subject and depth. Check a book's table of contents and index to see if it has what you are looking for. For some current research topics, however, books tend to be too general. To obtain more specific information on technological advancements, go to journal articles, technical reports, or other sources discused later in this chapter.

Try these resources; search drone aircraft on each to see which is best, most current:

Online Books Page. Provided by the University of Pennsylvania. Scroll to see the A-Z list of subject areas.
Library of Congress Online Catalog
www.worldcat.org. Provided by the OCLC WorldCat. Requires free registration; search on downloadable articles, for example, drones.

Here are some sites that consolidate access to thousands of libraries worldwide:

LibDex: http://www.libdex.com/

The WWW Library Directory: www.travelinlibrarian.info/libdir/other.html

## Periodicals

*Periodicals* is a librarian's word for stuff that comes out periodically—like magazines, journals, newspapers. Magazines, which are by definition for general audiences, are not likely to have much that is useful to your report.

Directory of Open Access Journals: www.doaj.org/. DOAJ offers free access to over 3,500 full-text, quality-controlled scientific and scholarly journals, over 1,200 of which are searchable at the article level. For example, search on solar power.

Most of the following are services you pay for; some offer a free 30-day trial. Your local library may subscribe to some of these, giving you free access. Find articles here then go to your library and read them:

Applied Science and Technology: http://www.ebscohost.com/academic/applied-science-technology-full-text. As an individual, you must pay for access; but membership in any major library is likely to give you access.

Academic Search Complete: http://www.ebscohost.com/academic/academic-search-complete. The same access requirements as *Applied Science and Technology* but enables access in tthousands of research journals.

Science Direct: Science Direct Journals. Many of these provide open access to PDF versions of research articles.

## Technical Reports

IEEE Xplore

NASA Technical Reports Server http://ntrs.nasa.gov/search.jsp

## Associations and Interest Groups

Organizations like associations, special-interest groups, advocacy groups are a good potential for information on your topic—or a terrible ideological swamp. You never know: there may be an association out there just dying to send you information about home hydroponic gardening systems. *Encyclopedia of Associations* may be a good resource. Ask your librarian for help with this kind of resource.

## Government Documents

One enormous source of technical information is the U.S. government. The only problem is getting to the indexes of it, and then getting the documents themselves. If you're willing to make a trip to a major library, you can get at most of both. Such libraries are like dumpsites for selected U.S. government documents—and that amounts to a lot! And of course many of these documents are on various kinds of microforms in order to conserve space. But if you wanted a pile of technical reports related to your topic, you could get them this way. Try these strategies for checking in government documents for your topic:

1. Check in *Government Documents* to see an example, search on global warming.
2. Check in a recent volume of *National Archives* for reports on your topic (be sure to read the companion abstracts).
3. Check a recent volume of the *Government Reports and Announcements* index for reports and other information sources related to your topic.

4. Check *Index to U.S. Government Periodicals* for articles appearing in U.S. government magazines and journals related to your topic.
5. Data and Statistics about the U.S. This one comes out every year.
6. U.S. Census Guide: How to Get the Most out of Census.gov. Provided by backgroundchecks.org.

These sources give you just a taste of what's available in government documents. Better indexed methods of finding this type of information are probably now available; check with a librarian for help.

### Library and Subject Guides

The link below provides research assistance, subject guides, useful resources and web sites compiled by the friendly librarians at Austin Community College—for example, on occupational therapy, business and technical communications, and other department and field names:

http://researchguides.austincc.edu/

### Other Information Resources

There are certainly other kinds of information sources such as patents, standards, product literature, conference procedings. Again, ask your librarian for help with these kinds of resources.

## Evaluate Your Research Findings

The following is a system of evaluating the reliability of Internet information developed by the Cornell University Library:

| | |
|---|---|
| **Point of view** | Does this article or book seem objective, or does the author have a bias or make assumptions? What was the author's method of obtaining data or conducting research? Does the website aim to sell you something or just provide information? What is the author's purpose for researching and writing this article or book? |
| **Authority** | Who wrote the material? Is the author a recognized authority on the subject? What qualifications does this author have to write on this topic? Is it clear who the intended audience is? What is the reputation of the publisher or producer of the book or journal? Is it an alternative press, a private or political organization, a commercial press, or university press? What institution or Internet provider supports this information? (Look for a link to the homepage.) What is the author's affiliation to this institution? |
| **Reliability** | What body created this information? Consider the domain letters at the end of a Web address (URL) to judge the site's quality or usefulness. What kind of support is included for the information? Are there facts, interviews, and statistics that can be verified? Is the evidence convincing to you? Is there any evidence provided to support the author's conclusions, such as charts, maps, bibliographies, and documents? Compare the information provided to other factual sources. |
| **Timeliness** | Has the site been recently updated? Look for this information at the bottom of a web page. How does the copyright of a book or publication date of an article impact the information contained in it? Do you need historical or recent information? Does the resource provide the currency you need? |
| **Scope** | Consider the breadth and depth of an article, book, website, or other material. Does it cover what you expected? Who is the intended audience? Is the content aimed at a general or a scholarly audience? Based on your information need, is the material too basic, too technical, or too clinical? |

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response.

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# 4.6.2: Citing Sources of Borrowed Information

## If you borrow it, don't steal it—cite it!

When you write a researched technical report, you can and should borrow information like crazy. However, to make it legal, all you have to do is "document" it. If your report makes you sound like a rocket scientist but there's not a single source citation in it and you haven't even taken college physics yet, people are going to start wondering. (In *Night Court*, you'd be guilty of plagiarism. Fine—an F on the paper in question.)

However, if you take that same report and load it up properly with source citations (those little indicators that show that you are borrowing information and that show from whom), everybody is all the more impressed—plus they're not secretly thinking you're a shady character.

A documented report (one that has source indicators in it) says to readers that you've done your homework, that you're up on this field, that you approach these things professionally—that you are no slouch.

Note: For format on citing books, articles, Internet and other information sources, see these resources:

Research and Citation Resources. Overview from the Purdue OWL with links to specific systems.
Citing Sources Styles. From Austin Community College.

**APA (Author Date System)**

APA Documentation. Austin Community College (Austin, Texas)
APA Style. American Psychological Association.

**IEEE (Number System)**

IEEE Citation Style. From Murdoch University, Murdoch, Western Australia.
6.2: Setting Up A Reference List – Sample Entries (IEEE). From LibreTexts: Humanities.
IEEE Reference Style Guide for Authors. IEEE

**MLA (Author Page System)**

MLA Documentation. Austin Community College (Austin, Texas)

Here are some resources on plagiarism:

Plagiarism. From the Purdue OWL.
Paraphrasing and summarizing. Methods of avoiding plagiarism. From the Purdue OWL.

## Number System of Documentation

**Caution:** Shown here is a simplification of the IEEE documentation system. Make sure that the documentation style you use conforms to the system required by the journal, publisher, or instructor you write for.

If you've taken other college writing courses recently, you have probably been exposed to other documentation systems—specifically the MLA, or works-cited system. The problem with that system is that it is rather limted to the literature field. Unfortunately, it is not widely used outside that field—especially not in technical and scientific fields.

One of the more common systems used in technical fields is the *number system*. It's too bad you have to learn a different system, but at least this one is easy to learn and use. The citation-sequence version of the *CSE (Scientific) Documentation* (see the link above) is one of the specific incarnations of the number system. (Notice that here that we use *brackets*, not parentheses for the source indicators.)

In this number system, you list your information sources alphabetically, number them, and put the list at the back of your report. Then in the body of your report, whenever you borrow information from one of those sources, you put the source number and, optionally, the page number in brackets at that point in the text where the borrowed information occurs. The following examples show how this system works:

- [4] would refer to source 4 in the list

- [4] would refer to source 4 in the list.
- [4:231] would refer to page 231 of source 4.
- [4:231-235] would refer to pages 231 through 235 of source 4.
- [4;7] would indicate that the information was borrowed from source 4 and source 7.

## What to Document

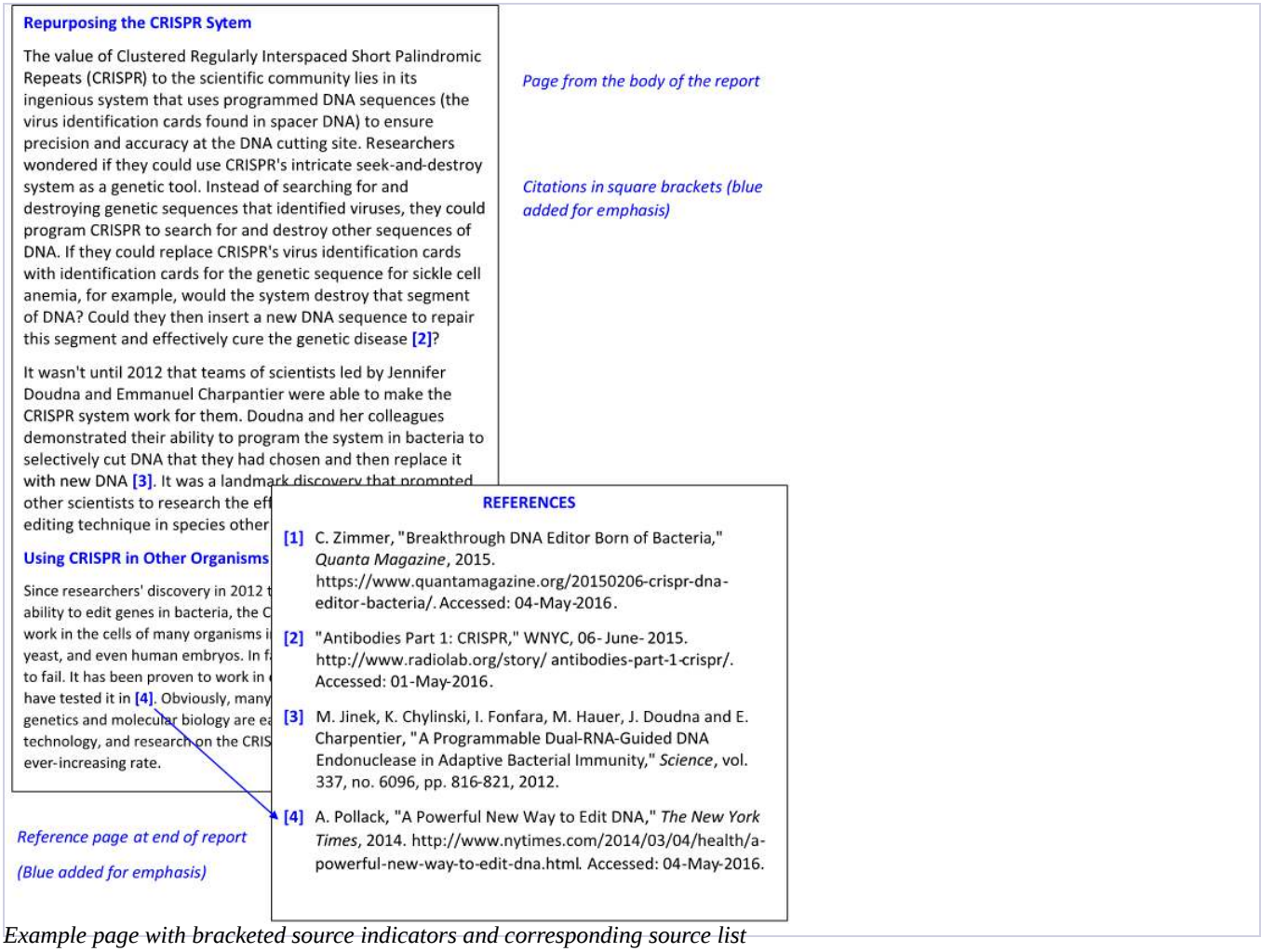
This question always comes up: how do I decide when to document information—when, for example, I forgot where I learned it from, or when it really seems like common knowledge? There is no neat, clean answer.

You may have heard it said that anything in an encyclopedia or in an introductory textbook is common knowledge and need not be documented. However, if you grabbed it from a source like that just recently—it really isn't common knowledge for you, at least not yet. Document it! If you just flat can't remember how you came by the information, then it has safely become common knowledge for you. (All that's really going on here is that we're trying to protect the efforts of those poor devils who worked themselves into the ground originating the information we want to borrow—give 'em a break, give 'em their due!)

One other question that is often asked: do I document information I find in product brochures or that I get in conversations with knowledgeable people? Yes, most certainly. You document *any* information, regardless whether it is in print, in electronic bits, magnetic spots, or in thin air.

## How to Place the Source Indicators

It's a bit tricky deciding exactly where to place the source indicators—at the beginning of the passage containing the borrowed information, at the end? If it makes sense to "attribute" the source (cite the name of the author or the title of the information), you can put the attribution at the beginning and the bracketed source indicator at the end (as shown in the following).




*Example page with bracketed source indicators and corresponding source list*

In the number documentation system, the code numbers in the text of the report are keyed to the references page. For example, [6:5] in the middle of the page from the body of the report indicates that the information came from source 6 (in References), page 5. Notice that the attribution of the quotation indicates the beginning of the borrowed information and the bracketed source indicator marks the end.

## How to Set up the Sources List

A bit more challenging is setting up the list of information sources—that numbered, alphabetized list you put at the end of the document. (The context here is still the number system.) The best way to learn is to use examples. The following examples show you how to handle books, government reports, articles from magazines and journals, encyclopedia articles, and personal interviews.

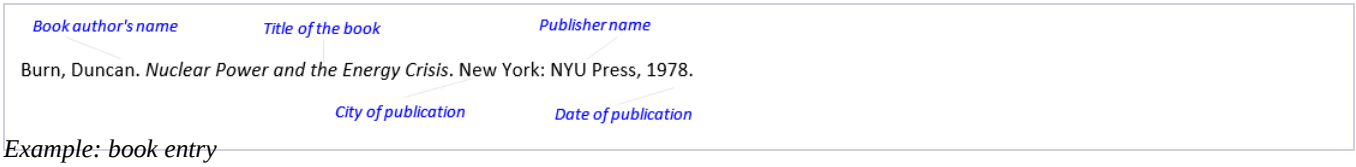
**Internet and Web information sources.** For format on citing Internet and Web information sources, see any of the resources listed above. As you will see, there are quite a few variations. However, a simple functional practice would be in this order:

1. Author name, last name first. If that's not available, use the organization's name, followed by a period.
2. Next, the title of the page.
3. After that the publication date of the web page, if available; otherwise, use the "N.d" indicator.
4. Next, the full URL of the page.
5. And finally an indication of the date you accessed the page, for example, Accessed June 6, 1988.

| Material type | In-text example | Reference List example |
|---|---|---|
| **Web-based source: Individual author** | As mentioned in [9], solar panels ... | [9] M. Crawford, "Catching the Sun." asme.org. https://www.asme.org/engineering-topics/articles/renewable-energy/catching-the-sun (accessed Feb. 5, 2022). |
| **Web-based source: Corporate author** | Engineers Australia [12] provided the evidence ... | [12] Engineers Australia, "Cook Islands Renewable Energy," engineersaustralia.org.au. https://www.engineersaustralia.org.au/portal/news/cook-islands-renewable-energy (accessed Oct. 3, 2021). |
| **Web-based source: No author** | As seen in [7], the Panama Canal ... | [7] "Engineering Triumph That Forged a Nation: Panama Canal Turns 100," msnbc.msn.com. http://www. msnbc.msn.com/news/world/engineering-triumph-forged-nation-panama-canal-turns-100-n181211 (accessed Nov. 3, 2021).<br>**Note: Where there is no author, use the web source title enclosed in double quotation marks.** |

*Source:* https://libraryguides.vu.edu.au/ieee...apper-10146966. Thanks to Muraco Kyashna-tocha

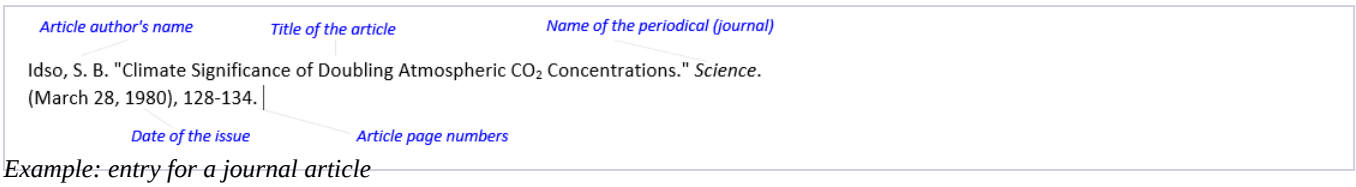
**Books.** For books, put the name of the author (first name last) first, followed by a period, followed by the title of the book in italics, followed by a period, followed by the city of the publisher, followed by a colon, followed by the publisher's name (but delete all those tacky "Inc.," "Co.," and "Ltd." things), followed by the year of publication, ending with a period. In this style, you don't indicate pages.




*Example: book entry*

**Magazine and journal articles.** Start with the author's name first (last name first), followed by a period, then the title of the article in quotation marks and ending with a period, followed by the name of the magazine or journal in italics, followed by a period, followed by the date of issue of the magazine the article occurs in, followed by the beginning and ending page. If the article is spread out across the magazine, you can write "33+." or "33(5)." The (5) in the preceding is an estimate of how many pages the article would be if it were continuous.

If there is no author, start with the article or book title. If there are two authors, add "and" and the second author's name, first name first. If there are too many authors, use the first one (last name first), followed by "*et al.*," which means "and others."




*Example: entry for a journal article*

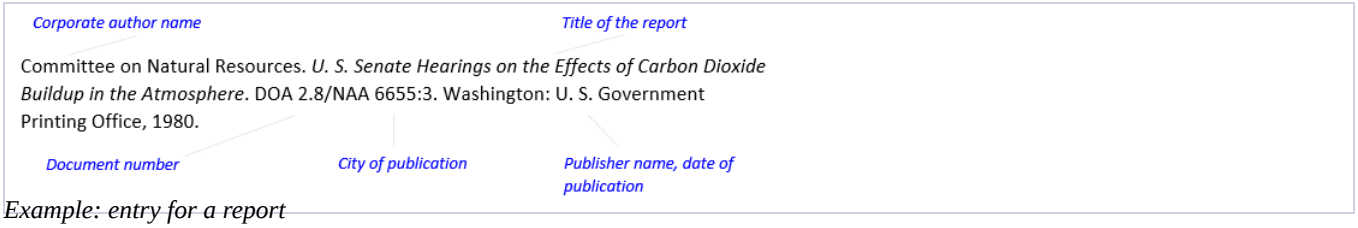
*Note*: You may have seen complex entries indicating volume and issue numbers. While those may be required in some contexts, normally you can simplify things and just include the issue date. But ask!

**Encyclopedia articles.** Encyclopedia articles are easy! Start with the title of the article in quotation marks ending with a period, followed by the name of the encyclopedia (in italics if you have it; otherwise, underline), followed by the period, then the year of the edition of the encyclopedia.



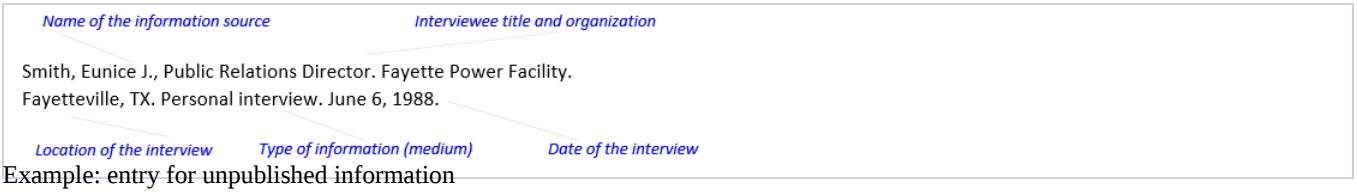
*Example: encyclopedia entry*

**Reports.** With reports, you're likely to dealing with government reports or local informally produced reports. With most reports, you may not have an individual author name; in such cases, you use the group name as the author. For government reports, the publisher is often the Government Printing Office; and the city of publication, Washington, D.C. Also, for government documents, you should include the document number, as is shown in the following example.



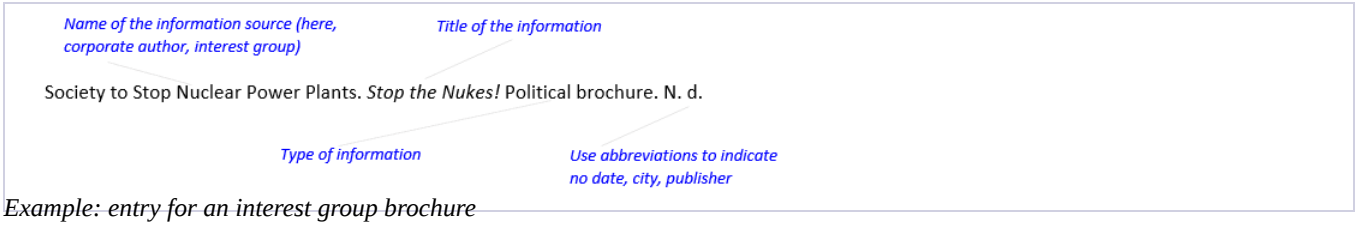

*Example: entry for a report*

**Personal interviews, correspondence, and other nonprint sources.** With these sources, you treat the interviewee or the e-mail or letter writer as the author, follow that name with the person's title, followed by a period, then the company name, followed by a period, then the city and state, followed by a period, then what the information was ("Personal interview" or "Personal correspondence") followed by a period, ending with the date.




Example: entry for unpublished information

**Interest group brochures.** For these kinds of information sources, treat the interest group name as the author, followed by a period, use the title of the brochure, followed by a period, ending with a date if you can find one (otherwise, put "N.d.").




*Example: entry for an interest group brochure*

**Product brochures.** For these kinds of information sources, treat the company name as the author, followed by a period, use something identifying like the product name (including the specific model number), followed by anything that seems like the title of the brochure, followed by a period, ending with a date if you can find one (otherwise, put "N.d.").




*Example: entry for a product brochure*

**Documenting borrowed graphics.** It's certainly legal to copy graphics from other sources and use them in your own work—as long as you document them. You indicate the source of a borrowed graphic in the figure title (caption), which is located just below the graphic. In the figure title, you can show the source of the graphic in two ways—the long traditional way or the shorter way that uses the format of the number system:



*Traditional citation for a graphic: complete bibliographic details are given, plus page number.*

Figure 3. Advanced Widget Asssembly. Source: Alfred Newperson. *Widget Design: Twenty-First Century Potentials* (Summe City: Nouveau, 2010), 32.



*Source citation using the number system: the "5" indicates source 5 in the sources list at the end of the document; the "32" indicates the page number.*

Figure 3. Advanced Widget Asssembly [5:32].

*Two ways to indicate the source of borrowed graphics (Source: toys.rubegoldberg.com).*

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response.

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# 4.6.3: Cross-Referencing

## Show 'em what's related

Technical reports and instructions often require cross-references—those pointers to other places in the same document or to other information sources where related information can be found.

A cross-reference can help readers in a number of different ways:

- It can point them toward more basic information if, for example, they have entered into a document over their heads.
- It can point them to more advanced information if, for example, they already know the stuff you're trying to tell them.
- Also, it can point them to related information.

Related information is the hardest area to explain because ultimately everything is related to everything else—there could be no end to the cross-references. But here's an example from DOS—that troll that lurks inside PC-type computers and supposedly helps you. There are several ways you can copy files: the COPY command, the DISKCOPY command, and XCOPY command. Each method offers different advantages. If you were writing about the COPY command, you'd want cross-references to these other two so that readers could do a bit of shopping around.

Of course, the preceding discussion assumes cross-references within the same document. If there is just too much background to cover in your document, you can cross-reference some external website, book, or article that does provide that background. That way, you are off the hook for having to explain it all!

## Components of Cross-References

Cross-references can be *internal* (within the same document) or *external* (outside of the current document). Most cross-refencing guidelines depend on whether the cross-reference is internal or external. With external sources, you cannot control the titles of books, chapters, headings, page numbers. They are likely to change!

With cross-references to external documents:

- Do not cite titles of books, chapters, headings exactly word-for-word verbatim. Instead, refer to the general topic covered.
- Do not cite exact chapter or section numbers or exact page numbers.

Now, a decent cross-reference consists of several elements:

- **Name of the source being referenced**—This can either be the title or a general subject reference. If it is a chapter title or a heading, put it in quotation marks; if it is the name of a book, magazine, report, or reference work, put it in italics. (Individual article titles also go in quotation marks.)
- **Page number**—Required if it is in the same document. If the cross-reference is to the beginning of a chapter and the chapter number and title are cited (either internal or external), no need for the page number. Readers can use the table of contents. If the cross-reference includes a heading internal to a numbered chapter, include the page number where that heading occurs.
- **Subject matter of the cross-reference**—Often, you need to state what's in the cross-referenced material and indicate why the reader should go to the trouble of checking it out. This may necessitate indicating the subject matter of the cross-referenced material or stating explicitly how it is related to the current discussion.

These guidelines are shown in the following illustration. Notice in that illustration how different the rules are when the cross-reference is "internal" (that is, to some other part of the same document) compared to when it is "external" (to information outside of the document).

## Examples of Cross-References

Internal cross-references are cross-references to other areas within your same document; external ones are those to information resources external to your document.

| | |
|---|---|
| For details on creating graphics and then incorporating them into a document, see the section on graphics in this guide on page 16. | In this *internal* cross-reference, the section is referenced generically. It's standard to cite the page number in internal cross-references. |
| For details on creating graphics and then incorporating them into a document, see "Graphics" in the *Online Technical Writing Guide*. | The title of the chapter is in double quotation marks. The title of the book that the chapter occurs is italicized. |
| For details on creating graphics and then incorporating them into a document, see the chapter on graphics in the *Online Technical Writing Guide*. | If you don't want to cite the exact titles of the chapter, just use lowercase. |
| For details on creating graphics and then incorporating them into a report, see "Brighten Up That Monthly Report!" in the *Office Information Newsletter*. | If you cite an article in a periodical, put the article in quotation marks and italicize the name of the periodical. |

## Explanatory Phrasing in Cross-References

It is unhelpful and annoying to encounter cross-references like this: (see Fig. 3)

Readers need to know what the cross-reference material is about, why they should go look at it.

They also need just a brief idea of how to understand the internal cross-referenced text, images, table, chart, or diagram—just a hint. Here's an example (a gray background has been added to the cross-reference text):

Lithium is extracted by two major methods: traditional open pit mining techniques, and brine extraction [6]. As shown in Figure 3, pegmatites account for 26% of the worldwide lithium resources while brines account for 66% [6].

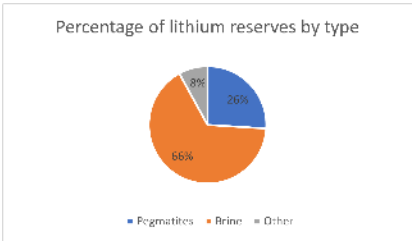



Figure 3. Percentage of global lithium reserves by type [6].

*Example of an explanatory cross-reference to a chart. Source: James Ball.*

Once the brine in an evaporation pond has reached an ideal lithium concentration, the brine is pumped to a lithium recovery facility for further processing and extraction. The

remaining brine solution is returned to the underground reservoir [9]. Figure 5 shows the scale of a typical lithium evaporation pond system. Note the size of the roads and utility poles for scale.



Figure 5. Lithium evaporation ponds [10].

*Example of an explanatory cross-reference. Source: James Ball.*

Here's another example; the gray background is not in the original:

**Open Pit Mining.** Pegmatite is extracted from open pits using traditional mining techniques. The extracted lumps of pegmatite are then mechanically crushed to reduce their size. The crushed ore is further milled to produce a finer product, which is more suitable for further separation. The processing results in a concentrate which is chemically processed to create lithium carbonate or lithium hydroxide [3]. Figure 4 provides an example of an open pit lithium mine which shows the typical scale of these operations.



Figure 4. Open pit lithium mine [7].

*Example of an explanatory cross-reference. Source: James Ball.*

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response.

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# 4.7: Information-collecting strategy

The following explores ways to collect information for a technical writing project—the topic plastic pollution. This has become a big topic in the 2020s.

## Brainstorm questions related to the topic

Take a look at the links McMurrey has collected the past few years (as of end of December 2024):

Plastic Pollution: Article Links

If you skim the titles, you can probably think of questions like these about plastic pollution:

what's the amount?
where it's located?
who's producing it?
what are its contents?
how harmful to living things?
what other dangers does it represent?
does it break down disappear?
can it be recycled?
are there alternatives to plastic pollution?

You probably can think of more questions.

## Pick a question to write about

How would you collect notes on one or more of these questions? You could probably develop a decent technical document on just the question "what's the amount?" And that might include discussing what kind of stuff is in the plastic pollution. Also, the situation in which you write this document might demand that you discuss "who's producing all this plastic?" (One answer might be "who isn't?")

To simplify this task in order to focus on *collecting* information, use "Plastic Pollution: Article Links" above. How about focusing on the question "how much plastic pollution is there?"

## Create a tentative outline

Make a list of subtopics relevant to the chosen topic "how much plastic pollution" is there?

where is it located?
what are the sources?
what are the contents?
where does it go?

If you are not able to do this with your topic, skim some of the information resources you have found. Even the ttles will give you good ideas.

## Strategize how to collect information

The goal is collecting information for a writing project is to be able to use it, say, two months later when you've forgotten practically all of it.

**Index-card method.** Decades ago, the standard expected method was to summarize, paraphrase, or directly quote useful information onto index cards. It was assumed that all a writer need do was to transcribe the information on the complete set of index cards into a rough draft on regular paper, clean up the transitions a bit, and (boom!) the project would be done. To some members of generations of writers, including this one, this vision of the process has never seemed practical or realistic.

**Photocopy method.** When photocopying machines became widely available, photocopying pages relevant to a writing project became a common approach. Likely at that point, taking notes on index cards became obsolete. If you use the photocopy method,

you highlight sentences and paragraphs you think you can use in your researched technical document. If you have an outline, you tag what you've highlighted with number-letter combinations identifying it with specific parts of your outline.

**Online method.** Now that the Internet has become so pervasive, you can simply highlight and copy information directly off the screen and paste it into note files, saving you lots of nickels and dimes and giving the poor tired library photocopy machines a break. And now you highlight sentences and paragraphs you think you can use in your researched technical document. If you have an outline, you tag what you've highlighted with number-letter combinations identifying it with specific parts of your outline.

True, some resources may not be online. If you decide a few of these resources are not hopelessly antiquated, head for the library with a bag of nickels and dimes. Also, some resources may be online but in an old PDF format that that cannot be selectively copied. Do a screen capture for those and resign yourself to transcribing the information manually or learn how use OCR (optical character recognition ) to convert the information to usable text.

## Identify some potentially useful information sources

You may have gathered a lot of information resources that might have useful material for your writing project. That's a good thing. You don't want to rely on just one information resource—it may be all wrong, biased, or incomplete!

Let's say you've narrowed your resource list to the items below. Scan them to find specific information on the *volume* of plastic pollution. Click on a link to view details and a link to the complete article. Click again to close.

**Think that your plastic is being recycled? Think again.**

On a Saturday last summer, I kayaked up a Connecticut river from the coast, buoyed by the rising tide, to pick up trash with a group of locals. Blue herons and white egrets hunted in the shallows. Ospreys soared overhead hauling freshly caught fish. The wind combed the water into fields of ripples, refracting the afternoon sun into a million diamonds. From our distance, the wetlands looked wild and pristine. See full article

**At every stage from farm to table, more microplastics enter your food**

A new study has found that, globally, micro- and nanoplastics and plastic additives are widespread across our food supply. While we have an understanding of how they get there, we donâ€™t know a lot about their effects on human health, food safety and security. See full article

**Study finds blue whales eat some 10 million microplastic particles a day**

We know that marine animals of all sizes are inadvertently consuming plastics as they move through the ocean, but what does this diet look like for the largest of them all? To answer this question, scientists at Stanford University have analyzed the foraging habits of whales off the coast of California and found that blue whales take in an estimated 10 million pieces of plastic each day. See full article

**380 million tons of plastic are made every year. None of it is truly recyclable**

No plastic is truly recyclable—not even the water bottles and milk jugs that people usually toss into their blue bins. According to a new report released on Monday by Greenpeace USA, no plastic product meets a common industry standard for recyclability, even though they bear the familiar â€œchasing arrowsâ€ recycling symbol. See full article

**Scientists unearth record amount of microplastics on the seafloor**

Millions of metric tons of plastic waste enter the ocean each year, but beyond that, we have little idea where much of it ultimately winds up. Researchers working to trace its path through the marine environment have discovered the highest concentration of microplastics ever recorded on the seafloor, an example of a hotspot of plastic pollution created by deep-sea currents that act like conveyor belts for our trash. See full article

**Tagged bottles reveal the path of plastic through the ocean**

The more we know about the problem of plastic pollution, the better we'll be able to intervene and clean up, or even prevent, the mess. That includes understanding the way it moves through the marine environment, and a new study has shed further light on this process through the use of tagged plastic bottles. The bottles were dropped in the Ganges river and some ended up thousands of kilometer away. See full article

**380 million tons of plastic are made every year. None of it is truly recyclable**

No plastic is truly recyclable â€" not even the water bottles and milk jugs that people usually toss into their blue bins. According to a new report released on Monday by Greenpeace USA, no plastic product meets a common industry standard for recyclability, even though they bear the familiar â€œchasing arrowsâ€ recycling symbol. See full article

**Ganges river carrying billions of plastic particles into ocean each day**

A group of scientists studying the flow of plastic into the ocean have found a startling amount of pollution exiting South Asia's largest river systems. The scientists calculated that the Ganges and two nearby waterways are responsible for pumping as much as three billion microplastic particles into the Indian Ocean each day. The study was conducted as part of National Geographic's Sea to Source project, which aims to tackle the problem of plastic pollution by investigating how it can be prevented from reaching the ocean. In December, scientists working on this project published research detailing just how far tagged plastic bottles can travel along the Ganges river, washiing thousands of kilometers downstream into the Indian Ocean. See fullarticle

**1.3 billion tonnes of plastic to pollute environment by 2040, study warns**

With its production continuing to increase at an exponential rate, our problem with plastic pollution is showing no sign of slowing down. A new study mapping mapping the movement of plastic waste has outlined just how drastic the situation might become, projecting that 1.3 billion tonnes of plastic will be dumped on land and in the oceans by 2040 unless some significant steps are taken to address the trend. See full article

**So, about all that plastic in the ocean...**

For thousands of years humans have existed on Earth, but it is only in the last 100 or so that plastics have entered our lives. These days you can barely go a minute without touching something made from some kind of plastic. But while we've been getting all swept up in the convenience that synthetic polymers bring us, the trash has been piling up. Millions of metric tons of plastic enter the ocean every year, and no one really knows where it is and what damage it is causing. So ... what are we to do about it? See full article

## Track down useful information in your sources

Imagine the excerpt in source 10 above catches your attention, you link to the full article (https://newatlas.com/plastic-ocean-cleanup/50277/), and then scroll to this paragraph:

> In 2015, a paper published in the journal Science estimated that somewhere between 4.8 and 12.7 million metric tons of plastic enter the ocean each year. The researchers arrived at this figure after estimating how much plastic waste every coastal country in the world produces, and then calculated how much could wash into the sea from open dumps and improperly secured landfills. The scientists guess that this amounts to between 15 to 40 percent of all disposed plastic.

Now, wanting details, you click the 2015 link and find a more informative article in the journal *Science*:

```
Estimates of the mass of plastic waste
carried by particular waterways range from
<<1 kg per day (Hilo, HI) to 4.2 MT (4200
kg) per day (Danube River) (10, 11). Because
of their dependence on local watershed
characteristics, these results cannot be
easily extrapolated to a global scale.

Read entire excerpt
```

### Create an extended-summary note; add the sources to your bibliographic list

You believe that your readers, being skeptical types, will be curious how the estimates of total plastic pollution were achieved, but not to the extent of reading the entire excerpt or even a paraphrase of it. So you decide to summarize the information:

```
{summary}
```

Notice in the summary note above, an all-important bibliographic identifier—information about the authors, book or journal, dates, pages has been added.

### Updating the outline

As you take notes, you must regularly update the locators on all your notecards because as you read, take notes, and learn more about your technical subject, your outline may either change or become more specific. Imagine that you started with this excerpt of a rough outline and had taken these notecards:

```
In 2015, a paper published in the journal
Science estimated that somewhere between 4.8
and 12.7 million metric tons of plastic
enter the ocean each year. The researchers
arrived at this figure after estimating how
much plastic waste every coastal country in
the world produces, and then calculated how
much could wash into the sea from open dumps
and improperly secured landfills. The
scientists guess that this amounts to
between 15 to 40 percent of all disposed
plastic.
```

*Figure 11. Notecards and the corresponding outline before updating*

As you took these notecards, you would update your outline periodically; at the end, the outline might look like this:

```
Revised outline
```

*Figure 12. Updated outline*

Notice...

If you had taken these notes and updated your outline, you would revise the locators on the individual notecards like this:



*Figure 13. Revised locators*

Remember that if you don't like the number-combinations as locators, you can substitute short phrases, as is shown in the alternate locators above.

### Final stages in the notetaking process

As you take notes, check off sections of your outline for which you gather sufficient information, as is done in this outline excerpt. In this example, the writer has taken sufficient notes for much of IV.B. but still needs information for the rest of the outline.



*Figure 14. An outline for which note-taking is partially complete*

In the final step in notetaking, you arrange the notecards in the order that you'll use them as you write the rough draft. Read through your cards several times to make sure the sequence is right and that there are no gaps in the information you've gathered. When you're sure that the order is right, write sequence numbers on each of the cards to preserve the order (see the sequence numbers on the notecards in the next section). With the notecards in the right order and numbered, you are ready to write the first draft, which is discussed in the section on rough drafting.

## Other systems of notetaking

There are plenty of other ways to take notes. The main point of any form of note-taking of course is to make your technical document work easier and less time-consuming. You may prefer some other note-taking system because of your own work style or because of your technical document project. Or, you may end up using some other system in combination with the traditional one. Any system that enables you to get your work done efficiently is a good one.

- Mental notetaking. With short technical documents, it is possible to remember all the information and not writing any of it down is possible. But few of us are able to remember all of the information for long, highly technical technical documents.
- Book marks. If you use only a few articles or books, you can mark the important passages with slips of paper and write the rough draft with them. If you have many books and articles, this approach can get to be quite chaotic.
- Photocopying. You can also photocopy everything you think you need in your technical document. With the photocopied pages, you highlight the important passages, or cut out the important passages and paste them on notecards. Two problems with this approach are that (a) you may photocopy many unnecessary pages and waste money and (b) you still have the job of paraphrasing and summarizing ahead of you. Still, this is a system some technical document writers use occasionally to supplement their more traditional note-taking procedures.
- Exploratory drafts. If you are already familiar with your technical document subject, you can try writing a rough skeletal draft to show you what information you need. You may discover that all you lack is specific names, statistics, or terminology. You can take notes and plug the information into the draft (especially if you have computerized word processing). Writing the exploratory draft shows you what you know and don't know.
- Notetaking by the source. If you have only a few sources, you can also use one other fairly common system of notetaking:

1. You take notes from individual sources onto long sheets of paper rather than onto notecards.
2. You take all the information you need from the source onto as many sheets of paper as necessary; you don't split it up into bits of information on separate notecards.
3. At the top of each notesheet, you give full bibliographic information on the book or article.
4. Throughout each notesheet, you indicate the exact pages the information comes from.
5. Also, you label these pages of notes with locators, the letter-number combinations from the outline.
6. You mark off sections of the outline as you gather sufficient information for them.
7. In some cases, you can cut up these full-page notes and actually handle them as if they were notecards.

Here is an example sheet of notes using this approach:



*Figure 15. Sample notesheet: taking notes by the source*

In this system, the source (book, article, technical document, etc.) is indicated at the top of the page; the page numbers are indicated down the right margin in parentheses; and the sheet of notes is keyed to the outline down the left margin in parentheses.

## Electronic Note-Taking Methods

As of 2015, the writing-teaching world—at least at the college level and in terms of textbooks—is seriously behind in terms of what it knows and what it teaches about note-taking for major writing projects. Strangely, the very best writing resource on the Internet, the Purdue OWL, has nothing on note-taking. Read the following section Traditional Note-Taking Methods for a review of just what good *any* note-taking system is.

Until we get our act together, consider how the traditional note-taking system is implemented in software applications.

A particulary good tutorial on the traditional note-taking method has been developed at Bonita Springs Middle Language Arts Department. You can go download it here: How to Organize a Research Paper using Notecards. Makes you want to write a research paper!

A number of software applications are available that support note-taking and related tasks: Evernote, EasyBib, NoodleTools, and more. Their basic functions are similar so let's use NoodleTools. It has a nice set of YouTube videos that walk you through the main phases of its use:

**How do I create a new project?** This video takes you from the very start!

**NoodleTools—Creating Outlines.** If you've created good notecards, creating the outline from them is terrific, as this video shows.

**Noodle Tools Works Cited.** If you've created good notecards, creating the bibliography from them is also terrific.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 4.8: Quotations, Paraphrases, Summaries- Phrasing, Punctuation, Attribution

However you use your borrowed information—whether directly quoting, paraphrasing, or summarizing—remember that you must cite your sources. That's called *documenting your sources of borrowed information*. That is covered in documentation.

## Quoting Directly

For various reasons, you may feel compelled to throw in a lot of quotations in your technical documents. It's true: direct quotation can provide authority to your documents, but so can paraphrasing and summarizing (covered below).

### Reasons for Direct Quotations

In technical texts, you can reduce your reasons for direct quotations to these:

**Authority speaks:**

According to Stephen Hawking in an interview with *Nature*, "There is no escape from a black hole in classical theory, Quantum theory, however, enables energy and information to escape from a black hole."

Dr. Avijit Banerjee, chair of cardiology and operative dentistry at King's College London, said "the potential harmful effects of fluoride cited have not been associated with the very low levels of fluoride used in water fluoridation programs."

**Avoid guilt by association:** Imagine that some politician makes hopelessly misinformed comments about vaccines. You don't want readers to think that *you* have that idea about vaccines so you quote the politician, perhaps loading the attribution:

In his presidential campaign, he has put forth the widely discredited notion that fluoridated water is "associated with arthritis, bone fractures, bone cancer, IQ loss, neurodevelopmental disorders, and thyroid disease."

**Crazy, quirky expression:**

In *Into a Black Hole* transcribed by https://www.hawking.org.uk/, Hawking stated that "black holes ain't as black as they are painted."

The legendary H. Ross Perot, in his famous criticism on NAFTA (a free-trade agreement), argued that it would create "a giant sucking sound going south," meaning U.S. jobs leaving of the U.S. because lower wage expectations elsewhere.

### Methods of Direct Quotation

**Block quotation**

According to APA style:

Format quotations of 40 words or more as block quotations.
Do not use quotation marks to enclose a block quotation.
Start a block quotation on a new line and indent the whole block 0.5 in. from the left margin.
Either
(a) cite the source in parentheses after the quotation's final punctuation or
(b) cite the author and year in the narrative before the quotation and place only the page number in parentheses after the quotation's final punctuation.

Researchers have studied how people talk to themselves:

> Inner speech is a paradoxical phenomenon. It is an experience that is central to many people's everyday lives, and yet it presents considerable challenges to any effort to study it scientifically. Nevertheless, a wide range of methodologies and approaches have combined to shed light on the subjective experience of inner speech and its cognitive and neural underpinnings. (Alderson-Day & Fernyhough, 2015, p. 957)

*Source:* https://apastyle.apa.org/style-grammar-guidelines/citations/quotations#:~:text=Block%20quotation%20with%20narrative%20citation,311)

Check APA style for the format of narrative citations and parenthetical citations.

**Complete-sentence direct quotation**

If you need to quote a complete sentence, remember to attach some sort of attribution to it, and use appropriate punctuation:

*Colon:* Research from the Encyclopedia Britannica states that distance learning was not universally accepted by colleges and universities across the United States: "the introduction of distance learning in traditional institutions raised fears that technology will someday completely eliminate real classrooms and human instructorsâ€ based on research from the Encyclopedia Britannica" [3].

*Comma:* According to the United States Distance Learning Association, "in 2015, an estimated quarter of a million people were participating in some level of undergraduate distance learning in the United States alone" [2].

See the next section on attribution

**Run-in direct quotation**

In plenty of instances, it's better to run in parts of a direct quotation to the syntax of your own writing, for example:

Dewey stated that "by 1987, for example, the interest in distance learning was sufficient to create the United States Distance Learning Association (USDAL)" [2].

Another advantage of online learning is that it more readily enables "adaptation of training materials that address students' individual needs" [1].

## Direct Quotations: Attribution

An *attribution* for a quotation indicates who made the quoted statement and possibly other related details. The attribution is highlighted in red:

Dewey also argues that â€œthis shift has significant implications and allows distance educators to play an important role in the fulfillment of the promise of the right to universal educationâ€ [2].

Now, here is an example containing the unattributed quotations highlighted in red (using bracketed-format for citations):

Technology changed the game of distance learning entirely. Just a few of the technologies that are commonly used in distance learning courses include video chat, webinars, chat room digital forums and e-mail based on details from the Essential Guide [1] and are the foundation of virtual classrooms. "By 1987, for example, the interest in distance learning was sufficient to create the United States Distance Learning Association (USDAL)" [2]. And as technology has continued to improve, access to computers and internet in most homes, as well as high speed cellular connections, the growth and interest in distance learning in many forms has skyrocketed. "In 2015, an estimated quarter of a million people were participating in some level of undergraduate distance learning in the United States alone" [2]. While this number may seem like distance learning was accepted by colleges and universities across the United States, "the introduction of distance learning in traditional institutions raised fears that technology will someday completely eliminate real classrooms and human instructors" [3]. Because of this unrealistic fear, many colleges and universities still offered limited or no remote or online course options even as recent as five years ago. But the major driver that brought distance learning into the mainstream and helped to solidify this education method as just as valuable as a regular classroom model was the COVID pandemic.

LARGE ATTRIBUTION

The bracketed numbers in the above example identify the sources of the quotations. But that is inadequate. In this revision, attributions have been added and are highlighted in teal:

> Technology changed the game of distance learning entirely. Just a few of the technologies that are commonly used in distance learning courses include video chat, webinars, chat room digital forums and e-mail based on details from the

Essential Guide [1] and are the foundation of virtual classrooms. Dewey states that "by 1987, for example, the interest in distance learning was sufficient to create the United States Distance Learning Association (USDAL)" [2]. And as technology has continued to improve, access to computers and internet in most homes, as well as high speed cellular connections, the growth and interest in distance learning in many forms has skyrocketed. According to the United States Distance Learning Association, "in 2015, an estimated quarter of a million people were participating in some level of undergraduate distance learning in the United States alone" [2]. While this number may seem like distance learning was accepted by colleges and universities across the United States, research presented in the *Encyclopedia Britannica* states that "the introduction of distance learning in traditional institutions raised fears that technology will someday completely eliminate real classrooms and human instructors" [3]. Because of this unrealistic fear, many colleges and universities still offered limited or no remote or online course options even as recent as five years ago. But the major driver that brought distance learning into the mainstream and helped to solidify this education method as just as valuable as a regular classroom model was the COVID pandemic.

## Paraphrasing

In a technical-document, usually the better approach to note-taking is to paraphrase. When you paraphrase, you convey the information fact-by-fact, idea-by-idea, and point-by-point in your own words. The writer of the original passage ought to be able to read your paraphrase and say that it is precisely what she or he had meant.

### Reasons for Paraphrasing

Here are some reasons for paraphrasing as opposed to directly quoting:

- There is nothing special or unusual in the direct quote.
- The quotation is too long (True, you could reduce the length with ellipses, but the result would be a hard-to understand collection of fragments.
- You can make the paraphrase fit the context and terminology of your discussion.
- It's much easier to transition into and out of the paraphrase.

As for punctuation, you punctuate the paraphrase as you would your own writing.

## Paraphrases: Attribution

Here is an example of original text followed by a paraphrase of it, including an attribution highlighted in red:

**Original passage**

*(Numbers in parentheses are source citations.)*

Estimates of the mass of plastic waste carried by particular waterways range from <<1 kg per day (Hilo, HI) to 4.2 MT (4200 kg) per day (Danube River) (10, 11). Because of their dependence on local watershed characteristics, these results cannot be easily extrapolated to a global scale.

Here we present a framework to calculate the amount of mismanaged plastic waste generated annually by populations living within 50 km of a coast worldwide that can potentially enter the ocean as marine debris. For each of 192 coastal countries with at least 100 permanent residents that border the Atlantic, Pacific, and Indian oceans and the Mediterranean and Black seas, the framework includes: (i) the mass of waste generated per capita annually; (ii) the percentage of waste that is plastic; and (iii) the percentage of plastic waste that is mismanaged and, therefore, has the potential to enter the ocean as marine debris (12) (data S1). By applying a range of conversion rates from mismanaged waste to marine debris, we estimated the mass of plastic waste entering the ocean from each country in 2010, used population growth data (13) to project the increase in mass to 2025, and predicted growth in the percentage of waste that is plastic. Lacking information on future global infrastructure development, the projection represents a business-as-usual scenario.

We estimate that 2.5 billion MT of municipal solid waste was generated in 2010 by 6.4 billion people living in 192 coastal countries (93% of the global population). This estimate is broadly consistent with an estimated 1.3 billion MT of waste generated by 3 billion people in urban centers globally (5). Approximately 11% (275 million MT) of the waste generated by the total population of these 192 countries is plastic. We expect plastic waste to roughly track plastic resin production (270 million MT in 2010) (3), with differences resulting from the time lag in disposal of durable goods (lifetime of years to decades), for example. Scaling by the population living within 50 km of the coast (those likely to generate most of the waste becoming marine debris), we estimate that 99.5 million MT of plastic waste was generated in coastal regions in 2010. Of this, 31.9 million MT were classified as mismanaged and an estimated 4.8 to 12.7 million MT entered the ocean in 2010, equivalent to 1.7 to 4.6% of the total plastic waste generated in those countries.

Our estimate of plastic waste entering the ocean is one to three orders of magnitude greater than the reported mass of floating plastic debris in high-concentration ocean gyres and also globally (14â€“17). Although these ocean estimates represent only plastics that are buoyant in seawater (mainly polyethylene and polypropylene), in 2010 those resins accounted for 53% of plastic production in North America and 66% of plastic in the U.S. waste stream (4, 18). Because no global estimates exist for other sources of plastic into the ocean (e.g., losses from fishing activities or at-sea vessels, or input from natural disasters), we do not know what fraction of total plastic input our land-based waste estimate represents.

Our framework was designed to compute, from the best-available data, an order-of-magnitude estimate of the amount of mismanaged plastic waste potentially entering the ocean worldwide. It is also a useful tool to evaluate the factors determining the largest sources of mismanaged plastic waste. The amount of mismanaged plastic waste generated by the coastal population of a single country ranges from 1.1 MT to 8.8 million MT per year, with the top 20 countriesâ€™ mismanaged plastic waste encompassing 83% of the total in 2010 (Fig. 1Opens in image viewer and Table 1Opens in image viewer). Total annual waste generation is mostly a function of population size, with the top waste-producing countries having some of the largest coastal populations. However, the percentage of mismanaged waste is also important when assessing the largest contributors of waste that is available to enter the environment. Sixteen of the top 20 producers are middle-income countries, where fast economic growth is probably occurring but waste management infrastructure is lacking (the average mismanaged waste fraction is 68%). Only two of the top 20 countries have mismanaged fractions

<15%; here, even a relatively low mismanaged rate results in a large mass of mismanaged plastic waste because of large coastal populations and, especially in the United States, high per capita waste generation.

*Science*, Vol. 347, No. 6223
https://www.science.org/doi/10.1126/science.1260352

**Paraphrased version**

(*This version shorter than the above because irrelevant text was omitted.)*
The estimation of plastic waste in the oceans was derived from a framework that assessed the quantity of mismanaged plastic waste produced annually by populations residing within 50 kilometers of coastlines globally. This study involved 192 coastal countries, each with at least 100 permanent residents adjacent to major oceans and seas. The framework accounted for three key factors: the annual waste generation per person, the proportion of waste that is plastic, and the portion of plastic waste that is poorly managed and thus likely to become marine debris. Using various conversion rates from mismanaged waste to marine debris, researchers estimated the volume of plastic waste entering the ocean in 2010 from these countries, projected this increase to 2025, and forecasted a rise in the share of waste that is plastic, assuming no significant changes in global infrastructure.
In 2010, about 2.5 billion metric tons of municipal waste were produced by 6.4 billion people in these countries, with approximately 11% (or 275 million metric tons) being plastic. It was estimated that 99.5 million metric tons of plastic waste originated from coastal regions, with 31.9 million metric tons identified as mismanaged. Consequently, between 4.8 and 12.7 million metric tons of plastic waste entered the ocean that year, representing 1.7% to 4.6% of the total plastic waste produced. This figure exceeds known amounts of floating plastic debris found in high-density ocean gyres and globally. The study emphasizes the significant role coastal population size and inadequate waste management play in contributing to oceanic plastic waste. The findings underline that middle-income countries, often experiencing rapid economic growth but lacking effective waste management systems, are major contributors to mismanaged plastic waste. — ChatGPT-4o, January 2025

As of fall 2025, these paraphrasing tools were available:

Quillbot Paraphrasing Tool l
Quillbot AI-Detector
Scribbr Paraphrasing Tool

Grammarly may also offer a paraphrasing tool.

## Summarizing

### Reasons for Summaries

Here are some reasons for summarizing as opposed to quoting or paraphrasing:

- You just want to cite the main idea of the source.
- You want to enable readers to read further, dive deeper.
- You want to state that the source provides further support for the point you're making.

As for punctuation, you punctuate the summary as you would your own writing.

## Summaries: Attribution

Here is an example of original text followed by different summaries of it:

**Original text**

Please see eSoil: A low-power bioelectronic growth scaffold that enhances crop seedling growth

**Summarized versions**

*Extended (like an abstract):*

Active hydroponic substrates that stimulate on demand the plant growth have not been demonstrated so far. Here, we developed the eSoil, a low-power bioelectronic growth scaffold that can provide electrical stimulation to the plantsâ€™ root system and growth environment in hydroponics settings. eSoilâ€™s active material is an organic mixed ionic electronic conductor while its main structural component is cellulose, the most abundant biopolymer. We demonstrate that barley seedlings that are widely used for fodder grow within the eSoil with the root system integrated within its porous matrix. Simply by polarizing the eSoil, seedling growth is accelerated resulting in increase of dry weight on average by 50% after 15 d of growth. The effect is evident both on root and shoot development and occurs during the growth period after the stimulation. The stimulated plants reduce and assimilate NO3âˆ’ more efficiently than controls, a finding that may have implications on minimizing fertilizer use. However, more studies are required to provide a mechanistic understanding of the physical and biological processes involved. eSoil opens the pathway for the development of active hydroponic scaffolds that may increase crop yield in a sustainable manner.

*Single sentence (main point):*

The scientist in this research demonstrate that barley seedlings growth is enhanced as the dry weight increased on average by 50% after electrical stimulation.

As of fall 2024, this summarizing tool was available:

Quillbot Summarizer

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response.

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# 4.9: Basic patterns and elements of the sentence

This section is a quick review of the fundamentals of the sentence. If you encounter unfamiliar terminology in this book or in your class, refer to this section for help. For more on osentence grammar, see *English Fundamentals* by Emery, Kierzek, and Lindblom (Macmillan) for a thorough discussion of sentence grammar, along with exercises.

## Basic sentence patterns

Subject + verb. The simplest of sentence patterns is composed of a **subject** and *verb* without a direct object or subject complement. It uses an *intransitive verb*, that is, a verb requiring no direct object:

Control **rods** *remain* inside the fuel assembly of the reactor.

The **development** of wind power practically *ceased* until the early 1970s.

All amplitude-modulation (AM) **receivers** *work* in the same way.

The **cross-member** exposed to abnormal stress eventually *broke*.

Only two **types** of charge *exist* in nature.

Subject + linking verb + subject complement. Another simple pattern uses the *linking verb*, any form of the to be verb without an action verb:

The chain **reaction** *is* the basis of nuclear power.

The **debate** over nuclear power *has* often *been* bitter.

**Folding** and **faulting** of the earth's surface *are* important geologic processes.

**Windspeed** *seems* to be highest during the middle of the day.

The silicon solar **cell** *can be* difficult and expensive to manufacture.

Subject + verb + direct object. Another common sentence pattern uses the **direct object**:

Silicon conducts **electricity** in an unusual way.

The anti-reflective coating on the the silicon cell reduces **reflection** from 32 to 22 percent.

Prestressing of the concrete increases the load-carrying **capacity** of the members.

Subject + verb + indirect object + direct object. The sentence pattern with the **indirect object** and *direct object* is similar to the preceding pattern:

| |
|---|
| We are sending **you** the *balance* of the payment in this letter. |
| I am writing **her** about a number of problems that I have had with my Execucomp wordprocessor. |
| The supervisor mailed the **applicant** a *description* of the job. |
| I am writing **you** about a number of problems... |
| Austin, Texas, has recently built its **citizens** a *system* of bikelanes. |

Subject + verb + direct object + object complement. The sentence pattern using the [*direct object*] and **object complement** is not common but worth knowing:

| |
|---|
| The walls are usually painted **black**. |
| The plant shutdown left the entire *area* an economic **disaster**. |
| The committee declared the new *design* a **breakthrough** in energy efficiency. |
| The low cost of the new computer made *competition* much too **difficult** for some of the other companies. |

Passive voice pattern. The passive voice is not ordinarily considered a "pattern," but it is an important and often controversial construction. It reverses the subject and object and, in some cases, deletes the subject. (See the section on problems with the weak use of the passive.) Compare these example active and passive voice sentences:

| **Passive voice** | **Active voice** |
|---|---|
| Saccharin is now permitted as an additive in food. | The FDA now permits saccharin as an additive in food. |
| This report is divided into three main sections. | I have divided this report into three main sections. |
| Windmills are classified as either lift or drag types. | Engineers classify windmills as either lift or drag types. |
| The valves used in engine start are controlled by a computer. | A computer usually controls the valves used in an engine start. |
| The remains of Troy were destroyed by later builders on the site. | Later builders on the site of Troy destroyed the remains of citadel. |
| Some restaurant locations can be leased. | You can lease some restaurant locations. |

Simple sentences. A simple sentence is one that contains **subject** and a *verb* and no other independent or dependent clause.

> **One** of the tubes *is attached* to the manometer part of the instrument indicating the pressure of the air within the cuff.
>
> To measure blood pressure, a **device** known as a sphygmomanometer and a **stethoscope** *are needed. (compound subject)*
>
> There *are* basically two **types** of stethoscopes. *(inverted subject and verb)*
>
> The **sphygmomanometer** *is* usually *covered* with cloth and *has* two rubber tubes attached to it. *(compound verb)*

Compound sentences. A compound sentence is made up of two or more **independent clauses** joined by a *coordinating conjunction* (*and*, *or*, *nor*, *but*, *yet*, *for*) and a comma, an adverbial conjunction and a semicolon, or a semicolon.

> **In sphygmomanometers, too narrow a cuff can result in erroneously high readings,** *and* **too wide a cuff can result in erroneously low readings.**
>
> **Some cuff hook together** *;* **others wrap or snap into place.**

Compound predicates. A **predicate** is everything in the verb part of the sentence after the subject (unless the sentence uses inverted word order). A **compound predicate** is two or more predicates joined by a *coordinating conjunction*. Traditionally, the conjunction in a sentence consisting of just two compound predicates is not punctuated.

> Another library media specialist **has been using** Accelerated Reader for ten years *and* **has seen** great results.
>
> This cell phone app **lets users share pictures instantly with followers** *and* **categorize photos with hashtags**.

## Basic parts of the sentence

Subject. The subject of a sentence is that noun, pronoun, or phrase or clause about which the sentence makes a statement.

> Einstein's general **theory** of relativity has been subjected to many tests of validity over the years.
>
> Although a majority of caffeine drinkers think of it as a stimulant, heavy **users** of caffeine say the substance relaxes them.
>
> Surrounding the secure landfill on all sides are impermeable barrier **walls**.
> *(inverted sentence pattern)*
>
> In a secure lanfill, the **soil** on top and the **cover** block storm water intrusion into the landfill.
> *(compound subject)*

Verb phrase. The main verb, or verb phrase, of a sentence is a word or words that express an action, event, or a state of existence. It sets up a relationship between the subject and the rest of the sentence.

> The first high-level language to be widely accepted, FORTRAN, **was implemented** on an IBM 704 computer.
>
> Instruction in the source program **must be translated** into machine language. *(passive construction)*
>
> The operating system **controls** the translation of the source program and **carries** out supervisory functions. *(compound verb)*

Predicate. The predicate is the rest of the sentence coming after the subject. It can include the main verb, subject complement, direct object, indirect object, and object complement.

> The pressure in a pressuried water reactor **varies from system to system**.
>
> The pressure **is maintained at about 2250 pounds per square inch to prevent steam from forming**.
>
> The pressure **is then lowered to form steam at about 600 pounds per square inch**.
>
> In contrast, a boiling water reactor **operates at constant pressure**.

Subject complement. The subject complement is that noun, pronoun, adjective, phrase, or clause that comes after a linking verb (some form of the *be* verb):

> The maximum allowable concentration is ten **parts** $H_2S$ per million parts breathable air.
>
> The deadening of the sense of smell caused by $H_2S$ is the **result** of the effects of $H_2S$ on the olfactory nerves of the brain.
>
> Continuous exposure to toxic concentrations of $H_2S$ can be **fatal**.

Direct object. A direct object—a noun, pronoun, phrase, or clause acting as a noun—takes the action of the main verb. A direct object can be identified by putting *what?*, *which?*, or *whom?* in its place.

> The housing assembly of a mechanical pencil contains the mechanical **workings** of the pencil.
>
> Lavoisier used curved glass **discs** fastened together at their rims, with wine filling the space between, to focus the sun's rays to attain temperatures of 3000° F.
>
> The dust and smoke lofted into the air by nuclear explosions might cool the earth's **atmosphere** some number of degrees.
>
> A 20 percent fluctuation in average global temperature could reduce biological **activity**, shift weather **patterns**, and ruin **agriculture**.
> *(compound direct object)*
>
> The cooler temperatures brought about by nuclear war might end all **life** on earth.
>
> On Mariners 6 and 7, the two-axis scan platforms provided much more **capability** and **flexibility** for the scientific payload than those of Mariner 4.
> *(compound direct object)*

Indirect object. An indirect object—a noun, pronoun, phrase, or clause acting as a noun—receives the action expressed in the sentence. It can be identified by inserting *to* or *for*.

> In the application letter, tell *[to]* the potential **employer** that a resume accompanies the letter.
>
> The company is designing *[for]* senior **citizens** a new walkway to the park area.
>
> Do not send *[to]* the personnel **office** a resume unless someone there specifically requests it.

Object complement. An object complement—a noun or adjective coming after a direct object—adds detail to the direct object. To identify object complements, insert *[to be]* between the *direct object* and **object complement**.

> The superviser found the *program [to be]* **faulty**.
>
> The company considers the new *computer [to be]* a major **breakthrough**.
>
> Most people think the space *shuttle [to be]* a major **step** in space exploration.

## Parts of speech and other sentence elements

Nouns. A noun is the name of a person (Dr. Sanders), place (Lawrence, Kansas, factory, home), thing (scissors, saw, book), action (operation, irrigation), or idea (love, truth, beauty, intelligence). Remember that, while a word may look like a noun, it must function in the sentence as a noun:

> The one **experiment** that has been given the most **attention** in the **debate** on **saccharin** is the 1977 Canadian **study** done on **rats**.
>
> The Calorie Control **Council**, a **group** of Japanese and American **manufacturers** of **saccharin**, spent **$890,000** in the first three **months** of the 1977 **ban** on **saccharin** on **lobbying**, **advertisements**, and public **relations**.
>
> A flat-plate **collector** located on a sloping **roof** heats **water** which circulates through a **coil** and is pumped back to the **collector**.
>
> The **blades** start turning when the **windspeed** reaches 10 **mph**, and an **anemometer** is attached to the **shaft** to measure **windspeed**.
>
> The multifuel **capacity** of the Stirling **engine** gives it a **versatility** not possible in the internal combustion **engine**.
>
> The regenerative cooling **cycle** in the **engines** of the Space **Shuttle** is made up of high pressure **hydrogen** that flows in **tubes** connecting the **nozzle** and the combustion **chamber**.

Pronouns. A pronoun stands in the place of a noun. There are several types: personal pronouns, demonstrative and indefinite pronouns, and relative and interrogative pronouns. Pronouns have antecedents, a reference to a word they take the place of.

*Personal pronouns* include nominative case, objective case, and possessive case pronouns.

- **Nominative case pronouns** are used in the positions of subjects or subjective complements; they include:

| | |
|---|---|
| I | we |
| you | you |
| he, she, it | they |

- **Objective case pronouns** are used as direct objects, indirect objects, and objects of prepositions; they include:

| | |
|---|---|
| me | us |
| you | you |
| him, her, it | them |

- **Possessive case pronouns** show possession; they include:

| | |
|---|---|
| my, mine | our, ours |
| your, yours | your, yours |
| his | their, theirs |
| her, hers | its |

- **Demonstrative and indefinite pronouns.** Demonstrative pronouns substitute for things being pointed out; indefinite pronouns substitute for unknown or unspecified things:

| Demonstrative pronouns | Indefinite pronouns |
|---|---|
| this, these | each, either |
| that, those | any, neither |
| | anybody, some |
| | every, somebody |
| | everybody, someone |

- **Relative and interrogative pronouns** link dependent to independent clauses; they link to adjective or noun clauses to simple sentences. Relative pronouns include

| | | |
|---|---|---|
| who | when | which |
| whom | where | whether |
| whose | why | that |

Here are some examples of relative pronouns in use:

> Until the early 1960s, desk calculators, **which** performed only the basic arithmetic operations, were essentially mechanical in operation.
>
> The invention of the transistor in 1948 and the integrated circuit in 1964 were two events **that** formed the basis of the electronic calculator revolution.
>
> The form in **which** memory is presented to the software is sometimes called local address space.
>
> George Boole, **who** was a self-taught man, is famous for his pioneering efforts to express logical concepts in mathematical form.
>
> In 1855, Boole married Mary Everest, a niece of Sir George Everest after **whom** Mount Everest was named.
>
> Lemaître proposed **that** all the matter in the Universe was concentrated into **what** he termed the primeval atom, **whose** explosion scattered material into space to form galaxies, **which** have been flying outward ever since.

- Interrogative pronouns, similar to relative pronouns, are used in question sentences:

> **What** is the fundamental unit of storage in a computer?
>
> **When** did the first exhibit of computer graphics occur?
>
> **Who** were the mathmaticians that arranged that first exhibit?
>
> **Where** was the first computer graphics exhibit held?
>
> **Why** is computer-aided art not considered art by some?

Verbs. Traditionally, verbs are divided into four groups: active verbs, linking verbs, auxiliary verbs, and modals.

- **Active verbs.** Active verbs express some sort of action and can be subdivided into intransitive and transitive verbs. Intransitive verbs do not take direct objects while transitive verbs do, as these two sets of examples show:

| | |
|---|---|
| *Intransitive verbs* | The rearrangement or division of a heavy nucleus may occur naturally (spontaneous fission) or under bombardment with neutrons.<br><br>The probability of an accident leading to the melting of the fuel core was estimated to be one chance in 20,000 reactor-years of operation.<br><br>The fuels used in ramjet engines burn in only a narrow range of fuel-air ratios. |
| *Transitive verbs* | The generation of electric energy by a nuclear power plant requires the use of heat to produce steam or to heat gases in order to drive turbogenerators.<br><br>In an auxiliary relay, when the applied current or voltage exceeds a threshold value, the coil activates the armature, which either closes the open contacts or opens the closed contacts.<br><br>The solar power satellite absorbs the solar energy in geosynchronous orbit.<br><br>In the photovoltaic solar power system, solar cells convert the light energy into electricity. |

- **Linking verbs.** A linking verb is any form of the verb to be without an action verb; it sets up something like an equal sign between the items it links. Linking verbs of a sentence can be longer than one word:

| | |
|---|---|
| had been | would have been |
| was being | might have been |
| had to have been | will have been |

A few linking verbs do not use *to be* but function like it:

That word processing program **seems** adequate for our needs.

This calculus problem **looks** difficult.

Since the oil spill, the beach **has smelled** bad.

He quickly **grew** weary of computer games.

- **Auxiliary verbs.** Auxiliary verbs "help" the main part of the verb. Here are some auxiliary verbs:

By 1967, about 500 U.S. citizens **had** received heart transplants.

Better immunosuppression management in transplant operations **has** yielded better results.

Researchers **have** found propranolol to effective in the treatment of heartbeat irregularities.

- **Modals.** Modal verbs change the meaning of the verb in a variety of ways as illustrated in the examples below:

Cracks in the welding **can** only be detected by x-rays.

Liquid oxygen **could** have leaked into the turbine and caused the fire.

The light metal fast-breeder reactor **must** be operated under extreme safety precautions.

Verbs are used together in a complex variety of tenses. In the chart below, keep in mind that "continuous" tenses are those that use *-ing* and "perfect" tenses are those that use some form of the auxiliary verb *have*.

| | |
|---|---|
| Simple Present | works |
| Present Continuous | is working |
| Present Perfect | has worked |
| Simple Past | worked |
| Past Continuous | was working |
| Past Perfect | had worked |
| Simple Future | will work |
| Future Continuous | will be working |
| Future Perfect | will have worked |
| Present Perfect Continuous | has been working |
| Past Perfect Continuous | had been working |
| Future Perfect Continuous | will have been working |

Adjectives. An adjective provides more detail about a noun; that is, it modifies a noun. Adjectives occur just before the nouns they modify, or after a linking verb:

The armature is a **rectangular** ring about which **another** coil of wire is wound.

The generator is used to convert **mechanical** energy into **electrical** energy.

The **steel** pipes contain a **protective sacrificial** annode and are surrounded by **packing** material.

Adverbs. An adverb provides more information about a verb, adjective, or another adverb; that is, it "qualifies" the verb, adjective, or adverb:

| |
|---|
| The desk is made of an **especially** corrosion-resistant industrial steel. |
| The drilling bit **actually** tears rock apart to get at the oil. |
| The power company uses huge generators which are **generally** turned by steam turbines. |
| The debate over nuclear power has **often** been bitter. |

Conjunctions. Conjunctions link words, phrases, and whole clauses to each other and are divided into coordinating, adverbial, and subordinating conjunctions. In this list, only the list of coordinating conjunctions is complete:

| Coordinating conjunctions | Subordinating conjunctions | Adverbial conjunctions |
|---|---|---|
| and | although | therefore |
| or | since | however |
| nor | because | in other words |
| but | when | thus |
| yet | while | then |
| for | if | otherwise |
| whereas | as if | nevertheless |
| as | | on the other hand |

- **Coordinating conjunctions** link words, phrases, and clauses. Here are some examples:

| |
|---|
| Nuclear-powered artificial hearts proved to be complicated, bulky, **and** expensive. |
| In the 1960s, artificial heart devices did not fit well **and** tended to obstruct the flow of venous blood into the right atrium. |
| The blood vessels leading to the device tended to kink, obstructing the filling of the chambers **and** resulting in inadequate output. |
| The small clots that formed throughout the circulatory system used up so much of the clotting factor that uncontrolled bleeding from external **or** internal injury became a risk. |
| Current from the storage batteries can power lights, **but** the current for appliances must be modified within an inverter. |

- **Adverbial conjunctions** link two separate sentences, but require a semicolon or colon:

The Kedeco produces 1200 watts in 17 mph winds using a 16-foot rotor; **on the other hand**, the Dunlite produces 2000 watts in 25 mph winds.

The first artificial hearts were made of smooth silicone rubber which apparently caused excessive clotting and, **therefore**, uncontrolled bleeding. *(This example does not contain two sentences; no semicolon, therefore, is needed.)*

For short periods, the fibers were beneficial; **however**, the eventual buildup of fibrin on the inner surface of the device would impair its function.

The atria of the heart contribute a neglible amount of energy; **in fact**, the total power output of the heart is only about 2.5 watts.

- **Subordinating conjunctions** combine separate sentences in a different way: they turn one of the sentences into an adverb clause. Here are some examples of subordinating conjunctions:

The heart undergoes two cardiac cycle periods: a diastole, **when** blood enters the ventricles, and systole, when the ventricles contract and blood is pumped out of the heart.

**Whenever** an electron acquires enough energy to leave its orbit, the atom is positively charged.

**If** the wire is broken, electrons will cease to flow and current is zero.

## Phrases and clauses

Phrases and clauses are groups of words that act as a unit and perform a single function within a sentence. A phrase may have a partial subject or verb but not both; a dependent clause has both a subject and a verb (but is not a complete sentence). Here are a few examples (not all phrases are highlighted because some are embedded in others):

| Phrases | Clauses |
|---|---|
| Electricity has to do **with those physical phenomena** involving electrical charges and their effects when **in motion** and when **at rest**.(involving electrical charges and their effects is also a phrase.) | Electricity manifests itself as a force of attraction, independent of gravitational and short-range nuclear attraction, **when two oppositely charged bodies are brought close to one another**. |
| Electricity manifests itself **as a force of attraction**, independent of gravitational and short-range nuclear attraction, when two oppositely charged bodies are brought close **to one another**. | The symbol **that denotes a connection to the grounding conductor** is three parallel horizontal lines, each of the lower ones being shorter than the one above it. |
| **In 1800**, A. Volta constructed and experimented **with the voltaic pile**, the predecessor **of modern batteries**. | These studies led Planck to postulate **that electromagnetic radiation is emitted in discrete amounts, called quanta**. |
| **In 1833**, Faraday's experimentation **with electrolysis** indicated a natural unit **of electrical charge**, thus **pointing to a discrete rather than continuous charge**. (to a discrete rather than continuous charge is also a phrase.) | **Since the frequency is the speed of sound divided by the wavelength**, a shorter wavelength means a higher wavelength. |
| The symbol that **denotes a connection to the grounding conductor** is three parallel horizontal lines, each of the lower ones **being shorter than the one above it**. | Nuclear units planned or in construction have a total capacity of 186,998 KW, **which, if current plans hold, will bring nuclear capacity to about 22% of all electrical capacity by 1995**. *(*if current plans hold *is a clause within a clause)* |

Prepositional phrases. A prepositional phrase, composed of a preposition and its object, shows relationships involving time, direction, or space:

An artificial heart was installed **in a human subject for the first time in 1969**.

The current leads **to the field coils and into an external circuit**.

Alternators are not compatible **with wind systems because of their high rpm requirements**.

The operation **of a wind generator** is based **upon Faraday's law of induced voltage** which states that the voltage **between the ends of a loop of wire** is proportional **to the rate of change in the magnetic field lines within the loop**.
*(four prepositional phrases in the last highlighted area.)*

Appositives. An appositive, a word or phrase that renames a noun or pronoun, adds information about a noun but in a way different than do adjectives:

> In 1972, Richard Nixon, **president of the U.S.**, approved the development of a reusable space vehicle, the Space Shuttle.
>
> Broad principles about space flight were laid down by the Austrian astronautical pioneer, **Dr. Eugen Sanger**.
>
> The external tank of the Space Shuttle's main engines is composed of two tanks—**a large hydrogen tank and a smaller oxygen tank**.
>
> An upper air inversion, **a layer of stable air**, is usually present over large areas of the tradewinds as a hurricane develops.

Participial phrases. A participial phrase is a group of words acting as an adjective and modifying a noun or pronoun. A participle is the *-ed* or *-ing* form of a verb:

> The Eagle Generator uses a 6-pole, shunt-wound generator **designed to reach maximum power at 20 mph**.
>
> Because of the design **created by Kwan-Gett**, endothelial cells could grow on the fibrin layer, **making the interior surfaces of the artificial heart similar to those of the natural heart**.
>
> The wire is wrapped around field cores **made of steel laminations**.

Gerunds and gerund phrases. Similar in appearance to a participial phrase, the gerund plays the role of noun. A gerund is a single word with *-ing* used as a noun. A gerund phrase is a single word with *-ing* accompanied by its objects, complements, and modifiers; it is a group of words acting as noun:

> In the iron-core type transformer, the **winding** is wrapped around an iron bar.
>
> The **splitting** of an atom produces a great amount of energy.
>
> The **cloning** of a cell produces an identical cell.
>
> Jarvik changed his artificial heart design in 1974 by **fitting his model with a highly flexible three-layer diaphragm made of smooth polyurethane**.
>
> The Jarvik-7 design then in 1979 achieved a record time of **sustaining life in a calf for 221 days**.
>
> **Reversing the rotation of the electrohydraulic heart pump** reverses the direction of the hydraulic flow.

Adjective clauses. An adjective clause is almost a complete sentence—but not quite. It functions the same way a single-word adjective does: both modify, that is, add more information to our understanding of a noun. Adjective clauses contain (1) a relative pronoun, (2) in some cases, a subject, (3) a complete verb, and (4) any other accompanying predicates or objects:

> Typically, one portable drilling rig, **which requires two tug boats to bring it to the site**, and several other boats are used in the exploratory drilling phase.
>
> The company holds many patents on its wind energy systems, such as the flyball governor **which varies the pitch of the blades in high winds** and the slow-speed generator **whose performance curve matches that of the propeller**.
>
> The idea of the artificial heart arose in part from the need to treat people **who cannot receive a donor heart**.
>
> Nose designed a "biolized" heart **in which the surfaces that came into contact with blood were made from natural tissues treated with chemical fixatives to make them tougher and immunologically inert**.
> *(an adjective clause within another adjective clause)*
>
> The regular CPR class **people are taking everywhere** now only lasts an evening.

Adverb clauses. An adverb clause is also nearly a complete sentence; it functions like an adverb does by explaining the how, when, where, and why of the discussion. The adverb clause usually contains a subordinating conjunction, a subject, a complete verb, and any other related phrases or clauses:

> **Because the shortage in donor hearts is so severe**, transplant surgery is limited to people with the best chances of surviving.
>
> **As long as the wind speed is sufficient**, the electrical energy will be continuously generated.
>
> **If an oil spill occurs away from shore**, it is unlikely to affect many birds, **unless they are directly in a major migratory path at a migrating season**.

Noun clauses. A noun clause is a group of words used as a noun. Introduced by a relative pronoun, a noun clause can play any of the functions a noun plays: subject, direct object, object of preposition, subjective or object complement. Here are example noun clauses, with their functions labelled:

Estimates indicate **that 20 million Americans owned hand-held calculators by 1974**.
*(direct object)*

Computer systems are often measured by **how much main memory their architectures allow** and by **how fast that memory can be accessed**.
*(object of preposition—two of them!)*

Lemaitre proposed **that all matter in the Universe was once concentrated into what he termed the primeval atom**.
*(direct object; in this sentence, "what he termed the primeval atom" is also a noun clause.)*

The choice of furnace wall construction depends on **how sophisticated the gas-cleaning equipment is** and on **whether a large amount of waste is to be recovered**.
*(object of preposition—two of them)*

Most microcomputers use **what are called flexible diskettes** for program and data storage.
*(direct object)*

The major disadvantage of sequential files is **that they are slow**.
*(subject complement)*

Coordinated elements. Many of the sentence elements described above can be "coordinated"; that is, they can be doubled, tripled, or even quadrupled and linked with coordinating conjunctions like *and* and *or*. For example, in the phrase "a black and white Datsun 240Z," two adjectives are are coordinated. Here are some examples of **coordinated sentence elements**:

In 1800, A. Volta **constructed** and **experimented** with the voltaic pile, the predecessor of the modern battery.
*(two verbs)*

Maxwell's theory not only **synthesized theories about electricity and magnetism**, but also **showed optics to be a branch of electromagnetism**.
*(two predicates)*

Heat exchangers can be so designed that **chemical reactions** or **energy-generation processes** can be carried out in them.
*(two noun phrases)*

Heat exchangers find wide applications **in the chemical process industries, in the food industry, in the generation of steam for production of power and electricity, in aircraft and space vehicles**, and **in the field of cryogenics for low-temperature separation of gases**.
*(nine total prepositional phrases)*

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# 4.10: Common grammar, usage, punctuation problems

## Listen to your inner editor

These links go to information that covers only those grammar, punctuation, usage, and spelling problems that give people the biggest headaches.

Technical-writing professionals try to simplify grammar rules as much as possible, without hurting the language or putting themselves in straitjackets. Typically, they work in teams and frequently move in and out of projects—so that the same document may be worked on by different writers and editors during the space of just a few years. That's why any guidelines based on interpretation or personal style or judgment must be avoided.

Here are some other sources to consult:

Brian Garner. *Garner's Modern American Usage*. Oxford.

grammarbook.com. Provided by Jane Straus.

Guide to Grammar and Writing. Provided by Charles Darling at Capital Community College.

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# 4.11: Common spelling problems

## Who made up this language?

For some writers, their main spelling problem is similar-sounding words, for example, principle and principal or affect and effect. These problems cannot be flagged by software spell-checking functions.

Here is a list of these commonly confused homophones (different spelling, same or very similar pronunciation), with examples of their correct use.

**accept, except**
The construction form **accepted** the offer to build the bridge.
Everything has been finished **except** for the paint job.

**advice, advise**
The construction firm ignored the engineer's **advice**.
The engineer **advised** the firm to use single-suspension walkways.

**affect, effect**
The **effect** of the increased oil prices has been devastating on our economy.
The increased oil prices have **affected** our economy drastically.

**cite, site, sight**
The consulting engineer **cited** a paragraph from the building code.
At the construction **site**, the workers carefully erected the scaffolding.
The collapse of the walkways was a terrible **sight**.

**complement, compliment**
The programmer has received many **compliments** on her new system.
The colors that have been selected for the room do not **complement** each other.

**counsel, council, consul**
She was appointed **consul** to the embassy in Beirut.
There was lengthy debate on the tax proposal at city **council** last night.
He **counselled** her to get a degree in technical communication.

**its, it's**
It's time to go home; **it's** getting late.
The car has lost one of **its** headlights.

**lose, loose**
Your car **loses** power when it is out of tune.
I have some **loose** change in my pocket.
Don't let Mamie get **loose**!

**personal, personnel**
They plan to take out a **personal** loan to build the deck.
Send your application to the **personnel** office.
The CEO wants to have a **personal** chat with all this company's personnel.

**principal, principle**
The **principal** component of the solar panel is the collector.
Explain to me the **principle** of convection.

**stationary, stationery**
Use company **stationery** for company business purposes only.
The derrick may not remain **stationary** during the gale-force winds.

**than, then**
My utility bill was higher this month **than** it was last month.
The hurricane reached the Texas coast; **then** it plunged right into the heart of Houston.

**their, there, they're**
**Their** calculus course is much harder than ours.
Over **there** on the table is your calculus book.
**They're** not taking calculus this semester.

**to, too, two**
Are they going **to** pave the street today?
It is still **too** rainy to pave the street.
**Two** hours ago, the sky was clear.

**whose, who's**
**Whose** technical writing book is this?
There is the woman **whose** technical report won top honors.
Do you know **who's** in charge around here?
He's a man **who's** not afraid of criticism.

**your, you're**
**Your** technical writing book is on the table.
**You're** going to have review Part 1 before writing that report.

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# 4.12: Strategies for peer-reviewing and team-writing

## Be a thoughtful reviewer; be a good team member

*Peer reviewing* (also called peer-editing) means people getting together to read, comment on, and recommend improvements on each other's work. Peer-reviewing is a good way to become a better writer because it provides experience in looking critically at writing. Peer reviewing is also important in team writing: it's how individual team members review each other's drafts of the writing project.

*Team writing*, as its name indicates, means people getting together to plan, write, and revise writing projects as a group, or team. Another name for this practice is collaborative writing—collaborative writing that is out in the open rather than under cover (where it is known as plagiarism).

## Strategies for Peer Reviewing

When you peer-review another writer's work, you evaluate it, criticize it, suggest improvements, and then communicate all of that to the writer. As a first-time peer-reviewer, you might be a bit uneasy about criticizing someone else's work. For example, how do you tell somebody his essay is boring? Read the following discussion; you'll find advice and guidelines on doing peer reviews and communicating peer-review comments.

**Initial meeting.** At the beginning of a peer review, the writer should provide peer reviewers with notes on the writing assignment and on goals and concerns about the writing project (topic, audience, purpose, situation, type), and alert them to any problems or concerns. As the writer, you want to alert reviewers to these problems; make it clear what kinds of things you were trying to do. Similarly, peer reviewers should ask writers whose work they are peer-reviewing to supply information on their objectives and concerns. The peer-review questions should be specific like the following:

Does my expanation of virtual machine make sense to you? Would it make sense to our least technical customers?
In general, is my writing style too technical? (I may have mimicked too much of the engineers' specifications.)
Are the chapter titles and headings indicative enough of the following content? (I had trouble phrasing some of these.)
Are the screen shots clear enough? (I may have been trying to get too much detail in some of them.)

**Peer-reviewing strategies.** When you peer-review other people's writing, remember above all that you should consider all aspects of that writing, not just—in fact, least of all—the grammar, spelling, and punctuation. If you are new to peer-reviewing, you may forget to review the draft for things like the following:

- Make sure that your review is comprehensive. Consider all aspects of the draft you're reviewing, not just the grammar, punctuation, and spelling.
- Read the draft several times, looking for a complete range of potential problem areas:
    - Interest level, adaptation to audience
    - Persuasiveness, purpose
    - Content, organization
    - Clarity of discussion
    - Coherence, use transition
    - Title, introduction, and conclusion.
    - Sentence style and clarity
    - Handling of graphics
- Be careful about making comments or criticisms that are based on your own personal style. Base your criticisms and suggestions for improvements on generally accepted guidelines, concepts, and rules. If you do make a comment that is really your own preference, explain it.
- Explain the problems you find fully. Don't just say a paper "seems disorganized." Explain what is disorganized about the document. Use specific details from the draft to demonstrate your case.
- Whenever you criticize something in the writer's draft, try to suggest some way to correct the problem. It's not enough to tell the writer that her paper seems disorganized, for example. Explain how that problem could be solved.

- Base your comments and criticisms on accepted guidelines, concepts, principles, and rules. It's not enough to tell a writer that two paragraphs ought to be switched, for example. State the reason why: more general, introductory information should come first, for example.
- Avoid rewriting the draft that you are reviewing. In your efforts to suggest improvements and corrections, don't go overboard and rewrite the draft yourself. Doing so takes away ownership of the document from the writer and steals from the writer the opportunity to learn and improve as a writer.
- Find positive, encouraging things to say about the draft you're reviewing. Compliments, even small ones, are usually wildly appreciated. Read through the draft at least once looking for things that were done well, and then let the writer know about them.

**Peer-review summary.** Once you've finished a peer review, it's a good idea to write a summary of your thoughts, observations, impressions, criticisms, or feelings about the rough draft. See the peer-reviewer note below, which summarizes observations on a rough draft. Notice in the note some of the following details:

- The comments are categorized according to type of problem or error—grammar and usage comments in one group; higher level comments on such as things content, organization, and interest-level in another group.
- Relative importance of the groups of comments is indicated. The peer-reviewer indicates which suggestions would be "nice" to incorporate, and which ones are critical to the success of the writing project.
- Most of the comments include some brief statement of guidelines, rules, examples, or common sense. The reviewer doesn't simply say "This is wrong; fix it." He also explains the basis for the comment.
- Questions are addressed to the writer. The reviewer is doublechecking to see if the writer really meant to state or imply certain things.
- The reviewer includes positive comments to make about the rough draft, and finds nonantagonistic, sympathetic ways to state criticisms.

```
From hcexres36:05 1999 -0600
Date: Sun, 5 Dec 1999 15:36:04 -0600 (EST)
From: "David A. McMurrey" <hcexres@io.com>
To: julie@colltech.com
cc: xgraphic_team
Subject: Review of your section of Xgraphics HTML project
Content-Type: TEXT/PLAIN; charset=US-ASCII

Julie, your section of the guide is super! You've
done several things the rest of the team ought to
incorporate in their sections.

1. But I do find places where it feels like there is
too much text -- for example, in "Using Gravity and
Snap." It's not a major problem but I'd be looking
to see if I could cut a few lines from the longer
paragraphs without sacrificing detail.

2. Your labels for the screen captures are really
nice. You'll have to show the rest of the team how
you do it.

3. You leave out generic buttons on several pages --
I think the group was in agreement that *all* pages
would have them at the bottom.

4. I notice in some areas you use italics for some
interface elements, bold for others. Our style guide
states that we wanted bold for any screen button or
similar element that makes something happen when you
click it. Maybe we need to discuss the distinction
you are thinking about here at our next meeting.
```

*Excerpt from a note summarizing the results of a peer review*. Spend some time summarizing your peer-review comments in a brief note to the writer. Be as diplomatic and sympathetic as you can!

## Strategies for Team Writing

As mentioned earlier in this chapter, team writing is one of the common ways people in the worlds of business, government, science, and technology handle large writing projects.

**Assembling the team**. When you begin picking team members for a writing project in a technical writing course, choose people with different backgrounds and interests. Just as a diverse, well-rounded background for an individual writer is an advantage, a group of diverse individuals makes for a well-rounded writing team.

If you are the team leader, you might even ask prospective team members for their background, interests, majors, talents, and aptitudes. These following writing teams combine individuals with diverse backgrounds and interests:

| **Writing team 1** | |
|---|---|
| *Project:* | A report on current cloaking technologies |
| *Team members* | *Backgrounds, skills, interests* |
| Shawn S. | Electrical engineering major, currently doing basic office-management chores at a law firm |
| Tracey K. | Senior English major, hoping this course helps with employment prospects |
| Sanjiv Gupta | Computer science major, currently doing computer graphics at a software development shop |
| Jeon Chang Yeon | Soon-to-be electrical engineering major, still developing English language skills |
| Alice B. | Undeclared major with a nontechnical focus, possibly in the wrong course, no stated skills |

**Planning the project.** Once you've assembled your writing team, most of the work is the same as it would be if you were writing by yourself—except that each phase is a team effort. Specifically, meet with your team to decide or plan the following:

### Planning Stages

- Analyze the writing assignment.
- Pick a topic.
- Define the audience, purpose, and writing situation.
- Brainstorm and narrow the the topic.
- Create an outline.
- Plan the information search (for books, articles, etc., in the library).
- Plan a system for taking notes from information sources.
- Plan any graphics you'd like to see in your writing project.
- Agree on style and format questions (see the following discussion).
- Develop a work schedule for the project and divide the responsibilities (see the following).

Capture your team's profiles and decisions in a simple *team-plan document*. It can contain the key dates in the team schedule, a tentative outline of the document to be team-produced, formatting agreements, individual writer assignments, word-choice preferences, and so on. Mention is made below of a by-laws document. That can be incorporated in the team plan as well.

Much of the work in a team-writing project must be done by individual team members on their own. However if your team decides to divide up the work for the writing project, try for at least these minimum guidelines:

- Have each team member responsible for the writing of one major section of the paper.
- Have each team member responsible for locating, reading, and taking notes on an equal part of the information sources.

Some of the work for the project that could be done as a team you may want to do first independently. For example, brainstorming, narrowing, and especially outlining should be done first by each team member on his own; then get together and compare notes.

Keep in mind how group dynamics can unknowingly suppress certain ideas and how less assertive team members might be reluctant to contribute their valuable ideas in the group context.

After you've divided up the work for the project, write a formal chart and distribute it to all the members.

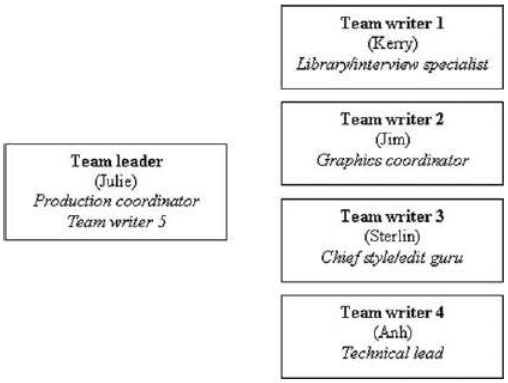



*Chart listing writing team members' responsibilities for the project*

**Scheduling the project and balancing workload.** Early in your team writing project, set up a schedule of key dates. This schedule will enable you and your team members to make steady, organized progress and complete the project on time. As shown in the example schedule below, include not only completion dates for key phases of the project but also meeting dates and the subject and purpose of those meetings. Notice these details about that schedule:

- Several meetings are scheduled in which members discuss the information they are finding or are not finding. (One team member may have information another member is looking everywhere for.)
- Several meetings are scheduled to review the project details, specifically, the topic, audience, purpose, situation, and outline. As you learn more about the topic and become more settled in the project, your team may want to change some of these details or make them more specific.
- Several rough drafts are scheduled. Team members peer-review each other's drafts of individual sections at least twice, the second time to see if the recommended changes have worked. Once the complete draft is put together, it too is reviewed twice.

| | |
|---|---|
| Individual prototypes due | October 1 |
| Team meeting: finalize the prototype | October 1 |
| Rough-draft style guide due | October 5 |
| Team meeting: finalize style guide | October 5 |
| Twice-weekly team meetings: progress & problems | October 5–26 |
| Graphics sketches due to Jim | October 14 |
| Rough drafts of individual sections due | October 26 |
| Review of rough drafts due | October 28 |
| Team meeting: discuss rough drafts, reviews | October 28 |
| Update of style guide due from Sterlin | October 31 |
| Revisions of rough drafts due to reviewers | November 3 |
| Final graphics due from Jim | November 5 |
| Completed drafts to Sterlin: final edit/proof | November 7 |
| Team meeting: review completed draft with final graphics and editing | November 12 |
| Completed drafts due to Julie for final production | November 15 |
| Team meeting: inspection of completed project | November 15 |
| Project upload due to McMurrey | November 16 |
| Party at Julie's | November 19 |

*Schedule for a team writing project*

**Anticipating problems and creating team by-laws.** Think about how to resolve typical problems that can arise in a team project and document your team's agreements about these matters in a *by-laws document*:

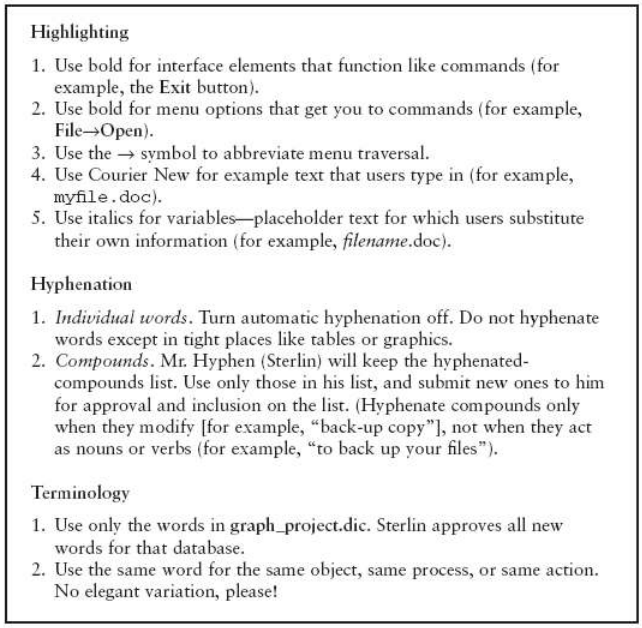
- *Workload imbalance.* When you work as a team, there is always the chance that one of the team members, for whatever reason, may have more or less than a fair share of the workload. Therefore, it's important to find a way to keep track of what each team

member is doing. A good way to do that is to have individual team members keep a journal or log of what kind of work they do and how much time they spend doing it.

Both during and at the end of the project, if there are any problems, the journal should make that fact very clear and enable a more equitable balancing of the workload. At the end of the project, team members can add up their hours spent on the project; if anyone has spent a little more than her share of time working, the other members can make up for it by buying her dinner or some reward like that. Similarly, as you get down toward the end of the project, if it's clear from the journals that one team member's work responsibilities turned out, through no fault of his own, to be smaller than those of the others, he can make up for it by doing more of the finish-up work such as typing, proofing, or copying.

- *Team members without relevant skills.* As you can see in the example description of team members' skills above, one members has no relevant skills with which to contribute to the project. Sometimes, that's just an indication of that person's anxiety or lack of interest in engaging in a group project. Of course, each team member in a writing course should contribute a fair share of the writing for a project. Howwever, there are plenty of tasks that do not require technical knowledge, formatting skills, or a sharp editorial eye, for example: typing up and distributing the team plan, the by-laws, minutes of team meetings; reminding team members of due dates and scheduled meetings. In fact, except for the anxiety or lack of interest, the self-professed unskilled team member might make the best team leader!
- *Disappearing team members.* If your team is so unfortunate as to have an irresponsible member who simply vanishes, have a plan for what to do about that, and document it in your team by-laws. One obvious solution is to kick the team member off the team and inform the instructor if it's a writing course or the next level of management if it's a nonacademic organization.
- *Seemingly entrenched team-member disagreements.* It is amazing how vehemently team members can disagree on aspects of a team-writing project. Have a plan, written in your team by-laws, how to resolve these matters. Should they be put to a vote? Should you "escalate" the matter to a neutral or higher-level party?
- *Radically inconsistent writing styles and format.* Because the individual sections will be written by different writers who are apt to have different writing styles, set up a style guide in which your team members list their agreements on how things are to be handled in the paper as a whole. These agreements can range from the high level, such as whether to have a background section, all the way down to picky details such as when to use italics or bold and whether it is "click" or "click on." See the excerpt from a project style sheet in the following. For discussion of these items, see stylesheets and style guides.

Before you and your team members write the first rough drafts, you can't expect to anticipate every possible difference in style and format. Therefore, plan to update this style sheet when you review the rough drafts of the individual sections and, especially, when review the complete draft.



Highlighting

1. Use bold for interface elements that function like commands (for example, the **Exit** button).
2. Use bold for menu options that get you to commands (for example, **File→Open**).
3. Use the → symbol to abbreviate menu traversal.
4. Use Courier New for example text that users type in (for example, `myfile.doc`).
5. Use italics for variables—placeholder text for which users substitute their own information (for example, *filename*.doc).

Hyphenation

1. *Individual words*. Turn automatic hyphenation off. Do not hyphenate words except in tight places like tables or graphics.
2. *Compounds*. Mr. Hyphen (Sterlin) will keep the hyphenated-compounds list. Use only those in his list, and submit new ones to him for approval and inclusion on the list. (Hyphenate compounds only when they modify [for example, "back-up copy"], not when they act as nouns or verbs (for example, "to back up your files").

Terminology

1. Use only the words in **graph_project.dic**. Sterlin approves all new words for that database.
2. Use the same word for the same object, same process, or same action. No elegant variation, please!

*Excerpt from a style guide for a writing project*. The items listed represent agreements team writers have made in order to give their paper as much consistency as possible.

**Reviewing drafts and finishing.** Try to schedule as many reviews of your team's written work as possible. You can meet to discuss each other's rough drafts of individual sections as well as rough drafts of the complete paper. When you do meet, follow the suggestions for peer-editing discussed in the previous section of this chapter, Strategies for peer-reviewing.

A critical stage in team-writing a paper comes when you put together into one complete draft those individual sections written by different team members. It's then that you'll probably see how different in tone, treatment, and style each section is. You must as a group find a way to revise and edit the complete rough draft that will make it read consistently so that it won't be so obviously written by three or four different people.

When you've finished with reviewing and revising, it's time for the finish-up work to get the draft ready to hand in. That work is the same as it would be if you were writing the paper on your own, only in this case the workloads can be divided up.

I would appreciate your thoughts, reactions, criticism regarding this chapter: your response—*David McMurrey*.

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# 4.13: Information structures

## Use a logical, natural structure—content and organization

The main parts of a technical-writing course focus on applications—ways technical writing skills are applied in the real world. However, these applications use varying combinations of information infrastructures. An *information infrastructure* is (1) a type of information content (such as descriptive writing), (2) a way of organizing information (such as a comparison or classification), or (3) both.

The information infrastructures reviewed in this appendix are the ones commonly used in technical writing. Of course, there are other infrastructures—maybe some that scholars of technical writing have not yet pinned a label on, but these are the most common and the most readily visible. And of course some of these infrastructures blend together. The main thing is that by knowing these, you have the intellectual tools for quickly organizing and structuring just about any writing project.

### Description

- Discussion
- Examples:
  - Rayovac Workhorse Flashlight
  - Primitive Stone Scraper

### Comparisons

- Discussion
- Examples:
  - Nuclear Power Plants
  - Wind Electrical-Power Generators

### Classification

- Discussion
- Examples
  - Industrial Robots
  - Types of Solar Water Heaters

### Causal Discussion

- Discussion
- Examples
  - Effects of a Nuclear Attack

### Definition

- Discussion
- Examples
  - Sickle Cell Anemia
  - Stratospheric Ozone Depletion and HVAC Refrigerants

### Process Discussion

- Discussion
- Examples
  - Cardiac cycle
  - Wind Turbine Power Generation

## Introductions

- Discussion
- Examples
  - Introductions to Brief Instructions
  - Introductions to Brief Reports
  - Report Introduction from a Report on Nuclear Reactors
  - Report Introduction from a Report on the Ames Municipal Solid Waste Recovery System
  - Section Introduction Occuring in a Report on Wire-Line Logging Technology

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# 4.13.1: Description

## What does it look like?

The biggest hurdle you may face in writing a description is remembering what the term means as it is used in this context. We all use the word *description* loosely to refer to practically any discussion or explanation. But in this context, it means *the detailed discussion of the physical aspects of a thing*. That means discussing things like color, shape, size, weight, height, width, thickness, texture, density, contents, materials of construction, and so on.

For example, this sentence is not really description in our sense of the word:

A computer diskette is a device used for storing electronic data.

It explains the function or purpose but provides little or no physical detail. However, this sentence is very definitely description:

The common computer diskette is 3.5 inches by 3.5 inches and approximately 1/8 inch thick.

Be sure to check out the example descriptions available with this chapter.

## Contexts for Description

As mentioned earlier, descriptions are common element in technical writing—just not quite in the same way that instructions are. Descriptions appear more often as a sentence or two here, a paragraph there, or a whole section elsewhere. Certain kinds of technical writing feature description:

- Accident reports requiring plenty of description.
- Product specifications—documents that describe design and feature of a new or changed product—have plenty of description.
- Instructions often require description to enable readers to visualize what they are doing and what they are working with.

## Contents and Organization of Descriptions

The following is a review of the sections you'll commonly find in descriptions. As you read, check out the example descriptions.

**Introduction.** Plan the introduction to your description carefully. Make sure it does all of the following things (but not necessarily in this order) that apply to your particular description:

- Indicate the specific object about to be described.
- Indicate what the audience needs in terms of knowledge and background to understand the description.
- Provide a general description of the object.
- Include an overview of the contents of the description.

**Background.** If the thing you are describing is not likely to be familiar to most of your readers, consider adding some background before you plunge into the actual description. If you are about to describe an SGO/3 density gauge to nonspecialists, you'd better first discuss what in the world the thing is, what it does, and on what part of the planet it is used.

**Discussion of the parts or characteristics.** The main part of your description is the discussion of each part or characteristic. You must divide the thing you are describing into parts, or characteristics, or both. *Parts* are easy: for example, a wooden pencil has lead, a wooden barrel, an eraser, and a metal clip. *Characteristics* are describable aspects of a thing but are not parts: for example, the pencil has a certain weight, length, width, and so on. If you were a budding real-estate tycoon and had to describe a vacant lot for company files, you'd probably describe it by its characteristics: its location, square footage, terrain, vegetation, access to utilities, and so on. (Check out the description of the primitive stone scraper in the examples; part of it is arranged by characteristics, and part by parts!)

Once you've divided the thing you are decribing into parts, characteristics, or both, your next job is to describe each one. For mechanical things, it works well to start by defining the part, by explaining its function. After that, you describe the part from general to specific, using any of the sources of description that are appropriate.

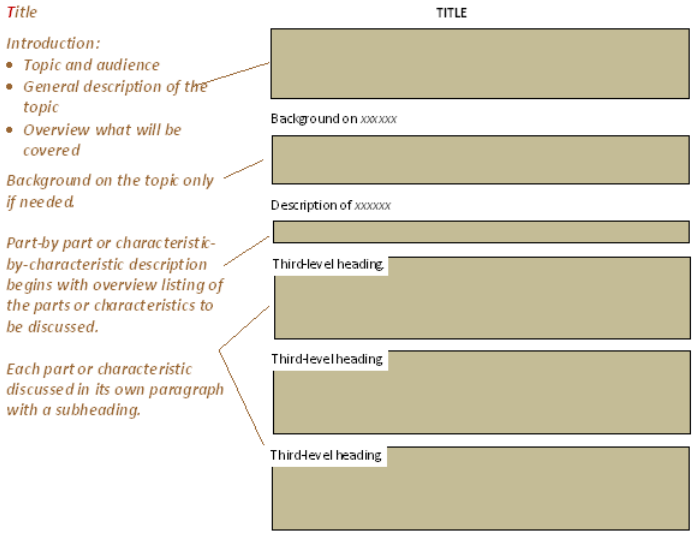
Notice that in description, you can mix other kinds of writing. You'll find yourself explaining functions, defining terms, discussing a bit of process as you describe. That's not a problem as long as the primary focus and the majority of the content is truly description.

**Discussion of the related operation or process.** At some point in a description, often at the end, it is useful to summarize the operation or process associated with the object you're describing. For example, if you've just described a mechanical pencil, you could briefly explain how it is used. If you've just described a snowflake, you could discuss the process by which it formed.

## Sources of Description

When you write a description, you need to think about the kinds of descriptive detail you can provide. Sometimes, descriptions are rather weak in this area. Use the following list to plan your description or to review a description you have written. Think of the categories of descriptive detail you could provide, or use the following list to identify categories you have not used:

| | |
|---|---|
| color | depth |
| height | amount |
| width | pattern, design |
| shape | ingredients |
| weight | age |
| materials | subparts |
| texture | length |
| location | finish |
| methods of attachment | temperature |
| odor | moisture content |




*Schematic view of descriptions*. Remember that this is just a typical or common model for the contents and organization—many others are possible.

## Miscellaneous Concerns

In descriptions, you'll probably find yourself puzzling over how to handle numbers, abbreviations, and symbols:

**Numbers.** Remember that technical writing breaks some of those rules you worked so hard to learn in past writing classes. In the technical writing context, we are often vitally concerned about numbers and want them to stand out. This means that you should use numerals in running text when the number indicates an exact, measured, or measurable amount or when it represents a critical value. For example, in these sentences, it seems to matter that the numbers are exact:

The cup is 3 inches in diameter.

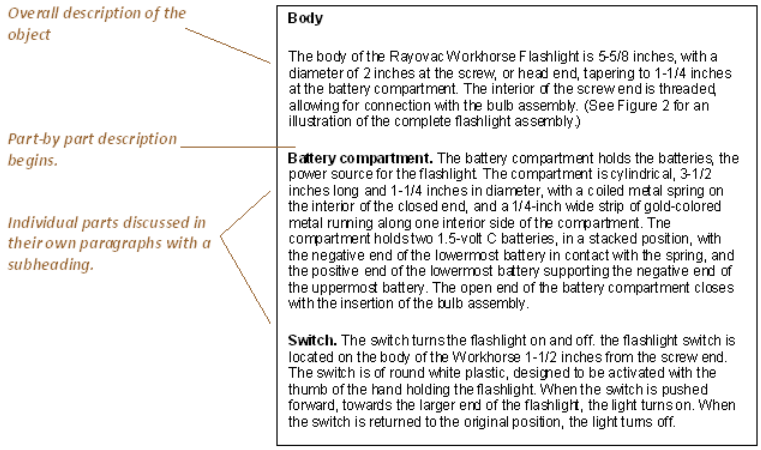
Use 4 tacks to fasten the poster to the wall.

However, this does not mean using numerals for indifferent values. For example, in this sentence, there is nothing heart-stopping

about how many sections the report has:

The report contains four major sections.

See the section on numbers vs. words for further details.




*Anatomy of a descriptive paragraph*. Typically, it starts with some statement about the purpose or function of the part, with the descriptive detail following. Descriptive detail draws upon the "sources" of description—such things as color, shape, width, and height.

**Abbreviations.** In technical writing, we expect to see abbreviations. Use them in your description freely. Remember the rule on punctuating abbreviations—punctuate them only if they spell a word (for example, "in."). Remember too that abbreviations do *not* go up against the number they are used with (for example, make that "8 mm tape" or "8-mm tape" but *not* "8mm tape").

**Symbols.** The most common problem with symbols in instructions and descriptions has to do with inches and feet. If you're writing instructions for a carpenter's dream project where there are feet and inches all over the place, use the symbols " (inches) and ' (feet). However, if you cite inch and foot measurements only a few times, use the word or abbreviation instead.

## Graphics and Format in Descriptions

In most descriptions, you'll need at least one illustration of the thing you are describing, with labels pointing to the parts. See the section on graphics for more on creating graphics, formatting them, and incorporating them into your descriptions.

**Headings.** In descriptions, you'll want to use headings and subheadings to mark off the discussion of the individual parts or characteristics. Remember that, ideally, you want to describe each part in a separate paragraph or section—and flag that discussion with a heading. If you have a background section, use a heading for it too. See the section on headings for the specific requirements.

**Lists.** Lists are not nearly so important in descriptions as they are in instructions. However, if you itemize parts or subparts or list specifications, these are good situations for lists. See the section on lists for the specific requirements.

**Special notices.** In descriptions, there is nothing like the important role for special notices as there is in instructions. After all, if it really is a description, readers should not be trying to follow any procedure, and therefore should not be running any risks of damaging equipment, wasting supplies, screwing up the procedure, or injuring themselves or others. However, you may find the *note* special notice to be useful to emphasize important points or exceptions. See the section on special notices for complete discussion of the proper use of these special notices as well as their format and placement within instructions.

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# 4.13.2: Comparison

## What's it like—what's it not like?

Another important information structure often used in technical writing is comparison.

## What Is Comparison?

In technical writing, comparisons can be very important. Short comparisons to similar or familiar things can help readers understand a topic better; comparisons can also help in the decision process of choosing one option out of a group. An *extended comparison*, which is the focus in this chapter, is one or more paragraphs whose main purpose and structure is comparison. One type of comparison the *analogy*, which is a special type of extended comparison of an unfamiliar thing to a familiar thing.

Extended comparisons can be *informative* or *evaluative*. An informative comparison seeks to compare the topic to something similar or familiar to help people understand the topic or, in some cases, to help people understand both better. An *evaluative* comparison seeks to recommend one or more of the options by comparing them. This is the focus of the types of reports discussed in the section on recommendation reports, feasibility reports, evaluative reports.

**Note:** Be sure and check out the examples of comparison.

## How to Identify Points of Comparison

When you write an extended comparison, you must start by identifying the specific ways in which you are going to compare the things you plan to write about. These *points of comparison* are like categories of comparative detail. For example, in an evaluative comparison of smart phones, you'd probably want to compare the best four or five machines according to the following:

- cost
- ease of use
- reliability
- special features, and so on

If you don't start by identifying the points of comparison, your comparison can become uneven—for example, you might say that model 1 is easy to use but not say anything about the the ease of use of models 2, 3, or 4.

## How to Organize Comparisons

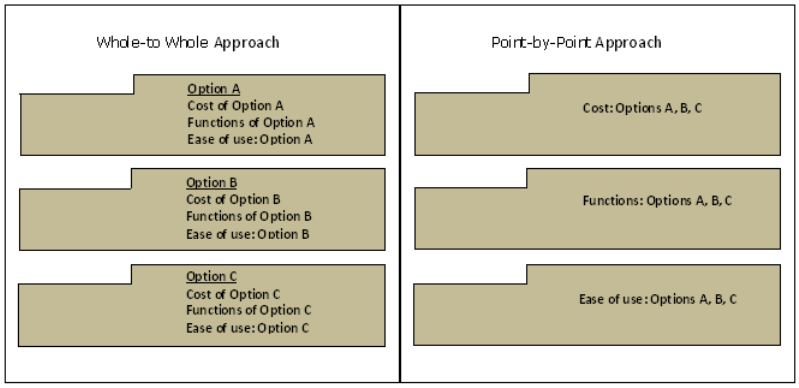
One of the most important concepts to learn in writing comparisons has to do with organizing the contents. There are two basic ways to organize a comparison:

- whole-to-whole approach
- point-by-point approach

To get a sense of how these two approaches work, take a look at the following illustration of these two approaches. In the whole-to-whole approach, details about each of the options being compared are lumped together. This is our natural tendency—however, it does a sloppy, uneven job of stating the comparisons. The better way is to use the point-by-point approach. In the schematic diagram in the illustration, you'd have one paragraph comparing the costs of Models A, B, and C; then another paragraph comparing the warranties of the three models; and so on.

Use the point-by-point approach unless something about your topic, purpose, or audience dictates otherwise. With the whole-to-whole approach, the comparison is often uneven—you might forget to tell about the warranties for Model B; you might neglect to state the actual results of comparison—that Model C is better in terms of special features. In the whole-to-whole approach, writers often leave the actual comparisons up to the reader, thinking that just supplying the raw data is enough.

In the point-by-point approach, each of the comparative sections should end with a conclusion that states which option is the best choice in that particular category of comparison. Of course, it won't always be easy to state a clear winner—you may have to qualify the conclusions in various ways, providing multiple conclusions for different conditions.




*Schematic view of the whole-to-whole and the part-by-part approaches to organizing a comparison.* Unless you have a very unusual topic, use the point-by-point approach.

*Lead-in to the comparison*

**Stirling Engines: An Evaluation**

Many characteristics make the Stirling engine an appealing alternative to the internal combustion engine:

*Point-by-point comparisons:*

- *Fuel efficiency*
- *Emissions*
- *Fuel*
- *Noise*
- *Torque*

- Foremost is its fuel efficiency and fuel economy: the Stirling engine runs at an efficiency of 37.4 percent, more than double that of the internal combustion engine. It is projected to yield 50 percent better gas mileage.
- The Stirling engine produces extremely low emissions: it can meet all emission standards with none of the special modifications required by internal combustion engines.
- Unlike the internal combustion engine, the Stirling engine can run on practically any fuel that can produce heat.
- Without valves and fuel explosions that take place in an internal combustion engine, the Stirling engine operates with very little noise.
- Finally, the Stirling engine has a flat torque characteristic, meaning that torque is practically independent of engine speed. Compared to the internal combustion engine, the Stirling engine provides much higher torque, and thus more power, at lower engine speeds.

*Each point mentions both engine types.*

All of these characteristics should lead to the increasing importance of the Stirling engine in the years to come.

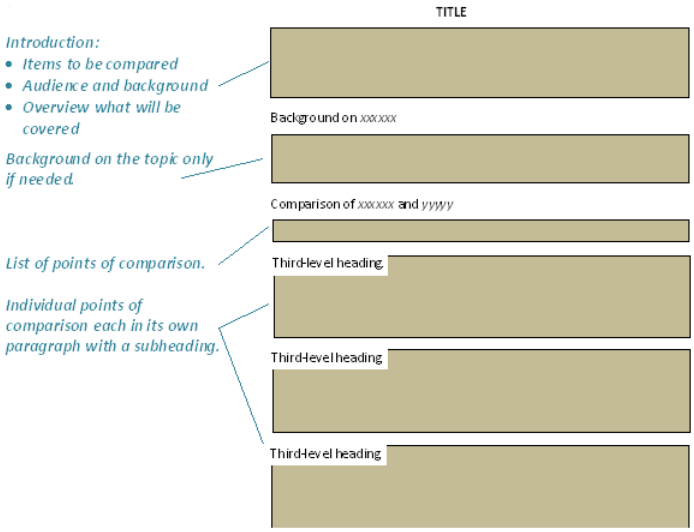
— *Text developed in the 1980s*

*Short paragraph-length comparison*

## How to Write Comparisons?

As with causal discussions, comparisons are not distinctive because of a certain kind of content. Instead, it's the special transitional words that make comparative writing work: for example, "similar," "unlike," "more than," "less than," and other such words that draw readers' attention to comparisons and highlight the results of the comparisons. Notice how many are used in the illustrations in this chapter.

When you write comparisons, take special care to use these transitional words. Emphasize the similarities and differences—don't force readers to figure them out for themselves.




*Schematic view of comparisons*. Remember that this is just a typical or common model for the contents and organization—many others are possible.

## How to Format Comparisons?

Comparisons don't call out for any special format; just use headings, lists, notices, and graphics as you would in any other technical document. For details, see:

- Headings
- Lists
- Notices
- Graphics

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# 4.13.3: Classification (Categorization)

## What are its categories—into which does it fit?

Another important information structure often used in technical writing is categorization . However, the term *classification* seems nonintuitive to many. Maybe it's the Classified Ads in newspapers or the classifications in the military. Instead of referring to classification and cateorization in evety instance, this chapter uses *categorization* and *categories*.

## What is Categorization?

In some technical reports, certain paragraphs or sections use a kind of writing and pattern of organization known as categorization. Categorization means either (1) explaining which category a thing belongs to or (2) dividing a group of things into categories. You may find that categorization is an effective way to present background information to your readers.

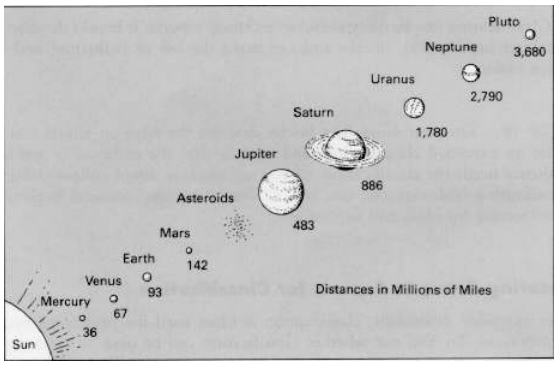
See the complete example of a division-type categorization.

**True categorization.** You are "categorizing", in the strict dictionary sense of the term, when you place an object, action, or person in one of several categories. For example, the XYZ Corporation may have just come out with its new ABC computer but cannot decide whether to categorize it as a laptop or a notebook computer. A botanist may have discovered a new species of fungus and must now decide how to categorize it. Written documents on these questions would resemble comparison because features of the new item (the computer or the fungus) must be compared to those of the established categories. The Jupiter example in the following shows an example of a true categorization in which the writer shows why the object belongs to one specific category.

**Division.** Categorization can also refer to breaking a thing down into its types, classes, categories, or kinds and then discussing each one. For example, computers were once divided into several categories: minicomputers, microcomputers, and macrocomputers. And, if you have ever taken biology, you know that terrestrial life is divided into into plant and animal "kingdoms"; the kingdoms, broken down into phyla (the plural of phylum); phyla, into classes; classes, into families; families, into genera; and genera, into species. Each of these divisions represents a category.

Several key words indicate that categorizations are being discussed: *classes*, *kinds*, *types*, *categories*, *sorts*, or *groups*. Categorization can be quite useful in technical reports: it breaks the discussion of a subject into smaller chunks, and it can make the job of evaluation and selection much easier.

Jupiter can be classed as a Jovian planet because of its size and its average density. Indeed Jupiter is the largest planet in our solar system (as shown in the figure below) and one of the brightest objects in the sky, having attained a magnitude of -2.5, more than a full magnitude brighter than Sirius, the brightest star in the sky. Jupiter's brightness results from its great size of course but also from its high reflectivity: it reflects about 44 percent of the light it receives. The size and composition of Jupiter's interior are open to much speculation. Some astronomers picture the interior as having a radius of over 30,000 miles and as possibly being composed of liquid hydrogen. The core is small and dense and may contain iron silicates. The other Jovian characteristic of the planet is its density. Even though its diameter is only 11 times that of the Earth, its total volume is 11 × 11 × 11, or over a thousand times that of Earth.




Planet Jupiter

More graphically, over 1000 Earths could be packed into the space occupied by Jupiter.

**"True" categorization.** In this example, the writer argues that Jupiter should be categorized as a "Jovian"-category planet. This is one type of categorization; in the other, you divide a collection of things into categories, or types.

## How to Identify Categories and the Principle of Categorization?

Once you know what you are going to divide into categories, your next step is to identify the categories and the principle of categorization. For example, if you were categorizing dialysis machines (used to treat people with kidney disease), you might list these categories:

- parallel flow design dialyzers
- coil design dialyzers
- hollow-fiber capillary dialyzers

The principle of categorization is the design of the structure through which blood is filtered.

The *principle of categorization* then is the method you use to sort the items into categories. If you sorted marbles into red, green, and blue ones, you'd be using color as the principle of categorization. You must be careful to use only one principle of categorization at a time. For example, you couldn't sort your marbles by color *and* size—you might have some big red ones and some small red ones!

Here are some additional examples of categorizations and their principles:

| *Topic* | *Category* | *Principle of categorization* |
|---|---|---|
| Electrical circuits | Series<br>Parallel<br>Series-parallel | Pathway of electrical current |
| Anemias | Blood-loss anemia<br>Iron-deficiency anemia<br>Pernicious anemia | Main cause of the anemia |
| Hurricane track prediction methods | Total climatology and persistence methods<br>Particular climatology and persistence method<br>Circulation and climatology method<br>Dynamic model method | Combination of hurricane characteristics |
| Wind machines | Lift machines<br>Drag machines | Interaction between the wind and propeller blade |

## How to Discuss the Categories?

When you write the discussion of the individual categories, you must choose sources of discussion that enable you to explain each category fully, add comparisons so that readers can see the differences between the categories, and plan for the length of your categorization.

**Choosing sources of discussion.** Writing the discussion of individual categories is much the same as it is with extended definitions: you combine a variety of sources to explain the categories fully—see the checklist for a listing of these sources. To discuss the three categories of dialysis machines for victims of kidney disease, you might use these sources:

| **Categorization of dialysis machines** | |
|---|---|
| *Definition* | Kidney disease |
| *Description* | Main components of the different dialysis machines |
| *Process* | How the different machines operate |
| *Comparison* | Advantages and disadvantages of these machines |

Of course, some categorization may use only one kind of writing. For example, in the discussion of different hurricane track prediction methods, the discussion would most likely be process—step by step how the methods work.

**Adding comparisons.** No matter which sources you use in discussing the categories, comparison is an important ingredient. It helps readers distinguish the different categories from each other. Check out the following example of how comparisons work in categorizations.

*The higher-level heading would be something like "Types of Reactors."*

*First type of reactor is discussed—mostly in terms of how it works.*

*Second type of reactor is discussed, with direct comparisons to the preceding type. (Italics added.)*

**Pressurized-water reactors (PWR).** The first pressurized-water reactor was the submarine thermal reactor built in Idaho in 1953, which led directly to the first nuclear-powered submarine, the USS *Nautilus*. As the name implies, a pressurized-water reactor is both cooled and moderated by water under high pressure, thus permitting high temperatures. The hot water is pumped from a pressurized vessel containing the nuclear core to a steam generator in which heat is exchanged to produce the steam that drives a turbogenerator. . . .

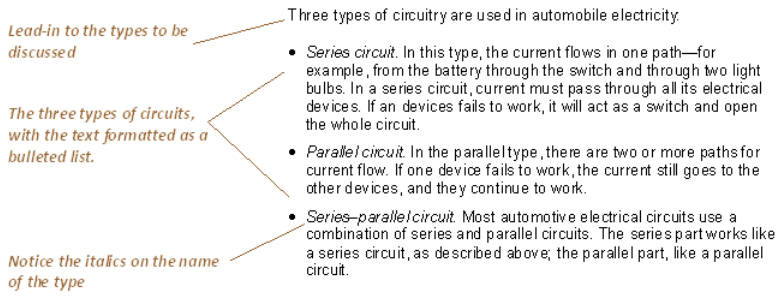
**Boiling-water reactors (BWR).** Boiling water reactors have much in common with pressurized-water reactors:

- The *main difference* is that the intermediate steam generator is omitted, and steam is supplied directly from boiling water in the reactor core.
- *Less pressurization* is needed because the water is allowed to boil, and *less pumping* is needed because of the large amount of heat absorbed by boiling water.
- An *increase in steam production* compared to that of the pressurized-water reactor is a result of an *increase in power level*, which *reduces the water volume* which *lessens its moderating ability*—a condition which in turn *lessens reactivity*.

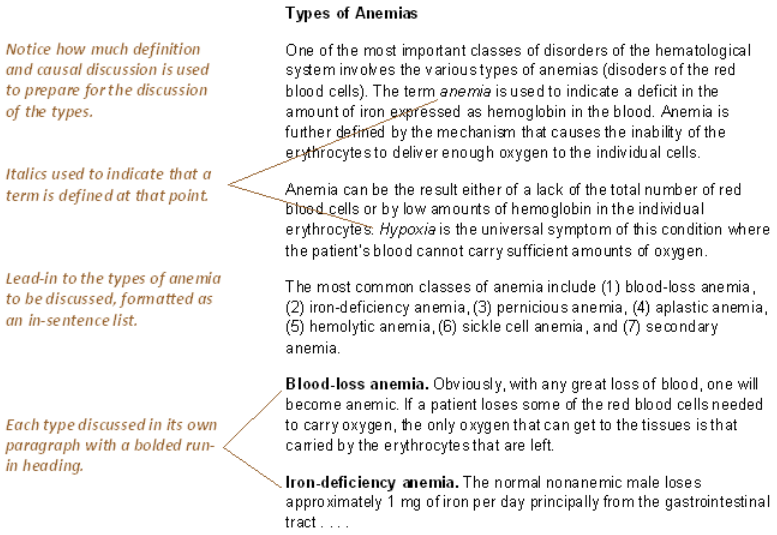
*—Text developed in the 1980s*

*Comparisons used in categorization*. Comparing the categories to each other gives readers a clearer sense of the categories as well as their distinguishing features.

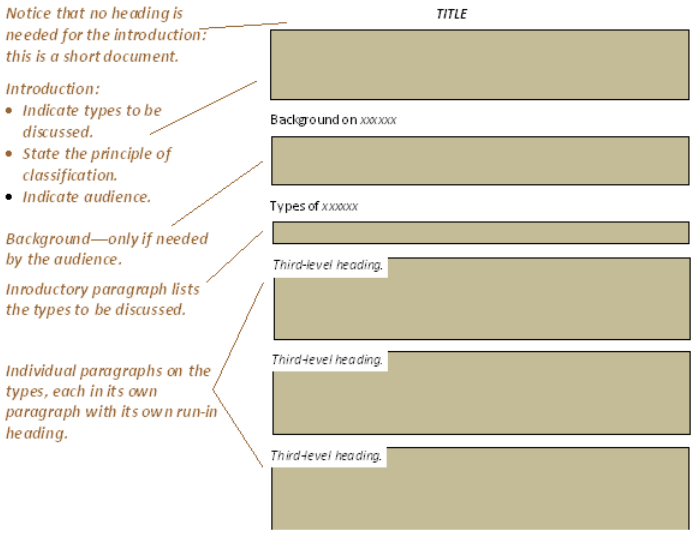
**Short and extended categorizations.** In short categorizations, an overview of the categories is packed into one sentence or into one paragraph. In an extended categorization , you might have one or more paragraphs on each category. For an extended categorization, you'll use a paragraph or more to discuss each of the categories, and a separate paragraph to introduce these categories—as illustrated in the extended categorization in the following.




*Single-paragraph categorization*. All the categories are discussed briefly in this one section. ("Types" is a synonym for categories.)




*Extended categorization with categories treated each in their own paragraphs*




*Schematic view of categorization*. Remember that this is just a typical or common model for the contents and organization—many others are possible.

## How to Format for Categorizations?

Categorizations don't call out for any special format; just use headings, lists, notices, and graphics as you would in any other technical document. For details, see:

- Headings
- Lists
- Notices
- Graphics

I would appreciate your thoughts, reactions, criticism regarding this chapter: response—*David McMurrey*

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# 4.13.4: Cause–Effect

## What happened—why did it happen?

Another important information structure often used in technical writing is the discussion of causes and effects.

## What Is a Cause–Effect Discussion?

Discussions like these answer questions such as the following:

- What are (or were) the causes of this? How and why does (or did) this happen?
- What brought about a situation, problem, or accident?
- What are (were or will be) the effects, results, or consequences of this? What will happen if a certain situation or problem continues?
- How does this work? What causes this to function as it does?
- Why won't this thing work? What's wrong with it?
- What changes will occur if a certain plan or action is taken?
- How can a certain problem or situation be avoided?
- What are the advantages, benefits, or disadvantages of an action or object?
- What are one or more potential solutions to a problem?

*Note*: See the complete example of a causal discussion.

Some examples:

- What causes tornadoes? What sorts of damage do tornadoes cause?
- What will happen if the world continues to use petroleum resources at its current rate?
- What were the causes of the Great Depression?
- What are the effects of an economic recession?
- How does a photocopier work?
- What makes a microwave oven work? (Does this sound like your seven-year-old?)

As you can see from these examples, we can discuss the causes and effects of human or social processes, natural processes, mechanical or physical processes, historical or economic processes, meteorological or biological processes, and on and on.

If you think about it, there's not much difference between process discussion and causal discussion. Both occur over time; steps in a process often involve causes and effects. The distinction depends on your purpose and emphasis: process discussions are primarily concerned with *how* an event occurs; causal discussions, with *why* an event occurs. Process discussion focuses on the chronology of something; causal discussion focuses on the causes and effects.

- I can tell you step by step how to take a photo or what events occur inside the camera when you take a picture—that's process.
- But I can also explain to you what physical and chemical principles are at work when you take a photo, what principles actually enable you to take a photo—that's causal discussion.

For some topics, however, such as explaining tornadoes, it's almost impossible to make a distinction. Here are some contrasting examples:

| Subject | Process discussion | Causal discussion |
|---|---|---|
| Lightning | How to safeguard home appliances from lightning | What natural phenomena cause lightning |
| Instruction writing | How to set up understandable instructions | What causes instructions to be unclear |
| Acquisition of language by childr enrapidly | How to help children learn language more rapidly | Why certain children learn language more rapidly |
| Growing tomatoes | How to plant and care for tomatoes | Reasons why tomatoes are less productive |
| Air conditioning | How cool air is produced by conventional systems | Why your air conditioning is costing you more this summer |

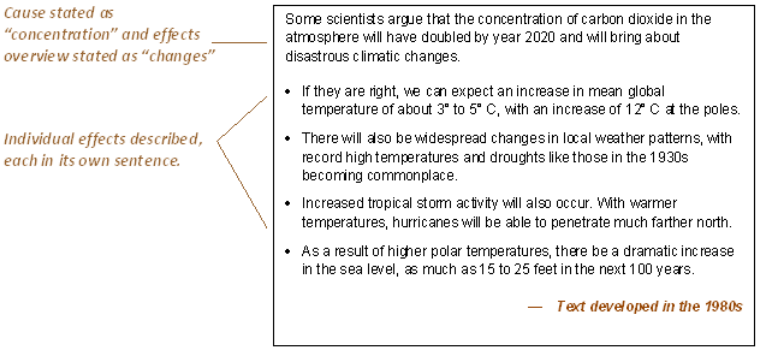
Here are some common reasons why you may need to discuss causal and effects:

- You need a record of the damage done by something. Photographs work, but words may also be needed.
- You need an account of the scientific principles at work in a process so that you can understand what you are doing in an instructional procedure.
- You need to understand the causes of something so you can have a better understanding of how to control or eliminate it.
- You need to understand the effects of something so that you can work to prevent it or increase its likelihood.

## How to Organize Causal Discussions?

How you organize the contents of a causal discussion depends on how many and what combination of causes and effects you discuss:

- **Single cause–single effect**—A single cause can lead to a single effect; for example, a radiator leak can cause the car to overheat.
- **Multiple causes–single effect**—Many different causes can be seen as leading to one effect: for example, high unemployment, high interest rates, and high real estate costs (causes) might lead to decreased real estate sales (effect).
- **Single cause–multiple effects**—A single cause can be seen as producing numerous effects. For example, proponents of the greenhouse effect believe that increased $CO_2$ in the atmosphere (cause) will lead to changes in weather patterns, higher temperatures, drought, increased storm activity, and higher sea levels (effects).
- **Sequential causes and effects**—One cause can bring about an effect, which in turn becomes the cause of another effect, and so on. For example, proponents of the greenhouse effect argue that increased burning of fossil fuels (cause) leads to increased $CO_2$ in the atmosphere (effect) which in turn is the cause of less thermal energy being reradiated out of the system (effect) which in turn becomes the cause of increased global temperatures.
- **Alternate causes and effects**—Causes and effects can be alternating. For example, if the car won't start (effect), it may be because of a dead battery (alternate cause 1), no gas in the gas tank (alternate cause 2), or a faulty part (alternate cause 3).




*Organization of effects in a short causal discussion*. First, the cause is stated; then the effects are discussed one after another.

Consider a simple example: imagine you want to discuss how a single situation has led to a number of problems, in other words, one cause leading to several effects. In a single paragraph, the first couple of sentences might focus on the cause; each of the following sentences would focus on the effects. In an extended discussion, there might be a paragraph on the cause, and a paragraph on each of the effects. The preceding schematic diagram of a causal discussion in shows you how the single-paragraph approach would look.

## How to Discuss Causes and Effects?

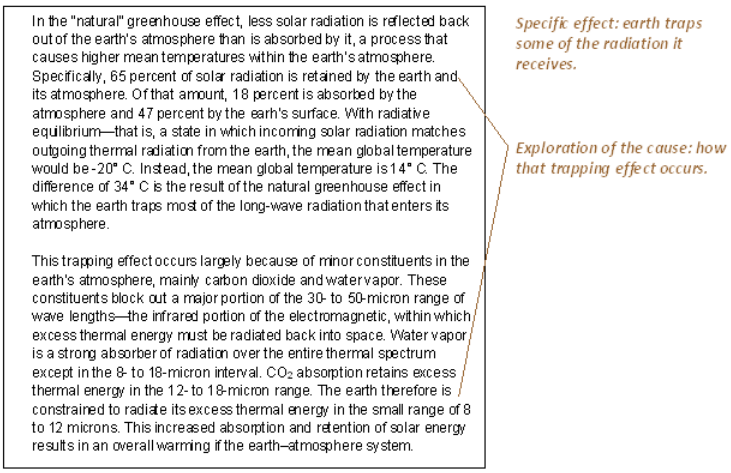
Actual discussion of causes and effects is not as immediately identifiable as descriptive or process writing are. Typically, causal discussions talk about events and describe things. What makes causal discussions distinctive is the use of transitional words to indicate the causes and effects.

In this sentence:

Increased deficit spending by the government leads to increased inflation

the verb "leads to" establishes the connection between a cause and an effect. In this excerpt, the connective "consequently" establishes a causal link between the increasing domestic anger over the Vietnam war and Johnson's decision not to seek reelection:

Meanwhile at home, anger, hostility, and outright revolt against the war grew. Johnson, sensing he could not get reelected in this atmosphere, consequently decided against running for another term.

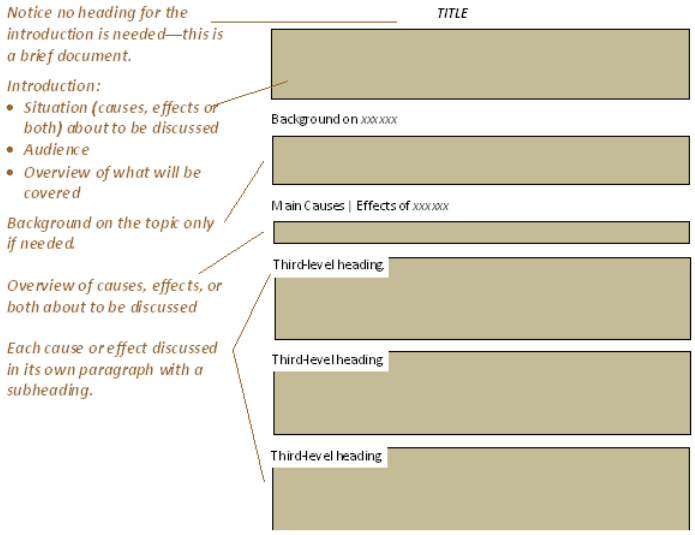



*Cause–effect relationship involving a single effect followed by an extensive exploration of its cause*.

## How to Format for Causal Discussions?

Here are a few suggestions on format as they relate specifically to causal discussions:

- **Headings.** If you write an extended causal discussion and have separate paragraphs for each of the causes or effects, then the headings should signal those causes. (See the examples in this chapter.) See the chapter on headings for details.
- **Lists.** If you discuss sequential causes and effects, you're likely to need in-sentence and vertical numbered lists. If you have multiple causes or effects but no necessary order amongst them, then bulleted lists are appropriate. See the chapter on lists for details.
- **Graphics.** Causal discussions often use conceptual diagrams to show the relationships between the causes and effects. In these you give a spatial representation of the causes and effects as they occur in time. See the chapter on graphics for details.
- **Style.** As with any other technical writing, you treat numbers, symbols, and abbreviations in process discussions the same. Exact measurement values should be numerals, regardless whether they are below 10. See the chapter on technical style for details.




*Schematic view of cause–effect discussions*. Remember that this is just a typical or common model for the contents and organization—many others are possible.

I would appreciate your thoughts, reactions, criticism regarding this chapter: response—*David McMurrey*

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# 4.13.5: Definition

## Just what does that mean?

An important writing tool you'll need, particularly if you are writing for nonspecialists, is definition—or more specifically, extended definition. An *extended definition* is a one or more paragraphs that attempt to explain a complex term. Some terms may be so important in your report, there may be so much confusion about them, or they may be so difficult to understand that an extended discussion is vital for the success of your report.

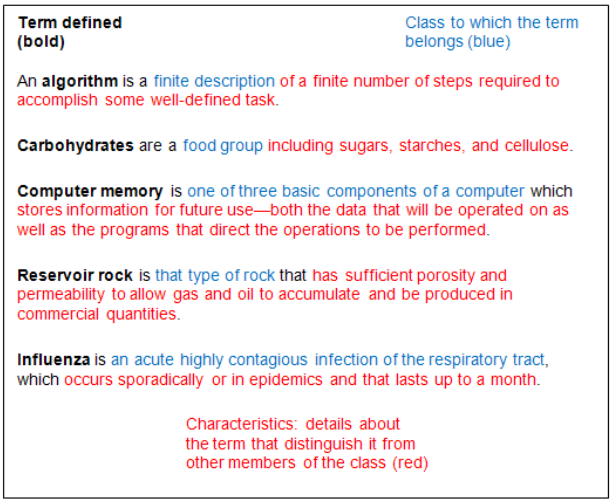
**Note:** See the complete example of an extended definition.

When you write reports, you may often discover that you need to explain certain basics before you can discuss the main subject matter. For example:

- in a report on new treatments for sickle cell anemia, you'd need a section defining the disease.
- In a report on the benefits of drip irrigation, you'd need to write an extended definition of drip irrigation, explaining how it works and what equipment is used.
- In a report showing small businesses how to weather economic recessions, an extended definition of the term economic recession would be needed first.

## Writing Formal Sentence Definitions

One of the first things to do when you write an extended definition is to compose the formal sentence definition of the term you are writing about. Place it toward the beginning of the extended definition. It establishes the focus for the rest of the discussion. It is "formal" because it uses a certain form. Here are several examples:




**Formal sentence definitions:** their components are the term being defined, the class it belongs to, and its distinguishing characteristics.

Take particular care when you write the reference to the class to which the term belongs; it sets up a larger frame of reference or context. It gives readers something familiar to associate the term with. The term may belong to a class of tools, diseases, geological processes, electronic components; it may be a term from the field of medicine, computer science, agriculture, reprographics, or finance. Avoid vague references to the class the term belongs to: for example, instead of calling a concussion an "injury" or botulism a "medical problem," call them something more specific like "a serious head injury" and "a severe form of food poisoning," respectively.

Similarly, provide plenty of specific detail in the characteristics component of the formal sentence definition. Readers need these details to begin forming their own understanding the term you are defining.

Be aware, however, that your formal sentence definition will likely contain additional potentially unfamiliar terms. Somewhere in your extended definition, you'll need to explain them as well, possibly by using short definitions (explained later in this section).

*Formal sentence definition begins this extended definition.*

*Stress is a measure of the internal reaction between elementary particles of a material in resisting separation, compacting, or sliding that tend to be induced by external forces*. Total internal resisting forces result from continuously distributed normal and tangential forces that vary in magnitude and direction and act on elementary areas throughout the material. These forces may be distributed uniformly or nonuniformly. Stresses can be categorized as tensile, compressive, or shearing, according to the straining action.

*Supplementary definition used within this extended definition.*

Strain is a measure of deformation such as:

a. linear strain, the length per unit of linear dimensions
b. shear strain, the angular skew in a radians of an element undergoing change of shape by tangential forces
c. volumetric strain, the change of volume per unit of volume.

The strains associated with stress are characteristic oif the material.

*A formal sentence definition used in an extended definition.*

## Choosing the Sources of Definition

When you write an extended definition, you literally grab at any of the writing resources or tools that will help you explain the term to your readers. This means considering all of the various sources of information that can help define the term adequately (for example, description, process narration, causal discussion, and classification).

Notice how many different kinds of writing are indicated in the examples in this chapter.

The key to writing a good extended definition is to choose the sources of definition to help readers understand the term being defined. Use this checklist to select the kinds of discussion to include in your extended definitions:

| Sources of Extended Definition | |
|---|---|
| Description | Does anything related to the term being defined need to be described? |
| Process narration | Is there some process (natural, social) associated with the term that should be discussed? |
| Additional definitions | Do unfamiliar terms occurring in the definition also need definition? |
| Historical background | Is there some history, some key individuals related to term being defined? Would that discussion contribute to he definition of the term? |
| Cause, causes | Does the reader need to know about causes related to the term being defined? |
| Effects, results, consequences | Does the reader need to know about effects related to the term being defined? |
| Problems, solutions | Does the term being defined represent a problem or a solution? |
| Statistics | Should you discuss numerical data related to the term defined—percentages, amounts, etc.? |
| Uses, applications | Would it help to discuss uses or applications related to the term? |
| Similarities, differences, analogies | Is the term similar to or different from something else? Would an analogy help define the term? |
| Classes, types, categories | Are there categories that the term can be divided into? Does it belong to a certain category? |
| Examples | Would examples contribute to the definition of the term? |
| Word origins | Would an understanding of the roots, the etymology, of the word help define it? |
| Future developments, implications | Should future developments related to the term be discussed? Does it have implications—good, bad, both? |
| Negatives | Would explaining what the term is *not*, what it does *not* refer to help? |
| Advantages, disadvantages | Are there advantages and disadvantages related to the term that can be discussed? |

*Checklist of sources for extended definitions*

I. Introduction
II. Alzheimer's Disease: Overview of Current Knowledge
  A. Two Main Types of Alzheimer's Disease
    1. Alzheimer's disease (pre-65)
    2. Senile dementia of the Alzheimer's type (post-65)
  B. Demography of Alzheimer's Disease
    1. Age distribution
    2. Gender distribution
    3. Other demographics
  C. Process and Characteristics of Alzheimer's Disease
    1. Forgetfulness
    2. Speech disorders
    3. Difficulty calculating
    4. Visual disorientation
    5. Abnormal judgment and social behavior
  D. Brain Pathology of Alzheimer's Disease Victims
    1. Reduced brain size
    2. Neurofibrillary tangles
    3. Neuritic plaques
    4. Loss of specific populations of nerve cells
  E. Etiology of Alzheimer's Disease
    1. Aging
    2. Inheritance
    3. Infectious agents and toxins
III. Current Alzheimer's Disease Treatment

*Classification: the disease is defined according to its main two types.*

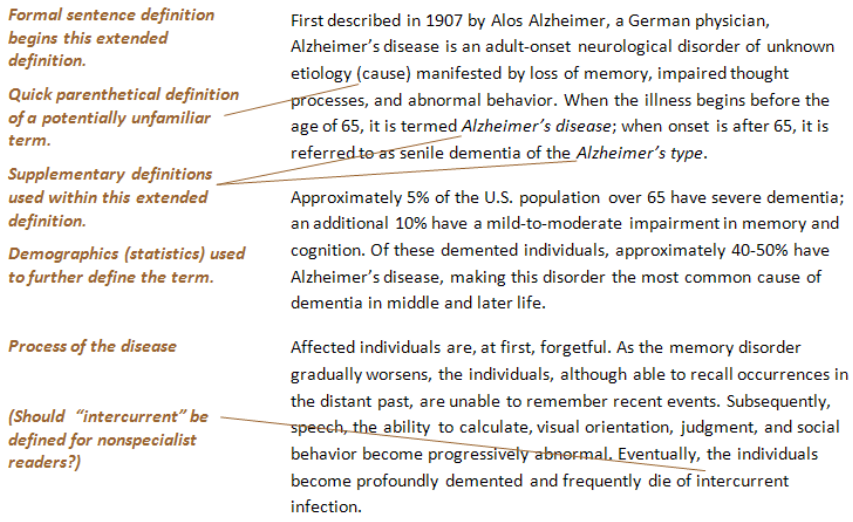
*Description: demographic statistics are used in this definition.*

*Process: the stages of the disease are identified along with the effects of the disease at each stage.*

*Effects: clinical effects of the disease.*

*Causes: various possible causes of the disease.*

*Outline of a report that uses extended definition*. This view shows how different sources of definition can be used to write an extended definition.




*Another extended definition*. This one uses additional definitions, description (demographics), process.

## Adding Short Definitions

As mentioned earlier, you'll find that in writing an extended definition, you must define other terms as well. Typically, short definitions —a sentence, clause, or phrase in length—will suffice. Notice how many are added to the "after" version in the following.

**Before Translation**

Measles is an acute, highly infectious disease, with cough, fever, and maculopapular rash. It has worldwide endemicity. The infective particle is an RNA virus about 100-150 nm in diameter, measured by ultrafiltration, but the active core is only about 65 nm as measured by inactivation after electron irradiation. Negative staining in the electron microscope shows the virus to have the helical structure of a paramyxovirus with the helix being 18 nm in diameter.

Measles virus will infect monkeys easily and chick embryos with difficulty. In tissue cultures, the virus may produce giant multinucleated cells and nuclear acidophilic inclusion bodies. The virus has not been shown to have the receptor-destroying enyzme associated with other paramyxoviruses. Measles, canine distemper, and bovine rinderspest viruses are antigenetically related.

**After Translation**

Measles is an acute, highly infectious disease caused by a virus. The illness is characterized by a cough, fever, and maculopapular (raised red) rash. It has worldwide endemicity—that is, people throughout the world are vulnerable to the disease. The infective particle (organism causing the disease) is a virus about 100-150 nm (a nanometer being $10^{-9}$ meter) in diameter and contains RNA (ribonucleic acid) as it genetic material rather than DNA (deoxyribonucleic acid). The size of the measles virus as measured by ultrafiltration, in which filters with extremely small pore are used. The active core, or actual genetic material (RNA), is only 65 nm, as measured by electron irradiation which inactivates the core. Negative staining, a shadowing technique used with an electron microscope, shows the virus to have a specific helical structure common to a group of viruses known as paramyxoviruses. The helix, a spiral around a core (similar to a winding staircase) is 18 nm in diameter.

Measles virus will infect monkeys easily and chick embryos with difficulty. In tissue cultures (those involving living cells or tissues from other living organisms), the measles virus may produce giant cells containing many nuclei and acidophilic inclusion bodies (red-stained areas in the nucleus which are a laboratory sign for certain viral infections). The virus has not been shown to have the receptor-destroying enyzme, a protein capable of destroying or inactivating a cell-surface molecule, usually associated with other viruses in the paramyxovirus group. Measles, canine distemper (a flu-like disease affecting dogs), and bovine rinderpest (a virus affecting cows) are antigenetically related—that is, they possess similar antigens (molecules that stimulate production of an antibody on their surfaces).

*Extended definitions often need additional definitions.* These can be short, phrase-length definitions.

This process of supplying short definitions "on the fly" is critical in good technical writing for nonspecialists. Notice how many quick definitions occur just in the first two sentences of the preceding illusration. "Maculopapular" is defined in parentheses as "(raised red)." "Endemicity" is defined by restating the idea in other words: "that is, people throughout the world are capable of contracting measles." And "infective particle" is quickly defined by providing an alternative: "or organism causing the illness." Obviously, the passage is almost tripled in length—but that's the price for thorough explanation and clarity.

## Definitions in Glossaries

In glossaries, as shown in the examples below, the term to be defined is shown in bold followed a period. Some styles prefer lower-casing the term. Notice that the actual definition typically begins with a fragment that includes the category and characteristics.

**Generation.** The weight of materials and products as they enter the waste management system from residential, commercial, and institutional sources and before recycling, composting, combustion, or landfilling take place. Pre-consumer (industrial) scrap is not included in the generation estimate. Source-reduction activities, such as backyard composting of yard trimmings, take place ahead of generation.

**Recycling.** The recovery of useful materials, such as paper, glass, plastic, and metals, from the MSW stream, along with the transformation of the materials, to make new products to reduce the amount of virgin raw materials needed to meet consumer demands.

**Composting.** The decomposition of organic materials by aerobic microorganisms. Composting facilities manage the amount of moisture and oxygen and the mixture of organic materials for optimal composting conditions. The composting process emits heat, water vapor, and biogenic carbon dioxide, reducing the raw organic materials in mass and volume to create compost.

**Landfilling.** The solid waste remaining after recycling, composting, and combustion with energy recovery. These materials are

discarded in a discrete area or excavation that is equipped to receive household waste. In some cases, particularly in rural areas, however, there materials are disposed of on site, or burned on site.

*Definitions in glossaries*. Thanks to Christopher White for providing this example.

## Format for Extended Definition

Extended definitions don't call out for any special format; just use headings, lists, notices, and graphics as you would in any other technical document:

- Headings
- Lists
- Notices
- Graphics




*Schematic view of an extended definition*. Remember that this is just a typical or common model for the contents and organization—many others are possible.

## Something to Consider

**What Is Administratium?**

The heaviest element known to science was recently discovered by investigators at a major U.S. research university.

**Atomic structure.** The element, tentatively named administratium or administrivium, has no protons or electrons and thus has an atomic number of 0. However, it does have one neutron, 125 assistant neutrons, 75 vice neutrons and 111 assistant vice neutrons, which gives it an atomic mass of 312. These 312 particles are held together by a force that involves the continuous exchange of meson-like particles called morons.

**Behavior.** Since it has no electrons, administratium is inert. However, it can be detected chemically as it impedes every reaction it comes in contact with. According to the discoverers, a minute amount of administratium causes one reaction to take over four days to complete when it would have normally occurred in less than a second.



**Longevity.** Administratium has a normal half-life of approximately three years, at which time it does not decay, but instead undergoes a reorganization in which assistant neutrons, vice neutrons and assistant vice neutrons exchange places. Some studies have shown that the atomic mass actually increases after each reorganization.

**Environmental occurrence.** Research at other laboratories indicates that administratium occurs naturally in the atmosphere. It tends to concentrate at certain points such as government agencies, large corporations, and universities. It can usually be found in the newest, best appointed, and best maintained buildings.

**Toxicity and control.** Scientists point out that administratium is known to be toxic at any level of concentration and can easily destroy any productive reaction where it is allowed to accumulate. Attempts are being made to determine how administratium can be controlled to prevent irreversible damage, but results to date are not promising.

I would appreciate your thoughts, reactions, criticism regarding this chapter: response—*David McMurrey*

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# 4.13.6: Process

## How does it happen?

In technical writing, process discussion is one of the most important kinds of prose: people need to know how things happen, how things work, how to operate things, and how to perform certain actions. A *narration* tells how something occurs over a period of historical time. A *process* is an event or set of events that can be performed or that occurs regularly or repeatedly. The words "procedure" and "routine" are closely related. When you "narrate" a "process," you explain how something works or how something occurs. We'll use "process discussion" here.

*Note:* See examples of process discussions.

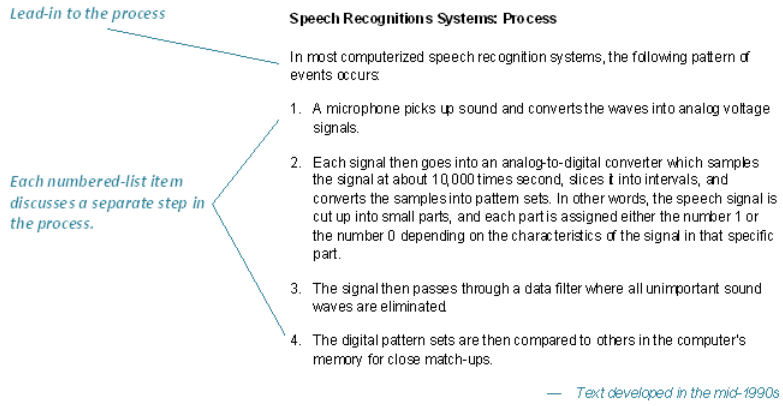
## What Is a Process?

Process discussion is an information structure—it's one of those fundamental combinations of content and organizational patterns you use in many different situations in technical writing. For example, instructions are an application of technical writing; instructions make heavy use of process discussion. (See the chapter on instructions.)

The focus of this chapter is some basic guidelines for writing *noninstructional* process discussions. These process discussions answer such questions as:

- How does this mechanism work?
- What are the typical steps in this natural, mechanical, social, biological, psychological phenomenon?
- How does this event (mechanical, natural, human, social) happen?

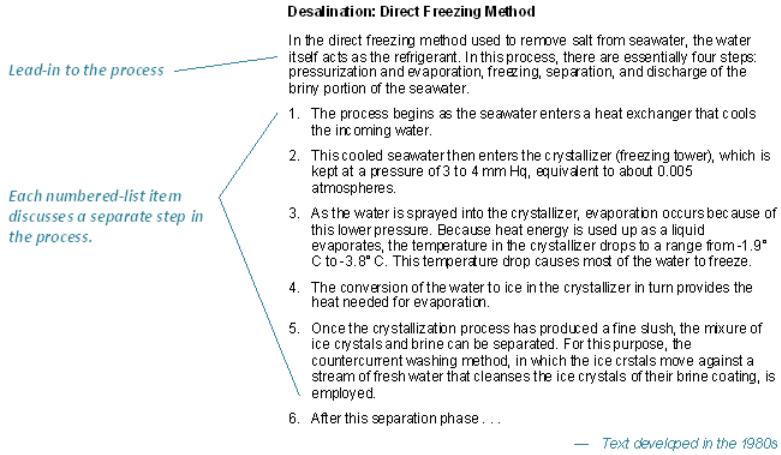
When we ask questions like these, we expect a systematic step-by-step explanation of how the mechanism works or how the phenomenon happens. We're not looking to perform it ourselves, just to understand it. In another chapter, you read about causal discussions. These are closely related to process discussions. In causal discussions, we're interested in why something happens, what causes it, what its results or consequences are. In process discussions, we are interested in how something happens, how it works, in a step-by-step fashion. Often the distinction between these two is blurry.




*Process discussion.* Step by step, this text explains how computers "recognize" speech.

Process discussions focus on things like formation of lightning, snow, hurricanes, cold fronts, tornadoes; gestation of a human embryo; pollination of a flower; automatic operations of a photocopier or a computer; occurrence of supernova, black holes, red giants, or white dwarfs. Process discussions explain the workings of such mechanisms as automobile batteries, light bulbs, telephones, televisions, microwave ovens, stereo receivers.

As mentioned previously, the focus in this chapter is *noninstructional* process. However, while explaining how doctors perform open heart surgery or how a nuclear power plant operates might sound like instructions, they aren't! Normally, documents on these topics would give people an overview of what goes on in these processes. This next illustration conveys a general idea of how seawater is converted into fresh water:




*Process discussion.* Step by step, this text discusses a method for the desalination of seawater.

## How to Divide the Process into Steps?

When you write a process discussion—whether it's a single paragraph or a whole report—one of the most important tasks is to divide the process into its main steps, phases, stages, or periods. There are of course other ways to handle a process discussion, but division by steps is usually the best. For example, you might try organizing a process discussion by the key parts of a mechanism. Use whichever plan seems to work best for your readers, topic, and purpose.

A step is one action or event (or a group of related ones) that is performed or that occurs in the process. Consider a simple process such as making coffee with a drip coffee pot. Such an activity involves the following steps, each of which actually represents a group of actions:

```
Steps                                    Individual actions (step 1)

1.  Boiling the water ------------------->a. Finding the kettle and taking it t
2.  Rinsing the coffee pot and               the sink
    the basket                           b.  Turning on the water and rinsing
3.  Measuring in the new coffee              out the kettle
4.  Pouring in the boiling water         c.  Filling up the kettle to the desi
                                             amount
                                         d.  Turning off the water and walking
                                             the stove
                                         e.  Placing the kettle on a burner
                                         f.  Turning on the burner
                                         g.  Waiting for the water to boil
```

Obviously, no one needs to be told all these specific actions; the example shows that a step usually stands for a group of related specific actions or events. If you look back at the preceding desalination example, you see a more realistic example of this process of division into steps. The discussion focuses on four steps in the desalination process: (1) pressurization and evaporation, (2) freezing, (3) separation, and (4) discharge of the briny portion of the seawater.

How are process discussions used in technical documents? First and foremost, processes are typically explained in instructions. For some situations, explaining how a thing works is almost as effective as providing the direct step-by-step instructions. And in any case, people understand the actions they are performing better when they understand the actions behind those actions. Process discussions are also vital in new product documents—either internal (meant for the product's designers and marketers) or external

(meant for the product's customers and users). And finally process discussions are important in scientific research literature. You can imagine researchers studying acid rain or oil spills—understanding these processes might lead to controlling them better.

## How to Discuss the Steps?

When you discuss a process, your goal is to enable readers to understand how that process works, the typical events that occur in that process. You use any writing tools at your disposal to accomplish that end. One of the most common ways of explaining a process is to divide it into steps, phases, periods, stages. These are essentially time segments—groupings of closely related events or actions. Take a look at any of the examples in this chapter; you'll see process sentences everywhere.

However, most process discussions aren't much without explanations of the causes and effects operating behind them. For example, it's not terribly exciting to read that when tornadoes form, it gets cloudy, wind and rain and twisters occur, wrecking things. We want more that just the bare-bones process: we want to know what causes them to form, what are the conditions favorable to their formation, how they behave once formed, and of course what sorts of damage they cause.

Other sorts of information can supplement the discussion of processes as well:

- **Description:** Explain how things look before, during, or after the process, or any phase within the process.
- **Definitions:** Explain the meaning of any technical terms used in the discussion.
- **Comparisons:** Compare the process, any of its phases or outcomes, to something similar or something familiar to help readers understand.
- **Examples:** Provide examples of the process you are explaining. For example, in a discussion of tornadoes, examples of tornadoes in history can help.

*Mitosis* is the process of cell duplication, during which one cell gives rise to two identical daughter cells. The process consists of four main phases: prophase, metaphase, anaphase, and interphase.

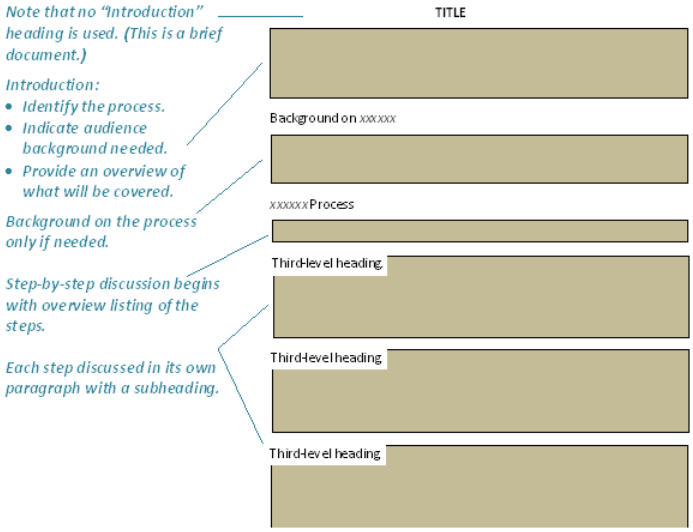
1. In prophase, the genetic material thickens and coils into chromosomes, the nucleus disappears, and a group of fibers begins to form a spindle.
2. In metaphase, the chromosomes duplicate themselves and line up along the mid-line of the cell. The halves are known as *chromatids*.
3. In anaphase, the chromatids are pulled at opposite ends of the cell by the spindle fibers. At this point, the cytoplasm of the mother cell divides to form two daughter cells, each with the number and kind of chromosomes the moher cell had.
4. In interphase, the daughter cells begin to function on their own, once their nucleus membranes and nucleoi reform.

*Expanding example of process discussion*. Information structures can work like an accordian—they can expand or collapse according to your needs. Click on the link in this example and see the expansion of the discussion of prophase.

## How to Format Process Discussions?

Here are a few suggestions on format as they relate specifically to process discussions.

- **Headings.** If you write an extended process discussion and structure it by steps or phases, in other words, time segments, then the subheadings can be related to those steps or phases, as illustrated in the following schematic view of process discussions. If your process discussion has one section in which you explain the process and another in which you discuss some supplementary aspect of the process, your headings would need to indicate that structure as well. See the chapter on heading for details.
- **Lists.** Because they focus on sequences of events, process discussions are likely candidates for in-sentence and vertical numbered lists as the examples in this chapter show. See the chapter on lists for details.
- **Graphics.** Process discussions are prime territory for flow diagrams such as you see in some of the illustrations in this book. In these you give a spatial representation of things as they occur in time. Useful also are diagrams and drawings of the mechanisms that take part in the process. See the chapter on graphics for details.
- **Style.** You treat numbers, symbols, and abbreviations in process discussions the same as in any other technical document. Exact measurement values should be numerals, regardless whether they are below 10. See the chapter on style and mechanics for details.




*Schematic of a process discussion*. A typical or common model for the contents and organization—others are possible.

I would appreciate your thoughts, reactions, criticism regarding this chapter: response—*David McMurrey*

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# 4.13.7: Persuasion

## Tell them why—get them on your side!

When the teaching of technical writing first emerged in university engineering schools, it was defined as rigorously objective in writing style—even to the extent of using the passive voice instead of the first-person singular "I." The standard model was the primary research report. However, since then, we've recognized that technical communication is much more than the primary research report. In this larger perspective, it has become clear that technical writers must often engage in persuasive communication efforts in their primary work.

## What Is Persuasion?

The infrastructure essential in proposals and progress reports is persuasion. To convince people to hire you to do a project and to reassure them that the project is going well, you need persuasive strategies. This chapter reviews the common persuasive strategies to get you ready to write those kinds of documents—as well as persuasive technical documents. Understanding general persuasive writing strategies, you will be well-equipped to develop these kinds of documents:

- Resumes
- Application letters
- Proposals
- Progress reports
- Complaint letters

*Note:* See examples of persuasion.

*Persuasion* is the communicative effort to convince people to think a certain way or act a certain way—for example, to vote for a city-wide recycling program, to oppose the building of more coal-fired electricity plants, and so on—or the opposite!

In the view of some, persuasion is not a legitimate tool for technical communication. For them, technical writing is supposed to be "scientific," "objective," "neutral." However, if you grant that proposals, progress reports, resumes, application letters, and even complaint letters are instances of technical communication because they often must convey technical information, then you see that persuasion is an important tool in technical communication.

*References:*


- Monroe's Motivated Sequence. Changing Works, 2002-2018.
- Toulmin Method. Purdue OWL.
- Aristotle's *Rhetoric*. Massachusetts Institute of Technology Classics.


## What Are the Tools of Persuasion?

The classical approach to persuasion, laid down my Aristotle (384–322 BCE) in the *Art of Rhetoric*, involves these appeals to readers and listeners (remember your Rhetoric and Composition 101?):

- *Logical appeal*—When you use reasons and arguments, backed up by facts and logic, to make your case, you are using the logical appeal. We normally think of the logical appeal as the only legitimate method of argument, but the "real world" shows us differently.
- *Emotional appeal*—When you attempt to rouse people's anger or sympathies in a persuasive effort, you are using the emotional appeal. Showing a little girl fleeing from a burning village bombed by war planes or an oil-soaked seagull on a beach devastated by an oil spill—these images spark emotions like anger, horror, sympathy; but they don't make a logical case for or against anything. These images may, however, capture readers' attention and cause them to pay more attention to the rest of your persuasive effort.
- *Personal appeal*—When you present your qualifications, experience, expertise, and wisdom or those others, attempting to build readers' confidence, you are using the personal appeal. As with the emotional appeal, there is no logical justification for the personal appeal. It's like saying, "Trust me." Despite that, readers sometimes want to know who you are and what gives you the

right to speak so authoritatively on the subject. Just as the emotional appeal can be used legitimately to get readers to pay attention and care about your message, the right amount of personal appeal can build readers' confidence in you—or at least a willingness to hear you out.

You may also have encountered the "stylistic" appeal: the use of language and visual effects to increase the persuasive impact. For example, a glossy, fancy design for a resume can have a positive impact just as much as the content.

In your rhetoric and composition studies, you may also have encountered something called the Toulmin approach to persuasion. The complete system involves claims, grounds, warrant, backing, and rebuttal, but a particularly useful element is the rebuttal, and another known as the concession.

- *Rebuttal.* In a rebuttal, you directly address counter-arguments that your persuasive opponents might bring up. You show how they are wrong or, at least, how they don't affect your overall argument. Picture yourself face to face with your persuasive opponents—what arguments are they going to come back at you with? How are you going to answer those arguments? In a written persuasive effort, you must simulate this back-and-forth, debate-style argumentative process. Imagine your opponents' counter-arguments (arguments they might put forth against your position) and then imagine your own rebuttals (your answers to those counter-arguments).
- *Counter-argument.* A persuasion can be structured entirely around tearing down the opponent's argument. Consider this example:

**We're Not Running Out of Trees**

Anti-recyclers rightly point out that more trees are growing in the U.S. than ever before and that new forests are started as soon as trees are cut. However, this perspective fails to take into account that, in the southern United States, for example, where most of the trees used to make paper are grown, the proportion of pine forest in plantations has risen from 2.5 percent in 1950 to more than 40 percent in 1990, with a concomitant loss of natural pine forest. At this rate, the acreage of pine plantations will overtake that of natural pine forests in the South during the 1990s and will approach 70 percent of all pine forests the next few decades afterwards. While pine plantations are excellent for growing wood, they are far less suited than natural forests are for providing animal habitat and preserving biodiversity. Paper recycling extends the overall supply of fiber and can thus help reduce the pressure to convert remaining natural forests to tree farms.

*Example of a counter-argument*. The paragraph begins by repeating an argument against recycling, then concedes a certain truth to it, but ends by showing that it is irrelevant.

See the complete example.

- *Concession.* In a concession, you acknowledge that certain opposing arguments have some validity, but you explain how they do not damage your overall argument. Concessions build personal appeal: they make you seem more open minded.
- *Synthesis.* Modern rhetoricians urge us not to view the persuasive process as a win-lose, all-out war. When people are entrenched, they shut out the arguments of the other side. Such rigidity prevents us from resolving the issue and getting on with our lives. Instead, the process of counter-argument, rebuttal, and concession should be sincere and continuous until all parties reach synthesis—a middle ground where they drop their weapons and agree.

| | |
|---|---|
| *Main assertion: This paragraph begins with a straightforward thesis that recycling is not cost-efficient—that it costs too much.* | One of the biggest problems with recycling is that it is not cost-efficient. In fact, recycling is a serious financial drain on all but a very few municipalities. As John Tierney pointed out in his 1996 *New York Times Magazine* article, collecting and handling a ton of recyclable materials is three times more expensive than putting them directly into a landfill. Why is that? Recycling programs require extra bureaucrats to manage them and enforcement officers to inspect people's recycling efforts and fine them if they are not complying. They require expensive public education campaigns to train people in the arduous process of sorting and storing their garbage correctly. (According to Tierney, "New Yorkers still don't know the rules.") Recycling programs are also more expensive because less garbage can be picked up at each stop. Tierney, in his aptly titled article, "Recycling Is Garbage," estimated that in 1996 New York City was spending more than $200 to recycle a ton of glass, plastic and metal than it would spend to bury the material in a landfill. He points out that market prices for recyclables has "rarely risen as high as zero." In fact, the city has to pay an additional $40 [per ton] to get rid of valueless recyclables. |
| *Support: Relying primarily on the Tierney article, this writer goes through a series of reasons for the extra expense: extra city officials, public education programs, reduced efficiency of recycling pickup, and minimal market value for recyclables.* | |
| *Direct quotations: Notice that this writer quotes two pithy phrases from Tierney's articles, quotations that carry some of the attitude and personality of the original author.* | |
| *Documentation: even if this writer had not quoted, he's still obligated to cite his source for this information he has borrowed.* | Source: John Tierney. "Recycling Is Garbage." *New York Times Magazine*, June 30, 1996: www.igc.org/nrdc/nrdcpro/recyc/appenda.html. Accessed January 18, 2000. |

*Single-paragraph example of persuasion*. This paragraph would be one of several paragraphs attempting to discredit the recycling movement.

## What Are the Common Flaws in Persuasion?

You should be aware too of the logical fallacies commonly found in persuasive efforts:

- *Hasty generalizations.* When you draw a conclusion based on too little evidence, that's a hasty generalization. For example, if you conclude that there is a big social trend to return to the 70's look because you see two or three bellbottoms and paisley shirts one day, you've drawn a hasty generalization based on a very limited, incomplete sample.
- *Irrelevant, ad hominem arguments.* When you base all or part of your persuasive effort on your opponent's character, behavior, or past, that's an *ad hominem* argument (meaning "to the man" in Latin). If a middle-aged political candidate were attacked for smoking marijuana in college, that might be an irrelevant personal attack.
- *Bandwagon effect.* If you base all or part of your persuasive effort on the idea that "everybody's doing it," you're using the bandwagon effect. Commercial advertisement commonly uses this tactic: everybody's buying the product—so should you!
- *False causality.* If you argue that because one event came after another, the first event caused the second, you may be making an argument based on false causality. For example, imagine that your father joined IBM in 1984 as a low-level regular employee and shortly thereafter the company began its historic slide to near-extinction. Imagine further that in 1995 he left the company, at which time the company began its remarkable comeback. Was it your dad who nearly brought the company to its knees? Did his departure save the company?
- *Oversimplistic, either–or arguments.* If you reduce the choices to the one you favor and to a totally unacceptable one, you are using an oversimplistic, either–or argument. Advocates of the nuclear power plant might argue that either we build the thing or we go without electricity
- *False analogies.* When you compare a situation to a simple object or process, that's an *analogy*. When you base an entire persuasive effort on an analogy, you may have problems. Some analogies are just wrong to begin with. And, at some point, all analogies break down. For example, arguments relating to global warming often use the analogy of how a car heats up when the windows are rolled up. The Vietnam war was justified using the analogy of how dominoes all topple over when they are lined up. Analogies can help readers understand, but not justify an argument.

## How to Write a Persuasive Document

Here are guidelines on writing persuasively in a technical-writing content:

- *Carefully pick your topic and your approach to it.* Finding a project for persuasion is like trying to pick a fight. Think of the main issues of the day—global warming, ozone-layer depletion, alternative fuels, mass transportation, pesticides, zero population growth, solar energy, cloning (bioengineering), abortion, effects of computer- and video-game violence, capital punishment, nuclear armaments, chemical warfare. Each of these topics has multiple issues that are hotly debated. Technical-writing courses are not the place for the common pro-and-con and letter-to-the editor essays you may have written in past writing courses. However, these topics have a technical side that challenges your abilities as a technical writer.

  What are the logical arguments for recycling——more specifically, a city-based curb-side recycling program? They range from altruistic (for the city, for the planet) to selfish (to reduce waste management costs, to decrease taxes). Which arguments you use depends on your readers. Altruistic arguments may be of no use to certain conservative or business readers or to city administrators, but they may be vital in getting ordinary citizens to back such the program.
- *Define each of your arguments; plan how you will support them.* You must prove each logical argument, using supporting data, reasoning, and examples. You can't just baldly state that something costs less, works better, provides benefits, and is acceptable to the public—you've got to prove it!

  In your persuasive effort to get the city to consider recycling, you might use the logical appeal that such a program would reduce landfill requirements. How can you prove that? Do some research. What's the city's daily input to the landfill; what are the costs? Can you determine the percent made up by recyclables? If you can get believable numbers, calculate landfill savings in terms of volume and dollars.
- *Consider emotional appeals.* At best, emotional appeals capture readers' attention and get them to care about the issue. At worst, they rouse strong emotions such as fear and anger, preventing readers from thinking clearly about the issue.

  What emotional appeals could you use for the recycling promotion (not that you actually would, of course)? Images of overflowing landfills might work; images of dwindling natural habitats, replete with deer, chipmunks, hummingbirds——these might work. Would they pull at the heart strings of your readers, or would readers cynically mutter "give me a break"? How would you feel about using such tactics?
- *Consider personal appeals.* Like emotional appeals, personal appeals have no logical relevance to an argument. If you use the personal appeal, you attempt to build readers' confidence in you as someone who is knowledgeable and reliable. Citing years of experience and education is a common example of building a personal appeal.

  What personal appeals could this recycling persuasion use? To get people to accept your data, cite believable sources, such as government reports or leading experts. To give yourself credibility, describe your past experience and training in this area. Perhaps also describe yourself as a long-time resident of the city. These appeals shouldn't have any relevance, but they may cause people to hear you out.
- *Address any counter-arguments.* It's a good idea to address counter-arguments—objections people might raise in relation to your argument. Imagine people out there saying "but—but—but—!" Discuss their counter-arguments and show how they are wrong, how they can be addressed, or how they are irrelevant to your main point. Notice that the persuasive document advocating recycling is structured on counter-arguments: Recycling: Not a Waste of Money or Time!

  As for recycling programs, you must address the standard objections. *It's a hassle*. Your might counter-argue that recycling is no more of a hassle than taking out the garbage. *It's a hassle sorting everything and keeping in separate bins*. That one is easy——most recycling programs don't require sorting. *It's messy and attracts pests*. Hmmm, that's a hard one——time for some research.
- *Plan an introduction.* In an introduction to a persuasion, you cannot start out guns blazing and swords rattling. It's not necessary to state your main argumentative point right away. Instead, just indicate the subject matter—not your main point about it. Your readers are more likely to hear you out.

  Imagine that you've written the main sections of this persuasion. You have logical appeals, counter-arguments, and possibly some personal and emotional appeals as well. Instead of demanding that the city adopt a recycling program, begin with a quiet purpose statement that this document "looks at" or "investigates" the possibilities for recycling. Indicate that this document is

for both city officials and ordinary citizens. Provide an overview, indicating that you'll be discussing current and projected landfill use and associated costs, amount of recyclables in municipal waste, their recyclable value, potential revenue from a recycling program, costs of a recycling program, and necessary administrative and citizen participation in such a program.

- *Consider the conclusion.* In a persuasion, the final section is often a "true" conclusion. If you have not yet overtly stated your main argumentative point, now's the time. When you do, summarize the main arguments that support it.

  While the introduction may be the place for quiet understatement, the conclusion is the place to pound home your main point. Come out and state vigorously that the city should implement a recycling program and then summarize the main reasons why.

## How to Format Persuasive Documents?

Here are a few suggestions on format as they relate specifically to persuasive documents.

- *Headings*. If you structure your persuasion by individual arguments, then the subheadings can be related to those arguments. Notice that the headings in the example persuasion address the counter-arguments: Recycling: Not a Waste of Money or Time!
- *Graphics*. Factual information—data—supplies a great deal of the legitimate support for your presuasive effort. Make that data more dramatic and vivid by creating tables, charts, and graphs. Graphics—illustrations, drawings, photos—can also supply that essential logical support—but also the emotional support mentioned earlier.

I would appreciate your thoughts, reactions, criticism regarding this chapter: response—*David McMurrey*

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# CHAPTER OVERVIEW

## 5: Examples, Cases and Models- Index


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5.2: Application letters
5.3: Complaint letters
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5.5: Inquiry letters
5.6: Order letters
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# 5.1: Resumes

## An example is worth half a thousand words

The following are links to the examples and models of the kinds reports, letters, and other documents discussed in this book. (Some of the items are excerpts.) True, many of these examples are as much as twenty years old. However, the point here is technical writing, format, organization, style—not up-to-date technology. Even so, why not write a technology update on blood glucose monitoring systems, voice recognition software, laptop computers, wind power systems? (And then send it to mcmassociates.io—me.)

## Resumes

**Warning:** These files are registered with numerous plagiarism-checking services.

Front-end developer. Check out this new two-column format
Veterinary assistant
LAN system administrator
Maintenance technician for high-tech systems
Science writer, editor, researcher
Computer service and sales representative
Case management nurse
Technical writing intern

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# 5.2: Application letters

## Application letters

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Technical writing intern
Science editorship
Database programmer
Quality assurance manager
Programmer/analyst

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# 5.3: Complaint letters

## Complaint Letters

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Microwave problems
Printer problems
Cosmetics problems
Digital multimeter problems
Garden polymer sprayers

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# 5.4: Adjustment letters

## Adjustment Letter

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Compensation for damaged freight

Archaeological bad news. True, this is not an answer to a direct complaint.

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# 5.5: Inquiry letters

## Inquiry Letters

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Questions about blood glucose monitoring systems
Questions about hardware support for Red Hat Linux

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# 5.6: Order letters

## Order Letter

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Office equipment purchase

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# 5.7: Proposals

## Proposals

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Proposal to Write Owner's Manual for a Camera Drone
Innovative School Garden: Growing for a Brighter Future: A Proposal To Whole Kids Foundation
Employee Wellness Program
Proposal to Write the Operation and Maintenance Manual for the M-16A2 Rifle
Academic Proposal
Nursing Staff Handbook on Communication and Swallowing Disorders in the Elderly
Student Guide for Solving Engineering Mechanics Problems

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# 5.8: Progress reports

## Progress Reports

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Construction handbook for a mycological growroom (annotated PDF)
Database development
Debugging techniques with Scheme
Quartz etch rate project
Therapeutic Electrical Stimulation Therapy (TES) for children with cerebral palsy (annotated PDF)

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# 5.9: Instructions

## Instructions, Policies & Procedures, Standard Operating Procedures

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Changing Front Disc Brake Pads
Using WS_FTP Pro for Windows
Beginner's Guide to Eudora Lite for Windows
Operating the Minolta Freedom 3 Camera
How to Raise Potatoes in the Home Garden
Instructions for a Simple Window Curtain
Welding and Brazing Cleaning Requirements
Accounting policies and procedures
Standard operating procedures: pouring dental impressions. Thanks to Melissa Burke for making this SOP available.

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# 5.10: User guides

## User Guides

**Warning:** These files are registered with numerous plagiarism-checking services.

Formidable Forms with Word Press: User Guide
LView Pro: User Guide
iBooks: User Guide
Video Edit Master: User Guide
Filepad User Guide
GIMP User Guide
Parallels User Guide

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# 5.11: Recommendation reports

## Recommendation & Feasibility Reports

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Neighborhood Safety
Sport Utility Vehicles
Laptop Computers (annotated PDF)
Fire Ant Control
Blood Glucose Monitoring Systems
Uninterruptible Power Supply (UPS) Systems
First Telescope Purchase
Voice Recognition Software

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# 5.12: Technical reports

## Formal Technical Reports (Annotated PDF)

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A Guide to Navajo Weaving
DVD Technology and Applications
Cerebral Palsy and Its Treatments
Effects of Increased Atmospheric Carbon Dioxide
Report on Light Water Nuclear Reactors

## Popular Science Articles

**Warning:** These files are registered with numerous plagiarism-checking services.

These are all student-written:

Lupus: The Silent Killer
Ultra-Fast Photonic Chip!
To Alter DNA or not to Alter DNA?
Wagyu Beef: Rare, Well-Done, or...Printed?
How Many Beer Bubbles?
Invasion of the Chatbots
Fascinating World of Twin Science

## Handbooks

**Warning:** These files are registered with numerous plagiarism-checking services.

Film production
Amazon
Asthma
Avian flu

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# 5.13: Primary research reports

## Primary Research Reports

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Trout Spawning Cycles
Bats Roosting in Deciduous Leaf Litter

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# 5.14: Technical specifications

## Technical Specifications

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Design and Construction of a Single-Story Purple Martin Birdhouse
Specifications: (a) Metal Doors and Frames, (b) Cassette Deck

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# 5.15: Oral reports

## Oral-Report Scripts & Videos

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3D Printing and Nanotechnology for Homeless Housing (Powerpoint by A. Joyce, 2024)
Developer Assistance with AI (MP4 by Bret Ellis, 2024)
HD TV (MP4 by Michael Johnston, 2024)
The Current Drug Crisis in the U.S. (MP3 by Caleb Hester, 2023)
The Impact of Greenwashing (MP4 by Morgan Humburg, 2023)
Patient Seminar on Physical Therapy
Presentation on Automobile Airbags for Sales Representatives
Presentation on Holo Lens Technology (MP4 by Yamel Gonzalez, 2020)

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# 5.16: Report and section introductions

## Report and Section Introductions

Introductions to Brief Instructions
Introductions to Brief Reports
Report Introduction from a Report on Nuclear Reactors
Report Introduction from a Report on the Ames Municipal Solid Waste Recovery System
Section Introduction Occuring in a Report on Wire-Line Logging Technology

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# 5.17: Descriptions

## Descriptions

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Rayovac Workhorse Flashlight
Mars Description
Mars Exploration Rover
Primitive Stone Scraper
Littman Stethoscope

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# 5.18: Comparisons

## Comparison

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Wind Electrical-Power Generators
Comparison of Nuclear Reactors

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# 5.19: Classification (Categorization)

## Classification

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Industrial Robots
Types of Solar Water Heaters

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# 5.20: Causal discussion

## Causal Discussion

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Effects of Global Warming on Weather and Climate
Potential Effects of a Massive Solar Storm
Effects of a Nuclear Attack
The Mystery of Lunar Organic Matter

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# 5.21: Definitions

## Definition

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Autism Spectrum Disorder
Sickle Cell Anemia
Stratospheric Ozone Depletion and HVAC Refrigerants
Superconducting Quantum Interference Device

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# 5.22: Process discussion

## Process Discussion

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Water Cycle
Cardiac Cycle
Wind Turbine Power Generation
Shock

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# 5.23: Persuasion

## Persuasion

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# Glossary

**Sample Word 1** | Sample Definition 1

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