# Chapter 20: Tables and Graphics

## Objectives

Upon completion of this chapter, readers will be able to do the following:

1. Distinguish among tables, charts, and graphs.
2. Identify chief characteristics of tables, charts, and graphs.
3. Identify and apply best practices in creating tables, charts, and graphs in technical communication.
4. Explain and apply the various uses of graphics in technical documents.
5. Create and format appropriate graphics for technical documents.

## Tables, Charts, and Graphs

Most technical writing contains graphics such as drawings, diagrams, photographs, illustrations, tables, pie charts, bar charts, line graphs, and flow charts. Graphics are crucial in technical communication. We learn more from a document when graphics are included (Gatlin, 1988). In fact, people learn about 1/3 more from a document with graphics than without (Levie and Lentz, 1982). Readers learn faster and are better able to use the information they learn when the text includes graphics (Große, Jungmann, and Drechsler, 2015). Graphics should be used carefully and placed correctly. The information below will help you make informed decisions regarding graphic creation and placement, helping you create effective documents for your readers.

### Tables

Tables are rows and columns of numbers and words that permit rapid access to and comparison of information. If the data are arranged chronologically (for example, sales figures over a ten-year period), the table can show trends—patterns of rising or falling activity.

For example, the table below tracks the percentage of home runs and strikeouts in Major League Baseball from 1982 to 2019, highlighting how these offensive outcomes have shifted over time. Notably, 1982 marks the introduction of sabermetrics—an analytical approach that uses advanced statistics to evaluate players and strategies beyond traditional measures. The data is presented in roughly ten-year intervals until 2010, when percentages began to change more dramatically. From that point forward, both home run and strikeout rates rose significantly, reflecting evolving hitting philosophies, changes in player training, and possibly adjustments in pitching and ball composition. This trend underscores the profound influence of statistical analysis and changing strategies on the game’s offensive profile. A table is an effective way to present that information to a reader.

| **Year** | **Homerun %** | **Strikeout %** |
| --- | --- | --- |
| 1982 | .80% | 5.04% |
| 1990 | .79% | 5.67% |
| 2000 | 1.04% | 6.45% |
| 2010 | .95% | 7.06% |
| 2015 | 1.01% | 7.71% |
| 2019 | 1.39% | 8.81% |

Table created by Dylan Galka. Sources: Major League Baseball Batting Year-by-Year Averages. (n.d.). Retrieved from https://www.baseball-reference.com/leagues/MLB/bat.shtml  
 A Guide to Sabermetric Research. (n.d.). Retrieved from <https://sabr.org/sabermetrics/single-page>

Tables are not necessarily the most vivid or dramatic means of showing such trends or relationships between data. Therefore, we have charts and graphs (discussed in the next section).

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

Tables are not strictly for numerical data. Whenever you have situations where you discuss several things about which you provide the same categories of detail, a table may be warranted. 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. This information is ideal content 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 must create row or column subheadings. This situation is illustrated here:

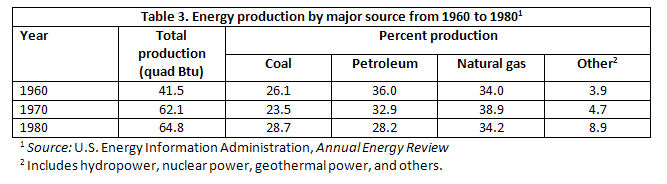


Figure 1: Format for tables with grouped or subdivided rows and columns. Notice that the table title goes above the table.

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.

#### **📊** Making Tables That Actually Help Your Reader

When you use tables in your documents, the goal isn't just to *show* data—it's to *communicate* it. Here's how to make your tables clear, readable, and useful to your audience:

##### 1. Set up your table with a purpose

Before dropping a table into your document, **talk about it first** in the text. Let readers know

* *What they’re about to see*
* *Why it matters*

Don’t just toss a data wall at them. Help them understand what they’re looking for.

##### 2. Don’t build a data monster 🐉

Avoid tables that feel like spreadsheets exploded. If your table has **11 columns and 30 rows**, it’s probably too much. Trim it down to just the data that:

* Supports your point
* Is easy to read at a glance
* Doesn’t distort the meaning

##### 3. Units go in the headers, not every cell

If every value in a column is in millimeters, you don’t need to write “mm” after every number. Instead, just label the **column header** like this:

Length (mm)

It saves space and keeps your table looking clean.

##### 4. Align numbers like accountants do

Numbers should be **right-aligned** or **decimal-aligned**. That way, the numbers stack neatly:



Words, on the other hand, are usually **left-aligned**—but you might **center** short ones (like "Yes" / "No") if that looks better visually.

##### 5. Column headings: Align with the data

Match your headers to your column content:

* **Text columns** → left-align the heading
* **Number columns** → center the heading over the numbers

##### 6. Use footnotes to keep the table clean

If you need to explain something specific—like an exception or special case—don’t cram it into the table. Add a footnote just below instead. Doing so keeps things neat and lets readers focus on the data first.

#### 🎯 Bottom line:

Good tables don’t just present data—they guide your reader through it. Think of a table as a visual aid, not a data dump.

#### Producing Tables

It is often the case that the information you use to create a table comes from a source other than yourself. 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. Just make sure you cite where you got the information.

If you use OpenOffice, Google Docs, 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.

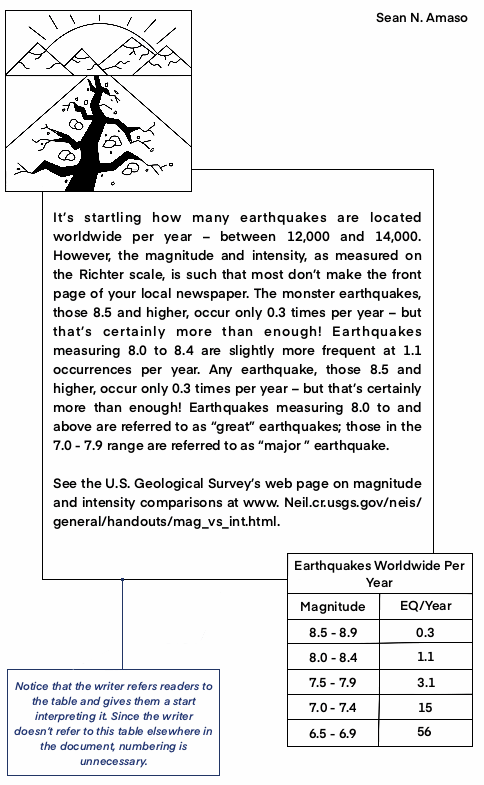
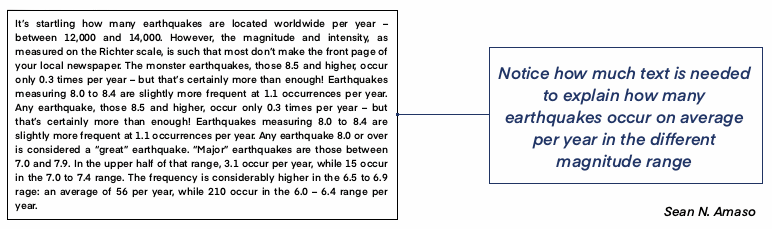


Figure 2: Example of information included in text that would be better represented in a table.

### Charts and Graphs

Charts and graphs are just another way of presenting the same data that are 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.

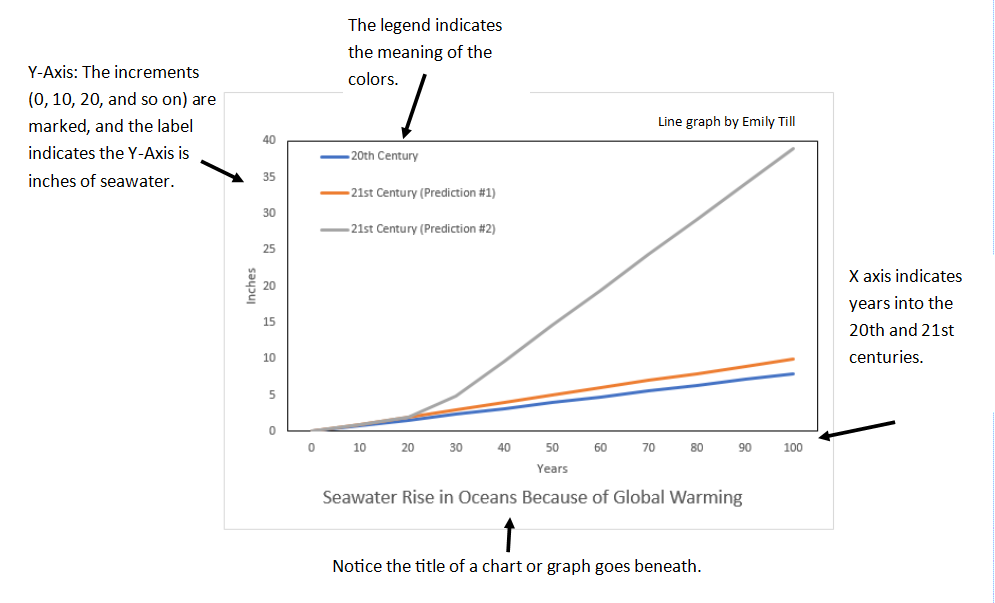
[More information on creating charts in MS Word](https://support.microsoft.com/en-us/office/create-a-chart-from-start-to-finish-0baf399e-dd61-4e18-8a73-b3fd5d5680c2" \t "_blank)

#### Formatting Requirements

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

1. 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.
2. 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.

Always introduce the information in the chart or graph within your text *before* presenting the visual. This introduction helps readers understand the significance of the data and prepares them to interpret it effectively. For example, one might introduce the graphic below thus: Withgott (2018) explains that “The world’s oceans rose 20 cm (8 in.) in the 20th century as warming temperatures expanded the volume of seawater and caused glaciers and ice sheets to melt, discharging water into the oceans. These processes are accelerating today, and scientists predict that sea level will rise another 26–98 cm (10–39 in.) or more in this century as climate change intensifies” (p. 479). The chart below shows the current rise in sea level in this century along with two possible scenarios for the next century.



*Figure 3: Example of a line graph*

#### Example of a Graph

Notice that a figure title is placed beneath the graph.

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

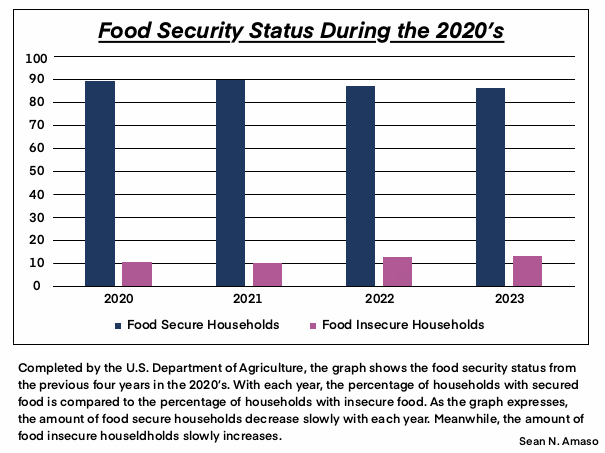


Figure 4: Example of a chart. Notice that text above and below the chart calls attention to the chart and briefly indicates its significance.

* Documentation—When you borrow information to create a graphic, be sure to use the standard format to indicate the source. It does not matter how you import the graphic into your report—it is all borrowed information, which some brave and noble soul worked hard to develop and who deserves credit for that effort.

#### Producing Charts and Graphs

As with illustrations, you have these options for creating charts and graphs: screen-capturing, scanning, photocopying, generating your own with software, and drawing your own.

### Documenting 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.

### General Guidelines for Tables, Charts, and Graphs

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. Such information is ideal for tables or even charts or graphs.
* Watch out for areas in your text where you define a series of terms. That information is 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, or 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 is 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 writers 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 entirely. This can be done in the title or in a footnote.
* Indicate identifying measurement values in column or row headings—not in each cell.
* Cross-reference all tables, charts, and graphs from the preceding text. In the cross-reference, give the number (if it is a formal table with title), indicate the subject matter of the table, and provide explanatory information as necessary.

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

What are best practices for creating graphics? This video will show you how to do things correctly and incorrectly.

[Graphics in Technical Writing](https://youtu.be/YatGWqmfQGY)

For more information and examples on how NOT to create graphs, please look at C.J. Schwarz' "[A Short Tour of Bad Graphs](https://alg.manifoldapp.org/api/proxy/ingestion_sources/339ee58b-7d40-4bc2-aa1d-0061aa89bf09)." Shared with permission.

## Graphics and Images

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 get graphics into your technical writing.

### 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 Atlanta, you could use a table with the columns marking off five-year periods since 2000; 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 illustrate how your company is structured—how departments, roles, and teams relate to one another—you can use a concept graphic such as an organizational chart. These often use shapes like boxes or circles, connected with lines, to show hierarchy and relationships between different parts of the organization.
* Concept graphics are especially useful when you're presenting nonphysical ideas—things like processes, systems, structures, or relationships. Today, these are often presented as infographics to make the information visually engaging and easy to understand. For example, an infographic might compare quantum processors to traditional processors to show differences in speed, power efficiency, and data handling—just like older graphics once compared 32-bit and 64-bit processors.
* Words—And finally graphics are used to depict words. You've probably noticed how textbooks put key definitions in a box, maybe with a 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.

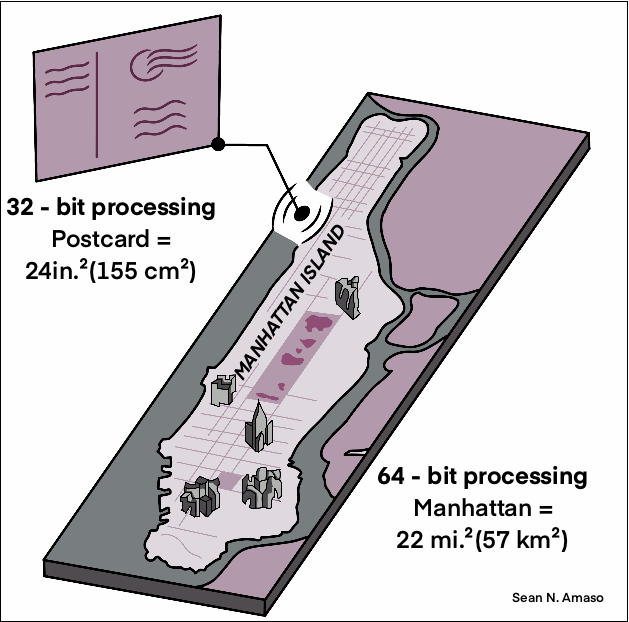


Figure 5: Graphic of the difference between 32-bit processors and 64-bit processors from Apple Computer

### Drawings, Diagrams, Photos

To depict objects, places, people, and relationships among 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 an abstract, schematic view of things. For example, a wiring diagram of an audio system hardly resembles the actual physical thing. 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:

1. In instructions, simple drawings (often called line drawings) are the most common. They simplify the situation and the objects so that the reader can focus on the key details. In the examples below, you can see a fully detailed photograph and a simplified, labeled diagram. Which would you prefer?

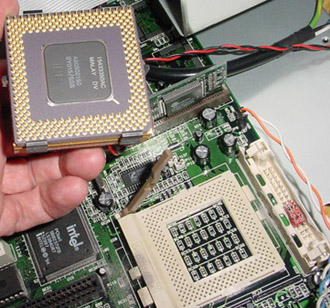


Figure 6: Fully detailed photograph

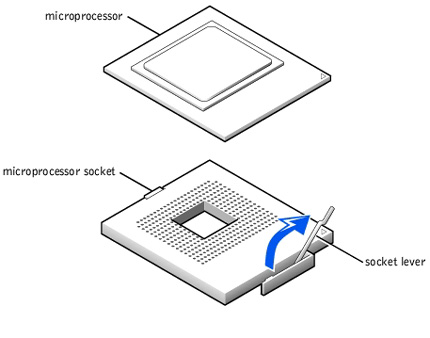


Figure 7: Simplified, labeled diagram

1. In descriptions, you would want to use drawings, but in this case drawings with more detail, such as shading and depth perspectives.
2. 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, keep several requirements in mind. (most of these are shown in this illustration):

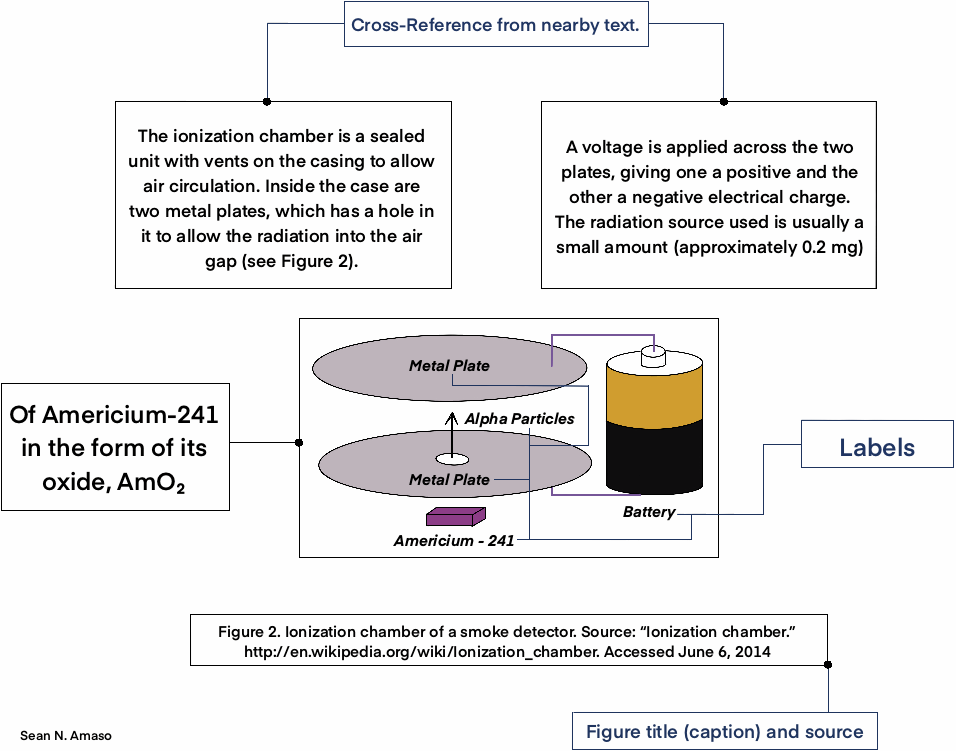


Figure 8: Formatting requirements

* 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). 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; and/or 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. Do more than just tossing in a "(See Figure 2)"; discuss the illustration briefly in order to focus readers' attention on the key details.
* 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 intersperse 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 your software 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 one blank line above and below the illustration.
* Level of technical detail—You want illustrations to be at the right technical level for your readers. No chip circuitry diagrams for computer beginners!

#### Producing Illustrations

There are several options for creating graphics like charts and graphs. Screenshots are probably the most common. Photographing the object with your phone and editing the graphic before inserting it into the document is another possibility. Some AI programs can create a chart or graph for you. In all of these production methods, don't forget that you must indicate the source of the borrowed graphic. If you use AI, share that the graphic was created with AI along with the source of the data.

With a little practice, you can create graphics like the ones shown in the figure here in Canva, Piktochart, Photopea, GIMP, Microsoft PowerPoint, Google Docs, Adobe Illustrator, and Adobe Photoshop.

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, take a picture with your camera, edit it if needed, and insert it into your document.

### Documenting Graphics: Indicating Sources

As mentioned earlier, it's perfectly legal to borrow graphics (like charts, not photos or images)—to trace, photocopy, scan, or extract subsets of data from them. Nevertheless, 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. It’s not okay to take another’s art or photograph and use it yourself. For photos and images, you’ll want to make sure the license allows you to use it for the purpose you intend. **Remember, just because a picture is on the internet doesn’t mean you can use it for any purpose**.

To find works that you can use in your own work, you can search [the Creative Commons](https://search.creativecommons.org/). Keep in mind that these items may have restrictions as well. It’s always good to read the license.

### Guidelines for Graphics: A Review

The preceding sections state 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 avoid them because creating them seems like too much work. At the same time, don't get intimidated by concerns about creating perfect graphics. This course is a writing class, not a graphic arts class.
* 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 overwhelm 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 (see the exceptions to this rule in the preceding).
* 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.
* Include identifying detail such as illustration labels, axis labels, keys, and so on. For labels, use text boxes and turn off the borders.
* Make sure graphics fit within normal margins. If they don't, enlarge or reduce the copies. Leave at least one blank line above and below graphics.
* 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.
* Cross-reference all graphics from the appropriate text. In the cross-reference, give the figure number (if one is used), indicate the subject matter of the graphic, and provide explanatory information as necessary.

## References

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## Attribution

This chapter is revised from the first edition of *Open Technical Communication*, Chapter 4.7: “[Tables, Graphs, and Charts](https://alg.manifoldapp.org/read/open-technical-communication/section/b1ca4069-52c9-49bb-9e47-510858d4e6f3)” by David McMurrey and Tamara Powell and Chapter 4.8: “[Graphics](https://alg.manifoldapp.org/read/open-technical-communication/section/d03f3bce-d354-4976-b0cd-63a1476416c2)” by David McMurrey, which are both openly available under a Creative Commons Attribution license.

The content in Chapters 4.7 and 4.8 of the first edition of *Open TC* were originally sourced and revised from David McMurrey’s *Online Technical Writing*, sections titled “[Tables, Charts, Graphs](https://mcmassociates.io/textbook/tables.html)” and “[Graphics](https://mcmassociates.io/textbook/graphics_only.html),” which are both openly available under a Creative Commons Attribution license.

## AI Assistance Notice

Some parts of this chapter were brainstormed, drafted, and/or revised in conversation with ChatGPT 4o and Google Gemini 2.5 Flash. All AI-generated content was reviewed and revised as needed by a human author.