4 Drafting Technical Definitions and Descriptions

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Technical definitions and descriptions exist all around us.[1] Many documents for work and for leisure come with terms, mechanisms, and processes that are unfamiliar to readers. Consumer products provide user documentation that defines technological terms; scientific articles describe mechanisms that form the natural world; government documents explain processes of voting procedures. Defining these terms and describing these mechanisms and processes are necessary for readers to understand information and solve problems.

For many of you, the university is an exciting place with a life of its own. But it is also a complex structure with terms that are often new to the first-time college student. For example, you are typically required to take many kinds of courses that range from general education courses, core courses in your major, electives, and so forth. You must understand these terms and types of courses in order to plan your study accordingly. You will also meet an array of people — professors, deans, advisors, etc. — and you need to know what roles they each play in your college life. Technical definitions help you understand the environment around you and navigate your college experience.

Furthermore, you will need to know crucial processes and procedures you must follow to finish your degree. For instance, many degrees require the completion of an internship. An internship is typically a short-term work experience that extends your study and prepares you for professional life. To complete an internship, you usually need to secure an opportunity, work with a supervisor, and fulfill a set of requirements by your employer and your college. If you are new to internships, it is good to consult with a technical description provided by your school to help you make informed plans.

In technical communication, technical definitions and descriptions are indispensable. They help readers understand concepts effectively, perform tasks safely, and make decisions wisely. Without technical definitions and descriptions, most technical documents would fail.

Technical Definitions

Technical documents often come with scientific, technical, business, and other terms of which their readers have little to no prior knowledge. Technical definitions describe and explain technical terms and concepts in text and visuals. A technical definition can not only explain what a term means, but also where it comes from, what it is made of, and what distinguishes it from similar terms. It helps readers understand and differentiate unfamiliar or specialized terms in order to read a technical document and perform tasks. To draft a technical definition, you must analyze your audience and context, gather subject-matter information, determine the appropriate type of definition, and manage content coherence of a document.

Analyzing Your Audience and Context

Technical documents are written for specific audiences who have specific characteristics. As you plan for a technical definition, consider who your readers are, what they know, and what they need the definition for. What needs to be defined depends on your audience. You may have noticed that, when I introduced internship earlier, I provided a brief definition. I did so because those of you in your first two years of college might not be familiar with this term. However, if I were writing for seniors only, I might not need to define it.

Consider, too, your readers' purposes. Do they need to gain a quick understanding of a term? Do they need a thorough understanding in order to make complex decisions? Answers to these questions help you decide if you want to provide a short definition or an extended one.

While some concepts can be explained in one sentence, many warrant extended definitions to fully make sense. As I discuss later in this chapter, writers use examples, analogy, visuals, and other ways to enrich technical definitions. Does an example provide an adequate explanation? Is an analogy appropriate and effective? What kind of visual is appropriate for your

readers' background and level of knowledge? Getting your audience and context right enables you to draft a technical definition appropriately.

Gather Subject-Matter Information

Whether you are an expert on the subject matter or possess some knowledge, it is wise to gather information about the terms you are defining. Definitions make a lasting impact in the perception of concepts and terms, thus must be authoritatively and effectively written. The following are some common ways you can go about gathering subject-matter information.

- Looking up a term in reference books: Many terms are defined in dictionaries, encyclopedias, and even popular sources. General reference books like the Webster's Dictionary, the Oxford English Dictionary, and the Encyclopedia Britannica are good places to start. If you work in a specialized field, consider specialized references as they cover domain-specific terms more comprehensively. Oxford's A Dictionary of Computer Science provides all-encompassing coverage of computing terms. WebMD.com covers thousands of health conditions and diseases. In addition, popular sources such as Wikipedia, wikiHow.com, and howstuffworks.com provide a large set of definitions, from everyday terms to uncommon ones.
- Synthesizing information from documents: Some definitions require you to gather and synthesize information from references, journals, Web articles, and other documents. Documents offer deeper knowledge and more comprehensive explanations than simple dictionary definitions. And because documents can treat a term differently for different audiences, they demonstrate many aspects and varying details of a term.
- Consulting with subject-matter experts: Many terms at work are best defined by subject-matter experts. These experts understand the context of a technical term and can offer a definition that best fits your goals. And if experts are not good at communicating their ideas, observe how they perform tasks and operate procedures. These first-hand experiences help you achieve greater accuracy and clarity.

Whether it's the help of reference books, pertinent documents, or subject-matter experts, the key to remember is that your technical definition must enable readers to use information effectively and safely. When in doubt, gather information on your terms and concepts.

Selecting the Appropriate Type of Definition

There are generally two categories of technical definitions: sentence definitions and extended definitions. Sentence definitions are short, often one-sentence, descriptions of a technical term. They are often the most typical definition for the everyday reader. Extended definitions are longer, more in-depth explanations.

Sentence Definition

A sentence definition is a brief and straightforward explanation of a term. It usually consists of the term being defined, the category it belongs to, and the characteristics that distinguish the term from other terms.

Consider the following definition of mortgage:

> A mortgage is a loan from a bank or other financial institution that helps a borrower purchase a home. (Taylor, "What Is A Mortgage?")

In this definition, "mortgage" is the term and "loan" is the category. The distinguishing characteristic is that mortgage loan helps a borrower purchase a home. This characteristic sets mortgage aside from other types of loans.

Selecting an appropriate category can be tricky. Category must provide concrete meaning and, at the same time, avoid merely repeating the term being defined. Take, for instance, the following example of a definition.

> A fixed-rate mortgage is a mortgage with an interest rate that stays the same. (adapted from Lewis, "Fixed-Rate Mortgages: What You Need to Know")

Here, the category mortgage merely repeats the term. It does not provide essential meaning that would improve readers' understanding of the term. This type of definition is considered circular definition, an explanation that uses the term being defined as the definition. Circular definitions appear as though the writer assumes that readers have prior knowledge in the term being defined.

How about the following alternative:

> A fixed-rate mortgage is a financial product with an interest rate that stays the same. (adapted from Lewis, "Fixed-Rate Mortgages: What You Need to Know")

This definition avoids being circular but isn't quite right yet. The category financial product is too broad to convey essential meaning.

Let's narrow down the category further.

> A fixed-rate mortgage is a home loan with an interest rate that stays the same. (adapted from Lewis, "Fixed-Rate Mortgages: What You Need to Know")

This version clearly categorizes a mortgage as a loan and then distinguishes mortgage loan from other loans.

Extended Definition

Unlike sentence definitions, extended definitions provide longer and more comprehensive explanations of a term. Here we discuss common strategies to extend a definition in various situations.

Extend by Example

Examples are an effective and powerful way to explain terms that are vague, abstract, complex, easily confused, or too specialized for the regular reader.

The following definition of text-to-speech technology is accurate, but to readers new to this technology, it is still abstract.

> Text-to-speech (TTS) is a type of assistive technology that reads digital text aloud. ("Text-To-Speech Technology: What It Is and How It Works")

For instance, where is text-to-speech technology used? Does it read text on your computer? Mobile phone? A few examples would do the trick.

> Text-to-speech technology can turn words and paragraphs on your computer, smart phone, tablets, and other digital devices into audio. (adapted from "Text-To-Speech Technology: What It Is and How It Works")

Choosing examples takes careful and thoughtful effort. Examples must represent the most typical ways a term can be fleshed out. Choose common, not rare examples. Examples must also be familiar to your readers. Here your knowledge and analysis of your readers come in handy.

Extend by Visual

You may have heard of the expression: A picture is worth a thousand words. Visuals can explain complex terms, spatial relationships, geographical distributions, or other concepts that are otherwise painstaking to explain in text. These days, readers are accustomed to infographics, animated visuals,

and even interactive visuals. They expect a visual when it is needed.

Consider the following definition of the exploded view drawing, a type of visuals that is commonly used in technical instructions.

> An exploded view drawing is a picture or diagram that shows how an object is assembled.

Good luck with that definition. It's not that the writer did a poor job; however, defining this type of concept is best done with visuals. Figure 4.1 allows most readers to understand exploded view drawings immediately.

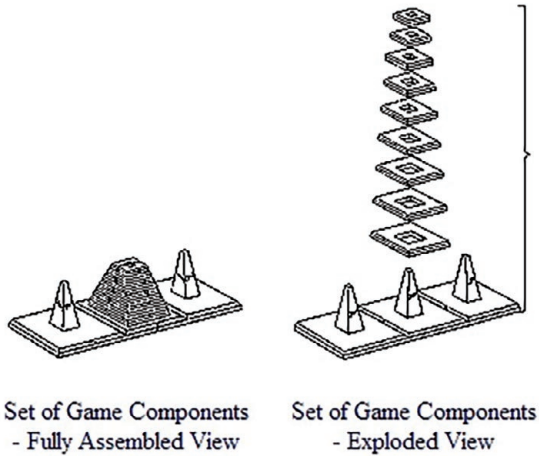


Figure 4.1: An exploded view drawing (Source: United States Patent and Trademark Office)

When using visuals, remember that you must consider copyright issues. You should not simply use images from the Web, social media, or other authors without getting permission.

Extend by Partition

Many complex terms can be defined by partitioning their components. Partition elaborates on the categories, variations, and applications of a term. Remember that a term can often be partitioned in more than one way. Choose components that are major to the term and context. Figure 4.2 shows an extended definition of renewable energy by the U.S. Energy Information Administration.

This definition begins with a sentence definition of renewable energy and extends to the five forms (partitions) of renewable energy: Biomass, hydropower, geothermal, wind, and solar.

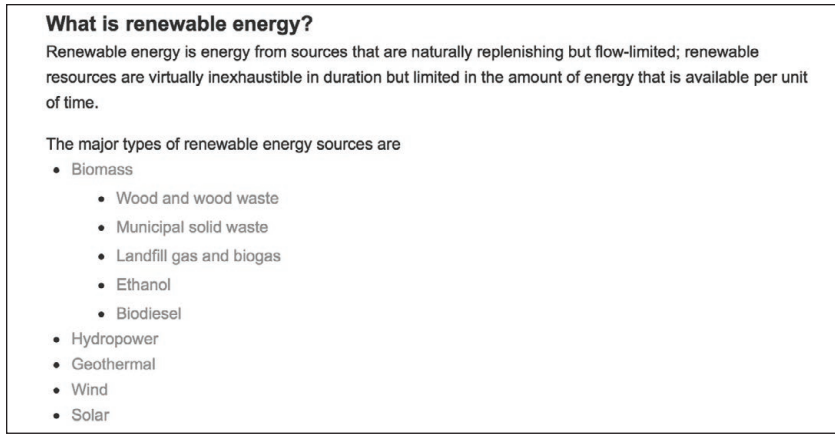


Figure 4.2: Renewable energy definition using partitions (Source: U.S. Energy Information Administration)

Extend by Comparison and Contrast

When the term being defined is similar to, commonly associated with, or easily confused with other terms, consider extending the definition through comparison and contrast. What makes the term distinctive? How does the term resemble other terms? How does it differ from other terms? Comparison and contrast help readers distinguish the term being defined from other terms. They help readers gain a deeper understanding of the term.

Take a look at an excerpt of a definition of laminate floors in Figure 4.3. When homeowners consider flooring options, they often must decide among several common flooring materials, including laminate, vinyl, solid hardwood, engineered wood, and natural stone. Homeowners might need to know how laminate floors resemble and differ from other flooring types with regard to their characteristics, quality, installation requirements, and price. Figure 4.3 shows an effective use of comparison and contrast in an extended definition of laminate floors.

Extend by Analogy

A distinctive way of defining a term is making analogies. Analogy links abstract or unfamiliar terms with concrete and familiar ones.

Consider the following definition of "keyboard":

> A computer keyboard is one of the primary input devices used with a computer. Similar to an electric typewriter, a keyboard is composed of buttons that create letters, numbers, and symbols, as well as perform other functions ("Keyboard")

Laminate Floors Compared to Other Floor Coverings		
	Different From Laminate	**Similar to Laminate**
Vinyl Floor	Vinyl flooring is flexible, contains only vinyl product, and is 100-percent impervious to water. Vinyl flooring does not need to acclimate to a room prior to installation.	Vinyl is a close cousin of laminate. It is competitively priced, equally easy for do-it-yourselfers to install, and has a similar look.
Solid Hardwood	Hardwood is 100-percent solid wood. Laminate has no solid wood. Solid hardwood is thick and can be sanded and re-sanded many times. Laminate is thin and can never be sanded.	Solid hardwood and laminate flooring can look remarkably alike, especially from a distance. High-definition imaging techniques make some laminate flooring a dead-ringer for real hardwood.
Engineered Wood	Engineered wood has a plywood base topped with a veneer of 100-percent real wood. Laminate has no plywood and no natural real wood veneer top.	Both engineered wood and laminate have a base that made of manufactured wood. Both products can look remarkably similar, especially with the premium laminates.
Natural Stone	Laminate flooring contains no stone product. Stone is hard, solid, and thick. Laminate is flexible, breakable, and thin.	As with the hardwood-to-laminate comparison, higher-end laminate flooring can look very much like stone.

Figure 4.3: A definition of laminate floor based on comparison (What Are Laminate Floors?)

Here the writer thoughtfully uses the analogy of an electric typewriter for readers who are not computer savvy. Analogy is challenging. In this definition, for instance, the writer clearly assumes that more readers are familiar with electric typewriters than keyboards. This assumption might ring true these days. A few decades from now, it perhaps will not. Readers might not need a definition of a keyboard, nor might they be familiar with electric typewriters, except having seen one in museums. Appropriate analogy requires savvy understandings of the audience and context.

Extend by Etymology

Terms can be defined by etymology, or their origin. The origin of a term helps readers understand who invented the term and how the term evolved. The etymology strategy is particularly suitable for terms translated from another language or those that have gone through significant changes.

Consider this definition of emoji:

> An emoji (絵文字) which translates to "picture character" is an electronic pictograph (picture conveying a message) initially used in Japan, and now all over the world. Emojis were first invented by Shigetaka Kurita and became more mainstream when they were introduced on the iPhone in 2011. ("Emoji")

Emoji isn't native to the English language. This definition explains the origin of emoji and how it became popular in the English-speaking world. Consider etymology for terms whose origin holds the key to their meaning.

Extend by Negation

Sometimes, a term is defined not by what it is but what it is not. This strategy is considered negation. Much less common, negation can be used to define terms that are commonly misunderstood or confused with other terms.

Take, for example, the coronavirus pandemic that unfolded in late 2019. In the early days of the pandemic, there was widespread confusion between the novel coronavirus and the flu. The Center for Disease Control and Prevention provides the following definition of novel coronavirus, while stressing that COVID-19 isn't the same as the common cold.

> A novel coronavirus is a new coronavirus that has not been previously identified. The virus causing coronavirus disease 2019 (COVID-19) is not the same as the coronaviruses that commonly circulate among humans and cause mild illness, like the common cold. ("About COVID-19")

Negation helps clarify concepts that the readers are easily confused with or hold widely misunderstood notions of. Use negation scarcely and only when it is necessary.

Managing Content Coherence

Definitions don't exist in isolation from the rest of a document. They must serve a document's coherence and enable readers to move through the document effectively.

Where does the reader need a definition of a term? Is the definition stand-alone, part of a text or a longer publication? What has been said before a definition is introduced? What needs to be said after? Does a definition bring in new terms that need to be defined? Is a definition essential to the understanding of the text that follows? Is a definition helpful to know but not essential?

A stand-alone article about solar energy might begin with a definition of solar energy. But an article on solar energy in a broader publication about government energy policy might not. Often, the writer chooses to contextualize a term, introduce its background, explain its relevance, and then lead the reader to the definition. Without context, a definition of a new term could seem out of nowhere. Contextualizing a term helps readers understand why the term is being defined and how it relates to other topics in a document.

If you are writing a longer document, consider what has been said before a term is introduced. Consider the following definition of autism by the CDC.

> Autism spectrum disorder (ASD) is a developmental disability that can cause significant social, communication and behavioral challenges. ("What is Autism Spectrum Disorder?")

Has developmental disability been defined or explained prior to this definition in the document? If it has, readers might not need further definition. On the CDC website, however, this definition is in a stand-alone article about autism, so the CDC further provides the following definition of developmental disability.

> Developmental disabilities are a group of conditions due to an impairment in physical, learning, language, or behavior areas. ("Facts about Developmental Disabilities")

When a technical definition of one term brings up other terms that need to be defined, consider using a parenthetical definition to any term in need of further definition. That is, readers can quickly understand a term that would otherwise get in the way of understanding the primary term being defined.

The following is the result of a parenthetical definition applied to "developmental disability":

> Autism spectrum disorder (ASD) is a developmental disability (conditions due to an impairment in physical, learning, language, or behavior areas) that can cause significant social, communication

> and behavioral challenges. (adapted from "What is Autism Spectrum Disorder?")

Consider, too, what needs to be said after defining a term. When the definition of autism introduces social, communication, and behavioral challenges, readers expect to know more about each of these challenges.

Where a definition appears in a document also matters. Important definitions, those that readers must have, are usually part of a document's main body of text. These important definitions often serve as opening sentences or thesis statements and are often given a distinctive formatting to visually distinguish them from the rest of the text. Some definitions appear on the page margin. They are supplemental to understanding the text. Still others appear in a footnote or glossary at the end of the document. These less important definitions serve as references.

To put it altogether, you should determine where a definition is needed, how important it is, and how they appear in your document.

Technical Descriptions

Technical description explains a technical object, mechanism, or process using text and visuals. Generally, technical descriptions explain how an object functions, how a mechanism works, or how a process takes place. An e-commerce website explains a new microwave oven for customers; a trade magazine describes the mechanism of carbon emissions for professionals; a government brochure describes the process to apply for a passport for the public. Technical descriptions not only inform readers about technical concepts but also educate the public about important issues. To draft a technical description, you must analyze your audience and context, gather subject-matter information, select the appropriate type of description, and develop effective details.

Analyzing Your Audience and Context

The first step in drafting a technical description is analyzing your audience and context. Unlike definitions, technical descriptions are longer, more thorough explanations. They give the writer greater flexibility with regard to what and how to draft, but they also require excellent understanding of your audience, purpose, and context. The audience and context of technical descriptions vary greatly.

Consider what your readers already know. Are they new to the technical mechanism or process you are describing? Do they have limited

knowledge? Do they hold common misunderstandings? Suppose you are writing a description of COVID-19 vaccines for a trade magazine aimed at a general audience. To help this audience understand how these vaccines work, you might need to explain how the human immune system works. But if you are writing this description for medical professionals, many of whom are familiar with the human immune system, you might not need as much foundational scientific knowledge. Instead, you might consider topics such as administering vaccines and screening for precautions.

In addition, readers with different goals have their own expectations for technical descriptions. If readers are doing a casual read to get to know a concept, they might expect a description that is to the point and short enough that they can finish in a few minutes. If customers are doing thorough research on several products, they might expect detailed descriptions that guide their decision making. Yet other readers might expect to know all the details of a process well enough so that they can carry it out.

Furthermore, the context in which a technical description is needed determines how it is written. A description of the fire evacuation process is usually needed in an emergency situation where readers must take quick action. Such a process description must be easy to read and visually salient. On the other hand, a description of how to take care of a plant is often kept by gardeners as a reference to consult with from time to time.

Gather Subject-Matter Information

Technical descriptions often require substantial support of pertinent information. Gathering such information can be crucial as it gives you a thorough understanding of a mechanism or process. You can do so by synthesizing documents and gathering information with subject-matter experts.

- Synthesizing information from documents: Many documents and sources provide existing descriptions of the mechanism or process you are describing. If you are describing a common concept, such as how mortgages work, you can find plenty of publications and online resources. Publications such as the "for dummies" book series cover a wide range of topics. Websites like howstuffworks.com and wikiHow.com cover an even greater range of topics. If you are describing a specialized concept, such as how Mask Aligners work, consider technical and scientific magazines and specialized journals.
- Consulting with subject-matter experts: No one is an expert on every mechanism or process. When writing technical descriptions, subject-matter experts are some of your best information sources.

> To know how something works, shadow subject-matter experts, observe how they work, and take detailed notes. Technical descriptions aren't done in one shot. After you draft your description, you will need to check with subject-matter experts to revise it for technical accuracy.

You might think you already know everything about a technical mechanism or process. But describing it to others is a different feat. As you dive further into a topic, you might uncover blind spots, clear misunderstandings, or learn whole new knowledge. Be prepared and allow yourself enough time to gather helpful information.

Selecting the Appropriate Type of Description

In general, there are two types of technical descriptions: Mechanism descriptions and process descriptions. Some also consider instructions as a form of technical description. For the purpose of this book, we do not cover instructions in this chapter.

Mechanism Descriptions

A mechanism or object description explains how a mechanism or an object functions. Mechanism descriptions can explain how a machine works, how a biological mechanism takes place, or how an engineering system operates. They are suitable for but not limited to the following topics:

- Scientific mechanisms: such as how human metabolism works.
- Technical objects: such as how the sawmill works.
- Technical and engineering mechanisms: such as how the microwave oven works.
- Professional and business mechanisms: such as how compound interest works.

Excellent mechanism descriptions enable readers to understand how an overall mechanism works and reduce unnecessary confusion.

Process Descriptions

A process description explains how a process works or how to carry it out. Process descriptions can explain how a phenomenon occurs, how a product is manufactured, or how a task is accomplished step-by-step. They are suitable for but not limited to the following topics:

- Technical processes: such as software development processes.
- Business processes: such as how to apply for paid leave.

- Legal and political processes: such as how to register to vote.

Excellent process descriptions help readers understand the scale, length, and complexity in a process and prepare for it informatively.

Developing Effective Details

An excellent technical description requires an effective structure and appropriate details. While mechanism and process descriptions share a lot in common, they have clear distinctions.

Mechanism Descriptions

Begin your mechanism description with your purpose, context, and scope. What does this description accomplish? What will readers take away from it? How in-depth is it? If readers hope to gain a basic understanding of a mechanism in a few minutes, provide a short description with basic facts and practical information. If readers are conducting research on a mechanism, perhaps provide a thorough description with comprehensive facts, background, and applications of that mechanism.

Introduce the mechanism and describe its most relevant aspects. What is it? What does it do? What does it look like? How does it work? How does it compare to similar mechanisms? Depending on what you are describing, many common strategies can be employed. For instance, you can describe a mechanism by its components and how they work together. You can describe a mechanism with regard to its causes and effects, problems and solutions. Another strategy is to compare and contrast a mechanism with other mechanisms for their similarities, differences, or commonly held misunderstandings.

Conclude your description by summarizing the major aspects of the mechanism. Depending on the length of your description, your conclusion could be as short as a sentence or two. It can also provide a relatively finer level of detail that highlights the gist of the mechanism.

Table 4.1 is an example that describes how text-to-speech technology works. This mechanism description first provides a summary of the most important points. Then, the description begins by introducing and defining text-to-speech technology. It clearly reveals its focus on children and identifies parents as the intended audience. It then describes how text-to-speech technology works and how parents can adopt this technology for children. It concludes with a list of key takeaways. This description is entirely appropriate for the intended audience, with the right length, level of detail, and selection of topics.

Table 4.1. A Mechanism Description ("*Text-To-Speech Technology: What It Is and How It Works*")

At a Glance • Text-to-speech (TTS) technology reads aloud digital text—the words on computers, smartphones and tablets. • TTS can help kids who struggle with reading. • There are TTS tools available for nearly every digital device.	**This mechanism description begins with a summary of important points. Notice that the summary clearly identifies the intended audience**
Text-to-speech (TTS) is a type of assistive technology that reads digital text aloud. It's sometimes called "read aloud" technology. With a click of a button or the touch of a finger, TTS can take words on a computer or other digital device and convert them into audio. TTS is very helpful for kids who struggle with reading. But it can also help kids with writing and editing, and even focusing.	**The author defines text-to-speech technology. The author then elaborates on TTS and explains their intended audience and purpose.**
How Text-to-Speech Works TTS works with nearly every personal digital device, including computers, smartphones and tablets. All kinds of text files can be read aloud, including Word and Pages documents. Even online web pages can be read aloud. The voice in TTS is computer-generated, and reading speed can usually be sped up or slowed down. Voice quality varies, but some voices sound human. There are even computer-generated voices that sound like children speaking. Many TTS tools highlight words as they are read aloud. This allows kids to see text and hear it at the same time. Some TTS tools also have a technology called optical character recognition (OCR). OCR allows TTS tools to read text aloud from images. For example, your child could take a photo of a street sign and have the words on the sign turned into audio.	**The author describes the nuts and bolts of how TTS works. Notice how the author connects the children with this description. The author also defines another term, OCR.**
How Text-to-Speech Can Help Your Child Print materials in the classroom—like books and handouts—can create obstacles for kids with reading issues. That's because some kids struggle with decoding and understanding printed words on the page. Using digital text with TTS helps remove these barriers.	**Here the author begins to explain how TTS can help children. Notice that the heading confirms that parents are the intended audience.**

Table 4.1. A Mechanism Description (continued)

How Text-to-Speech Can Help Your Child (continued)

And since TTS lets kids both see and hear text when reading, it creates a multisensory reading experience. Researchers have found that the combination of seeing and hearing text when reading:

- Improves word recognition
- Increases the ability to pay attention and remember information while reading
- Allows kids to focus on comprehension instead of sounding out words
- Increases kids' staying power for reading assignments
- Helps kids recognize and fix errors in their own writing

Like audiobooks, TTS won't slow down the development of your child's reading skills.

Types of Text-to-Speech Tools

Depending on the device your child uses, there are many different TTS tools:

- **Built-in text-to-speech:** Many devices have built-in TTS tools. This includes desktop and laptop computers, smartphones and digital tablets and Chrome. Your child can use this TTS without purchasing special apps or software.
- **Web-based tools:** Some websites have TTS tools on-site. For instance, you can turn on our website's "Reading Assist" tool, located in the lower left corner of your screen, to have this webpage read aloud. Also, kids with dyslexia may qualify for a free Bookshare account with digital books that can be read with TTS. (Bookshare is a program of Understood founding partner Benetech.) There are also free TTS tools available online.
- **Text-to-speech apps:** Kids can also download TTS apps on smartphones and digital tablets. These apps often have special features like text highlighting in different colors and OCR. Some examples include Voice Dream Reader, Claro ScanPen and Office Lens.

Here the author elaborates on types of TTS tools and example programs. This section can guide parents to select the appropriate program.

Table 4.1. A Mechanism Description (continued)

Types of Text-to-Speech Tools (continued)

- **Chrome tools:** Chrome is a relatively new platform with several TTS tools. These include Read&Write for Google Chrome and Snap&Read Universal. You can use these tools on a Chromebook or any computer with the Chrome browser. See more Chrome tools to help with reading.
- **Text-to-speech software programs:** There are also several literacy software programs for desktop and laptop computers. In addition to other reading and writing tools, many of these programs have TTS. Examples include Kurzweil 3000, ClaroRead and Read&Write. Microsoft's Immersive Reader tool also has TTS. It can be found in programs like OneNote and Word. See more examples of software for kids with reading issues.

How Your Child Can Access Text-to-Speech at School

It's a good idea to start the conversation with your child's teacher if you think your child would benefit from TTS. If your child has an Individualized Education Program(IEP) or a 504 plan, your child has a right to the assistive technology she needs to learn. But even without an IEP or a 504 plan, a school may be willing to provide TTS if it can help your child.

You can also use TTS at home. Try one of the previously mentioned tools, or check out options for free audiobooks and digital TTS books. And learn more about assistive technology for reading.

Key Takeaways

- Text-to-speech (TTS) can provide a multisensory reading experience that combines seeing with hearing.
- Using TTS won't delay the development of your child's reading skills.
- Your child's school can provide TTS, but you can also try it at home.

Finally, the author concludes this description with a summary of important points. Notice that this summary differs from the one at the beginning. It focuses more on actions parents can take.

Process Descriptions

Begin your description by introducing the process, your purpose, and scope. Describe the overall process and provide necessary definitions. State your purpose and the scope of your description. Does your description provide a basic outline of a process for readers who have an interest? Is your description here to help readers carry out a process with all the details needed? Does your description cover only major steps of a process, or does it also cover less important and miscellaneous details?

Provide an overview of the steps of the process. The overview lays out the steps in chronological order. It can serve as a map of the upcoming content.

Walk your readers through the process step-by-step. For each step, define its purpose, explain its context, and provide appropriate details. Often a step consists of sub-steps. Provide a clear hierarchy of steps to guide readers through the process.

Conclude your description by signaling the completion of the process and summarizing the steps of the process.

Table 4.2 provides an example that describes the DNA replication process. The description first defines the DNA replication process, outlines its three steps, and introduces DNA structure as a prerequisite for understanding DNA replication. It then describes each of the three steps of the replication process chronologically, using visuals at key places. Lastly, it describes what happens when this replication process goes wrong.

Table 4.2. A Process Description (Dovey, "*DNA Replication*")

DNA replication, also known as semi-conservative replication, is the process by which DNA is essentially doubled. It is an important process that takes place within the dividing cell. In this article, we shall look briefly at the structure of DNA, at the precise steps involved in replicating DNA (initiation, elongation and termination), and the clinical consequences that can occur when this goes wrong.	**The author defines DNA replication and introduces the DNA replication process.**
DNA Structure DNA is made up of millions of nucleotides. These are molecules composed of a deoxyribose sugar, with a phosphate and a base (or nucleobase) attached to it. These nucleotides are attached to each other in strands via phosphodiester bonds to form a 'sugar-phosphate backbone'.	**The author describes the DNA structure before explaining the replication process.**

Table 4.2. A Process Description (continued)

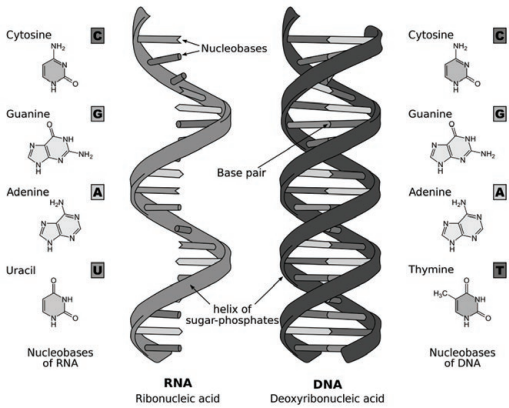
The bond formed is between the third carbon atom on the deoxyribose sugar of one nucleotide (henceforth known as the 3') and the fifth carbon atom of another sugar on the next nucleotide (known as the 5'). *N.B: 3' is pronounced 'three prime' and 5' is pronounced 'five prime'.* There are two strands running in opposite or anti-parallel directions to each other. These are attached to each other throughout the length of the strand through the bases on each nucleotide. There are 4 different bases associated with DNA; Cytosine, Guanine, Adenine, and Thymine. In normal DNA strands, Cytosine binds to Guanine, and Adenine binds to Thymine. The two strands together form a double helix.	
 Fig 1.0. The Structure of RNA and DNA (By Difference_DNA_RNA-DE[CC BY-SA 3.0], via Wikimedia Commons)	**Visuals are used to explain the complex DNA structure.**
Stages of DNA replication DNA replication can be thought of in three stages; Initiation, Elongation, Termination	**The author lays out the linear process that consists of three stages.**
Initiation DNA synthesis is initiated at particular points within the DNA strand known as 'origins', which are specific coding regions. These origins are targeted by initiator proteins, which go on to recruit more proteins that help aid the replication process, forming a replication complex around the DNA origin.	**Using each stage name as a heading, the author provides details about the three stages.**

Table 4.2. A Process Description (continued)

There are multiple origin sites, and when replication of DNA begins, these sites are referred to as replication forks. Within the replication complex is the enzyme DNA Helicase, which unwinds the double helix and exposes each of the two strands, so that they can be used as a template for replication. It does this by hydrolysing the ATP used to form the bonds between the nucleobases, therefore breaking the bond holding the two strands together. DNA Primase is another enzyme that is important in DNA replication. It synthesises a small RNA primer, which acts as a 'kick-starter' for DNA Polymerase. DNA Polymerase is the enzyme that is ultimately responsible for the creation and expansion of the new strands of DNA. **Elongation** Once the DNA Polymerase has attached to the original, unzipped two strands of DNA (i.e. the template strands), it is able to start synthesising the new DNA to match the templates. It is essential to note that DNA polymerase is only able to extend the primer by adding free nucleotides to the 3' end. One of the templates is read in a 3' to 5' direction, which means that the new strand will be formed in a 5' to 3' direction. This newly formed strand is referred to as the Leading Strand. Along this strand, DNA Primase only needs to synthesise an RNA primer once, at the beginning, to initiate DNA Polymerase. This is because DNA Polymerase is able to extend the new DNA strand by reading the template 3′ to 5′, synthesising in a 5′ to 3′ direction as noted previously. However, the other template strand (the lagging strand) is antiparallel, and is therefore read in a 5' to 3' direction. Continuous DNA synthesis, as in the leading strand, would need to be in the 3′ to 5′ direction, which is impossible as we cannot add bases to the 5′ end. Instead, as the helix unwinds, RNA primers are added to the newly exposed bases on the lagging strand and DNA synthesis occurs in fragments, but still in the 5′ to 3′ direction as before. These fragments are known as Okazaki fragments.

Table 4.2. A Process Descripti on (continued)

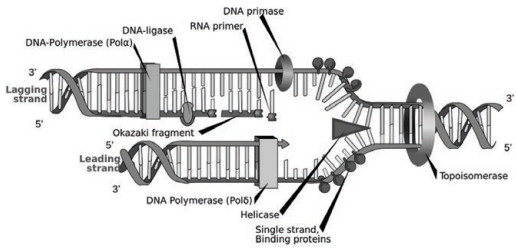
Termination The process of expanding the new DNA strands continues until there is either no more DNA template left to replicate (i.e. at the end of the chromosome), or two replication forks meet and subsequently terminate. The meeting of two replication forks is not regulated and happens randomly along the course of the chromosome. Once DNA synthesis has finished, it is important that the newly synthesised strands are bound and stabilized. With regards to the lagging strand, two enzymes are needed to achieve this; RNAase H removes the RNA primer that is at the beginning of each Okazaki fragment, and DNA Ligase joins fragments together to create one complete strand.	**Using each stage name as a heading, the author provides details about the three stages.**
 Fig 2.0 – Diagrammatic representation of DNA replication (By LadyofHats Mariana Ruiz [Public domain], via Wikimedia Commons)	
Clinical Relevance—Sickle Cell Anaemia Sickle Cell Anaemia is an autosomal recessive condition which is caused by a single base substitution, in which only one base is changed for another. In some cases this can result in a 'silent mutation' in which the overall gene is not affected, however in diseases such as Sickle Cell Anaemia it results in the strand coding for a different protein.) In this case an adenine base is swapped for a thymine base in one of the genes coding for haemoglobin; this results in glutamic acid being replaced by valine. When this is being transcribed into a polypeptide chain the properties it possesses are radically changed as glutamic acid is hydrophilic, whereas valine is hydrophobic.	**Finally, the author discusses what clinical results occur when the DNA replication process goes wrong.**

Table 4.2. A Process Description (continued)

This hydrophobic region results in haemoglobin having an abnormal structure that can cause blockages of capillaries leading to ischaemia and potentially necrosis of tissues and organs – this is known as a vaso-occlusive crisis.

These crises are typically managed with a variety of pain medication, including opioids and NSAIDs depending on the severity. Red blood cell transfusions may be required in emergencies, for example if the blockage occurs in the lungs.

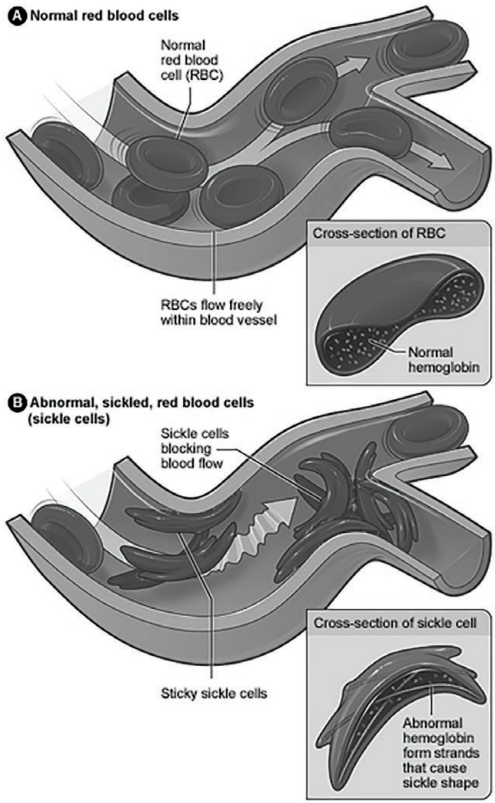


Fig 3.0 – The difference in structure between normal red blood cells, and those affected by sickle cell disease. (By The National Heart, Lung, and Blood Institute (NHLBI) [Public domain], via Wikimedia Commons)

Conclusion

In this chapter, I have introduced technical definitions and descriptions and discussed how to draft them. Technical definitions provide clear and accurate explanations of important terms and concepts. Technical descriptions inform readers of a mechanism or process and enable readers to take appropriate actions. They are not only common elements of technical documents, but also the backbone of effective technical communication.

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Teacher Resources

Overview and Teaching Strategies

Technical definitions and descriptions can be addressed in several ways in an introductory technical communication course. Instructors of such courses can incorporate technical definitions and descriptions in various kinds of projects, including but not limited to user manuals, product documentation, scientific publications, and Web content.

Instructors should follow the structure of this chapter by first providing learners an overview of technical definitions and descriptions, then analyzing the various types of definitions and descriptions, and ultimately practicing how to draft them. Because technical definitions and descriptions vary greatly by document genre, context, and audience goals, excellent examples that are contextualized can effectively illuminate this knowledge. Likewise, when students practice drafting technical definitions and description, such practices are best done in specific contexts of use. Because technical definitions and descriptions often come as part of a technical document — and are shaped by the broader goal of the document — instructors can embed relevant assignments in the creation of whole technical documents such as user manuals and product documentation. These whole documents provide rich contexts and defined audience that are ideal for practicing technical definitions and descriptions.

When asking learners to draft technical definitions and descriptions, instructors can consider the following activities:

- Begin with an analysis of audience and context. Instructors can help learners approach technical definitions and descriptions not as still dictionary entries, but as rhetorical messages that are aimed at audiences and contexts. Guide learners to investigate the intended audience and goals and apply concepts and strategies from this chapter.
- Gather subject-matter information. Instructors can help learners become skilled at gathering information from documents and consulting with subject-matter experts.
- Draft the technical definition or description. Instructors can guide learners to select the appropriate type of definition or description and apply appropriate strategies that respond to the given audience and context. It is also helpful to ask learners to try different strategies and compare how each strategy works with the context.
- Test with audiences. If conditions allow, it could be fruitful for learners to test their drafted technical definitions and descriptions

with target audiences. This process often allows learners to discover issues that they can't otherwise see and improve their ability to meet audience goals.

In summary, instructors can use this chapter to teach learners why technical definitions and descriptions matter, what they are, and how to create them. The key is to contextualize technical definitions and descriptions and link concepts from this chapter with specific contexts and audience goals.

Discussion Questions

To help learners understand technical definitions and descriptions, consider the following questions when analyzing or drafting these definitions and descriptions:

1. What technical definitions and descriptions do you encounter in everyday life? Where and how are they provided? In what contexts do you use them?
2. Who is the intended audience of a technical definition or description?
3. What are the primary goals of your audience in using a given technical document?
4. What do your audiences already know about the concepts to be defined and mechanisms or processes to be described?
5. What widely held views or misunderstandings, if any, exist in your audiences?
6. What resources are available on the subject matter?
7. What strategies are the most appropriate for defining a technical term or describing a technical mechanism or process?

These questions can be used to analyze examples of excellent and poorly written technical definitions and descriptions; they are particularly helpful when learners draft definitions and descriptions from scratch. The key is to help learners think about many factors that technical communicators must attend to when drafting technical definitions and descriptions and link these factors with the concepts and strategies from this chapter.