

A thick blue vertical bar runs down the left side of the page. A blue arrow points to the right, overlapping the bar, with the text 'Spring 2021' inside it.

Spring 2021

# **Technical and Business Writing**

**SS108**

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Technical & Business writing-ss108

**FAST-NU (KARACHI CAMPUS)**



**Course Outlines of BS(CS) Degree Program**

<b>Course Instructor</b>	Ms. Atifa Batool, Ms. Faiza Mumtaz, Ms. Nazia Imam	<b>Semester</b>	Spring
<b>Batch/Section(s)</b>	A, B, C, D, E, F, & G	<b>Year</b>	2021
<b>Course Title</b>	Technical & Business Writing	<b>Credit Hours</b>	03
<b>Prerequisite(s)</b>	English Language, English Composition		

**Reference Book(s)**

1. Title of Book	Technical Communication and its applications		
Author(s)	Jerome N. Borowick		
2. Title of Book	Technical Writing		
Author(s)	John M. Lannon		
3. Title of Book	Writing for Computer Science		
Author(s)	Justin Zobel		

**Course Descriptions:**

The purpose of this course is to enable students to understand the definition and the style of technical communication. The students will learn how to produce effective technical documents, like, reports, user manuals, specification, etc in business and industry. They will learn the universally accepted and international standards of technical communication. Using principles of analyzing and planning to meet the reader's informational needs, students produce proposals, instructions and the various types of informative and persuasive reports used in organizations. In this way, they will develop skills necessary for effective performance in professional life.

**Marks Distribution:**

Particulars	% Marks
1. Assignments	8 %
2. Class participation	4 %
3. Project & viva	5+2 %
4. Mid-Terms	15 %
5. Final Exam	50 %
<b>Total:-</b>	<b>100</b>

Weeks	Contents/Topics
Week-01	<ul style="list-style-type: none"> <li>• Orientation class</li> <li>• Technical Writing: Definitions, History, Purposes, Functions, Defining Characteristics</li> </ul>
Week-02	<ul style="list-style-type: none"> <li>• The Technical Style: Clarity, Precision, Objectivity, Simplicity, &amp; Economy</li> </ul>
Week-03	<ul style="list-style-type: none"> <li>• The Technical Writing Process- Purpose analysis &amp; Audience Analysis</li> <li>• Data Collection &amp; Analysis- Primary &amp; Sources, Qualitative &amp; Quantitative Data</li> </ul>
Week-04	<ul style="list-style-type: none"> <li>• Constructing Effective Paragraphs for the technical prose</li> <li>• Writing Synthesis Essay</li> <li>• <b>Assignment 1: Synthesis Essay (Deadline: week 5)</b></li> </ul>
Week-05	<ul style="list-style-type: none"> <li>• How to write instructions in user guides</li> <li>• <b>Assignment 2: Making a User guide (Deadline: week 8)</b></li> </ul>
Week -06	<b>MID 1</b>
Week-07	<ul style="list-style-type: none"> <li>• CV/Resume Writing</li> <li>• Cover Letters</li> <li>• <b>Assignment 3: Resume writing (Deadline: week 10)</b></li> </ul>
Week-08	<ul style="list-style-type: none"> <li>• Introduction to Scientific Research</li> <li>• The Technical Report: Writing the Introduction and Literature Review Sections</li> </ul>
Week-09	<ul style="list-style-type: none"> <li>• Technical Reports: Method, Results, Conclusion and Recommendation Sections</li> </ul>
Week-10	<ul style="list-style-type: none"> <li>• Preparing Prefatory Parts for Technical Reports: Title Page, Table of Contents, Letter of Transmittal, Abstract, &amp; Executive Summary</li> </ul>
Week-11	<ul style="list-style-type: none"> <li>• Supplementary Parts</li> <li>• Citation &amp; Referencing</li> </ul>
Week-12	<b>MID-II</b>
Week-13	<ul style="list-style-type: none"> <li>• Writing Project Proposals</li> <li>• Software Management Plan</li> <li>• Software Requirements Specifications</li> <li>• Software Design Specifications</li> </ul>
Week-14	<ul style="list-style-type: none"> <li>• Feasibility Studies (Class Participation 1-Activity)</li> <li>• Progress Reports (Class Participation 2- Activity)</li> </ul>
Week-15	<ul style="list-style-type: none"> <li>• Technical Proposals (Class Participation 3- Activity)</li> <li>• Business Letters: Format, Tone, Structure (Class Participation 4- Activity)</li> </ul>
Week-16	<ul style="list-style-type: none"> <li>• Memo Writing, Minutes of the Meeting</li> <li>• <b>Project Presentation</b></li> <li>• Revision</li> </ul>

## The Four Language Skills:

Receptive	Productive
Listening and Reading	Speaking and Writing

How does each of the skill mentioned above help us? Use the table below to answer the question.

The Receptive Skills	The Productive Skills

## Writing:

A Non-Productive Activity	Productive Activity
The writer is not the producer of the messages that he/she is writing. S/he is using the skill to record or store messages coming from an external source.	The writer him/herself is the producer of the messages that s/he is writing.

## The Importance of Writing:

- It helps you record history.
- It helps you transmit and preserve religious and cultural values, ideologies, and views.
- It helps you serve people by providing you a means via which we can share knowledge, experience, observation, insight, etc.
- It helps nations grow.
- It helps us guide, instruct, etc.
- It helps immortalize ideas, insights, etc.
- It helps preserve a particular language through codification.
- It is the most appropriate medium of communication in a great majority of cases.
- It makes things permanent and long lasting. Word of mouth is not considered reliable, but the written word carries immense power.

## Genres of Writing:

Fiction	Non-Fiction
Drama Poetry Novel Novelette Novella Short story	Essays Reports Research thesis Research papers Memos Articles Editorials Reviews Letters

## Types of Writings:

Type of Writing	Example	Trait
<b>Creative writing</b>	Poems, plays, stories	Connotative and expressive words, fictional characters, imagery, and plots
<b>Expressive Writing</b>	Narratives, descriptions	Subjective, based on personal experience, connotative and expressive words
<b>Expository Writing</b>	Comparison/contrast, analysis, cause/effect, argument/persuasion	Objective, connotative and denotative words
<b>Journalism</b>	News stories, features, Editorials	Objective, written from factual observation, short sentences and paragraphs, some connotative but more denotative words
<b>Technical Writing</b>	Memos, letters, reports, instructions, resumés, web pages	Objective, written about products or services, short sentences and paragraphs, denotative words

## Technical Specifications for Manufacturing Tennis Shoes

The D40 Slammer Tennis Shoe will be manufactured to the following specifications:

**Sole:** Neoprene rubber #345 white enameled paint 1.589" high

Slammer waffle-textured©

**Uppers:** Blue canvas

**Tongue:** White canvas Oval Slammer© logo heat pressure sealed, centered .50" from all sides

**Laces:** 15" long ,100% cotton

**Aglets:** Clear poly acetate plastic #290 **Weight:** 1 lb. 6 oz.

## Ode to a Shoe

My son's tennis shoes rest temporarily in a  
heap against the kitchen door,  
their laces soiled, their tongues hanging out  
like exhausted terriers.

The soles, worn down on the insides from  
sliding into second,  
are green, the shades of summer.  
Canvas exteriors, once pristine white, are the  
colors of the rainbow—  
sun bleached, mud splattered, rained on,  
ketchup and mustard adorned,  
each shoe shouting a child's joyous  
exuberance: "I'm alive!"

## What is Technical Writing?

*“It is a long-established and important professional activity that can be defined as a specialized form of communication whose purpose is to convey technical and scientific information and ideas accurately and efficiently.”*

*“It can also be defined as the written communication of engineering and scientific ideas, concepts, and facts presented objectively, logically, and accurately.”*

*“The accurate and factual recording of the knowledge that one gains through one’s senses for the purpose of disseminating it is technical writing.”*

*“It is a method of communication which deals with subjects in*

- 1. Engineering*
- 2. Business*
- 3. Trade*
- 4. Government*
- 5. Technology and Science”*

"The goal of technical writing is to enable readers to use a technology or understand a process or concept. Because the subject matter is more important than the writer's voice, technical writing style uses an objective, not a subjective tone. The writing style is direct and utilitarian, emphasizing exactness and clarity rather than elegance or allusiveness. A technical writer uses figurative language only when a figure of speech would facilitate understanding."

“Anyone who has ever assembled a bookshelf, tried to operate a DVD player, or read an owner’s manual has encountered technical writing. This type of writing aims to provide technical, business, or educational information in a way that helps readers understand a subject. It is stylistically different from creative writing and is often primarily informative.”

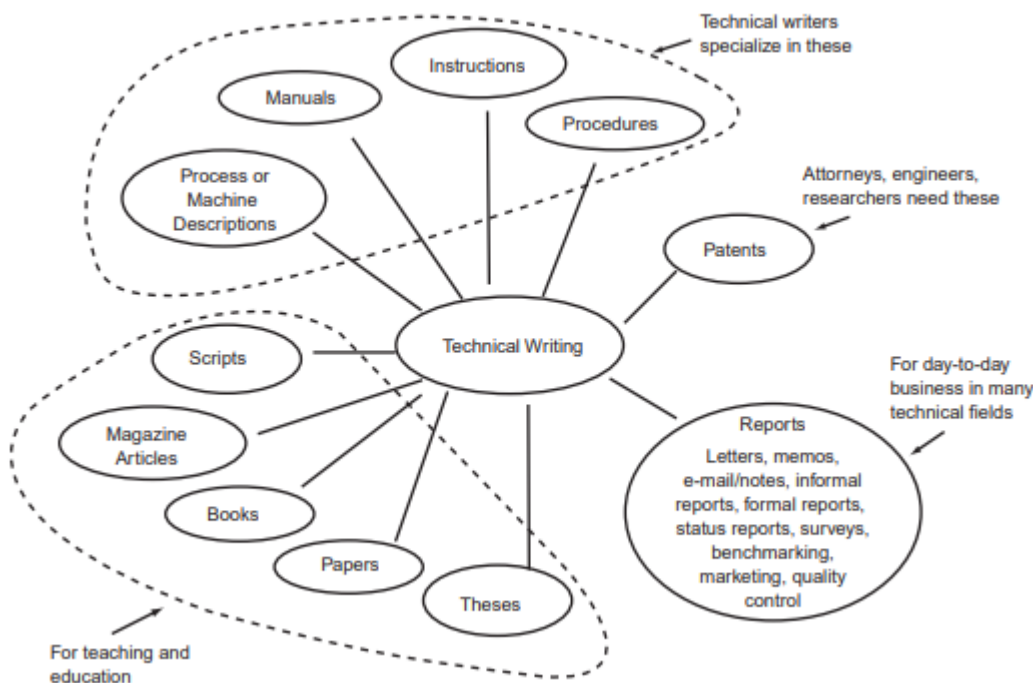
TECHNICAL WRITING is a broad term that encompasses a wide variety of documents in science, engineering, and the skilled trades. The major types of documents in technical writing can be grouped into four major categories:

- Reports and communications in day-to-day business
  - Technical papers, magazine articles, books, and theses for purposes of education, teaching, and the sharing of information and knowledge
  - Patents
  - Operational manuals, instructions, or procedures
- Most technical writing in day-to-day business involves the preparation of various “reports”. Writing reports is common for many technical people because reports are a major part of the development and application of technology. Very few companies pay technical professionals a salary without written words to implement and evaluate what has been worked on or developed. For example, if an engineer spends a year developing a new transmission for a car, several types of reports are needed for the design, evaluation, and implementation of the new component. Engineering must also report to management on the viability of design, costs, and work objectives. This usually requires a written document and related engineering drawings—a report. A second category of technical writing includes documents for teaching and education (Fig. 1.1) in the form of scripts, magazine articles, books, papers, and degree theses. Scripts for videos, movies, magazine articles, or multimedia presentations are most often written and edited by professionals in these fields. Books on technical topics are most often written by academicians, although technical professionals occasionally may write an entire book in their area of experience and knowledge. Writing a book obviously requires much more discipline than the writing of reports, but it still requires the clarity of presentation and purpose as in the reports and papers of day-to-day business. The key difference is that books are intended for a larger audience and should have unique and

compelling features for the readers. Papers and theses are more common forms of educational or informational documents written by technical professionals. Of course, many people in science and engineering write theses. However, they usually only do one per degree, and the formal writing style and related details are almost always rigorously dictated by the school involved. Papers are the other category in the grouping of types of technical writing that could be considered to be teaching or educational. Another category of technical writing is for manuals, instructions, and procedures (Fig. 1.1). This form of specialized writing is not addressed in this book because these kinds of documents often have legal/liability implications and are best left to trained technical writers. For example, if you invent a novel type of bicycle seat, a user who got hurt because he installed the seat pointing aft could sue you if you did not include in the installation and use manual a statement like the following:

*“The prow of the seat (point A in Fig. 6) should be positioned pointing at the handlebars (Fig. 7).”*

Similar liability could be incurred by overlooking a safety or environmental concern in writing a heat treating procedure for a gear. Finally, patents require another key type of document in technical writing. Lawyers usually write patents, but not without lots of writing and searching on the part of the applicant.



## History of Technical Writing:

- Prehistoric cave paintings in France and Spain that illustrate primitive man's techniques for hunting buffalo.
- Technical writing from Babylonians which has survived in the form of clay tablets contains information about their accomplishments in astronomy, mathematics, agriculture, instructions manuals for making beer, etc.
- Ancient Egyptian technical writing on papyrus in the fields of medicine and mathematics.
- More prolific technical writers were the ancient Greeks. Their writings on mathematics, physical sciences, biology, psychology, literature, etc provided the foundations for the current modern Western European and American civilization.

- Instruction books or manuals is an important area in technical writing and it started in the 16<sup>th</sup> century when the first manual on military weapons was written.
- World War II brought a tremendous speed-up in research and technology. As a result of this, the field of technical writing grew up almost overnight. The country needed a quick and efficient way to explain new scientific devices and weapons to the non-scientists and soldiers who were going to use them.
- Today's modern world more than ever needs technical writers to explain how to use the new systems, and consumer products and services, spawned by recent advances in agriculture, biology, chemistry, computer science, engineering, and physics.

### **Genres of Technical Writing:**

1. Instruction manuals
2. Procedure Guidelines
3. Reports
4. Specifications
5. Proposals
6. CV/Resumes
7. Business correspondence (letters and memos)
8. Research papers and articles
9. Other technical documents

### **The Importance of Technical Writing:**

In a world of rushing and pressure to save time, writing documents seems slow and time consuming. Why write a letter or a memo if you can make a quick phone call? Why spend time thinking about how to put into words information that can be transmitted spontaneously without the extra effort of heeding syntax and punctuation? This logical reasoning fails, though, when we come to consider the type of documents technical writers need to develop as well as the audience they are addressed to. On many occasions, communication is not just from one emitter to one receiver but rather from one to many, as is the case of memos addressed to company staff, or a report meant to be read by more than one person, for example. In addition, most documents generated in the technical field include information that cannot be easily transmitted unless it is orderly displayed on a document. In other words, oral communication may fall short when we need to transmit the information technical documents require. Hence, writing skills can be considered an important factor in the technical and scientific field because:

1. *In many different types of work, writing constitutes an important part of the everyday workload.* In a company, people write to inform about a project or activity (progress reports), to help managers in decision-making (recommendation reports), to communicate within the organization (memos), to ask questions (inquiry letters) and to contact colleagues, distributors, and mates in the same workplace (email messages). These various tasks reveal that writing is a key activity for many technical professionals.
2. *They facilitate communication with co-workers, clients and supervisors, that is, inside and outside the workplace.* Engineers and scientists' writing skills must be of a high standard in order to effectively communicate with the people with whom they work. It is not enough for them to be technically good, they must be skilful in communicating what they are doing and why it is important. As a last resort, their technical and professional value will very much depend on their capacity to convince others of the importance of their work.



3. *They are necessary for a successful career.* Organizations know the advantages of a well written document since the way they construct their documents reflects their image. Poorly written documents will reveal not only writers' inefficiency but also organizations' lack of seriousness. Thus, engineers who can communicate their thoughts clearly and efficiently are bound to be promoted to more challenging positions. Additionally, being good at written communication skills (in whatever language) is likely to act as an added value that enhances your curriculum vitae and helps you stand out from other applicants in a job selection process.

4. *Writing skills contribute to saving time and money.* Good technical writing saves time and, therefore, money. If you create a document, a report, for example, for your superior, which is clear and easy to understand, no time will be wasted on pondering the meaning.

Technologists, engineers, scientists, etc perform functions like: design, analyze, research, manufacture or construct, test, and manage. The result of their work is discussed in reports and other documents. In most of the cases, these reports and documents are one's only form of communication with clients, government agencies, managers, and professionals at other facilities and companies.

The importance of technical writing can be seen in a variety of applications, both in consumer products as well as the industrial environment. Without clear, precise writing that outlines the specifications and directions for use, products can become meaningless at best and dangerous at worst. Technical writing provides a context to products and processes, and allows them to be used safely and as intended. While it may not be impossible to construct and use equipment and processes without reading the technical documents, technical writing provides some assurances that the product is being used as intended.

In the industrial field, the importance of technical writing can be seen in a number of different applications, which includes in the pitching of new products or ideas. Not only is it important to be able to write technical documents clearly for investors and management, if introducing a new product or piece of equipment, it is a requirement if the company or individual is to apply for a patent. Technical writing must clearly demonstrate the purpose of the machine or product, as well as specifications such as its dimensions, individual parts, and power source, if applicable.

In addition to the unveiling of new products, the importance of technical writing is also seen in the use of more traditional products and processes. While trainers may help employees learn various pieces of equipment in an industrial setting, technical manuals can help when unusual situations occur, or serve as a comprehensive reference in other situations. This information is readily available, even if someone with more expertise or experience is not. Technical writing documents can reduce downtime or help to prevent it altogether.

For end users, or home consumers, the importance of technical writing can be seen in the documents that come with various products. For example, putting together a bicycle, pieces of furniture, or installing appliances may take some level of expertise without proper directions; this might even result in irreparably damaging the product. Technical writing helps by explaining the process in detail in simple steps, and provides an easy-to-understand list of tools and alternatives. The documents also provide safety information related to the product.

Technical writing can help individuals save time and money, while at the same time stimulating the economy. Without good technical writing, individuals and businesses could be discouraged from investing in new products and processes. Patents may not be granted because of undocumented similarities to other known products. Thus, the importance of technical writing is not only seen in the money it helps to generate, but also by the convenience and safety it creates for readers.

### **Common Purposes of Technical Writing:**

- To give information (It is the primary purpose of TW)
- To analyze and interpret events and their implications
- To persuade and influence decisions

### **Functions of Technical Writing:**

1. To serve as basis for management decisions
2. To furnish needed information
3. To give instructions
4. To explain techniques
5. To report achievements
6. To analyze problem areas
7. To determine design and system requirement
8. To serve as basis for public relation
9. To provide report to stockholders of companies
10. To develop a product
11. To provide service
12. To record business proposals
13. To procure business through proposals

## **WRITING IN COMPUTER SCIENCE**

Any graduate's career starts from CV/resume and cover letter writing. For a successful career, computer science graduates require well-developed technical skills, good communication skills, and sound background knowledge of their field. Technical writing is perhaps the most important skill and ability. Graduates will have to engage in writing different types of technical documents. There are many documentation types found in the Computer Science industry. It is important to understand that many of the documentation types will follow a certain format or standard. Always check with the company or client to verify the required format. The main types of documents used in the career of a computer scientist are:

### **1. Project Proposals**

Project proposals are used to introduce projects to clients or management. They identify a specific problem and state how that problem will be solved.

The purpose of the proposal is to convince your audience that you have a viable solution to a specific problem. Proposals should briefly describe the nature of the client's business and what the client's needs are. Then describe how the software will meet those needs. The level of detail needed will be dictated by the size of the project, but proposals should be rough estimates of possible projects. Proposals for small projects may be very brief, a page or two,

while proposals for large expensive projects will need to be much more detailed and thorough. A refined description of the project will come in future documents.

## **2. Project Overview Specification (POS)**

A POS is the first step in refining the project described in the proposal. The purpose here is to provide an overview of the project to the client. The intent is to create a mutual understanding between the development team and the client of what is expected over the course of the project.

The main sections of the POS include an executive summary of the document, followed by a description of the client and the client's needs. This serves to let the client know that the development team understands the client's business and provides a clear statement of what the problem is. The POS also defines the goals and vision of the project. In general terms it should describe how the project will fulfill the client's needs. The POS will introduce how the project will be managed and include an estimated schedule and budget. Finally, the POS concludes with a listing of assumptions and constraints that may limit development. Constraints can include time, cost, or technical limitations. It is important to define constraints in order to establish the project's scope and final expectations. Without limiting factors the project may never finish.

## **3. Software Project Management Plan (SPMP)**

The SPMP is used to describe the development team's management process for the project. It describes the project's organization and control processes. This does not describe the software itself, only the processes for which it will be managed. Things to include will be potential risks and how to deal with them, project schedules, budget, and software tools that will be used during development.

The SPMP focuses on the organization of the project. The process model should be clearly specified in order to show the flow of the project phases (see figure right). Phases are then broken down into the necessary tasks needed to complete each phase. Weekly schedules for each phase are set in order to ensure project progression. The SPMP is used as a guide to control and manage the project.

## **4. Software Requirements Specification (SRS)**

This is where we completely define the functionality of the software. The SRS is a refined description of the software's intended uses as well as its non-functional requirements. Intended uses are specified with use-cases. Each use-case describes a scenario for which a user will interact with the software. A use-case may specify the steps needed in order for an administrator to manage users on a social networking site, for example (see diagram right). The use-case steps must be described completely and precisely. All possible scenarios should be defined. These requirements will be used to determine the design of the software.

Non-functional requirements involve things like security, performance, and reliability. The SRS serves as a kind of contract between the developers and the client detailing the intended behavior of the finished product.

Included are definitions of the data elements, data structures, or data tables that will be used in the design. This is known as the data dictionary and should clearly define the type, purpose, and description of each element.

## **5. Software Design Specification (SDS) or Software Design Description (SDD)**

The purpose of the SDS is to give the development team a guideline as to how the project is to be implemented. It describes the system's architecture; how the different modules of the software will interact with each other. Diagrams or figures are often used to provide visual descriptions of how components relate to one another. The SDS also reveals to other developers what design decisions were made. This makes it easier to modify or maintain the software in the future.

In addition to the system architecture, the SDS specifies the interface design. This is the portion of the system that the user will be interacting with. It includes prototypes of how a graphical interface may look. Multiple prototypes can be produced until a final interface layout is adopted.

Also included are detailed definitions for each component of the software. Each component will relate to each of the use-cases previously described in the SRS. The components will contain the actual code needed to implement those use-cases.

## **6. System Test Specification (STS) and System Test Report (STR)**

The purpose of the STS is to describe the plan for testing the software, and to specify the test cases and test procedures necessary to demonstrate that the software satisfies the requirements as specified in the project's System Requirements Specification document.

This provides an organized plan for the developers to follow in order to test the program thoroughly. It also allows other developers to be able to confirm what test cases have or have not been performed. The actual results of the test cases can be used to generate a System Test Report. The results are then evaluated to determine if the software has adequately satisfied the requirements.

## **7. User Manuals**

User manuals are guides that instruct users on how to use the software. They should include step-by-step instructions that are easy to follow.

## **8. Code Comments**

Code comments allow other developers the ability to understand the intended behavior and purpose of your code. Other developers need to be able to understand your code in order to modify and maintain it. Without sufficient comments this task can become incredibly difficult and time consuming.

## **9. Memoranda**

Memoranda or memos are used in order to fulfill a variety of objectives. The style and purpose of the memo will depend on objective. Objectives can range from an instructor wants your reaction to a journal article to a manager needs to inform the development team about a policy change. Memos should be limited to a few pages and should have a clear purpose. Usually the format of a memo is standardized within a company with its own heading style and letterhead.

## **10. Technical Report**

## **11. Simple technical information report**

## **12. Technical Evaluation Reports**

## **13. Technical Recommendation Reports**

Good writing is critical at all levels of software development. At the conceptual level, one has to be able to express ideas to the customers. You need to be able to justify your approach and design. Also, computer users have to be able to make use of your program, so you need to be clear in your instructions for use and maintenance. Finally, your documentation both inside and outside your program should be easy to understand.

First, Clarity and organization are vital when you write for a technical field. When you are writing a technical report on a system you have developed, you have to be able to explain how your system is different (or better or otherwise important) when compared to other systems available. You must also explain the significance of what you have accomplished, the details of your accomplishments, and your future work. (In a field as dynamic as Computer Science, there are always avenues for improvement.)

Second: In software development, the ability to summarize your work so that your customer or audience can follow your logic is important. Also, programs themselves are logically sequenced to accomplish certain things. If you organize your program poorly, you won't get the desired results!

Third: Mechanics are important as well, particularly when writing a program. For example, while another person may have no trouble understanding you if you have subject-verb disagreement, a compiler (which turns a program into executable code) is not so forgiving. Proper syntax is essential to the creation of a working system.

*All* careers in Computer Science require writing. The different types of writing your position might demand is detailed above (program code, documentation, communication with customers, etc.). You must be able to communicate effectively through writing to succeed in this field.

## **QUIZ**

**State whether the following statements are true or false.**

1. Technical writing is limited to science and technology only.
2. Technical writing skills have to be learnt in order to develop.
3. Technical communication is a unique distinctive type of communication with its own conventions and trends.
4. Communication with clients can be termed as technical communication.
5. Technical writing is a type of communication that never happened before the industrial revolution.

**Provide brief answers.**

1. What are the major fields/genres of technical writing?
2. Why are good technical writing skills crucial for software engineers?
3. What is the primary purpose of technical writing?
4. Define technical writing in your own words.

## Difference between Technical and Literary Writing:

Point of Difference	Technical Writing	Literary Writing
<b>Rule-governed</b>	It has its own set of rules and practices. It presents a formal order or structure for conveying ideas.	It is experimental.
<b>Organization</b>	It is highly well-organized and logically structured. It follows the patterns and conventions for different text types strictly.	It can be loosely organized.
<b>Clarity</b>	It possesses high degree of clarity. All messages are delivered directly and explicitly. Writers' purpose and theme is clearly indicated in the very first paragraph.	It can be implicit and covert. It may challenge the reader's intellect to discover the writer's objectives and key ideas.
<b>Grammatical Accuracy</b>	It adheres to traditional conventions of punctuation, grammar, and spelling completely.	It tries to do the same.
<b>Tone and Style</b>	It has a formal tone. The writer appears objective, tolerant, and serious. Sentences may be complex.	It can have variety of tones and styles, like, formal, informal, humorous, sarcastic, pensive, meditative, poetic, emotional, nostalgic, friendly, casual, conversational, sophisticated, complicated, etc.
<b>Stylistic Devices</b>	It is more straight forward and down to earth.	It uses plenty of stylistic devices, like, metaphors, similes, irony, puns, oxymoron, etc.
<b>Vocabulary</b>	It uses standard language in order to develop the formal tone and attitude which is the hallmark of technical writing. It may use technical words.	It can use vocabulary belonging to different language varieties depending on the audience and tone.
<b>Content</b>	It is usually based on factual, straightforward, specialized topics.	It can choose from a wide variety of topics, ranging from very important to less significant things in life.
<b>Authenticity</b>	It always informs readers about the sources from where it collects information.	Sources might be clear, or unclear, or sometimes not mentioned at all.
<b>Use of Visual Aids</b>	It uses tables, graphs, figures to facilitate comprehension of facts, statistics, and data	Pictures might be used, but rarely.
<b>Summary</b>	Informative, unemotional, limited interpretation possible.	Entertains, amuses, appeals to imagination and emotions. Suggestive, creative, dramatic, imaginative, metaphoric. Various interpretations possible.

**Compare and contrast the texts given below. How are they different from each other despite describing the same object?**

**TEXT A**

One enters the palatial room through an elegantly carved maple door to reveal the French provincial furniture of another century. The plush beige carpet makes one want to run and dance barefoot.

**TEXT B**

The entrance to the 24-ft room is a 36-in. by 80-in. maple door decorated with a carved family crest. The floor has a beige nylon carpet with a 1-in. pad. The furniture is French provincial.

**Put the following characteristics under the correct heading in the boxes below.**

- a. The organization is more sequential and systematic.
- b. The purpose is usually to entertain, provoke, captivate, or express.
- c. The tone is subjective.
- d. The content is factual.
- e. A variety of styles can be employed.
- f. Specialized vocabulary and a formal standard language is used.
- g. Arbitrary and artistic

Technical Writing	Literary Writing

**Read the text below and comment on its style.**

1. The aqueous self-assembly of oligopeptide-flanked #-conjugated molecules into discrete one-dimensional nanostructures is described. Unique to these molecules is the fact that the #-conjugated unit has been directly embedded within the peptide backbone by way of a synthetic amino acid with #-functionality that is compatible with standard Fmoc-based peptide synthesis. The peptide-based molecular design enforces intimate ### communication within the aggregate after charge-screening and self-assembly, making these nanostructures attractive for optical or electronic applications in biological environments. The synthesis and assembly are reported along with spectroscopic and morphological characterization of the new nano materials.
2. The sky was clear and dark, and a slight breeze stirred the air. A silvery cloud drifted over the mountains that surrounded him, its edges glowing with ruddy light cast from the harvest moon cradled between two peaks. Streams flowed down the mountains from stolid glaciers and



glistening snowpacks. A brooding mist crept along the valley's floor, almost thick enough to obscure his feet.

3. In the last few years much has been written about the ways in which these tools are changing practices; practices that involve shifting from the web as a content repository and information retrieval mechanism to a web that enables more social mediation and user generation of content. New practices are emerging:
  - sharing of images,videos and documents (as is evident with sites such as Flickr, YouTube and Slideshare)
  - mechanisms for content production,communication and collaboration (through blogs, wikis and micro-blogging services such as Twitter and social sites like Facebook, Elgg and Ning)
  - opportunities to interact in new ways through immersive virtual worlds (such as Second Life)

**Can you identify which genres the following extracts are taken from?**

**Tip:**

Study the elements of the text to identify the genres. Elements are **tone, attitude, the author's personality, style, treatment of subject matter, and overall impression.**

**EXTRACT 1**

In Egypt, the words "street food" and "gourmet" don't often go hand in hand. Street food is not about style; it's meant to be quick, cheap and filling. However Chris Khalifa, a 30-year-old owner of Zooba cafe in Cairo, has tried to change that. He saw a trend elsewhere in the world: chefs hit the streets and serve dishes out of food trucks.

"I noticed no one had ever tried to do this with Egyptian street food," said Khalifa. "I try to create a brand around a more gourmet Egyptian street food."

But instead bringing gourmet food to the street, Zooba turns street food into fine dining. Located in Cairo's up-market Zamalek neighborhood, the cafe serves classic street fare like koshari and falafel with a new twist. The dishes, like spinach-infused "baladi" bread or sweet potatoes roasted with a blowtorch, are prepared by professionally trained chefs, using top-quality ingredients.

**EXTRACT 2**

**Probably the most difficult problem for people living alone is dealing with feelings of loneliness.** First, they have to understand the feeling. Some people confuse being alone with feeling lonely. They need to remember that unhappily married people can feel very lonely with spouses, and anyone can suffer from loneliness in a room crowded with friends. Second, people living alone have to fight any tendencies to get depressed. Depression can lead to much unhappiness, including compulsive behavior like overeating or spending too much money. Depression can also drive people to fill the feeling of emptiness by getting into relationships or jobs that they do not truly want. Third, people living alone need to get involved in useful and pleasurable activities, such as volunteering their services to help others.



### EXTRACT 3

The sources said nobody, including the owner, could carry out any construction at the site protected under the act that prescribed long prison terms and heavy fines for violators. The repair, restoration and rehabilitation work at the protected site could be carried out only after the advisory committee on cultural affairs, headed by the chief secretary, gave its permission or issued a no-objection certificate, they added.

An advisory committee member said permission/ NOC was required to carry out work at the Clifton heritage site. “No NOC has been issued for this project,” he added.

### EXTRACT 4

Five score years ago, a great American, in whose symbolic shadow we stand today, signed the Emancipation Proclamation. This momentous decree came as a great beacon light of hope to millions of Negro slaves who had been seared in the flames of withering injustice. It came as a joyous daybreak to end the long night of their captivity.

But one hundred years later, the Negro still is not free. One hundred years later, the life of the Negro is still sadly crippled by the manacles of segregation and the chains of discrimination. One hundred years later, the Negro lives on a lonely island of poverty in the midst of a vast ocean of material prosperity. One hundred years later, the Negro is still languished in the corners of American society and finds himself an exile in his own land. And so we've come here today to dramatize a shameful condition.

### EXTRACT 5

We believe in a phased approach, allowing us to first evaluate and document the exact software development requirements of the project in the abstract, and then future phases of implementing and testing the solution.

Our first software development phase will focus on gaining a thorough understanding of the full scope of the project, based on consistent two-way communication (written and verbal). During this first phase, we will need a great deal of input from the Software Development Client. The deliverables for this phase of the software project are thorough functional and technical specifications and a project plan that details the breakdown of deliverables in distinct sub phases, timelines, milestones and their exact costs. These deliverables help ensure project success and help facilitate clear communication by all stakeholders before implementation begins.

Upon approval of this roadmap, we would proceed to implement each sub phase using standard programming and project techniques.

Depending on the availability of your internal team members, we feel that we can complete our initial phase within two to three weeks and the full project within four months. There are many decisions to be made during a software development project that can affect the timeline and hours that are required for the project. We will advise you of the costs, benefits, and drawbacks for each option and allow you to make the ultimate decision.

## EXTRACT 6

1801. - I have just returned from a visit to my landlord - the solitary neighbour that I shall be troubled with. This is certainly a beautiful country! In all England, I do not believe that I could have fixed on a situation so completely removed from the stir of society. A perfect misanthropist's heaven: and Mr. Heathcliff and I are such a suitable pair to divide the desolation between us. A capital fellow! He little imagined how my heart warmed towards him when I beheld his black eyes withdraw so suspiciously under their brows, as I rode up, and when his fingers sheltered themselves, with a jealous resolution, still further in his waistcoat, as I announced my name.

'Mr. Heathcliff?' I said.

A nod was the answer.

'Mr. Lockwood, your new tenant, sir. I do myself the honour of calling as soon as possible after my arrival, to express the hope that I have not inconvenienced you by my perseverance in soliciting the occupation of Thrushcross Grange: I heard yesterday you had had some thoughts - '

'Thrushcross Grange is my own, sir,' he interrupted, wincing. 'I should not allow any one to inconvenience me, if I could hinder it - walk in!'

The 'walk in' was uttered with closed teeth, and expressed the sentiment, 'Go to the Deuce:' even the gate over which he leant manifested no sympathising movement to the words; and I think that circumstance determined me to accept the invitation: I felt interested in a man who seemed more exaggeratedly reserved than myself.

## EXTRACT 7

The battery compartment holds the batteries, the power source for the flashlight. The compartment is cylindrical, 3-1/2 inches long and 1-1/4 inches in diameter, with a coiled metal spring on the interior of the closed end, and a 1/4-inch wide strip of gold-colored metal running along one interior side of the compartment. The compartment holds two 1.5-volt C batteries, in a stacked position, with the negative end of the lowermost battery in contact with the spring, and the positive end of the lowermost battery supporting the negative end of the uppermost battery. The open end of the battery compartment closes with the insertion of the bulb assembly.

## EXTRACT 8

In a boiling water reactor, steam is allowed to form directly in the core. The main components of a boiling water reactor are the core control rods, the core shroud and reactor vessel, the recirculation system, the steam separators, and the steam dryers. The core of a boiling water reactor is slightly larger than that of a pressurized water reactor but contains the same elements. The coolant is circulated through the system by the recirculation system that consists of two loops containing pumps external to the reactor vessel and jet pumps inside the vessel. After steam is formed in the reactor vessel, it flows to a series of steam separators where it is separated from the coolant. The steam then flows through steam dryers where additional drying is done, and then it proceeds to turn a turbo generator. The control rods and reactor vessel function in the same way as in the pressurized water reactor.

**How did you identify which genre the extracts belong to? What elements of the text helped you make your choice?**

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**Describe the technical style**

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**Which adjectives do you think can best describe technical writing and technical writers?**

Imaginative/objective/dreamy/sensational/precise/straight/forward/subjective/researcher/meticulous

creative/conformity/direct/experimental/innovative/exact/vague/scrupulous/dramatic/sober/emotional

**What genres of writing do you think the following documents belong to? Choose from the options below.**

- **Journalistic**
- **Academic**
- **Literary**
- **Technical**

Essay/poetry/articles/press release/user manuals/novels/research papers/brochures/news reports/pamphlets/memos/drama/reviews/feasibility studies/literature reviews/instructions

## **The Style of Technical Writing**

The technical style has its own peculiarities and features. Let's consider the definition of the word "technical". It can be defined as "something having to do with practical, industrial, or mechanical arts or applied sciences." Now, let's consider the definition of the word "style". It can be defined as,

1. "Proper words in the proper places." Jonathan Swift
2. "Dress of thoughts." Seneca and Lord Chesterfield
3. The way a writer puts words together into sentences, arranges sentences into paragraphs and groups paragraphs to make a piece of writing express thoughts clearly.

In general, technical writing has a degree of formality, and it generally focuses on a specific subject with the purpose of making something happen or sharing useful information or knowledge. Ten general attributes of technical writing are listed and described in the following sections:

- It pertains to a technical subject.
- It has a purpose.
- It has an objective.
- It conveys information/facts/data.
- It is impersonal.
- It is concise.
- It is directed.
- It is performed with a particular style and in a particular format.
- It is archival.
- It cites contributions of others

**Technical style is the way you write when you deal with a scientific or technical subject. This style can be achieved with the understanding of the following major ideas:**

### **1. Language**

Technical reports use formal English, direct language, and simple terms. Employ correct scientific terms and conventions for engineers. Replace words that are a problem for the foreign reader, such as the verb "do" and words with multiple meanings (feel, do, as, like).

#### **1.1 Formal English**

Colloquialisms (local or regional expressions) are characteristic of ordinary spoken or written communication that imitates informal speech, which may not carry the expected meaning. Examples include "gonna" for "going to" and "passed on" for "died."

Jargon, or slang, is terminology that is used by a particular group of people in a specialized field; it may not be understandable by any other group or individual. If jargon is used, define or explain the meaning. For example, a "hydrostat transmission" is jargon for a "variable pump hydraulic transmission with infinite speed variability." Examples of slang include "hang on" for "wait" and "run" for "computer simulation."

Clichés, when first created, were vivid descriptions of something that was current in the minds of the people. As time passed, the descriptions lost their original meaning,

and no longer represent descriptive text (e.g., avoid like the plague; a can of worms; in the long run; and by the same token). Technical writing must also be void of recent and current clichés. Sexist language is inappropriately gender specific.

To prevent bias, eliminate gender specific words to describe a category of people who could be either male or female. Do not use adaptations, such as he/she, because they hinder the text flow. As alternatives, use plurals, change words, or simply say he and she, his or her, him and her.

<b>Cliché</b>	<b>Possible Replacement</b>
<b>Bite the bullet</b>	Sacrifice
<b>Don't mince words</b>	Be precise
<b>Drop in the bucket</b>	Tiny
<b>Feather in your cap</b>	Accolade
<b>Happier than a calm at high tide</b>	Satisfied
<b>In this day and age</b>	Today
<b>Ins and outs</b>	Details
<b>Nitty gritty</b>	Details
<b>No mean feat</b>	Difficult
<b>Only time will tell</b>	Eventually
<b>The world is your oyster</b>	An opportunity arises
<b>Whets the appetite</b>	Invites

### **1.2 Simplicity**

The technical style demands formal yet simple language. Use technical words only when you really need to. Avoid unnecessary jargon and gobbledygook. Gobbledygook refers to unintelligible, pompous, and stiff language.

<b>Jargonized and pompous language</b>	<b>Simple and formal</b>
We will use the input of each department to finalize our game plan.	We will consider the suggestions of each department to complete our programming.
At this juncture, the aforementioned procedure should be utilized.	The plan which we discussed should be used now.
We should commence operational capabilities in systematic increments.	We should begin the project step by step.
It just isn't politically correct to suggest a purchase from a company that is played.	It just isn't smart to suggest a purchase from a company whose sales are failing.

### **1.3 Objectivity**

The technical style is characterized by objectivity and impersonality. Personal, subjective, emotionally stimulating and judgmental style and tone is not used to eliminate the possibility of multiple interpretations. Objectivity establishes credibility in your writing. Objective writing is writing that presents the facts and does not pass judgments

or give opinions. Usually to achieve an objective and impersonal style, the passive voice and the third person point of view is adopted in scientific writing. However, there are places where the passive and the third person point of view will be unnecessary.

### **Exercise:**

**Which of the following sentences is objective and which one is subjective?**

1. The results of the tests were incredibly wonderful.
2. Ninety percent of the tested samples met the accepted criteria.

### **Rewrite the following text using an impersonal style of writing.**

I want to argue that all children in Australia have the right to be educated in their mother tongue. I expect that many children in the past spent months or years in school but did not understand the lessons. I am convinced that many migrant children are failing in our education system because we do not have bilingual education programmes. If we look at the U.N. report on language and education, we can discover that children who become literate in their own language have the greatest chance of educational success. People have been discussing the latest figures on university entrance recently and you can tell that migrant children do less well than “Anglo” children at present. I suspect that this is because they have difficulty with English and I would claim that the government has done too little to help these children. Surely the best way to achieve this in Australia is for the State governments to set up bilingual education programmes for all migrant children. I would suggest that this is the number one important issue for multicultural Australia.

## **1.4 Direct Language**

In technical writing, every word must have a place in the sentence and a meaning. Use direct statements and an active voice, avoiding past tense as much as possible, except in the executive summary, where past tense is always used. Use future tense to project into the future.

### **1.4.1 CONCISENESS**

Conciseness is saying what you want to say in fewest possible words without sacrificing important information. A concise message is complete without being wordy. Read the following paragraph, taken from an actual business correspondence:

*“In order to facilitate an efficient meeting and fuel thought processes prior to June 25, I want to provide you with a brief overview of discussions recently carried out at the director and manager level within the process. These discussions involved personnel from Accounts Payable, Information Services, Procurement/ Materials Management, Financial Systems, and Property Accounting, centering on a proposed framework for managing process improvement moving forward.”*

- Do you understand this letter?
- Do you remember what you read?
- Did you even finish reading it?

Successful technical writing should help the reader understand the text, not present challenges to understanding. The above paragraph is not successful writing. It fails to communicate clearly because it is too long-winded. In this case, conciseness actually would aid clarity.

Good technical writing is concise. It is a tool for the readers to use to accomplish whatever job they are doing. In contrast to traditional essays, effective technical writing uses short words and short sentences. Conciseness can be achieved at two levels:

- Limit paragraph length
- Limit word and sentence length

Conciseness can be achieved by following the given guidelines:

#### **Conciseness achieved through short words**

Use one and two syllable words. Of course, some multisyllabic words can not be changed. We can not replace engineer, telecommunications, or Internet. Other words, however, can be avoided. Look at these, for example.

Long Words	Short Words
cognizant	know
Endeavor	Try
Domicile	Home
morbidity	Death
terminate	End

#### **Conciseness achieved through short sentences**

You can shorten a sentence by avoiding:

- Redundancy
- prepositional phrases
- passive voice
- shun words
- camouflaged words
- expletive pattern

Here is an unsuccessful example of technical writing:

“In order to successfully accomplish their job functions, the team has been needing more work space for some time now.”

An improved sentence would read, “The team needs more work space to do its jobs.”

The first sentence contains 20 words and 28 syllables; the second sentence contains ten words and ten syllables

#### **Avoiding redundancy**

Why say, “The used car will cost the sum of \$1,000.00”? It is more concise to say, “The used car will cost \$1,000.00.” In this instance, “the sum of” is redundant. The following examples replace redundancy with concise revisions:

Wordy Sentence	Less Wordy Sentence
We collaborated <b>together</b> on the projects.	We collaborated on the project.
This is a <b>brand new</b> innovation.	This is an innovation.
The <b>other</b> alternative is to eat soup.	The alternative is to eat soup.

#### **Avoiding prepositional phrases**

Prepositional phrases create wordy sentences. Consider the following examples (note that the prepositional phrase is in bold type):

<b>Wordy Sentence</b>	<b>Concise Sentence</b>
I will see you in the near future.	I will see you soon.
I am in receipt of your e-mail message requesting an increase in pay.	I received your e-mail message requesting a pay raise.
He drove at a rapid rate.	He drove rapidly.

### **Avoiding passive voice**

Passive voice constructions are weak for at least two reasons. They are wordy, and they replace strong verbs with weak verbs. Example:

***“The window was broken by the boys.”***

***versus***

***“The boys broke the window.”***

The first sentence contains seven words and the weak verb was. In contrast, the second sentence contains five words and the strong verb broke. The emphasis is placed on the individuals (boys) rather than on an inanimate object (window). Other examples follow:

<b>Passive Voice</b>	<b>Active Voice</b>
It is my decision to run for office.	I decided to run for office.
There are sixteen people who tried out for the basketball team.	Sixteen people tried out for the basketball team.
The computer was purchased by Tom.	Tom purchased the computer

### **Shun words**

One way to write more concisely is to avoid shun words- words ending in –tion or –sion.

<b>Shun words</b>	<b>Concise versions</b>
Came to the conclusion	Concluded (or decided)
With the exception of	Except for
Make revisions	Revise
Consider implementation	Implement

### **Camouflaged words**

Camouflaged words are similar to shun words. In both instances, a key word is buried in the middle of surrounding words (usually helper verbs, or unneeded prepositions).

<b>Camouflaged words</b>	<b>Concise versions</b>
Make an amendment to	Amend
Make an adjustment of	Adjust
Have a meeting	Meet
Thanking you in advance	Thank you
For the purpose of discussing	discuss

### **Expletive pattern**

Another way to write concisely is to avoid the following expletives:

- There is, are, was, were, will be
- It is, was



Example: There are three people who will work for Acme.

Revised: Three people will work for Acme.

### **Exercise:**

**Change the following long words to shorter words:**

Long Word	Short Word
Utilize	
Anticipate	
Cooperate	
Indicate	
Initially	
Presently	
Prohibit	
Inconvenience	

**Change the following long phrases to one word.**

Long Phrase	One Word
In the event that	
At this point in time	
With regard to	
In the first place	
Is of the opinion that	
Due to the fact that	
Make revisions	
Take into consideration	
With the exception of	
Make an adjustment of	

**Revise the following long sentences, making them shorter.**

1. I will be calling you on May 31 to see if you have any questions at that time.
2. If I can be of any assistance to you in the evaluation of this proposal, please feel free to give me a call.
3. The company is in the process of trying to cut the cost of expenditures relating to the waste of unused office supplies.
4. I am of the opinion that Acme employees have too much work to do.
5. In the month of July, my family will make a visit to the state of Arkansas.
6. It is the company's plan to take action to avoid problems with hazardous waste.
7. On two different occasions, the manager of personnel met with at least several different employees to ascertain whether or not they were in agreement with the company's policies regarding overtime.

Avoid saying the same thing twice and repeating the same word in a sentence. When a sentence contains the same word twice, try rewriting the sentence. Reword negative language to the positive.

#### **1.5 Negatives**

In technical writing, it is preferred to use the positive form of declarations, directions, and instructions rather than the negative. For example, instead of

writing “do not include” it is better to write “exclude.” Similarly, instead of writing “do not permit” use “forbid” and rather than “do not allow” write “disallow.” The positive statements are more direct and promote the use of more precise language. Similarly, in writing requirements specifications, you should use the positive form, rather than the negative form in structuring the requirements. That is, the requirement should be written using “shall” statements rather than “shall not” statements.

While it is desirable to avoid “shall not” requirements altogether, there are sometimes exceptions. Consider the following example:

**The system shall permit access only to authorized users.**

The requirement can be rewritten equivalently as:

**The system shall not permit access to unauthorized users.**

In this case, the first form is easier to understand because it does not involve a double negative.

### **1.5 Concreteness**

Communicating concretely means being specific, definite, and vivid rather than vague and general. Often it means using denotative (direct, explicit, often dictionary based) rather than connotative words (ideas or notions suggested by or associated with a word or phrase).

#### **a. Use specific facts and figures**

It is desirable to be precise and concrete in both written and oral communication.

<b>Vague, general, indefinite</b> Student GMAT score are higher.	<b>Concrete, Precise</b> In 1996, the GMAT score averaged 600; by 1997 they had risen to 610.
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#### **b. Choose vivid, image building words**

Business and scientific writing uses less figurative language than does the world of fiction.

<b>Bland image</b> This is a long letter.	<b>More vivid images</b> This letter is three times as long as you said it would.
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### **Exercise:**

**Make the following statements more concrete:**

1. Those reports are quite a bit behind the schedule
2. The software in that department needs updating.
3. A number of departments are frequently late in submitting results.
4. The project should be attended to properly.
5. The camera has a system which gives good pictures.

**Which of the following are general and which are concrete?**

1. Heavy precipitation during the period
2. Excessive heat
3. Four inches of rain in 48 hours
4. 120 degrees Fahrenheit
5. Select the appropriate key
6. Click Alt-B

Provide certainty by eliminating auxiliaries such as would, should, could, may, and might. Avoid ambiguous words and phrases by selecting a clearer alternative. Replace wordy text (despite the fact that) with a concise alternative (because). Additional examples of concise alternatives are provided in Appendix.

**a. Be direct and to the point. Example:**

Due to uncertainties in the weather, it is difficult to predict when the first flight will be. However, the preference is for tomorrow. (*Indirect*)  
If the weather permits, the first flight will be tomorrow. (*Direct*)

**b. Avoid weak sentence beginnings:** Unnecessary beginning phrases detract the reader's attention.

Example: It was the resilience of the material that prevented it from shattering. (*Weak*)  
The resilience of the material prevented it from shattering. (*Strong*)

**c. Break longer sentences.**

**d. Do not misuse of passive**

**e. Repeat key nouns and verbs whenever necessary.** Do not change nomenclature.

Example: The work surface of the *scaffold* was usable, even though the wood needed to be repaired.....Therefore, salvaging the *scaffold* was feasible.

**1.6 Simple Terms**

Impress the audience with analysis, not vocabulary. Replace complex words with simple language if it conveys the same meaning. This prevents the audience from interpreting the text, allowing the author to maintain control by forcing the reader to understand the intended meaning. Replacing the word “utilize” with “use” or “altercation” with “dispute” simplifies the text.

**1.7 Action Verbs**

Develop precise and interesting text. Replace verb-preposition combinations with high quality action verbs (go with → accompany, find out → discover, start out → begin). A list of action verbs is provided in Appendix.

**2. CREATE TEXT FLOW**

Select an appropriate style and tone, and then simply write down ideas and facts without concern for quality or format under each heading and subheading. Then edit, wait, and edit again, eliminating irrelevant information, emotion, unsupported opinions, and judgments.

Organize the ideas into smooth flowing text by developing coherent paragraphs, using transitional words, and incorporating sentence variety. Be selective in the use of acronyms and initialisms. Use numbers or bullets to convey lists of information.

### **2.1 Coherent Paragraphs**

Create paragraphs with a single topic or focus, and include supporting details. Each paragraph usually contains around five sentences (although this is not a rule). To improve comprehension, place the key topic at the beginning of a sentence and new information at the end.

All of the ideas contained within a paragraph must relate to one central thought. Arrange factual sentences in a logical order from general to specific. If there are ideas that relate to other foci, construct additional paragraphs.

In order to build the individual paragraphs into a complete paper, take ideas from the beginning paragraph and expand each into subsequent paragraphs. Link paragraphs together by stating what will appear in the next paragraph.

### **2.2 Transitional Words**

Use transitional words to connect one idea to the next, one sentence to another, one paragraph to another. Forms of transitional words include: indicators for time order (earlier, later); position in time (rarely); sequence (next); occurrences that happen again (to explain); conclusions (in conclusion); the end of an idea (finally); compare/contrast (also/but); causality (because, as a result, therefore); spatial concerns (neighboring); and other connectors (or, nor, but, subsequently, then, besides, furthermore, similarly, likewise, moreover, in which, nevertheless).

### **2.3 Sentence Variety**

Develop clear concise text by writing shorter sentences that are appropriate for the intended audience, avoiding very short sentences. Use a long sentence only when it consists of more than one clause and both the meaning and logical relationships between the clauses are clear. Avoid using phrases with more than three nouns in a row by dividing the phrase into a shorter noun phrase with a relative clause or prepositional phrase, or use hyphens to connect closely related words in the noun string. Compare the first example, which has six nouns in a row, with the rewritten sentence that follows:

***The nanotechnology enhanced iron foam column contactor removes phosphorus ...***

***The column contactor uses nanotechnology-enhanced iron foam to remove phosphorus ...***

For clear text that is understandable for non-native English-speaking readers, use simplified verb phrases and tenses. The sentence:

***Fabricated steel components should not be welded by beginning students.***

Could be written as

***Beginning students should not weld fabricated steel components. (Simplified)***

Locate previously introduced information in the topic (subject) position of the next sentence to assist with comprehension.

***Bob called the dog. The dog stopped immediately.***

When using prepositional phrases, make sure it is obvious what each preposition is modifying. *The news report stimulated conversation, but this did not resolve the problem.*

(Does this refer to the news report or the conversation?)

Avoid ending a sentence in a preposition by selecting a more descriptive action verb.

*The burglar finally gave up. The burglar finally surrendered.*

To create smooth flowing text and interesting reading, vary the length and beginning of the sentences, arrangement of information, and kinds of sentences. Eliminate repeated words in a single sentence. Use the following diverse sentence structures to provide variety. Simple sentence: Includes subject-verb-object, in that order.

*The laboratory report summarized the results.*

Compound sentence: A subordinate clause appears before the main clause.

*If you find the answer, it will relieve everyone in the class.*

Complex sentence: Consists of an independent clause followed by an independent clause  
*The final reports were due yesterday, and no one knew who had the original.*

Compound/complex sentence: An independent clause is preceded or followed by a subordinate clause and then a second independent clause.

*If you find the answer, it will relieve everyone in the class; admiration from all is a nice reward.*

## **2.4 Acronyms and Initialism**

Both acronyms and initialisms are abbreviations formed using the first letter of a series of words. Acronyms are pronounced as a word, whereas initialisms are pronounced as a series of letters (IBM).

Sometimes an acronym or initialism is more commonly used than the words themselves. For example, random access memory is known by its acronym, RAM and the International Business Machines Corporation as IBM. Some acronyms, like "scuba" (self-contained underwater breathing apparatus), have become so accepted that their original derivations have been lost and the acronyms have been added as new words to the English language.

Using uncommon acronyms and initialisms makes reading harder for all but a few specialists; therefore, be selective and limit their use. When using either, write the full name or phrase followed by the acronym or initialism in parentheses for the first appearance. However, do not follow this procedure if the acronym is not used again.

An acronym or initialism followed by a simple s is the plural form. Whereas an acronym with an 's shows the possessive form.

## **3. CLARITY**

The most important criteria for effective technical writing is clarity. If the audience responds to a memo, letter, report, or manual with, "Huh?" what has the writer accomplished? If the correspondence is not clearly understood, the reader will either call the writer for further clarification, or just ignore the information. In either case, the writer's time is wasted; the reader's time is wasted; the message is lost.

Clarity, however, is not just a time concern. Think of it from this perspective: your company has written an installation manual for a product. The manual, unfortunately, is not clear. When the reader fails to understand the content, three negatives can occur:

- **BAD**—The equipment is damaged. This requires the owner to ship the equipment back. The company will replace the equipment, costs accrue, and public relations have been frayed.
- **WORSE**— The owner is hurt, leading to pain, anxiety, doctor's bills, and bad public relations.
- **EVEN WORSE**— The company is sued. The company loses money, the writer of the manual loses a job, and public relations are severed.

Clarity can be achieved:

### 3.1 Provide specific detail

One way to achieve clarity is by supplying specific, quantified information. If you are using vague, abstract adjectives or adverbs, such as *some* or *recently*, your readers will interpret these words in different ways.

Look at the following example of vague writing caused by imprecise, unclear adjectives.

#### Before

Our latest attempt at molding preform protectors has led to some positive results. We spent several hours in Dept. 15 typing different machine settings and techniques. Several good parts were molded using two different sheet thicknesses. Here's summary of the findings.

First, we tried the thick sheet material. At 240 F, this thickness worked well.

Next, we tried the thinner sheet material. The thinner material is less forgiving, but after a few adjustments we were making good parts. Still, the thin material caused the most handling problems.

#### After

During the week of 10/4/14, we spent approximately 12 hours in Dept. 15 trying different machine settings, techniques, and thicknesses to mold preform mold protectors. Here is a report on our findings.

0.030" Thick sheet

At 240 F, this thickness worked well.

0.015"thick sheet

This material is less forgiving, but after decreasing the heat to 200F, we could produce good parts. Still, material at 0.015"causes handling problems.

### 3.2 Answer the questions

A second way to write clearly is to answer the reporter's questions—who, what, when, where, why, and how. This flawed memo, written by a manager to a newly hired employee, highlights the importance of clarity.

Date: March 5, 2004

To: Michelle Fields

From: Earl Eddings

Subject: Meeting

Please plan to prepare a presentation on sales. Make sure the information is very detailed.

Thanks.

- **What do you know in this memo?**
- **What additional information should the writer have included for clarity?**

*What don't you know in this memo?*

*What additional information should the writer have included for clarity?*

### **Reporter's Questions Checklist**

**Who** is the audience? Who will know what? Will the audience know a great deal (High Tech)? Will the audience know a little about the topic (Low Tech)? Will the audience know nothing about the topic (Lay)?

**What** do you plan to do? What do you want the audience to do? What do you want to know?

**When** should the job be completed? What's the turnaround time? What's the timetable? What's the desired schedule? When do you need an answer?

**Where** will the work take place?

**Why** is the task being undertaken (the rationale, motivation, goal)? Why is the desired date important?

**How** should the task be performed? What's the preferred procedure?

Using the Reporter's Questions Checklist as a prewriting tool, the previous memo could be revised to achieve greater clarity. Here is an example of a revised memo.

Date: March 5, 2004

To: Michelle Fields

From: Earl Eddings

Subject: Sales Staff Meeting

Please make a presentation on improved sales techniques for our sales staff. This meeting is planned for March 18, 2004, in Conference Room C, from 8:00 a.m. - 5:00 p.m.

Our quarterly sales are down 27%. Thus, we need to help our staff accomplish the following: 1. Make new contacts. 2. Close deals more effectively. 3. Earn a 40% profit margin on all sales.

Use our new multimedia presentation system to make your presentation. With your help, I know our company can get back on track.

Thanks.

**3.3 Use familiar and easily understandable words:** Another key to clarity is using words that your readers can understand easily. Avoid obscure words and be careful when you use acronyms, abbreviations, and jargons.

<b>Obscure words</b>	<b>Alternative words</b>
Accede	Agree
Subsequent	Later
Inasmuch as	Because
Ascertain	Find out
Cognizant	Know
Remittance	Pay
Supersede	replace

### **EXERCISE:**

Revise the italicized vague words and phrases, specifying exact information. (Students are allowed to invent numbers.)

Vague word(s)	specified
I have a <i>low GPA</i> .	
The b-ball player was <i>really tall</i> .	
I'll be home <i>as soon as possible</i> .	
The team has a <i>losing record</i> .	
The computer has <i>lots of memory</i> .	

### **4. CLEAR PRONOUN REFERENCE:**

Scientists, engineers, and other technical people sometimes use full nouns phrases repeatedly to avoid being "imprecise". They have heard of cases, perhaps, where a single misinterpretation of a pronoun by a single reader has led to some accident or mishap, which in turn has led to the writer's company being sued for damages. Therefore, they tend to avoid pronouns and demonstratives altogether, preferring instead to repeat full noun phrases over and over. This strategy is certainly a safe one, and indeed it should be used in appropriate circumstances (**such as when writing operating instructions for a potentially hazardous machine or when writing a legally binding contract**). There are many circumstances, however, where such caution is uncalled for, and where in fact it simply disrupts the coherence of the text.

### **5. Accuracy**

Effective technical writing must be correct, whether grammatically, mathematically, electronically, etc. Errors in technical writing make the company and the employee look bad. More importantly, errors can lead to damages, injuries, lawsuits, or just embarrassment and misunderstandings.

Accuracy has three main aspects:

- a. Document accuracy refers to the proper coverage of your topics in appropriate detail. Often an accurate document needs to focus clearly on a problem. Document accuracy is generally cultivated by a clear problem statement and by a preliminary outline. Theses writing tools help you focus your writing effort by reducing your data in a way that solves a theoretical or practical problem.
- b. Stylistic accuracy concerns the careful use of language to express meaning. Accurate language requires the careful use of paragraph and sentence structure and word choice to describe and analyze your topics effectively. As a writer, you gain command of accuracy by studying the elements of style a by learning to apply those elements to



your drafting, revising, editing, and proofreading. Stylistic accuracy is also a matter of using words precisely.

- c. Technical accuracy requires stylistic accuracy but is not based solely on it. The effective document in science and technology must be grounded in a technically accurate understanding and representation of the subject. Technical accuracy depends on the writer's conceptual mastery of the subject and its vocabulary, as well as on his or her ability to analyze and shape data with minimum of distortion. In science and technology, enormous creative energy is given to mastering this technical aspect of subject development.

Try these proofreading techniques:

- Use the computer's spell check—remember, however, that a spell check will not catch form if you mean from, to if you mean too, or except if you mean accept.
- Let it sit—for a day or a weekend. When the document is cold, students are more objective about their own writing.
- Use peer evaluations—others will see the errors we miss.
- Read it aloud—sometimes we can hear errors.
- Read it backwards—then you read words out of context. You cannot anticipate the next word.

## 6. Numbers as Words

- 6.1 Generally spell out isolated numbers from one to ten.

**The discussion lasted for ten minutes.**

- 6.2 Unless emphasizing them, spell out indefinite numbers that may be expressed in one or two words.

**Approximately thirty appliances were damaged.**

- 6.3 Spell out a number that introduces a sentence. If the number is long, recast the sentence to avoid awkwardness.

**Twenty people attended the lecture.**

- 6.4 Spell out common fractions that are used alone. However, use figures in writing a mixed number.

**He refused to accept his one-fourth share.**

**The hike was 10 ½ miles long.**

- 6.5 When two numbers come together, express one in figures and the other in words. As a rule, spell the first number unless the second number is a significantly shorter word; i.e.,

**Sixty \$5 bills or 500 four-page booklets.**

- 6.6 When rounding numbers, spell out million or billion to make reading easier.

**This tax legislation will increase revenue by \$7 million.**

## 7. Numbers – Text or Digits

- 7.1 Generally use numerals to express all exact numbers above ten.

**The corporate file has been missing for 31 days.**

- 7.2 Use the written form of a number for values 10 and below except to express market quotations, dimensions, temperature, decimals, street numbers, pages and divisions of a book, time, weights and measures, and identification numbers.

**The experiment had three independent variables staged at 5, 10, and 15 degrees Kelvin.**

- 7.3 If several numbers in a sentence perform similar functions, express them uniformly. If one is written as a figure, write all as figures.

**The inventory shows 21 ranges, 9 refrigerators, 37 washers, and 10 dryers.**

**The 32 tables sold in five days. (The numbers do not perform similar functions.)**

## **8. That and Which**

Generally “that” defines and restricts; “which” provides additional information.

“That” is used restrictively to narrow a category or identify a particular thing. The information following “that” is critical to the reader’s understanding.

**The article that was printed in the newspaper yesterday is inaccurate.**

“Which” is used nonrestrictively to add some descriptive but incidental information and is preceded by a comma, a dash, or a parenthesis.

**The ballerina was dancing around the room wearing a baseball cap, which is not something you would expect.**

“Which” is used restrictively only when it is preceded by a pronoun.

**Realize that you will be asked for your opinions about topics in which you do not feel completely comfortable.**

For example, note the usage of “that” twice, and the lack of commas, in the following text causes confusion.

**There are other factors that contribute to the uncertainty that were not considered in the...**

The first “that” introduces a restrictive clause that essentially describes the noun, “factors,” and the meaning of the sentence. The reader needs to know “that” other factors “contribute to the uncertainty.” In the case of the second “that,” the idea of the factors not being considered is also critical to the understanding of the sentence. The following sentence clarifies the meaning.

**There are other factors that will impact funding, which have garnered little interest in the audience.**

The rewritten passage uses one “which” and one “that.” The “which” introduces a nonrestrictive clause, which simply provides additional information to the reader. The “that” clause contains information that is vital to the context.

## **9. Organization**

As a writer, you cannot haphazardly throw words on the page and expect readers to understand you clearly. In contrast, you should order that information on the page logically, allowing your readers to follow your train of thoughts. Following are five patterns of organization that you can use to help clarify content.

- **Spatial**

If you are writing to describe the parts of a machine or a plot of ground, you might want to organize your text spatially. You would describe what you see as it appears in space-left to right, top to bottom, inside to outside, or clockwise.

For example, let’s say you are a contractor describing how you will refinish a basement. Your text reads as follows:

*At the basement’s north wall, I will build a window seat 7’ long by 2’ wide by 2’ high. To the right of this seat, on the east wall, I will build a desk 4’ high by 5’ long by 3’ wide. On the south wall, to the left of the door, I will build an entertainment unit the height of the wall including four, 4’ high by 4’ wide by 2’ deep shelving compartments. The west wall will contain no built-ins. You can use this space to display pictures and to place furniture.*

- **Chronological**

Chronology is used to document time or the steps in an instruction. For example, an emergency medical technician (EMT) reporting services provided during an emergency call would document those activities chronologically.

Example:

*At 1:15 p.m., we arrived at the site and assessed the patient's condition, taking vitals (pulse, respiration, etc.). At 1:17 p.m. after stabilizing the patient, we contacted the hospital and relayed the vitals. By 1:20 p.m., the patient was on an IV drip and en route to the hospital. Our vehicle arrived at the hospital at 1:35 p.m. and hospital staff took over the patient's care.*

- **Importance**

Your page of text is like real estate. Certain areas of the page are more important than others- location, location, location. If you bury key data on the bottom of a page, your reader might not see information. Decide which idea you want to emphasize and then place that information on the page accordingly. Place the more important ideas above the less important ones.

The following agenda is incorrectly organized:

- Miscellaneous ideas
- Questions from the audience
- Refreshments
- Location, date, and time
- Subject matter
- Guest speakers

A better list would be organized by importance, as follows:

Agenda

- Subject matter
- Guest speakers
- Location, date, and time
- Refreshments
- Questions from the audience
- Miscellaneous ideas

- **Comparison/contrast**

Many times in business you will need to document options and ways in which you surpass a competitor. These require that you organize your text by comparison and contrast. You compare similarities and contrast differences.

Item	Feature	Cost
The Broadmoor	4 bedrooms, 3 ½ baths 2-car garage Fully equipped kitchen	\$200,000

The Aspen	4 bedrooms, 3 ½ baths Finished basement 3-car garage Fully equipped kitchen	\$240,000
The Regency	4 bedrooms, 3 ½ baths Patio deck Finished basement with ½ baths Finished basement with ½ bath 3-car garage Fully equipped kitchen	\$280,000

- **Problem/solution**

Every proposal and sales letter is problem/solution oriented. When you write a proposal, for instance, you are proposing a solution to an existing problem. If your proposal focuses on new facilities, your reader's current building must be flawed. If your proposal focuses on new procedure, your reader's current approach to doing business must need improvement.

Note how the following summary from a proposal is organized according to problem/solution.

*Your city's 20 year old wastewater treatment plant does not meet EPA requirements for toxic waste removal or ozone depletion regulations. This endangers your community and lessens property values in its neighbourhoods.*

*Anderson and sons Engineering Company has a national reputation for upgrading wastewater treatment plants. Our staff of qualified engineers will work in partnership with city's planning commission to modernize your facilities and protect your community's values.*

### **Exercise:**

1. Using spatial organization, write a paragraph describing your classroom or any room in your house.
2. Organizing your text chronologically, write a report documenting your drive to university, or your activities at a sporting event.

## Writing the technical Prose

The technical prose is informational, defining, and instructional in nature. While writing the technical prose, you may be required to do one or more of the following.

1. Explaining
2. Description
3. Comparison
4. Following chronologies (series of events); for example, when discussing historical background and development of things/concepts over the period of time, writing steps in a procedure, etc.
5. Analysis and evaluation
6. Calculations
7. Referencing and citing
8. Using support material: Examples (Real or Hypothetical)

Facts and Figures, Statistics

Events, incidents

Quotations, insightful observations

Analogies, metaphors, similes, etc

## Academic & Technical Writing: a comparison:

- Thesis or hypothesis initiates the text
- Cited evidence serves as the body of the text
- Conclusion of summation and ideas for further research closes the text

Academic Writing	Business & Technical Writing
Prose is primary writing mode.	Lists, bullets, and short paragraphs are primary writing mode.
Thesis is in opening paragraphs.	Thesis is in paragraph, phrase, or heading.
Ideas are divided by paragraph.	Ideas are divided by paragraphs, lists, or sections.
Sources are a permanent record.	Sources are only as permanent as the message.
Paragraphs are preferred over lists.	Lists are preferred over paragraphs.
Sentence diversity is valued.	Parallelism and repeated patterns are valued.

## 3. Rewrite the following using a technical style.

### Computers

Computers have impacted our lives with numerous benefits. Whether it be landing on the moon or just every day to day business transactions, nothing is possible without computers. Computers are now used in almost every phase of life and there is hardly any area where computer hasn't benefited the humans. Bringing speed and more reliability with them, computers can do numerous mathematical calculations with incredible speed and pin point accuracy. Add to that the fact that new software's and hardware's are always making the computer better, life without a computer is like a rose without petals.

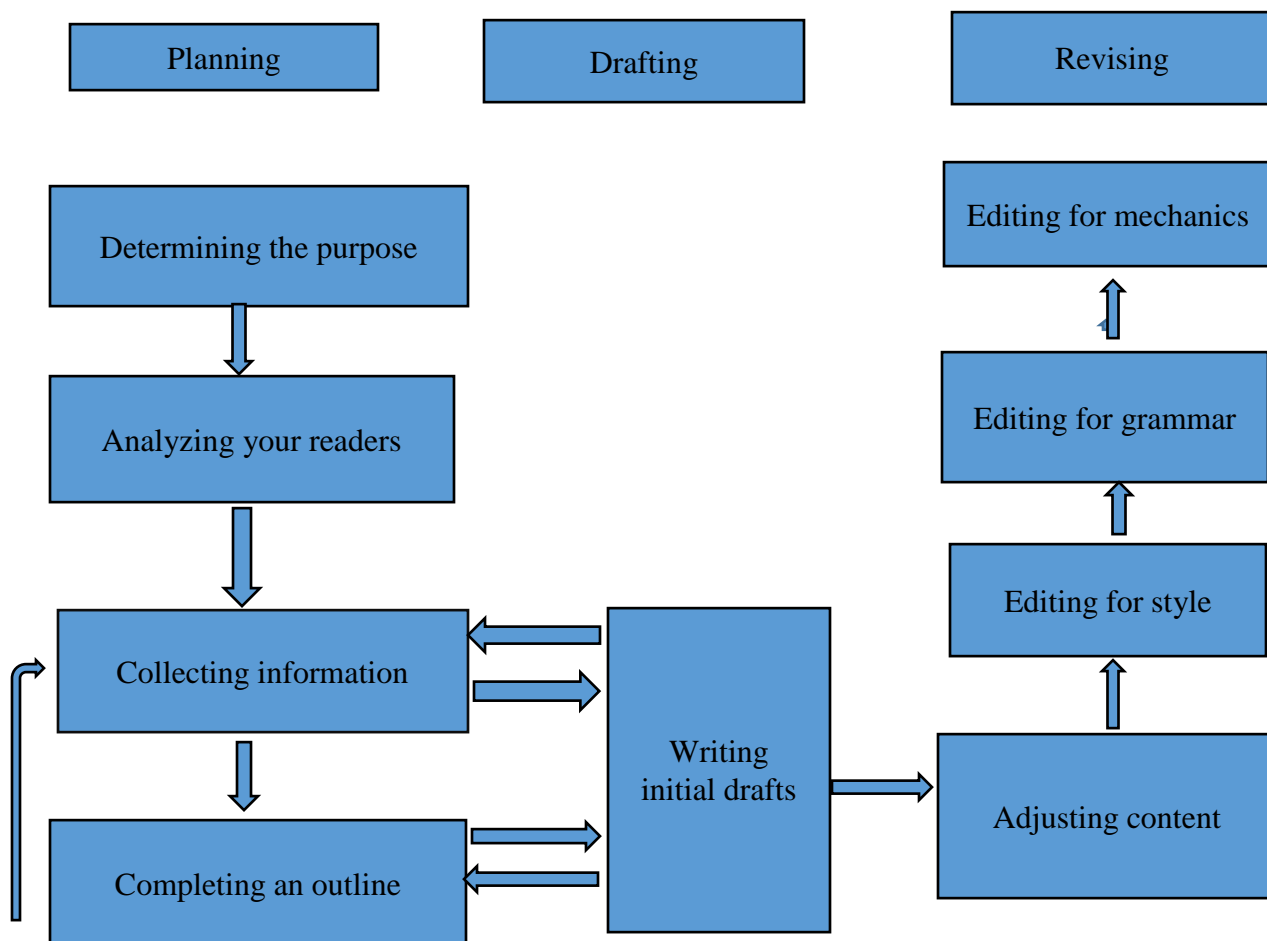
# THE TECHNICAL WRITING PROCESS

Effective writing is time consuming. Inexperienced professionals commonly err by allowing inadequate time to prepare their reports properly. The technical writing process should not be a concentrated effort; rather, it should be several smaller efforts separated in time to help you organize your ideas. It is most efficient to begin writing the components of a report as you complete the phases of your work project so that when you are ready to write the report, parts of it may be ready for rewriting and editing for the final draft.

Technical writing, more than literary and journalistic writing, is a recursive process. As components of a report are completed, information presented in earlier sections may need to be supplemented, revised, or deleted so that these components become the natural results of this information.

## The Writing Process

Technical writing comprises three steps: planning, drafting, and revising. As shown in the figure, these steps are further divided into sub steps that is followed in completing most technical communication.



## Analyzing Purpose

Writing is done for a purpose, and to accomplish something. A document has two purposes:

### **The writer's purpose:**

Why the writer is writing the document?

What the writer wants the reader to know and do?

### **The reader's purpose:**

Why is the reader reading?

What the reader wants to know or do?

A writer may have one of the following purposes if writing a technical document:

**1. To Instruct:** If you are writing to instruct, things to consider are:

- The purpose of the procedure/task
- How to perform a task/procedure (all the steps)
- Why it should be done
- Special conditions that affect the procedure

Example Documents: Training and operator manuals, policy and procedure statements, consumer instructions, etc.

**2. To record:** Things to consider are:

- Tests or research performed and results
- Decisions made and responsibilities assigned
- Actions and their consequences

Example Documents: Minutes, file reports, lab reports, etc.

**3. To Inform (for decision making):** Things to consider are:

- Accurate information and thorough data analysis to enable the reader to make decisions
- Specific facts

Example Documents: Progress reports, performance evaluation, feasibility reports, investigative reports, etc.

**4. To Inform (without decision making):** Things to consider are:

- The specific who, what, where, when, why, and how of the subject
- A sequence of events showing cause and effect
- The relationship of the information to the company's interest

Example Documents: Information bulletins, literature reviews, product descriptions, process explanations, etc.

**5. To recommend:** Things to consider are:

- Reasons for the recommendation
- Expected benefits
- Why the recommendation is preferable to an alternative

Example Documents: Simple proposals, feasibility studies, recommendation reports, etc.

**6. To persuade:** Things to consider are:

- Sound evidence
- Counter arguments
- Importance of the action suggested
- Consequences of not taking the suggested action
- Benefits

Example Documents: Construction bids, grant applications, technical news release, reports dealing with sensitive topics, etc.

You can consider the following questions to determine the reader's purpose:

- a. What action (or decision) do I want my reader to take (make)?
- b. How does the reader intend to use this document?
- c. What effect will this document have on the reader?
- d. Do my purpose and my reader conflict in any way?

Write the purpose statement before you begin your research for material.

## **Determining and Analyzing Document Type**

What specific document type is required or will be appropriate. Search for the internationally accepted standards regarding format and organization

### **Analyzing the Writing Situation/Context**

No writer works in isolation. Employees work in a certain organizational environment which may have a particular communication atmosphere, preferences for specific documents, formats, or types of information, the organizations relationship with externals, government regulations, professional standards or ethical codes the organization follows, etc. In analyzing your writing situation, consider these questions:

1. Is the subject controversial within the organization?
2. What events created the need for this document?
3. What continuing events depend on this document?
4. Given the deadline for this document, what information can be included?
5. What influence will this document have on company operations or goals?
6. Is the subject under the control of a government agency or specific regulations?
7. What external groups are involved in this subject, and why?

## **Analyzing Audience**

The audience of a technical report—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.

To communicate effectively and maintain receptivity in the readers, a good writer generates an audience profile before writing. In this way, s/he can select style, language, organization, and form of expression suitable and appropriate for the target readers.

### **Technical Readers**

Unlike most of the other types of writings, audiences of technical writing are

- Well- defined
- Sometimes writers may have personal knowledge of the reader(s)
- Technical readers have a professional or organizational responsibility to read the material

The readers of technical documents will fall into one or more of the following categories:

<b>Reader</b>	<b>Purpose</b>
Executives	To make decisions based on applicability, and profitability. They want conclusions and alternatives rather than details.
Technologists, engineers, & scientists	Interested in information transfer. They need facts, details, theory, methodology, and conclusions.
Technicians	Need information to troubleshoot, modify, upgrade, and maintain or repair equipment. They need practical information in format that is easy to use. To facilitate understanding, they rely on visuals.



Operators	Need instructions to operate equipment or to perform procedures. They need a set of easy to understand commands in a step by step format with visuals.
Non technical persons	They read for interest and information

### EXERCISE:

Match the writers below with their correct target readers:

Writer	Readers
Computer specialist designing a computer system for a bank	Supervisors and drug manufacturers
Chemist writing a report about tests on a certain drug	The company, bank managers, city engineers, etc.
Consulting engineer writing a report recommending a water storage system for a city.	Supervisors, managers of the bank, and the programmers who will have to learn the new system.

## Conducting audience analysis and generating an audience profile

Questions to consider are:

1. Who is/are my specific reader(s)?
2. What is the position of the reader(s) in the organization or are they external?

External: outside the organization	Internal: inside the organization
Customers, vendors, stockholders, employees of government agencies or industry associations, competitors, and the general public.	<ul style="list-style-type: none"> <li>• Supervisors: executives who make decisions based on information in the document. Supervisors who may be semi experts.</li> <li>• Subordinates: they rank lower than the writer.</li> <li>• Peers: equals.</li> </ul>

### EXERCISE:

What issues will you discuss and emphasize when writing in the following scenarios? Match the following:

If you are writing a report to superiors about a new company computer system, your readers would be interested in...	How the system will link departments and functions, change current procedures, and support company or department goals
If the same report is meant for peers, you may focus on...	Overall costs, the effect of the system on company operations, expected benefits company wide, and projections of future computer uses and needs
If the same report is for subordinates, you will probably emphasize information about...	Specific models and programs, locations for the new computers, how these computers support specific tasks and systems, and how the readers will use the computers in their jobs.

### 3. Why do they need this document?

Usually, technical readers read to gain information. For a writer, an important issue to investigate is

- What particular information does the reader need?
- Why does s/he need it?
- Considering readers' needs, what material would be appropriate, and what sequence would be the most suitable one?

#### **EXERCISE:**

Match the following by analyzing the readers and the order of material most suitable for them.

Readers	Order of material
A decision maker	A brief summary of recommendation from the investigation.
A dissertation advisor	The answer or the conclusion first.
An engineering manager	A retracting of steps of a research or development procedure with answers at the end.

### 4. How will they use it?

Technical documents usually are not read, nor are meant to be read, from the beginning to the end like a mystery novel. Readers may be interested in specific information in the document depending on their needs and reading habits.

#### **EXERCISE:**

What sections of the technical document (manual, reports, brochures) would the following readers be interested in? Choose from the options in the box and also explain why?

- |   |
|---|
| <ul style="list-style-type: none"><li>• Summaries or abstracts</li><li>• Specific sections of the document: (correct operating procedures, section on maintenance, description of machines)</li><li>• The entire document</li></ul> |
|---|

- A. a customer trying to decide what automobile to buy
- B. an executive
- C. a service technician
- D. someone who opposes the project
- E. someone who needs to change an automobile tire
- F. a psychologist searching for research studies about abused children

### 5. Do they have a hostile, friendly, or neutral attitude towards the subject?

Considering this question will help you in deciding upon techniques for being persuasive and assertive.

**EXERCISE:****Match the following:**

<b>Readers</b>	<b>Techniques</b>
A person with a negative attitude about the subject	Adjusting your document to match international standards
a reader with strong personal preferences regarding formats	Using lists, headings, indexes and other design features to make the text more useful and emphasizing the importance of suggested action
A reader reluctant to read and act	Organizing information from generally accepted to less accepted data or from shared goals to opposing points

6. What is the level of their technical knowledge about the subject?

<b>Expert level</b>	<b>Semi expert level</b>	<b>Non expert level</b>
They require few definitions and explanations of principles.	They may vary a great deal in how much they know and why they want information. They will require more definitions and explanations of general principles than the expert reader does.	They have no specialized training or experience in the subject. Usually, they are given a glossary of technical terms, checklists of important points, simple graphics, and summaries.

**EXERCISE:**

How may you describe the following readers?

1. A manager who understands some engineering principles in a report but probably is more interested in information about how the project affects company planning and budget subjects in which the manager is an expert.
2. A person reading a document to learn how to install a heat lamp in the bathroom.
3. A marketing manager reading a report explaining possible strategies for selling a home appliance in selected regions of the country.
4. An equipment operator who knows little about the scientific basis of a piece of machine but is more interested in information about handling the equipment properly.
5. A person reading an article in a general science magazine about the disappearance of the dinosaurs from earth.
6. A scientist who wants to duplicate a new genetic test, and so wants information about every step in the test.

**Multiple Readers**

<b>Primary readers</b>	<b>Secondary readers</b>
They are the people for whom the document is originally intended and written. They will take action or make decisions based on the document. Primary readers can be one or many.	They might be affected or influenced by the document.

For multiple primary readers, the following steps may be useful:

1. Precede all information with headings that direct different readers to sections of the report relevant to them.
2. Write a different cover letter that emphasizes the relevant sections of the report and add any other relevant information.
3. Sometimes you may be required to separate, similar report for each audience.

## WRITING USER DOCUMENTATION

What problem can low quality documentation create for both the readers and the writers?  
Discuss with reference to user guides?

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Key terms and their definitions are given below:

**INSTRUCTIONAL WRITING:** It is that writing which gives instructions to readers regarding a well-defined and specific topic.

**INSTRUCTIONS:** Instructions direct/teach/guide a person to do something, furnish with information needed to accomplish something.

**TASK:** A specific piece of work, a distinct specific action/activity

**PRECEDURE:** It refers to

1. manner of proceeding; a way of performing or effecting something: standard procedure.
2. A series of steps taken to accomplish an end: a medical procedure; evacuation procedures.
3. A set of established forms or methods for conducting the affairs of an organized body such as a business, club, or government.
4. Computer Science: A set of instructions that performs a specific task; a subroutine or function.

Can you name some tasks for which instructions are written?

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## WRITING INSTRUCTIONS

Instructions are provided in user guides, manuals, tutorials, training videos, etc. All such documents may contain instructions for different tasks, procedures, etc.

***In the context of technical writing, instructions are those step-by-step explanations or guidelines which teach/guide/help/direct users regarding how to do accomplish tasks.*** They explain how to carry out a procedure in order to achieve an objective. They usually teach how to assemble something, operate something, repair something, or do routine maintenance on something.

Before we move on to study how to write instructions, there is an important thing you need to bear in mind about readers before you start working on writing instructions for them.

- Users usually read the documentation in desperation, after what they tried to do failed.
- They're now frustrated, they have messed up things.
- They're lost as to how to proceed to complete their goal.

**How to write instructions to explain the procedure to accomplish a well-defined and distinct task:**

1. Conduct a thorough research on the task and identify all the steps that are followed to complete the procedure. Find all minute details. Visualize the procedure and show this awareness in writing. Work on achieving a technically advanced understanding of the procedure and all the steps. Make a list of all the steps. This is your rough draft.

2. Identify special requirements, conditions, cautions, warnings, any other vital background information that is needed. Inform the reader about it before beginning to instruct about the task (steps).
3. After audience analysis decide on the level of detail, organization, style, and vocabulary.
4. Write a clear heading for the task. Instructions are usually titled as "How to do task ABC", making sure that the instructions under this heading all have to do with accomplishing task ABC (and nothing else). Headings should be descriptive, informative, and direct.

Bad	Good
<ul style="list-style-type: none"> <li>• Reports</li> <li>• Files</li> <li>• Backups</li> </ul>	<ul style="list-style-type: none"> <li>• Printing Duplex Reports, How to Print Duplex Reports</li> <li>• Saving XML Files To Shared Networks,</li> <li>• Creating and Archiving Backups</li> </ul>

5. Use imperative sentences. Use precise, concrete, and image building verbs. For example, **“Press** the emergency button” rather than “Hit the emergency button.”
6. Always use active voice.
7. Address the reader directly using the pronoun “you”. Avoid third person pronouns.
8. Put the steps/commands in chronological order. Enable readers to visualize the procedure.
9. Explain with the help of graphics.
10. Use a numbered list when the order is important. Use a bulleted list (like this list) when the order is not important (for example, when the reader can choose between different options).
11. Specify conditions before the primary part of the instructions. For example, at step 5 of some stocktaking instructions, do not write, "Before you start the stocktake, make sure that..." (This type of problem frequently occurs.)
12. Avoid lists of more than approximately ten steps. If possible, divide a long list of instructions into two or more different tasks.
13. Specify what the reader does when the task is complete. If a reader asks, "Now what?", the instructions are not complete.

For software, follow the guidelines given below:

- a) Orient the users: tell the users where they are and what they should be seeing on their screen, such as the name of the window they should be looking at.
- b) Tell them what button(s) to click on the current window and/or what text they need to type into what field(s).
- c) Explain with the help of graphics (screen shots).
- d) Tell them how to get to the next step/location and describe what they should see onscreen when they take that action.

In short,

***tell the reader where they are→tell them what to do→describe the results of their actions***

For example:

1. From the **Main Window**, select any one option you want to activate. Click **OK**. The **Second Window** appears showing the current status of the options you selected.
2. On the **Second Window**, verify that all of the options selected are correct. If all options are correct, click **Activate Options** and the **Third Window** appears otherwise click **Back** to return to the **Main Window** and select different options.

**Critically analyze the following instructions taken from the user guide of “Photo Meister Professional version 2”. Find out the problems with the instructions.**

### **Managing Photos**

In helping you manage your photo collection, PhotoMeister allows you to move, delete, dump, and copy photos within PhotoMeister photo albums.

#### ***Using the clipboard***

To copy the current photo into the clipboard, select **Copy** from the Edit menu. Then you can paste the photo into any other Windows application that supports the clipboard. (Please note that it may be a better idea to open the file of the photo directly within the other application to create less memory load!)

To paste an image stored on the clipboard by another application into the current album, **Paste** is selected from the edit menu. PhotoMeister will ask you for a name for the new photo and then stores the photo into the album's folder.

#### ***Moving and Copying Photos***

Moving and Copying Photos are accomplished in exactly the same manner

- Select a photo
- Appropriate option from the file menu should be chosen.
- Move Single Photo to Album (or Move Selected Photos to Album if working with multiple photos)
- Copy Single Photo to Album (or Copy Selected Photos to Album if working with multiple photos)
- Selecting an option will bring up the appropriate window.
- From the list of albums, choose an album to which to copy or move the selected photo(s) or create a new album by clicking "New Album"
- Click next to complete the transfer
- An informational message will appear informing you the transfer was successful.

## **EXERCISES:**

**Correct the errors in the following instructions. Some might be correct:**

1. Allow the glue to dry adequately.
2. Drag and drop to quickly and in an easy manner rearrange headings and the content beneath them.
3. Just save the document to see changes from other editors as you work. Your changes also become available to other editors each time you save.
4. Push the stem into the fork tube a few inches in as shown in the figure.
5. After having used the equipment, sliding the temperature sensor back into its holder on the side of the control base is highly recommended.

**Write instructions for the following tasks.**

1. Inserting pictures in power point slides.
2. Changing font type and size in MS Word.
3. Inserting tables in MS Word.
4. Printing MS Word Document.
5. Sharing files via Bluetooth from one mobile phone to the other.



## USER DOCUMENTATION:

A common user guide can be defined as

- ▶ A **user guide** or **user's guide**, also commonly known as a **manual**, is a technical communication document intended to give assistance to people using a particular system.
- ▶ Manuals are written guides or reference materials which are used for training, assembling mechanisms, operating machinery or equipment, servicing products, or repairing products.

Software user documentations

1. Provide helpful references to specific system functions.
2. Help the user to find the information they need quickly and easily to get right back to work.
3. Explains how to use software to do procedures. A user guide answers the question, "How do I...?"
4. A user guide can contain operating instructions, maintenance instructions, technical descriptions, flow charts, drawings, and diagrams.
5. A common user guide is the "Getting Started Guide" that is developed to help the user get comfortable using the software. A user guide should cover how to run the system, how to enter data, how to modify data, and how to save and print reports.
6. This guide should also include a list of error messages and advice on what to do if something goes wrong.
7. The user manual is vital for learning both basic and more advanced techniques of a program or application.

Manuals are typically short, but if more detail is needed, they can be much longer. The length of a manual will depend solely on the type of software and how much detail it must include. *Users will appreciate manuals with easy to find, concise information, with enough detail to prevent confusion.*

## IMPORTANCE OF SOFTWARE USER GUIDES:

Computer documentation, when done correctly, enhances the value of the software described by making it easier to use and therefore more accessible. Think of more benefits of user documentations and write below:

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## TYPES OF USERS:

Types of user and their typical needs are explained in the table below:	
User type	Comment
Absolute beginners	Require handholding, no assumptions, simple step-by-step instructions. Many pictures. Only one method of achieving a required result.
Novice	Require handholding, no or few assumptions, simple step-by-step instructions (but less detail than absolute beginners). Encouragement to learn alternative methods.
Competent	Require brief reminders, explanations of options, alternatives, comparisons with other methods.
Advanced	Require brief reminders, trade-offs, alternatives, minimum text and few <u>screen shots</u> . Unusual functions, oddities, shortcuts.

## TYPES OF USER DOCUMENTATION:

User documentation includes user guides, manuals, tutorials, help systems, quick reference cards, guided tours and *Getting Started* sections, often used for installation and set-up, as well as reference guides designed for referral only. For convenience, we will divide user documentation into two types:

1. Typical printed documentation
2. Typical Online documentation

### PRINTED DOCUMENTATION

Type	Typical Users	Advantages and disadvantages to users
<u>Reference manual</u>	Advanced	Typically uses structural description. Usually focuses on how and what to do, not why. Most material is rarely used, but it must be available.
Introduction / Welcome guide	All	Useful for setting the context. Usually redundant as soon as the user is familiar with the software.
<u>User guide</u>	Beginner, competent	To be useful to novices, must set the context, and make everything clear. No or few assumptions, and therefore, quite verbose. Possibly, quickly becomes redundant.
Quick reference / Checklist	Competent, advanced	Compact. Users must know what they want to do before they can use these.

## ONLINE DOCUMENTATION

Type	Typical Users	Advantages and disadvantages to users
Online manual	Novice, competent, advanced	Easy to search on keywords (but not concepts). Those users who want a paper copy must print one themselves.
<u>Context-sensitive help</u> (window-level)	Novice, competent, advanced	Typically, when a user calls the help, the help topic explains the functions of the buttons and entry boxes in the dialog box or window from which the help was called. This is excellent for reference information, but it is not particularly useful for getting the global picture.  A large problem is that one <u>procedure</u> typically uses many dialog boxes, and sometimes, one dialog box is used in many procedures. Additionally, help topics are necessary to explain <u>processes</u> , procedures, and concepts. Usually, the help topics cannot be context sensitive.
Popup help (What's This? help, field-level help)	Novice, competent, advanced	Sometimes, useful as a short reminder. However, it is sometimes a waste of time. Typical example: an entry box says 'Name' and the help says 'Enter the name here'. Bad for explaining the general picture. Information must be duplicated in Help Topics window or HTML-based help, because otherwise it is difficult to print many items.
Online video	Novice, competent	Shows users how, but needs to be high quality and clear. (Implementation requires considerable memory.) Operations must be slow. Useful for beginners, but probably not as good for advanced users, because a sequence of menu options is faster to read. Mouse clicks and keyboard entry of non-printing characters is not explicit.
Computer-based training (CBT)	Novice	Useful in training environments where users do not expect to do useful work. Possibly, persuading users to use the material is difficult.

We will study how to prepare a typical user guide or online manual for a software application. We will target novice users.

A user guide can contain operating instructions, maintenance instructions, technical descriptions, flow charts, drawings, and diagrams. Sometimes, a user guide has full information about all the tasks that users do. Sometimes, a user guide has information only about the most frequent tasks or the most important tasks that users do.

Usually, a good combination of documentation is a user guide that contains only basic information, and online documentation that has full help about a product. This combination of documents has the following benefits:

- Users have all the information that they need.

- The user guide is relatively small.

Software developers can write the reference information in online documentation.

On the other hand, a reference manual is a document that explains the parts of a product. A reference manual answers the question, "What is x?"

Usually, a reference manual for software has the following features:

- Necessary background information and theory about the subject
- Full information about the product
- An explanation of each dialog box, screen, field, tab, and button
- An explanation of all the options that users have.

## **PREPARING SOFTWARE USER GUIDES:**

The procedure contains the following steps:

### **1. INTENSIVE RESEARCH ON THE PRODUCT, USERS, AND OTHER ESSENTIAL INFORMATION:**

It is very important that you conduct a professional inquiry on the users and the software. You can use the following attack strategies:

- a. Refer to the programmers to find out all the things that the software can do. Find out what tasks it can accomplish, what functions it can perform, how does it help? what it can do, precise description of the software and its objective, and so on.
- b. Interview potential users to find out how they will use the software, why they will use it, what do they want to accomplish, and so on.
- c. How does the software make things easier, efficient?
- d. List down all functions (basic to advanced), all tasks that can possibly be accomplished through the software, all options, accurate names and titles for everything, etc.

### **2. MAKE AN OUTLINE TO HAVE A PLAN TO FOLLOW:**

1. A typical software user guide consists of the following sections.

*The installation procedure, software purpose, menu descriptions, common tasks, advanced functions, and a troubleshooting section.*

Also, include sub-sections in your outline for specific tasks. Following is an example outline, starting with the introduction and advancing to complex features:

- Introduction of the system
- "Getting started" tasks
- Developing the system
- Modifying the system
- Customizing the system with advanced features
- Conclusion

### **3. WRITING DIFFERENT COMPONENTS OF A USER GUIDE:**

#### **a. Introduction:**

Introduces the software, describes it, and explains its purpose and objective. It explains what the software does.

Provide a detailed description of the software's purpose. Include what a user needs the software for and how they can benefit. For instance, if the software deals with accounting, explain common accounting tasks that the software makes easier. Explain which functions are the most important to the end user. This will give the user an idea of which functions to try to learn first. For instance, in music creation software, tell the user about how many tracks can be recorded at once, any included sounds and rhythms, and the formats the files can be saved in. Include a brief description of advanced features that makes this software different from others on the market. For instance, your software may be able to generate more reports or supports more file types than any other program currently available.

#### **b. Installation Procedure:**

Detail the installation process, including computer requirements. Provide requirements before the main installation procedure so users can prepare their computer.

Include even the most basic steps for computer beginners. These steps may include "double-clicking the installation file" or "insert the CD into the CD-ROM drive."

Typical installation steps involve explaining installation options, such as a typical installation versus an advanced installation, walking the user step-by-step through each GUI screen they encounter, registering the software and entering any codes or serial numbers, and how to access the program once installed to verify correct installation.

#### **c. Orient Users:**

Explain how to navigate menus. Explain each item in the menus provided. Any items that cannot be explained in one or two sentences should be included in the Common Tasks section of the manual. These tasks could include changing fonts and colors, printing to different formats and file types, and organizing files and information.

#### **d. List Important Tasks Along with the Procedure:**

Give detailed instructions about accomplishing different tasks that the software can perform for you. Use graphics, notes to ease comprehension. Also, give instructions for task that a user will have to perform in order to achieve a higher objective.

#### **e. Advanced Functions and Extra Features:**

Write a separate section for advanced functions and extra features. This is the place to go into detail. For instance, a user manual for Microsoft Excel might include information on creating reports, links, and macros.

Extra features will include functions the end user may not expect. For instance, music creation software may come bundled with a music player. Take the time to explain extras that may come with your software, or unique uses of the software.

**f. Troubleshooting Section:**

Provide troubleshooting tips. Explain the meanings of any errors the user might encounter, how to solve the issue, and how to prevent it in the future. This is also the place to include contact and help desk information.

**g. The Title Page and Index:**

Design a title page with the software name, version. It may be followed by legal copyright details.

Design a clear content page with page numbers.

Design an index and place at the end of guide. An **index** (plural: **indexes**) is a list of words or phrases ('headings') and associated pointers ('locators') to where useful material relating to that heading can be found in a document. In a traditional back-of-the-book index the headings will include names of people, places and events, and concepts selected by a person as being relevant and of interest to a possible reader of the book. The pointers are typically page numbers, paragraph numbers or section numbers.

**THE ROLE OF A TECHNICAL WRITER IN THE PROCESS OF DEVELOPING SUGs:**

An effective way to write a user guide is to create all the content in an online help system, such as RoboHelp, and then create the user guide through the printed documentation feature. Single sourcing is the act of writing the content once and using it in many formats. This way, you have created the online help system for the computer application along with a user guide for your end users.

The writer of a user guide should have a good working relationship with the product development team. Usually, the technical writer works directly with the developers and documents the step-by-step instructions on how to perform a system function. Technical writers design, write, and organize documents to deliver clear and consistent technical information. Well-written technical information can reduce human error, ease transition to a new system process, and reduce training and support costs.

Technical writers work closely with developers to write, test, rewrite, and retest the system features until they have a good draft for review. The next step is to submit the user guide for editorial review. At the same time, the quality assurance engineer should review the user guide for technical accuracy. Before publication, it is a good idea to double-check with the developers for last-minute system updates. After all the last-minute edits have been made, then the technical writer can send the user guide to the printer.

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### Exercise 1:

**Arrange the following tasks in the correct logical order. Justify your choice:**

1. Picture Editing Tools New and Improved
2. Recover unsaved versions
3. Open type Typography New!
4. Additional SmartArt Graphics
5. Shapes and Effects Improved
6. Insert Screen Shots

**Match the headings with the text below: You can choose from the options below:**

**Contact Management / Write your CV / Job Offers Capture / Write Your Cover Letter**

**TEXT 1:** When you click on the following icon,



, the cover letter writing screen shows. Initially you can distinguish clear grey frames that separate the different fields of the letter : issuer, recipient, subject/objective and the body of the letter.

This letter is a template, and it is necessary that you keep the "variable" fields (<...>), as these important information must show on a cover letter.

To fill it easily, click on the "Initialize" button. The variable fields appear on the page. You don't need to modify them as they will be automatically replaced by the corresponding data of the contact you wish to send the cover letter to.

When you answer to a job offer, you can modify the cover letter you previously generated without modifying your pattern.

**TEXT 2:** A contact corresponds to a job offer, that is to say to a company. If several job offers are issued from the same company, it will be saved as several contacts.

**To go to the contacts management screen,** click on the corresponding toolbar button :



The screen separates in two parts. On the right is your contact list. If you select a contact clicking on it, its specific details show on the left part of the screen.

How can you **create a new contact**?

If you only have the contact e-mail (common for spontaneous applications), **fill in** the corresponding field and submit. CVitae should recognize in the e-mail the company name and the contact name (eg : **franklinroosevelt@semantis-software.com**), and fill in automatically the corresponding boxes. But you need to check these information and correct them if needed.

**TEXT 3:** You write your CV step by step, each one being accessible using the first six icons of the toolbar.



For each step, a form shows every fields you need to fill in as well as information and advice on how to draft a good resume. As and when you fill in details, you can click on "Refresh CV" to see what the CV looks like.



You can choose your document format (Word or HTML) and color at any time.

The "Save" button allows you to save the information you filled in and to generate a word format CV. So if you wish to modify your CV using directly MS Word, remember to save first your folder clicking on the corresponding toolbar button or on "Save", both having the same function.

**TEXT 4:** Capturing a job offer saves you time, as every contact details is saved in your contact list. It is very useful when you wish to answer to the recruiter by email. When you have no choice but to fill in an application form directly on a website, you can nonetheless capture the job offer to keep record of it.



To capture a job offer, click on the corresponding toolbar button :

The Internet browser displays CVitae's home page.

Find job offer that corresponds to the position you are looking for. Starting with the job title, select the whole job offer text with your mouse. Make sure you select the company and contact information.

#### **Questions to Consider:**

- **Comment on the headings used in the above guide.**
- **Comment on the style and language.**
- **What pattern does the writer follow?**
- **How does the writer give instructions?**



## Sample Technical Proposal

**Date:** May 1, 2002

**To:** Sheila Campbell, Computer Resources Project Leader

**From:** Mary Silvers, VITR Project Manager

**Re:** Proposal to upgrade CAD computer systems

### SUMMARY

As you know, H.J.R. has just won the contract from Emory Bros., Inc., to provide them with detailed drawings that graphically display all the machinery that produces titanium in their plant. This contract is very important for the future health of our company as you are aware. In order to provide a quality end product, our department will need to upgrade its nine computers immediately.

Our current computers are running AutoCAD Rel.12, but we must upgrade to Rel.16 which Emory Bros. is supplying to our staff. Our computers do not have sufficient memory or speed to accommodate this new AutoCAD version. The new AutoCAD software requires 21 inch monitors so that our designers can see the detail that the software generates.

Our computer technician, Sharon Jones, has explored the various computer options and has chosen the Val-U-Mate computers as the most cost-effective and reliable for meeting the contract requirements. We propose that our company immediately purchase nine of these computers systems for our staff.

### DESCRIPTION

#### Technical Information

To meet the requirements of the contract, H.J.R. will need new computer systems that still keep costs in the budget.

*Computer Specifications:* The computers that will run AutoCAD Rel. 16 must have a minimum of:

- Pentium III processor
- 20 Gigabyte Hard Drive
- 128 MB SDRAM
- 8XMax DVD-ROM Drive

*Monitor Specifications:* The AutoCAD requires monitor that:

- measures 21 inches
- are compatible with a 32MB AGP Graphics Card

After carefully researching the many computers that fit our specifications and budget, we found that the Val-U-Mates were superior in all categories.

#### Computer Committee

Sharon Jones, H.J.R. network supervisor, was the head of the selection committee. The other members of the selection committee were Bob Anderson, lead design engineer, and Andy White, Project Supervisor. All three members have been company employees for at least eight years.

#### Schedule

Obviously, we need the computers before we can begin any computer work on the contract. Val-U-Mate has promised us next-day-delivery as soon as they get the order. Because we have a few preliminary details to take care of before we are ready to start the project, we can wait a week before we need the computers. Emory Bros., Inc., had already delivered AutoCAD Rel.16 to our office. Our schedule follows:

<b>Event</b>	<b>Date Needed</b>
<i>Purchase Computers</i>	Mon., May 8
<i>Deliver Computers:</i>	Wed., May 10
<i>Assemble Computers:</i>	Thurs., May 11
<i>Load and Test Software:</i>	Fri., May 12
<i>Begin Contract Work:</i>	Mon., May 15

### **Cost**

A chart detailing each computer, the technical details, and cost is included in the Appendix. A summary follows:

<b>Item</b>	<b>Cost</b>	<b>Number Needed</b>	<b>Total Cost</b>
<i>Computer:</i>	\$2399	9	\$21591
<i>Monitor:</i>	\$420	9	\$3780
<i>Zip Disks:</i>	\$6	200	\$1200
<i>Total Cost:</i>			\$26571

### **CONCLUSION**

We are very excited about the new contract with Emory Bros., Inc. This opportunity to apply our design skill and drafting expertise to a challenging project is very exciting. Delivering our final drawings to Emory Bros. will open the door to future work of this kind not only from their company but also from other companies who are looking for similar products. With our upgraded hardware, we look forward to aggressively bidding on other RFPs. We are proud that our department is able to contribute substantially to the continued financial health of H.J.R.