International Association Of Certified Practicing Engineers	**www.iacpe.com** **Knowledge, Certification, Networking**	 **Rev: 01** **Rev 01 – March 2016**
IACPE **No 19, Jalan Bilal Mahmood** **80100 Johor Bahru** **Malaysia**	**PROFFESIONAL TECHNICAL REPORTS AND PRESENTATIONS** **CPE LEVEL III** **TRAINING MODULE**	

The International Association of Certified Practicing Engineers is providing the introduction to the Training Module for your review.

We believe you should consider joining our Association and becoming a Certified Practicing Engineer. This would be a great option for engineering improvement, certification and networking.

This would help your career by

1. **Providing a standard of professional competence in the practicing engineering and management field**
2. **Identify and recognize those individuals who, by studying and passing an examination, meets the standards of the organization**
3. **Encourage practicing engineers and management professionals to participate in a continuing program of personal and professional development**

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TABLE OF CONTENTS

LIST OF TABLE

LIST OF PICTURE

INTRODUCTION

Scope

Engineering students probably imagine that success in your career will depend only on your technical competence. Your success will depend in equal measure on;1) your technical competence,2) your ability to communicate both orally and in writing and 3) your ability to work and play well with others. To be promoted you need all three skills sets.

For most technical writing, certain conventions apply regardless of the type of document being prepared. for example, tables of data should be prepared in a certain way whether they are in a technical report or a memo.

Writing should be in paragraph form, not in outline form. Remember the content of a report must be complete and should observe the ABC's of technical writing (accuracy, brevity, clarity). Length alone is not an indication of a report's worth.

The false perceptions of the engineering students only complicate the issue. Many still perceive the subject as the study of "English", seemingly unaware that analyzing literature and writing essays is an activity quite different than writing engineering reports and giving technical presentations about technical problems and engineering designs.

Some students consider technical communication to be nothing more than grammar and composition, packaged through it may be in technical reading exercises. even some engineering professors also adhere to the latter view, and are surprised to discover that the field has grown to be such a rich and varied one (and one, incidentally, that demands the talents of a communication specialist).

This guideline describes the specific attributes of technical writing and shows examples of how technical writing differs from other types of writing. 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 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

They are probably more attributes, but the attributes in the above list define some key characteristics that distinguish technical writing from other types of writing.

Pertains to a Technical Subject

Technical writing must pertain to some aspect of engineering or the sciences in a given subject area such as the following:

- Philosophy, psychology, and religion
- History
- Geography and anthropology
- Social sciences
- Political science
- Law
- Education
- Fine arts
- Language and literature
- Science
- Agriculture
- Technology
- Health/medicine

Libraries usually categorize books into these subject categories, and technical writing may apply to any of these categories if the work contains engineering or science as the

focus. The point is that technical writing can be one of many different subjects if the subject is being described or evaluated in an objective fashion.

A technical report is a formal report designed to convey technical information in a clear and easily accessible format. It is divided into sections which allow different readers to access different levels of information. This module explain the commonly accepted format for a technical report; explains the purposes of the individual sections; and gives hints on how to go about drafting and refining a report in order to produce an accurate, professional document.

What is a professional report?

A professional report is a report on a real world planning project or a detailed replica of a real world project. It provides an opportunity for students to demonstrate that they can diagnose a planning problem, select appropriate analytical methods to assess the problem, and evaluate and recommend strategies to address the problem.

A professional report is more professional in orientation and more objective than a master's thesis or many of the research papers students have written in the past. The professional report is more a piece of planning (tied to action) then an exercise in academic research (tied to general knowledge building). As a capstone project for the planning master's degree, the professional is designed to allow students to draw on skills and knowledge gained throughout the program.

General Consideration

A technical writer is a professional writer who engages in technical writing and produces technical documentation that helps people understand and use a product or service. This documentation includes online help, manuals (system, end user, training), white papers, design specifications, project plans, test plans, business correspondence, etc. With the rise of e-learning, technical writers are also charged with creating online training for their audience of learners. Technical writers explain technologies, processes, and products in many formats, including print, online, and other electronic means.

Technical writing is any written form of writing or drafting technical communication used in a variety of technical and occupational fields, such as computer hardware and software, engineering, chemistry, aeronautics, robotics, finance, consumer electronics, and biotechnology. IT encompasses the largest sub-field within technical communication.

The Society for Technical Communication defines technical communication as any form of communication that exhibits one or more of the following characteristics: "(1) communication about technical or specialized topics, such as computer applications, medical procedures, or environmental regulations; (2) communicating through technology, such as web pages, help files, or social media sited; or (3) providing instructions about how to do something, regardless of the task's technical nature"

"*…trained to reveal almost nothing about themselves in their writing. This makes them freaks in the world of writers, since almost all of the other ink stained wretches in that world reveal a lot about themselves to the reader.*" technical writers as Kurt Vonnegut describe.

Engineers, scientists, and other professionals may also produce technical writing, but often hand it off to a professional technical writer for development editing, proofreading, editing, formatting, and delivery to their audience.

A technical writer may apply their skills in the production of non-technical content, for example, writing high-level consumer information. Usually, a technical writer is not a subject matter expert (SME), but interviews SMEs and conducts the research necessary to write and complete technically accurate content.

A proficient technical writer has the ability to create, assimilate, and convey technical material in a concise and effective manner. They may specialize in a particular are abut must have a good understanding of the products they describe. For example, IACPE writers primarily work on IACPE documents, while other technical writers specialize in electronic commerce, manufacturing, scientific, or medical material.

Technical writers gather information from many sources. Their information sources are usually scattered throughout an organization, which can range from developers to marketing departments.

Effectively analyze the rhetorical situation. Creating effective technical documentation is driven by the writer's analysis of three elements that comprise the rhetorical situation of a particular project: audience, purpose, and context.

Technical writers strive to simplify complex concepts or processes to maximize reader comprehension. The final goal of a particular document is to help readers find what they need, understand what they find, and use what they understand appropriately.To reach this goal, technical writers must understand how their audiences use and read

documentation. An audience analysis at the outset of a document project helps define what an audience for a particular document requires.

When analyzing an audience, the technical writer typically asks:

Who is the intended audience?

- What are their demographic characteristics?
- What is the audience's role?
- How does the reader feel about the subject?
- How does the reader feel about the sender?
- What form does the reader expect?
- What is the audience's task?
- What is the audience's knowledge level?
- What factors influence the situation?

Accurate audience analysis provides a set of guidelines that shape document content, design and presentation (online help system, interactive website, manual, etc.), and tone and knowledge level.

Purpose refers to the function of a particular communication. A technical writer analyzes the purpose to understand what a document must accomplish. Determining if a communication aims to persuade readers to "think or act a certain way, enable them to perform a task, help them understand something, change their attitude," etc., guides the technical writer on how to format their communication, and the kind of communication they choose (online help system, white paper, proposal, etc.).

Context means the physical and temporal circumstances in which readers use communication—for example: at their office desks, in a manufacturing plant, during the slow summer months, or in the middle of a company crisis.Understanding the context of a situation tells the technical writer how readers use the communication. This knowledge significantly influences how the writer formats the communication. For example, if the document is a quick troubleshooting guide to the controls on a small watercraft, the writer may have the pages laminated to increase usable life.

Document design is a component of technical writing that affects readability and usability. According to one expert, technical writers use six design strategies to plan and create technical communication: arrangement, emphasis, clarity, conciseness, tone, and ethos.

Arrangement: refers to the order and organization of visual elements so that readers can see their structure—how they cohere in groups, how they differ from one another,

how they create layers and hierarchies. When considering arrangement technical writers look at how to use headings, lists, charts, and images to increase usability.

Emphasis: refers to how a document displays important sections through prominence or intensity. When considering emphasis technical writers look at how they can show readers important sections, warning, useful tips, etc. through the use of placement, bolding, color, and type size.

Clarity: refers to strategies that "help the receiver decode the message, to understand it quickly and completely, and, when necessary, to react without ambivalence." When considering clarity, the technical writer strives to reduce visual noise, such as low contrast ratios, overly complex charts or graphs, and illegible font, all of which can hinder reader comprehension.

Conciseness: refers to the "visual bulk and intricacy" of the design—for example, the number of headings and lists, lines and boxes, detail of drawings and data displays, size variations, ornateness, and text spacing. Technical writers must consider all these design strategies to ensure the audience can easily use the documents.

Tone: means the sound or feel of a document. Document type and audience dictates whether the communication should be formal and professional, or lighthearted and humorous. In addition to language choice, technical writers set the tone of technical communication through the use of spacing, images, typefaces, etc.

Ethos: - The degree of credibility that visual language achieves in a document. Technical writers strive to create professional and error-free documentation to establish credibility with the audience.

Qualifications

Technical writers can have various job titles, including *technical communicator, information developer*, or *technical documentation specialist*.

Technical writers normally possess a mixture of technical and writing abilities. They typically have a degree or certification in a technical field, but may have one in journalism, business, or other fields. Many technical writers switch from another field, such as journalism—or a technical field such as engineering or science, often after learning important additional skills through technical communications classes.

Methodology (document development life cycle)

To create a technical document, a technical writer must understand the subject, purpose, and audience. They gather information by studying existing material, interviewing SMEs, and often actually using the product. They study the audience to learn their needs and technical understanding level.

A technical publication's development life cycle typically consists of five phases, coordinated with the overall product development plan:

- Phase 1: Information gathering and planning
- Phase 2: Content specification
- Phase 3: Content development and implementation
- Phase 4: Production
- Phase 5: Evaluation

The document development life cycle typically consists of six phases (This changes organization to organization, how they are following).

1. Audience profiling (identify target audience)
2. User task analysis (analyze tasks and information based on target audience)
3. Information architecture (design based on analysis, how to prepare document)
4. Content development (develop/prepare the document)
5. Technical and editorial reviews (review with higher level personnel—managers, etc.)
6. Formatting and publishing (publish the document).

This is similar to the software development life cycle.

Well-written technical documents usually follow formal standards or guidelines. Technical documentation comes in many styles and formats, depending on the medium and subject area. Printed and online documentation may differ in various ways, but still adhere to largely identical guidelines for prose, information structure, and layout. Usually, technical writers follow formatting conventions described in a standard style guide. In the US, technical writers typically use the Chicago Manual of Style (CMS). Many companies have internal corporate style guides that cover specific corporate issues such as logo use, branding, and other aspects of corporate style. The Microsoft Manual of Style for Technical Publications is typical of these.

Engineering projects, particularly defense or aerospace related projects, often follow national and international documentation standards.

Environment

Technical writers often work as part of a writing or project development team. Typically, the writer finishes a draft and passes it to one or more SMEs who conduct a*technical review* to verify accuracy and completeness. Another writer or editor may perform an *editorial review* that checks conformance to styles, grammar, and readability. This person may request for clarification or make suggestions. In some cases the writer or others test the document on audience members to make *usability* improvements. A final production typically follows an inspection checklist to ensure the quality and uniformity of the published product.

Career growth

There is no single standard career path for technical writers, but they may move into project management over other writers. A writer may advance to a senior technical writer position, handling complex projects or a small team of writers and editors. In larger groups, a documentation manager might handle multiple projects and teams.

Technical writers may also gain expertise in a particular technical domain and branch into related forms, such as software quality analysis or business analysis. A technical writer who becomes a subject matter expert in a field may transition from technical writing to work in that field. Technical writers commonly produce training for the technologies they document -- including classroom guides and e-learning -- and some transition to specialize as professional trainers and instructional designers.

Technical writers with expertise in writing skills can join printed media or electronic media companies, potentially providing an opportunity to make more money and/or improved working conditions.

The U.S Department of Labor expects technical writer employment to grow 17 percent from 2010 to 2020, about as fast as the average for all occupations. They expect job opportunities, especially for applicants with technical skills, to be good.

Data Management Cycle

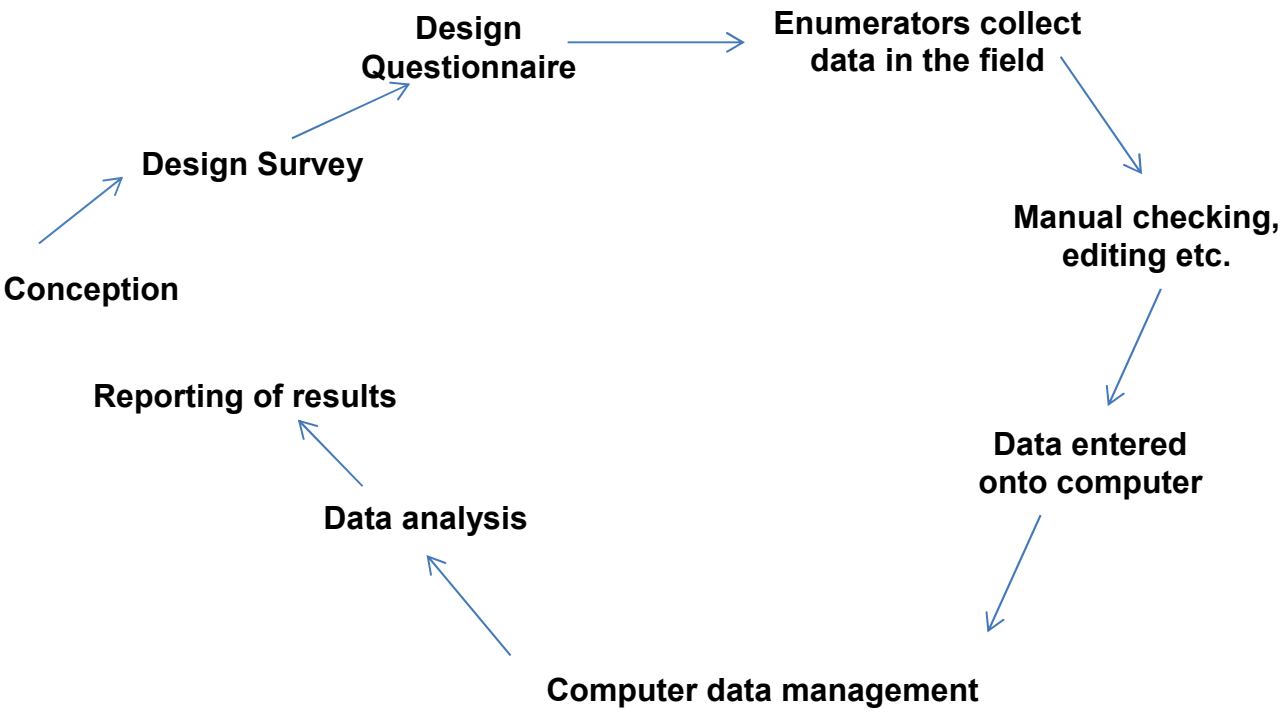

Figure 1 Data Management Cycle

This module is intended to equip you with the basic skills of communicating information to others without necessarily the need for meetings. Effective reports give a professional image and get others to take your work seriously.

A report is prepared account of what happened, about a particular event, presented in formal and organized format backed with statistical evidence.It may be a single report or a series of them.

Type of Reports

- Academic Report
  Academic reports are usually detailed and in most cases targeting academicians. They are of high content and the producer and the reader are at the same level or a little different.

- Professional Report
  - Professional reports are for informing and persuading people as well as initiating change
  - They may be detailed depending on the targeted audience/taste of the sponsor

In most cases they have a mixed audience of those who may understand the in-depth of the subject content and non-technical people like the decision makers.

Good Report

The following comments have been made by senior managers about what they look for in a good report.

Assess the comments and evaluate them

- A report must the needs of the readers and answer the questions in their minds
- A report must be at the right level for the readers. Some readers have an in-depth knowledge of the subject while others may be decision-makers without specialized, technical knowledge.
- A report must have a clear, logical structure-with clear signposting to show where the ideas are leading
- A report must give a good first impression
- Presentation is very important
- A report must not make assumptions about the readers' understanding
- All writers need to
  - apply the 'so what' test
  - explain why something is a good idea
- Reports must be written in good English
  - using short sentences with correct grammar and spelling
- Reports should have a time reference

Steps to Follow for a Good and Effective Report

1. Define your aim
2. Collect your ideas
3. Select the material and decide how to show the significance of your facts
4. Structure your ideas
5. Start on report writing

General Structure of the Report

- Title
- Introduction
- Main Body
- Conclusion and Recommendations
- Appendices

Report Editing

A checklist to use while editing a report looks at 7 areas

1. The purpose
   - Have you clarified your purpose?
   - Have you identified your readers' needs and characteristics?

2. Information
   - Have you included the main points?
   - Are these points supported by evidence?
   - Is the information relevant to the purpose?

3. Accuracy
   - Are there spelling mistakes?
   - Do the figures add up?
   - Are the references correct, in the text and at the end?
   - Are all sources of information listed in the References section?
   - Are abbreviations consistent?

4. Images
   - Are images clear?

5. Format
   - Is the report easy to follow?
   - Are headings and numbering clear?
   - Are the arguments followed through?
   - Is it logical/easy to follow?
   - Is the font and style consistent for the different levels, body, tables and graphics?

6. Language
   - Is it clear, clear, direct, easy to read?
   - Will the readers understand it?
   - Will its tone help you achieve the purpose?
   - Can unnecessary word/phrases be deleted?
   - Is the grammar/punctuation correct?
   - Is there any repetition?

7. Presentation
   - Is the layout appealing
   - Does it highlight important points?

DEFINITIONS

Accuracy– a level of measurement with no inherent limitation.

Data Analysis– a process of inspecting, cleaning, transforming, and modeling data with the goal of discovering useful information, suggesting conclusions, and supporting decision making.

Design Survey – critical in determining the quality of research. The potential for poor design is vast – whether intentionally on the part of the researcher or unintentionally.

Design Questionnaire - a multistage process that requires attention to many details at once.

Handout – something given freely or distributed free to those in need.

Heading – a process which incorporates the extruding and upsetting processes.

Objective – are more specific and easier to measure than goals. basic tools that underline all planning and strategic activities.

Patent – a set of exclusive rights granted by a sovereign state to an inventor or assignee for a limited period of time in exchange for detailed public disclosure of an invention.

References – a relation between objects in which one object designates, or acts as a means by which to connect to or link to, another object.

Report – any information work (usually or writing, speech, television, or film) made with the specific intention of relaying information or recounting certain events in a widely presentable form.

Research – in the broadest sense of the word, the definition of research includes any gathering of data, information and facts for the advancement of knowledge.

Slides – a single page of a presentation. Collectively, a group of slides may be known as a slide deck.

Sub-Heading – an additional headline or title comes immediately after the main headline or title. a title given to one of the parts or divisions of a piece of writing.