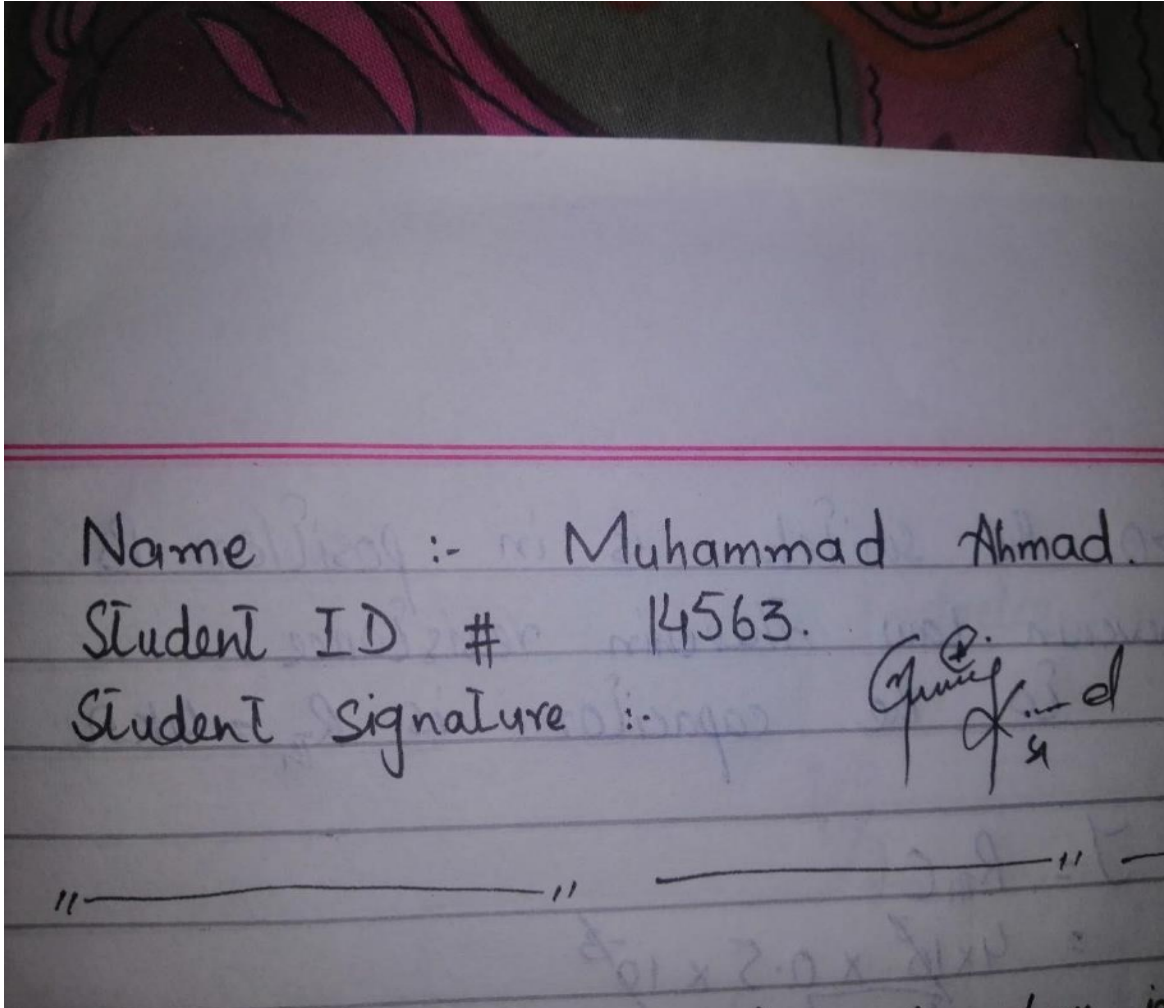


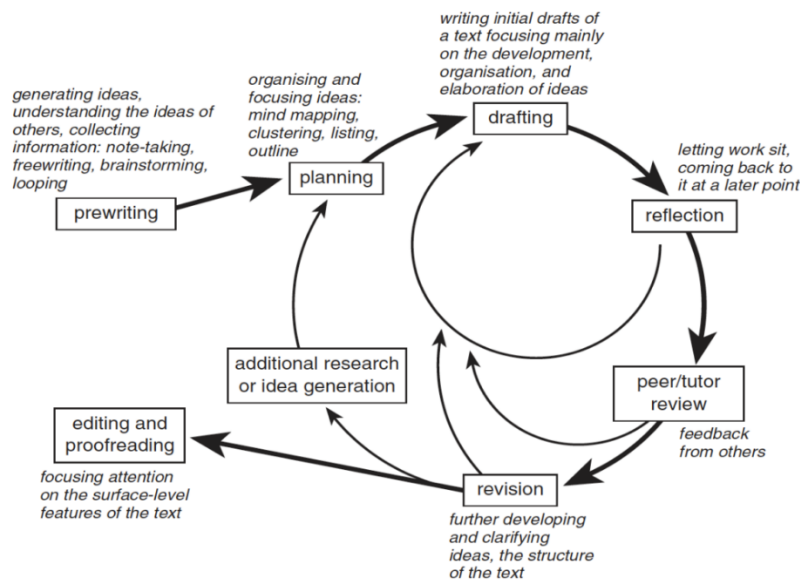
Department of Electrical Engineering
Course Title: Technical Report Writing
Module: 4th semester
Student Detail



QNo 1=Technical writers use design processes to creatively solve complex problems; they use writing processes to create complex documents. In both cases, there are steps or stages. What is the chronological manner to know the technical writing process?



Design Process (fig 1)



Writing Process Diagram(fig 2)

You may have come across a “writing process” before, and it may or may not have worked well for you. There is no single process that works for everyone in every situation. The key is to recognize the various steps in a typical writing process and figure out how to use or adapt them most effectively for your situation.

For example, you may have come across the 40-20-40 writing process, which suggests that you should break up the amount of time you spend on the writing task into three distinct stages of planning, drafting and revising, and give each one a specific percentage of the time you have available.

40-20-40 Writing Process

Stage 1 – Planning: spend 40% of your time planning your document (task analysis, thinking, discussing, free-writing, researching, brainstorming, concept mapping, focusing ideas, outlining, *etc.*)

Stage 2 – Drafting: spend 20% of your time writing a rough draft (quickly getting all your ideas down in print, in more or less complete sentences and paragraphs, in more or less the right order, without agonizing over style or grammar choices)

Stage 3 – Revising: spend 40% of your time revising, editing, and proofreading (polishing your draft, making sure the content is complete and well supported, ideas flow logically, formatting meets expectations, expression is grammatically correct and has the appropriate tone and vocabulary).

These percentages are a helpful guideline, as they emphasize the need to allot significant time for revision, but don’t always work for all people in all situations (think of a final exam situation!). It also does not clearly account for the need to iterate; sometimes while revising your draft (stage 3), you may have to go back to the planning stage (stage 1) to do additional research, adjust your focus, or reorganize ideas to create a more logical flow. Writing, like any kind of design work, demands an organic and dynamic process.

As with the design process, the writing process must begin with an understanding of the problem you are trying to solve. In an educational context, this means understanding the assignment you’ve been given, the specifications of that assignment, the objectives you are meant to achieve, and the constraints you must work within (due dates, word limits, research requirements, *etc.*). This is often referred to as “Task Analysis.” In professional contexts, you must also consider who your intended reader(s) will be, why they will be reading this document, and what their needs are, as well as deadlines and documentation requirements

Image descriptions

A design process flow chart that encourages you to revisit previous steps as needed for fig 1.

- **Define the problem.** This involves a needs assessment, problem statement, designing criteria and goals and background research.
- **Generate possible solutions.** Brainstorming using the idea trigger method, thumbnail sketching, and creative thinking. At this point, you may need to revisit your problem definition. Once you have a number of possible solutions, move on to the next step.
- **Evaluate possible solutions.** Do ideas meet design criteria? List the advantages and disadvantages. Select the best design alternatives. Use a decision matrix to evaluation. At this

point, you may need to revisit your problem definition or brainstorm some more. Once you have evaluated possible solutions, move on to the next step.

- **Make and test a model.** Create detailed technical drawings, prototype or scale model, mathematical and computer models, Conduct performance and user tests. At this point, you may need to go back to brainstorming solutions or evaluating possible solutions. Once you have a model you are happy with, move on to the next step.
- **Modify and improve design.** Fix problems, improve design, do more testing if needed. In the worse case, scrap the design. You may need to go back to evaluating possible solutions to making and testing the model. Once you have a design you are happy with, move on to the next step.
- **Communicate final design.** Create final technical drawings, and technical manuals for assembly, operation, and maintenance.

A writing process diagram that encourages constantly revisiting previous stages for fig 2.

- **Prewriting.** This stage is for generating ideas, understanding the ideas of others, and collecting information (note taking, free-writing, brainstorming, looping).
- **Planning.** Here, you are organizing and focusing ideas. This may involve mind mapping, clustering, listing, and creating outlines.
- **Drafting.** In the drafting stage you are writing initial drafts of a text focusing mainly on the development, organization, and elaboration of ideas.
- **Reflection.** In the reflection stage, you can let the work sit and come back to it at a later point. You may cycle back between drafting a reflection a number of times before moving on.
- **Peer/tutor review.** Now you can get feedback from others. This may require you to return to the drafting and reflecting stages.
- **Revision.** Here you are further developing and clarifying ideas and the structure of the text. This may require you to return to the drafting and reflecting stages. If the work requires additional research or idea generation, return to the planning stage.
- **Editing and proofreading.** Here the focus is on surface-level features of the text.

Qno 2 In research the question leads to a problem that needs to be solved by the researcher. Clearly explain the parameters within which your proposal must stay.

Definition #A research problem is a statement about an area of concern, a condition to be improved, a difficulty to be eliminated, or a troubling question that exists in scholarly literature, in theory, or in practice that points to the need for meaningful understanding and deliberate investigation. In some social science disciplines the research problem is typically posed in the form of a question. A research problem does not state how to do something, offer a vague or broad proposition, or present a value question.

The purpose of a problem statement is to:

1. **Introduce the reader to the importance of the topic being studied.** The reader is oriented to the significance of the study and the research questions or hypotheses to follow.
2. **Places the problem into a particular context** that defines the parameters of what is to be investigated.
3. **Provides the framework for reporting the results** and indicates what is probably necessary to conduct the study and explain how the findings will present this information

So What!

In the social sciences, the research problem establishes the means by which you must answer the "So What?" question. The "So What?" question refers to a research problem surviving the relevancy test [the quality of a measurement procedure that provides repeatability and accuracy]. Note that answering the "So What" question requires a commitment on your part to not only show that you have researched the material, but that you have thought about its significance.

To survive the "So What" question, problem statements should possess the following attributes:

- Clarity and precision [a well-written statement does not make sweeping generalizations and irresponsible statements],
- Identification of what would be studied, while avoiding the use of value-laden words and terms,
- Identification of an overarching question and key factors or variables,
- Identification of key concepts and terms,
- Articulation of the study's boundaries or parameters,
- Some generalizability in regards to applicability and bringing results into general use,
- Conveyance of the study's importance, benefits, and justification [regardless of the type of research, it is important to address the "so what" question by demonstrating that the research is not trivial],
- Does not have unnecessary jargon; and,
- Conveyance of more than the mere gathering of descriptive data providing only a snapshot of the issue or phenomenon under investigation.

Types and Content

There are four general conceptualizations of a research problem in the social sciences:

1. **Casulist Research Problem** -- this type of problem relates to the determination of right and wrong in questions of conduct or conscience by analyzing moral dilemmas through the application of general rules and the careful distinction of special cases.
2. **Difference Research Problem** -- typically asks the question, "Is there a difference between two or more groups or treatments?" This type of problem statement is used when the researcher compares or contrasts two or more phenomena.
3. **Descriptive Research Problem** -- typically asks the question, "what is...?" with the underlying purpose to describe a situation, state, or existence of a specific phenomenon.
4. **Relational Research Problem** -- suggests a relationship of some sort between two or more variables to be investigated. The underlying purpose is to investigate qualities/characteristics that are connected in some way
5. **Existence:** This is designed to uphold the existence of a particular phenomenon or to rule out rival explanation, for example, can neonates perceive pain?
6. **Composition:** It calls for breakdown of whole into components, for example, what are stages of reflux nephropathy?

Characteristics of Good Research Question

"The most successful research topics are narrowly focused and carefully defined but are important parts of a broad-ranging, complex problem."

A good RQ is an asset as it:

- Details the problem statement

- Further describes and refines the issue under study
- Adds focus to the problem statement
- Guides data collection and analysis
- Sets context of research.

Hence, while writing RQ, it is important to see if it is relevant to the existing time frame and conditions. For example, the impact of “odd-even” vehicle formula in decreasing the level of air particulate pollution in various districts of KPK.

Writing down the research question

- State the question in your own words
- Write down the RQ as completely as possible.

For example, Evaluation of reproductive hormonal profile in children presenting with isolated hypospadias)

- Divide your question into concepts. Narrow to two or three concepts (reproductive hormonal profile, isolated hypospadias, compare with normal/not isolated hypospadias–implied)
- Specify the population to be studied (children with isolated hypospadias)
- Refer to the exposure or intervention to be investigated, if any
- Reflect the outcome of interest (hormonal profile).

What Makes a Good Research Statement?

A good problem statement begins by introducing the broad area in which your research is centered and then gradually leads the reader to the more narrow questions you are posing. The statement need not be lengthy but a good research problem should incorporate the following features:

Compelling topic

Simple curiosity is not a good enough reason to pursue a research study. The problem that you choose to explore must be important to you and to a larger community you share. The problem chosen must be one that motivates you to address it.

Supports multiple perspectives

The problem must be phrased in a way that avoids dichotomies and instead supports the generation and exploration of multiple perspectives. A general rule of thumb is that a good research problem is one that would generate a variety of viewpoints from a composite audience made up of reasonable people.

Researchable

It seems a bit obvious, but you don't want to find yourself in the midst of investigating a complex research project and realize that you don't have much to draw on for your research.

IV. Mistakes to Avoid

Beware of circular reasoning. Don't state that the research problem as simply the absence of the thing you are suggesting. For example, if you propose, "The problem in this community is that it has no hospital."

This only leads to a research problem where:

- The **need** is for a hospital
- The **objective** is to create a hospital
- The **method** is to plan for building a hospital, and
- The **evaluation** is to measure if there is a hospital or not.

This is an example of a research problem that fails the "so what?" test because it **does not reveal the relevance** of why you are investigating the problem of having no hospital in the community [e.g., there's a hospital in the community ten miles away] and because the research problem **does not elucidate the significance** of why one should study the fact that no hospital exists in the community [e.g., that hospital in the community ten miles away has no emergency room].

QNo3 # Assume that your manager wants to create a Web page/ Facebook page/ YouTube channel. Investigate the situation, and write a report explaining the feasibility of creating and maintain a Web page/Facebook page/ YouTube channel.

Answer #One of the things that have set the present age apart like never before is the advent and continuous development of the social media. The social media indeed have come to stay and more and more people have taken to the internet to promote a whole lot of areas; from your personal life, to the business side of life.

The social media will continue to be handy. This is no wonder that several businesses have gone ahead to sprig up. If you do not have an idea of how to write a business plan, then you may want to consider using a template like this;

Industry Overview

Over the years, loads of stuffs have changed especially the way businesses are conducted and the marketing strategies that people employ to market their goods and services. The advent of the computer and later the internet gave a whole new definition of how things are supposed to be done in our world.

Social media marketing is one of the fruits of the internet and for sure it has enabled loads of entrepreneur to launch multi-million dollars international businesses; businesses with clientele base that cut across geographical boundaries.

Social Media Marketing in its simplest term is the process of pulling website traffic or attention through social media sites; they achieve this by creating content that attracts attention and encourages readers to share it across their social network platforms. One of the major purposes of leveraging on Social Media in marketing is that it covers a wide range of target market compared to other marketing tolls.

The Social Media Marketing industry comprises of social networking website publishers and developers as well. It is important to state that the industry does not include companies who majorly specialize in developing video games, internet content, online dating websites or online forums at all.

The Social Media Marketing industry is quickly expanding as a share of the economy. Before the year

2020, the Social media marketing industry value added, which represents its contribution to the economy, is projected to grow annually at a 26.2 percent rate.

In the meantime, GDP growth is forecast to increase at a 2.2 percent average rate per year over the same 10 year period. The growing trend which makes it easier for people to spend more time on the internet especially on social networking sites is a major boost in the revenue generated by social networking marketing companies.

Our Product and Services

Grapevine Marketing Consulting™, LLC was established with the aim of maximizing profits in the Social Media Marketing industry. We want to compete favorably with the leading social media marketing companies in the United States of America and the world which is why we have but in place a competent team that will ensure that we meet and even surpass our customers' expectations.

We will work hard to ensure that Grapevine Marketing Consulting™, LLC do not just work for clients in the United States of America, but also for clients in other parts of the world. Our products and services are listed below;

- Communication (advertising and branding) services
- Professional services
- Blogging services
- Specialty (image / profile boosting for individual clients) services
- Entertainment services
- Social media management services
- Social media marketing consulting and advisory services
- Other social media marketing related services

Our Mission and Vision Statement

Our vision is to establish a standard and world class social media marketing company whose services and brand will not only be accepted in the United States of America, but also in other parts of the world. Our mission is to provide professional and highly creative result oriented social media marketing services and other related services that will assist businesses, individuals and non-profit organizations in promoting their brands and reaching out to a wide range of potential customers all over the globe. We want to build a social media marketing company that can favorably compete with other leading brands in the social media industry.

Our Business Structure

Grapevine Marketing Consulting™, LLC, is a social media marketing company that intend starting small in Cape May, but hope to grow big in order to compete favorably with leading social media marketing companies in the industry both in the United States and on a global stage. We are aware of the importance of building a solid business structure that can support the picture of the kind of world class business we want to own. This is why we are committed to only hire the best hands within our area of operations. At Grapevine Marketing Consulting™, LLC, we will ensure that we hire people that are qualified, hardworking, creative, result driven, customer centric and are ready to work to help us build a prosperous business that will benefit all the stake holders (the owners, workforce, and customers).

As a matter of fact, profit-sharing arrangement will be made available to all our senior management staff and it will be based on their performance for a period of five years or more as agreed by the board of trustees of the company. In view of the above, we have decided to hire qualified and competent hands to occupy the following positions;

1. Chief Executive Officer
2. Creative Director
3. Human Resources and Admin Manager
4. Sales and Marketing Executive
5. Accountant
6. Web Designer cum Graphic Artist
7. Content Creator / Online Traffic Generator
8. Client Service Executive

SWOT Analysis

Grapevine Marketing Consulting™, LLC engaged the services of a core professional in the area of business consulting and structuring to assist our organization in building a well – structured social media marketing business that can favorably compete in the highly competitive social media marketing industry in the United States and the world at large.

Part of what the team of business consultant did was to work with the management of our organization in conducting a SWOT analysis for Grapevine Marketing Consulting™, LLC. Here is a summary from the result of the SWOT analysis that was conducted on behalf of Grapevine Marketing Consulting™, LLC;

Strength:

Our core strength lies in the power of our team; our workforce. We have a team of creative, result driven and highly proficient social media marketing expert, a team with excellent qualifications and experience various niche areas in the social media marketing industry and other related industry. Aside from the synergy that exist in our carefully selected social media marketing experts, our services will be measurable, result driven and guided by best practices in the industry.

Weakness:

As a new social media marketing company in Cape May – New Jersey, it might take some time for our organization to break into the market and gain acceptance especially from top profile clients in the already saturated and highly competitive social media marketing industry; that is perhaps our major weakness.

Another weakness is that we may not have the required cash to pump into promoting our business especially via main stream media (TV, Radio and Newspapers et al) the way we would want to.

Opportunities:

No doubt, the opportunities available in the social media marketing industry is massive considering the number of individuals and corporate organizations with active presence on the internet and of course the pretty large numbers of people who visit the internet / social media platforms on a daily basis. As a standard and world class social media marketing company, we are ready to take advantage of any opportunity that is available in the industry.

Threat:

Just like any other business, one of the major threats that we are likely going to face is economic downturn. It is a fact that economic downturn affects purchasing / spending power. Another threat that may likely confront us is the arrival of a social media marketing company in same location where our

target market exist and who may want to adopt same Business model like us.

MARKET ANALYSIS

Market Trends

The growing trend which makes it easier for people to spend more time on the internet especially on social media networking sites is a major boost in the revenue generated by social networking marketing companies. It is not common to find players in this industry generating an increasing amount of advertising revenue per user by developing targeted advertising platforms and tools to measure the effectiveness of advertising and marketing.

This has indeed changed the ways that organizations approach to interact with customers, as a substantial percentage of consumer interactions and profiling are now being carried out over online and social media platforms with much higher visibility.

Another important factor worthy of mentioning in this industry is that the target market keep expanding, people and organizations are now seeing the need for them to have an official website and also to engage the services of social media marketing experts either in branding or packaging their products and services or in helping them directly sell their products and services to their targeted market.

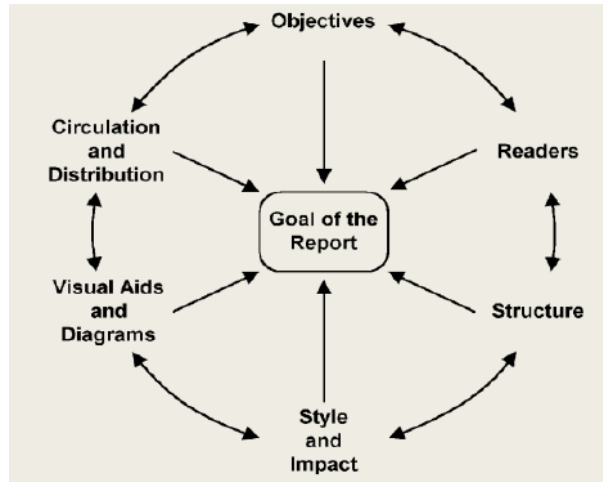
Another common trend in the social media marketing industry is that, most social media marketing firms no longer settle for clients within the location where their physical office is located but also from any part of the world. The truth is that with the advent of the internet, it is now easier for a social media marketing company to work for clients in any part of the world.

A social media marketing company can be located in the United States of America and have their biggest client in United Arab Emirates or in China. Many thanks to the power of the internet which has brought the world closer to us. Lastly, the social media marketing industry will continue to evolve due to the advancement of computer technology and software applications designs et al.

Qno 4=The report is generally written for the purpose of solving a problem. There are many different types of reports. Define different types of reports and explain the particular requirements for the Formal report

Ans = Report

A report is a statement in which the writer (or speaker if it an oral report) give information to some individual or organization because it is his or her responsibility to do so. It is an assigned communication for a purpose and for a specific receiver/reader. A report may be defined as a formal statement describing a state of affairs or what has happened. It contains detailed description of a problem or a situation, findings of an investigation, recommendation or action taken. A good report must be an orderly arrangement of some factual information that is objective in nature and serves some purpose.



Purpose of Report

1. Give information about a company's activities, progress, plans and problems.
2. Record events for future reference in decision making.
3. Recommendation specific action.
4. Justify and persuade reader about the need for action in controversial situations.
5. Present facts to the management to help decide the direction the business should choose.

TYPES OF REPORT

Reports can be classified into different categories on the basis of the media of communication, formats adopted, frequency of issue as well as on the basis of their functions.

On the Basis of Communication Media

1. Oral Reports

An oral report is face-to-face communication of an impression or observation. It is comparatively informal and time saving. It is simple and easy to present. But the receiver has to listen to every word of it.

2. Written Report

A written report is relatively more accurate and precise. It tends to be more formal and can be referred to again and again. It provides a permanent record and cannot be denied at any time.

On the Basis of Format and Procedures Adopted

1. Informal Reports

An informal report is usually in the form of person-to-person communication. It may range from a few lines to several pages of detailed information. It is usually written in form of a letter.

2. Formal Report

A formal report is presented in a prescribed form. It is prepared in accordance with an established procedure and is submitted to a prescribed authority.

On the Basis of Function

1. Information Reports

An informational report presents the data collection or facts observed in an organized form. It presents the situation as it is and not as it should be.

2. Interpretative Reports

Such a report is not only contains facts but also interpretation or evaluation of data. It includes report's conclusions and may also contain recommendation for action.

3. Routine Reports

These reports are required to be prepared and submitted periodically on matters required by the organization so as to help the management of the organization to take decisions in the matters relating to day to day affairs.

Formal report A formal report's intention is identifying a problem and finding the solution for that particular problem, much like a dissertation. The writer of a formal business report must have a crystal idea about the instructions that should be observed while presenting a report. Thorough understanding of the entire context is essential, to pierce through that particular issue and offer a solution that could be implemented by the managers of the organization. The memorandum part of the report is like a briefing of the entire report, to provide the reader a glimpse of the report that he is about to unfold. Although the writer might find it difficult to cite the problem along with the proper solutions with fixed outcomes, the reporter would strictly have to finish his report within the limit of 2000 to 3000 words. The references that the writer attaches should be collected from reliable journals and those references should not be less than seven. The researcher must remain cautious so that any irrelevant source does not get added in the list of the report. If the rule of the proportion would be followed, the researcher would have to provide an executive summary which is 10 percent of the entire length of the body. As the executive summary is the replica of the entire formal report. Some report writing examples would help to illustrate the matter farther. The brief of the problem, methodology and the recommendation should come in a separate paragraph in the executive summary.

The introduction part of the report would remain incomplete without a proper context and the background of the research along with the purpose of the study. An overview of the methodology, research methods, either primary or secondary should focus primarily on the medium of collecting information and analyzing them in each step. The points and analysis should appear in a convenient manner to the executives so that the report becomes easily understandable. The reporter should be aware of the circumstances and the working process of the company while providing recommendations for the implementation purpose. The snapshot of a formal report writing format sample can help to define the pattern more vividly.

Types of Formal Reports

There are many different kinds of formal reports that you may encounter throughout your career. Here are a few of the more common kinds:

- **Research reports** gather and explain data; these reports are informational. Module 4: Research discusses research methods to obtain the data you'll use in these reports.
- **Proposals** may be internal to a company in addressing a business situation, or they may come from a solicited or unsolicited sales situation. Formal proposals will include details of the proposed solutions and costs.
- **Feasibility reports** are a specific type of analytical report. When an entrepreneur or business manager has a new idea, it is prudent to fully explore the idea before making major investments. Some think of this report as a precursor to developing a full business plan. While a business plan may take many months to develop, a feasibility report can be developed in much less time, and it still provides excellent direction for decision makers.
- **Business plans** are typically informational reports about what a new or existing company plans to do over the next period of time. A business plan may take on a bit more of an analytical tone rather than a strictly informational tone when it is shared with potential investors. In some cases, the

business plan may be presented with a request for funds; in those cases, the writing is gently more persuasive.

- **Other complex recommendations** may also come in the form of a formal report. These recommendations result from a business problem that an individual or team has been asked to solve.

Sections of Formal Reports

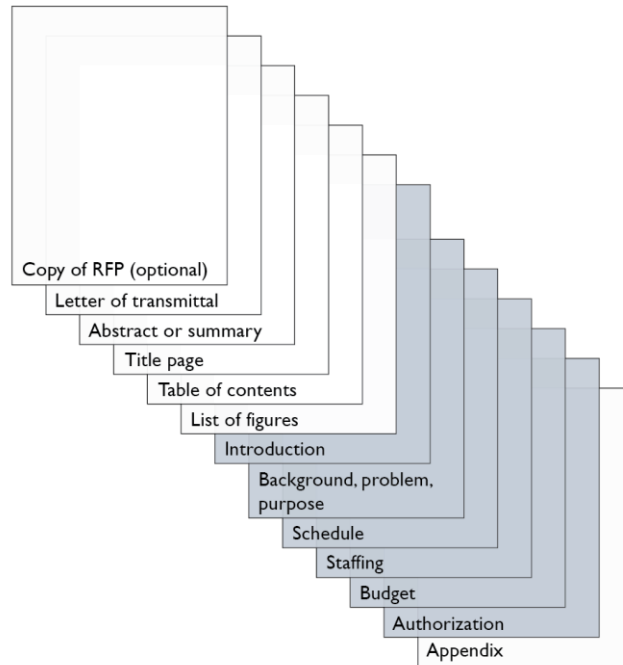
Depending upon the situation and the institution you're working for or writing to, some or all of the following sections may be required in a specific formal report. Some guides to formal reports indicate that specific sections are recommended for each type of formal report. However, smart writers will be sensitive to the organization's requirements or expectations and the needs of the information, then use that knowledge to determine the contents of their report.

The next few pages describe a large number of these section types so you, as a writer, may pick and choose what is appropriate to each situation. It is important to the report's impact and the writer's professional image to understand the purpose of each of these sections.

In a formal report there are three major sections.

1. The **front part** includes sections that come prior to the report itself to establish various items such as authority of the report and intended audience.
2. The **body** of the report has many sections of key information and possible analysis. It is the meat of the report.
3. The **back matter** contains sections of material that support the body.

Take a look at Figure 1 to see an example of the many potential sections in a sales proposal. Since this example models a response to an RFP (request for proposal), these sections were like required by the customer requesting the bid. The white, shaded, white pages related to the broad parts of a formal report. They are illustrative since the author determines specific sections needed based on report purpose company policy, and audience.



Title Page

Begin most business reports with a title page that contains the full title of the report, the name of the author or compiler, the name of the intended audience and the date of submission. A title page may also include the name of the organization for which the report has been prepared.

Abstract or Executive Summary

Highlight the main purpose and the primary points of a business report with a 200- to 250-word "abstract" or a one-page or shorter "executive summary." Abstracts and executive summaries usually follow the title page on a separate page and highlight the purpose, methods, scope, findings, conclusions and recommendations of the report.

Table of Contents

List the contents of a business report on a separate "Table of Contents" page. The table of contents page may precede or follow the abstract and should identify each primary section of the report by page number and in order of appearance. List of Figures, Tables, Abbreviations or Symbols If you include more than five figures or tables, list these items by page number on a "List of Figures" or "List of Tables" page following the table of contents. If the report uses several abbreviations or symbols, identify these as well on a separate "List of Abbreviations" or "List of Symbols" page.

Introduction

Begin the body of your report with an introduction that presents the purpose and scope of the report. Any background information or research necessary for understanding the rest of the report should be presented here.

Body

Identify primary sections of the body of the report with appropriate headings. These sections will cover the central content of the report, whether you are reporting on a current problem, a potential solution or some other subject of interest to your audience. Complement this material, where appropriate, with illustrations and tables as well as with research and sources.

Conclusions and Recommendations

At the end of the body of the report, present your concluding ideas and arguments in the “Conclusions” section. If appropriate, state your “Recommendations” as well, indicating the course of action you suggest in light of your arguments in the body of the report.

Endnotes or Explanatory Notes

If you do not include footnotes in the body of the report, you may find it helpful to include “Endnotes” or “Explanatory Notes” after your conclusions section. These notes provide additional helpful information for your readers that may be distracting if it were included in the body of the report.

Bibliography, References or Works Cited

List the references that you use either to prepare your report or to support the argument and ideas in your report on a separate “Bibliography,” “References” or “Works Cited” page after the endnotes section. Include any research sources, such as websites, books or interviews, that you used during your research or referenced directly in the text of your report.

Appendix and Glossary

If helpful for your readers, you may also want to include an “Appendix” or a “Glossary” at the end of your report. An “Appendix” provides information that is too detailed or involved to be included in the body of the report, but that may be helpful as additional reading. A “Glossary” alphabetically lists specialized terminology with definitions.

QNo5 It is considered illegal to reproduce someone else's expression of ideas or information without permission. Define the term which is used for this literary crime and explain how to protect any “Fact” that have been considered the intellectual property of the author.

Defining Plagiarism?

The Merriam Webster dictionary defines the act of plagiarism as; “to steal and pass off ideas, expression or words of another as one’s own”. Simply put, plagiarism is the process of taking other people’s words and/or ideas and pretending that they are your own. An alternative definition of plagiarism is forwarded by the Collins Dictionary which explains that plagiarism is the practice of using someone else’s work and pretending that it is your own. Plagiarism can also be defined as the act of deliberately trying to deceive your academic tutor by submitting content which is not your own work.

Citation: Jolly M, Fletcher AC, Bourne PE (2012) Ten Simple Rules to Protect Your Intellectual Property. *PLoS Comput Biol* 8(11): e1002766. doi:10.1371/journal.pcbi.1002766

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The concepts that underpin the protection of ideas and inventions are not new; such laws have been around for several hundred years and are discussed under the broad heading of intellectual property

(IP). IP is easily misunderstood, but at the same time most scientists encounter it at some point in their career, as it is a necessary feature in the commercialization of research.

The term intellectual property includes such concepts and rights as copyright, trademarks, industrial design rights, and patents. It is important to remember that IP is a tool to help your endeavours, and not a goal in itself. Having IP for its own sake is pointless. IP can be crucial in commercializing research and running a successful science-based business, but having a patent and having a successful patented product are two very different things.

Above all, IP can only work for you if you understand what it is, why you want it, and what you are going to do with it. These ten simple rules are intended to provide an overview of these issues; however, we must start with a warning. Laws relating to IP change all the time, they are complex, sometimes rather obscure, and are very different from country to country. For example, research surrounding methods of treatment by surgery and therapy and diagnostic methods are patentable in the United States, but specifically excluded from patentability in Europe [1]. However, these boundaries seem to be shifting in both the US and Europe. In short, we are dealing with a complex and changing subject and restrict ourselves here to the guiding principles.

Get professionals help

Although the process of obtaining IP looks deceptively simple, like many things the devil is in the detail. Let's consider patents as an example. The practicalities of patent application are straightforward; you simply file documents with the relevant body indicating that a patent is sought, and provide the identity of the person applying and a description of the “invention” for which a patent is sought. The patent office will then write back to you with an application number.

However, there is no guarantee that a patent application will become a granted patent. Indeed, at the application stage they do not even check that your description describes an invention at all. Even if you draft a description in as much detail as you would for an academic research paper and file it yourself, the prospect that it will be granted and enforceable is very low. There is skill and technique, even a language, that patent attorneys and patent agents have that allows them to describe and define inventions in the way a patent office requires. As an example, in everyday parlance, the terms “comprise” and “consist” could be considered to mean the same, whereas they have very distinct meanings in a patent application.

The dangers are possibly even greater with trademarks and registered designs (also known as “design patents”)—these are generally granted with very little examination and patent offices are often even less inclined to suggest using a patent/trademark attorney for such “simpler” rights; however, the lack of examination means the validity of such a right is uncertain and they become open to challenge. The costs of redrafting a self-filed application are invariably higher than the costs for drafting an application from scratch, and if there has been any disclosure it will probably not be possible to re-draft. So, in summary, if you want your IP to be valuable, you should seek professional advice at an early stage.

Know Your (Intellectual Property) Rights

IP rights come in various guises, and each is a defensive right to pursue legal action in the event that a third party infringes. In very basic terms:

Patents protect inventions—broadly, things that are new and not obvious—and the way they work. Sometimes this is expressed as “everything under the sun made by man”; however, there are numerous

local exceptions from patentability—we touched on the complexities of methods of treatment above—but there are similar issues in relation to genes, computer programs, and business methods, for example.

Registered designs protect the appearance of products (not the function, which is protected by patents). Trademarks protect brands (e.g., trade names and logos).

Copyright protects the expression of ideas—i.e., the words you choose to use to describe your idea—not an idea itself.

Most businesses do not need the trinity of patents, trademarks, and designs; in fact, trademarks are probably the only IP most companies have or need, however for a few companies the full house is required: for example, consider the Apple® iPad®: two registered trademarks, a registered design for its shape, and of course patents for the way it interacts with the user. Not to mention copyright covering the code and the packaging. A huge battle in the courts around the world is currently taking place over these rights that may well effect changes in the law. The Wall Street Journal calls the recent Apple/Samsung case “the patent trial of the century” .

Intellectual property

Intellectual property is often the foundation of emerging enterprises, so owners and managers of many small and growing companies focus their energies and resources on its development and protection. In fact, the balance sheets of many emerging companies show that their intellectual property is their most valuable asset. If competitors were free to copy and use those ideas and inventions, innovators would, in effect, be sacrificing their stock-in-trade. It is, therefore, critically important for companies to take steps to protect customer lists, patents, trademarks, proprietary systems, methods, processes, products and operational techniques. As a first step, every innovator needs to understand the definition of the various legal components of intellectual property.

Patents. A patent grants an inventor the right to exclude third parties from making, using or selling the subject matter of his or her invention throughout the United States for a defined period of time. Utility patents, which are the most common type of patents granted by the U.S. Patent and Trademark Office (USPTO), protect new, useful and non-obvious processes, machines, compositions of matter and articles of manufacture for a period of 17 years. Design patents, which stay in effect for 14 years, cover new, original, ornamental and non-obvious designs for articles of manufacture. And plant patents, which USPTO issues for certain new varieties of plants that have been asexually reproduced, are in effect for 17 years.

Trademarks, Servicemarks, and Tradenames. The Lanham Act of 1946 defines a trademark as any word, name, symbol, or device adopted and used by a manufacturer or merchant to identify and distinguish its goods from those manufactured or sold by others and to indicate the source of the goods. A servicemark serves similar purposes, but it protects the advertising and marketing of services rather than products. A tradename is the name a business or other organization selects to identify itself as a distinct entity. While it's true that some companies do use their tradenames as trademarks or servicemarks, it's important to treat the two varieties of intellectual property differently. A company cannot assume that its name has automatically acquired trademark or servicemark rights simply because it has been offering its goods or services under its particular company name. Tradename protection, which lasts 10 years, is granted by the USPTO.

Copyrights. Copyright protection is available to authors of original literary, dramatic, musical, artistic and certain other intellectual works that are fixed in any tangible medium of expression. In most cases,

the owner of a copyright from the USPTO has the exclusive right to or authorize others to reproduce and/or prepare derivative works, distribute copies, perform or display the copyrighted work, during the author's lifetime, plus 50 years. For more detailed information on this topic, read the article in this series entitled, "Copyright Law: A Strategic Primer."

Trade Secrets. A company's tradesecrets may comprise any information that it treats as confidential and proprietary and uses to give it an advantage over competitors. Rather than securing trade secret protection from a government agency, a company must define the scope of its trade secrets through its contractual and fiduciary relationships with its suppliers and customers.

Why should you avoid plagiarism?

There are many reasons to avoid plagiarism. You have come to university to learn to know and speak your own mind, not merely to reproduce the opinions of others - at least not without attribution. At first it may seem very difficult to develop your own views, and you will probably find yourself paraphrasing the writings of others as you attempt to understand and assimilate their arguments. However it is important that you learn to develop your own voice. You are not necessarily expected to become an original thinker, but you are expected to be an independent one - by learning to assess critically the work of others, weigh up differing arguments and draw your own conclusions. Students who plagiarize undermine the ethos of academic scholarship while avoiding an essential part of the learning process.

You should avoid plagiarism because you aspire to produce work of the highest quality. Once you have grasped the principles of source use and citation, you should find it relatively straightforward to steer clear of plagiarism. Moreover, you will reap the additional benefits of improvements to both the lucidity and quality of your writing. It is important to appreciate that mastery of the techniques of academic writing is not merely a practical skill, but one that lends both credibility and authority to your work, and demonstrates your commitment to the principle of intellectual honesty in scholarship.