Chapter 3

Technical Report types and its Applications

3.1 Introduction

Reports vary in their purpose, and in the type of information they present. However, all of them share similar features, a formal structure and careful planning, presenting the material in a logical manner using clear and concise language.

3.2 Types of reports

There are three types of reports

a) Informal Report
b) Formal Reports
c) Proposals

3.2.1 State types of informal reports.

a) Memo
b) Agendas of committee meetings
c) Minutes of meetings or Meeting Minutes

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3.2.1.1 Memo

A memo (short form of memorandum) is a very short document, usually up to a page long. In effect, it's an adaptation of a business letter, and is less formal than a letter.

How to write a memo?

The memo heading: it is quite different from those of a letter. A memo is headed by the word MEMORANDUM and followed by the side headings:

To:

Cc:

From:

Date:

Subject:

MEMORANDUM

To: (Name and **title** of the person to whom you are writing)

C: (Names and titles of other people to be sent copies of your memo (if required))

From: (Your name)

Date: (In the style 21 March 2016, not 21/03/16)

Subject: A clear, informative title, containing the main message of your memo. It is often side-heading in short memo, short memo (about half a page) or a centered title in a longer memo.

In separate paragraphs (body of the memo) write:

- purpose of the memo, Your conclusion(s) or main point & facts/data to support the conclusion(s). Note that the supporting data are placed after the conclusion(s) or main point. Don't lead up to them and place them at the end. Recommendation (if necessary)

Note. NO salutation or closing**,** i.e, doesn‘t use *yours sincerely/faithfully* etc.

All headings justified to the left-hand margin.

Your signature

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An example of a very short memo (half page long)

MEMORANDUM

To: Dr Peter Brown, Department of Mechanical Engineering

Cc: Prof. Jennifer Green, Head of Department, Mechanical Engineering

From: Pat Black

Date: 21 March 2016

Subject: My visit to Composites Construction Ltd

This is to let you know that from 14 to 17 April I shall be visiting the research labs at Composites Construction Ltd in Middletown.

As we previously discussed, my main activity will be to discuss the progress of our joint research program, our proposals for future development and the next round of funding.

I look forward to discussing the visit with you on my return

3.2.1.2 Agendas for Committee Meetings.

An agenda is a list of items to be discussed during a meeting. It must be drawn up in advance. An agenda may take various forms,

according to the requirements and, in some cases, the kind of meeting to which it refers. Be sure you know precisely what is expected of you.

- Here are two common forms of committee agenda:

A. The standard agenda

B. The discursive agenda

The standard agenda simply lists the subjects to be discussed, and the order in which they will be taken.

The discursive agenda is designed to stimulate thought before and comment at the meeting. It is often used for 'one-off' meetings.

In deciding what to include on an agenda, bear these points in mind:

a) Talk to the chairperson and other committee members who may have business to include.
b) Refer to the minutes of previous meetings for any business or discussions which were then deferred, and for reminders of routine annual, half-yearly, quarterly or monthly recurring items.
c) Keep a special file of documents which are likely to be required at the next meeting. Sort and arrange them before drafting the agenda.

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➢ Suitable format for Standard Agenda and Discursive agenda

A. **Standard agenda**

A suitable format for a standard agenda would be as follows:

1. Heading (including where and when the meeting will take place)
2. Apologies for Absence
3. Minutes of the Previous Meeting
4.
5. Items requiring the attention of the committee
6.
7.
8. Any Other Business (_leftovers', not items that should have been discussed within section 4–7)

9. Date of Next Meeting (also give the time and location)

10. Papers required for the Meeting (in the order that they will be needed).

Items 1–3 and 8–10 are standard. Between them come all other items requiring the attention of the committee.

B. Discursive agenda

A discursive agenda could be structured as follows:

1. Heading (including where and when the meeting will take place)

2. Introduction (what will be discussed, and why – keep it fairly general)

3. Scope (what are the boundaries of the discussion?)

4. Discussion points (list the items to be discussed and the reasons for discussing them)

5. Possible action (what options are open to the committee?)

6. Summary (the reason for the meeting; what it hopes to achieve and why members should attend and contribute)

7. Papers required for the meeting (in the order that they will be needed).

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3.2.1.3. Minutes of Meetings Writing.

Minutes are a record of the proceedings of a meeting e.g. who attended and did not, discussion that took place, action to be taken, time the meeting started and closed.

- **Purpose to write Meeting Minutes.**
  - To capture the essential information of a meeting – decisions and assigned actions.
  - To save and use them for reference or background material for future meetings relating to the same topic.
- **How will you write Effective Minutes? Explain with an example.**

The way the minutes are recorded may differ depending on the type of meeting it is. This means, you may need to record all the discussion as well as the resolutions or you may only need to record the

resolution and not worry about the discussion leading up to the resolution.

a) Before the Meeting: If you are recording the minutes, make sure you aren‘t a major participant in the meeting. You can‘t perform both tasks well. Make sure you leave some blank space to record your notes. Include the following information:

Date, time and place of the meeting The purpose of the meeting The meeting lead or chair‘s name Assigned action items Decisions made

b) During the Meeting: As people enter the room, check off their names on your attendee list. Ask the meeting lead to introduce you to meeting attendees you aren‘t familiar with. This will be helpful later when you are recording assigned tasks or decisions. When you‘re writing out your notes, use some of the following tips from the International Association of Administrative Professionals (IAAP).

Number the pages as you go, so you aren’t confused later. Focus on action items, not discussion.

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Be objective. Write in the same tense throughout and usually avoid using people‘s names except for motions or seconds. This is a business document, not about who said what.

Avoid inflammatory or personal observations. The fewer adjectives or adverbs you use, the better. Dull writing is the key to appropriate minutes.

If you need to refer to other documents attach them in an appendix or indicate where they may be found. Don‘t rewrite their intent or try to summarize them.

c) After the Meeting: Review the notes and add additional comments, or clarify what you didn‘t understand right after the meeting.

Who should be deputed to take the Minutes? Minutes are usually taken by the Secretary or Minute Clerk. If you are the person nominated to take the minutes, ensure you receive a copy of the agenda when it is distributed so that you are familiar with the matters to be discussed.

Example: Sample minute

TEACHING COLLEGE MINUTES Minutes of the Health and Safety Committee Meeting held in room G104 at 4pm on 9th July 20XX.

PRESENT Erin Smith, Health & Safety Officer (Chairperson) (ES) Ian Jones, Administration Officer (IJ) Aarlif Hussain, Staff Welfare Co-ordinator (AH) Bradley Pitt, Department Representative (BP) George Coney, Estates Manager (GC)

etc

Jo Smith (Secretary) (JS)

ACTION

1. **APOLOGIES FOR ABSENCE**
   Apologies were received from Brian Jones and Angela Green
2. **MINUTES OF PREVIOUS MEETING**
   The minutes of the previous meeting were taken as read, agreed as a true and correct record and signed by the Chairperson
3. **MATTERS ARISING**
   George Coney reported that the recent fire drills had been successful and all the issues raised last time had been resolved.
4. **NEW BUILDING REGULATIONS**
   These were effective from 1 October 20XX. Members agreed that all staff must be informed of the implications. A copy of the surveyor‘s letter was circulated and will be discussed in a meeting to be arranged for next week.
5. **PLANNED IT UPDATES**
   It was proposed that these would be undertaken by Ace Technology during October and November to minimize disruption to operations. George Coney will meet with Ace next week to discuss plans
6. **ANY OTHER BUSINESS**
   Aarlif Hussain raised the issue of bank holidays and has asked members to give him their thoughts at the next meeting
7. **DATE AND TIME OF NEXT MEETING/Adjournment**
   It was agreed that the next meeting should be held at 4pm on 10 October 20XX

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Signed …….. (Chairperson) Date----------

9) Write in detail about Technical Report.

General Format

Technical Reports have an organized format because a majority of your audience may not read the entire report in one reading. This specific format allows readers to quickly locate the information they need. Most technical reports include the parts listed below. However, you may be required to include or exclude specific sections. Be sure to check with your instructor before using the format outlined here.

- Cover letter(optional)
- Title Page
- Transmittal Letter/Letter of submittal (optional)
- Acknowledgments
- Table of Contents
- List of Illustrations/List of Figures & List of Tables
- Abstract
- Executive Summary
- Report Body
- References
- Glossary of terms (optional)
- Appendices

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A. Transmittal Letter and Covering Letter: They are business letters that accompany a document.

A covering letter is any letter that is sent together with any document.

Purpose:

(a) To provide the recipient with a specific context within which to place the document.

(b) To give the sender a permanent record of having sent the material.

(c) To show willingness to provide further information.

Transmittal Letter

Purpose:

• To adequately describe the contents of your document in the fewest possible words.

• To give the reader immediate access to the main subject matter.

A Transmittal Letter is a business letter and should be formatted accordingly; that is, you should include the recipient's address, your address, a salutation and closing. Depending on the project, you may also need to include contact information. Letter of submittal immediately follows Title Page. Always check with your instructor to determine whether or not you should attach a transmittal letter to your report.

Look at the sample Transmittal Letter below.

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December 12, 1996

Dr. Tom Siller Colorado State University Fort Collins, CO 80524

Dear Mr. Siller:

We are submitting to you the report, due December 13, 1996, that you requested. The report is entitled CSU Performing Arts Center. The purpose of the report is to inform you of our design decisions for the center. The content of this report concentrates on the structural and acoustical aspects of the CSU Performing Arts Center. This report also discusses cable-stayed technology. If you should have any questions concerning our project and paper please feel free to contact Mike Bridge at 491-5048.

Sincerely,

Mike Bridge Lead Engineer

B. Title Page

The title should tell the reader what the report is about. A technical report should always include a title clearly identifying the report. A title should be descriptive and accurate, but not wordy, verbose or too terse.

C. Abstract

Abstracts are formal summaries writers prepare of their completed work.

Purpose: to allow a reader to get a quick picture of the report's content and make a judgment. That is, to enable readers to decide what to read, whether to read the work in full or to decide what to pass over. Generally, Abstracts define the report's purpose and content. This section should give a true, brief description of the report's content. The content may present the:

- scope of the report
- major points, including a summary of your research methodology
- highlights of the conclusions and recommendations

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Since an Abstract is a brief summary of your report, its length corresponds with the report's length. So, for example, if your report is eight pages long, you shouldn't use more than 150 words in the Abstract. Generally, keep your abstract concise (preferably one page).

Types of Abstracts:

informative vs. descriptive and Structured vs. unstructured

Depending on the *kind of information they contain*, abstracts are often classified as descriptive or informative.

A *descriptive abstract* summarizes the **purpose**, **scope**, and methods used to arrive at the reported findings. It is a slightly expanded **table of contents** in sentence and paragraph form. A descriptive abstract need not be longer than several sentences.

An informative abstract - is an expanded version of the descriptive abstract. In addition to information about the purpose, scope, and research methods used, the informative abstract summarizes any results,

conclusions, and recommendations. The informative abstract retains the **tone** and essential scope of the original work, omitting its details.

The type of abstract you should write depends on your **audience** and the organization or publication for which you are writing. Informative abstracts work best for wide audiences that need to know conclusions such as proceedings and progress reports that do not contain conclusions or recommendations.

ABSTRACT (Example of Informative Abstract for an Article)

The Effects of Long-Distance Running on Male and Female Runners Aged 50 to 72 Years by Sandra Young

The long-term effects of long-distance running on the bones, joints, and general health of runners aged 50 to 72 can help determine whether physicians should recommend long-distance running for their older patients. Recent studies conducted at Stanford University and the University of Florida tested and compared male and female long-distance runners aged 50 to 72 with a control group of runners and non runners. The groups were matched by sex, race, education, and occupation. The Florida study used only male runners who had run at least 20 miles a week for five years and compared them with a group of runners and non runners. Both studies based findings on medical histories and on physical and X-ray examinations.

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Both studies conclude that long-distance running is not associated with increased degenerative joint disease. Control groups were more prone to spur formation, sclerosis, and joint-space narrowing and showed more joint degeneration than runners.

Female long-distance runners exhibited somewhat more sclerosis in knee joints and the lumbar spine area than matched control subjects. Both studies support the role of exercise in retarding bone loss with aging. The investigation concludes that the health risk factors are fewer for long-distance runners than for those less active aged 50 to 72. The investigation recommends that physicians recognize that an exercise

program that includes long-distance running can be beneficial to their aging patients' health.

Writing Strategies

Write the abstract *after* finishing the report or document. The abstract, although it heads the article, is often written last, together with the title. This is partly because,

• writers know what they have achieved, and

• partly because it is not easy to write an abstract.

• Or, the abstract may not accurately reflect the longer work.

Begin with a topic sentence that announces the subject and scope of your original document. It may be helpful if you first summarize the main points you have made in each section before combining them into as brief as possible piece of writing. It is also, easier to write an abstract if you remember that all abstracts have a basic structure. Based on their structure, they can be structured or unstructured.

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Descriptive Abstract - Decide what material is relevant to your abstract-distinguish primary ideas from secondary ones. Write with **clarity** and **conciseness**, eliminating unnecessary words and ideas. Do not, however, become so terse that you omit articles (*a*, *an*, *the*) and important transitional words and phrases (*however*, *therefore*, *but*, *next*).

Write complete sentences, but avoid stringing together a group of short sentences end to end; instead, combine ideas by using **subordination** and **parallel structure**. Spell out all but the most common **abbreviations**. In a report, an abstract follows the title page and is numbered page iii.

Types of Abstracts: Structured & Unstructured

Structured Abstracts are typically written using five sub-headings –'background', 'aim', 'method', 'results' and 'conclusions'. Sometimes the wording of these sub-headings varies a little – 'objectives' for 'aim',

for example, but the meaning is much the same. Compared with traditional abstracts, structured abstracts:

- contained more information
- were easier to read
- were easier to search
- facilitated peer review for conferences
- were generally welcomed by readers and by authors

Background: In 1997 four journals published by the British Psychological Society began publishing structured abstracts.

Aims. The aim of the studies reported here was to assess the effects of these structured abstracts by comparing them with original versions written in a traditional, unstructured format.

Method. The authors of the articles accepted for publication in the four journals were asked to supply copies of their traditional abstracts (written when the paper was submitted for publication) together with copies of their structured abstracts requested by the editor when their paper was accepted. Forty-eight such requests were made, and thirty pairs of abstracts were obtained. The abstracts were then compared on a number of measures.

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Results. Analysis showed that the structured abstracts were significantly more readable, significantly longer and significantly more informative than the traditional ones. Judges assessed the contents of the structured abstracts more quickly and with significantly less difficulty than they did the traditional ones. Almost every respondent expressed positive attitudes to structured abstracts.

Conclusions. The structured abstracts fared significantly better than the traditional ones on every measure used in this enquiry. We recommend, therefore, that editors of other journals in the social sciences consider adopting structured abstracts.

Above is an original abstract in structured form. The same can be written in unstructured form as given below:

In 1997 four journals published by the British Psychological Society began publishing structured abstracts. The aim of the studies reported here was to assess the effects of these structured abstracts by comparing them with original versions written in a traditional, unstructured format. The authors of the articles accepted for publication in the four journals were asked to supply copies of their traditional abstracts (written when the paper was submitted for publication) together with copies of their structured abstracts requested by the editor when their paper was accepted. Forty-eight such requests were made and thirty pairs of abstracts were obtained. The abstracts were then compared on a number of measures. Analysis showed that the structured abstracts were significantly more readable, significantly longer and significantly more informative than the traditional ones. Judges assessed the contents of the structured abstracts more quickly and with significantly less difficulty than they did the traditional ones. Almost every respondent expressed positive attitudes to structured abstracts. In short, the structured abstracts fared significantly better than the traditional ones on every measure used in this enquiry. We recommend, therefore, that editors of other journals in the social sciences consider adopting structured abstracts.

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D. Acknowledgments:

Briefly thank (e.g., people) who assisted you in compiling and writing up the information in the report. This may be from librarians, technicians or computer centre staff, for example. Here are Sample Acknowledgments**:**

MASK Engineering would like to thank Dr. Michael Schaff of the CSU Music Department and Ms. Annie Cleveland from the CSU Theater Department for their expertise and input for the CSU Performing Arts Center. We would also like to thank Dr. Tom Siller for his aid in our research and use of his research materials.

E. Executive Summary

Purpose: written for readers who,

- do not have time to read the entire technical report.

-do not want to read the report

-do not have specialist knowledge of the report

The length is usually no longer than 10% of the report. It can be anywhere from 1-10 pages long, depending on the report's length. It should summarize the key points and conclusions from your report. You might include an executive summary with your report, or the summary can be a separate document.

Some reports only include an abstract while others include an executive summary. Always check with your instructor to determine which to include or if you should include both.

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F. Table of Contents

Table of Contents is a list of the main sections/headings of the report and the page number on which they first appear. It goes on its own page.

- don‘t give range of pages: e.g., the following entry is wrong:

5.1 Experiment set-up 35-36

Correct is:

5.1 Experiment set-up 35

- include section heading (exactly as in report)
- List of Figures / Tables follows contents (usually on their own page)
- Figures and tables are embedded within the report body or placed at the end of the report in their own section (not the same as an Appendix)

G. List of Figures, List of Tables & List of Symbols

Like the Table of Contents, you need to present both of these in an organized, appealing format.

If you use tables, figures or symbols in your report, you must list them in the preliminary pages of your report, immediately after your Table of Contents page.

Each list identifies its components by number, title, and page number. Do not list any tables or figures that appear in the appendices. Typically, you can shorten a figure or table's title when you create these lists.

Let us discuss the format of Title Page, Table of Contents, List of Tables and List of Figures of a BSc Civil Engineering Project Report "A STUDY ON THE STABILIZATION OF EXPANSIVE SOIL USING RICE HUSK ASH".

Note: Title Page, Table of Contents, List of Tables and List of Figures must be in separate sheet

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TITLE PAGE

A STUDY ON THE STABILIZATION OF EXPANSIVE SOIL USING RICE HUSK ASH

PROJECT REPORT

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Submitted by

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V B.SC Civil Engineering

Under the Guidance of

Mr.Saife Michael Getachew

in partial fulfilment for the award of the degree

of

BACHELOR OF SCIENCE

in

CIVIL ENGINEERING



BULE HORA UNIVERSITY

BULE HORA, ETHIOPIA

JUNE 2018

TABLE OF CONTENTS

Chapter No.	Title		Page No.
	ABSTRACT		
	LIST OF TABLES		
	LIST OF SYMBOLS		
1	**INTRODUCTION**		
	1.1	Introduction to soil stabilization	
	1.2		
	1.3		
	1.4	Need for the Study	
	1.5	Scope of the Study	
2	**LITERATURE REVIEW**		
	2.1		
	2.2		

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3	**APPARATUS USED**			
4	**EXPERIMENTAL SETUP**			
5	**EXPERIMENTAL PROCEDURE**			
	5.1	Introduction		
	5.2	Mix Proportions		
		5.2.1	Mix proportions by using Clay Soil using Husk Ash	
	5.3	Description of Test Programme		
		5.3.1	Determination of Atterberg Limits	
		5.3.2		
6	**SAMPLE CALCULATIONS**			
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	6.2			
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7	**RESULTS AND DISCUSSIONS**			
8	**CONCLUSIONS**			
9	**REFERENCES**			
10	**BIBILIOGRAPHY (if Reqd.)**			
11	**APPENDICES (if Reqd.)**			

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LIST OF TABLES

Table No.	TITLE	Page No.
4.1.1	Liquid Limit for Clay Soil	
4.1.2		
4.2.1		
4.2.2		

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LIST OF FIGURES

Figure No.	TITLE	Page No.
3.1	Apparatus Used	
4.1	Experimental Setup	
5.2.1		

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LIST OF SYMBOLS & ABBREVIATIONS

EBCS	Ethiopian Building Code Standard
FA	Fine Aggregate
OPC	Ordinary Portland Cement
γ	Density
γ_d	Dry density
σ	Compressive Stress

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H. Report Body

In a technical report, the body typically presents an Introduction, context for the report, detail methods and procedures used to generate the report, demonstrate how results were obtained, describes the results, draws conclusions, and, if appropriate, makes recommendations. Throughout the body, you should include text (both your own and research from other sources), graphics, and lists. Whenever you cite information or use graphics from another source, you must credit these sources within your text. Check with your instructor to know which reference style to use.

I. References

Whenever you cite information (this includes graphics) from another source, you must credit the source in your References. Always check with your instructor to determine which reference style to use.

J. Appendices:

Appendices include information that is too large to fit within your report, yet information necessary to your report. For example, large graphics, computer print-outs, maps, or sample codes are best placed in Appendices. When making decisions about what to place in an Appendix, consider whether or not the material interrupts the reading flow. For instance, six pages of calculations would obviously cause readers to lose their train of thought. Appendices always appear at the end of a report.

K. List of Illustrations/Diagrams

Diagrams are an essential part of many technical reports, in some circumstances giving a great deal of information more easily than continuous prose could do.

3.2.2 Formal Report.

3.2.2.1. Progress report

Purpose: To report at intervals on the progress of a management project undertaken by several individuals.

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Possible structures for a series of progress reports

1. Initial report at the start of the activity

This is likely to be similar to a project proposal, in which you describe how you will approach the task. As with any plan, it will involve intelligent and informed guesswork. Use the principles given in

1. Executive Summary

2 Objectives

3 Initial analysis of the problem

4 A preliminary literature survey

5 A clear statement of how you propose to tackle the first stages of the project, together with a brief description of the methods you will use.

6 If needed, Schedule of Tasks.

7 Allocation of responsibilities individuals in the team

2 Intermediate reports

3 ***The final report***

This report will probably need to be longer than the preceding reports.

o It will need to tie up the whole body of work into a logical story.

o It should concentrate on the results, conclusions and recommendations.

o If required, a description and possibly a peer review of the tasks undertaken by the various individuals.

o If appropriate, a description of how the work you have done could be further developed in the future.

3.2.2.2. Consulting/Management Report

Purpose: To write a report as though you have been doing consulting work for the management personnel of another organization. In imagining the organization where your report is going, the following points need to be remembered:

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1. *Senior management may not read a whole report.* They rely heavily on the Executive Summary, Recommendations and Conclusions to get an overview of the substance of the report. A longer report may also need section summaries. They will expect to understand from these:

- What your work means.
- How it will benefit the company's activities.
- Any further work that needs to be done.
- Possibly, what it will cost.

2. *Senior management of an organization may not be technically or scientifically qualified*. They may be accountants or lawyers etc. Moreover, your report may be passed onto other people whom you didn't expect to read it. It may, for instance, be read by financial or local government personnel. This means that your report should be able to be understood by non-experts- at least in ***overview, meaning and implications***. It also needs to be written so that everyone can extract from it what they need, without having to read the whole document. Even

if they read the whole document, readers will need a pathway to help them navigate through it. The Executive Summary, Recommendations, Conclusions and section summaries are crucial parts of this.

Possible structure of a management report

- Title page
- Letter of Transmittal (cover letter), if needed
- Executive Summary
- Recommendations
- Table of Contents
- List of Figures
- List of Tables
- Glossary of terms and Abbreviations
- Acknowledgements

The following four sections may be required in a CONSULTING REPORT:

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- Purpose Statement: state the purpose of the document
- Scope (or Scoping) Statement: To describe the topics covered in the document.
- Procedure Statement: To describe the processes you followed in investigating the topic of the document
- Problem Statement: To describe the problem and its significance.
- Background or Introduction or both
- The body of the report: (structured under a series of headings appropriate to your topic) Conclusions (if not placed at the beginning) or Conclusions and Recommendations
- References (if needed)
- Appendices

3.2.2.3. Recommendation Report

Purpose: To make a recommendation or a series of recommendations, supported by a reasoned argument, together with appropriate background material, facts and data.

How to write it

- A recommendation report is focused towards the future: it should show the ability to objectively assess a set of conditions, and to recommend actions to be taken.
- Recommendations are your subjective opinions about the required course of action. But this doesn't mean you can go into wild flights of fancy.
- No recommendation should come out of the blue: your report should contain adequate supporting information for each recommendation.

Possible structure of a recommendation report

Title Page

Executive Summary or Summary or Abstract: Summarize the background material and your investigation.

Recommendations: List your recommendations. Or instead, uses section called Conclusions and Recommendations and place it at the end of the report (see below).

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Table of Contents

List of Illustrations (if needed)

The following four sections may be effective in a RECOMMENDATION REPORT, either before the Introduction/Background or as sections of it:

- Purpose Statement
- Scope (or Scoping) Statement
- Procedure statement
- Problem statement
- Introduction or Background
- Subheadings appropriate to the topic, and covering the methods and results.
- Conclusions**:** You may be required to write a section called Conclusions and Recommendations.

In this case, place it here at the end of the report and omit the Recommendations section after the Abstract.

- List of References
- Appendices

3.2.2.4. Engineering Design Report

Purpose: design reports are used to communicate your solution of a design problem, usually to your boss or a colleague.

Readership: The report should be written for another person of equal or greater competence than yourself.

General characteristics of design documentation

The report should be self-contained, except for references to other specific documents {contracts, drawings, textbooks, standards etc.). Your report must contain all the information needed for someone to check how you arrived at your recommended solution. While carrying out your design you will have used analysis to demonstrate that your design will actually solve the problem. This needs to be clearly set out in your documentation.

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Suggested structure of design documentation

1. Summary

2. Development of a Model

3. Design Calculations

The Summary: Purpose of this section: The Summary should state precisely what the report is about, and answer the following questions. To make sure you don't solve the wrong problem, write up the first two before you start the design.

1 What problem does the report address?

If the problem was defined in writing (assignment, tender or contract document), just refer to this briefly and accurately rather than restate

the whole problem. Your reader will already know what you were supposed to be doing.

2 What criteria were set for deciding on an adequate solution?

a) You can only make a sensible design recommendation if you understand the criteria that are to be used in judging the success of your design, and obviously you must know this before you start designing. Again, if these were defined in writing just refer to the original document.
b) Sometimes there are other constraints such as national standards that must be met. These should also be stated.
c) If the criteria were incomplete or contradictory, for example between the cost and durability of a new product, you need to decide the relative importance of the criteria to be used in making your decision. You need to explain this in a subsequent section.

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3 How did you model the problem?

Outline very briefly the factors influencing how you went about your design:

a) The analysis that was needed. How many different options were considered?
b) The main factors influencing the design.

Note: If you are designing something that is routine, this section would be very short.

4 What did you conclude?

Refer to drawings or other details of your recommended solution. If you considered various options, summarize why you chose your particular solution.

2. **Development of a Model: Purpose of this section**

The first step in an engineering design is to be able to conceptualize the problem in a way that allows standard methods of analysis to be used. This section should explain how you went about this.‘

Design calculations: Purpose of this section

This is the part which proves that your design will work as it should, and will consist mostly of small sketches and steps in solving equations.

Form of this section

- Use subheadings to make it clear what each section is about, and underline the important results.
- Include details of all components (material and dimensions of parts, electrical components etc.) plus all the physical properties you have used (strengths, elastic modulus, density, specific heats etc.).
- Your design report should contain only your final recommended solution.

3.2.2.5. Feasibility Reports

When organizations consider a new project—developing a new product or service, expanding a customer base, purchasing equipment, or moving operations—they first try to determine the project's chances for success. A feasibility report presents evidence about the practicality of a proposed project based on specific criteria. It answers such questions as the following:

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• Is new construction or development necessary?

• Is sufficient staff available? What are the costs?

• Is funding available? What are the legal ramifications?

Based on the findings of this analysis, the report offers logical conclusions and recommends whether the project should be carried out. When feasibility reports stress specific steps that should be taken as a result of a study of a problem or an issue, they are often referred to as *recommendation reports*. In the condensed feasibility report shown in Figure F–1, a consultant conducts a study to determine how to upgrade a company's computer system and Internet capability.

Before beginning to write a feasibility report, analyze the needs of the **audience** as well as the **context** and **purpose** of the study. Then write a

purpose statement, such as —The purpose of this study is to determine the feasibility of expanding our Pacific Rim operations,‖ to guide you or a collaborative team

Feasibility Report Sections

Every feasibility report should contain an **introduction**, a **body**, a **conclusion**, and a **recommendation**.

Introduction: The introduction states the purpose of the report, describes the circumstances that led to the report, and includes any pertinent background information. It may also discuss the scope of the report, any procedures or methods used in the analysis of alternatives, and any limitations of the study.

Body: The body of the report presents a detailed review of the alternatives for achieving the goals of the project. Examine each option according to specific criteria, such as cost and financing, availability of staff, and other relevant requirements, identifying the subsections with headings to guide readers.

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Conclusion: The conclusion interprets the available options and leads to one option as the best or most feasible.

Recommendation: The recommendation section clearly presents the writer‘s (or team‘s) opinion on which alternative best meets the criteria as summarized in the conclusion.

- **Sample Feasibility Report**

Introduction

The purpose of this report is to determine which of two proposed options would best enable Darnell Business Forms Corporation to upgrade its file servers and its Internet capacity to meet its increasing data and communication needs. . . .

Background: In October 2008, the Information Development Group put the MACRON System into operation. Since then, the volume of processing transactions has increased fivefold (from 1,000 to 5,000

updates per day). This increase has severely impaired system response time; in fact, average response time has increased from 10 seconds to 120 seconds.

Scope: We have investigated two alternative solutions to provide increased processing capacity: (1) purchase of an additional Aurora processor to supplement the one in operation, and (2) purchase of an Icardo 60 with expandable peripherals to replace the Aurora processor currently in operation. . . .

Additional Aurora Processor

Purchasing a second Aurora processor would require increased annual maintenance costs, salary for a second computer specialist, increased energy costs, and a one-time construction cost for necessary remodeling and installing Internet connections.

• Annual maintenance costs $35,000 Total annual operating costs $117,500

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• Construction cost (one-time) $50,000 Annual increased energy costs $7,500

• Total first-year costs $167,500 Annual costs for computer specialist $75,000

The installation and operation of another Aurora processor are expected to produce savings in system reliability and readiness.

System Reliability: An additional Aurora would reduce current downtime periods from four to two per week. Downtime recovery averages 30 minutes and affects 40 users. . . . [The feasibility report would also discuss the second option— purchase of the Icardo 60 and its long-term savings.]

Conclusion

A comparison of costs for both systems indicates that the Icardo 60 would cost $2,200 more in first-year costs.

Aurora Icardo 60

Net additional operating costs $56,300 $84,000

One-time construction costs $50,000 $24,500

First-year total $106,300 $108,500

Installation of an additional Aurora processor would permit the present information-processing systems to operate relatively smoothly and efficiently. -----

Recommendation

The Icardo 60 processor should be purchased because of the long-term savings and because its additional capacity and flexibility will allow for greater expansion in the future.

3.2.3. Proposals.

A proposal is a document written to persuade readers that what is proposed will benefit them by solving a problem or fulfilling a need. When you write a proposal, therefore,

• you must convince readers that they need what you are proposing,

• that it is practical and appropriate, and

• that you are the right person or organization to provide the proposed product or service.

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3.2.3.1 Proposal Forms

Proposals are written within a specific context. Understanding the context will help you determine the most appropriate writing strategy as well as the proposal‘s length, formality, and structure.

Informal Proposal Structure: Informal proposals are relatively short (about five pages or fewer) and typically consist of an introduction, a body, and a conclusion.

Introduction: The introduction should define the purpose and scope of your proposal as well as the problem you propose to address or solve. You may also include any relevant background or context that will help readers appreciate the benefits of what you will propose in the body.

Body: The body should offer the details of your plan to address or solve the problem and explain (1) what service or product you are offering;
(2) how you will perform the work and what special materials you may use; (3) the schedule you plan to follow that designates when each phase of the project will be completed; and (4) if appropriate, a breakdown of project costs.

Conclusion: The conclusion should persuasively resell your proposal by

emphasizing the benefits of your plan, solution, product, or service over any competing ideas or projects. You may also need to include details about the time period during which the proposal is valid. Effective conclusions show confidence in your proposal, your appreciation for the opportunity to submit the proposal, and your willingness to provide further information, as well as encouraging your reader to act on your proposal.

Formal Proposal Structure: Proposals longer than five pages are often called formal proposals and typically include front matter and back matter. The number of sections in a proposal depends on the audience, the purpose, and the scope of the proposal.

Front Matter of Formal Proposal

• *Cover Letter or Letter of Transmittal*. In the cover letter, express appreciation for the opportunity to submit your proposal, any help from the customer (or decision-maker), and any prior positive associations with the customer. Then summarize the proposal's recommendations and express confidence that they will satisfy the customer's or decision-makers needs.

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• *Title Page*. Include the title of the proposal, the date, the name and logo of the organization to which it is being submitted, and your company name and logo.

• *Table of Contents.* Include a table of contents in longer proposals to guide readers to important sections, which should be listed according to beginning page numbers.

• *List of Figures.* If your proposal has six or more figures, include a list of figures with captions as well as figure and page numbers

Body

• *Executive Summary*. Briefly summarize the proposal's highlights in persuasive, nontechnical language for decision-makers.

• *Introduction.*

• *Body*. (See the sections Grant and Research Proposals)

• *Conclusion.* ((See the sections Grant and Research Proposals)

Back Matter

• *Appendixes*. Provide résumés of key personnel or material of interest to some readers, such as statistical analyses, organizational charts, and workflow diagrams.

• *Bibliography*. List sources consulted in preparing the proposal, such as research studies, specifications, and standards.

• *Glossary*. If your proposal contains terms that will be unfamiliar to your intended audience, list and define them in the glossary.

3.2.3.2. Proposal Types: based on purposes

Proposals are written for many specific purposes, but the two most common types of proposals are sales proposals and grant & research proposals.

Grant and Research Proposals: Grant proposals request funds or material goods to support a specific project or cause. Grants are not loans and usually do not have to be repaid. For example, the president of Habitat for Humanity may write a grant proposal to a lumber company asking for a donation of lumber to help construct new housing for disadvantaged families.

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Research proposals request approval to conduct research to investigate a problem or possible improvements to a product or an operation. Because their purpose is to gain approval to conduct research, they do not focus on particular solutions or ultimate results. For example, an engineer may submit a research proposal to a manager for permission to research a new method that improves cement strength for bridges. Similarly, students often submit research proposals to request approval of their research plans for term projects, such as formal reports, or thesis projects.

Grant and research proposals are persuasive when they clearly define your research goals, your plan for achieving those goals, and your qualifications to perform the research. The proposal typically includes the following key components:

- **Title page**. This should be short and explanatory.
- **Introduction:** Explain the reasons for and the benefits of the proposal. What can readers expect as a result of the proposed

research, and what is the value of your potential findings?

- **Background:** Describe the problem your research will address so that readers are confident that you understand the problem completely. Illustrate how both your primary audience and others will benefit from the results of your proposed research. This section should contain a rationale for your research. Why are you undertaking the project? Why is the research needed? This rationale should be placed within the context of existing research or within your own experience and/or observation. Describe the problem your research will address so that readers are confident that you understand the problem completely. Illustrate how both your primary audience and others will benefit from the results of your proposed research.
- **Research Plan:** Discuss in detail your plan for conducting the research. First, focus on your research objectives—what specifically you plan to investigate. Then, focus on your research methods—how you plan to achieve your objectives (through interviewing? on the Web? through other sources?).

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A. **Aim**-The aim of a research project is a statement of what the research will attempt to do – often in the form of what is to be investigated, which is more appropriate for qualitative research, or what impact the main independent variables are believed to have on the dependent variable, an approach which is more suitable for quantitative studies.

Example

To investigate the 'maintenance path' for local authority school buildings in UK through establishing maintenance needs and work execution mechanisms, and provide maintenance information to designers in an environment of resource constraints.

B. Objectives-The objectives are statements within the strategic statement of aim; they are statements at the actual/operational level. Objectives take the aim of the research and translate the aim into coherent, operational statements. These are statements which relate to

each other logically but which are, each self-sufficient. They describe what the research hopes to achieve or discover through the study.

For most research projects, especially smaller ones, it is good discipline to restrict the project to a single aim and the objectives to about three. Such restriction promotes rigor in considering what the research is about and what can be achieved realistically. Keep the statements simple, especially for objectives, working with one independent variable in each which impacts on the dependent variable of the study, and ensuring that those variables can be identified. Example:

(1) To investigate any linkages between construction types and maintenance requirements.

(2) To examine any relationship between age of buildings and their maintenance needs.

(3) To determine the factors which impact on maintenance work execution for UK local authority school buildings.

(4) To develop and test a model for maintenance of UK local authority school buildings

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Hypotheses-it is a statement of conjecture–it suggests a relationship between an independent and a dependent variable and the nature of that relationship. The statement concerns direction in the relationship, known as causality.

Consider the following hypothesis:

'The method of programming construction projects employed by contractors influences project performance, and hence participants' satisfaction with those projects'. This statement contains two dependent variables–project performance and participants' satisfaction. This raises issues of what may be said about support for the hypothesis if, after testing, one part is supported and the other is not. Clearly, it would be preferable to split the hypothesis into two, or even three:

- Programming–performance
- Performance–satisfaction
- Programming–satisfaction

The performance–satisfaction relationship is implied in the hypothesis.

- **Methodology/methods**: Describe your proposed research methodology and methods and justify their use.
  - ❖ Why have you decided upon your methodology?
  - ❖ Why have you decided to use those particular methods?
  - ❖ Why are other methods not appropriate?

This section also needs to include details about samples, numbers of people to be contacted, method of data collection, methods of data analysis and ethical considerations.

Discuss in detail your plan for conducting the research. First, focus on your research objectives—what specifically you plan to investigate. Then, focus on your research methods—how you plan to achieve your objectives (through interviewing? on the Web? through other sources?).

- **Work Schedule/Timetable:** Outline realistic deadlines for specific research tasks that will help you achieve your objectives and meet the final deadline.

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Table 1: Survey Timetable

Date	**Action**
January – 5 February	Literature Search Primary Research (talk to revelant people)
6 February – 7 March	Develop and Pilot Questionnaire Continue literature search
8 March – 9 March	Analyse pilot work and revise questionnaire. Ask relevant people for comments
10 April – 21 April	Send our questionnaire. Categorize returned quesionnaires
21 April – 1 May	Send our reminder letter for no responses. Continue to categorize returned questionnaires.
1 May – 1 July	Data input. Data analysis.

2 July – 3 August	Write report Prepare oral presentation

- **Qualifications:** Summarize the expertise of those who will conduct the research. You might also include their résumés in an appendix.
- **Budget.** If you're applying to a funding body you need to think about what you will need for your research and how much this is likely to cost. Provide a list of projected costs for your research project, as appropriate, including costs of all resources needed to carry out your research plan. You need to do this so that you apply for the right amount of money and are not left out of pocket if you have under-budgeted. Funding bodies also need to know that you have not over-budgeted and expect more money than you're going to use. If you are a student you may not have to include this section in your proposal, although some tutors will want to know that you have thought carefully about what resources are needed and from where you expect to obtain these.

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Table 2: Research Budget

RESOURCE	**COST**	
	Unit Price (in Birr)	Unit Price (in Cents)
1 Good quality personal recorder with battery indicator light, self turning mechanism and headphones	500	0.99
10 90 minute audio cassette tapes	6	0,99
20 long – life batteries	50	55
40 second class postage stamps	70	0.60

Stationery-paper, envelopes, paper clips, ring binder, scissors	120	00
Travel expenses – petrol, overnight stay at five locations	Petrol to be notified at usual college allowance. Total accommodation = 8000	0.95
Advert in local paper	500	00
1000 Leaflets	3000	0.50
Total Expenditure	11746	5.08 + Petrol (to be notified)

Conclusion: Remind the reader of the benefits from your research and any specific products that will result, such as a formal report. Close with a request for approval by a specific date and offer to answer any of the readers' questions.

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