

General Guidelines on Writing Reports and Dissertations

Introduction

A good report is easy to recognise. It has a precise and informative title, a clear and well organised layout, is easy to handle, and opens flat to reveal both text and diagrams. It is written in a fluent and concise style; headings clearly indicate the content of each section; and diagrams, tables and graphs are clear and labelled. Reading a well written report is a pleasure. We cannot give you a detailed absolute, immutable set of rules for producing reports because the report's purpose should determine what it contains and how it is constructed. What we can give are some guidelines:

1. The READER is the most important person.
2. Keep the report as short as possible.
3. Organise the report for the reader's convenience.
4. Give complete and correct references.
5. Write in a concise, fluent style.
6. Put diagrams in the right place for the reader with the right titles.
7. Give the whole picture in miniature form in the summary.
8. Check the report thoroughly for technical errors, typing errors and inconsistencies.
9. Make the report look as good as it surely is.
10. The READER is the most important person.

Yes, 1 and 10 are the same. This is not a mistake, we have repeated 1 because it is one guideline that overrides all the others. A report is written once but is (you hope) read many times.

Aims

You need to have a clear set of aims before starting to write a report. In formulating the aims you need to consider:

- what is the intended content of the report;
- for whom is it being written; and
- why is it being written.

You will find it helpful to list a set of objectives under each of these headings before starting to write a report.

What is the intended content?

This depends on what you were asked to do: build a mathematical model, design a controller; compare design techniques; or write some software. For example, if you were asked to design a controller you might list the intended contents as:

1. Description of system to be controlled.
2. Choice of design method.
3. Details of design procedures and justification for decisions.
4. Assessment of performance of the design.

For whom is it being written?

This is clearly important in terms of setting aims. You are writing a dissertation so that we can assess your ability. Your aim is to obtain a high mark. This you can subdivide into several objectives:

1. To demonstrate your technical competence.
2. To show your organisational skills.
3. To demonstrate that you work hard and have initiative.
4. To demonstrate that you can write clearly and concisely.
5. To demonstrate that you can produce a good report.

Producing the Report

Having established the aims of the report you can begin collecting material: you probably have some already. You can begin organising the report before you have collected all the material. A good way of doing this is to separate the material into three categories:

1. Obviously important information which must go into the report.
2. Borderline information which might be of use to some readers, or which might amplify or substantiate other more important material.
3. Information that you find interesting (or cannot bear to throw away) but which is not relevant to the report.

Material in category 1 will probably go in the main body of the report and that in category 2 in an appendix. Material in category 3 you will probably eventually throw away (but not yet, for if you do you will find that it contained a piece of vital information which you had overlooked).

Beginning and End

A report has to start and has to end but you do not necessarily start writing at the beginning and stop writing at the end. Before elaborating further let us look at the general structure:

- Preliminaries.
- Body of the report.
- References (or bibliography).
- Appendices.

Frequently a good starting point is to decide what is to go in appendices and to assemble or write each appendix. The appendices should be used to remove information from the body of the report that is not essential to the majority of the readers. For example, details of how to use a particular computer program to obtain a controller design. This is valuable information for anyone who subsequently wishes to use the program but is not relevant to the reader who is interested in how the controller performs. Another use of appendices is to hold program listings or detailed tables of results. An appendix can also be used to contain background information which most readers will know but a few need to be told. For example, detailed derivations of formulae or theorems.

The Body of the Report

The body of the report should be broken down into chapters (or simply sections in a short report). Each chapter should have a title which conveys to the reader an idea of its contents. A typical chapter order is:

- Introduction: gives a general description of the project and the objectives.

- Background: reviews previous work by others that is relevant to the project. A review does NOT mean reproducing in detail materials given in text books, reports and papers. It DOES mean summarising the information so that a reader is informed of where to look for the information.
- One or more Chapters, the content of which will depend on the type of project. - a practical project may have a chapter in which the apparatus used (or built) is described; followed by chapters describing experimental or test procedures and discussion of results. - a design project may have a chapter describing a particular design method, followed by chapters describing how the method has been applied, a discussion of reasons for design decisions and an analysis of the design.
- A chapter containing a discussion of results or findings. For a design project this may take the form of a detailed assessment or evaluation of the design.
- A concluding chapter that summarises the outcomes of the project and in which proposals for further work are given. Suggestions for further work may range from simple statements about further experimental tests required to major proposals for totally different approaches to the problem that you have been studying.

Structure of Chapters

Just as the body of the report is divided into sections - chapters - so should each chapter be subdivided. Each chapter should have an introduction, a body, and a conclusion or summary. (There is a useful aphorism "Tell them what you are going to say, say it, then tell them what you have said"). Thus the introduction should briefly state the objectives of the chapter (what you are going to write about) and the conclusion should summarise the key points of what you have just written. The body of each chapter will normally be split into sections and sub-sections each of which should have a heading. In technical reports and books the most common form of identification for headings and sub-headings and is the so called legal or decimal notation. For example: Chapter 3 THE CONTINUOUS CASTING PROCESS 3.1 Introduction 3.2 Overview of Process 3.3 Metal Pouring and First Stage 3.3.1 The Mould 3.3.2 The Strand Cooling Unit It is seldom necessary to have more than three levels of heading, if you need further sub-division it is preferable not to number the sub-division. Simply give it an unnumbered heading.

References

Web references should not be over relied upon. Original or more permanent sources are preferred.

References are important and are used for a number of reasons, the main ones are:

1. To acknowledge the source of material being used.
2. To tell the reader where the confirmation of statements that you have made can be found.
3. To tell the reader where a more extensive or more detailed discussion of the subject (or related subject) can be found.

Whatever the reason for giving the reference, it must be accurate and complete. There is nothing more irritating than trying to follow up a reference and finding that it is wrong or incomplete. There are two commonly used forms of indicating a reference (citation) within the body of the text: numeric, and the so called Harvard system. In the numeric system the citation is indicated by the use of a superscript number in the text; 1 or by placing a number in square brackets in the text.[1] Note that in the numeric system the superscript number, as the number in brackets, follows any punctuation mark. In the Harvard system the citation is given in the text by the last name of the author(s) and the year of publication of the work. For example: Several numerical algorithms have subsequently been proposed to unwrap the phase spectrum for a given signal (Tribolet, 1976; McGowan and Kuc, 1982; Moura and Bageroer, 1988). A further example is: Fundamental results in this area were obtained by Sandberg (1964) and Zames (1963, 1964). If there are several citations to the same author for publications in the same year then they are identified by adding the letters a, b or c etc., to the year, for example, Sandberg 1964a and Sandberg 1964b. A reference with three or more authors would be cited in the list as Jones et al (1997) with the complete list of

authors included with the reference. Using the numeric format the above examples would be written as: Several numerical algorithms have subsequently been proposed to unwrap the phase spectrum for a given signal.1,2,3 and fundamental results in this area were obtained by Sandberg4 and Zames.5 A full list of references should be given at the end of the report. For the Harvard system they are arranged in alphabetical order of author. All the authors should be given with the last name of each author preceding their initials. For journal articles the preferred style of the citation is author name(s), year, title, name of journal, volume number, page numbers. For books: author name(s) year, title, place of publication, publisher. Examples Mayne, D.O., Brockett, B.W., 1973, *Geometric Methods in Systems Theory*, (Boston, MA: Reide). Sandberg, I.W., 1964, "A frequency-domain condition for the stability of feedback systems containing a single time-varying nonlinear element", *Bell System Techn. Journal*, 43, 1601-8. Note: the title of the journal and the title of a book are either set in italic type or underlined. The volume number of a journal should be set in a bold face type or should be preceded by the abbreviation "vol." (but not both). In the numeric system the references are listed in numerical order. In the above examples the list would be as follows:

1. J.M. Tribolet, 1977, "A new phase unwrapping algorithm", *IEEE Trans. Acoust., Speech, Signal Processing*, ASSP-26, 170-177, ASSP-26, 170-177.
2. R. McGowan, and R.Kuc, 1982, "A direct relation between a signal time series and its unwrapped phase: theory, example and program", *IEEE Trans. Acoust., Speech, Signal Processing*, ASSP-30, 719-726.
3. J.M.F. Moura and A.B.Baggeroer, 1988, "Phase unwrapping of signals propagated under the Arctic ice crust: a statistical approach", *IEEE Trans. Acoust., Speech, Signal Processing*, ASSP-36, 617-630.
4. I.W. Sandberg, 1964, "A frequency-domain condition for the stability of feedback systems containing a single time-varying non-linear element", *Bell System Technical Journal*, 43, 1601-8.

Note that in the numeric system the author's initials are placed in front of the last name.

Final comment on references

When you examine reference lists in books and journals you will find many different formats used- the exact format is a matter of house style and is not important. The three important things are:

- consistency;
- completeness; and
- correctness.

Citing Electronic Sources of Information

Special rules apply where information is derived from the World Wide Web or other electronic sources. The University of Sheffield Library provides guidance on the matter.

<http://www.shef.ac.uk/library/libdocs/hsl-dvc2.pdf>

Writing the Report

We cannot tell you how to write your report or dissertation but we can give you some brief comments. You can obtain more guidance in the books listed in the bibliography.

Brevity

The reader is probably a busy person so say what you want to say briefly. If you have little to say padding it out will not conceal the fact but will irritate the reader. Do not use phrases such as "at this present moment in time" when you mean "now" or "at present"; or "it should be noted that" when you could use "note". Use of the active voice "I recommend" is preferable to use of the

passive voice "it is recommended that...". Avoid adding "empty" words-keep a watch on words and phrases such as "rather", "quite", "fairly", "very", "in due course",-ask yourself if they are really necessary.

Sentences and Paragraphs

Sentences may be long or maybe short. Short sentences produce a clear, easily-read style for factual material. Longer sentences are appropriate when you want the reader to consider two or three ideas together or to compare and/or contrast information. Long sentences are difficult to construct and punctuate; you need to get the main subject at the beginning of the sentence so that the reader knows what is being commented on. Paragraphs should have a unity of content. This may be one idea or may be several that share some common theme. Paragraphs also have a psychological affect on the reader. One long paragraph extending over a page discourages the reader: many short paragraphs each consisting of one or two sentences gives an impression that the writer has not organised the material in a coherent way.

Punctuation and Spelling

Punctuation is simple when using short sentences: it becomes more difficult when longer sentences are used. Spelling mistakes distract the reader and hence obscure the information which you are trying to convey. You can avoid many errors, and correct typographical errors, by using a spelling checker, if you are using a word processor. However, a spelling checker will not detect all your mistakes. In particular it cannot detect words which are correctly spelt but wrongly used. You still need to read through your text. For technical words and new words you should adopt what seems to be the most common usage and be consistent. For example, non-linear and nonlinear are both acceptable but you should choose one form and use it consistently.

Format

General

A Microsoft Word template for formatting your dissertation is available. You should use the template provided.

Equations

All equations (or at least those that are referred to in the text) should be numbered. Place the number in parentheses "(")" at the right hand margin alongside the equation. Number the equations consecutively within each chapter, thus the fourth equation in chapter 5 will be numbered (5.4). For example. $y = mx + C$ (5.4) When referring to equations in the text use the form "equation 5.4" or "equations 5.4 and 5.5". All symbols used in equations should be either listed in a table of symbols at the beginning of the report or should be defined at the point of first use. If possible use a different type face to distinguish symbols that are based on the standard alphabet from normal text. A typical convention is to use an italic font for symbols.

Diagrams and tables

A clear, well drawn diagram can convey quickly a large amount of information; a muddled badly presented diagram will distract and annoy the reader. Diagrams should be carefully drawn (simple drawing packages with print out on dot matrix printers do not produce acceptable diagrams). Each diagram should have an informative title and each should be numbered in the order of appearance with a chapter. For example, "Figure 3.6 Schematic of Cracker Unit". In the body of the text diagrams should be referred to as "Figure 3.6" or "Figures 3.6 and 3.7". As far as possible the diagram should be placed close to the point in the text where it is first referred to. Tables should be numbered consecutively within the chapter and each should be labelled with the number and title. For example, "Table 6.3 Annual coal production from British mines 1900-1980".

Finishing the report

The report has been typed, you have assembled all the diagrams and tables and you have checked all the references, you sit back and think that you have almost finished. But you have not finished for there are still the preliminaries to complete. For your dissertation the preliminaries are:

1. Title page: this gives the name of the university and the department; the title of the project and your name as author, and the month and year of completion.
2. Abstract: this is a brief summary of the report in 100-150 words.
3. Executive Summary (in some cases).
4. Acknowledgements: acknowledgement of any help that you have received in carrying out the project and in writing the report.
5. Table of contents: this lists each chapter, section and sub-section with the starting page number for each.

Abstract

Writing a good summary of the report is difficult. In brief the summary should say what you were trying to do, what you did, and what you concluded. The reader wants to know what area of work the report covers. A good way of conveying this information is to ensure that the abstract contains the key words that will be recognised by a reader conversant with the discipline.

Executive Summary

In some cases you may be asked to provide an Executive Summary (for example, this is a requirement for MSc dissertations in the department) An Executive Summary is a more highly structured form of an abstract, intended to provide a one-page overview of an entire project. The Executive Summary should include some short sections or bulleted lists addressing the following aspects of the work:

- Introduction/Background
- Aims and Objectives
- Achievements
- Conclusions/Recommendations

Checking

You thought you had finished? No, you have not, for you have yet to check the report. If you possibly can, wait for 48 hours before doing the final check. The final check requires you to read the report line-by-line and to check everything: consistency of notation; equation, figure, table and page numbers; references; numerical data etc. When you are sure that all the material is correct and is assembled in the right order then the report can be bound.

Bibliography

Report Writing

Bolsky, Morris I., 1988, *Better Scientific and Technical Writing*, (London: Prentice Hall). Kirkman, John, 1992, *Good Style, Writing for Science and Technology*, (London: E. & F.N. Spon). Tusk, Christopher and Kirkman, John, 1989, *Effective Writing, Improving Scientific, Technical and Business Communication*, (London: Spon). van Emden, Joan, 1990, *Handbook of Writing for Engineers*, (Basingstoke, Macmillan Education). English Usage Gowers, Ernest, 1986 (revised), *The Complete Plain Words*, (Harmondsworth, Penguin). Punctuation Carey, G.V., 1971, *Mind the Stop*, (Harmondsworth, Penguin).

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