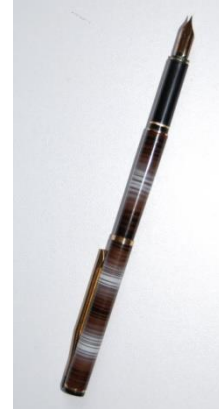# Technical Writing

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1   Writing Style

1.1   Structure of Technical Writing

In a good essay ideas are presented and discussed leading to a conclusion. In literature the structure of a book or story is as shown on Figure 1(a). The plot builds up until, at the end, all is revealed. The butler killed the duchess.

In technical writing the opposite structure is needed - Figure 1(b). At the beginning, the butler's crime would be exposed and the remainder of the report would tell how and why. The most important information is introduced as soon as possible and the less important parts are moved to the end - possibly in the form of an appendix.

A technical report should not tell a story about how ideas developed. Readers may only want to know the final conclusions; the means of arriving at these may be of secondary importance.

A fundamental strategy in technical report writing is to get the important information to the beginning - of the report, of the paragraph. of the sentence. The provision of an executive summary at the beginning of the report should be considered.
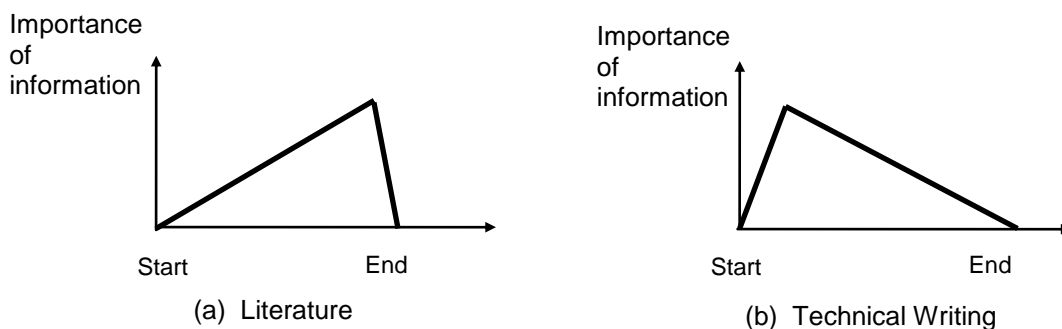
Figure 1 Structure of Writing

(a) Literature

(b) Technical Writing

1.2   Fog

The captain of a ship in a fog finds difficulty in knowing what course to steer. Readers of foggy writing have similar difficulty in knowing the direction of the text.

Foggy writing has the following characteristics:
*   Too many long sentences.
*   Too many long words.
*   Unnecessary words, phrases, sentences, paragraphs.

Consider the following sentence:

> Even more typically however, for most projects, the economically feasible provisions dealing with replacement and treatment of soils will provide partial rather than total relief from the problems of volumetric changes in potentially expansive soils.

This sentence (from a real report) is too long (35 words) and has a lot of unnecessary words. The following sentence gives the same information more efficiently:

> For most projects, economically feasible provisions will give only partial relief from problems of expansive soils.

The latter sentence has half the number of words as compared with the original, is much easier to read but delivers the same message. *It is good practice to scan what you have written and remove anything that can be removed without reducing the information to be transmitted.*

1.3   Length of a technical report

A technical report should be as short as is practical consistent with transmitting the necessary information.

1.4   Further Techniques for Improving Readability

Use simple words. Long words reduce readability so they should not be used if there is a shorter equivalent. Never use jargon if there is a well-known equivalent. But do not be afraid to use jargon provided you are sure that the reader will understand it.

Use short sentences. .   Structure the text in a similar form to that of speech. Few people talk in long sentences and it can help to consider how you might verbally describe the matter under consideration.

Activate the verbs. Formerly technical writing was expected to use passive verbs. For example the phrase ' it is believed that' was preferred to 'we believe that' or 'I believe that'. One has to be very careful in the use of the word 'I' but, contrary to some opinion, the first person can be used in technical writing and can improve readability. Some firms have a house style which prohibits the use of the first person in technical reports and, if this is so, then you will have to conform to the standard.   Use the first person sparingly to make important personal statements.

A small proportion of passive verbs may help to improve the flow of technical writing but use of mainly active verbs is best.
Example: : Activate the following sentence:

> Unsatisfactory results have been reduced by using new measuring equipment.

Answer;

> New measuring equipment has reduced unsatisfactory results

Think about the reader. Try to put yourself in the position of the reader and imagine what information will be needed.

Use lists.   In technical writing the use of lists of items can be worthwhile. Number the items in the list only if you need to refer to them by a number. If the numbers are not needed then put a 'bullet' at the beginning of each item and indent the text.

2   Structure of a technical report

2.1   General Items
The following items should be included in reports:
- **Cover page** with title in large font, name of author(s), date, name of client, name of firm, report number.
- **Sections**   Break down the report into *numbered and headed sections*.
- **Contents list**   Provide a contents list with numbers and titles of sections and subsections with page numbers in a column to the right of the items.
- **Page Numbers**   Make sure that all pages are numbered.

2.2   Heading Styles
All but very short reports should have numbered headings.   The headings should be defined using a word processor 'style'. Use of up to three levels of numbered headings is recommended. The advantages of using heading styles include the ease of inserting new sections and the ease of creating and updating a table of contents (e.g. from 'Index and Tables' on the Insert menu in Microsoft Word).

Example of heading style:
Heading 1:

1. Introduction (14 point, Arial, caps)
Text follows *after a blank line*

Heading 2:
1.1 Sub-title (12 point, Arial, caps and small)
Text follows on a *new line*

Heading 3:
1.1.1 Sub-sub-title   (12 point, Times New Roman caps and small)
Text follows on same line

2.3   Main font
The body text should normally be in 11 or 12 point single spaced.

2.4   Figures
All figures should be numbered consecutively either within the whole report (e.g. 'Figure 2' is the second figure in the report) or numbered within each main section (e.g. 'Figure 1.2' is the second figure in Section 1).   All figures must have a title after the number.   Do not have separate 'plates' or 'diagrams', etc. Describe all graphic items as 'Figures'.   The number and title to be centred *below* the figure. Each figure should have at least one cross reference to it in the report.

2.5   Tables
All tables should be numbered and have a title. It is normal to put such information left justified above the table. Each table should have at least one cross reference to it in the report.

2.6   Cross References

Plagiarism, copying, copyright.   *Plagiarism* is to claim authorship of information which is the work of others. This is totally unacceptable behaviour.   However using the work of others in a report is a common strategy and perfectly acceptable provided that sources are acknowledged and copyright is not infringed.   If you copy text directly from another source then put it in quotations and make a reference to the source. If your text uses information (without direct copying) from elsewhere then make a reference to the source (see later in this section). If you copy a figure, make a reference to the source after the title (on the same line as the title if there is room). References to sources may also be inserted as notes in a figure.

Copyright   It is generally accepted that when preparing academic reports, the copying of material from other sources with due acknowledgement is acceptable provided that it is only used within a narrow academic scope (and certainly not used for any financial gain).

References and bibliography   At the end of the report (before the appendices) provide a *References List* (this must be an item in the contents list).

Standards for cross references

1. Vancouver Method
References are numbered in the order that they appear in the text
Example
   1. Stevens L K   Elastic stability of practical multi-storey frames, *Proc. Instn. of Civil Engineers,* Vol 36, pp 99-107, 1967

2. Harvard Method
References are listed in alphabetical order of surname of first author followed by the year of publication
Example
Stevens L K (1967) Elastic stability of practical multi-storey frames, *Proc. Instn. of Civil Engineers,* Vol 36, pp 99-107.

Where there is no named author, the publisher's name should be given first in the list.

Cross references within the text of the report (or on figures)
Harvard Method
   A cross reference in the text of a document is the surname of the author followed by the year of publication.   For example: 'According to Stevens (1967) the stability of frames.   Where there is more than one reference in the list with the same author and year they are normally differentiated by adding a,b,c... after the year. For example   'According to Stevens (1967b)....'
   Where there are two authors use both names, e.g. 'According to Whyte and MacKay (1996)....'. If there are more than two authors use the form 'According

to Black et al.(1996)....'. Black' is the surname of the first author and 'et al.'
stands for' *et alteres* which is Latin for 'and others'.

2. Numerical Listing (Vancouver style)
   A cross reference within text then gives the number in brackets or in superscript.
   When using this convention the year normally comes last in the list of items in
   the reference (rather than second in the Harvard Method).

2.7   Checklist for reports

Body of Report
- Use A4 format , bound along left-hand side.
- Allow margins such that binding does not obscure anything.
- Binding should allow report to lie flat when open.
- All parts should be able to be viewed without dismantling the binding.
- Do not put text pages into transparent pockets
- Break down the text into numbered sections with headings and sub-headings.
- Number the pages consecutively

Length
Make the report as short as is practicable.

Sections
- Provide a contents list with page references.
- Provide an introduction stating objectives and referring to requirements such as
  the Service Brief and the Requirements Statement.
- Provide an executive summary if appropriate
- Provide conclusions if appropriate.

Text
- Put the most information to the front of the report, the paragraph, the sentence.
- Confine the main body of reports to essential information. Non-essential
  information should be in an appendix.
- Give cross references to all sources - including sources of copied diagrams.
- Use a standard format for references - Section 2.6
- Before the final printing *always* use the spellchecker.

Diagrams
- Give each diagram a number and a title (below the diagram).
- Number the diagrams and tables consecutively throughout or by section, e.g.
  Figure 2.2 is the second diagram of Section 2.
- The axes of graphs should be labelled and units given.

- Use portrait format if possible. If landscape format is necessary make sure that the binding edge margin is adequate and that the orientation is bottom of diagram to the right of the page

Drawings in Reports

Drawings associated with reports should be bound into the report (reduced to A3 or A4) or may be put in an easily accessible pocket if bigger than A3.