Writing Professional English

A Reference Handbook for Scientific and Technical Writers

A Language Competences Project

Project Partners

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1.3 Technical Reports

Engineering and science professionals write different kinds of reports, and these can have various names - project reports, interim reports, final reports, analysis reports, etc. The form, length, content and emphasis are determined by the purpose of the report and the intended end-user: for example, to brief managers, to provide technical background for lay people associated with a project, or to make recommendations to a technical supervisor. However, they all represent an important source of information in the scientific/technical field; kept on file, reports are there for the benefit for others to refer to in future project development.

The structure of a technical report

The basic structure of reports is similar to that of research papers (see Section 1.2 Research Papers), though you should check whether companies or sponsoring organisations have specific requirements about the format they want you to use. Here are some general guidelines about the sections you should include:

<table>
<thead>
<tr>
<th>Title</th>
<th>Keep this to not more than 10-12 words, to indicate the precise nature of the topic presented. Include the name (and details) of the author</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>Summarise the purpose of the work done and describe the main results in brief (between 50 and 120 words)</td>
</tr>
<tr>
<td>Table of contents</td>
<td>Make a list of all the sections in the report, with headings and subheadings. Include a separate list of figures and tables, numbered consecutively, together with the numbers of the pages on which they appear</td>
</tr>
<tr>
<td>Introduction</td>
<td>Describe the problem and your objectives</td>
</tr>
<tr>
<td>Materials and methods</td>
<td>Describe the source of your data. Indicate the model you have used for your work (with reference to its relevance and reliability). Explain your statistical methods or validation methods. What is the rationale for your methods?</td>
</tr>
<tr>
<td>Results</td>
<td>Include illustrations (figures, graphs) and explain what they mean. Make sure figure captions, axes and other text are clear</td>
</tr>
<tr>
<td>Discussion</td>
<td>Support the main findings of the report with further evidence and explanations. Analyse technical issues related to the report. Discuss limitations of the results</td>
</tr>
<tr>
<td>Recommendations</td>
<td>Not all reports have recommendations. But when they do, they should tell the reader what action should be taken to follow up the results given in the report</td>
</tr>
<tr>
<td>Appendices</td>
<td>These should serve a precise purpose, not just a means of adding something you have left over. They should include information helpful to your intended reader but not vital to their understanding of the main issues of the report, such as tables of raw data.</td>
</tr>
</tbody>
</table>

The language of reports

This should be even more concise, specific and oriented to the target-user than the language of research papers or articles. For examples of how language can be simplified, see Section 2.8 Describing Tables and Graphs and Section 3.2 Clarity.
2.4 Introductions

This section covers two forms of introductions:
- introduction to an article
- introduction to a research paper

Introductions to articles

The introduction does more than tell the reader what the subject of the paper or article is, though obviously it must do that. It must also capture the reader's attention at the beginning, or they will never continue to the end. A good introduction gets the reader wanting more.

Points to include in an introduction

In the introduction to an article you present your topic in general, then narrow the focus on the topic and make a clear thesis statement. Your thesis statement expresses the central idea of your paper. Everything else you write flows from this and depends on it. The thesis statement needs to be clear, and concisely and precisely stated.

Sample introduction to an article

The Use of Hemp in Reprocessed Paper Manufacture

As recycling paper becomes more common throughout the world, new uses for the reprocessed product are increasing. Paper bags and cardboard boxes, the pages of the latest best-selling paperback, disposable cups, paper towels and toilet paper all use recycled paper with varied effectiveness. The paper bags tear easier than those made of virgin paper. The paperbacks begin to crumble in a few short years, the paper towels break down quickly into mush and the paper cups leak before the coffee has even had a chance to cool. It is the nature of recycled paper. In the recycling process the waste paper is broken down and reformed. A result of the process is that the new paper has shorter fibres and is more brittle, with less tensile strength than the original paper.

Finding ways of adding strength to the recycled product, thereby making it a more usable and reliable material, has given rise to a whole research industry. Scientists are exploring changes to the recycling processes hoping to do less damage to the fibers. Additives to the paper are being tried at different stages of manufacturing with mixed results. The adding of non-recyclable materials to the papers does make them stronger, but defeats the purpose.

Finding suitable materials that meet the structural, recyclable and cost effective requirements are driving more and more researches to marijuana. No, not to smoke but for the fibres found in the marijuana plants. Marijuana, or Hemp (Cannabis sativa), fibres are proving to be one of the most promising recyclable additives. Papers with hemp fibres added in the pulp stage are proving to be stronger and more durable than those made of recycled paper alone. Hemp is the solution for the paper industry, certainly to the structure problems of recycled papers.

Analysis

- The introduction presents the topic Recycling Paper by stating very general information that most readers are already aware of.
- The topic is narrowed down to a particular problem with recycled paper: its lack of structural strength and the difficulties scientists have in trying to overcome it.
- This is then further narrowed down to a thesis statement at the end of the text, saying that hemp is the solution to the problem.
- Note that the writer suggests that hemp may perhaps have something more to offer the paper industry than just its strength.
- Note how the writer goes beyond the basic information in order to capture the reader's attention by planting a hook. Here the hook was Marijuana. A hook causes the reader to pause and pay attention, here to find out what marijuana has to do with recycled paper. The writer goes on to explain that it is a specific product of the hemp plant, fibre, that is a solution to the problem of weak and brittle recycled paper.
2.11 Abstracts

Abstracts are called ‘summaries’ by some journals, though strictly speaking the terms are not exactly the same.

- A summary restates the main findings and conclusions of a paper and is written for people who have already read the whole thing. (See section 2.12 Summary Writing)
- An abstract is a shortened version of the paper written for people who may never read the full version. Since abstracts are often reprinted in abstracting journals separated from the original paper, they need to be self-explanatory.

An abstract normally appears at the top of the page in front of the actual paper it outlines. The purpose is to inform readers as concisely as possible what is in the article so that they can decide whether to read it in detail.

Types of abstracts

There are two kinds of abstract –

- **Descriptive abstract**: this provides a kind of ‘contents list’ of what will be in the paper; what the writer will deal with or attempt to prove in the article, rather than a synopsis of the actual results. Since it contains general statements, it is more appropriate for longer papers, such as review articles, and can be written before the paper itself is drafted.

- **Informative abstract**: this does not simply describe what will be in the paper, but also gives a summary of the main factual information, such as your methods and materials, results and conclusions. This type of abstract is more suited to papers or reports about original research. It is usually better to write an informative abstract when the writing of the complete paper is finished.

A research abstract is an informative abstract with a more formal structure. This structure is often called IMRAD, consisting of Introduction, Methodology, Results, Analysis, Discussion.

Deciding whether to write a descriptive abstract or an informative abstract

Your journal editor will guide you on this point. Normally, when writing up research, the informative abstract is better since you give the reader factual information as well as your main opinions. In some circumstances, the descriptive abstract is preferred, e.g. if you are working in a controversial area and have results that you do not want to reveal until the reader has read the whole paper. Abstracts can also be a mixture of both descriptive and informative elements.

Length of an abstract

There is no fixed length. It is important to write enough for what the reader needs to know rather than summarising everything in the paper. A typical length is between 100 and 250 words, or between 5% and 10% of the original.
Points to include in an informative abstract

The informative abstract will contain a selection of these elements, depending on how you perceive the reader's needs
- an expansion or explanation of the title
- the purpose of the research
- how the research was conducted
- what the main findings were
- what the findings mean
- what recommendations can be made, e.g. for further research
- what the limitations of the research were

Normally you would NOT include in your abstract
- any information that is not in the paper itself
- tables and diagrams
- citations from other people's work

Structure of an abstract

Rather than following the sequence of sections in the paper itself, it is often a good idea in an abstract to put the most significant ideas first, whether it be the method, the results, your recommendations, or whatever. In this way, readers who are short of time will at least know your main point even if they only read the first sentence.

Difference in style between a descriptive and an informative abstract

Both types of abstract must communicate ideas effectively, preferably with direct, active statements in short, simple sentences. There can be a difference in the use of verb tenses:
* use the present tense when you make general statements of fact, or say what your paper does (as in a descriptive abstract)
* use the past tense when you explain what you actually did or found out in your piece of research (as in an informative abstract)

The descriptive abstract will make more use of generalised vocabulary and phrases, while the informative abstract will have more precise, specific language, including numbers.

Sample abstracts

Abstract A

An Overview of Rotating Stall and Surge Control for Axial Flow Compressors.

Modeling and control for axial flow compression systems have received great attention in recent years. The objectives are to suppress rotating stall and surge, to extend the stable operating range of the compressor system, and to enlarge

Points to note
Purpose. Abstract A is a descriptive abstract: it tells you what the writers do in the article, but not their actual ideas.
Structure. 'A' begins with an explanation of the research field, its aims and the potential outcome of the research; it goes on to state the authors' intention of surveying the research literature and
domains of attraction of stable equilibria using feedback control methods. The success of this research field will significantly improve compressor performance and thus future aeroengine performance. This paper surveys the research literature and summarizes the major developments in this active research field, focusing on the modeling and control perspectives to rotating stall and surge for axial flow compressors.

Keywords: axial flow compressor, rotating stall, surge


Abstract B

CD46 is a Cellular Receptor for Human Herpesvirus 6

Human herpesvirus 6 (HHV-6) is the etiologic agent of exanthem subitum, causes opportunistic infections in immunocompromised patients, and has been implicated in multiple sclerosis and in the progression of AIDS. Here, we show that the two major HHV-6 subgroups (A and B) use human CD46 as a cellular receptor. Downregulation of surface CD46 was documented during the course of HHV-6 infection. Both acute infection and cell fusion mediated by HHV-6 were specifically inhibited by a monoclonal antibody to CD46; fusion was also blocked by soluble CD46. Nonhuman cells that were resistant to HHV-6 fusion and entry became susceptible upon expression of recombinant human CD46. The use of a ubiquitous immunoregulatory receptor opens novel perspectives for understanding the tropism and pathogenicity of HHV-6.

Points to note

Purpose. Abstract B is an informative abstract: it contains details of what was investigated, what the findings were and what might happen in the future.

Structure. ‘B’ first defines HHV-6 and explains its importance; it gives the purpose of the research (we show that …), the method (downregulation …) and the results; it concludes with a statement of future prospects as a result of the research.

Language use.
- It uses present tenses for general statements and explanation of what the paper does.
- It uses past tenses to describe the procedure and results of the research.
- It contains a greater density of technical, topic-related terms than the descriptive abstract, together with specific verbs to describe precisely what happened in the research (inhibited, blocked, etc.).
- Note the use of the passive when describing the research.
- It also uses extended sentences in order to condense information. For example, the first sentence is Human Herpesvirus 6 is …, causes …, and has been …

Santoro F., Kennedy P., Locatelli G., Maluati M., Berger E., Lusso P. Cell Vol 99 No 7 December 23, 1999

Points to check in your own writing

- Do you need to write an informative or a descriptive abstract?
- Does your abstract give the reader a clear, straightforward idea of what your research is about?
- Does it contain the right amount and the right kind of information (depending on what type it is)?
- Is it the right length?