Good Habits of Technical Writing

Before embarking on the details of grammar, punctuation, and wording the following general recommendations are provided:

1. Understand that a pedagogical presentation is as important as the content; focus aggressively on clarity: First write, rewrite, and revise, then put the text aside for a while before reviewing, rewriting, and revising again
2. While focusing on a clear and inspirational presentation, never compromise on technical quality and academic integrity
3. To improve your writing, study and imitate the style and phrasing of publications that you find particularly clear and inspiring
4. Define who your readers are and continually imagine them reading what you write
5. Always start writing a paper by spending significant time setting up a bullet-itemized outline; a guideline is provided in the section below
6. Let each paragraph have one topic and provide meaningful links between paragraphs to assist the flow of the text
7. Write grammatically active and complete sentences in accordance with the rules that are described later in this document
8. Continuously search for more formal words to replace more informal ones; this improves the style, clarity, and suitability of an academic paper
9. Keep the sentences short and concise; mercilessly place each word on a imaginary scale to test if it really justifies its presence
10. Avoid abbreviations unless they significantly improve the readability and brevity of the subsequent text; if an abbreviation is necessary then define it only once, where it first appears
11. Always describe and discuss the content of tables and figures in the text, but do not duplicate data from those elements in the text
12. Avoid the use of boldface, italics, underline, parenthesis and other importance labels in the text; state everything with words

Outline

Regardless of whether the document is a paper, thesis, report, or some other academic document it must contain certain elements. Without limiting the scope of this discussion the document is called “paper” in the following. Several books and papers are written on how to write papers. They all emphasize the importance of the early stage. Various techniques are proposed to structure the ideas and the material. Regardless of how this is done the result is an outline of the paper. The following headlines provide a typical outline. The content must be addressed even if different headlines are utilized. Also, a numbered list in the following means that the order is important.

Title

Short titles are best, but the title must describe the unique content that is presented. A good title is designed to intrigue the reader. It is unnecessary to create an elaborate title that attempts to explain the entire content of the paper.

Abstract

The abstract is written last, when the paper is complete. It contains a few sentences about each of the following items:

1. Objective
2. Importance
3. Method
4. Key results
5. Conclusions

Introduction

The importance of the introductory part of a paper cannot be overemphasized. Although it does not contain the substance of the paper it sets the stage and establishes the tone of the paper. A poor introduction usually identifies a poor paper. A proper introduction contains the following elements:

1. Start with a thoughtful first sentence that concisely summarizes the objective and why it is important; above all, inspire the reader to read on
2. State the long-term goals and visions of the work
3. State the short-term objectives that are specifically addressed to achieve the long-term goals
4. Provide a motivation and justification for the work to establish why the results are useful
5. State the scope of the work to identify the problems that are, or are not, considered
6. Identify who has done what in the past. Sometimes, this review requires a separate section. However, care should be exercised to avoid an unnecessarily lengthy literature review. A concise and well-informed exposure of the background fits in the introductory section.
7. Depending on the complexity of the paper, provide an overview of the sections. This type of overview is more common in books, reports, and theses than in conference and journal papers.
8. Identify the novelties of the paper to let the peer reviewer understand that there is something new in this paper, and to let the general reader know which highlights to look out for

Between the Introduction and the Conclusions there exist no mandatory section organization. The outline depends strongly on the work that is carried out. The following two sections provide a suggested organization and suggested content.

Methodology

1. Build-up
    - Bring the reader up to speed on the existing methodology; be brief
2. Developments

   - Explain the new use, merger, or extension of the methodology; be detailed
3. Advantages
   - Candidly substantiate what is this better than what has been seen before
4. Contrast
   - Explain in detail how the new methodology compares with other approaches
5. Disadvantages
   - Honestly describe the pitfalls and downsides of the new developments

Application

1. Case selection
   - Employ realistic examples that bring out the best in the methodology
2. Enable reproduction
   - Give complete data to enable the reader to reproduce the results
3. Demonstrate
   - Show results that highlight what the developed methodology provides
4. Visualize
   - Include informative and visually appealing figures and tables
5. Discuss
   - State the experience gained from the examples: including new results, efficiency, etc.
6. Compare
   - Contrast the results with earlier work

Conclusions

The conclusions should *not* serve as a summary. Rather, the conclusions are observations from a higher and broader viewpoint. The conclusions should explicitly state the significance of the developments. The conclusions may also suggest problems to be addressed by future work.