How to Write a Technical Report

Julie Longo, Technical Communications
Howard R. Hughes College of Engineering
Julie.Longo@unlv.edu

Robin Anawalt, Grant Proposal Coordinator
Robin@anawalt@unlv.edu

March 2016
These workshops count towards the Graduate College Research Certificate Program. You may want to apply for this program.

<table>
<thead>
<tr>
<th>GRADUATE COLLEGE PROGRAMS</th>
<th>GRADUATE COLLEGE RESEARCH CERTIFICATE PROGRAM</th>
<th>GRADUATE COLLEGE TEACHING CERTIFICATE PROGRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete the GCRCP Application for Admission found at graduatecollege.unlv.edu/gcrcp.html</td>
<td>Application Due: Friday, April 3, 2015</td>
<td>graduatecollege.unlv.edu/gctcp.html</td>
</tr>
</tbody>
</table>
Most engineers assume that one form of technical writing will be sufficient for all types of documents. **This is absolutely not true.**

Writing a technical report requires different skills from writing a paper, dissertation, or thesis.

This presentation will help you sharpen your technical writing skills so that you have a greater chance of the funding agency accepting – and using – your technical report.
Steps in writing a technical report

• Know who your audience is
• Organization of a technical report
• Style formatting
• Proper citations and references
• Proper use of tables and figures
• Appendices
• Table of Contents, List of Figures, and List of Tables
• Refining your work and knowing when to stop
Know your audience
Know your audience

- Knowing your audience is critical to writing a good technical document – or any written material, for that matter.
- If people think you do not understand who they are and what they are interested in, then:

  They simply won’t read your work. This is not a good thing.
Know your audience

Who will read that technical report?
• Peers in your specific field?
• Peers in your general field?
• Technical people not in your field?
• A non-engineering but professional audience?

Decide who is your primary audience.

Understand who are your secondary audiences.
Know your audience

Exercise:

Example from The Transportation Research Center at UNLV

- Who is the primary audience of most of those reports?


- If the agency is pleased with the report, who do they show that report to?

- What do you think happens if the agency is not satisfied with the work?
Steps in writing a technical report

• Know who is your audience
• Organization of a technical report
• Style formatting
• Proper citations and references
• Proper use of tables and figures
• Appendices
• Table of Contents, List of Figures, and List of Tables
• Refining your work and knowing when to stop
Organization of a technical report

Title Page
Abstract
Executive Summary
Table of Contents
List of Figures / List of Tables
Main Report
• Introduction
• Background or Literature Review
• Project Description
• Data and Discussion of Data
• Conclusion
Acknowledgements
References
Appendix A. Acronym List
Other Appendices
Organization of a technical report

Title Page
Abstract
Executive Summary
Table of Contents
List of Figures / List of Tables
Main Report
  • Introduction
  • Background or Literature Review
  • Project Description
  • Data and Discussion of Data
  • Conclusion
Acknowledgements
References
Appendix A. Acronym List
Other Appendices

Work on these sections first
Organization of a technical report

Title Page
Abstract
Executive Summary
Table of Contents
List of Figures / List of Tables
Main Report
  • Introduction
  • Background or Literature Review
  • Project Description
  • Data and Discussion of Data
  • Conclusion
Acknowledgements

References
Appendix A. Acronym List

Other Appendices
Organization of a technical report

• A technical report involves an enormous amount of detail in:
  - The data (text, tables, and figures)
  - The discussion
  - The formatting of the material

• The most important thing is that the report can be easily read, understood, and used by your audience.

• Pay special attention to figures and tables – and to the List of Figures and List of Tables. *(Why?)*
Organization of a technical report

• After writing the main report:
  - Conclusion
  - Abstract
  - Executive Summary
Organization of a technical report

• After writing the main report:
  - Conclusion
    - If you have an Executive Summary and an Abstract, then keep the Conclusion brief.
    - Highlight the key points of the report
    - Make key recommendations
    - State limitations of your study
    - Suggest future work or study
  - Abstract
  - Executive Summary
Organization of a technical report

• After writing the main report:
  - Conclusion
  - Abstract
    - Similar in style as for a paper
    - Key issues / scope of project / experiment / new methodology
    - Two or three key findings
    - Must be brief
  - Executive Summary
Organization of a technical report

• After writing the main report:
  - Conclusion
  - Abstract
  - Executive Summary
    - This is for the top executive who does not have time to read the entire report
    - It is a condensed version of the report, about 10% of the total page count, and hits all the important points and results of the report
    - This is where you make your major recommendations; the report will back up these recommendations with details and data.
Organization of a technical report

Include in the appendices (or just after the Table of Contents) an Acronym list.

• Format it in such a way that the readers can photocopy it and have it readily available as a reference while they read the report.

• This is a courtesy to the readers that will earn you big points with them.
Steps in writing a technical report

- Know who your audience is √
- Organization of a technical report √
- Style formatting
- Proper citations and references
- Proper use of tables and figures
- Appendices
- Table of Contents, List of Figures, and List of Tables
- Refining your work and knowing when to stop
Types of style guides available:

- For electrical and computer engineering: IEEE style (IEEE Digital Author Toolbox)
- For transportation engineers: TRB style
- For other civil & environmental engineers: Either APA 6\textsuperscript{th} edition or ASCE style
- For mechanical engineers: Usually APA 6\textsuperscript{th} edition.
Create your own ‘style sheet’

• As you begin to write, keep track of terms you use so that you are consistent.

• Note when you first use an acronym.

• If the journal or proceedings does not have instructions for headers, captions, or tables, create in your style sheet the format you plan to use.

• A customized style sheet is especially valuable for creating reports to agencies – you can create a consistent and professional look to the documents you submit.

Once you make the rules, stick with them for the sake of consistency.
Steps in writing a technical report

• Know who is your audience ✓
• Organization of a technical report ✓
• Style formatting ✓
• Proper citations and references
• Proper use of tables and figures
• Appendices
• Table of Contents, List of Figures, and List of Tables
• Refining your work and knowing when to stop
Why is proper citation and referencing important?
Why is proper citation and referencing important?

Ethics in publishing is just as important when submitting a technical report to a government funding agency as when submitting a paper for publication.

The difference is in the consequences for:

- Poor research
- Faulty data
- Plagiarism
- Authorship (publications or code)
What to Cite

- Material reporting original research findings or ideas that you have read *personally*—primary sources
- Citing material from secondary sources discussing primary sources is just hearsay

When to Cite

- You want to back up your own ideas / hypotheses / results with those of others in the field
- You want to discuss other viewpoints that differ from your ideas / hypotheses / results
- You want to compare your work with those of others in the field
- You want to demonstrate the knowledge gap in the field, justifying the reason for your research
How to Cite
Most journals have their own guidelines on how they want you to cite. Most common forms are:

<table>
<thead>
<tr>
<th>Style</th>
<th>Most Commonly Used By...</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEEE [numeral]</td>
<td>Electrical engineers, computer science</td>
</tr>
<tr>
<td>APA 6th Ed. (Author, date)</td>
<td>Social sciences, civil engineering and mechanical engineering</td>
</tr>
<tr>
<td>Chicago Manual of Style #1</td>
<td>Humanities</td>
</tr>
<tr>
<td>Chicago Manual of Style #2</td>
<td>(Author date)</td>
</tr>
<tr>
<td></td>
<td>Social sciences, physical sciences, ASCE journals</td>
</tr>
<tr>
<td>MLA (Author page)</td>
<td>Liberal arts and humanities, Literature</td>
</tr>
</tbody>
</table>
How to Put Together a Reference List Correctly

- Make very sure your citations match your references
- Do not add any other material to your Reference List other than what you cite in the paper
- Follow the directions of the style manual used in your field – they give detailed information on the correct format.
- If you use a referencing software tool, make sure you check it for accuracy against the style manual
How to Paraphrase and Quote Correctly

- When paraphrasing, make sure you acknowledge who you are paraphrasing with a citation and reference.

- Take some time to really think about what you learned when reading the original material and why it is important to talk about it in your paper. This will greatly help in paraphrasing correctly.

- If you only change a few words, and people can recognize the original, then you are plagiarizing.

- Sometimes, you can have a mixture of paraphrasing and direct quotation.

- When quoting, make very sure that it is inside quotation marks “…” and completely accurate, including punctuation.
Recognizing and Avoiding Plagiarism

<table>
<thead>
<tr>
<th>Introduction</th>
<th>Principles</th>
<th>Logistics</th>
<th>Exercises</th>
</tr>
</thead>
</table>

**Introduction**

"Academic Integrity is expected of every Cornell Student in all academic undertakings. Integrity entails a firm adherence to a set of values, and the values most essential to an academic community are grounded on the concept of honesty with respect to the intellectual efforts of oneself and others."

- Cornell Code of Academic Integrity, p. 1

Plagiarism is the unacknowledged use of the words or ideas of others. It is the most common form of academic integrity violation at Cornell, comprising over 60% of all reported cases within the last three years. This web presentation will introduce you to Cornell's policy on plagiarism and review ways of avoiding common errors. First you will read about the principles linking plagiarism policy to Cornell's Academic Integrity Code. The logistics section will tell you how to document sources and avoid plagiarism. You will then go on to a series of exercises to test your understanding of how to use and cite sources correctly. If one of your instructors has asked you to complete this tutorial as part of a class assignment, you will be able to send the results of your exercises to a designated e-mail address.

[Next >](https://plagiarism.arts.cornell.edu/tutorial/index.cfm)
Steps in writing a technical report

• Know who is your audience ✓
• Organization of a technical report ✓
• Style formatting ✓
• Proper citations and references ✓
• Proper use of tables and figures
• Appendices
• Table of Contents, List of Figures, and List of Tables
• Refining your work and knowing when to stop
Proper Use of Tables and Figures

• How do you know when to use tables?

<table>
<thead>
<tr>
<th>This</th>
<th>That</th>
<th>And the Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calculations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budget</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data example</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

• How do you know when to use figures?
Steps in writing a technical report

- Know who is your audience ✓
- Organization of a technical report ✓
- Style formatting ✓
- Proper citations and references ✓
- Proper use of tables and figures ✓
- Appendices
- Table of Contents, List of Figures, and List of Tables
- Refining your work and knowing when to stop
Appendices

- Appendices can contain:
  - Acronym list
  - Raw data upon which the report is based
  - Consultant reports that feed into your report
  - Resumes
  - Vendor quotes
Steps in writing a technical report

• Know who is your audience

• Organization of a technical report

• Style formatting

• Proper citations and references

• Proper use of tables and figures

• Appendices

• Table of Contents, List of Figures, and List of Tables

• Refining your work and knowing when to stop
Table of Contents, etc.

• Do not forget to update your
  • Table of Contents
  • List of Figures
  • List of Tables
• Check that the right information is there
• Check that all figures and tables are listed
• Your readers *use* these to find information throughout your report!
Steps in writing a technical report

- Know who is your audience ✓
- Organization of a technical report ✓
- Style formatting ✓
- Proper citations and references ✓
- Proper use of tables and figures ✓
- Appendices ✓
- Table of Contents, List of Figures, and List of Tables ✓
- Refining your work and knowing when to stop
Refining Your Work

• After writing, put the document away for a couple of days.
• Print it out, and use a pen to mark your work up.
• Make a checklist and go through the report several times for:
  • Flow of thought
  • In-text citations and references
  • Grammar and punctuation
  • Equations, figures, and tables
  • Conformance to the style guide
Specifically for Latex users

• The writing process has two phases:
  
  ▪ Phase I
    o Original writing (raw)
    o Editing and refining
    o This phase is very fluid and changeable
    o Use some kind of format (MS Word, OpenOffice, text) that allows for easy revisions
  
  ▪ Phase II
    o Formatting for publication
    o The material is finalized
    o The style is rigid
    o Do not put material into Latex until it is finalized, especially if you plan to work with a technical editor during Phase I
• An Editor-in-Chief once told me that it could take a lifetime to learn the art of knowing when to stop writing.
• There is a point in your writing – or editing – where you must stop or risk having your material degenerate.
• Let’s explore: how do you know when to stop writing for a really big report?

Know when to STOP
In Conclusion

• It is essential to pay attention to the requirements of the agency who requested the report.

• Technical reports are all *about the details*.

• Whether you continue with an academic career or work for an organization, knowing how to put together a good technical report is a valuable skill.
Resources

College of Engineering Resources for Proposals, Papers, and Reports
http://www.unlv.edu/engineering/resources

http://guides.library.unlv.edu/content.php?pid=9413

UNLV Writing Center
http://writingcenter.unlv.edu/

UNLV Online Writing Lab
http://writingcenter.unlv.edu/owl/

UNLV Downloadable Writing Tips
http://writingcenter.unlv.edu/writing/downloads.html

Purdue OWL
http://owl.english.purdue.edu/owl/resource/544/01/
For further reading:


Thank you for your attention!