



Writing a Research Paper

Equity & Ethics in Software Engineering

CS/SWE 795

<http://go.gmu.edu/swe795>

Dr. Brittany Johnson-Matthews

(Dr. B for short)

Paper Structure

A research paper has the following key components (though they may not be explicitly labeled as such):

1. Abstract
2. Introduction
3. Background/Related Work
4. Methodology
5. Findings
6. Discussion
7. Conclusion

Abstract

The abstract provides a concise summary of the paper.

The goal is to convey...

- the problem the paper is discussing/addressing

- what's missing from existing work that makes your contribution necessary

- what the contribution of the paper is (or what you did)

- some findings and/or insights

Check out [“How to write a scientific abstract in six easy steps”](#) for more.

Introduction

The introduction should:

- Clearly motivate the research you did (or are proposing)
- Clearly summarize the paper's contribution

The motivation should be **grounded in prior work** (and include relevant citations).

This can include relevant non-research articles (e.g., news articles).

Background/Related work

The section after the intro typically provides background or related work (or both).

What it's called is less important than what it contains, which is:

- anything the reader needs to know to understand your contribution

- prior work that did something similar to what you did (and how your work differs)

Methodology

Next, the paper should outline what was done (and why).

This is where you tell the reader...

- the research question(s) or hypothesis/es (when applicable)

- what approach you used (or propose) to conduct the research

The approach typically describes:

- the data collected (and how)

- how the data was analyzed

Literature review "methods"

Literature reviews have a variety of ways of conveying "methodology".

They may or may not have a methodology section.

But they will at least have details on *scope* (what papers are considered relevant).

There are some examples of literature reviews in paper schedule.

Also, [one I contributed to](#) 😊 (which doesn't have a methods section)

Findings

(Almost) every paper should have findings to report from their efforts.

Your paper may not have a findings section (especially in the case of a literature review)

But it should detail the insights gathered.

If you proposed a research project you haven't done, talk about expected findings.

Discussion

All papers should include some discussion

Most often it's in its own section (though not always called "discussion").

The goal of the discussion is to help the reader interpret the findings.

That could mean implications for (future) research and/or (improve) practice.

Conclusion

The conclusion (re-)summarizes the paper and its contributions.

It should **not** be copy paste from the abstract.

Unlike the abstract, the conclusion doesn't need a problem statement/motivation.

It can also include thoughts about future work.

Putting it all together

Paper should tell clear, cohesive story.

The story should be based on:

Prior work (that supports the story), and
Insights from what you did.

Check out “[Writing Good Software Engineering Research Papers](#)” to learn more about putting together a conference quality research paper.

Expectations & Grading

I've been lenient to support learning...

...and because I should have given this lecture *before* outlines were due.

But will be much **more rigorous** in grading the final paper submission.

Because now you know 😊