

# How to Write a Thesis, or a Research Paper

## *A Short Introduction*

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- Updated versions of these slides will be available in our [Github repository](#).
- Special thanks to Prof. Dr. Alex Norta, who taught the course “*How to Conduct Research? Thinking, research methods, structuring publications*” at Tallinn University of Technology, which inspired and formed the foundation of this presentation.



# INTRODUCTION

# Introduction

## Overview

- **How to write a thesis, or a research paper?**
  - What are the required theoretical concepts to write a good thesis/paper?
  - What is the general document structure?
  - What are the specific steps of writing your thesis/paper?

# Introduction

## The Creative Process

- 1) This is awesome
- 2) This is tricky
- 3) This is shit
- 4) I am shit
- 5) This might be OK
- 6) This is awesome

# Introduction

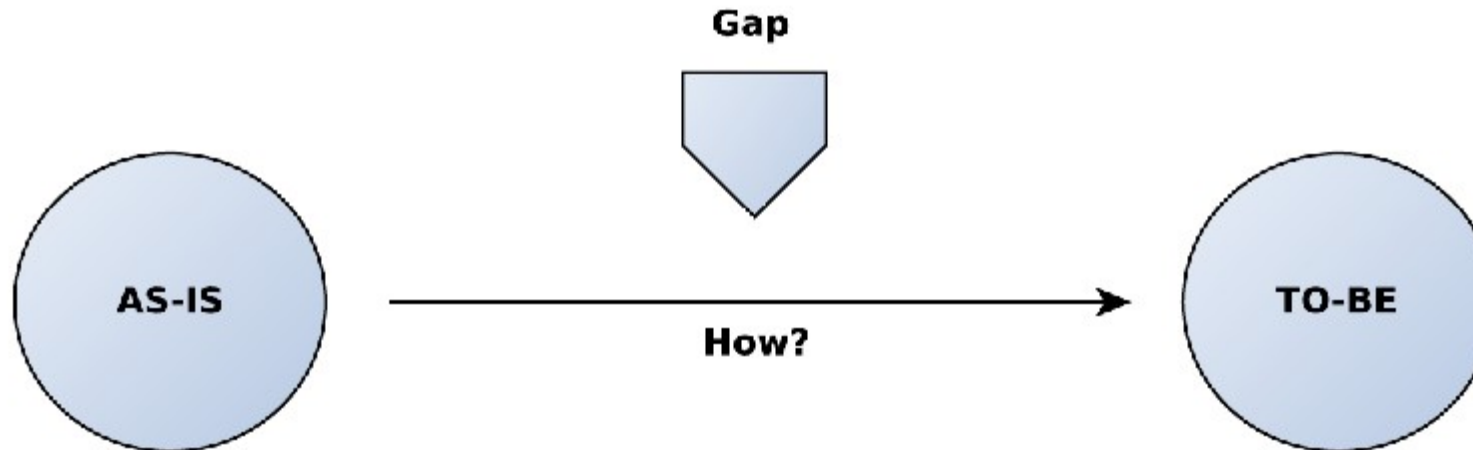
## “Why?”

- **Why should someone read your thesis/paper?**
  - Introduce and motivate your topic/problem statement
  - Describe the State of the Art (SoA)
  - Detect a knowledge gap
  - Close the knowledge gap by providing an answer to the problem statement

# Introduction

## Detecting a Gap

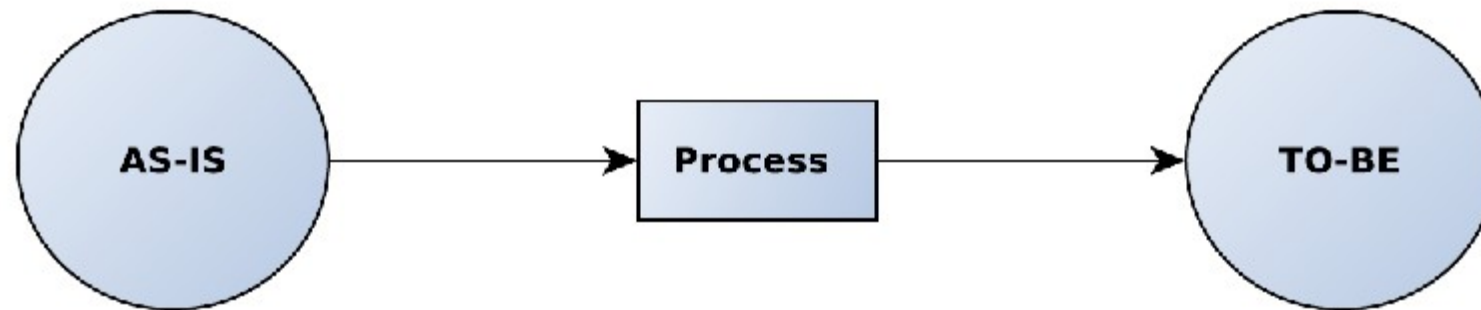
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# Introduction

## Closing the Gap

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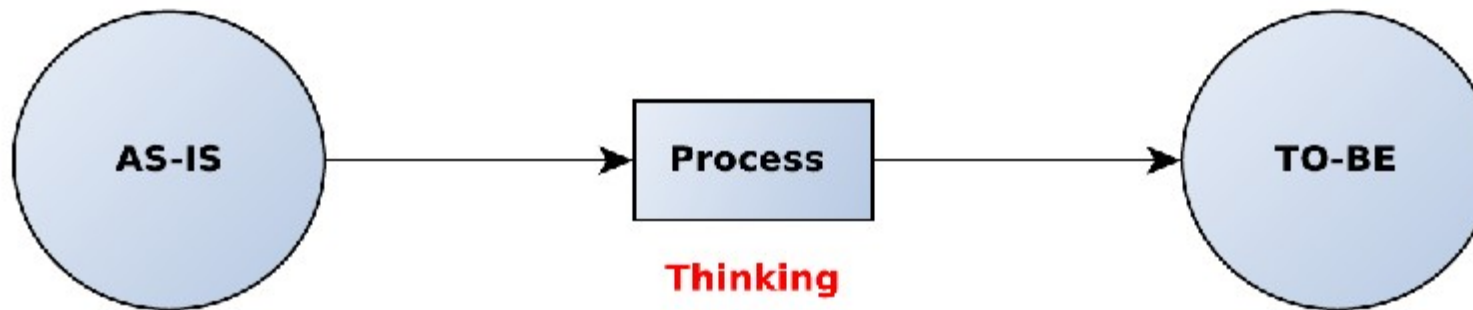




# Introduction

## Closing the Gap

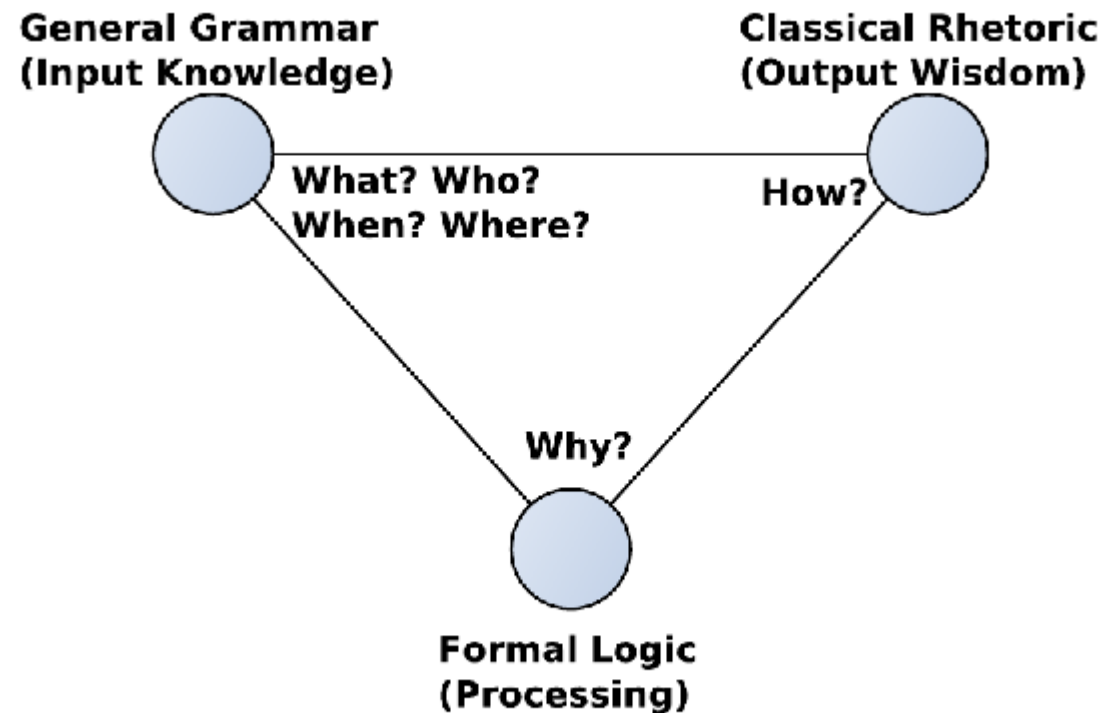
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# Introduction

## Trivium

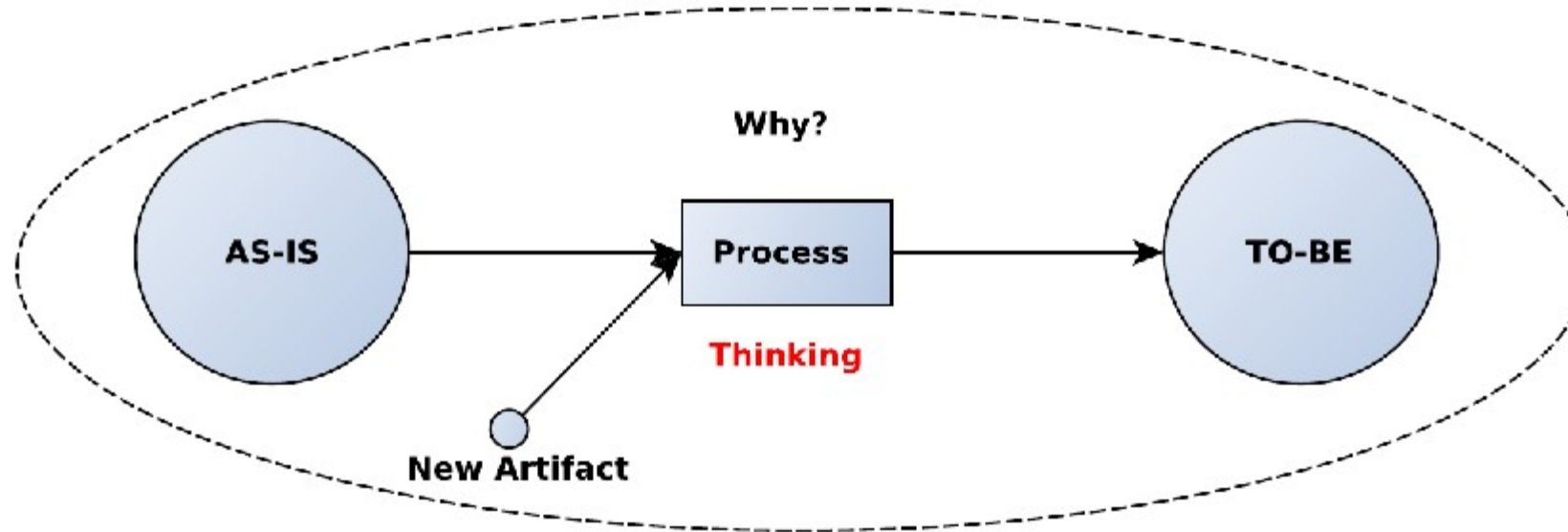
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# Introduction

## Trivium - Research Paper

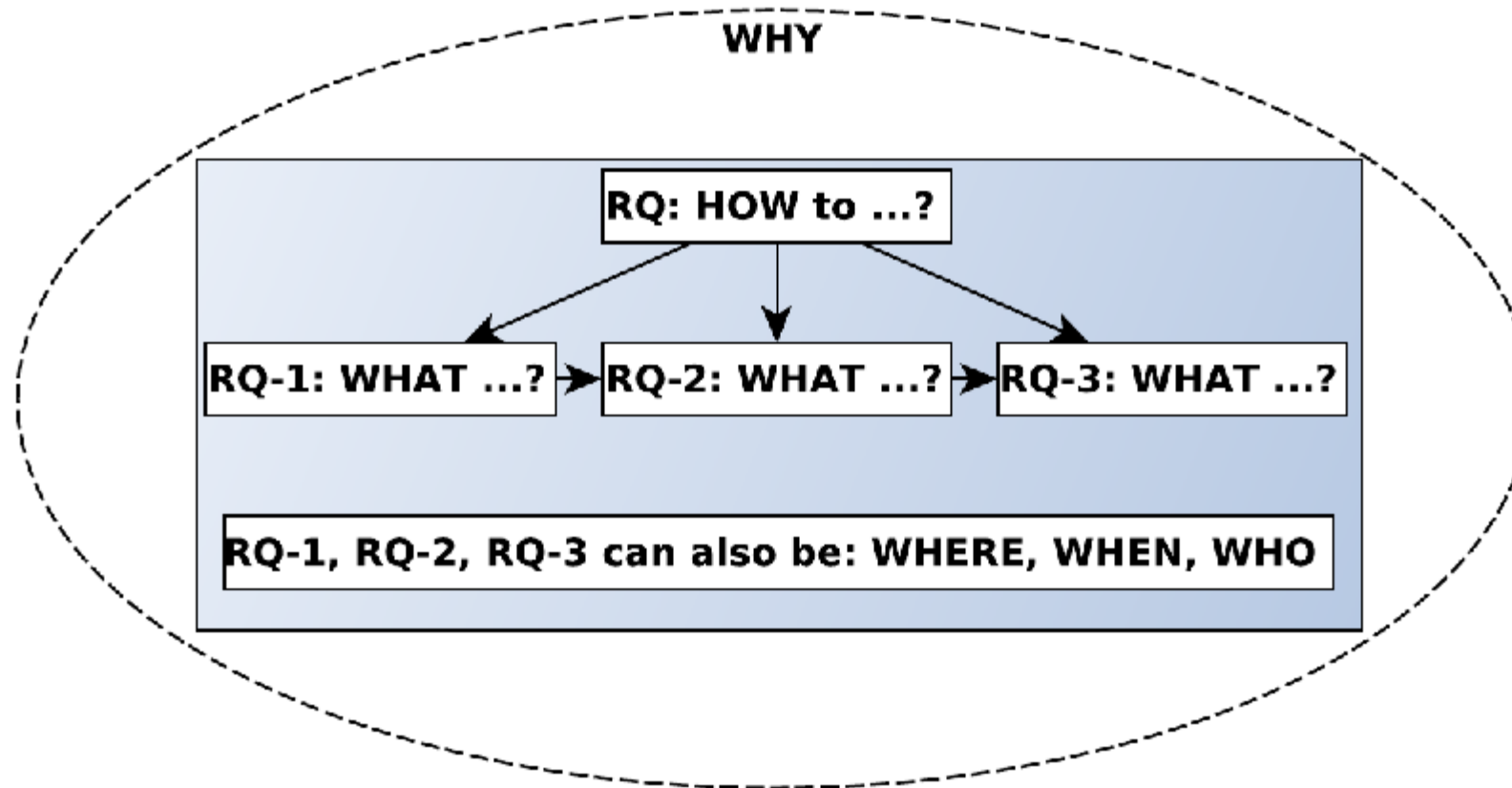
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# Introduction

## Research Questions (RQ) - Paper

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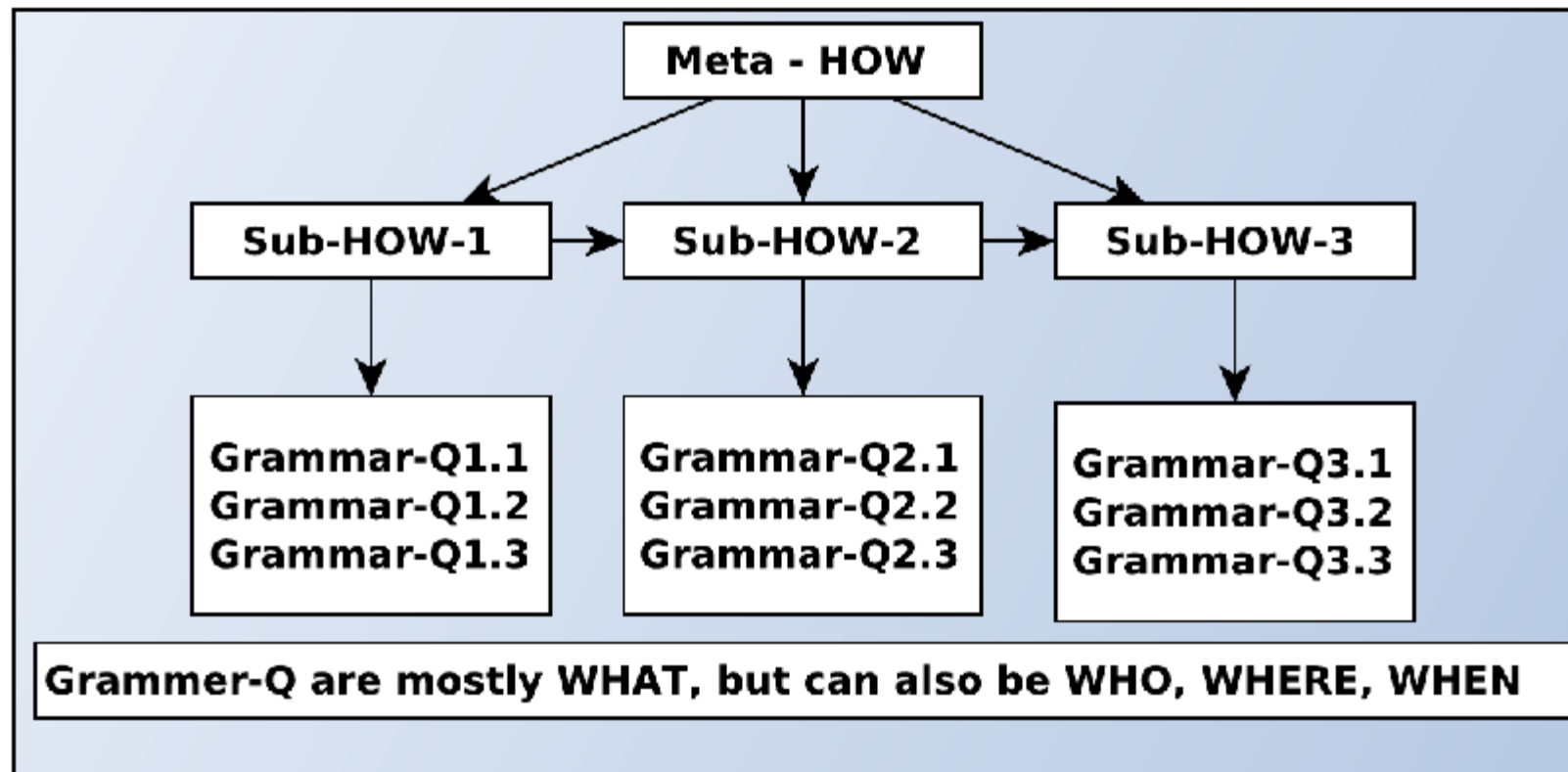


# Introduction

## Research Questions (RQ) - Thesis

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WHY?





# RESEARCH METHODS

# Research Methods Overview

**TODO – BL**

- TODO – different research methods for different fields of research, context, etc.

# Research Methods

## Information Systems Research Methods

- **Common Information System (IS) Research Methods**
  - Design Science Research (DSR)
  - Action Research (AR)
  - Action Design Research (ADR)



# Research Methods

## Design Science Research (DSR)

TODO – BL

- DSR in one page

# Research Methods

## Action Research (AR)

**TODO – BL**

- AR in one page

# Research Methods

## Action Design Research (ADR)

**TODO – BL**

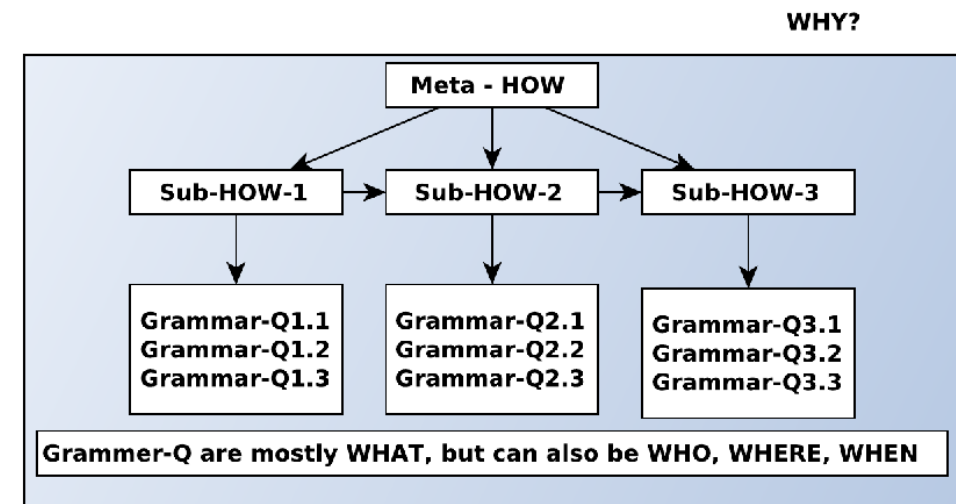
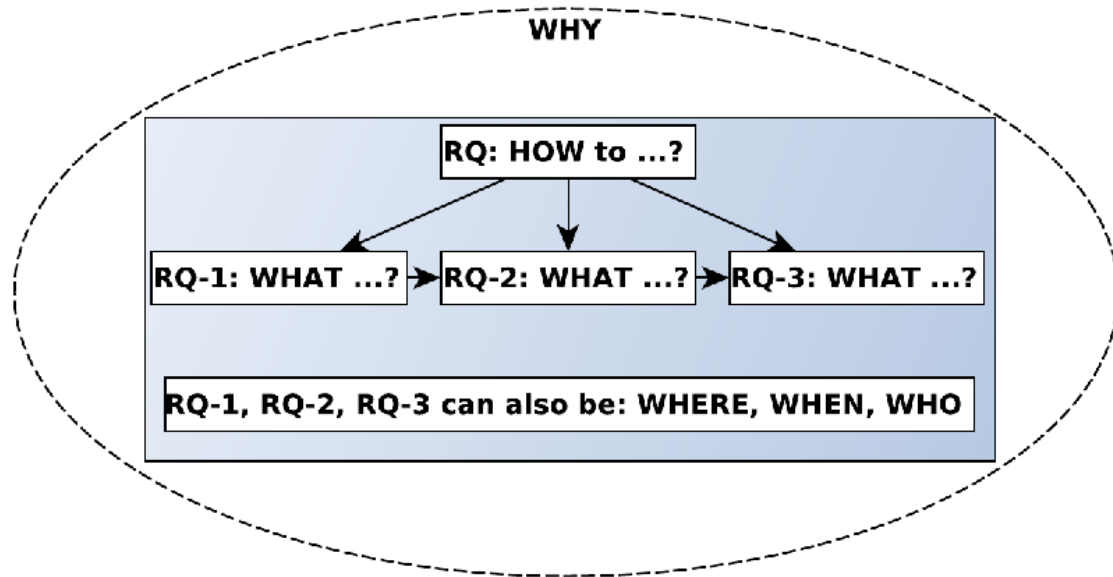
- ADR in one page

# STRUCTURE

# Structure

## RQs - Paper vs. Thesis

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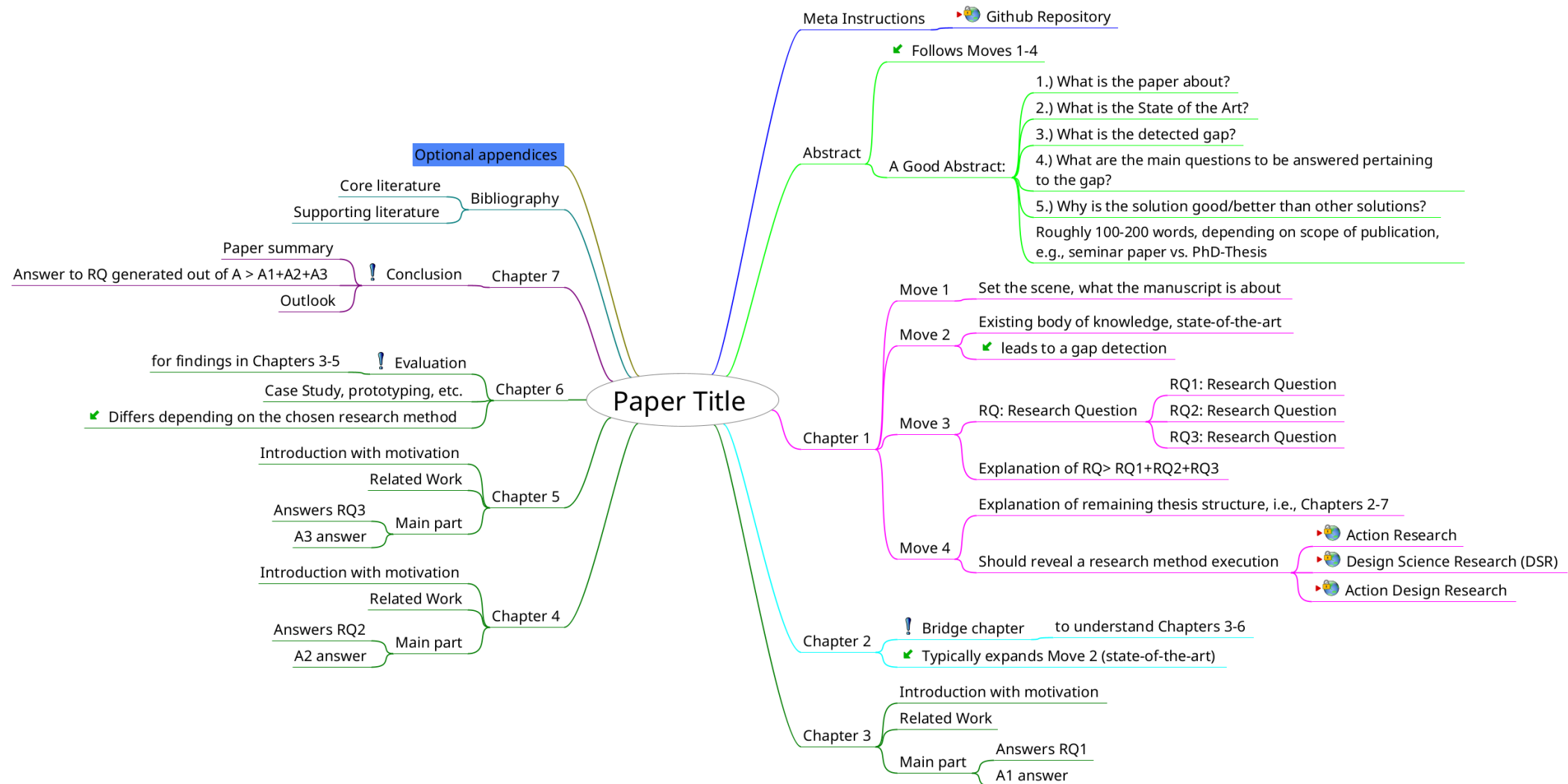




# STRUCTURE – RESEARCH PAPER

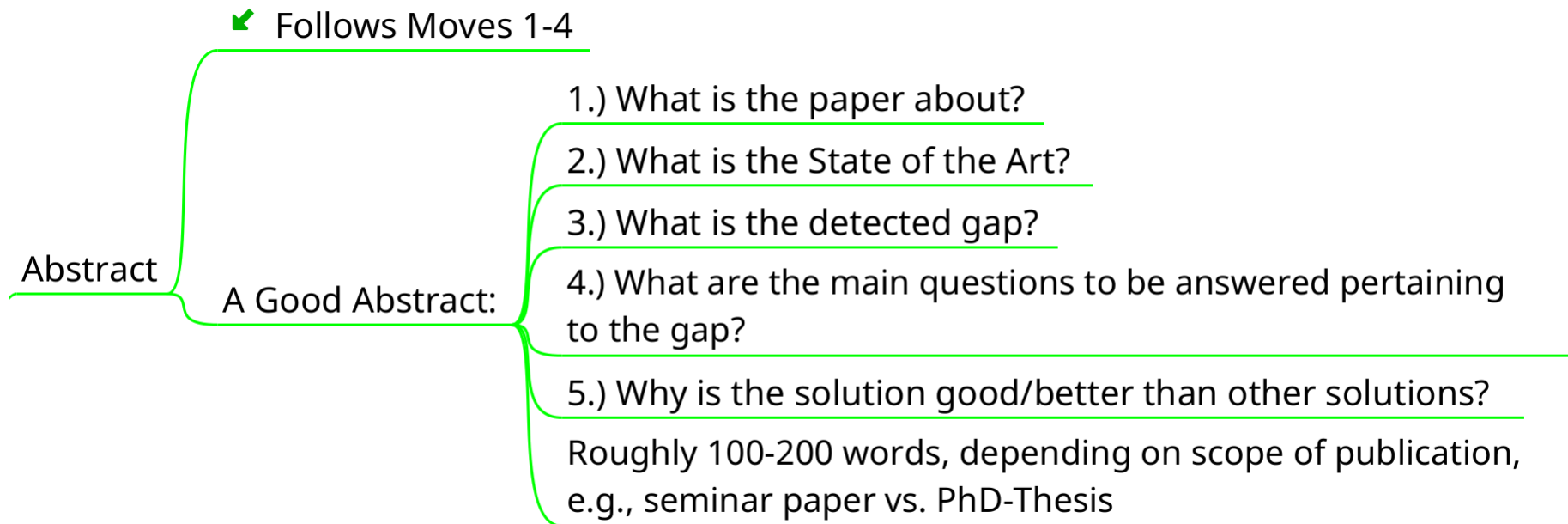
# Structure - Paper

## Mind Map - Overview



# Structure - Paper

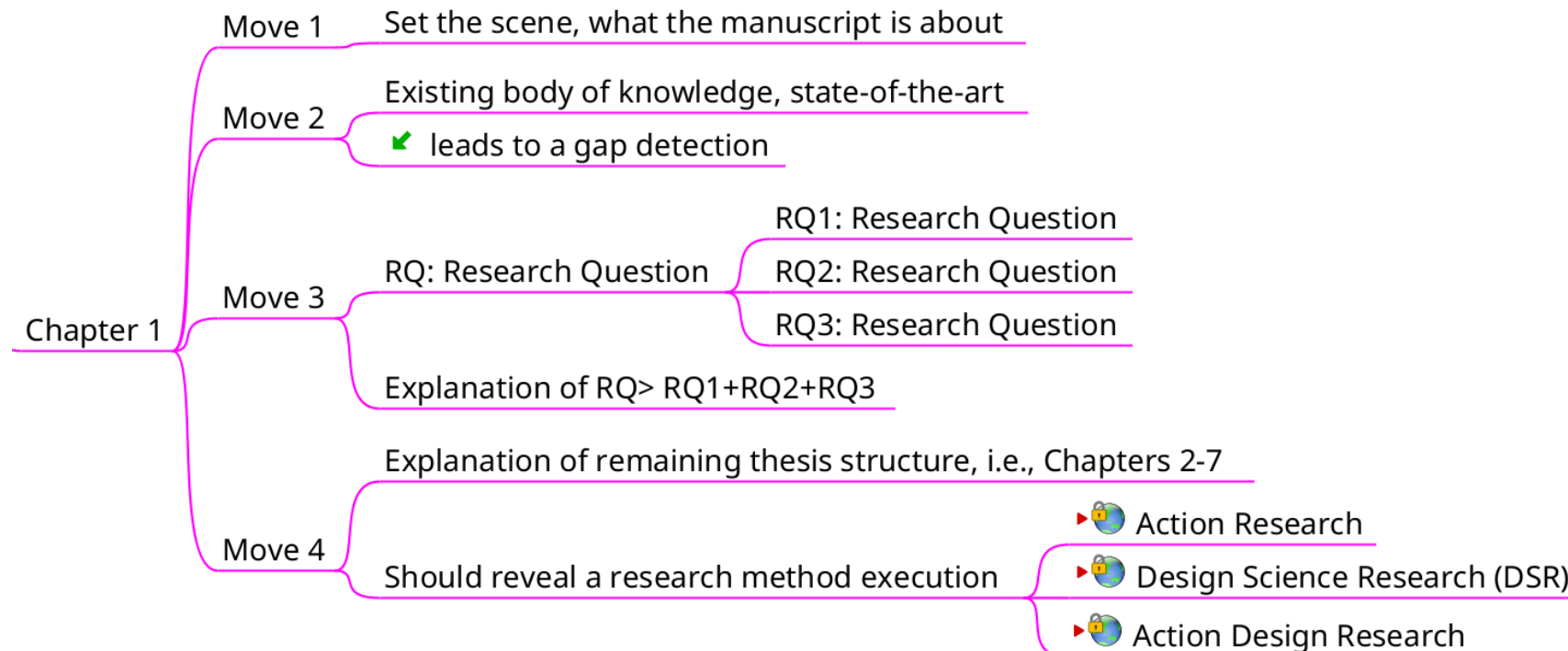
## Mind Map - Abstract





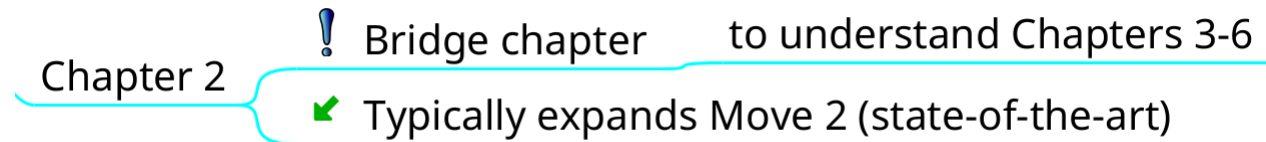
# Structure - Paper

## Mind Map - Section 1 (Introduction)



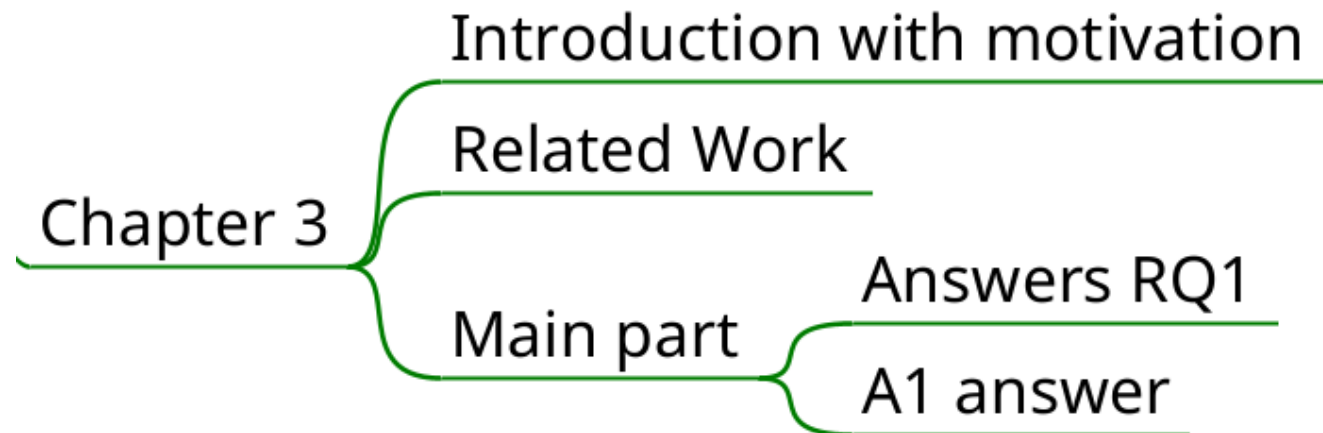
## Structure - Paper

### Mind Map - Section 2 (Bridge Section)



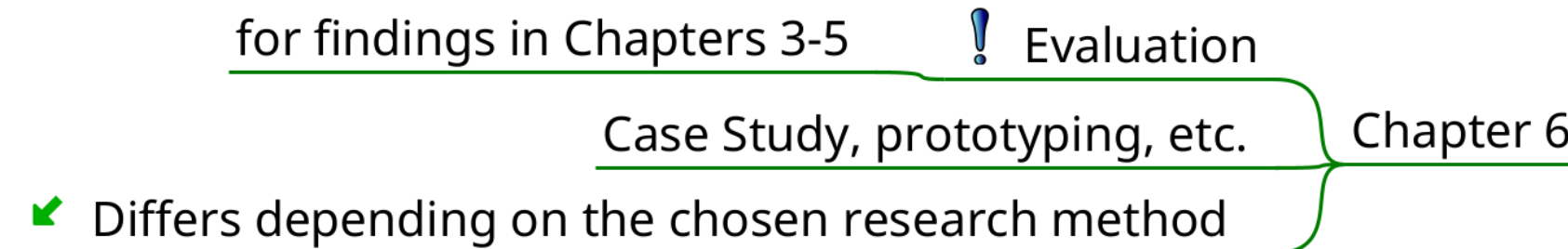
## Structure - Paper

### Mind Map - Section 3/4/5 (Answers to RQs)



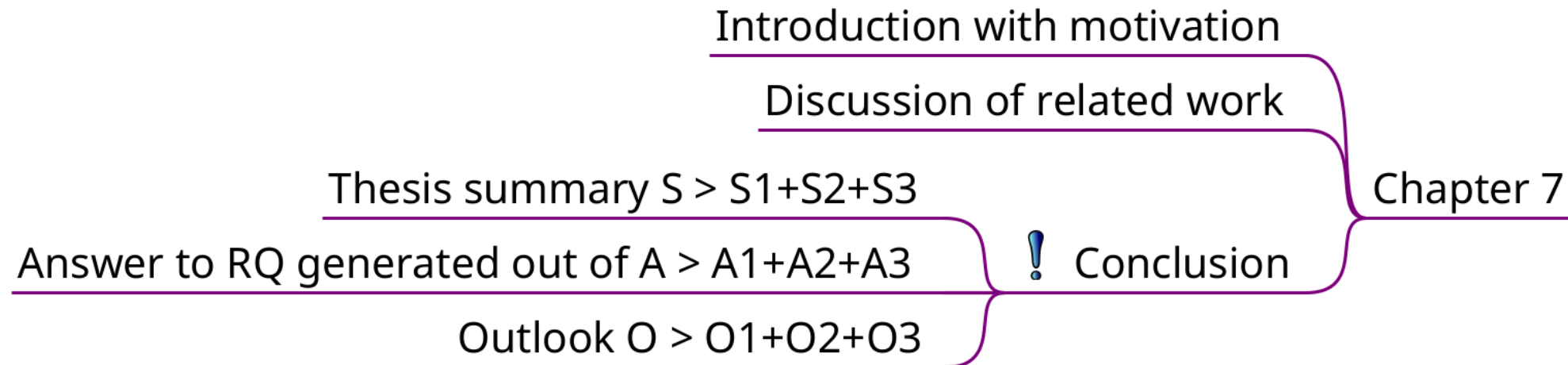
## Structure - Paper

### Mind Map - Section 6 (Evaluation)



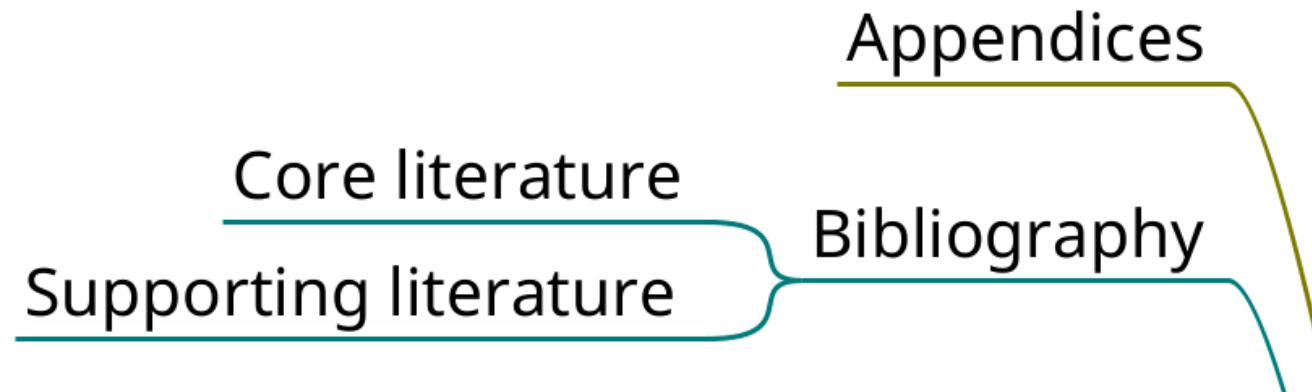
## Structure - Paper

### Mind Map - Section 7 (Conclusion)



# Structure - Paper

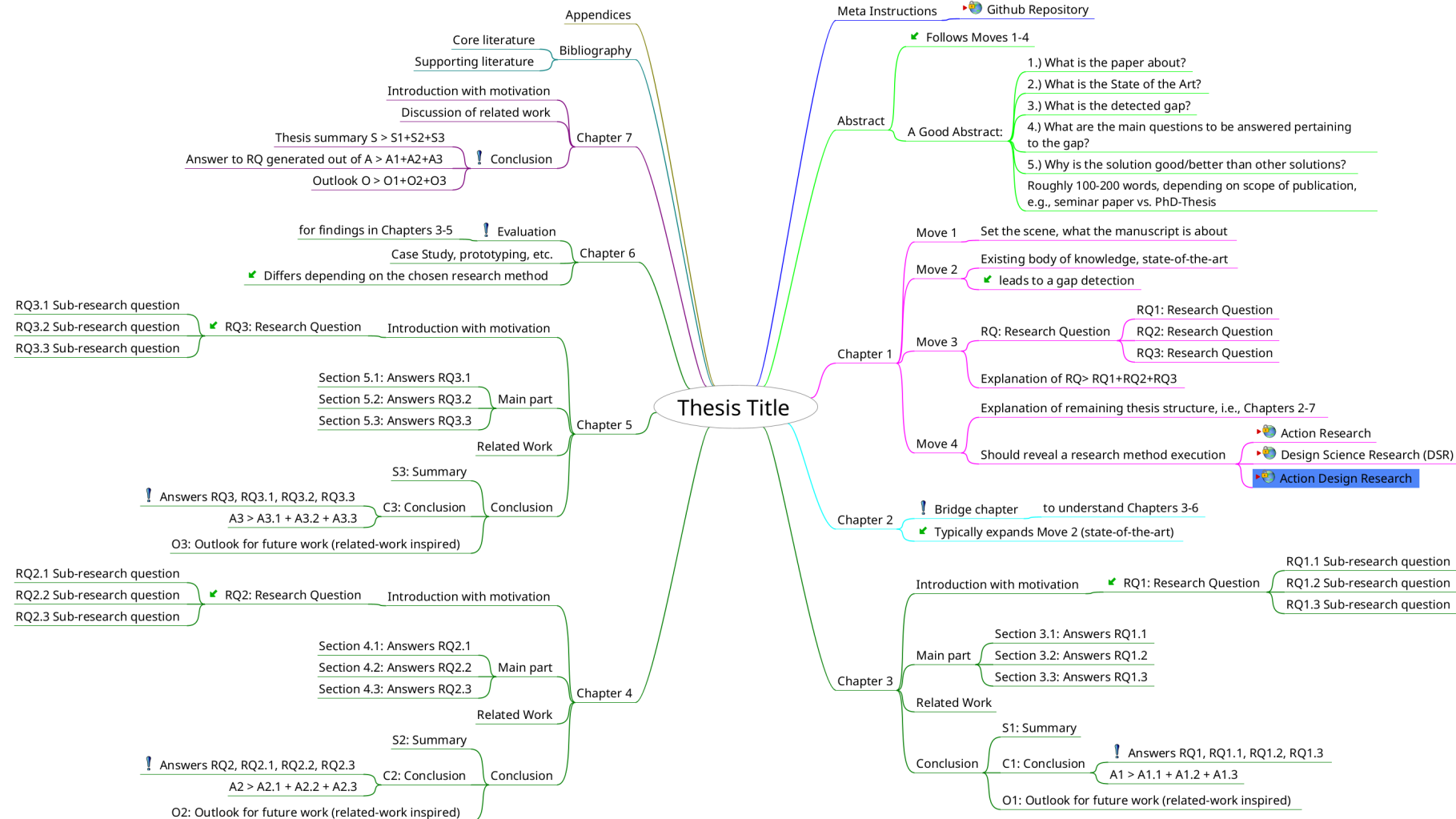
## Mind Map - References



# STRUCTURE – THESIS

# Structure - Thesis

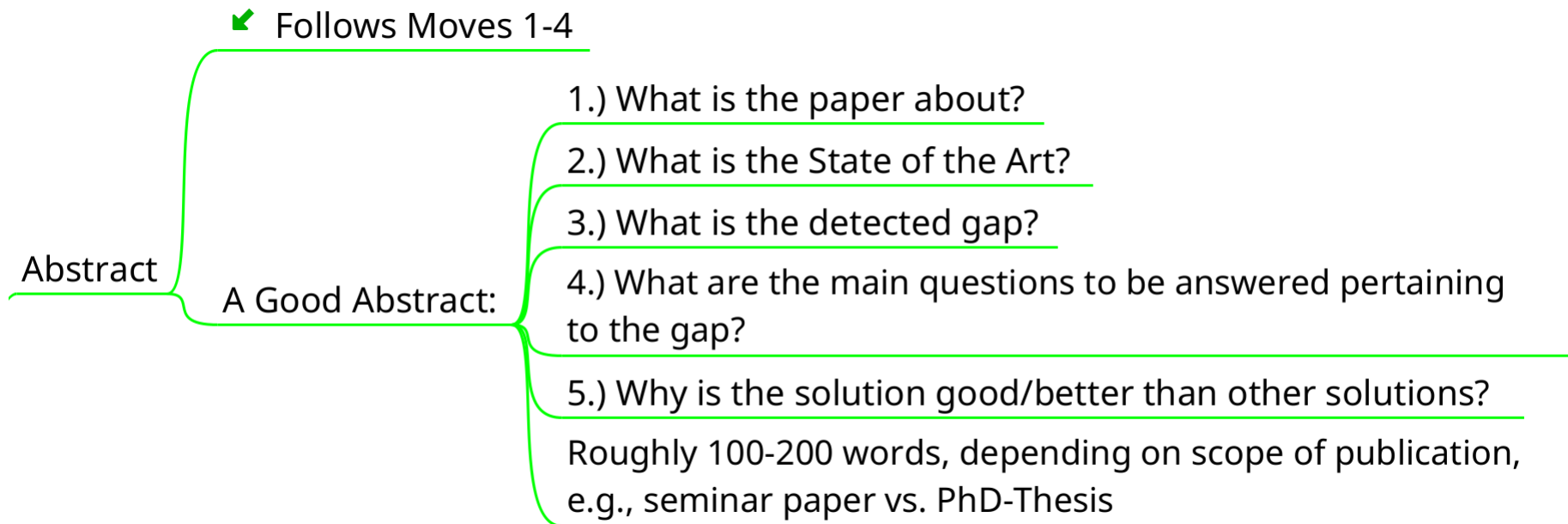
## Mind Map - Overview





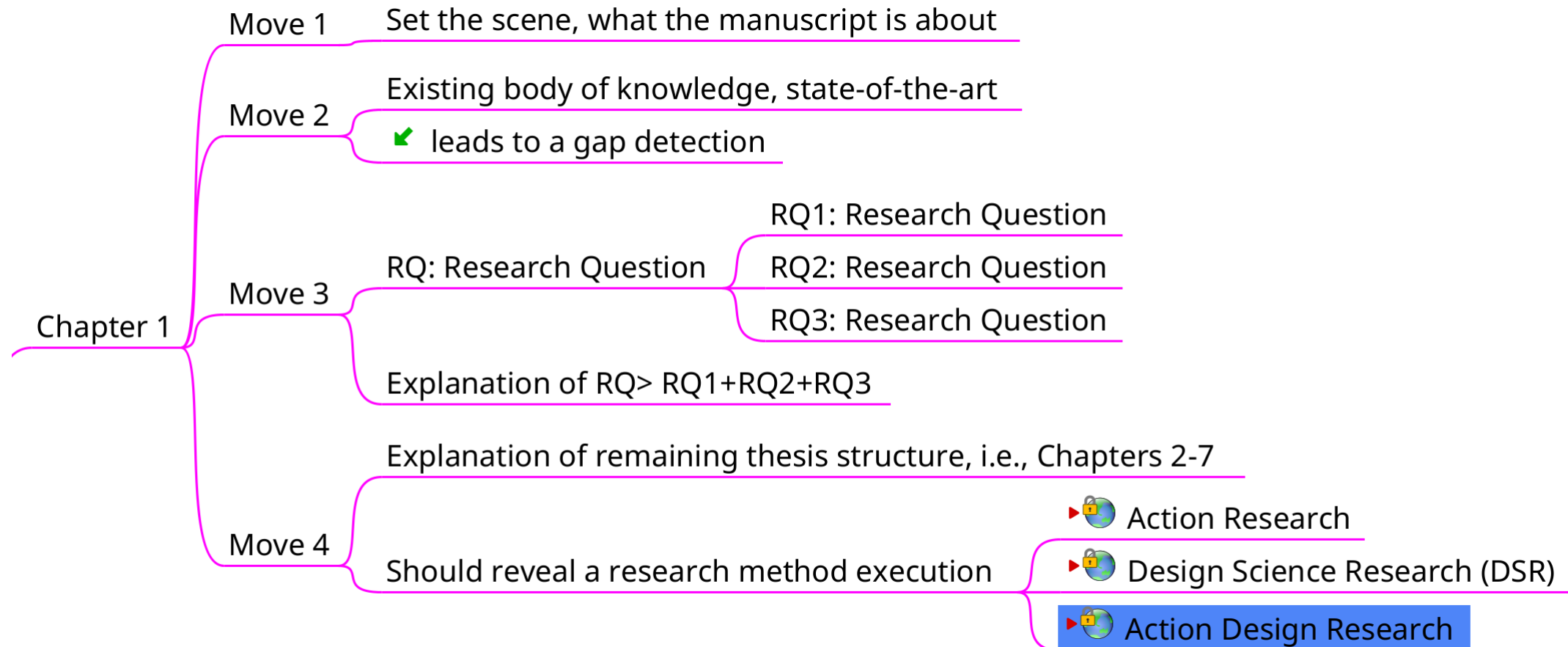
# Structure - Thesis

## Mind Map - Abstract



# Structure - Thesis

## Mind Map - Section 1 (Introduction)



## Structure - Thesis

### Mind Map - Section 2 (Bridge Section)

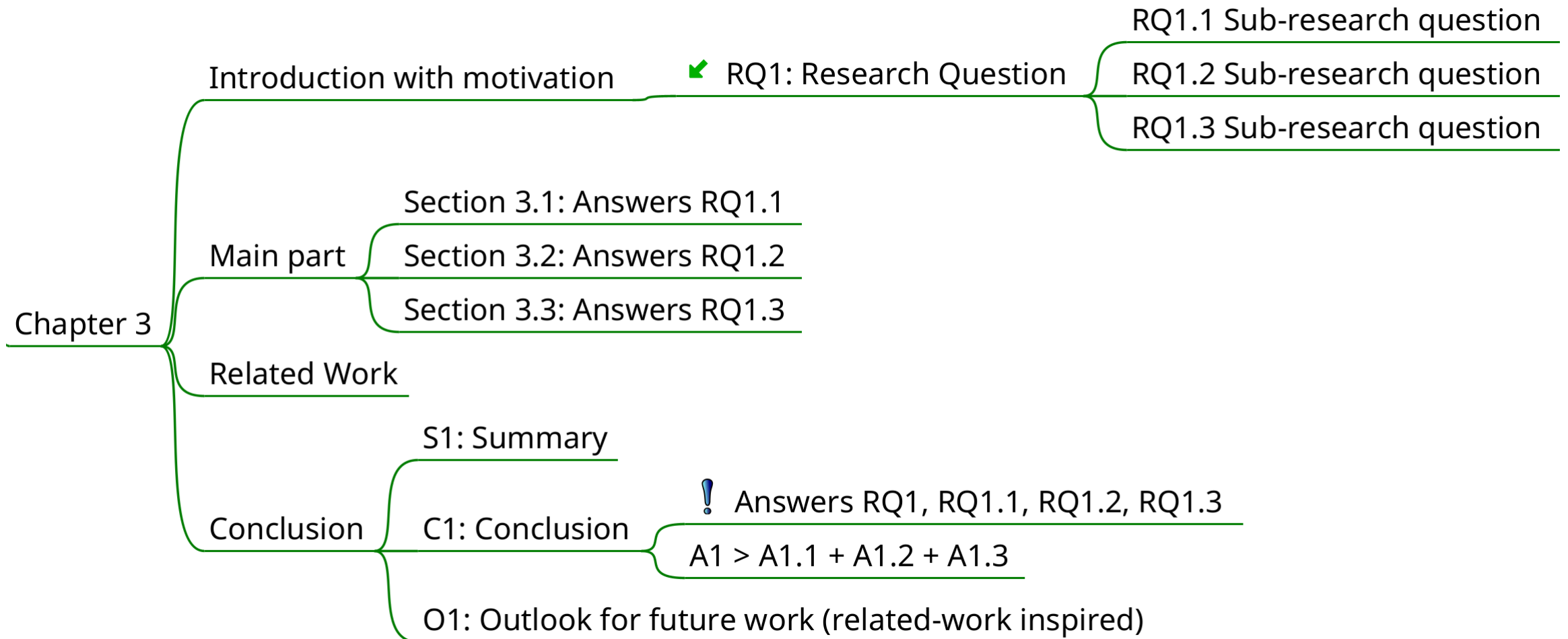
Chapter 2

! Bridge chapter to understand Chapters 3-6

✓ Typically expands Move 2 (state-of-the-art)

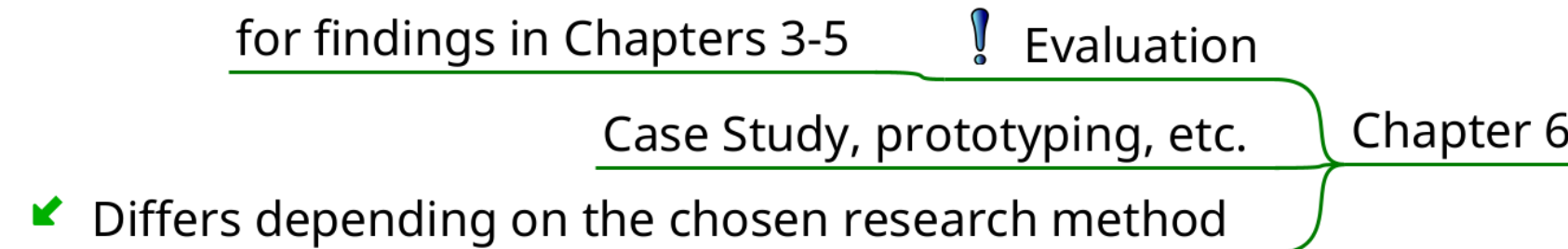
# Structure - Thesis

## Mind Map - Section 3/4/5 (Answers to RQs)



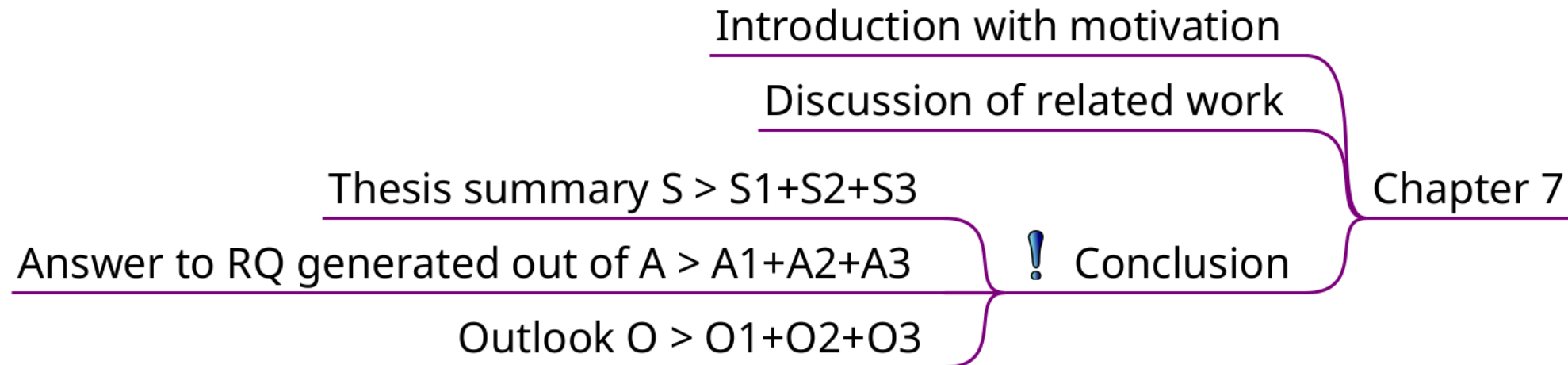
# Structure - Thesis

## Mind Map - Section 6 (Evaluation)



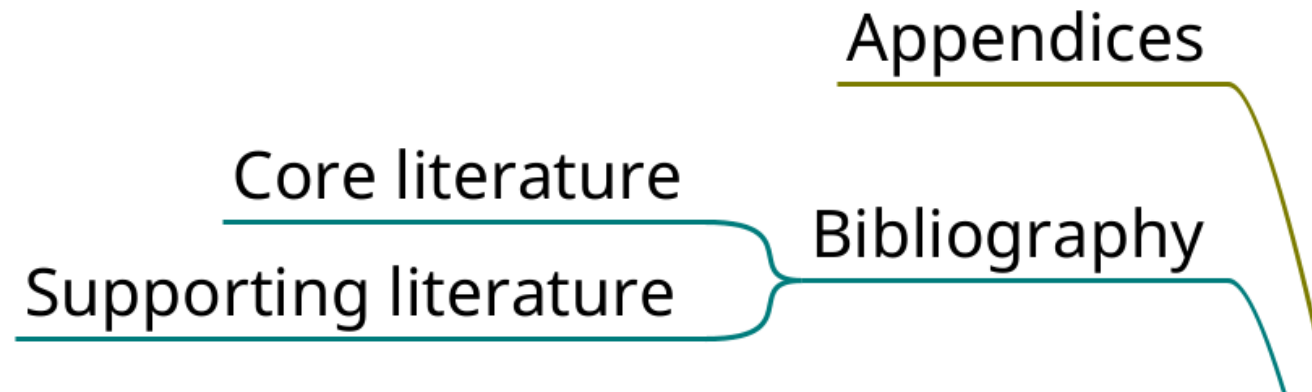
## Structure - Thesis

### Mind Map - Section 7 (Conclusion)



## Structure - Thesis

### Mind Map - Appendix





# RUNNING CASE – SEMINAR PAPER



# Running Case - Seminar Paper Overview

- **How to write a seminar paper?**

- RQ-1: What is a good way to review and process literature?
- RQ-2: What is a good way to structure your paper?
- RQ-3: What is a good way to write your paper?
-

# Running Case - Seminar Paper Overview

- **How to write a seminar paper?**

- RQ-1: What is a good way to review and process literature?
- RQ-2: What is a good way to structure your paper?
- RQ-3: What is a good way to write your paper?

- 

*Might not be the best and most well defined RQs*

# Running Case - Seminar Paper

## Literature Sources

- Google Scholar → [Link](#)
- Journals/Conferences/Magazines/etc., eg.,
  - IEEE → [Link](#)
  - ACM → [Link](#)
  - AISel → [Link](#)
  - Etc.
- Libraries
- Researcher
- Etc.

# **Running Case - Seminar Paper**

## **Systematic Literature Review**

- Systematic Literature Review in Computer Science - A Practical Guide → [Link](#)

# Running Case - Seminar Paper

## “Good” Literature - Examples

- Peer-reviewed paper, journals, poster, etc.
- Scientific books
- (Bachelor-, Master-, PhD-Thesis)
- (Patents)

# Running Case - Seminar Paper

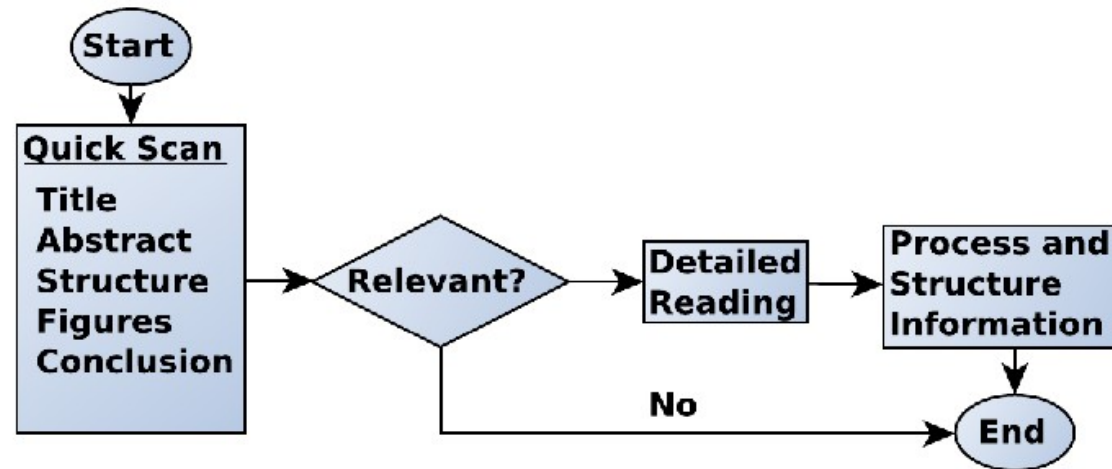
## “Difficult” Literature - Examples

- Whitepaper / Technical Reports
- Websites (Blogs, Newspaper, etc.)
- Unreviewed scientific materials (e.g., arXiv.org)
- Peer-reviewed  $\neq$  good literature (e.g., bogus/predatory conferences)

# Running Case - Seminar Paper

## How to Read a Paper?

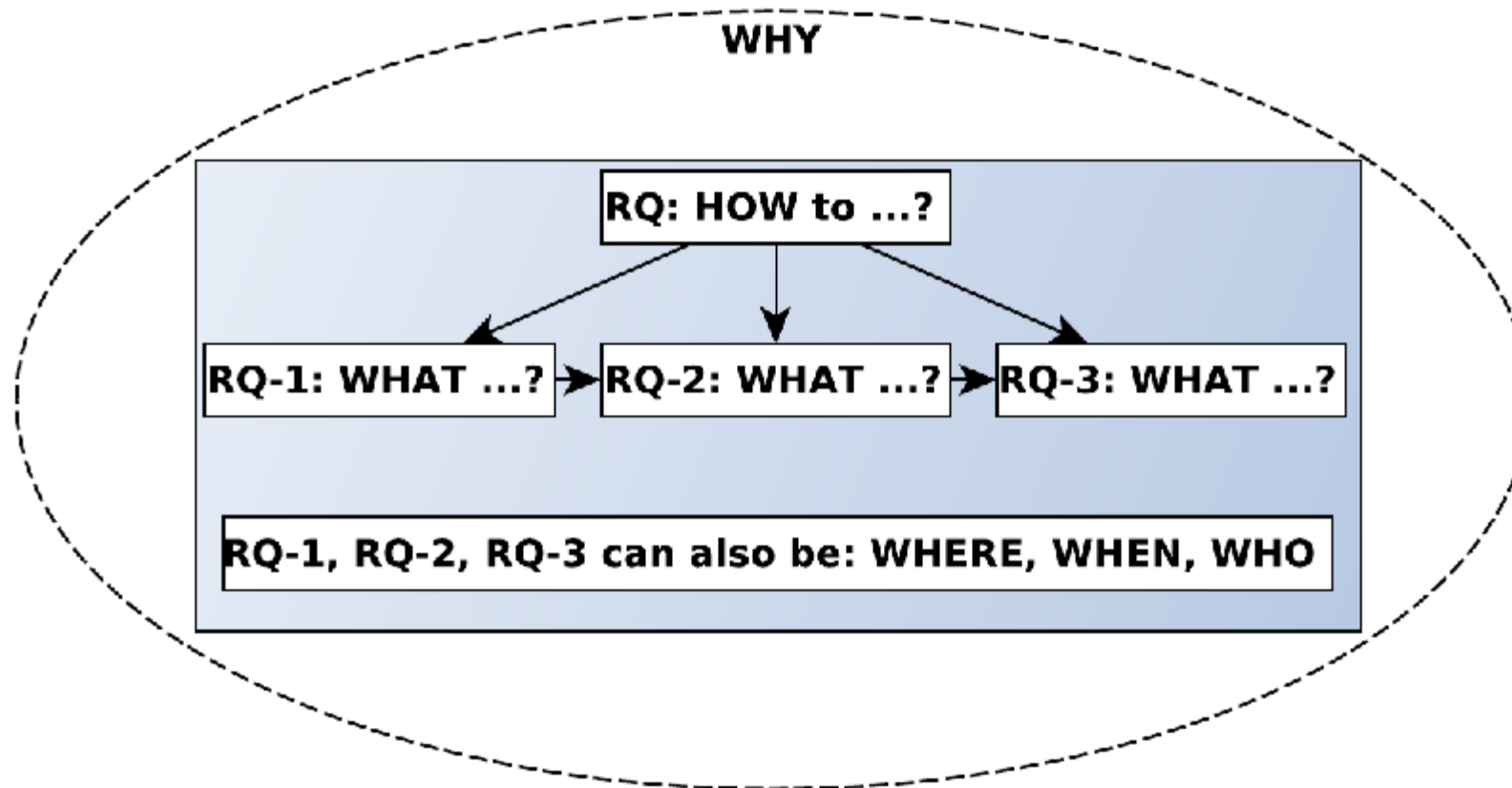
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- Critical thinking!
- Check the references of papers that you read!

# Running Case - Seminar Paper

Identify Your Gap and Define Your RQs @Mattes:  
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# Running Case - Seminar Paper

## Write Your Paper - LaTeX vs. Word

- LibreOffice / Word:
  - Widespread
  - Nice for short paper (1-3 pages)
  - Awful for long papers and complex structures
  - Move one figure and you may accidentally summon Satan

# Running Case - Seminar Paper

## Write Your Paper - LaTeX vs. Word

- LibreOffice / Word:
  - Widespread
  - Nice for short paper (1-3 pages)
  - Awful for long papers and complex structures
  - Move one figure and you may accidentally summon Satan
- LaTeX:
  - Simple scripting language
  - Professional results, customizable and reusable
  - Visualize complex mathematical equations
  - Awesome reference management (Bibtex)
  - Required by most conferences, journals, etc.
  - Many templates available (Paper, Bachelor, Master, PhD, Book, etc.)

# Running Case - Seminar Paper

## Write Your Paper - Tips

- Tell a story!
- BUT, don't write about your personal journey from the problem to the solution. Instead, write about the final and “*correct*” approach that leads to the solution.
- Write for your audience? (Beginners vs. Experts)
- Are you writing a BA/MA/PhD-Thesis, a seminar paper or a research paper?
- Writing is only 25% of the work, the other 75% happen before you even start writing.

# Running Case - Seminar Paper

## Write Your Paper - Tips

- Avoid spelling mistakes.
- Many iterations and proof-read several times.
- Adhere to the template guidelines.
- Avoid long sentences.
- Clarify special notations.
- Figures are very helpful, but make sure to properly integrate them into you text (reference, comment, analyze).
- Use equations if necessary, but be careful (+ same as for figures).
- Balance between details and abstract ideas (page limits).
- Making a claim? Provide a source or proof it!

# Running Case - Seminar Paper

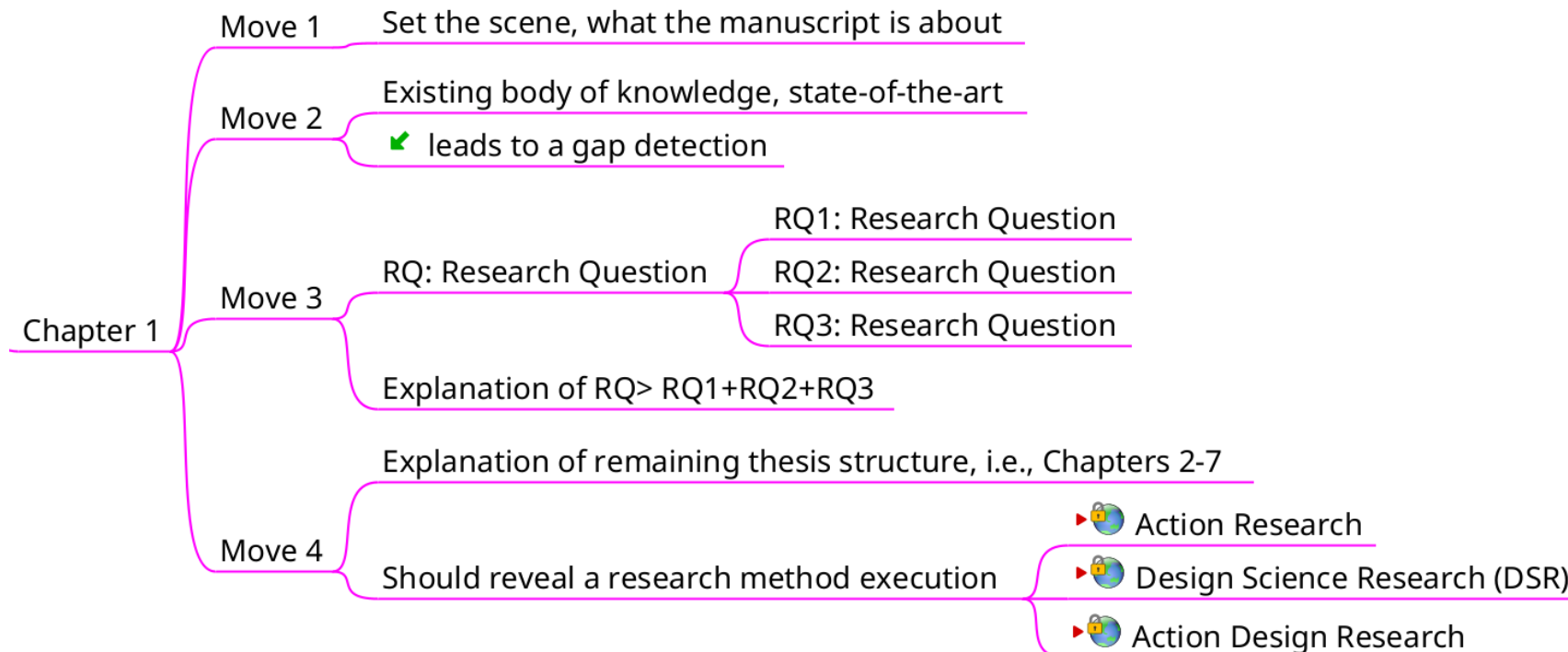
## Write Your Paper - A Good Abstract

- 1) What is the paper about?
- 2) What is the State of the Art?
- 3) What is the detected gap?
- 4) What are the main questions to be answered pertaining to the gap?
- 5) Why is the solution good/better than other solutions?

- Roughly 100-200 words, depending on scope of publication, e.g., seminar paper vs. PhD-Thesis

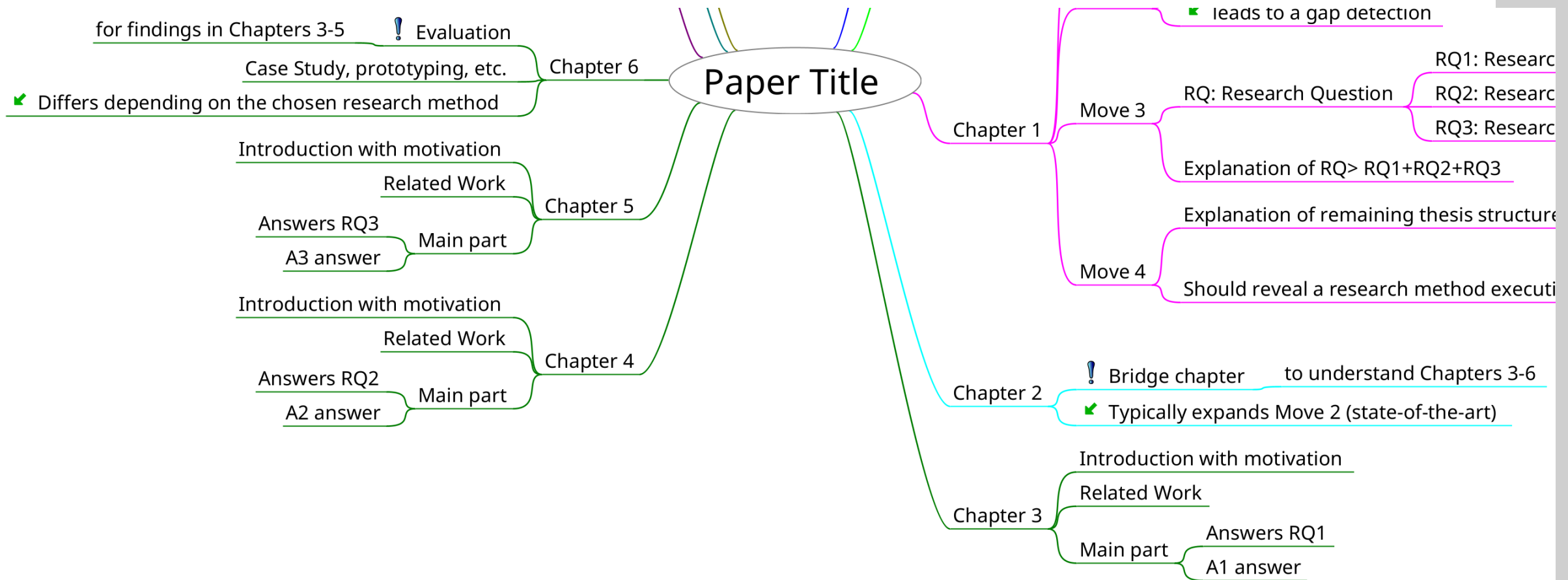
# Running Case - Seminar Paper

## Write Your Paper - Introduction



# Running Case - Seminar Paper

## Write Your Paper - Main Part



# Running Case - Seminar Paper

## Write Your Paper - A Good Conclusion

- 1) General summary
- 2) Answer to RQ-1
- 3) Answer to RQ-2
- 4) Answer to RQ-3
- 5) (Evaluation)
- 6) Future Work



# Running Case - Seminar Paper

## Write Your Paper - References

- Different sources (book, paper, phd/master thesis, website, journal, etc.)
- Direct vs. indirect citations
  - *“Penguins are black and white” vs. The authors [Ref.] argue that penguins are black and white.*
- Different citation styles (IEEE, APA, MLA, etc.)
- It is not your own idea or work? Provide reference to the original source!

## Running Case - Seminar Paper

### Write Your Paper - References (BibTex - Example)

- Example for the publication “Self-managed and blockchain-based vehicular ad-hoc networks ” - [Link](#)

```
@inproceedings{leiding2016self,  
  title={Self-managed and blockchain-based vehicular ad-hoc networks},  
  author={Leiding, Benjamin and Memarmoshrefi, Parisa and Hogrefe, Dieter},  
  booktitle={Proceedings of the 2016 ACM international joint conference on  
    pervasive and ubiquitous computing: adjunct},  
  pages={137--140},  
  year={2016}  
}
```



## ADDITIONAL RESOURCES

## Additional Resources Templates

- Mind Map Template (Freeplane) – Paper → [Link](#)
- Mind Map Template (Freeplane) – Thesis → [Link](#)
- Latex – Paper (Springer) → [Link](#)
- Latex – Paper (IEEE) → [Link](#)
- Latex – Thesis → [Link](#)

## Additional Resources

### LaTeX Tutorials

- A simple guide to LaTeX – Step by Step → [Link](#)
- A Beginner's Guide to LaTeX → [Link](#)
- Using BibTeX: A Short Guide → [Link](#)

## **Additional Resources**

### **Systematic Literature Review**

- Systematic Literature Review in Computer Science - A Practical Guide → [Link](#)

## Additional Resources

### Research Methods

- Design Science Research → [Link](#)
- Action Research → [Link](#)
- Action Design Research → [Link](#)

# Questions?