Write like a Computer Scientist

Majd F. Sakr

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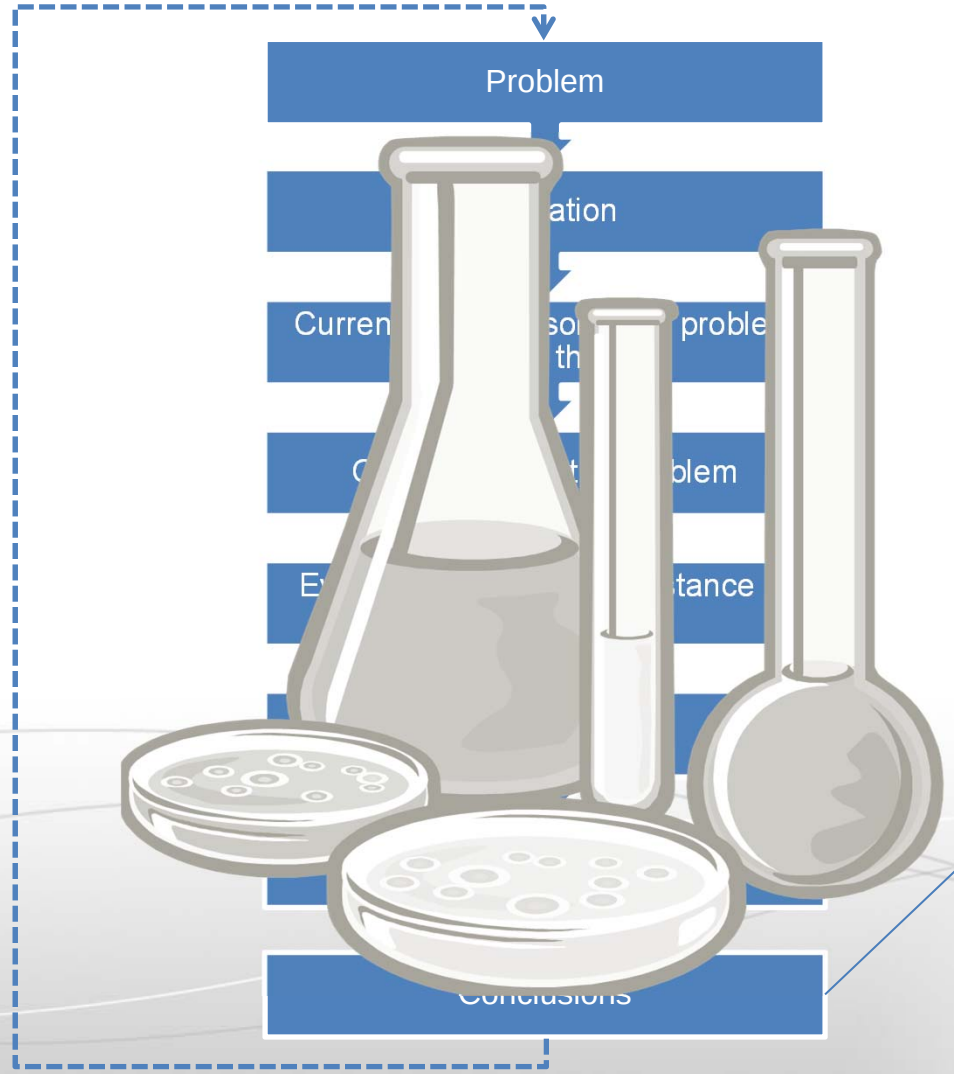
Flow of a Typical Science Project



Your Contribution

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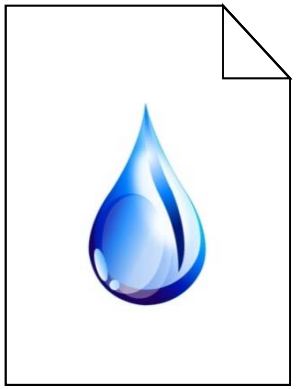
Your Contribution to Science



Tell the world of science about your contribution.

A drop in the ocean, but it keeps science going!

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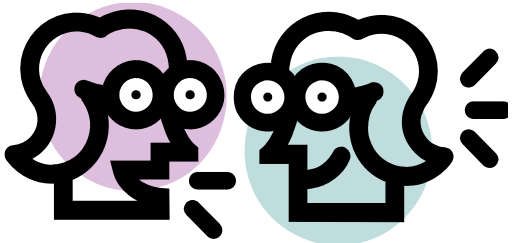
What do you get from writing a research paper?

Convey an Idea

Inform the scientific community about your work.



Invite critique and engage people in the same domain

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How to Write a Research Paper?

- Great Care to be taken while writing a paper
  - Critical to have a paper that is well written, clear and concise in order for it to be appreciated and have an impact

- General Considerations
  - Story
  - Clarity
  - Conciseness
  - Grammar and Language

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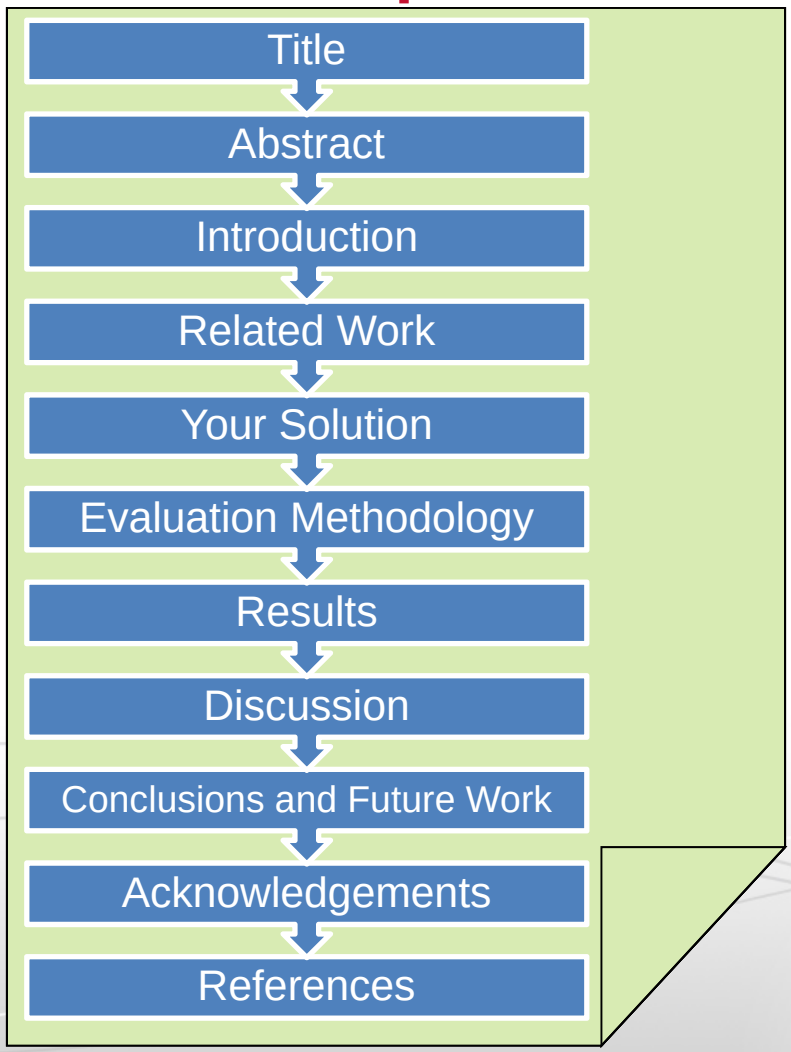
Sections of a Typical Research Paper



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Choosing a Paper Title

- A paper's title is very important
- Choose a title wisely.
- Thousands will read the title of a published paper
  - Only hundreds might actually read your paper in full.
- Title should capture the essence of the paper in the fewest possible number of words.

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Examples of Titles

- **Go To Statement Considered Harmful**
  - E. W. Dijkstra,1968
- **The Case for the Reduced Instruction Set Computer**
  - D.A. Patterson et. al. 1980
- **A Case for Redundant Arrays of Inexpensive Disks (RAID)**
  - D.A Patterson, Garth Gibson, Randy H. Katz, 1988
- **The Anatomy of a Large-Scale Hypertextual Web Search Engine**
  - S. Brin and L. Page, 1996
- **Xen and the Art of Virtualization**
  - P. Barham et. al., 2003

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Abstract

- Critical portion of the paper
  - Summarize the paper for the reader
  - A clear and concise abstract is best
- Abstract and Introduction usually influence the decision of the reader to proceed with your paper or not
- Best written after the rest of the paper is complete

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Style: Move Structures

- A **move** is a step taken by writers to achieve part of the overall purpose
- A **move structure** is a flowchart-like representation of the moves within a genre
- Structural features of text can be described formally using **move structures**:
  - Patterns
  - Transitions
  - Repeated Moves
  - Sequencing of Moves

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Abstract Move Structure

1. State What Was Done

- 1.1 Identify the research area and its importance
- 1.2 Mention a gap addressed by the work (optional)
- 1.3 State the purpose and accomplishment(s) of work

2. Identify Methods Used

- 2.1 Technique and Approach to solve the problem

3. Report Principle Findings

- 3.1 Highlight Major Results
- 3.2 Offer a concluding remark (optional)

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Abstract Example

Identify the Research Area

Mention a Gap

Introduce your Work

Describe your work and mention some key findings if required.

Abstract From: **A Case for Redundant Arrays of Inexpensive Disks (RAID)**
D.A Patterson, Garth Gibson, Randy H. Katz, 1988

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Introduction Section

- Answer the following questions
  - **What was the problem?**
  - **Why is it important?**
- Not all readers maybe familiar with the problem
  - Describe the general domain before heading into specifics.
  - Cite important papers and refer to the work as required.
- Gradually introduce a gap and motivate the problem.
- Fill the gap by introducing your work
- Roadmap for the rest of the paper.

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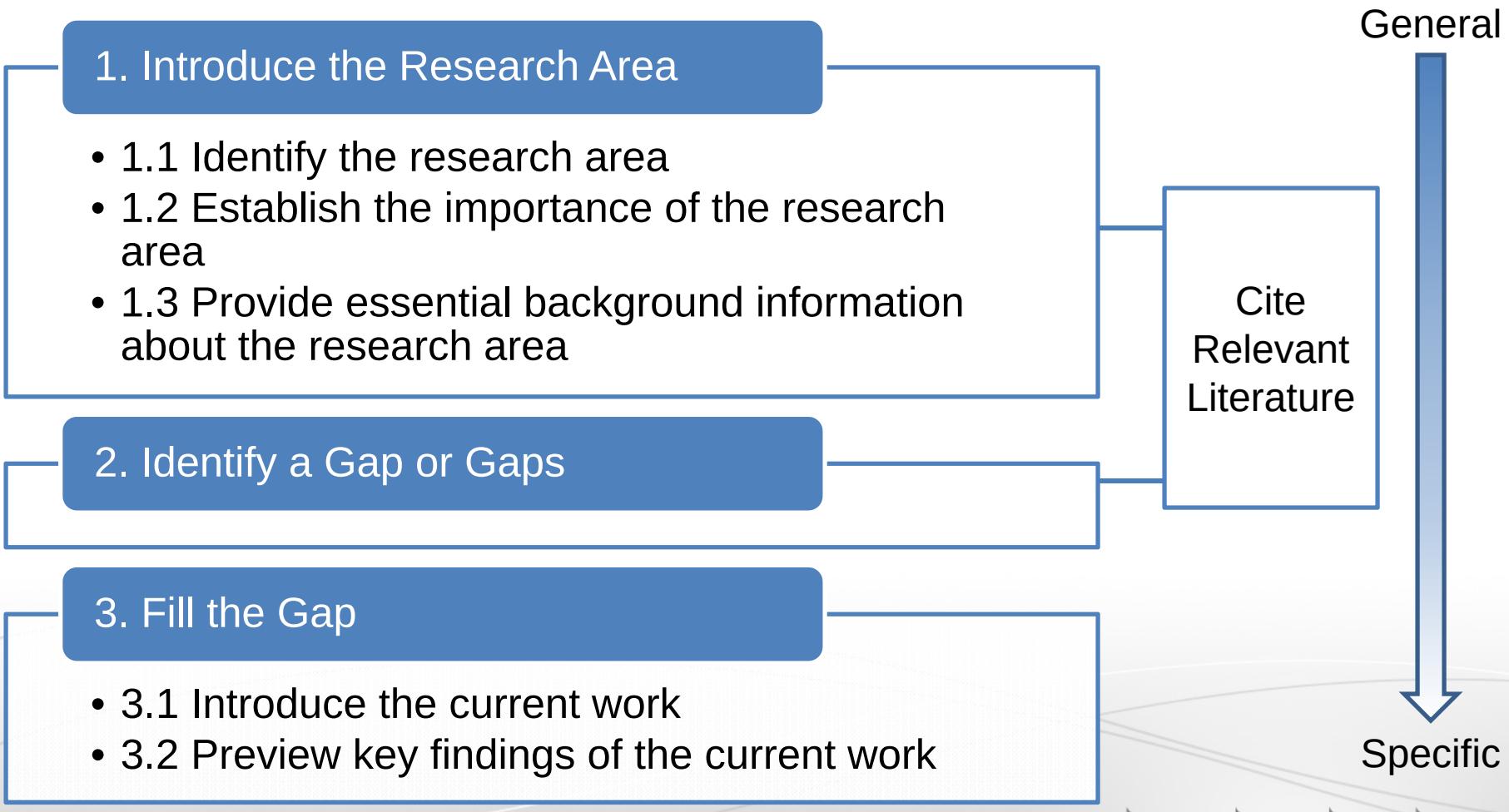
Introduction Move Structure



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Related Work Section

- Answer the question:
  - **What have others done on this or related problems?**
- Can be placed after the Introduction or before the Conclusion sections.
- Must be thorough and should encapsulate as much of the related work as possible.
  - Describe other work in a few sentences and compare your work to theirs (optionally).
  - Reviewers will want to compare and contrast your research with others in the domain

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Solution Overview Section

- Answer the questions:
  - **How did you study the problem?**
  - **What is your proposed solution?**
- Present your solution for a specific instance of the problem.

1. Solution Description

- 1.1 Describe the proposed solution in Detail
- 1.2 Effective use of Diagrams can work well in visually describing your solution
- 1.3 Provide formal descriptions of Algorithms and Proofs if they are novel.

Solution Overview Move Structure

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Evaluation Methodology Section

- Answer the question:
  - **How can you prove your Solution is effective?**

- In order to prove that you have an effective solution to the research problem, you will need to evaluate it and present the results
- Your evaluation can be experimental or theoretical
- Present your evaluation parameters in detail
- State any assumptions made
- Give enough information for reproducibility

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Results Section

- Answer the Question:
  - **What did you observe?**
- Presenting the results in a neat and logical manner is crucial to convincing the reader about the efficacy of your solution
- Each result set should be displayed in a graphical or tabular forms

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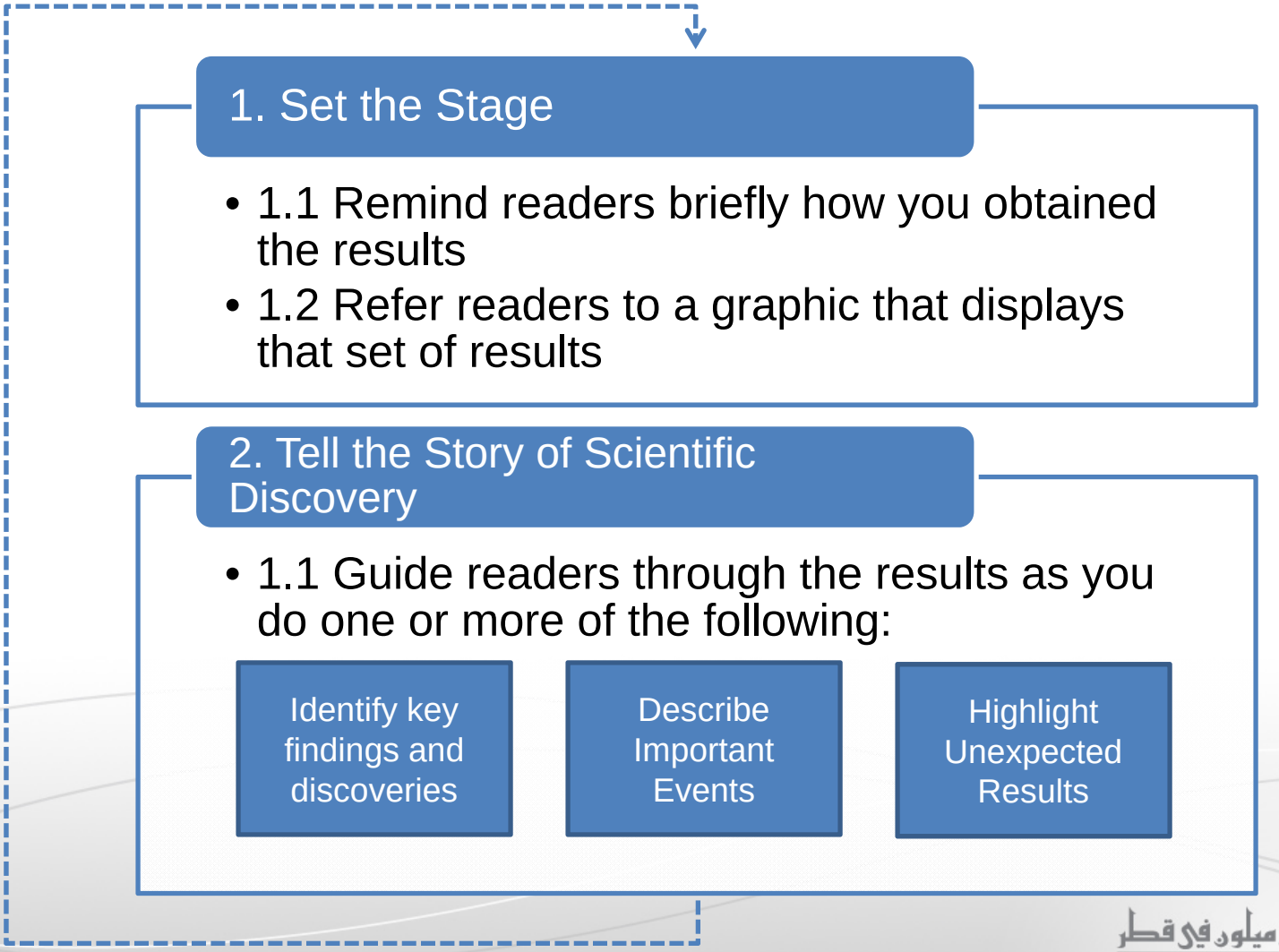
Results Set Move Structure



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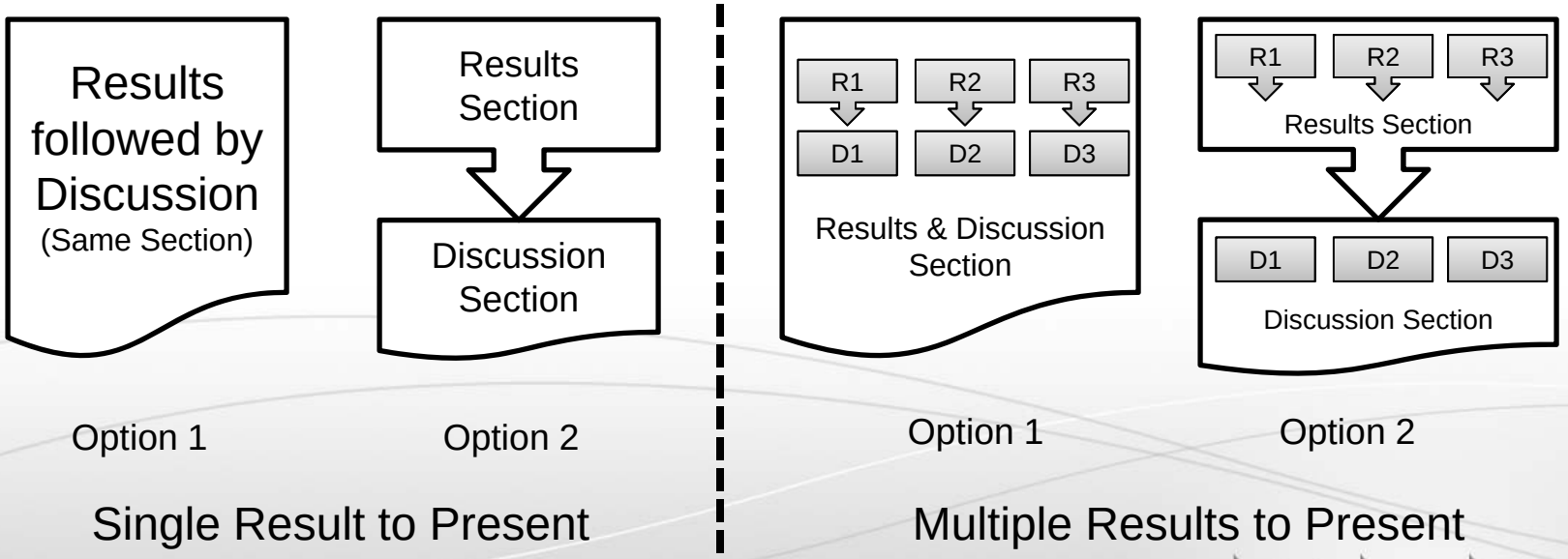
Analysis and Discussion Section

- Answer the question
  - **What do the findings mean?**

- Discussion can be a separate section or integrated with Results as follows:



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Final Sections

- Conclusion Section
  - Very brief summary of the work to remind the reader (optional)
  - Indicate overall implications of your findings
  - What does one learn from your findings
- Future Work Section
  - Describe future studies based on your conclusions and findings
  - Do not hesitate to mention shortcomings of your work that you intend to cover in the future.
- Acknowledgements
  - Funding agencies and sponsors (if any)
  - Other people (non-authors) who helped with the work.

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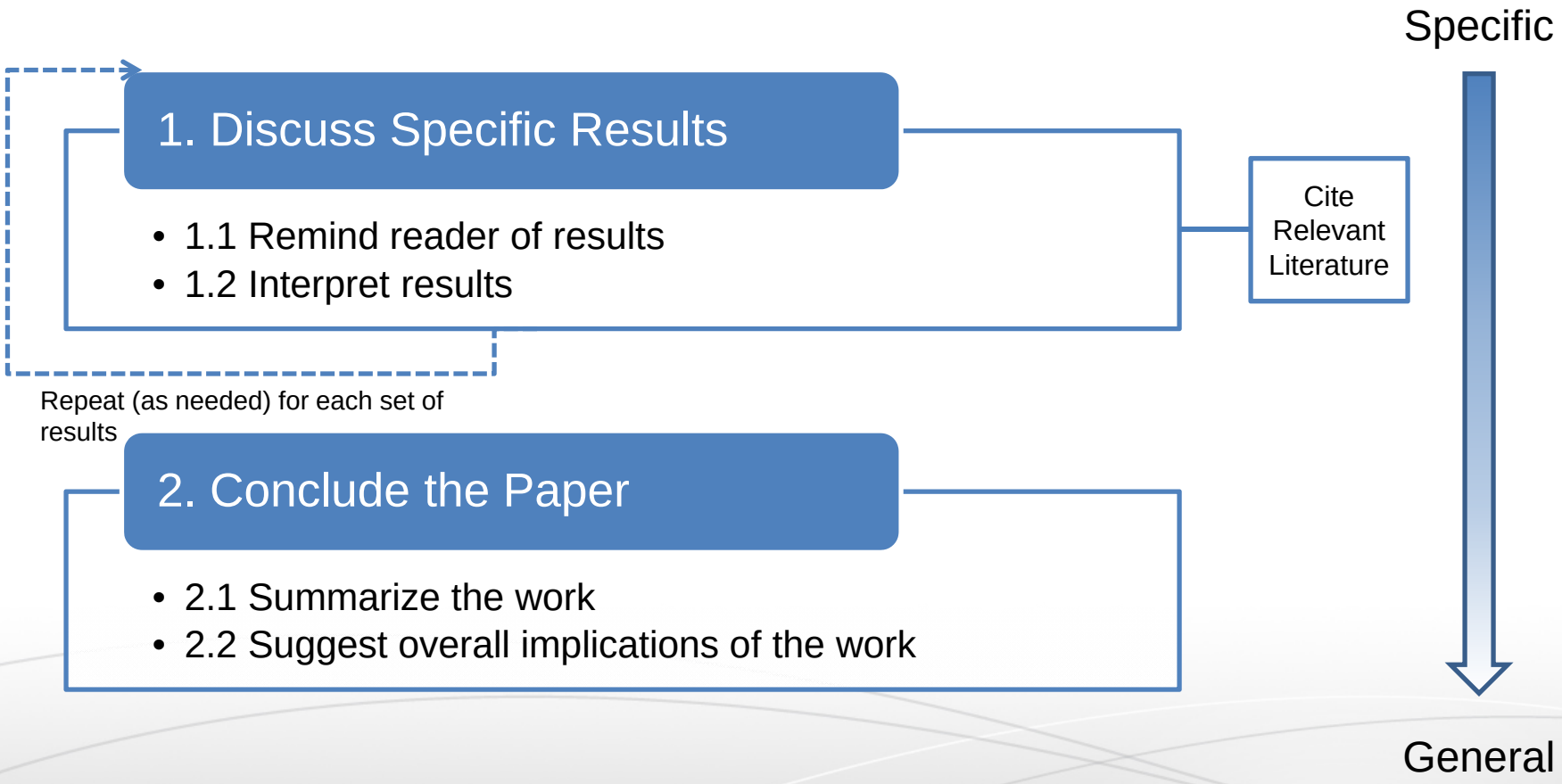
Discussion and Conclusion Move Structure



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A Note on References

1. Bowman, M., Debray, S. K., and Peterson, L. L. 1993. Reasoning about naming systems. *ACM Trans. Program. Lang. Syst.* 15, 5 (Nov. 1993), 795-825. DOI= http://doi.acm.org/10.1145/161468.16147.

ACM-style references

- Follow the reference style as indicated by the conference template strictly.
- You can use Reference managers such as EndNote or Bibtex to simplify reference management while writing the paper.

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