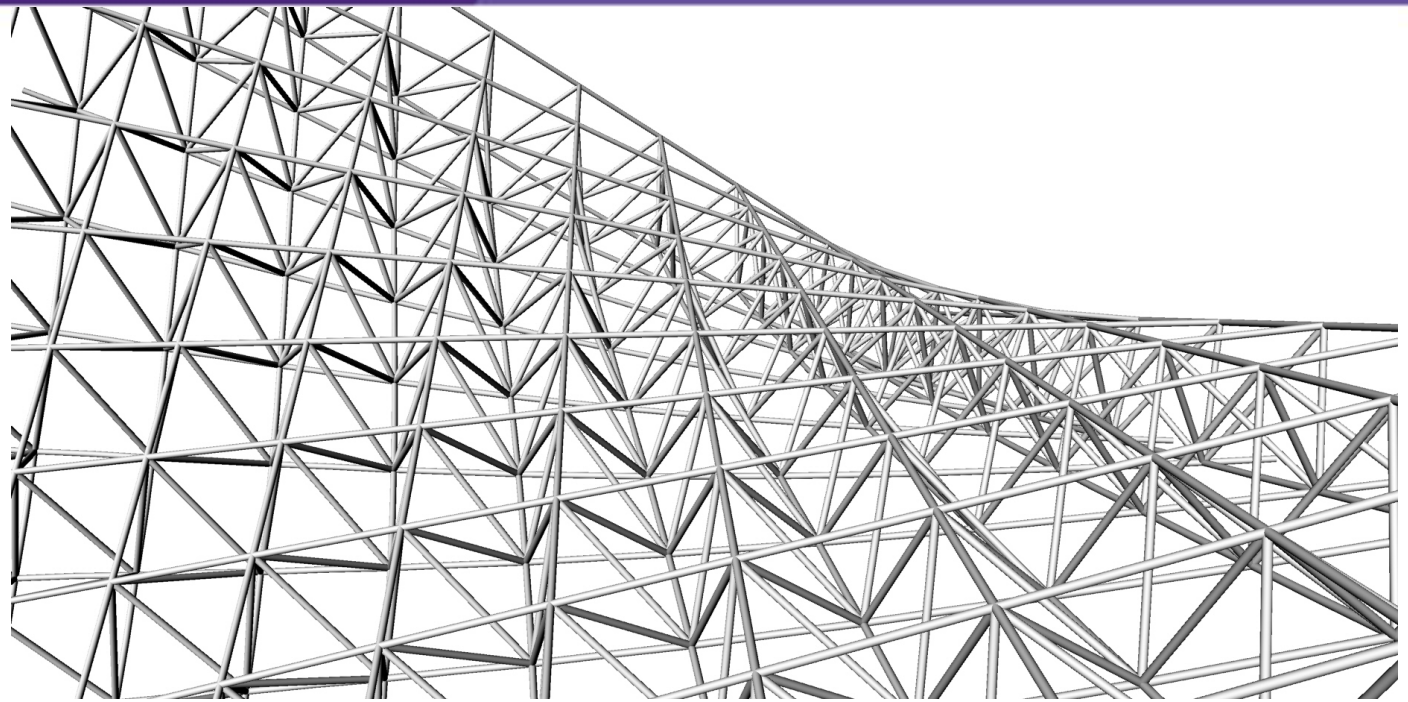
UNSW AUSTRALIA
Canberra

Never Stand Still

The Structural Elements of a Research Report

Prepared by the ALL Unit, Learning and Teaching Group



Dr Janise Farrell
Senior Learning Advisor
ALL Unit

UNSW CANBERRA

What is your task?

11-page summary report = a compulsory requirement for all students

and for some students…

a 40-page thesis

Structure of a summary report

Abstract

I. Introduction (and Background)

II. Materials and Methods 1

III. Materials and Methods 2

IV. Results and Discussion repeated

V. Conclusions

VI. Recommendations

VII. Acknowledgements

References

II. System Model
III. Proposed Graph-Based Model

A short paper format that combines results and discussions, but discusses each one result at a time.

Structure of a thesis

Abstract

I. Introduction

II. Literature Review

III. Materials and Methods 1

IV. Materials and Methods 2

V. Results and Discussion (repeated)

VI. Conclusion

VII. Recommendations

Acknowledgements

References

III. Theoretical Calculations
IV. Experimental Set Up and Procedure

11-page Summary Report

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40-page Thesis

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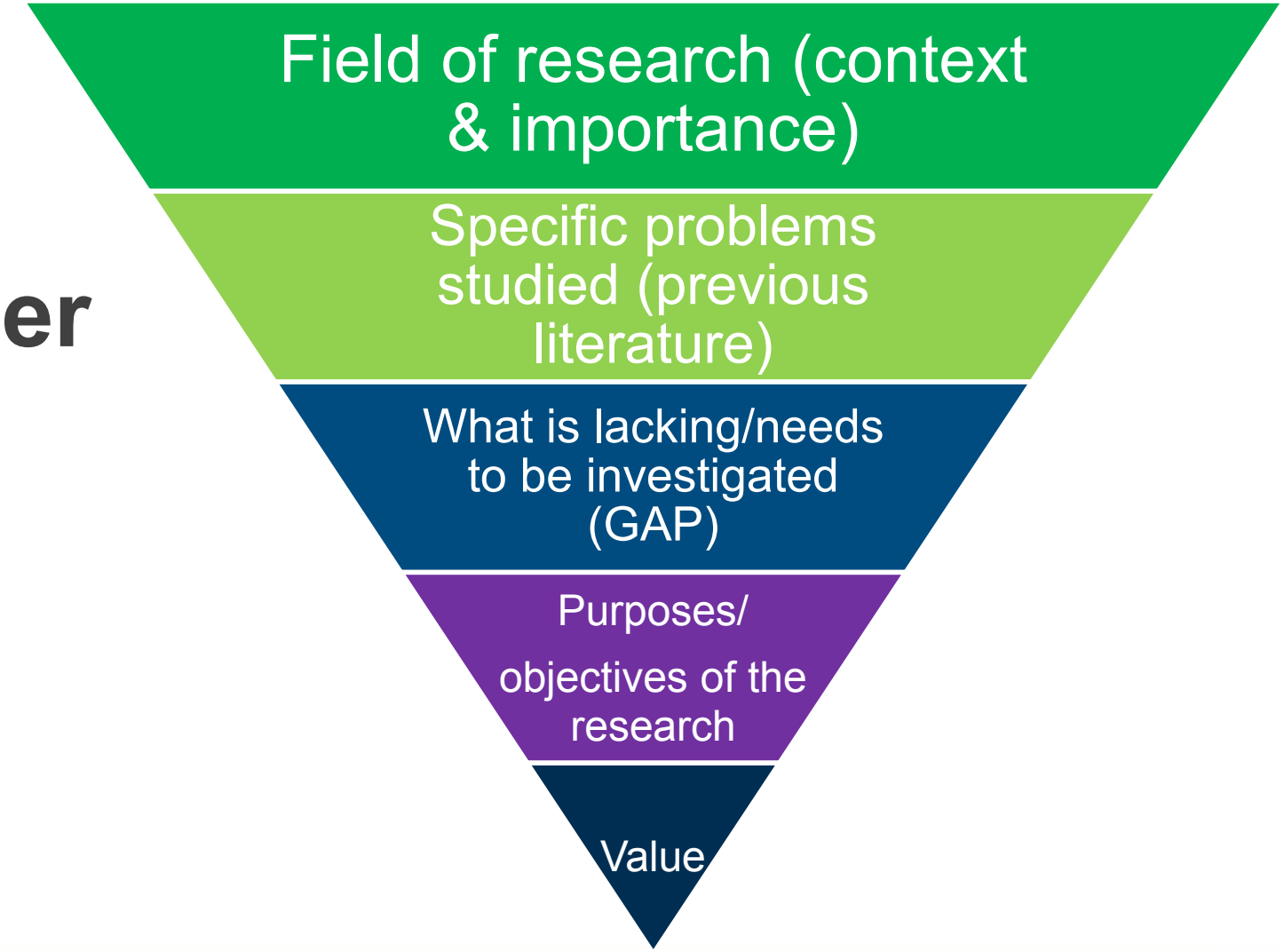
[INTRODUCTION/BACKGROUND/LITERATURE]

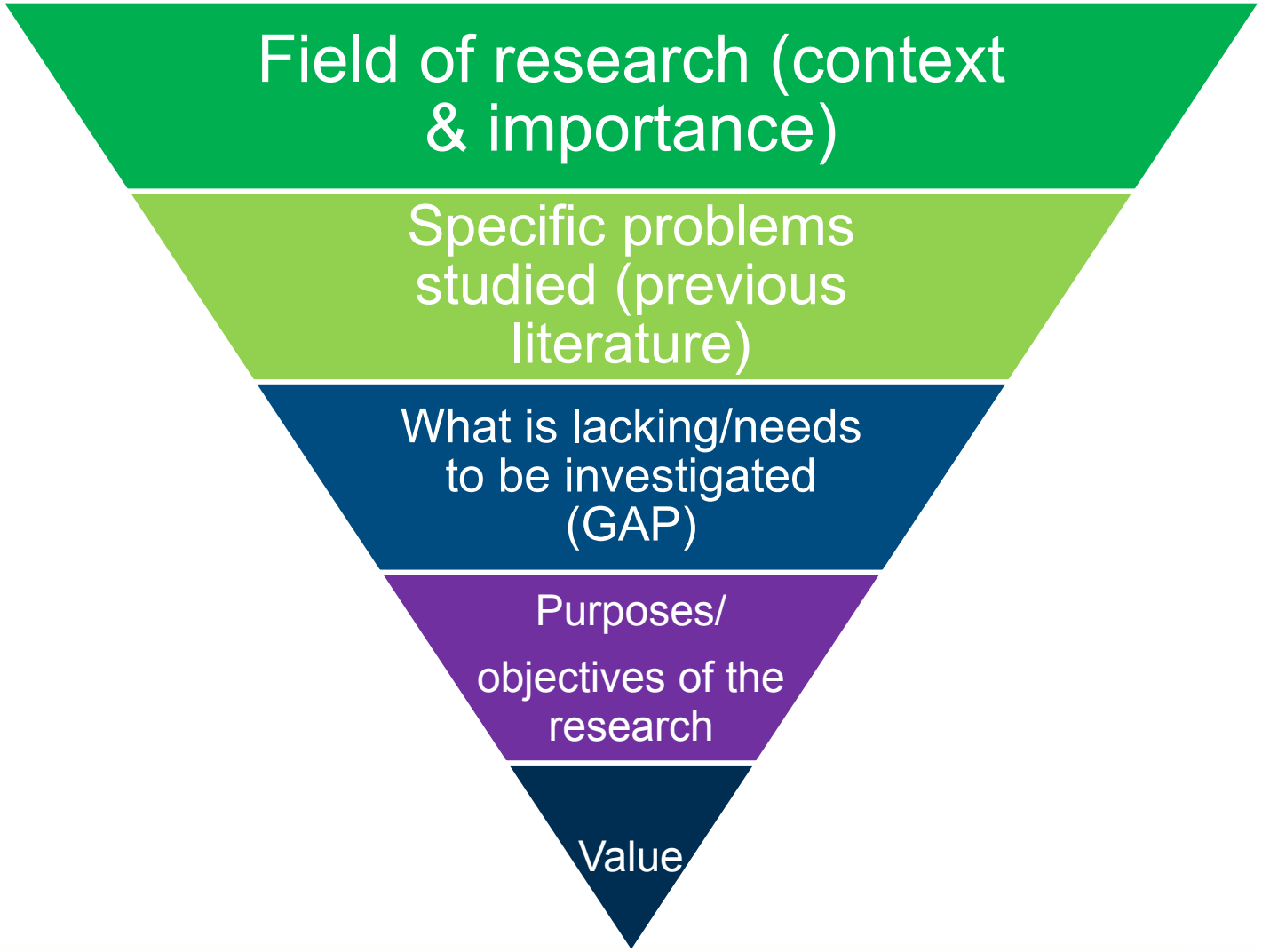
The contextualiser



[INTRODUCTION/BACKGROUND/LITERATURE]

General

Specific



I. Introduction and Motivation

Since the bombing of the Murrah Federal Building in Oklahoma City in April 1995 [1], the design and validation of structures against blast loads has become increasingly important for modern society and accurate prediction of material response is able to ensure personnel and property protection [2]. Further, according to the National Terrorism Public Alert System, the current likelihood of a terrorist attack in Australia is 'High', indicating that proactive protection analysis and validation must be conducted [3].

Context/ Previous Literature

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To achieve, or even define, significant progress in the field of materials research and the subsequent creation of high performing yet realistic protection systems, it is important to understand the fundamental limitations of particular materials as well as the capabilities and restrictions of the computational analysis methods which aid in the facilitation of these progressions.

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Gap

I. Introduction and Motivation
(second paragraph)

How does this paragraph start? Are we still talking about the gap in the literature? Have we moved on to the purpose of the study and the value? Where does one rhetorical move end and the next begin? Does the paragraph cleanly end with the 'value' of the research?

The objective of this study was to simulate panels of glass subjected to air blast loading using ANSYS AUTODYN software, and determine the protection, if any, offered by a wire mesh security screen placed between the glass panel and the source of detonation. Determining the amount of protection offered by this simple design may lead to a new approach whilst establishing protective glass configurations for buildings or vehicles, incorporating modified factor of safety values and blast resistance capabilities. Due to the potency of blast loading which can cause a significant range of fatal injuries, this study has the potential to impact design in both a civilian and military context. The effects of various blast loading parameters on the dynamic response of glass were also studied.

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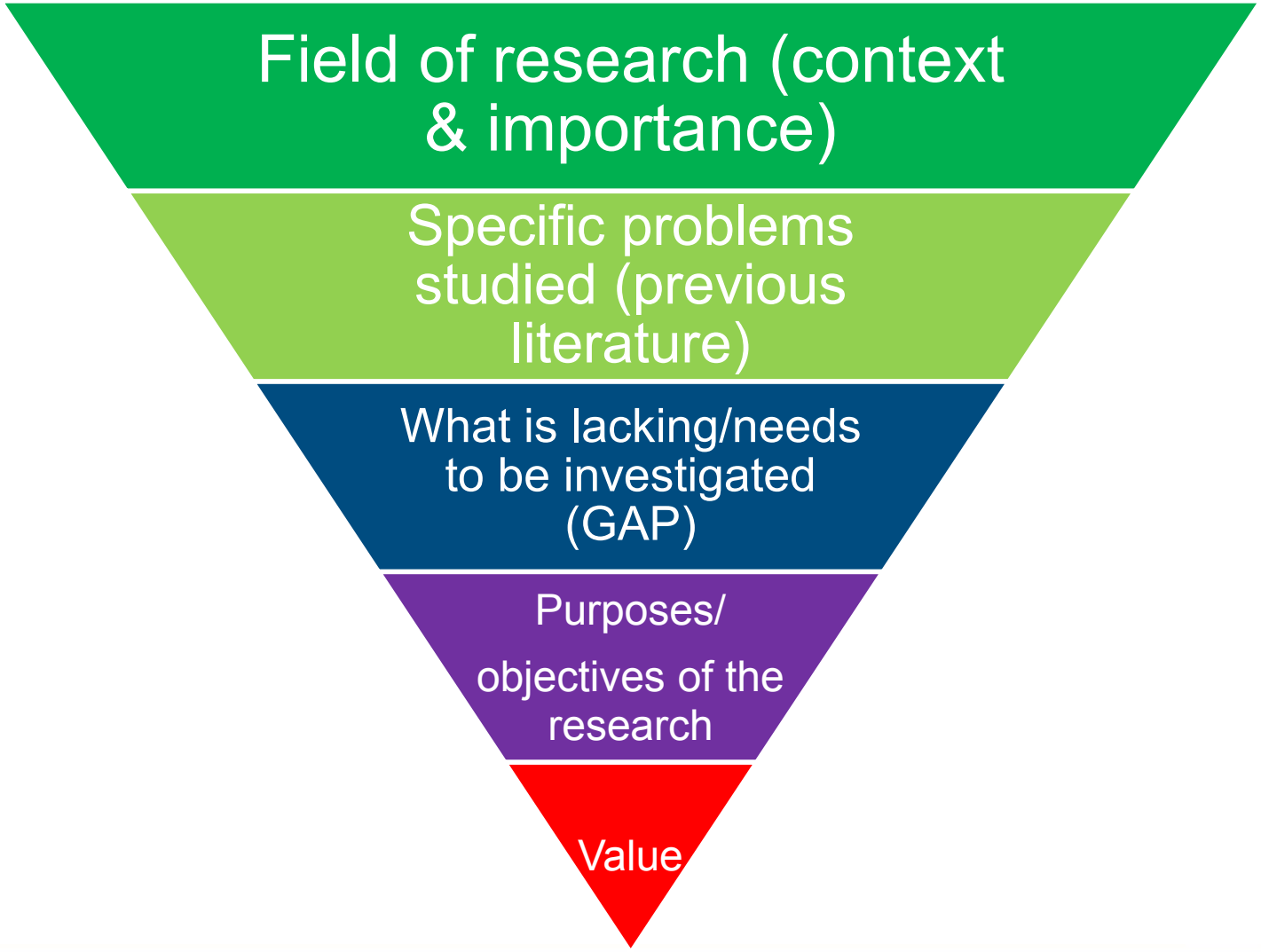
[INTRODUCTION/BACKGROUND/LITERATURE]

General

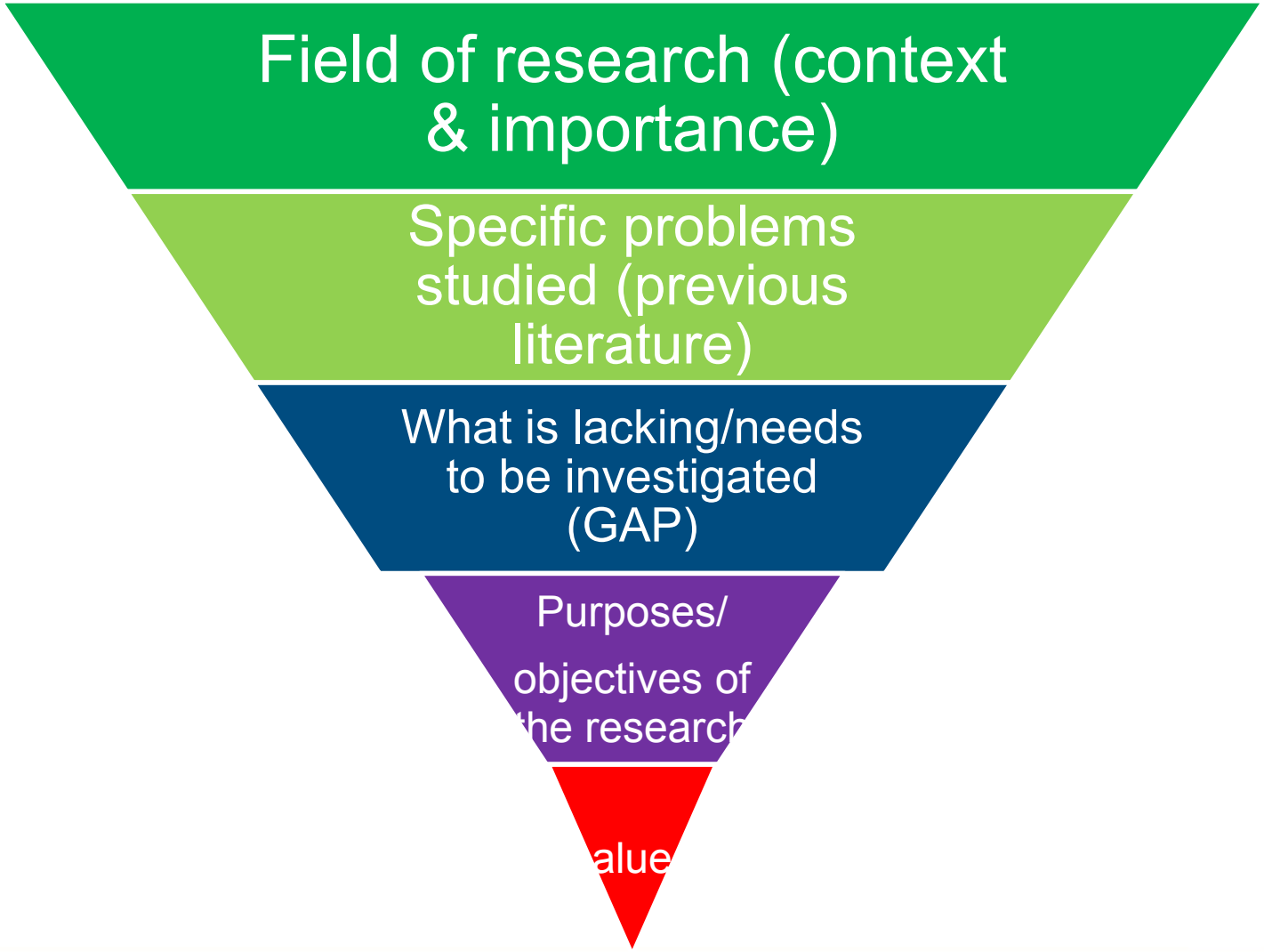
Specific



[INTRODUCTION/BACKGROUND/LITERATURE]

General

Specific



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[BACKGROUND/LITERATURE REVIEW]

- Scott Socolofsky, Professor in Environmental Fluid Mechanics at Texas A&M University: How to write a research journal article in engineering and science (2004).

1. Cite the most significant sources that form the foundation underlying the topic that will be extended in your report.
2. Focus on the cutting-edge knowledge base and the significant differences between the work that has already been published and the new contribution that your report is presenting.

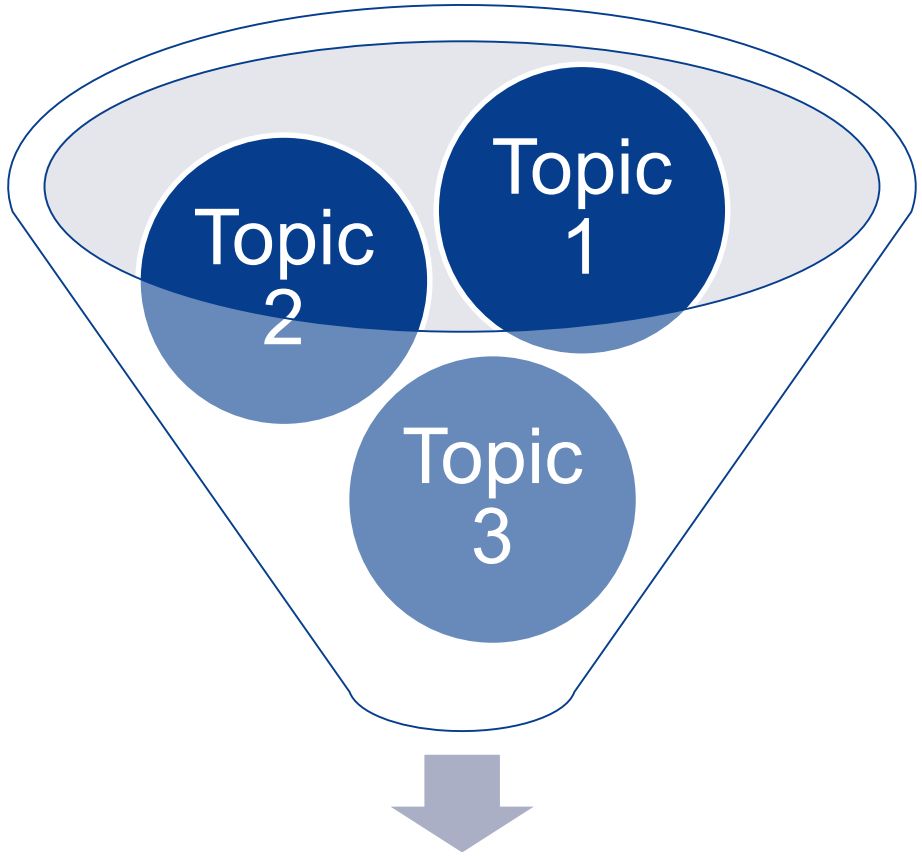
Guiding principle:

The literature review identifies significant early contributions, outlines the current state of knowledge, and justifies the novelty of the thesis' contribution.

THE LITERATURE REVIEW: 'FUNNEL' ANALOGY

General

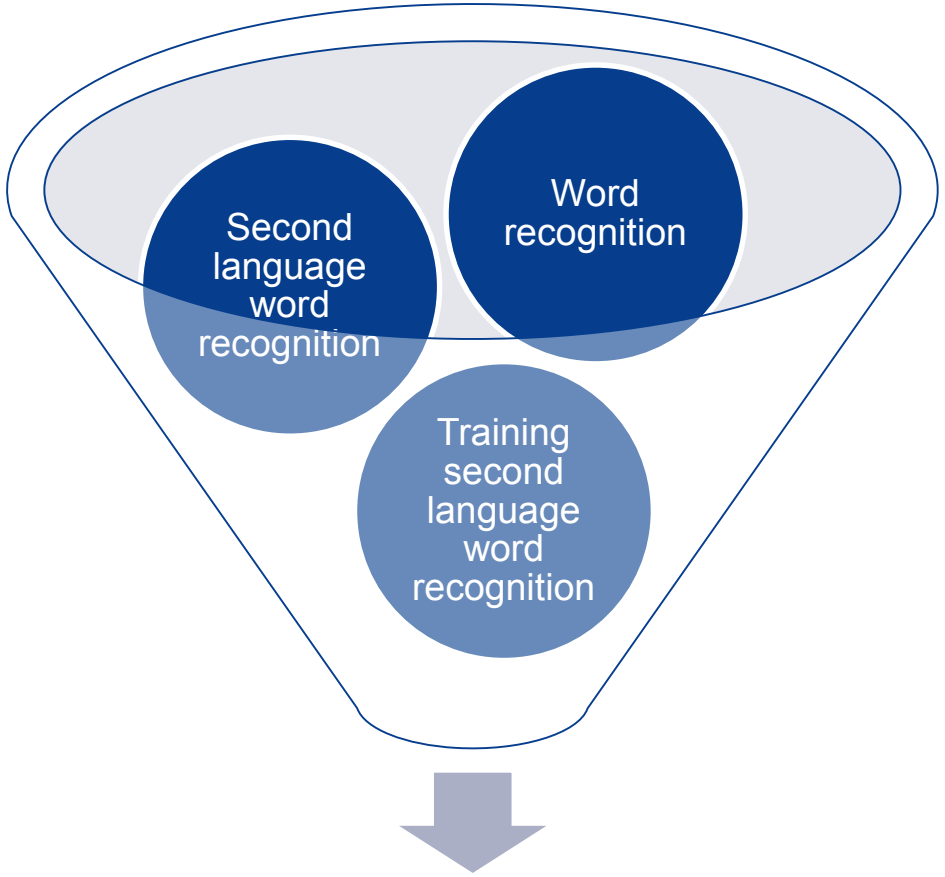
Specific



Your topic

Think of the bottom of the funnel as the 'gap'

Example from my own thesis



A novel method of training second language word recognition

[BACKGROUND/LITERATURE REVIEW]: Tense use

You can indicate your opinion of the research you are writing about through careful tense selection.

Present tense

*Many of the lakes and wetlands in the region **are located** in craters or valleys blocked by early Pliocene lava flows (Ollier & Joyce, 1964).*

Does the writer believe these research findings are true and relevant?

(Adapted from a University of Melbourne information sheet)

[BACKGROUND/LITERATURE REVIEW]: Tense use

Present perfect tense

A great deal of research has been conducted on the basic techniques of nuclear transfer.

- It happened in the past, but it's still relevant to now. It still has currency.

Does the writer believe these research findings are true and relevant?

(Adapted from a University of Melbourne information sheet)

[BACKGROUND/LITERATURE REVIEW]: Tense use

Present perfect tense

Currency may be **positive** (asserting that previous studies have established a firm research foundation) or **negative** (asserting that not enough relevant or valid work has yet been done).

A great deal of research has been conducted on the basic techniques of nuclear transfer, but few experiments have been carried out to discover the most appropriate age of the cytoplasm to support nuclear transfer most effectively.

(Adapted from a University of Melbourne information sheet)

[BACKGROUND/LITERATURE REVIEW]: Tense use

Present or past tense?

1. Jones measures/measured the impact of X on Y?

[BACKGROUND/LITERATURE REVIEW]: Tense use

Present or past tense?

1. Jones ~~measures/~~measured the impact of X on Y?

[BACKGROUND/LITERATURE REVIEW]: Tense use

Present or past tense?

1. Jones ~~measures/~~measured the impact of X on Y?
2. Jones suggests/suggested the result was due to Z.

Both are OK!
Do they give you the same feeling about the validity of the suggestion?

- *Jones suggested the result was due to Z. However, subsequent research by El-Nashar has shown that…*

Note that 'found' doesn't have that same negative connotation.

Reporting verbs

strong… weak… tentative… neutral

according to	reveal	show
argue	maintain	state
claim	mention	suggest
assert	report	write
explain	find (found)	propose
concede	assume	observe

These are used to introduce others' work and can help us to compare and contrast their views.

Reporting verbs

Smith (2000) argued that the wool industry was experiencing difficulties related to falling demand worldwide since the development of high-quality synthetic fibres. **However, Jones et al. (2004) found** that industry difficulties were more related to quality of supply than to demand issues.

(Cargill & O'Connor, 2013)

[BACKGROUND/LITERATURE REVIEW]: Gap in the research

Can you find the words and phrases used to introduce a gap in the literature in the following sentences?

1. However, understanding how these processes interact to regulate invasions remains a major challenge in ecology.
2. Despite its acknowledged importance, propagule pressure has rarely been manipulated experimentally and the interaction of propagule pressure with other processes that regulate invasion success is not well understood.
3. It is presently unclear how different disturbance agents influence long-term patterns of invasion.

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[BACKGROUND/LITERATURE REVIEW]: The road map

Final paragraph

The roadmap can either

- give a general outline of the following sections, or
- specifically mention the content of the following sections

"Section 2 introduces models for drag, turbulence, and diffusivity for flow through emergent vegetation. Laboratory and field experiments described in section 3 provide observations which support these models. The comparison of model prediction and experimental observation is given in section 4. Finally, the models are used to compare the mean flow, turbulence intensity, and diffusivity in vegetated and unvegetated regions in section 5" (Nepf, cited in Socolofsky, 2004).

[METHOD] – The narrator: **Methods** you followed. **Materials** you used

Language Note

The focus should be on the experiment, not the person carrying out the experiment. The passive voice should be used, e.g., *The pizza was eaten*.

Change the following sentence in the active voice to the passive voice.

ACTIVE: I conducted 78 individual simulations.

PASSIVE: 78 individual simulations were conducted.

Past tense is used because the method describes what was done in the lab when the experiment was carried out.

Not: 78 individual simulations **are** conducted.

[METHOD] – Examples

Sample Report: First paragraph

To properly analyse the effect of air blast loading on structures and investigate parameter criticality, this study was broken up into a few main areas, referred to as 'Outputs'. These outputs were later compared against each other through use of a scaled distance technique. 78 individual simulations in total were conducted, 39 without the glass panel in place, and 39 with. This was done in order to investigate both the material response and examine blast wave propagation without reflection or disturbance.

[RESULTS] – The driver

1. Determine **what** findings need to be presented based on your original aim/focus

2. Decide **how** best to present the information e.g. tables, figures (graphs, charts)

3. **Number** each table/figure and give them a **title**, placing captions above tables and below figures (e.g. Table 1, Table 2…; Figure 1, Figure 2…)

4. **Introduce** your tables and figures in the body of the text, very **briefly summarising** what they demonstrate (e.g. *The results show that … (see Table 1)…), Figure 1 shows that…, As Figure 2 shows…,*

[RESULTS] – Structure

The results section usually includes three main stages:

Stage 1: Introduce the results section and tables and/or graphs (optional)

Stage 2: Present tables and graphs

Stage 3: Summarise results

What if you have a series of results to report?

- You can repeat the results section structure (i.e. the three stages).

[RESULTS] – Language: tense

Example:

Present tense: tables and figures

Fig. 6 demonstrates that the magnitude of pressure increase is directly related to the amount of wires in the screen. As the free, or permeable, area decreases, the pressure rise increases.

In particular, the screen which consisted of 2.5mm diameter wires was able to reduce the peak pressure at this location by approximately 39%.

Past tense: results obtained

[DISCUSSION] The interpreter

Your Discussion should:

- Make references back to your research questions/hypotheses/objectives
- Restate the most significant findings
- Discuss how these findings answer questions, meet objectives, etc.
- Review whether they agree/disagree with or support the findings of similar projects
- Return to references to the literature
- Discuss any limitations the project may have faced
- Relate the results to the broader discipline or implications for practice

[DISCUSSION] The interpreter

Importantly, what is your 'take home message'?

What do you need to emphasize so your reader will remember it?

[DISCUSSION]– Language

Example:

Quantitative and qualitative comparison was performed to validate the numerical model and ensure accuracy and computational efficiency and showed similar measurements… The **compelling** similarity between the plots indicates **result validity**.

[DISCUSSION]– Tense use

Example:

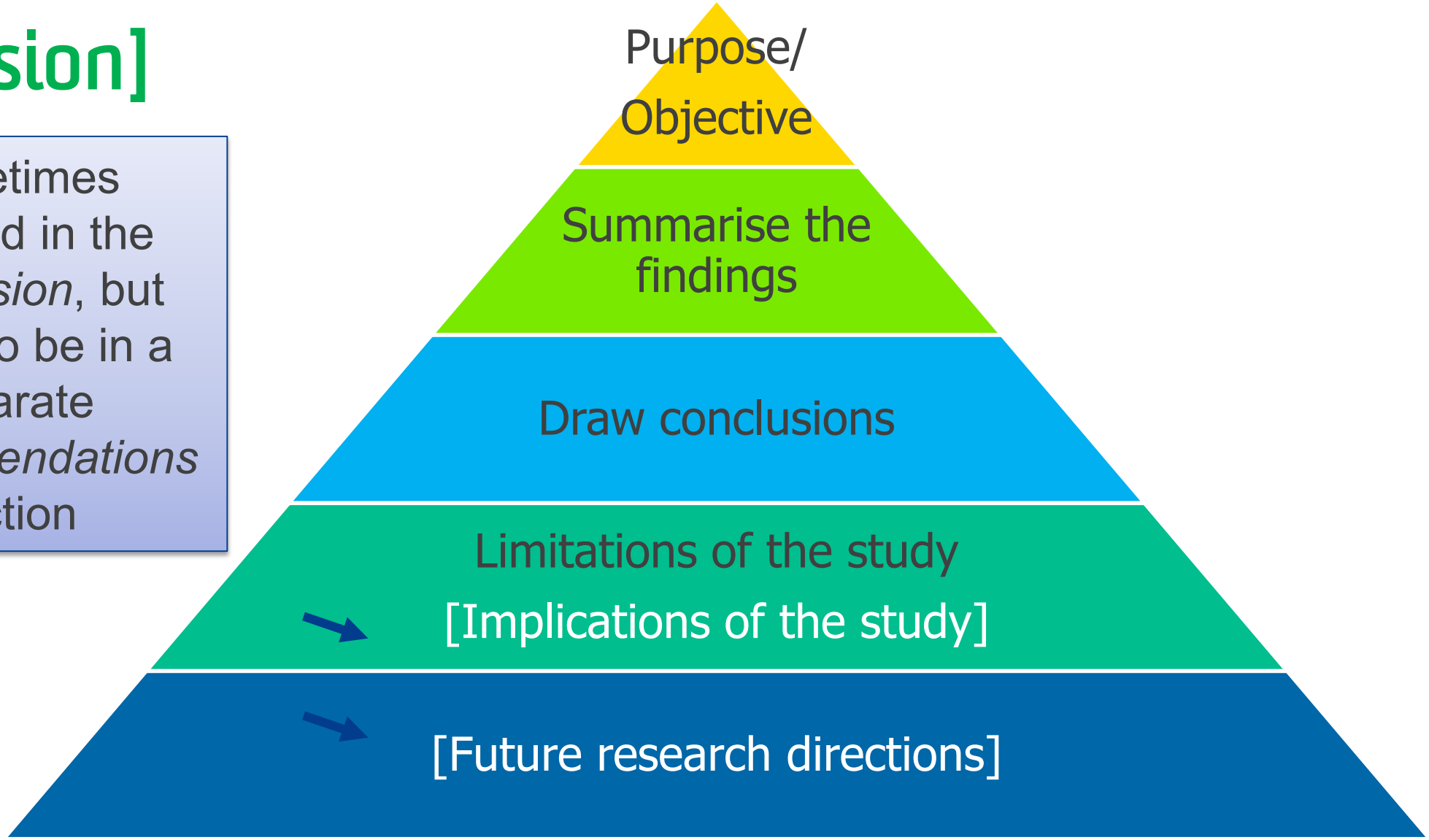
Past tense:
Summary of findings

Quantitativ[illegible]nd qualitative comparison was performed to validate the numeric[illegible] model and ensure accuracy and computational efficiency and **showed** similar measurements… The **compelling** similarity between the plots **indicates result validity**.

Present tense:
Interpretation of findings

[Conclusion]

Sometimes included in the *Conclusion*, but may also be in a separate *Recommendations* section



Sample conclusion

Can you find the different rhetorical moves in this example?

This report investigated a range of different blasts and transparent armour protection configurations to determine the qualitative and quantitative influences of mesh screen design and the parameters associated with air blast loading on blast wave propagation and finally material response. As a blast wave propagates through a wire mesh screen, complicated fluid dynamics…become prolific. There is a close correlation between quantity and thickness of wires and peak pressure reduction, where peak pressure at the target face and plastic work undertaken by the glass panel was reduced by a maximum of 39% and 42% respectively….An equation which incorporates the design variables, n, t, and d was derived to predict the peak pressure at a target location caused by a blast wave which propagates through a mesh screen; Eq. (7)... The frame which houses the glass panel and mesh screen may have significant effects on the propagation of the blast wave and then the plastic work undertaken by the target materials. Careful material selection and design must be considered to adequately predict these influences. … Close quantitative and qualitative agreement exists between the measured and theoretical peak overpressure values…

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Objective

Summary of findings

Conclusions

[Conclusion]: Tips

- No "I did this, then I did that"
- No references back to the literature
- No argumentation in support of findings
- No explanations of findings

✓ So…. What is you should be doing?

[Conclusion]: Tips

✓ You need to restate your objectives, summarise your findings and draw conclusions based on those findings.

You need to be

- Concise
- But still get your message across

[Recommendations]

What do you recommend as a course of action following your conclusion?

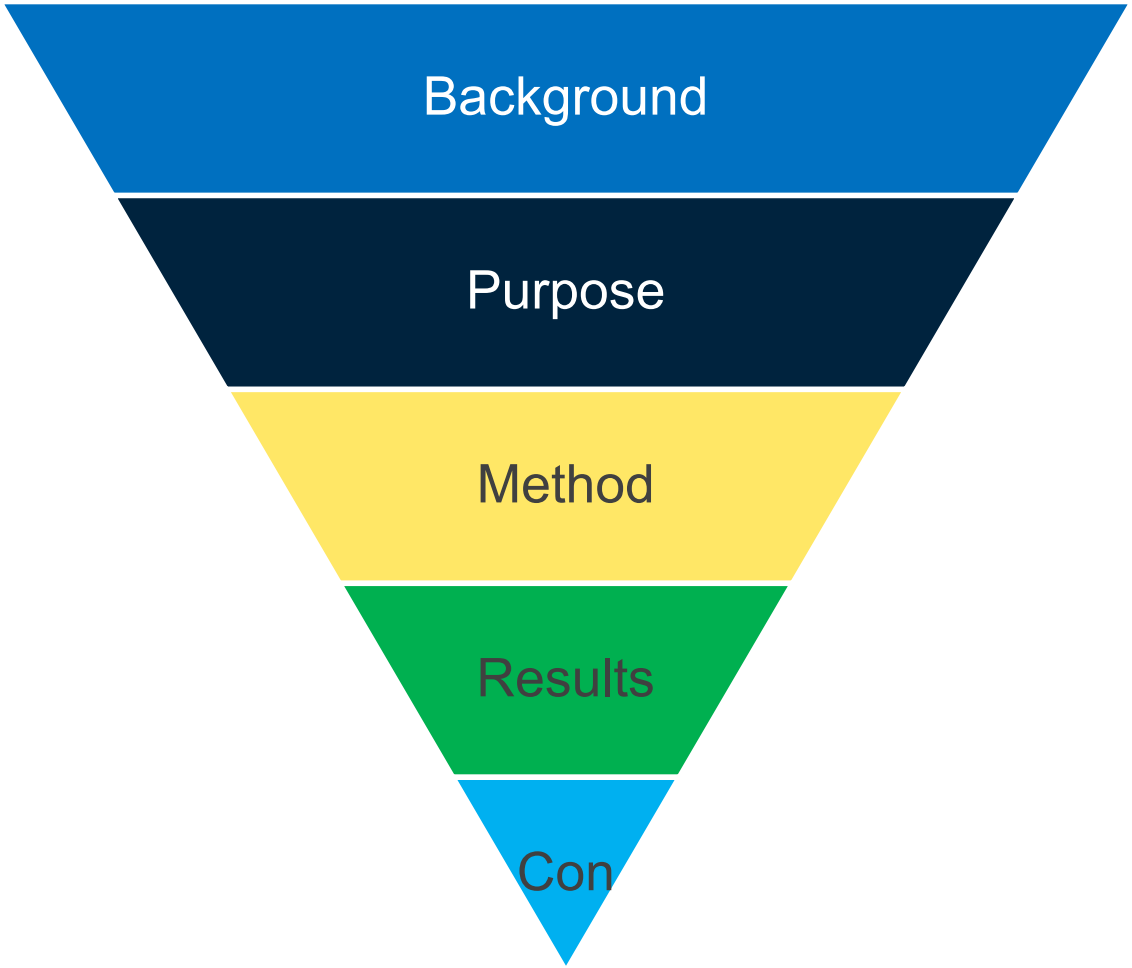
- future research plans;
- recommendations for future research, and/or
- practical applications

[ABSTRACT] The PR

1. Some background information

2. The principle activity (or purpose) of the study and its scope

3. Some information about the methods used in the study
4. The most important results of the study
5. A statement of conclusions and recommendations



(Cargill and O'Connor, 2013)

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[ABSTRACT]: Example

Adjoint Optimization of Volumetric Sources in Steady, Supersonic Flow: Energy Addition

Adjoint optimization methods have proven successful for the control of turbulence and boundary layers and in the design of airfoils and aircraft. In this paper, the adjoint equations are extended to the problem of controlling steady, inviscid, supersonic flow with volumetric source terms in the Euler equations, that is, mass, momentum, and energy addition. The adjoint solutions are shown to indicate both the optimal location for the source placement and cost gradient. In the particular case of drag reduction by energy deposition, the gradient is proportional to energy efficiency and becomes a key factor in optimization. The general form of the problem makes these results applicable to all forms of volumetric control with the goals of drag reduction, lift enhancement, and the generation of pitching moments.

(Limbach et al., 2013)

SURVEY

I have created a short survey to evaluate the effectiveness of this lecture. There are just four questions and only three of those ask for a text response. Please complete the survey, so that I can know how to best meet the needs of this group in the future. It is entirely anonymous.

https://unsw.au1.qualtrics.com/jfe/form/SV_5jRyw4LEz5nBIA5

Thank you!

References

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