

INFO5993 / 4990 Research Methods: Writing the literature review & research proposal

Learning Hub

Academic Language and Learning / Computer Science

Monday 13.03.2023

Dr Amanda Collins

Please download handout from your Canvas page

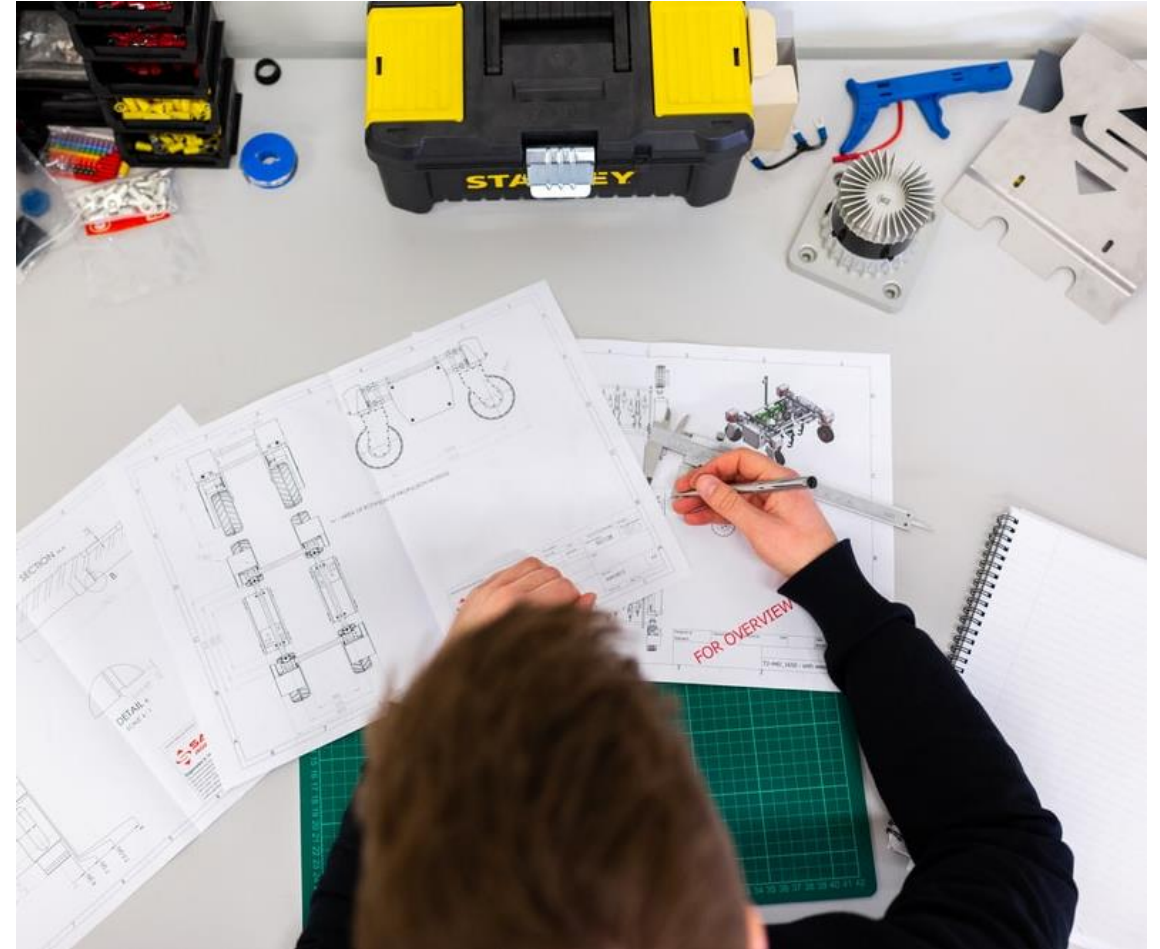


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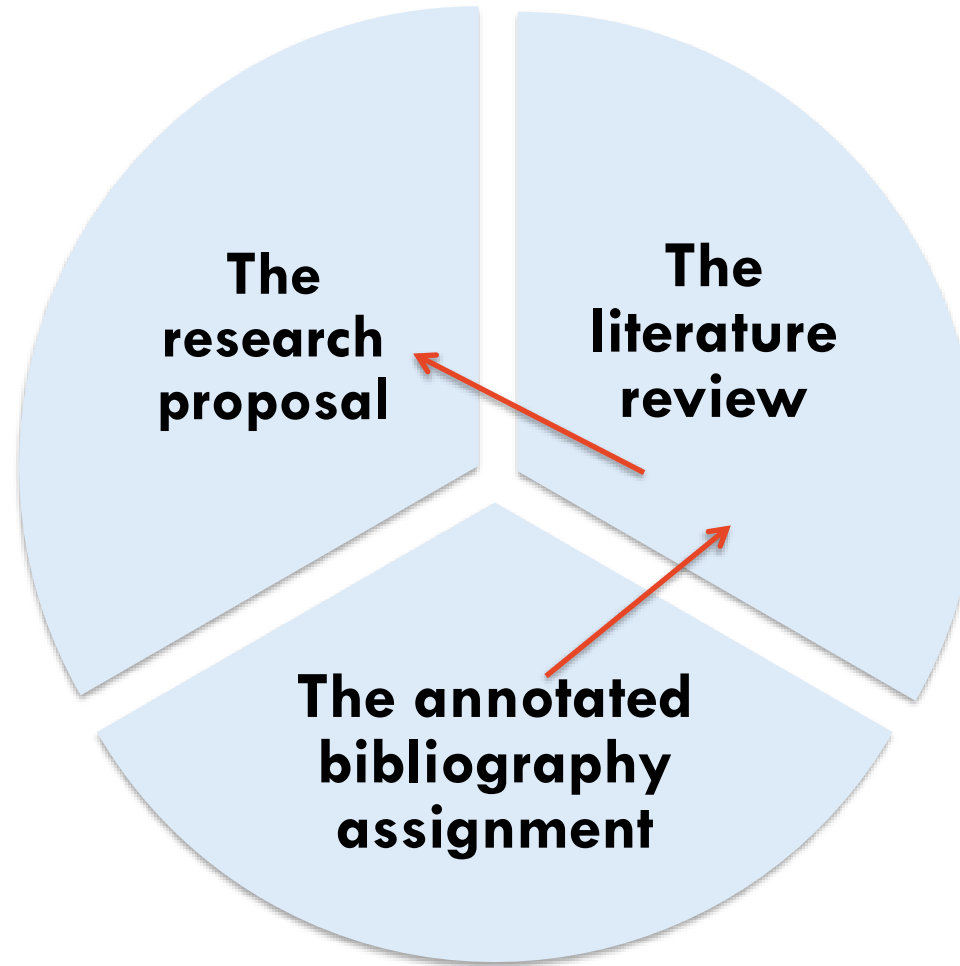


Learning Outcomes

- Identify the **purpose & structure** of a **literature review**
- Understand ways of **critically thinking** about and **analysing** the literature
- Understand ways of **critically writing** about the literature
- Identify the **purpose & structure** of a **research proposal**



The preliminary research process



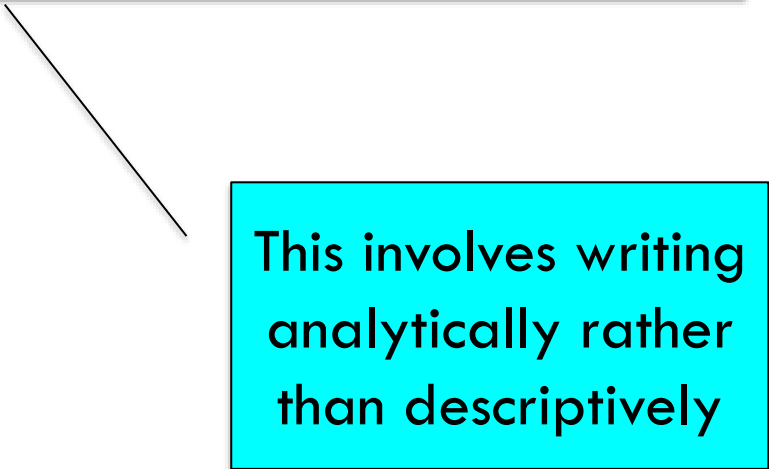
Your Context – Assignment 2 (Part 1)



How do I do this?

Prepare a report (around 10 pages) containing a **critical review** of the previous works you have found related to your research topic. The report should include around 15-20 properly referenced conference or journal articles and/or books and **highlight the gaps** you identified in the literature.

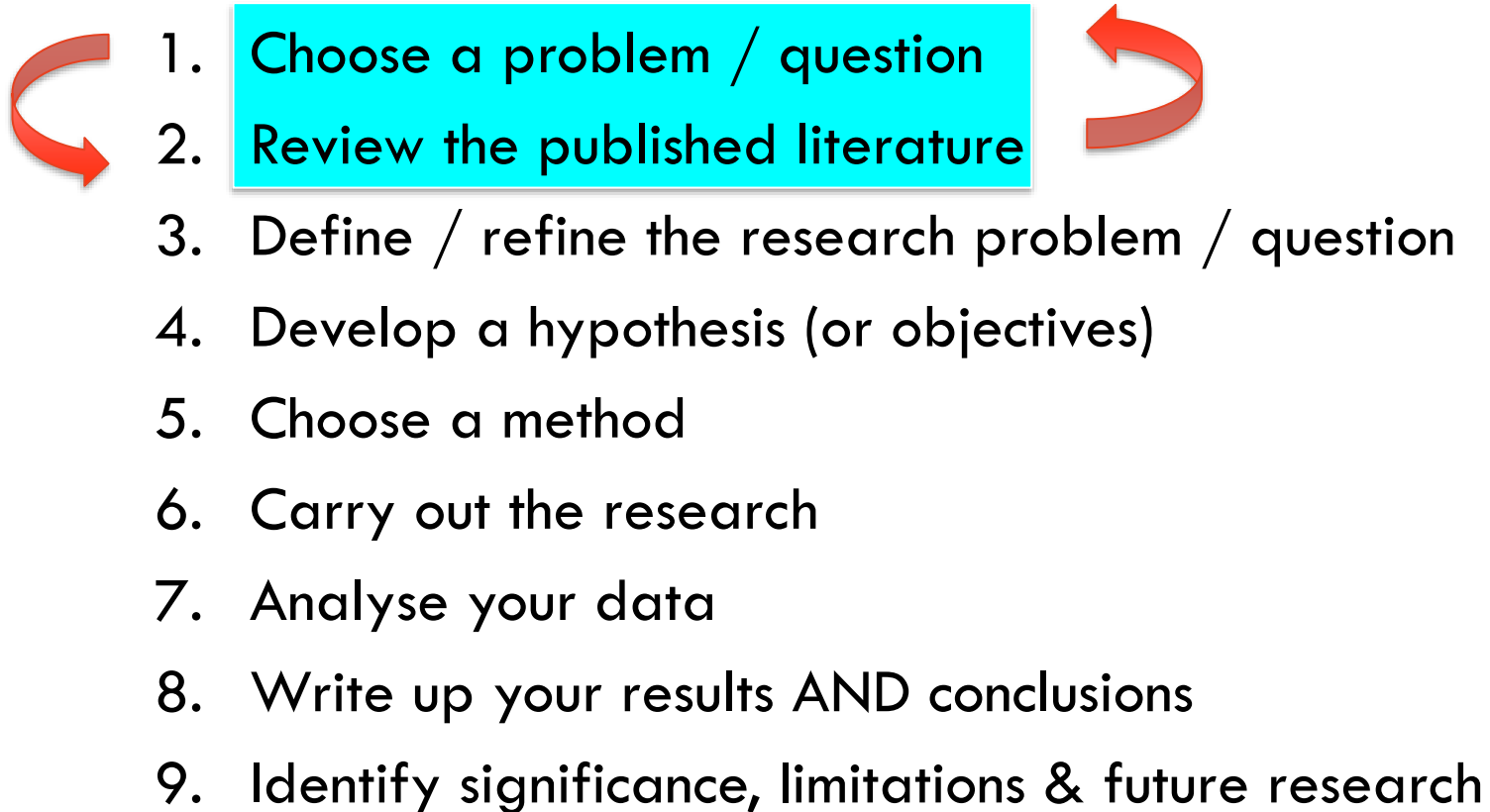
Organize the review around the questions or claims relevant to your research rather than just listing the papers you have read.



This involves writing
analytically rather
than descriptively

The iterative research and writing process

NB: The following process is applicable to many but not all research projects

- 
1. Choose a problem / question
 2. Review the published literature
 3. Define / refine the research problem / question
 4. Develop a hypothesis (or objectives)
 5. Choose a method
 6. Carry out the research
 7. Analyse your data
 8. Write up your results AND conclusions
 9. Identify significance, limitations & future research

The Literature Review

- Often Chapter 2 of final thesis
- Should be revised and updated *throughout* your 4-year candidature (iterative process)
- Can be a complex and challenging task
- **Activity 1:** So why write it? What are the different purposes of a literature review?



Some questions to help you fulfil the various purposes of a literature review

- What research has been done before?
- What have others said about this topic?
- How is this research relevant to my study?
- How is this research different from my study?
- Findings from previous studies: do they agree or disagree with each other?
- What are the strengths and weaknesses of the existing research?



- You are finding **the gap** that your research will fill.

Literature Review: Different Purposes

Theory

Methodology

Object

Context



Literature Review: Different Purposes



What gap / gaps have you identified? Which gap are you attempting to fill through your research? A gap in theory, methodology, object or context? Type your answer in CHAT.

What different purposes of a literature review can you see in this extract?

Electronic Health Records

National electronic health record architectures have been emerging and presenting challenges to the existing healthcare systems, practitioners and policy-makers. Gunter & Terry [2] have presented a discussion and critical analysis of these challenges and looked at the different methods of EHR implementations in the United States and Australia.

Overview

Identify
key
source

What different purposes of the review can you see in this extract?

The introduction of electronic health records has delivered many advantages to the medical system, especially in regards to efficiency and error-handling. As the input fields of electronic records are restrictive and decrease errors due to handwriting problems, the data collected in general is cleaner and superior to traditional paper records. Another advantage is the ease of physical storage, back-up and transportation. Gunter & Terry further discuss the role of information technology as the forefront of medical backends, especially in providing comprehensive longitudinal data. ...



summary

What different purposes of the review can you see in this extract?

...

Gunter & Terry's work was focussed heavily on the costs and risks surrounding litigation and privacy of patients and did not analyse the level of participation from users ...

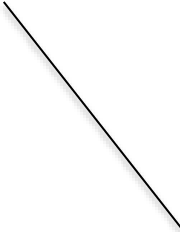
evaluation

The lack of investigation into user participation is addressed by Tsai & Starren [4], which focusses on the role of patients' interaction within the digital system.

similarities
and
differences

Your Context – Assignment 2 (Part 1)

Organize the review around the questions or claims relevant to your research rather than just listing the papers you have read.

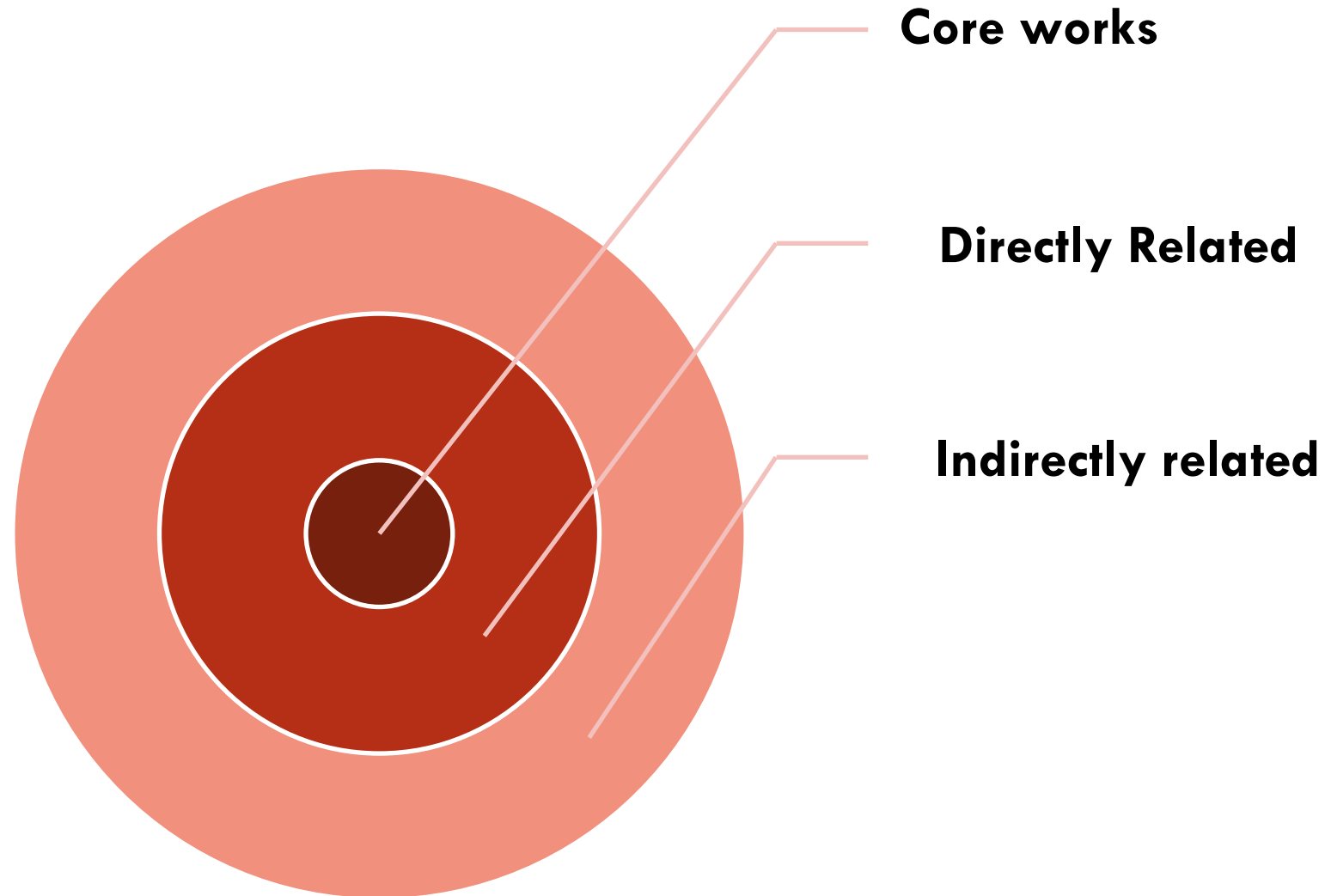


This involves writing
analytically rather
than descriptively

How do we do this?
What's involved in analysing your sources?

Group your literature

These groups will be driven by your topic and/or research question.



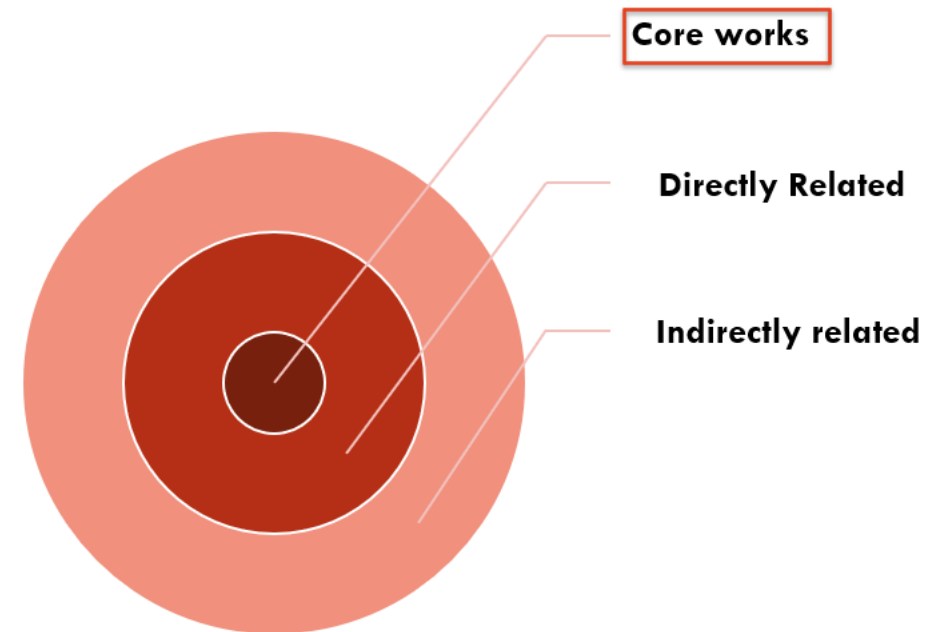
Core works

Tip! Remember – begin with bottom-up rather than top-down searching!

➤ very small number of specific topic areas, issues or even authors.

➤ A good way of getting clear about your research problem is to start by basing it very clearly on **one issue or area** closely related to your topic.

➤ You may even begin with **one author** and approach the problem as a "reaction" to their work.

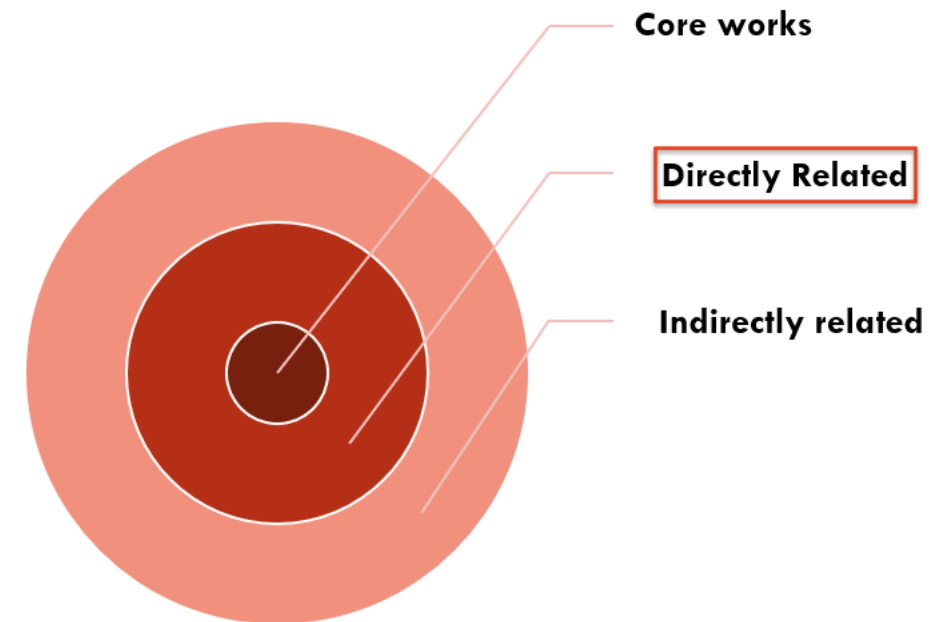


Directly related

Works or authors related directly in some way or another because they:

- focused on the same **question**,
- addressed some of the same **issues**,
- used the same **methods**
- had the same **data**.

Typically a larger list than the core works.

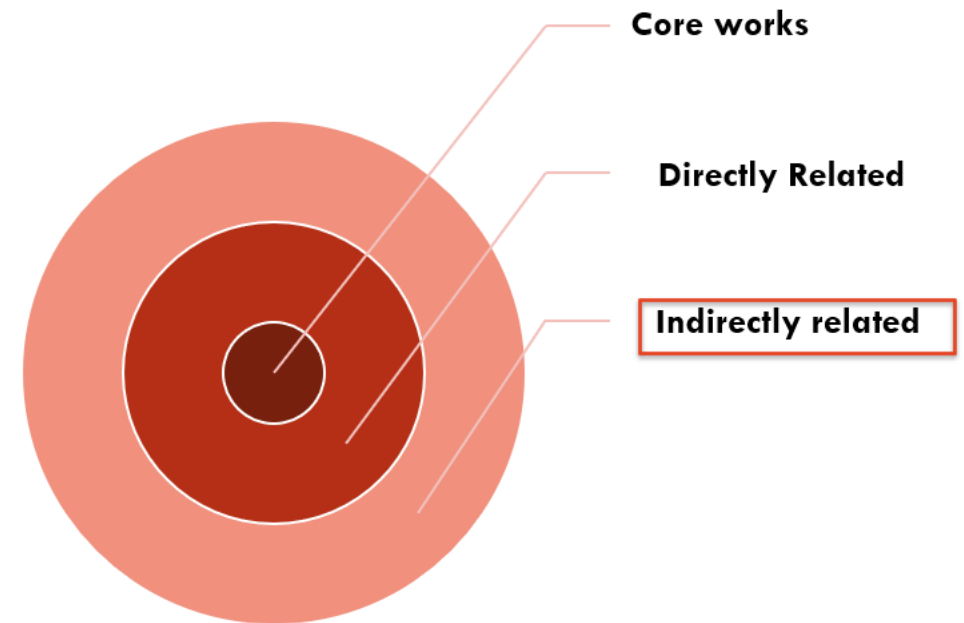


Indirectly related

Then there will be works or authors that have only

- ‘passing relevance’
- or some ‘single point of contact’

Often you do not appreciate this contact until very late in your research



Analysing the literature

Breaking down your topic into research questions

Topic area: Visual analytics for bettering the evaluation and care of health		Related literature
How?	<ul style="list-style-type: none">• How does visual analytics <i>help</i> in health care?• How do humans <i>interpret</i> visualisations?	existing literature on visualisation tools for electronic health records and how these are interpreted
What areas/ topics?	<ul style="list-style-type: none">• Medical informatics• ‘sense making’• What studies exist? • What are the issues/problems in using visual analytics in health care?	<p>e.g. West et al. systematic review 1996-2013</p> <ul style="list-style-type: none">• large amount of complex electronic medical data• lack of user participation


Analysing the literature

Breaking down your topic into research questions

Topic area: Visual analytics for bettering the evaluation and care of health		Related literature
What approach?	What approaches to visualisation are used in health care and other areas?	Graphs, time series; mapping data with visuals; ...
Where?	Australian studies?	Are there any?
Why?	Develop health data visualisation tools to support interpretation and decision making.	

Analysing the literature: iterative process

Published literature	Themes
Paper 1	Theme A Theme B
Paper 2	Theme A Theme C
Paper 3	Theme A
Emerging themes from the published literature	Published literature
Theme A Theme C	Paper 4 Paper 5



Managing your sources & note-taking



<https://libguides.library.usyd.edu.au/endnote>



How to use Zotero in 7 minutes

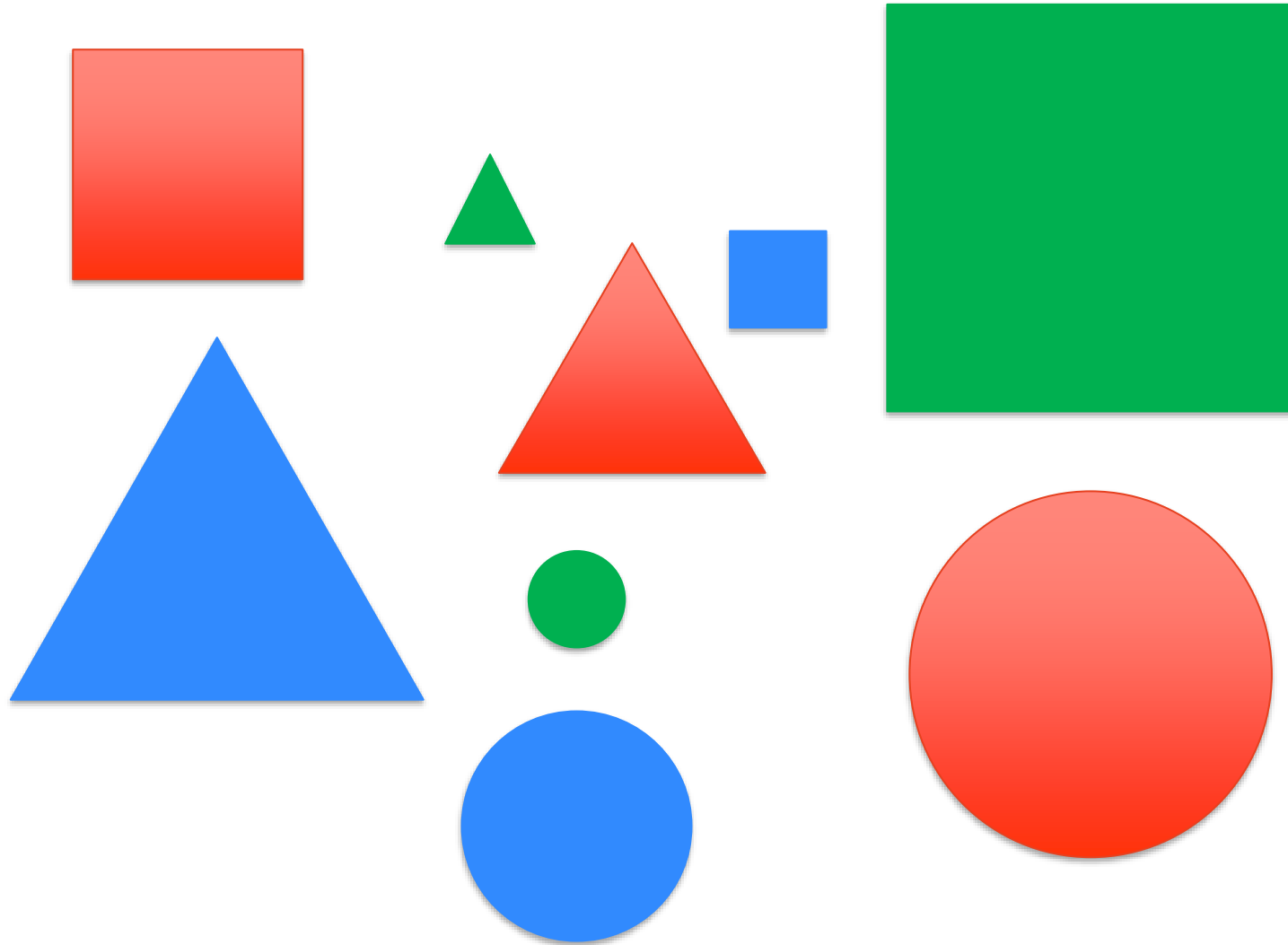
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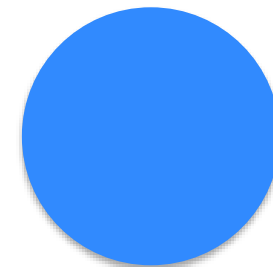
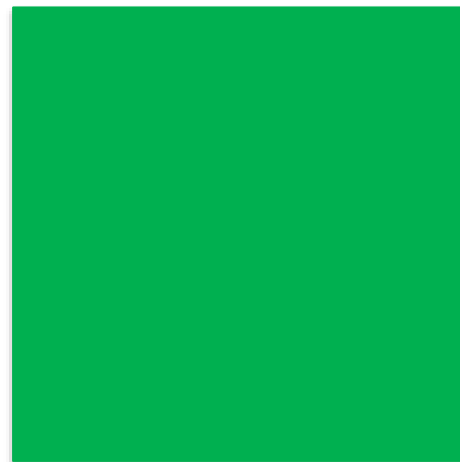
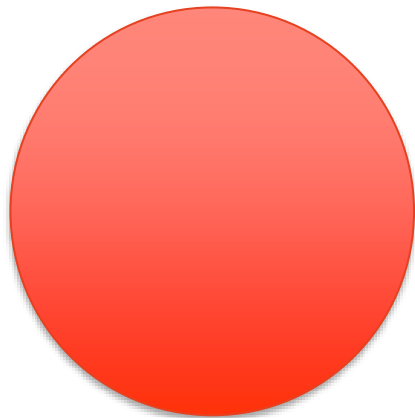
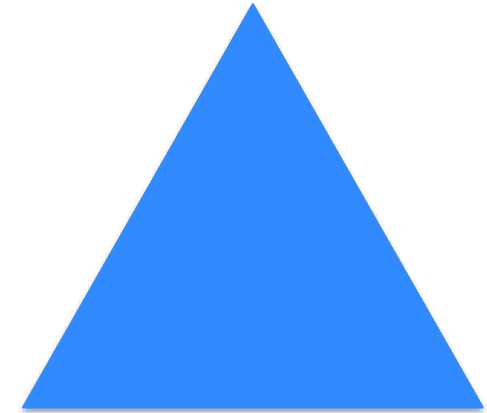
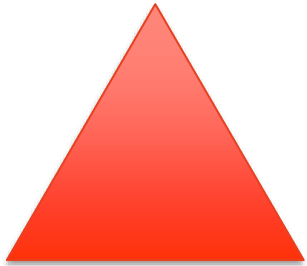
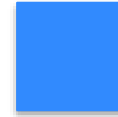
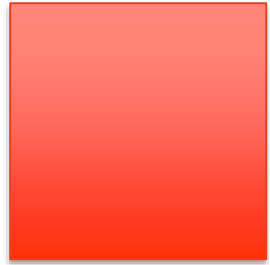


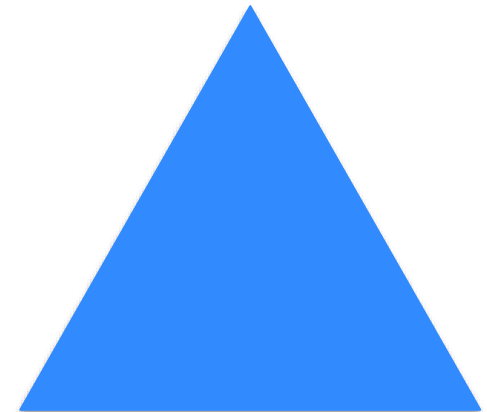
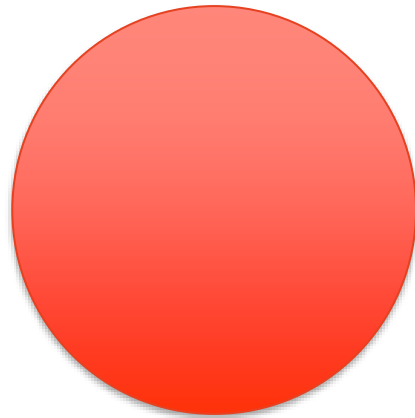
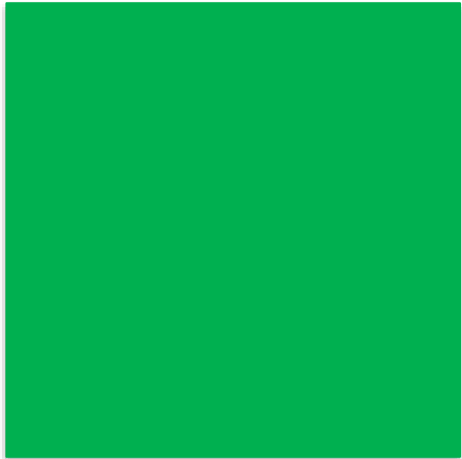
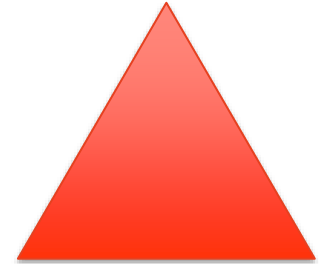
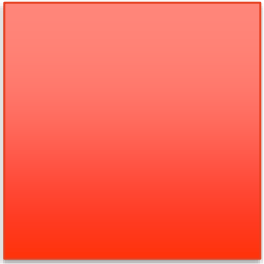
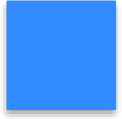
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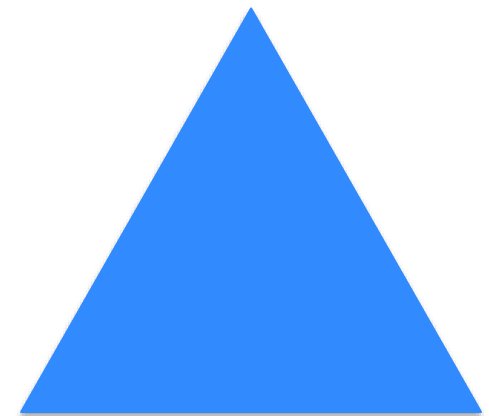
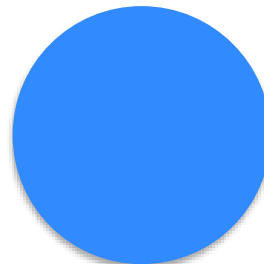
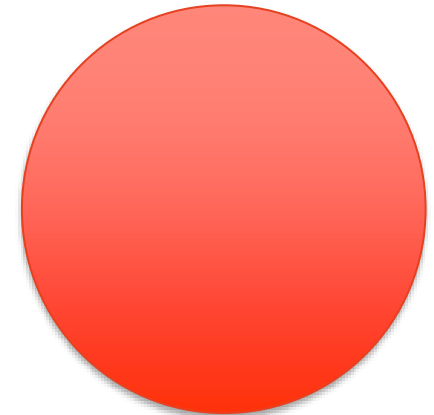
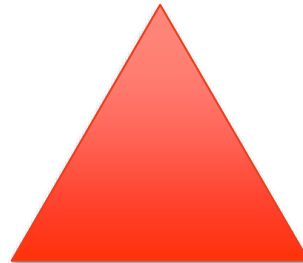
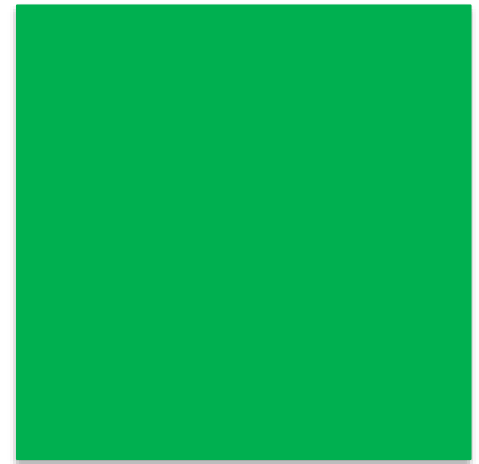
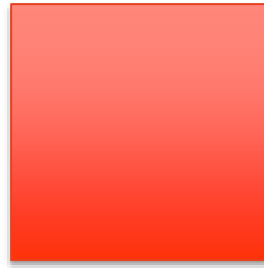
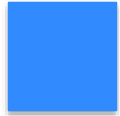


Analytical Framework









Organising your literature

There are many different ways you could organize your literature review, including:

- according to **various topics and sub-topics** which are central to your study
- according to **different points of views**
- according to **various research questions** to be asked
- according to **specific variables** in the study
- according to different **methods/approaches**
- **chronologically** from oldest to more recent research
- **OR a combination** of these.



Using a synthesis grid



Topic: Face Recognition

Source	Problem	Method	Results	Overall Focus
(Source, date, page no.)	Comparison of 2 skin tone detection methods in 5 colour spaces (both non-parametric): Look-up table and Bayesian. Which performs better?	What similarities or differences can you identify?	Bayesian method resulted in ML and MAP depending on assumptions made. ML outperformed MAP technique and the lookup table method	Skin colour modelling techniques (non parametric)
(Source, date, page no.)	What is the best colour space selection for best skin tone selection?	Designed an optimum detector using the Neyman-Pearson test on conditional probabilities derived from normalised histogram of a database of images	Colour space does not influence performance as long as the optimum skin detector for that space is used	Colour space
(Source, date, page no.)	Survey of pixel-based skin colour detection techniques and evaluation of results. Which performs better?	Identified 3 elementary problems: choice of colour space, modelling of skin colour distribution, developing efficient processing algorithm. Survey first two.	Categorised skin colour modelling techniques Best performance achieved by Bayesian Skin Probability Map method followed by maximum entropy model	Skin colour and colour space

Putting it all together

A critical and analytical literature review:

- **Focuses** on a **question** or **issue** or **problem**



Topic: *Visual analytics for health care* but what is the **focus:** question, issue, problem? (the gap)

- **Organises** the literature according to:

themes or

issues or

chronology...



How is the literature **organised** for your literature review and for your proposal?

that relate/s to the question, issue, problem
(the gap)

- **Evaluates** the literature in relation to question or issue or problem



Is the literature **evaluated** and if so, how?

Structure of the literature review

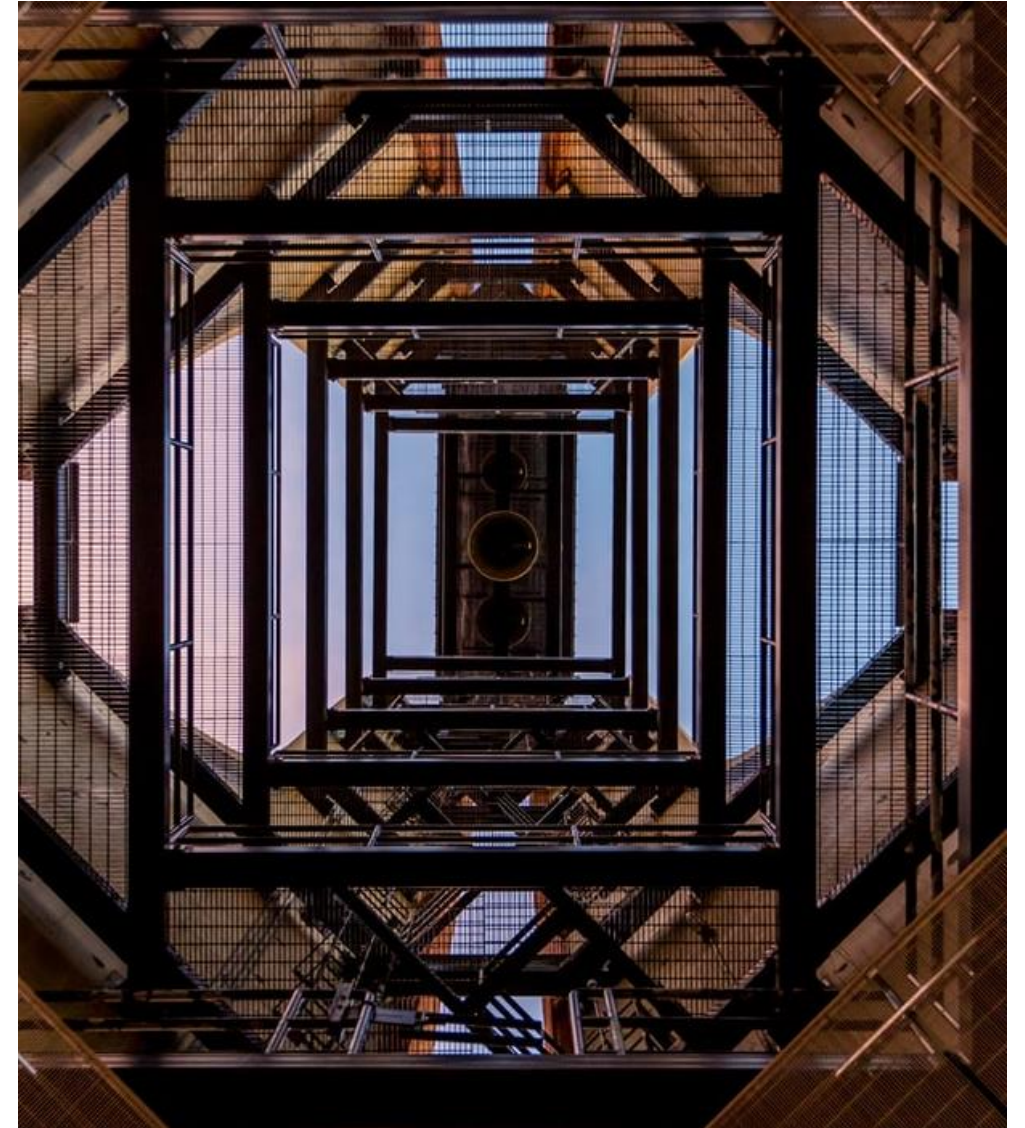
Is there any **ONE** way to structure your literature review?

To get you started, however...

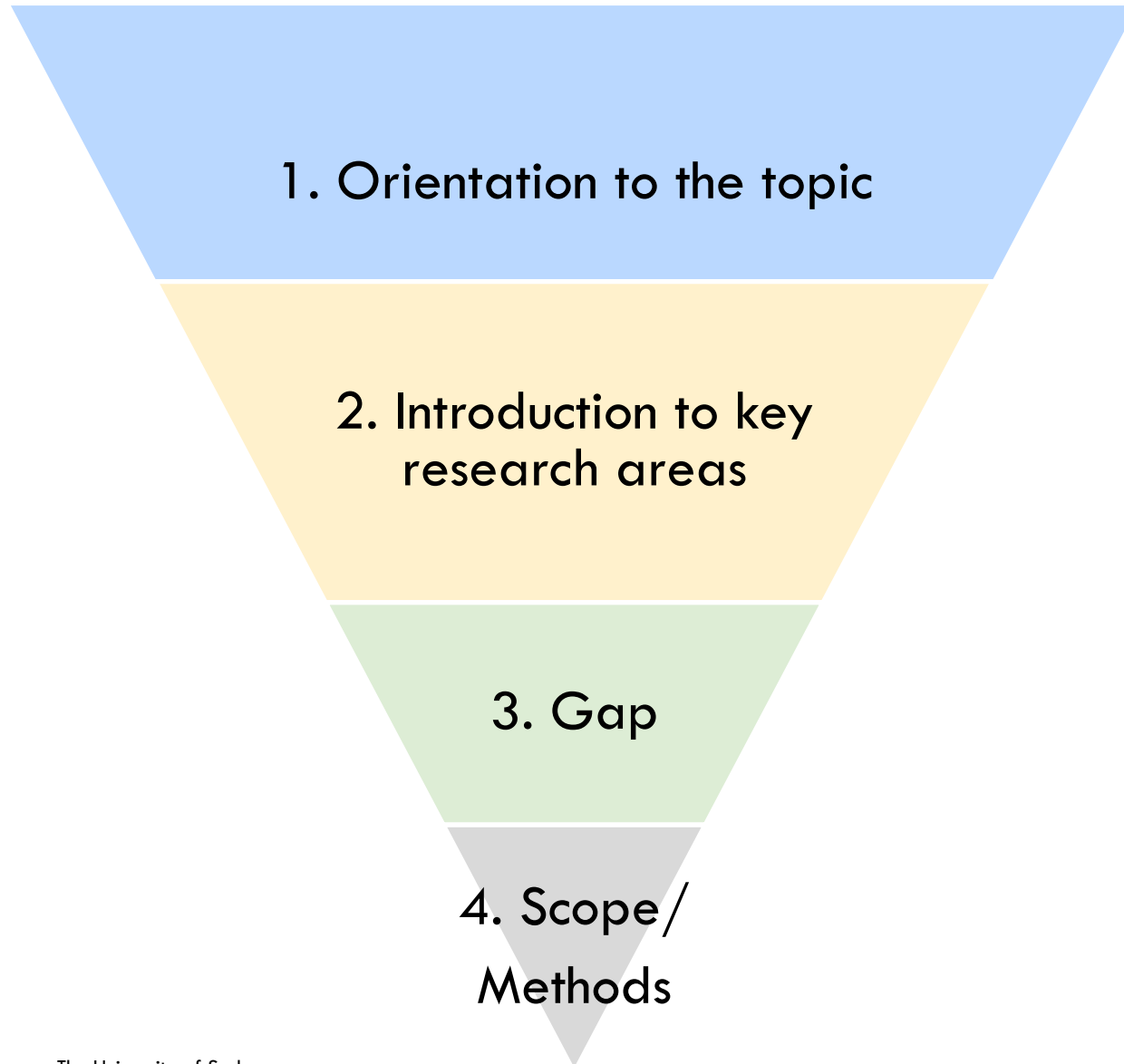
Stage: Introduction



Topic | Outline | Research Gap



Stages in your literature review introduction



1. The field of data science and informatics in healthcare and medicine is a rapidly growing area especially with increasing availability and adoption of electronic health records (EHRs) [1]

2. ... this presents an opportunity to analyse this information in the form of interactive web-based visualisations. ... Graphical representations ... more effectively communicate information to human readers,... how humans interpret abstracted data and make decisions is known as 'sense-making'.

3 ...there is a lack of work in representing this information graphically, especially in Australia.

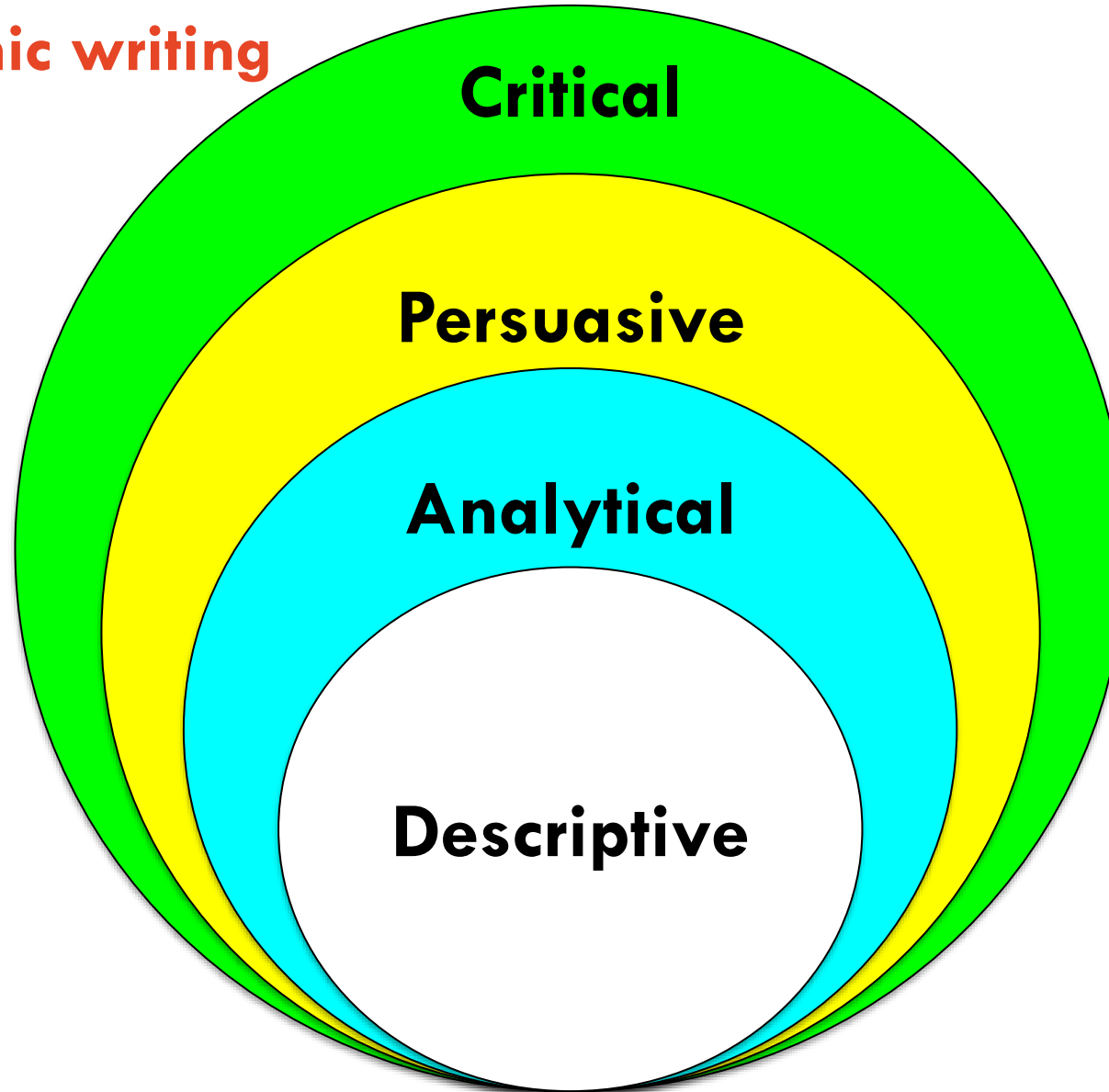
4 ...The gap exists where the two fields, medical informatics and sense-making, overlap.

Activity 2: Identify the stages in this example introduction

Automatically Measuring Consistency Properties of MongoDB	Stages
<p>1 Introduction</p> <p>The exponential growth of web applications and its dependency on data has driven the widespread adoption of NoSQL databases over traditional relational databases. This is due to attractive features offered such as high availability and low latency. However, this is achieved at the cost of weaker consistency properties.</p> <p>This literature review involves the appraisal of consistency models and properties, existing benchmarks and metrics to measure properties of NoSQL systems and MongoDB, a well known NoSQL database. Whilst these areas have been presented in a variety of contexts, this paper will primarily focus on their application to distributed database systems.</p>	<p>Activity 2 on Handout (p. 3)</p>

Critically analysing the literature

Types of academic writing



Types of academic writing

Concrete terms such as names/dates; reference to journal articles; descriptions of objects, techniques, models etc.
e.g. electronic health records (EHRs)



Descriptive

describe or recount

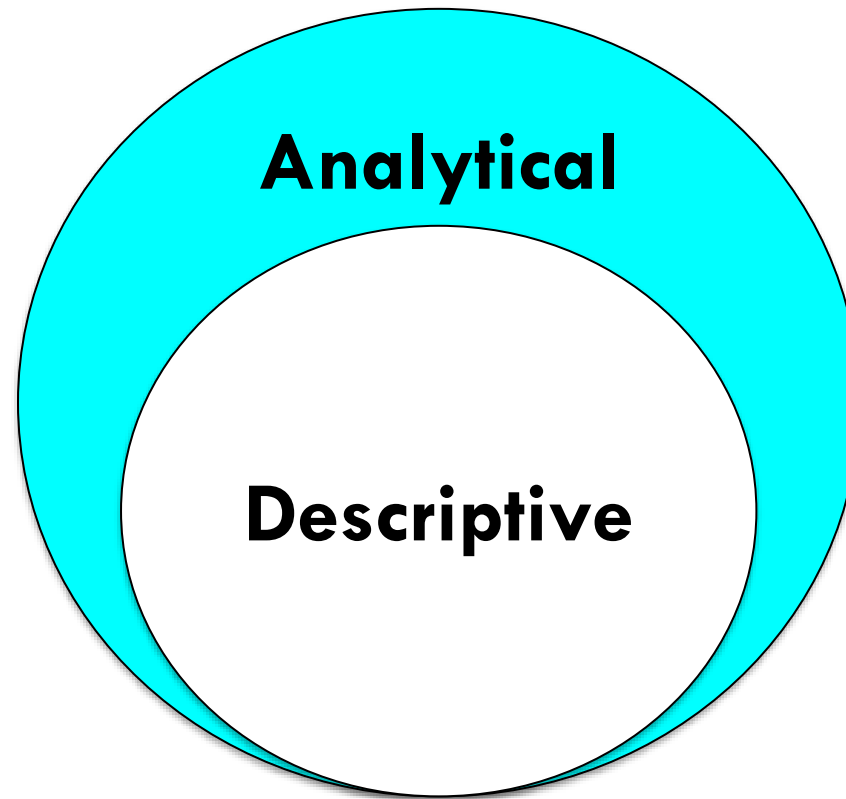
Draft A: Descriptive

Questionnaires and face-to-face interviews are methods of data collection in the social sciences. Questionnaires can be used to sample a large number of people over a wide geographical area. They can normally be conducted by one person at low costs. However, questionnaires do not allow the researcher to ask for extra information.

Face to face interviews, by contrast, are relatively small scale. They are labour intensive and time-consuming and costly. But interviews allow the researcher to clarify questions if necessary. Also, during interviews the researcher can ask additional questions. However, questionnaires do not allow the researcher to ask for extra information.

What key language tells you that the writing is mostly descriptive?

Types of academic writing



Abstract terms, language to show relationships, clear structure of ideas
e.g. types of EHRs visual /non visual etc.

re/organise, relate

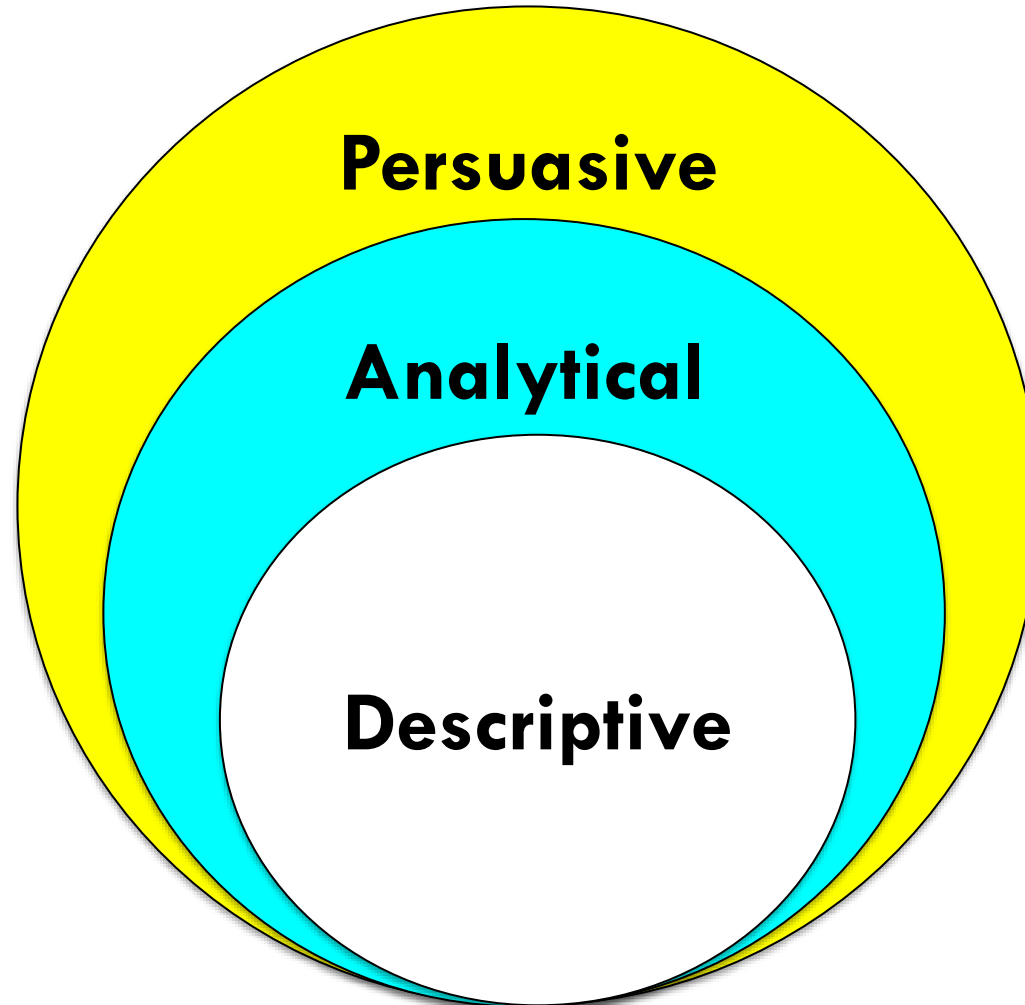
describe or recount

Draft B: Analytical

Questionnaires and face-to-face interviews are methods of data collection in the social sciences. Whereas the sample size in face-to-face interviews is normally small, the questionnaire can be sent out to large numbers of people over a wide geographical area. Costs, both in labour and money, are high with face-to-face interviews, while questionnaires can be distributed quickly by just one person at a relatively low cost. However, in terms of quality of information, interviews are often superior to questionnaires as the researcher has the opportunity to ask additional questions and explain what questions mean if this becomes necessary. This is not possible with questionnaires.

How have the 2 data collection methods been analysed?

Types of academic writing



Reference to claims
claim + reason + evidence
e.g visual EHRs are better
than non-visual

argue

re/organise, relate

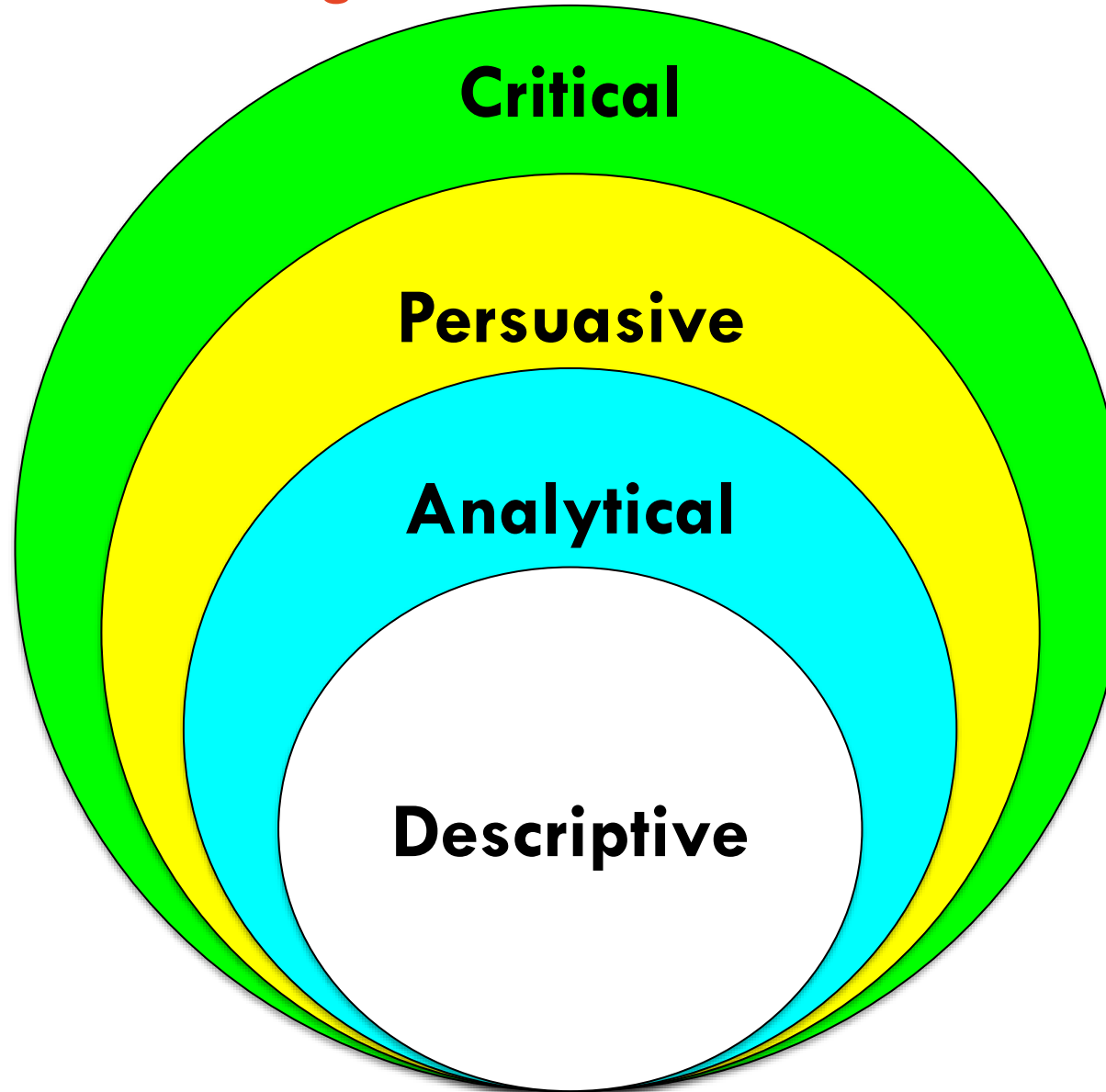
describe or recount

Draft C: Persuasive

Questionnaires and face-to-face interviews are methods of data collection in the social sciences. There are a number of advantages in using questionnaires, including lower costs and sample size. **However,** the quality of information obtained by interviews **is superior** to that obtained by questionnaires **because** the researcher has the opportunity to ask additional questions and explain what questions mean if this becomes necessary. **Therefore,** the importance of quality in the research process can necessitate the use of interviews for data collection.

What argument is the writer making (claim / reason)? What are the implications?

Types of academic writing



Reference to the work of others, combined with evaluative language

challenge

argue

re/organise, relate

describe or recount

Draft D: Critical

Two of the **main** choices available for social science data collection have **long been assumed** to be questionnaires sent by mail and the face-to-face interview. While both of these methods do have **advantages**, both have **limitations** which bring into **question** their **ultimate usefulness** as research tools (**Smith & Jones 2009**). Although the quality of information obtained by interviews is **undoubtedly far superior** to that obtained by questionnaires, the cost and time taken to obtain sufficient information on individual interviews is, in the current research climate, **no longer tenable**. In recent years a number of alternate methods have been used **successfully** in research. For **Kaufman (2003)**, an **often neglected** method of collection, for example, is the focus group, which is **far more** cost and time **efficient** compared to individual interviews but enables a **much greater depth of information** than questionnaires. Therefore such methods need to be given **more prominence** in social science research methodology.

An example

Activity 3: Identify the evaluative language used in this passage:

Gunter & Terry's work was focussed heavily on the costs and risks surrounding litigation and privacy of patients and did not analyse the level of participation from users on both ends. In particular, though the implementation of EHRs will eventually become compulsory in many states internationally, the quality and accuracy of data input was not analysed, especially in the context of older practitioners who may not be computer literate. The article lacked in quantitative analysis on the efficacy of EHR systems, where metrics such as latency and accuracy of users may be indicative of the gaps in the system implementation that could be addressed in the future.

An example

The lack of investigation into user participation is addressed by Tsai & Starren [4], which focusses on the role of patients' interaction within the digital system. The use of EHRs allows for better analysis of all health histories, especially when in the form of time series. An issue that arises is how this data is analysed and interpreted, given that the patient should have access rights to their own information. ...

Marking Scheme

- **Coverage:** most important relevant work covered [15 marks]
- **Identification of contributions:** identified and described in a pertinent way/well summarised and evaluated [15 marks]
- **Identification of research methods:** well identified and described in a pertinent way [15 marks]
- **Organisation:** review shows a deep understanding of the knowledge/work cited well connected to the research topic / effective use of tables and graphs / leads well to gaps in research [25 marks]
- **Presentation** (of whole assignment): consistent reference style and layout/ clarity of presentation and written expression/ academic style/ final editing touches) [15 marks]

Part Two: The Research Proposal



Your Context – Assignment 2 (Part 2)

Prepare a report (around 3 pages) that identifies a research problem (linked to your literature review above) and highlights the contributions you intend to make in your research area.

Outline how you plan to evaluate your contributions. You should provide enough details to show that you have thought about how to convince readers. For example, if you intend to measure performance, you should describe what aspects will be measured, and what you will compare the measurements to.

What is a research proposal?

A research proposal:

- **establishes a context** for the research,
- **demonstrates the need** for it
- **shows** that your study will meet this need and **how** you will meet this need (i.e. the **method** you will use)



Why write a research proposal?

- lays the groundwork for the research you're planning to do.
- forces you to think through the whole project from beginning to end
- allows you to better anticipate problems that may occur during the course of your study and to be prepared for them.



Purpose of a research proposal

In the most general sense, a thesis proposal is ‘a document that **presents a case** for an idea and the action one proposes with respect to it’ (Krathwohl, 1988, p. 12, emphasis added).

Its purpose is ‘to **justify** what you plan to do in order to gain approval for it’ (Tornquist, 1986, p. 3, emphasis added).

QUESTION: What are the implications of “**presents a case**” and “**justify**” for the way in which you write your proposal?

It must present an argument
It is a type of persuasive essay

Who is your audience?

- Should be written for “an **intelligent, well-informed** person, but one *who is not deeply involved* in the particular problems you are addressing (Mauch & Birch, 1989, p.65)



Macro-Structure of the proposal

1. Introduction	<ul style="list-style-type: none">➤ Nature of the problem➤ Why the problem is important➤ How your research would contribute to the solution of the problem
2. Research question(s) or hypothesis	<ul style="list-style-type: none">➤ Should also include a definition of terms➤ Can also state subsidiary questions or sub-hypotheses
3. A literature review	<ul style="list-style-type: none">➤ Not a list of summaries with some comments➤ An integrated statement that explains why these studies or theories are important

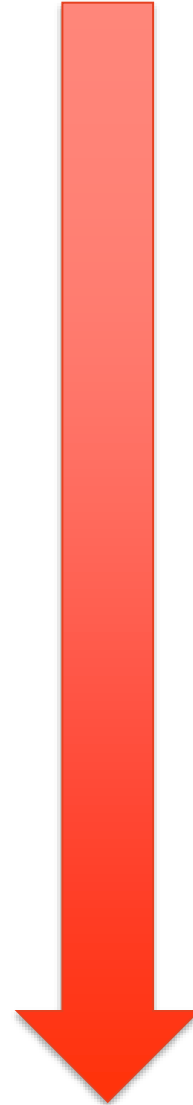
Macro-Structure of the proposal

4. Description & Evaluation of procedure / methods	<ul style="list-style-type: none">➤ The theoretical or conceptual framework➤ analytical technique and research design➤ a timetable for completing the study
5. Trial table of contents	<p>This has the following advantages:</p> <ul style="list-style-type: none">➤ It shows the reader the dimensions of the problem;➤ It provides the writer with a temporary organisational framework;➤ It helps with the note-taking process.
6. References / bibliography	<ul style="list-style-type: none">➤ Indicates the quality of your sources and enables the supervisor to suggest additional sources

(adapted from Powles, 1994, p. 23)

Detailed Proposal Structure

1. Title
2. Introduction
3. Short Literature Review
4. Aims, Objectives, Hypothesis
5. Significance
6. Research Methods & Materials
7. Rationale
8. Work schedule
9. Other supporting section
10. References



A flow of :

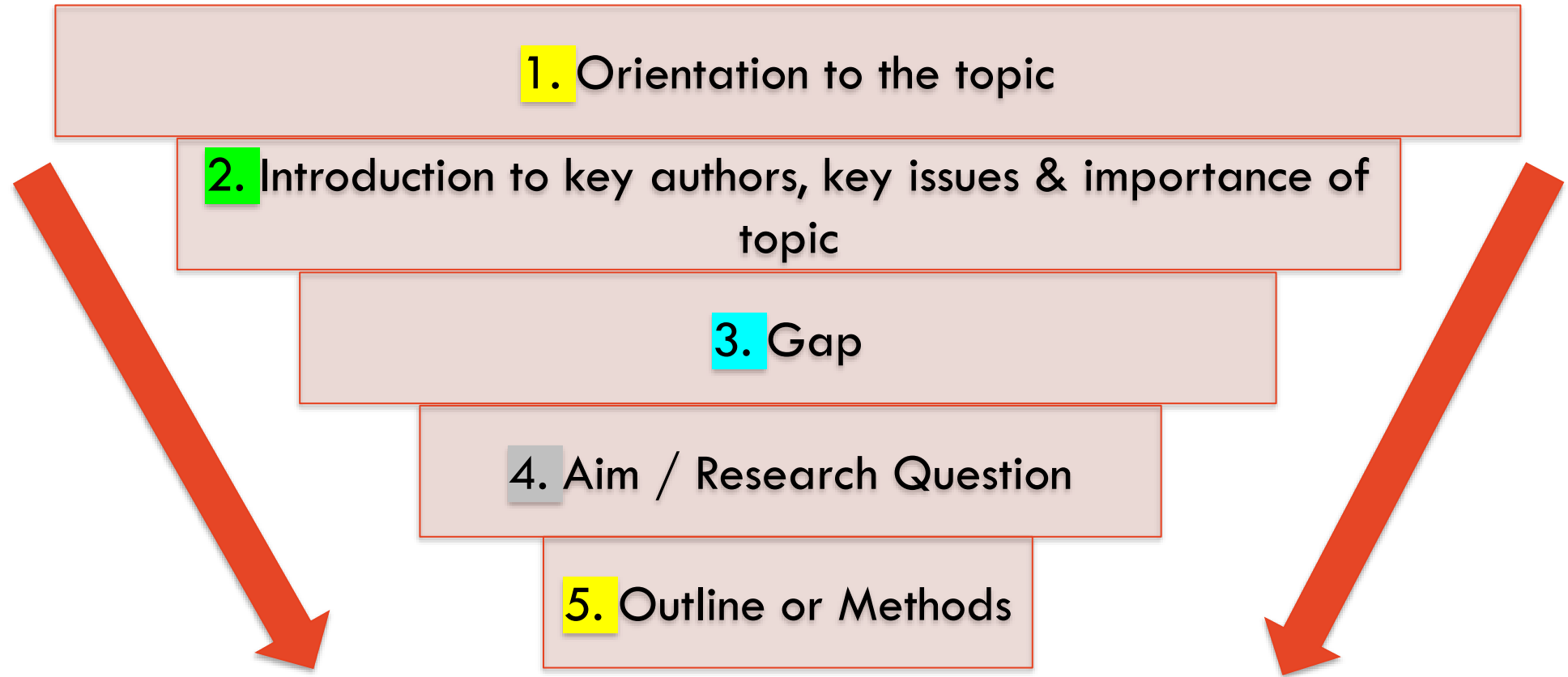
- **argument**
- **evidence and**
- **evaluation**

Linking all sections

The functions of the Introduction

Question	Purpose of the Information
Q1 What is the study about?	1. Orientates the reader with general background of the field
Q2 Why the research is significant?	2. Justifies your research area- anticipates the worth of outcomes
Q3 What is some of the most relevant work done in this field?	3. Summarizes progress or issues in the field
Q4 What further research is needed in this area?	4. Justifies your research by showing gaps / weaknesses in current research
Q5 What are you going to do about these gaps?	5. States the purpose of your research in addressing the issue, problem, or question

The Introduction: 5 Stages



The Research Proposal Introduction: Structure

Activity 4 on Handout (p. 3)

Identify the stages in the following text:

With the immense expansion of digital medical data, there is also much growth in the area surrounding visual analytics, human computer interaction and medical informatics. While many methods of data representation and processing for decision making have been researched and experimented with (see for example ...) , a gap exists where the two fields of medical informatics and sense-making overlap. Visual analytics provide an opportunity to improve the state of healthcare ... so there is a need for analysing different visualisation techniques to determine the best methods to most efficiently represent data that provide insights to strengths and weaknesses in a national medical system. ...

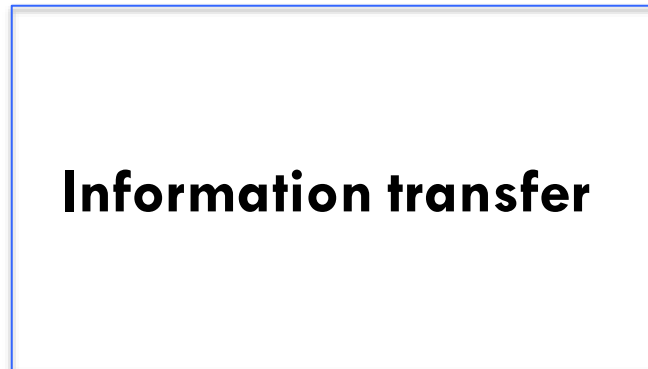
Stages 1 & 2: Orientations to the topic & claims for significance

1. The need to computationally identify certain classes of entities referred to in texts has become a core component of many Natural Language Processing tasks.
2. There is a great need for fast, reliable Question Answering (QA) systems to allow users to make full use of the vast amounts of textual data available to them on the internet
3. X is an important component in the Y, and plays a key role in Z
4. A common observation of X in daily life is Y
5. X is one of the most widely used groups of algorithms for Y

Stage 2: Introduction to key issues & key authors

1. A more thorough analysis of possible future directions of QA research can be found in the roadmap paper by Burger et al. (2001).
2. The task gained specification in the final two DARPA-funded Message Understanding Conferences (MUC-6, MUC-7; see Chinchor (1998).
3. Field observations (multiple citations) have provided evidence for the significance of X.
4. Early investigations of P in Q have been framed in R with S (multiple citations).
5. A recent development in X have heightened the need for Y (single citation).

Referring to sources



Be careful not to overuse
author prominent
information transfer

Information Prominent

Research topic / concept is the subject

The costs and risks surrounding litigation
and privacy of patients ... [2]

Author Prominent

Author is subject

Gunter & Terry's work was focussed heavily on
the costs and risks surrounding litigation and
privacy of patients

Reporting verbs and argument

Neutral reporting verbs

- present, list, report, state, describe, summarise, discuss

Examples

- Gunter & Terry [2] have **presented** a discussion and critical analysis
- Gunter & Terry further **discuss**

Interpretive or evaluative reporting verbs

- show, note, propose, determine, assert, posit, challenge, doubt, question, argue, recommend, illustrate

Examples

The lack of investigation into user participation **is addressed** by Tsai & Starren [4], which **focusses** on the role of patients' interaction

Stage 3: Gap Statements

**Activity 5: What is your gap?
Draft a gap statement.**

- Most studies in X have only been carried out in a limited number of areas.
- Several studies have produced estimates of X (Smith, 2002; Jones, 2003), but unfortunately there are still insufficient data to Y.
- However this analysis does not take account X, nor has Y been examined in sufficient detail.

Stage 4: Aim, Focus, Objective

- More specifically this thesis aims to advance understanding in the following areas
1... 2... 3... 4...
- This research will focus on the relationship between X and Y
- The objectives of this research are to determine whether...
- The purpose of this research is to develop further understanding of X
- We therefore see the automatic generation of a high-accuracy corpus of training data for NER as a feasible and necessary task, given the right resource: Wikipedia.

Stage 5: Outline, Methods, Scope

- This project will adopt three linked approaches of scaling analysis, numerical simulation and stability analysis. Using three linked approaches will allow...
- Achieving these objectives will require investigations of the following areas: A, B, C
- For the purpose of this thesis time constraints will not allow the study of long-term effects such as creep on the serviceability or long-term deformations of the slab.

Language Resources: On-line Academic Phrase Bank

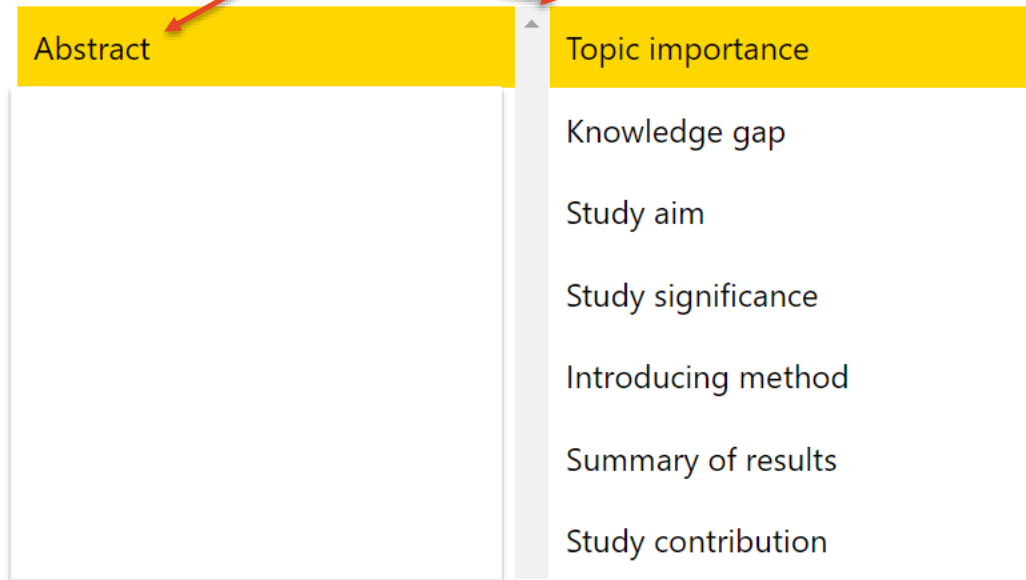
<https://www.phrasebank.manchester.ac.uk>

GENERAL LANGUAGE FUNCTIONS

Being Cautious
Being Critical
Classifying and Listing
Compare and Contrast
Defining Terms
Describing Trends
Describing Quantities
Explaining Causality
Giving Examples
Signalling Transition
Writing about the Past

Writefull: Exploring the Sentence Palette

The **Sentence Palette** features a collection of conventional phrases used in predominantly empirical scientific papers. The palette is organised by the different sections of a research paper and the moves/stages within each section.



<https://www.writefull.com/writefull-for-word>

Evaluating Your Proposal



The list on your Research Methods handout (p. 4) shows the criteria that the reviewer looks for in proposals.

Use the criteria as you are writing your proposal.

Marking Scheme

- Clear statement of the intended contribution / convincing evaluation process
that is appropriate to the claim [15 marks]

Would you like further information?

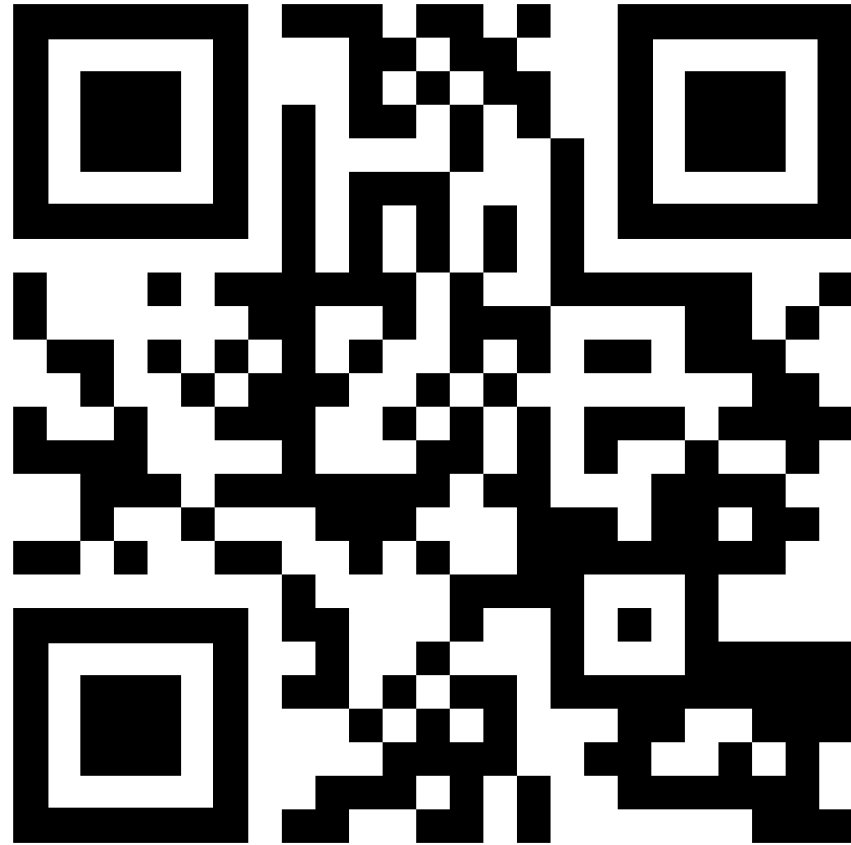


1. Access the Learning Hub for workshops:
<https://canvas.sydney.edu.au/enroll/FP7447>
2. OLE: Writing a Literature Review
<https://canvas.sydney.edu.au/enroll/ABTDBT>

External sites

The Writefull app	<u>https://www.writefull.com/writefull-for-word</u>
SKELL	<u>https://skell.sketchengine.eu/</u>
Grammarly plagiarism checker	<u>http://bit.ly/PlagiarismCh</u>
Readability Test Tool	<u>http://bit.ly/ReadTestTool</u>
Academic Word analysis	<u>http://bit.ly/AcadVoc</u>

We welcome your feedback!



<https://bit.ly/3T17CTb>