Tools for Writing Research Proposals and Research Articles

Learning Objectives for the Module

By the end of the module, learners will be able to

- Review the need for a research proposal
- Review the steps involved in the development of a research proposal
- Identify the steps of research proposal preparation when software tools can be used
- Argue the importance of mapping tools
- Demonstrate an understanding of mind mapping tools and how to draw mind maps
- Demonstrate an understanding of concept mapping tools and how to draw concept maps
- Demonstrate an understanding of argument mapping tools and how to draw argument maps
- Compare the three types of mapping tools covered in this module
- Identify suitable examples of mind mapping, concept mapping and argument mapping software

What is a research proposal?

- A document with two major objectives:
  - To analyze and synthesize the existing research about a particular topic.
  - Describe the researcher's idea for a new study.
- Any medical research / epidemiological

study should have a proper proposal in written form before it is actually carried out

- A research proposal is like a blue print of a building plan before the construction starts
- A good research proposal is based on scientific facts and on the art of clear communication
- Writing a formal research proposal should be started by the time one has decided on the topic for the study

Why I need a Research Proposal

- It is prerequisite for a degree
- Needed for approval from the research committee to start the work – this has to be produced before approval is given
- It conceives the research project
- Use it to impress the senior researcher as a potential researcher
- It serves as a contract between the researcher and funder.
- Provides an organized way to pursue personal interest.

Parts of a Research Proposal

- Introduction
- Background /Review of literature
- Research Problem
- Objectives
- Justification
- Methodology/study design
- Time frame and work schedule/Gantt chart
- Personnel needed / available
- Facilities needed / available
- Budget

Examples of How Tools can be used to Support Writing

- Tools for assisting to check grammar
- Tools for checking plagiarism
- Bibliography management tools
- Online dictionaries
- Gantt charts and other time management tools
- Tools for summarization of topics
- Tools for identifying concepts and how they are related
- Tools for forming a plausible argument around the research topic

Focus on a few aspects of a research proposal and the need for research proposal writing support tools

1. Research Problem

- The problem should be stated in such a way that its' importance and relevance is realized by any one who reads it
- It has to be written in such a way that there is a link between the various pieces of background information and the gap identified (research problem) to be filled by conducting the study
- A tool may be required to organize the concepts to clearly show the relationships and the identified gap

2. Review of Literature

- This section reflects extensive review of literature done by the investigator
- In this section, what is already known about the topic is written
- It helps the investigator to gain good knowledge in that field of inquiry
- It is important to make the review coherent, relevant and easily readable knowledge
- It involves writing and rewriting many times. There is need for tools and a system for managing versions of literature review as well as tools for organizing the concepts and their relationships
- One spends many hours looking for information. There is need for tools to manage the information/knowledge being generated from the review

3. Research methodology

- Research methodology is a way to systematically solve the research problem.
- It may be understood as a science of studying how research is done scientifically
- It is necessary for the researcher to know not only the research methodology but also research methods/techniques.
- It is also essential to discuss procedures clearly and completely with a considerable amount of detail

Research Methodology

- Elements of methodology
  - Study design
  - Study population
  - Sampling techniques
  - Sample size needed
  - Measurement instruments
  - Data collection procedures
  - Data analysis process
- Tools are needed for these, including sample size calculators, data analysis tools, data collection tools e.g. lime survey, etc

4. Time Frame & Work Schedule

- The proposal should include the sequence of tasks to be performed, the anticipated length of time required for each task's completion and tracking of time spent against targets
- This information can be presented in tabular or graphic form (Gantt chart) – hence tools for drawing Gantt charts are needed during proposal preparation
- Flow charts and other diagrams are often useful for highlighting the sequencing and interrelationship of different activities in the proposed study – you will need diagramming tools

5. Avoid Plagiarism

- Plagiarism is presenting someone else's ideas or words as though they were your own.
- There are tools which can be used to assist the researcher to check the level of plagiarism in the proposal as well as in the written papers

Graphic Organizers/ Mapping Tools

Graphic/Mapping Tools for Writing

- The phrase "graphic organizer" refers to "diagrams", "maps" or "visual aids." They can serve as a visual representation of the information you've acquired in the research process.
- They are useful for writing essays, summaries or research proposals
  - They help the researcher to visualize his/her research and how elements of the research connect with each other
  - Enhance one's essays, summaries and research papers with visual elements such as structure, colours and pictures
  - Track correlations between the researcher's thoughts, observations, facts or general ideas.
- When it comes to research essay/proposal writing, some of the most commonly used graphic organizers/mapping tools are mind maps, concept maps and argument maps

Why use Graphic Organizers/Mapping Tools for Writing essays/proposals or summaries

- Graphic organizers for writing can make writing enjoyable – or at least less stressful.
- They enable you to see the proposal or research article before actually writing it by requiring you to think about it as you draw the maps
- Graphic organizers (or diagrams or maps) can help you think outside the box, draw conclusions you wouldn't normally observe, and make the entire process faster and more efficient.
- Quality essays/research proposals are based on detail. No one is going to accept your opinions and reasoning just because you say so. You'll need proof. And organizing that proof will require attention to detail. Mapping tools/ graphic organizers can help you see that detail and how it contributes to the overall concept.
- The tools can be used to structure an essay on any topic in any discipline.

Why use Graphic Organizers/Mapping Tools for Writing essays/proposals or summaries..2

- The tools make converting a researcher's opinions, thoughts, feelings and ideas into writing less threatening using little doodles and sketches.
- For a writer, when thoughts are a jumbled mess (and often they are), it is easier to put them onto a diagram on paper or in a software tool (expressiveness improves) without trying to develop a perfectly structured list on first attempt.
- Mapping tools are flexible. You don't need to restructure your outline in case of minor changes . All you have to do is draw a few arrows and the relationship totally changes.
- A graphic organizer/mapping tool helps you establish validity and relevance so that you can easily remove the ideas that don't support or enhance your thesis/argument

A Detailed Look at Specific Tools for Proposal Writing:

1. Mind Maps
2. Concept Maps
3. Argument Maps

1. **Mind Maps**

Mind Maps

- Mind mapping (or "idea" mapping) has been defined as 'visual, *non-linear* representations of ideas and their relationships'.
- Mind maps comprise networks of connected and related ideas.
- **NOTE**: In mind mapping, any idea can be connected to any other. Free-form, spontaneous thinking is required when creating a mind map.
- The aim of mind mapping is to find creative associations between ideas. Thus, mind maps are principally association maps.
- Mind mapping techniques involve using line thicknesses, colours, pictures and diagrams to aid knowledge recollection.
- Mind maps are a great way to depict a hierarchy. What is a hierarchical organization? It is a representation in which a singular topic dominates, with each subsequent idea being of decreasing importance.

Mind Maps

- Usually, the mind map starts with the thesis (or main idea) at the center. From there, you can branch out with your supporting evidence.
- You can use this process to replace your traditional note taking technique – note cards, outlines, etc.
- You'll quickly realize that a mind map is a great way to formulate the structure of your research proposal.
- The thing to note here is that the nature of the mind maps forces you think about sub topics and how to organize your ideas.
- And once the ideas are organized, writing the essay or research proposal become very easy.

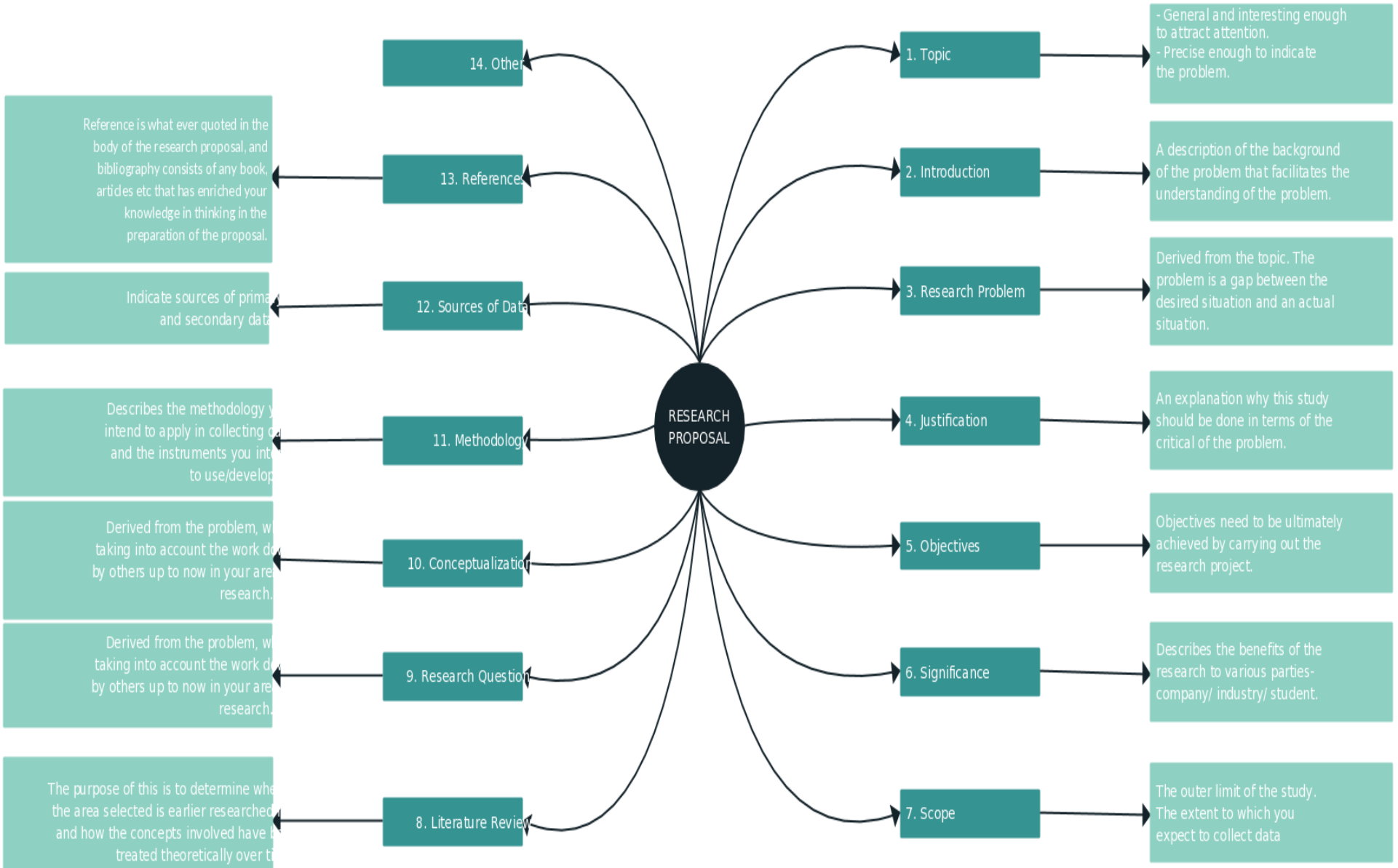
Steps in Development of a Mind Map

1. First identify your overarching question or research prompt, stating it as clearly and as comprehensively as you can.
2. Put your question in the middle of a piece of paper in landscape format.
3. Underline all the key terms / concepts / task words in your question.
4. Establish the questions that follow from each of these key terms and from your question as a whole? (These don't have to be tackled in any particular order, which is one of the advantages of mind maps).
5. Find out what follow-on questions are there for each of these E.g.:
   1. problems → solutions
   2. What? → Why? How? (Dig deeper and think critically!!)
6. Also look for links between questions.
7. It may be necessary to rework your map a couple of times to work out the best organizational structure, and this is where dedicated mind mapping software is very useful.

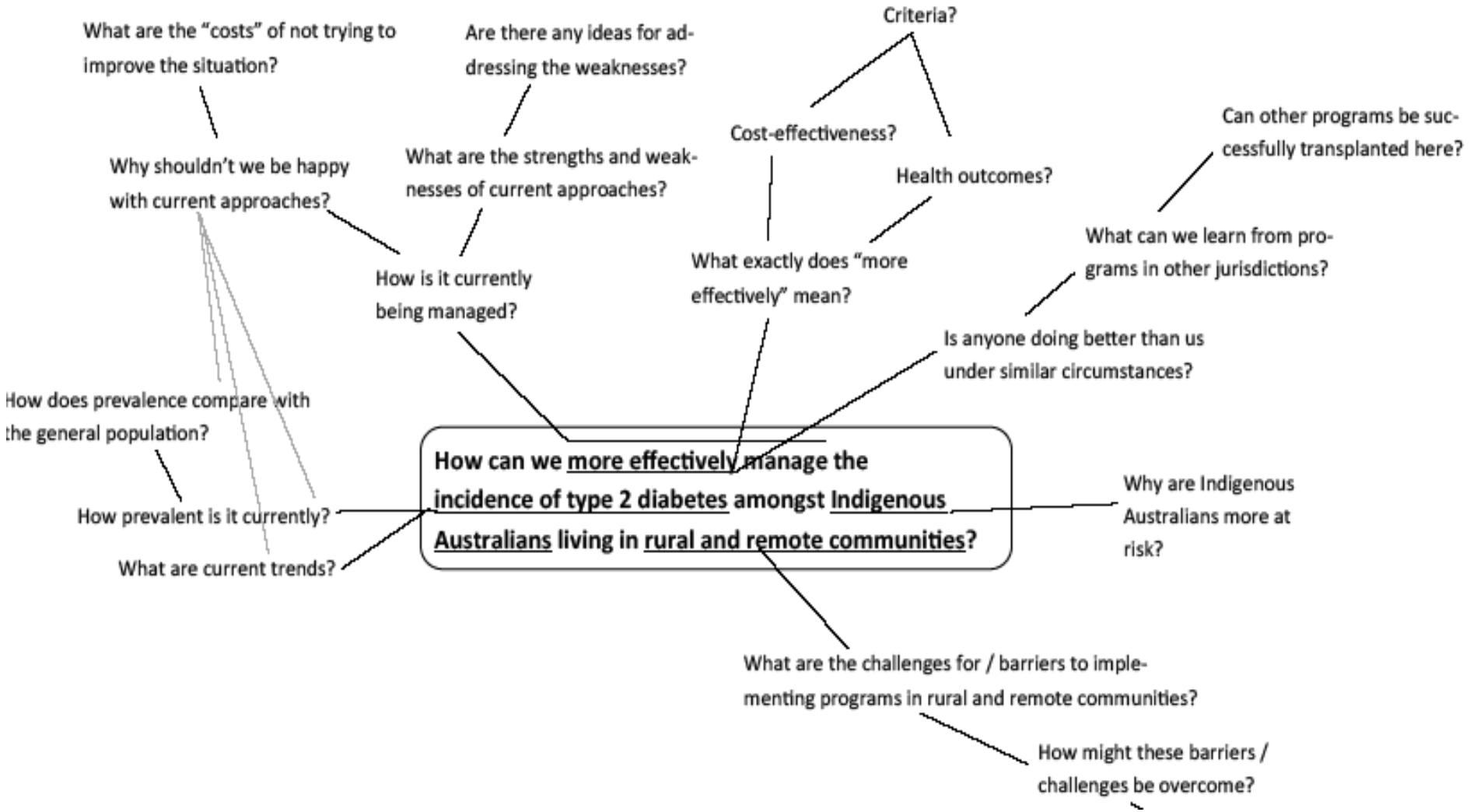
- In developing focus questions, try some of the classic question stems: Who? What? When / where / under what circumstances / To what extent? Why? How? How much?

Source: http://www.uq.edu.au/student-services/pdf/learning/graphic-organisers-v9.pdf

A mind map of a research proposal



Example of a Mind Map for Topic Analysis



Source: http://www.uq.edu.au/student-services/pdf/learning/graphic-organisers-v9.pdf

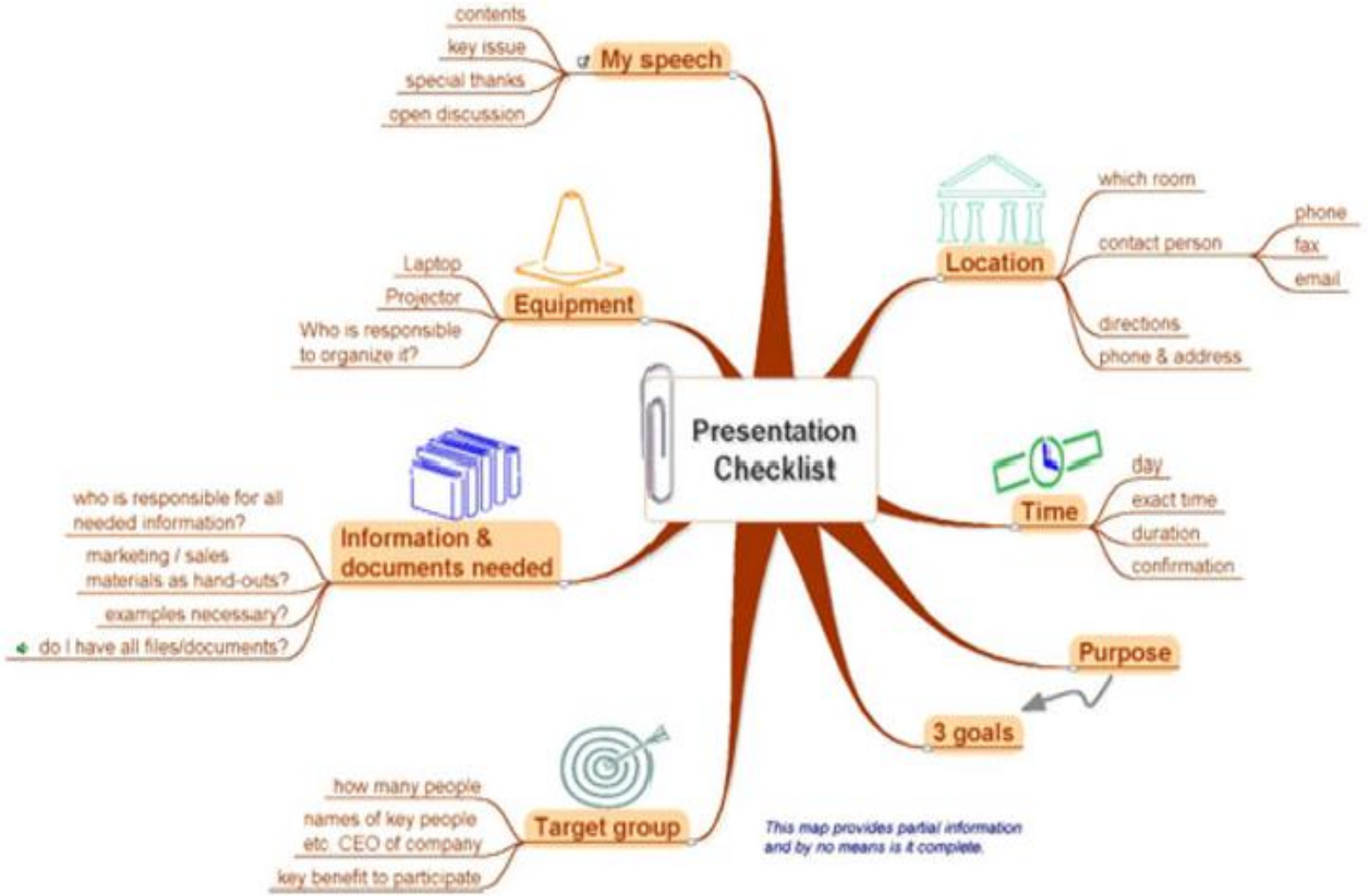
Buzan Recommendations for Mind Maps

- Buzan (Buzan, 1974; Buzan & Buzan, 2000 makes the following recommendations when mind mapping:

1. You can place an image or topic in the centre using at least 3 colours
2. Use images, symbols, codes and dimensions throughout your Mind Map.
3. Select key words and print them using upper or lower case letters.
4. Each word/image is alone and sitting on its own line/space.
5. Connect the lines starting from the central image. The central lines are thicker, organic and flowing, becoming thinner as they radiate out from the centre.
6. Use colours—set your own colour code—throughout the Mind Map.
7. Develop your own personal style of Mind Mapping.
8. Use emphasis and show associations in your Mind Map.
9. Keep the Mind Map clear by using *radial hierarchy* or numerical order to embrace your branches

Concept maps (another type of mapping tool), as we shall see, do not use such design flourishes/options i.e. have fewer design options.

Example Mind Maps for a Presentation Checklist



Source: http://fbe.unimelb.edu.au/__data/assets/pdf_file/0005/632516/mind_concept_argument_mapping.pdf

Why Mind Mapping

- The main use of mind mapping is to create an association of ideas.
- Another use is for memory. It is easier to remember a diagram than to remember a description.
- The advantages of mind mapping include its "free-form" and unconstrained structure. There are no limits on the number of ideas and links that can be made, and there is no necessity to retain an ideal structure or format.
- Mind mapping thus promotes creative thinking, and encourages "brainstorming".
- A disadvantage of mind mapping is that the types of links being made may be limited to simple associations.
- The absence of clear links between ideas is also a constraint.
- Mind mapping is limited in dealing with more complex relationships. For example, mind mapping might be useful to brainstorm the major issues a company needs to focus on in the forthcoming financial year. However, it is difficult to see it being as useful for something more complex e.g. the causes and effects of the Asian currency crisis, which requires clearly defined relationships.
- More complex topics require more than an associational tool, they require relational analysis. The concept mapping tool has been developed to address these limitations of mind mapping.

Tools for Mind Mapping

Open source

- Free Mind (http://freemind.sourceforge.net/wiki/index.php/Main_Page)
- MindMeister (https://www.mindmeister.com)

Others

- Microsoft Publisher

2. Concept Mapping

Concept Mapping

- Concept mapping is often confused with mind mapping (Ahlberg 1993, 2004; Slotte and Lonka 1999).
- However, unlike mind mapping, concept mapping is more structured, and less pictorial in nature.
- The aim of concept mapping is not to generate spontaneous associative elements but to outline relationships between ideas. Thus, concept mapping is a relational device

Concept Mapping--2

- A concept map has a hierarchical ‘‘tree’’ structure with super-ordinate and sub-ordinate parts (primary, secondary and tertiary ideas).
- The map normally begins with a word or concept or phrase which represents a focus question that requires an answer (Novak and Cañas 2006).
- Cross-links using connective terms (usually prepositional phrases) such as ‘‘leads to’’, ‘‘results from’’, ‘‘is part of’’, etc., are used to show relationships between concepts
- Examples are added to terminal concepts as instances of the concepts but these are not enclosed in boxes or circles as they are not concepts but represent instances of a concept.

Concept Maps and Mind Maps

- The difference between mind mapping and concept mapping is also at the level of precision and formality.
- Mind maps are less formal and less structured. Concept maps are formal (have rules to be followed) and are generally more tightly structured.
- Mind maps emphasize diagrams and pictures to aid recall of associations; concept maps generally use hierarchical structure and relational phrases to aid the understanding of relationships.
- Nonetheless, concept maps can take a variety of forms ranging from hierarchical to non-hierarchical forms

Steps in Creating a Concept Maps

1. Develop a declarative-type focus question (e.g., ‘‘What is inflation?’’) . This will be the general topic or title you will be writing about. Print it in the center of a piece of paper. Draw a circle or square around it.
2. Devise a ‘‘parking lot’’ of concepts and ideas that are related to the concept of inflation, and the question to be answered. The purpose of this stage is brainstorming. The resulting concepts may or may not be used in the final map.

-Write them on a separate piece of paper. Do not worry about the order of the ideas; simply generate as many as you can. The concepts are placed in circles or boxes to designate them as concepts.

Steps in Creating a Concept Maps

3. Select the words and phrases that fit in best with the general topic and support the main ideas of your writing.

4. Put concepts in hierarchical order of importance in a provisional map. In consultation with peers or an expert e.g. supervisor or principal investigator, an "expert skeleton map of the concept map" can be started to scaffold the learning process, aid student participation/junior researcher's participation and give students/junior researcher confidence to go on and complete the concept map in relation to the focus question and concepts provided.

-Hierarchical order in this step means that you write these words or phrases on your paper around the circle or square that contains your topic. Circle them or draw a square around them

Steps in Creating a Concept Maps

5. Link lines are then provided between the hierarchical concepts from top to bottom.
6. Devise suitable cross-links for key concepts in the map. Verbs and prepositions/ prepositional phrases are used most frequently, for example: ‘‘requires’’, ‘‘to work with’’, ‘‘will lead to’’, ‘‘involves’’, ‘‘during’’, ‘‘of’’, ‘‘through’’, and so on.

- The aim is to show the relationship between the key concepts and their subordinate or super-ordinate elements.

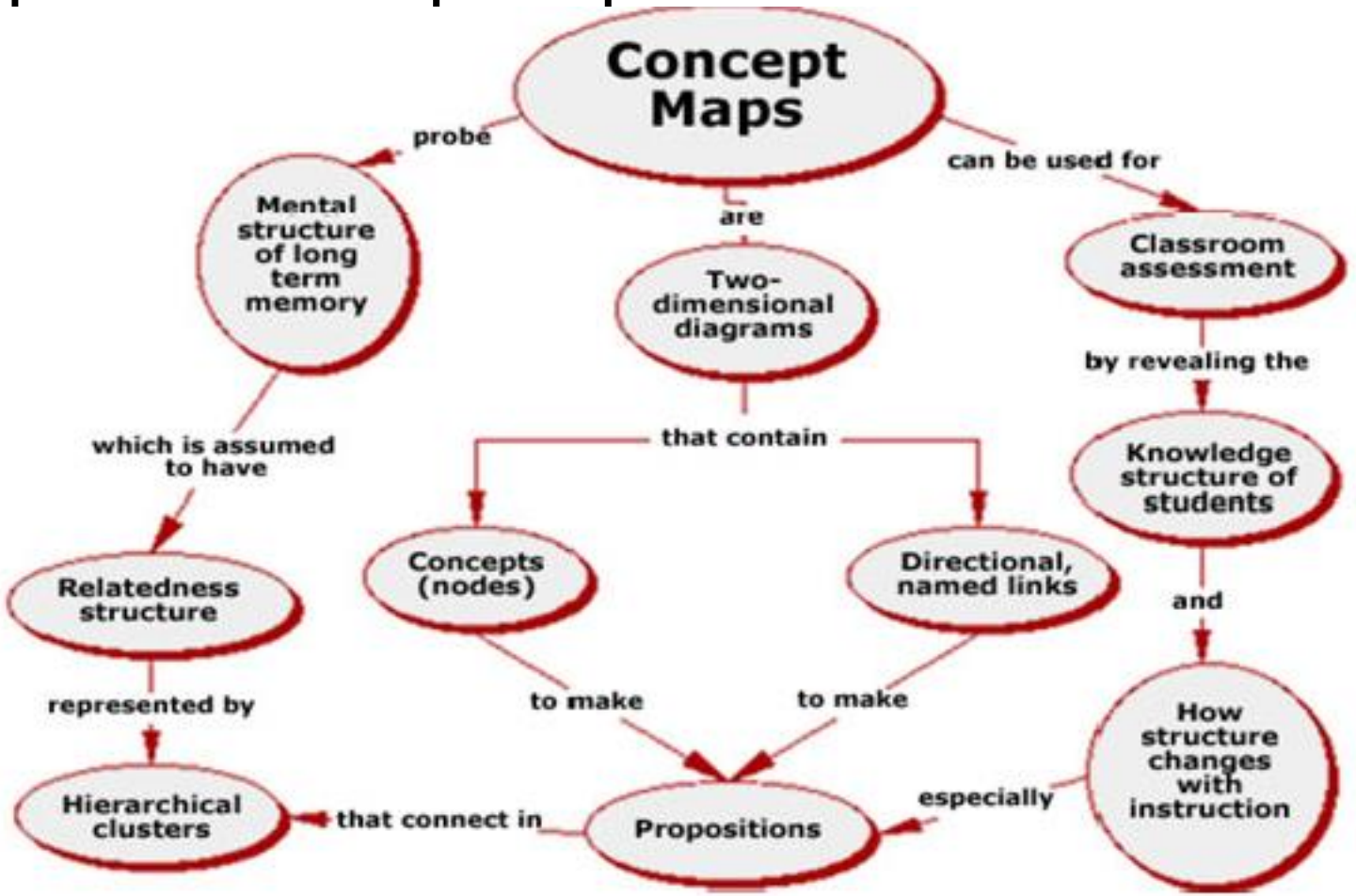
7. Repeat the process of brainstorming and branching for each of the subtopics you have circled on your paper until you have enough ideas and information to write about the topic.

Steps in Creating a Concept Maps

8. Add examples to the terminal points of a concept map. These are not enclosed in boxes or circles because they are not concepts but instances or examples of concepts.
9. Use the concept map to organize your writing. Ideas which are closely connected on your concept map should be closely connected in your writing as well.

- Refer to your concept map often while writing, as it is a visual representation of the points you wish to make and how they are connected.

Example concept map showing knowledge of Concept Maps i.e. concept map about concept map



- Source: http://fbe.unimelb.edu.au/__data/assets/pdf_file/0005/632516/mind_concept_argument_mapping.pdf

Advantages of Concept Maps

- Organize ideas and define a topic – ideas related to the topic are organized hierarchically
- Develop keywords and synonyms – as the emerging sub-topics
- Reveal patterns and themes between ideas – along lines of branching from the main concept at the centre.
- Generate search terms for your research – i.e. the emerging sub-topics

Disadvantages of Concept Maps

- They require some expertise to learn;
- The rigid rules used for identifying concepts and their multiple relationships does not make the process simple or easy to learn
- Because of their complexity, they may not always assist memorability – i.e. they may not effectively assist with remembering concepts and relationships
- The linear nature of concept maps means that they are not adequate to capture more complex relationships between concepts. In particular, they do not enable easy separation of concepts of critical importance from those of secondary importance

Examples of Concept Mapping Tools

- cMap (http://cmap.ihmc.us/)
- Inspiration (http://www.inspiration.com/Inspiration)
- Visual Understanding Environment (VUE) (http://vue.tufts.edu)
- Smart Ideas

3. Argument Maps

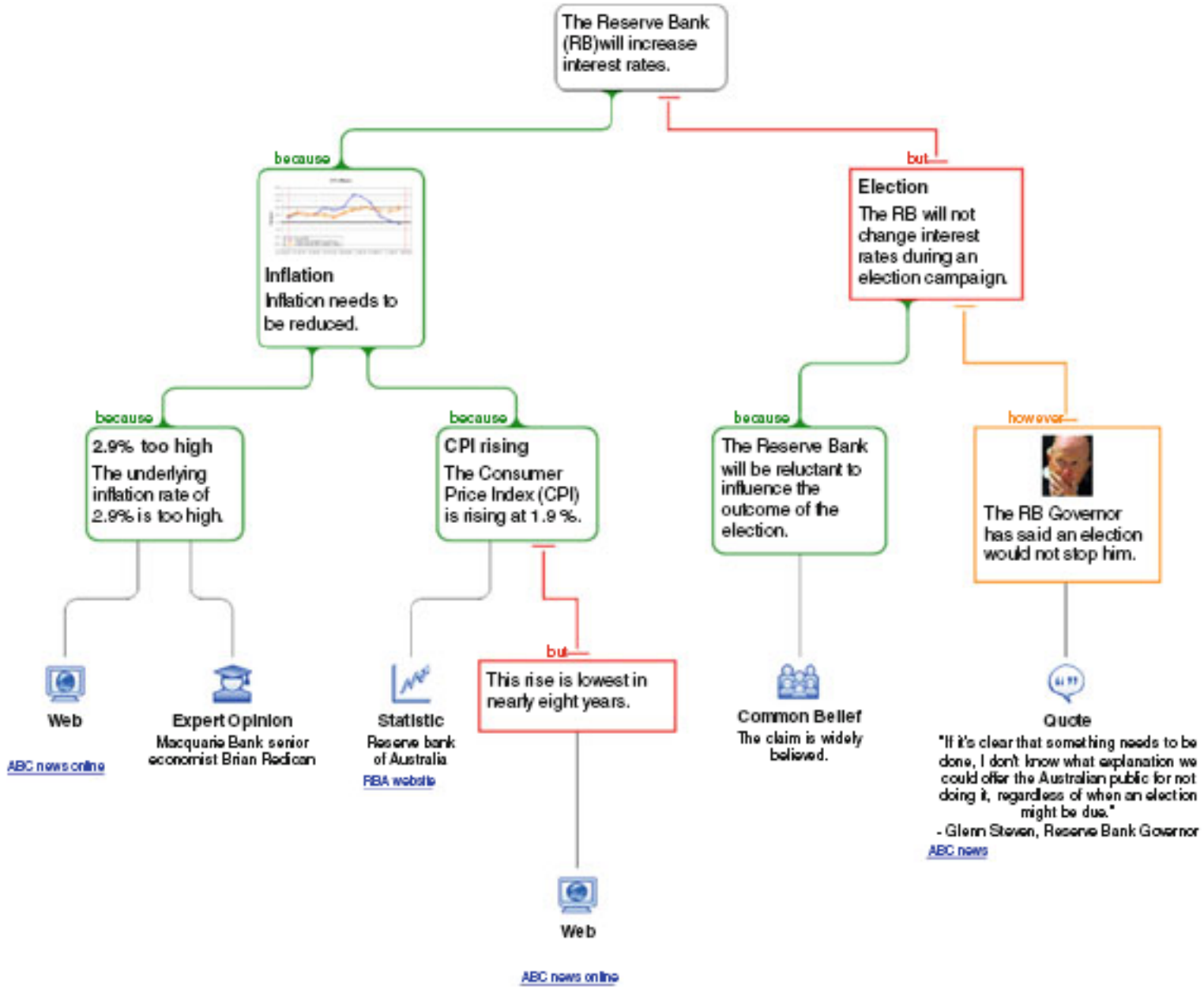
Argument Mapping

- A major disadvantage of concept mapping, is that it is limited to relations between concepts.
- Many issues require more than an identification of relationships between concepts; they require arguments to be made for positions that need to be defended, as well as objections to those positions i.e. non-relational relationships
- ‘‘Arguments’’ are statements (‘‘premises’’) joined together to result in claims (‘‘conclusions’’).

Argument Mapping

- At the first (top) level of the argument there is the contention.
- This is followed by a supporting claim (under the link word ‘‘because’’) and an objection (under the link word ‘‘but’’).
- These are, in turn, supported by more claims of support or objection (which become rebuttals when they are objections to objections).
- In the software for argument mapping, claims, objections and rebuttals are coloured differently.
- Finally, basis boxes which provide defence for the terminal claims, are provided at the end of the argument tree.
- The ‘‘basis’’ boxes at the terminal points of the argument also require evidence (in place of the brackets provided). Some of the evidence in the example argument map in the next slide is ‘‘statistics’’, ‘‘expert opinion’’ and ‘‘quotation’’.
- Objections and rebuttals to objections can be added at any point in the map (in different colours for easier visual identification).

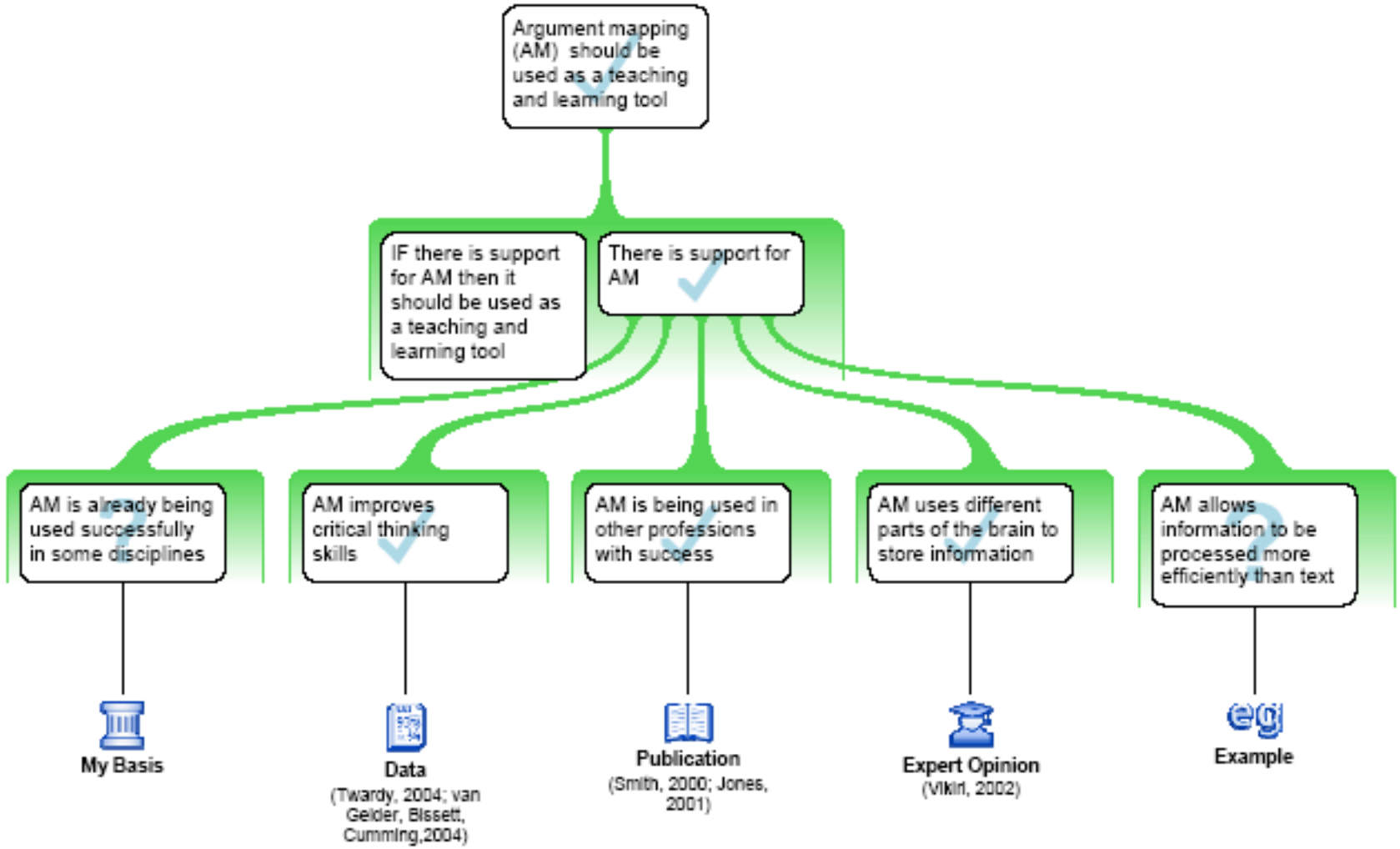
Example Argument Map



Source: http://fbe.unimelb.edu.au/__data/assets/pdf_file/0005/632516/mind_concept_argument_mapping.pdf

Another Example of an Argument Map

- Shown in the next slide is an example of an argument map defending the claim that "argument maps should be used as a teaching and learning tool".
- At the first (top) level of the argument there is the contention. This is followed in this example by **co-premises,** one of which is supported by a number of **claims.** These terminal claims are, in turn, supported by **basis boxes** which provide defence for the claims.



Source: http://fbe.unimelb.edu.au/__data/assets/pdf_file/0005/632516/mind_concept_argument_mapping.pdf

Example of an Argument Map

- The map above is incomplete.
- **Objections** and **rebuttals to objections** can be added at any point in the map (in different colours for easier visual identification).
- The "basis" boxes at the terminal points of the argument also require evidence (in place of the brackets provided).
- Some of the evidence has been provided, such as "data" and "expert opinion", and some have been left blank to show the software default.

Advantages of Argument Mapping

- Argument mapping focuses on a certain sub-class of relationships (i.e. logical inferences between propositions).
- Eventually, all reasons have to be grounded. These grounds are presented as terminal ‘‘basis’’ boxes for assumptions.
- Argument maps also put limitations around the items being mapped. There is a clear sense in which there are ‘‘boundaries’’ i.e. the end of an argument with terminal basis boxes and evidence and also the type of claims which can be included. However, with mind mapping and concept mapping, connections can potentially go on ‘‘forever’

Disadvantages of Argument Mapping

- A weakness of argument mapping is also its strength; argument mapping does not capture looser relationships e.g. cause and effect. This makes it a tool with a very precise purpose.
  - However, there is no reason why the advantages of argument maps cannot be supplemented with the advantages of other available tools e.g. mind maps or concept maps, and with additional refinements that do not exist at present.
- Another disadvantage of argument mapping is that it can assume too much. In the educational context, argument mapping exercises can assume that researchers have a sufficiently clear understanding of a topic or issue and the precise nature of the task at hand.
  - However, this understanding may often be absent and researchers themselves may need to define the scope of the issue to be addressed and the exact parameters of the task.

Comparing Mind Maps, Concept Maps and Argument Maps

	Purpose	Structure	Level of Abstraction	Nodes	Linking devices	Linking words
Mind Maps	Associations between ideas, topics or things	Non-linear, organic, radial	High generality	Pictures, words, diagrams	Lines, line thicknesses, colours, shading	Associative words ("Use" and "colours" and "links")
Concept Maps	Relations between concepts	Hierarchical, tree-like	Medium generality	Boxes	Arrows	Relational phrases ("in relation to", "is composed of", etc)
Argument Maps	Inferences between claims (conclusions) and support (premises)	Hierarchical, tree-like	Low generality	Boxes and lines	Lines, colours, shading	Inferential linking words ("because", "not", "however")

Examples of Argument Mapping tools

- Rationale (https://www.rationaleonline.com)
- Argumentative (https://sourceforge.net/projects/argumentative/)
- Argument (http://www.argunet.org)
- Common Sense Atheism (http://commonsenseatheism.com/?p=1903)

Sources

- Research Proposal by Dr.I.Selvaraj. Indian Railways Medical Service (VRS)
- Basic concepts of research proposal and Steps of research proposal development by Dr. Pushpa Raj Sharma Department of Child Health, Institute of Medicine
- University of Queeensland student services. Annotated Sample Research Proposal: Process and Product

http://uq.edu.au/student-services/pdf/learning/research-proposal-sample-v2.pdf

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- http://uq.edu.au/student-services/pdf/learning/research-proposal-sample-v2.pdf
- http://file.scirp.org/pdf/CE_20130207155917O2.pdf
- http://www.reasoninglab.com/wp-content/uploads/2013/10/Davies_ConceptMindArgumentmapping.pdf
- http://fbe.unimelb.edu.au/__data/assets/pdf_file/0005/632516/mind_concept_argument_mapping.pdf
- http://www.uq.edu.au/student-services/pdf/learning/graphic-organisers-v9.pdf
- http://philpapers.org/archive/GAPT.pdf
- http://www.phil.cmu.edu/projects/argument_mapping/ - many other tools
- https://ltlatnd.wordpress.com/2011/05/10/best-tools-and-practices-for-concept-mapping/ - a lot of information