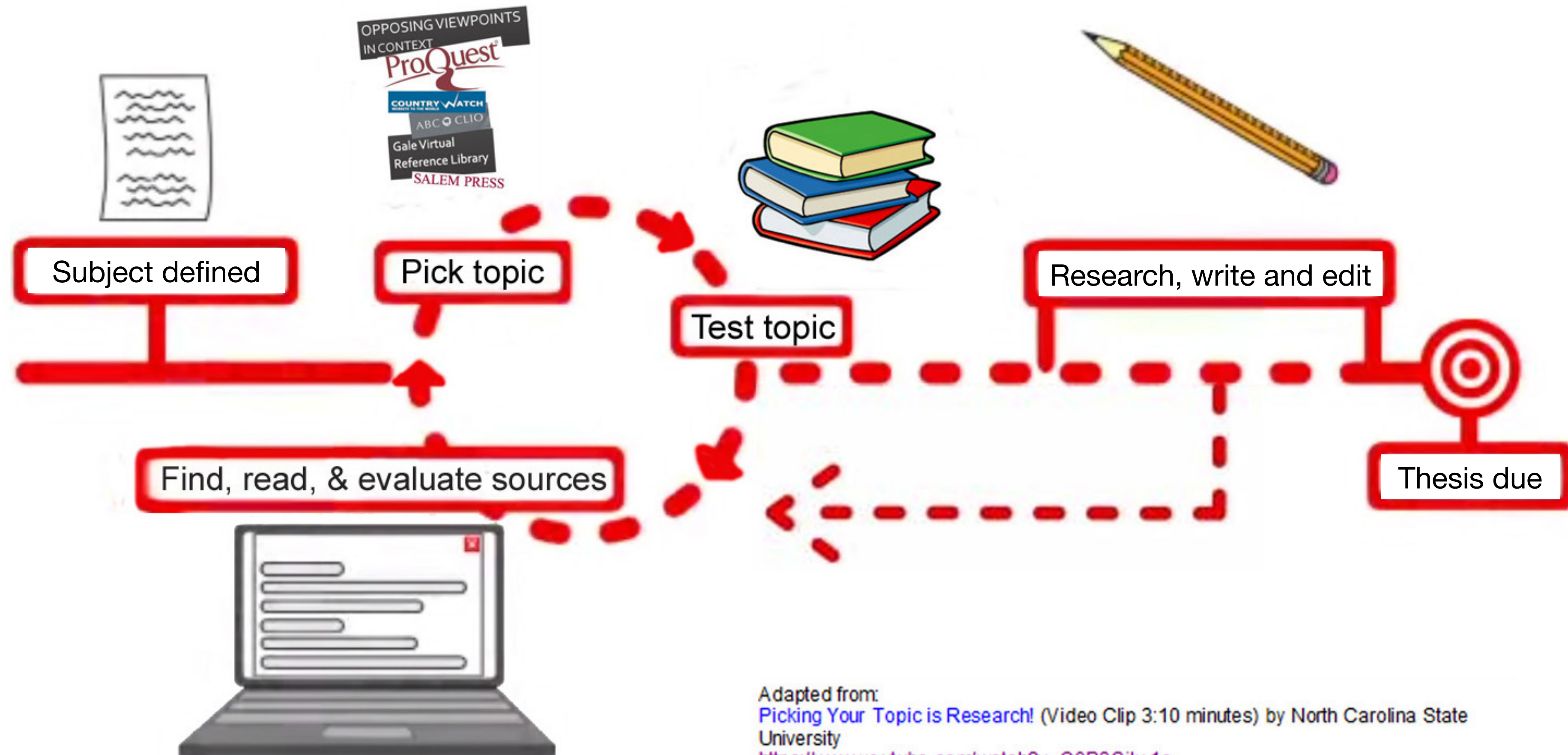Research topic, question and objectives

Scientific writing

João V. Cordeiro

Research topic, question and objectives

The Research Process

Subject defined

Pick topic

Test topic

Research, write and edit

Find, read, & evaluate sources

Thesis due

A **good research question** is:

- Well-conceptualized

- Relevant

- Direct and clear

- Focused

- Includes all components (main concepts)

What are the **advantages** of formulating a **structured research question**:

- Points the researcher in a **specific direction** (narrowing the scope/focus to ask a manageable question)

- Identifies the **main concepts** of the research

- Helps build the **literature search strategy**

- Improves information retrieval

- Possibilitates the evaluation the **usefulness/ appropriateness of the information** retrieved

123.5 million US adults will use voice assistants at least once per month in 2022.

The big data analytics market is set to reach $103 billion by 2023.

Poor data quality costs the US economy up to $3.1 trillion yearly.

Pollution is responsible for around 9 million premature deaths each year, or one in six globally.

In 2020, every person generated 1.7 megabytes in just a second.

95% of businesses cite the need to manage unstructured data as a problem for their business.

Using big data, Netflix saves $1 billion per year on customer retention.

Visit **https://www.gapminder.org/** to update worldview

Narrowing down your focus

Subject
e.g. Politics

Theme
e.g. Political Science

Context
e.g. Political engagement in the UK

Topic
e.g. Young people's attitudes towards politics

Source: https://www.futurelearn.com/info/courses/research-project/0/steps/4041
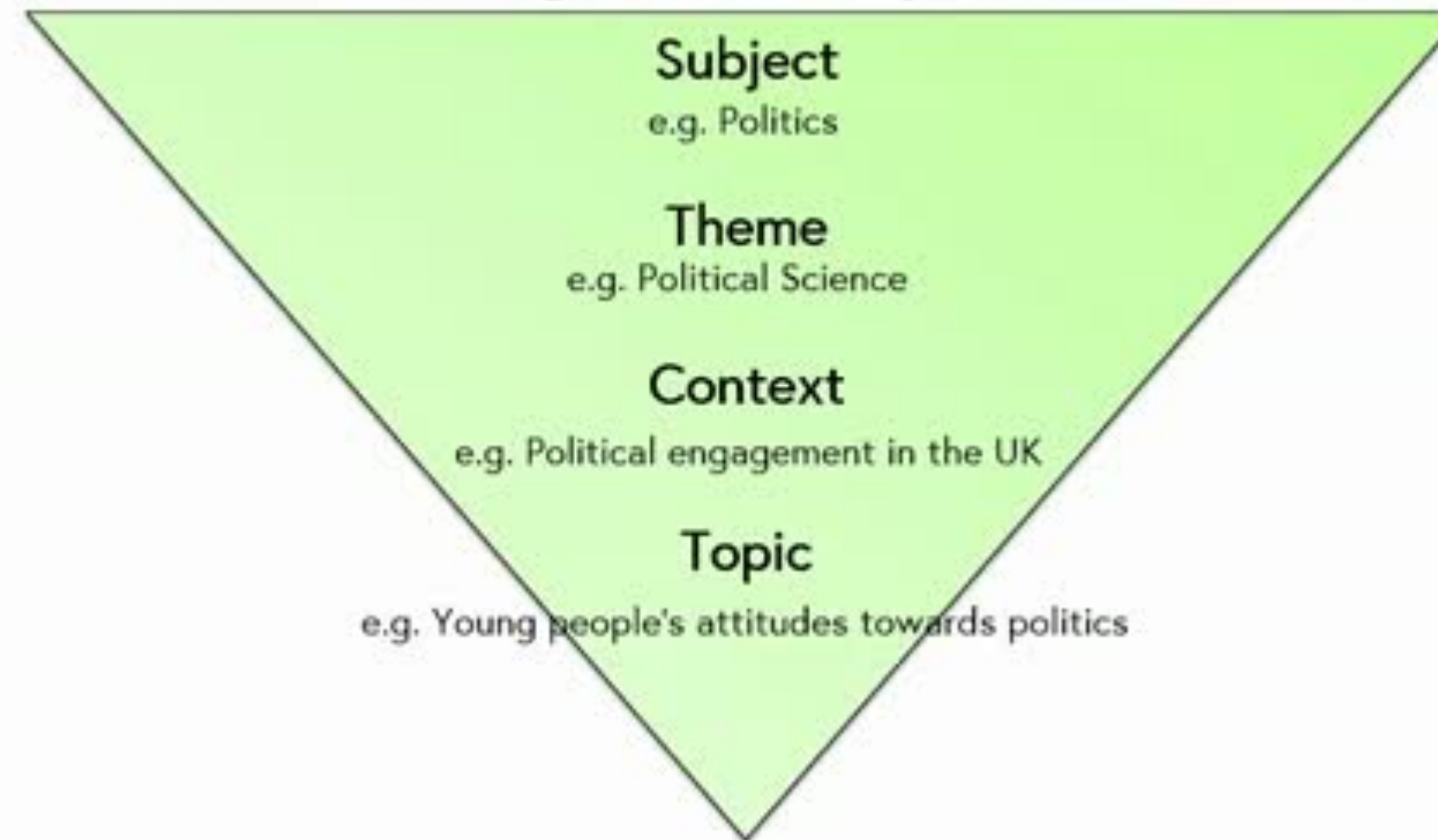
Using a framework to develop a research question can help to **identify the main concepts** of a research project.

Identifying these main concepts and the synonyms / similar terms that might be used to describe each of those concepts will also direct the literature review.

		OR		OR		OR	
		Synonym A	Synonym B	Synonym C	Synonym D
	Concept 1				
AND					
	Concept 2				
AND					
	Concept 3				
AND					
	Concept 4				

Frameworks to **structure research questions**

Framework	Useful for research questions	Description	Example
PICO	Covering the effectiveness of an intervention	**Patient, Population or Problem** - who and/or what is my question focussed on? **Intervention** - what intervention is being considered? **Comparison** - what intervention is this being compared with (a comparison is not always necessary) **Outcomes** - what do you hope to accomplish, improve or affect?	How effective are alternatives to CCTV for controlling robbery in city neighbourhoods? **P** - city neighbourhoods **I** - alternatives to CCTV (human surveillance? changes to opening hours?) **C** - CCTV **O** - robbery
PFO	Relating to prognosis issues	**Population**- who and/or what is my question focused on? **Prognostic Factors**- what is being prognosed? **Outcomes**- what are the possible outcomes of the prognosis?	How likely are insurance companies which apply data analytics to gain market shares? **P**- insurance companies **F**- data analytics **O**- market shares
CoCoPop	Relating to the prevalence/incidence of a condition, problem etc.	**Condition**- what condition/problem are you examining? **Context**- in what context is your question set? **Population**- what population/group are you examining	What is the prevalence of claustrophobia in adult patients undergoing MRI? **Co**- claustrophobia **Co**- MRI **Pop**- adults
CLIP	Relating to cost effectiveness, economic evaluations, service improvements etc.	**Client** – who is the service aimed at? **Location** – where is the service sited? **Improvement** – what do you want to find out? **Professional** – who is involved in providing/improving the service?	What are the ways of improving marketing services for banks in rural communities **C** - banks **L** - rural communities **I** - how services can be improved **P** - marketing services

Extensions to the frameworks, if your topic has additional concepts:
Add an **S**- standing for **study designs** (if you are only interested in examining specific designs of study)
Add a **T**- standing for **timeframe** (if your outcomes need to be measured in a certain amount of time e.g. 24 hours after a hurricane).
Add a **C -** standing for **context** (if it essential to specify in what context or place the problem is set)

Framework	Useful for research questions	Description	Example
ECLIPS(E)	Relating to cost effectiveness, economic evaluations, service improvements etc.	**Expectation -** what is the information needed for? **Client Group -** who is the information needed for **Location -** where is the client group or service located **Impact -** what is the change in the service, if any, which is being looked for? What would constitute success? **Professionals -** what professionals are involved in the service? **Service -** for which service are you looking for information?	What is the retention of interior arquitects in architecture offices in Barcelona? **E-** to find out retention rates **C-** Arquiteture School Deans **L-** Barcelona **I-** Retention of staff **P-** arquitects **S-** interior
PEO	Of qualitative nature, which evaluate experiences, meaningfulness etc.	**Population -** who is my question focussed on? **Exposure -** what is the issue I'm interested in? **Outcomes or themes -** what theme do I want to examine?	What are the perceptions on the quality of life of carers for people with dementia **P-** carers **E-** dementia **O-** quality of life
SPICE	Of qualitative nature, which evaluate experiences, meaningfulness etc.	**Setting -** where is the study set **Perspective -** from whose perspective is the study done **Intervention -** what intervention is being examined? **Comparison -** is the intervention being compared with another? **Evaluation -** the outcome measures	Attitudes of users of Lisbon green parks towards green space interventions **S -** Lisbon green parks **P -** users **I -** green space interventions **C -** NONE or (creating versus replacing green space) **E -** attitudes
SPIDER	Of qualitative nature, which evaluate experiences, meaningfulness etc.	**Sample -** the group of people being looked at **Phenomenon of Interest -** reasons for behaviour and decisions, rather than an intervention. (**Design -** the form of research used) **Evaluation -** outcome measures. (**Research type -** qualitative, quantitative and/or mixed methods.)	What are young parents experiences of attending ante-natal education **S -** young parents **PI -** attendance at ante-natal education classes **D -** (interviews? surveys?) **E -** Experiences **R -** (qualitative studies?)

Extensions to the frameworks, if your topic has additional concepts (if not listed already):
Add an **S**- standing for **study designs** (if you are only interested in examining specific designs of study)
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Add a **C -** standing for **context** (if it essential to specify in what context or place the problem is set)

Choosing **the right focus** for a topic is fundamental.

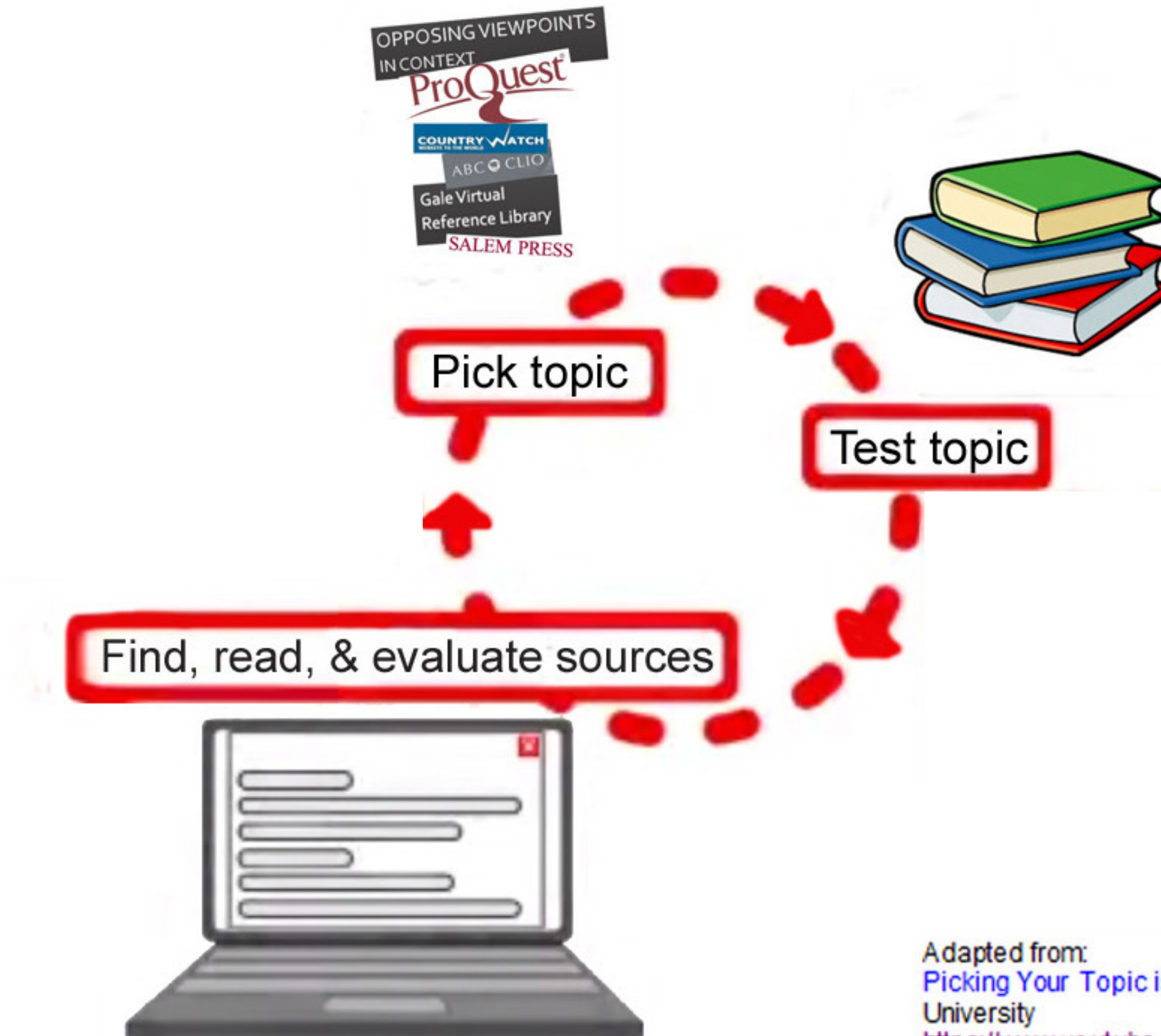If your topic is **too broad you will be overwhelmed with results.**

If your topic is **too narrow you will have a hard time finding information**.

You might have to tweak your topic based on the information you are finding.

You might have to go through an **exploratory cycle several times** before

you come up with a topic that will work well for your thesis.

The Research Process

Pick topic

Test topic

Find, read, & evaluate sources

Formulating a **Research Topic and Question**

It's time to **turn broad topics into refined research questions**.

Developing a research question is helpful to search more efficiently for relevant information.

Answer a series of questions to help you develop a research question.

Let's practice!

Formulating a **Research Topic and Question**

What are you interested in researching for your project?
What is your subject or theme?

Examples:

Reality Television, Politics, Health, Computer Science, Insurance, Transport, Finance, Sports

Subject/theme: _____

Scope	Your Answer	Example
Subject		Health

Formulating a **Research Topic and Question**

Background reading can help you choose and limit the scope of your subject/theme.

Spend some time searching for relevant information and literature for issues related to your subject/theme.

Give it a try, **find and write down 5 facts, relevant keywords, and important terms or concepts**.

Try to find aspects that are of interest to you on a personal level. That will make researching your topic much more interesting!

1: _____
2: _____
3: _____
4: _____
5: _____

Formulating a **Research Topic and Question**

Inspired by your 5 concepts/facts/keywords, ask yourself **who is impacted in your subject/theme**. Which population?

People, organizations, animals, plants, the environment? Consider gender, age, or profession; activity type; species; elements.

Example: clinical data management

Who is impacted: _____

Scope	Your Answer	Example
Subject		Health
Who		clinical data management

Formulating a **Research Topic and Question**

What aspect of your subject/theme are you interested in?

Is there a subtopic or category that you'd like to focus on? The causes? The effects or implications? The solutions?

Example: General Data Protection Regulation (GDPR) (implications)

Aspect of your subject/theme you are interested in: _____

Scope	Your Answer	Example
Subject		Health
Who		clinical data management
What		GDPR implications

Formulating a **Research Topic and Question**

Ask yourself when.

Are you interested in the current situation? In the past? Are you interested in a specific event? Looking to the future?

Example: Since 2016 (GDPR entry into force)

When: _____

Scope	Your Answer	Example
Subject		Health
Who		clinical data management
What		GDPR implications
When		since 2016

Formulating a **Research Topic and Question**

Ask yourself where.

Consider countries, regions, states, types of places like workplace, schools, online.

Example: hospitals in Portugal

Where: _____

Scope	Your Answer	Example
Subject		Health
Who		clinical data management
What		GDPR implications
When		since 2016
Where		hospitals in Portugal

Formulating a **Research Topic and Question**

Pull the elements together to create your focused research question.

Example:

What have been the implications of GDPR for clinical data management in hospitals

in Portugal since 2016?

Research Question: _____

Scope	Your Answer	Example
Subject		Health
Who		clinical data management
What		GDPR implications
When		since 2016
Where		hospitals in Portugal

The goal of the research project is to **answer the research question**.

To articulate the main research objective, **turn the research question into an aim**.

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RQ: How effective are alternatives to CCTV for controlling robbery in city neighbourhoods?

RO: To *(INSERT VERB)* the effectiveness of CCTV alternatives to control robbery in city neighbourhoods.

Avoid general verbs which are open to many interpretations: appreciate, know, learn, understand.

Use action verbs according to nature/context of research: characterize, define, describe, identify, outline, recognize, reproduce

Before achieving the main research objective, smaller aims must be reached for.

To **articulate different secondary objectives**, break down the route from **where you are (starting point)** to the **main objective (destination)**.

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RO: To *(INSERT VERB)* the effectiveness of CCTV alternatives to control robbery in city neighbourhoods.

SRO1: To *(INSERT VERB)* the prevalence of CCTV usage in city neighbourhoods

SRO2: To *(INSERT VERB)* alternatives to CCTV

SRO3: To *(INSERT VERB)* which CCTV alternatives are adequate to control robbery in city neighbourhoods

(...)

Avoid general verbs which are open to many interpretations: *appreciate, know, learn, understand.*
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SRO3: To *(INSERT VERB)* which CCTV alternatives are adequate to control robbery in city neighbourhoods

(…)

Knowledge gather/remember information	*characterize, cite, count, define, describe, draw, identify, indicate, label, list, match, name, outline, point, quote, read, recall, recite, recognize, record, relate, repeat, reproduce, select, state, tabulate, tell, trace, write*
Comprehension understand/organize stored info.	*associate, classify, compare, compute, contrast, convert, defend, derive, describe, differentiate, discuss, distinguish, estimate, explain, express, extend, extrapolate, generate, give examples, illustrate, infer, interpolate, interpret, locate, paraphrase, predict, reorder, report, restate, review, rewrite, summarize, translate*
Application use info. to solve problems	*apply, calculate, change, choose, classify, complete, compute, demonstrate, discover, dramatize, employ, examine, illustrate, interpolate, interpret, locate, manipulate, modify, operate, order, practice, predict, prepare, produce, relate, report, restate, review, schedule, select, show, sketch, solve, translate, use, utilize*
Analysis consider evidence to reach conclusion	*analyze, appraise, break down, conclude, contract, criticize, debate, deduce, detect, determine, diagram, differentiate, discriminate, distinguish, experiment, identify, illustrate, infer, inspect, inventory, outline, point out, question, regroup, relate, separate, select, separate, subdivide, summarize*
Synthesis break down info. to understand components	*arrange, assemble, categorize, codify, collect, combine, compile, compose, construct, create, design, detect, develop, devise, draw, explain, formulate, generalize, generate, integrate, manage, modify, organize, originate, plan, predict, prepare, prescribe, produce, propose, rearrange, reconstruct, relate, reorganize, revise, rewrite, solve, specify, summarize, synthesize, tell, write*
Evaluation judge merit	*appraise, argue, assess, choose, compare, conclude, contrast, criticize, critique, decide, describe, discriminate, determine, estimate, explain, evaluate, grade, interpret, judge, justify, measure, rank, rate, recommend, relate, revise, score, select, summarize, support, test*