Week02: Introduction

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Intended Learning Objectives

- Revisit students understanding of the scientific method.
- Formulate research questions.
- Formulate different forms of hypotheses.

What is the scientific method?

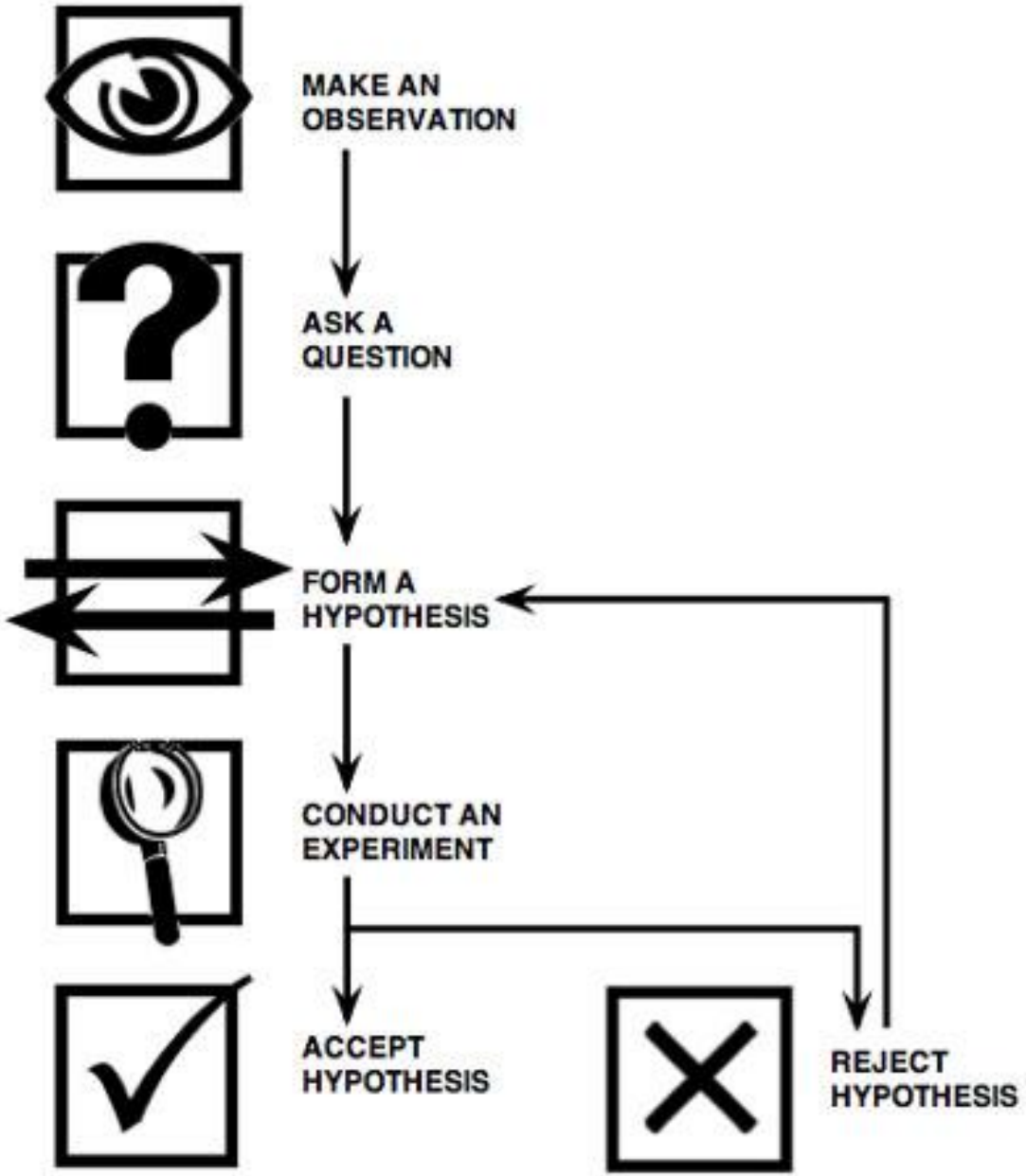
The **scientific method** is a procedure used to provide scientific explanations for questions about the world. It outlines the way a scientist can perform an **experiment** to collect **empirical data** which can be used to answer a **question**. The scientist plans their experiment based on **background** research that allows them to form a **hypothesis** predicting what may happen. When the experiment is complete, they will use their data to form a **conclusion**. (The Scientific Method: Steps, Terms & Examples, 2013)

A very Short Origin Story

- Sir Francis Bacon in 1620.
- Aristotle or Galileo first utilised the scientific method.
- Ibn al-Haytham first outlined a series of steps long before Bacon in the early 1000s.
- Issac Newton helped refine the process after Bacon in the later 1600s.

(The Scientific Method: Steps, Terms & Examples, 2013)

Scientific Method



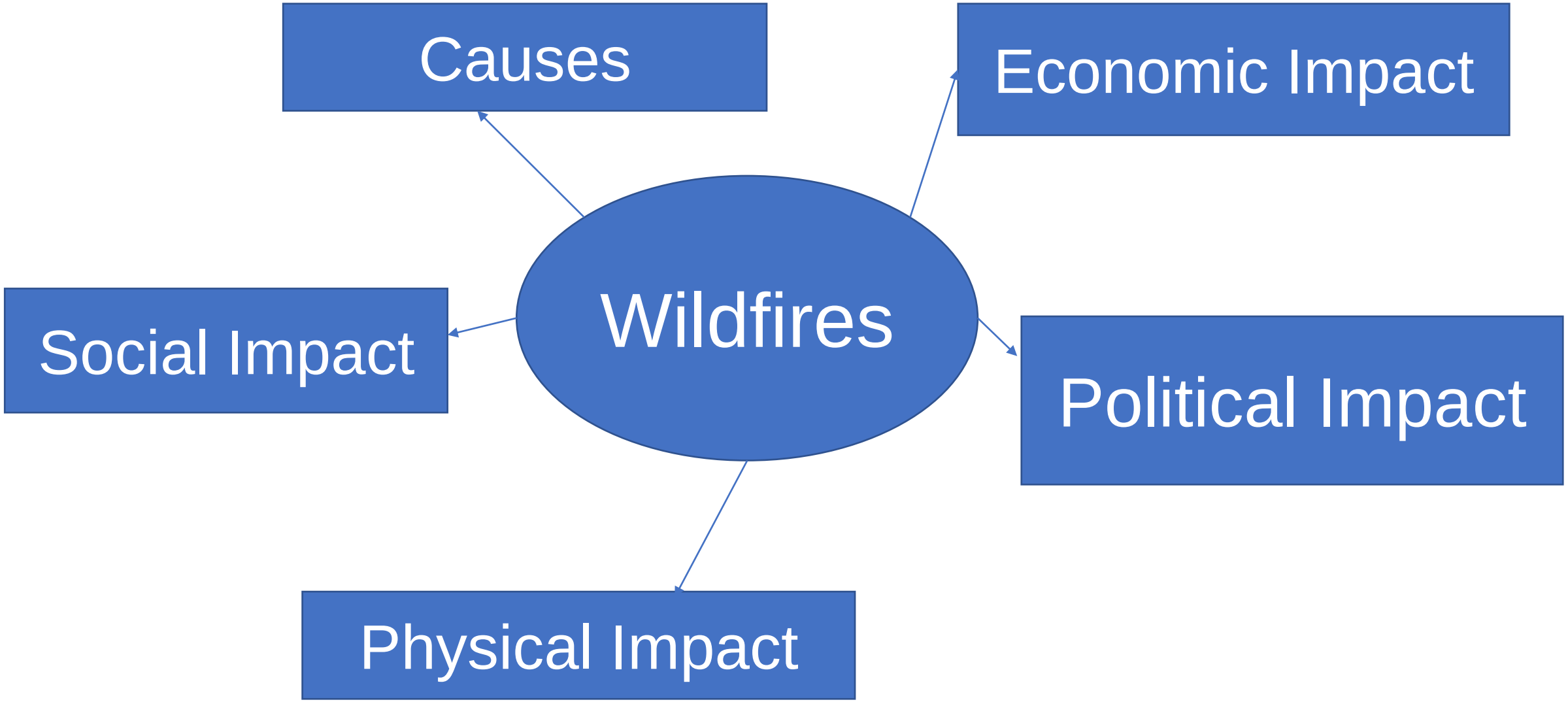
Research Questions

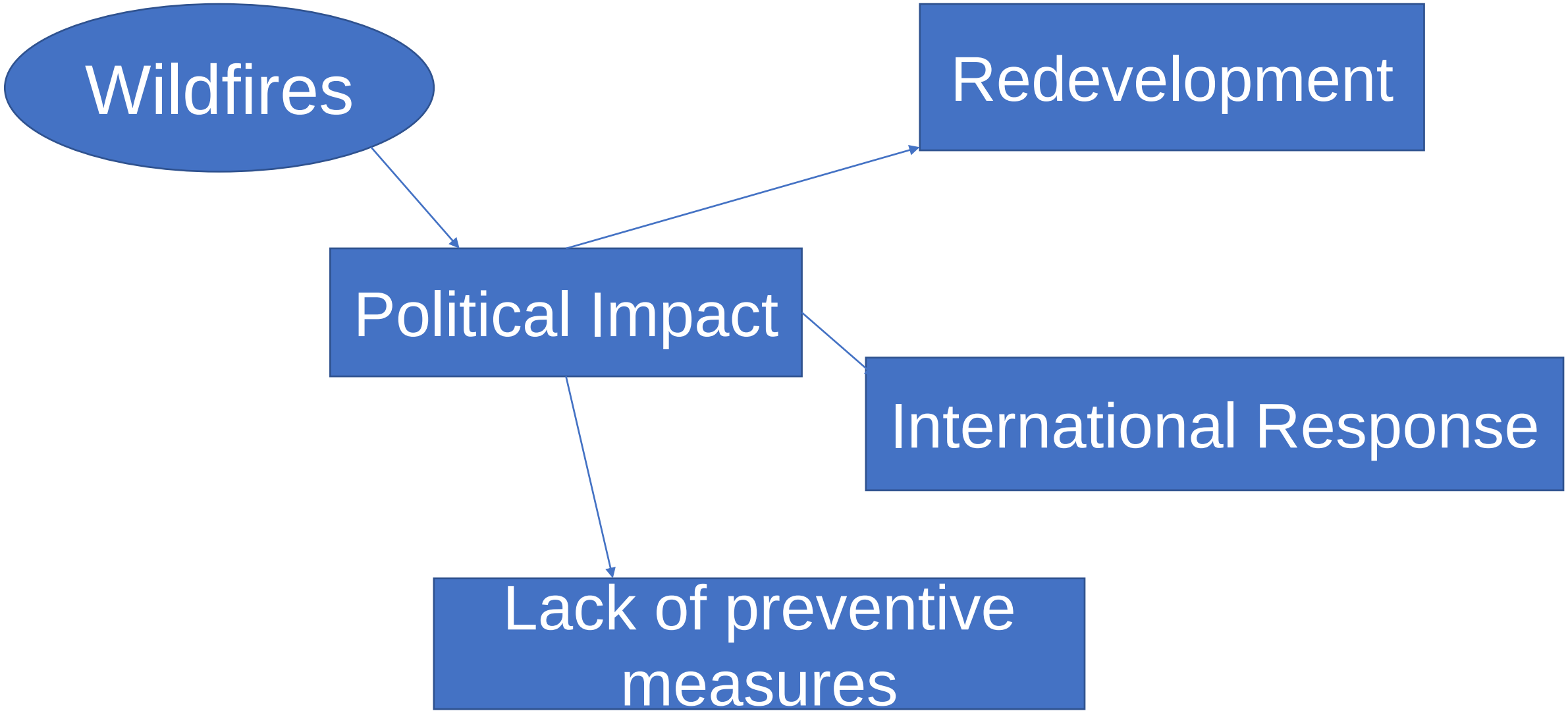
Techniques to develop research questions

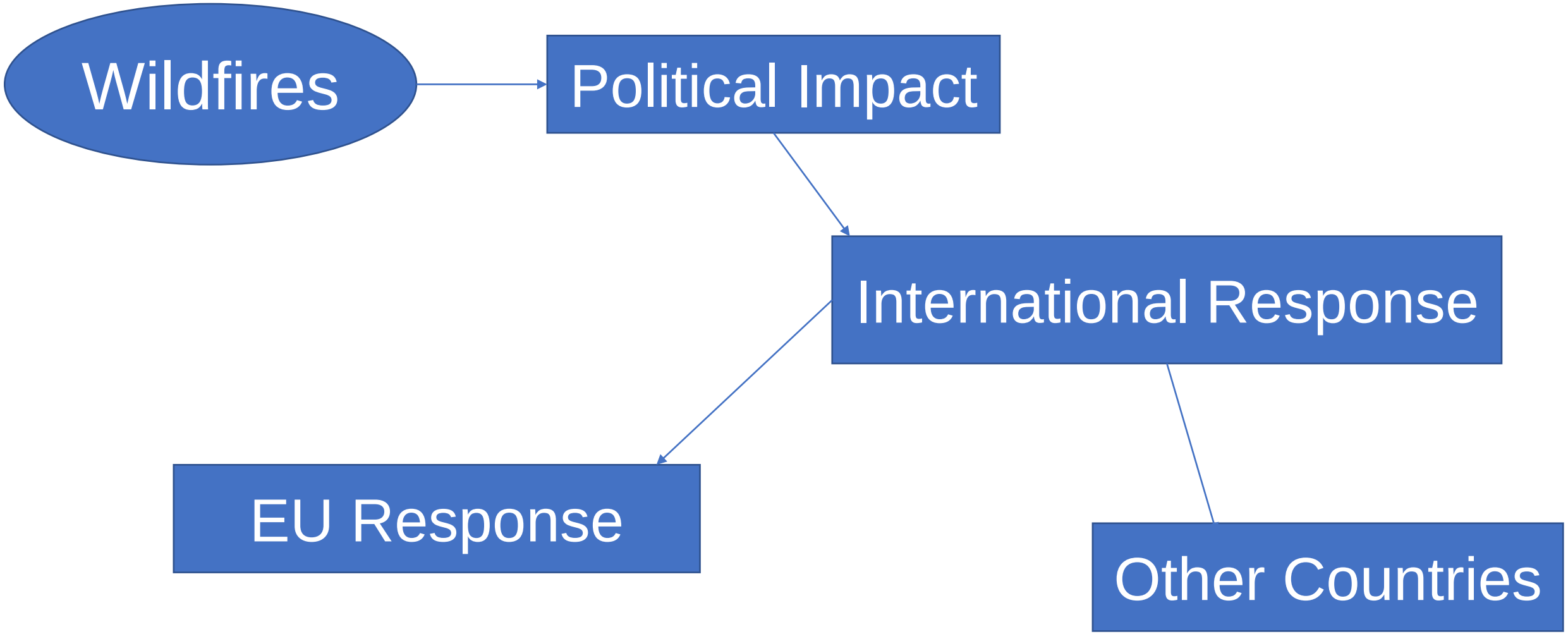
- Brainstorming/concept mapping different aspects of the topic
- Read to gain background information and a better understanding of the topic
- Develop a focused research question
- Revise your research question, if necessary, as you proceed with your research.

Concept mapping

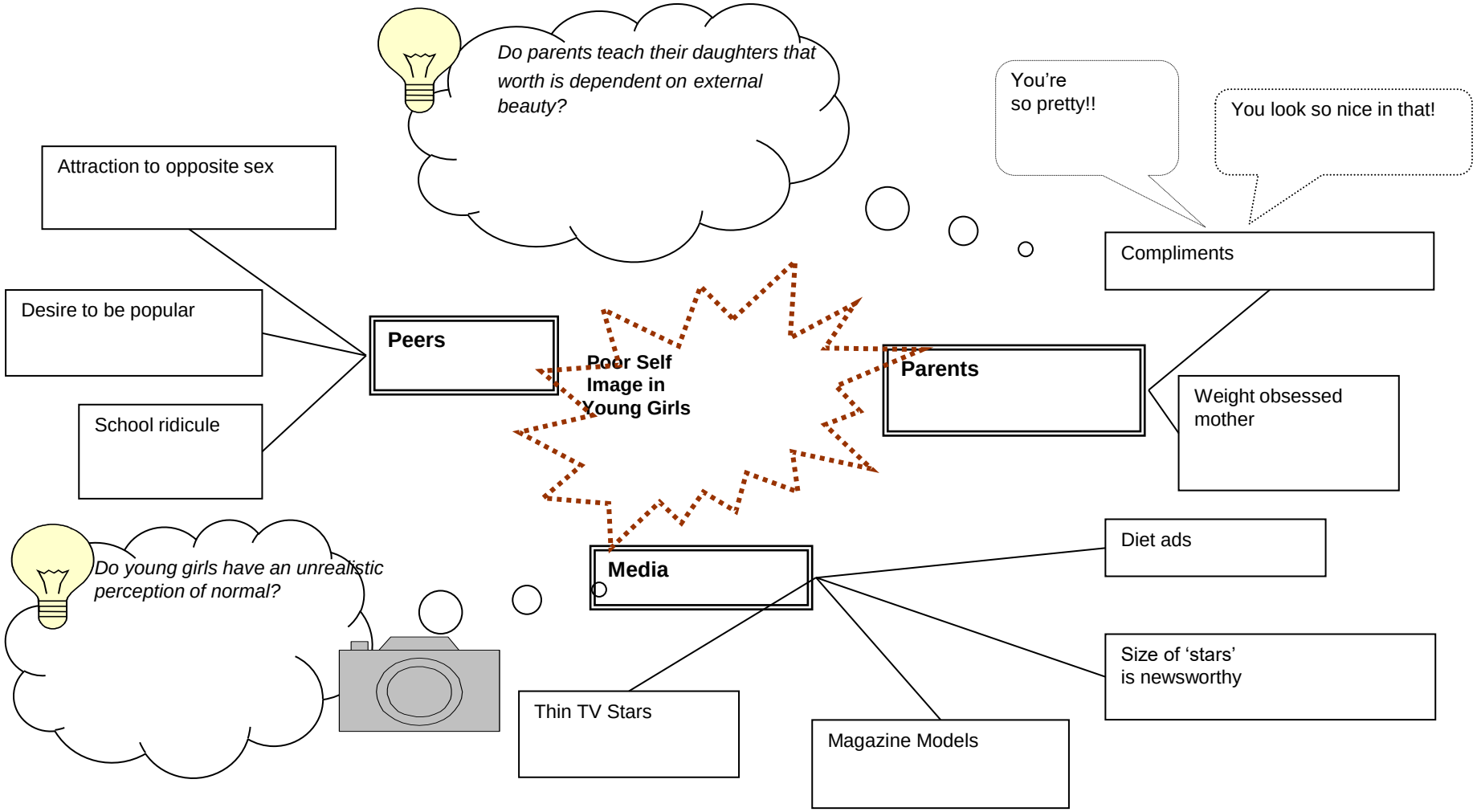
- You have been asked to research an issue related to dreadful events. Make a start by putting **Wildfires** in the middle of your graphic organiser and then come up with ideas related to this topic.


Causes
Economic Impact
Social Impact
Wildfires
Political Impact
Physical Impact


Wildfires
Redevelopment
Political Impact
International Response
Lack of preventive measures


Wildfires
Political Impact
International Response
EU Response
Other Countries

The Concept Map Revisited



O'Leary, Z. (2004) The Essential Guide to Doing Research. London: Sage. Chapter Three

The Research Questions

Consider narrowing, clarifying, and redefining questions if necessary

Getting the research questions right could be seen as a process that is informed by reading

Cycles of Research Question Development

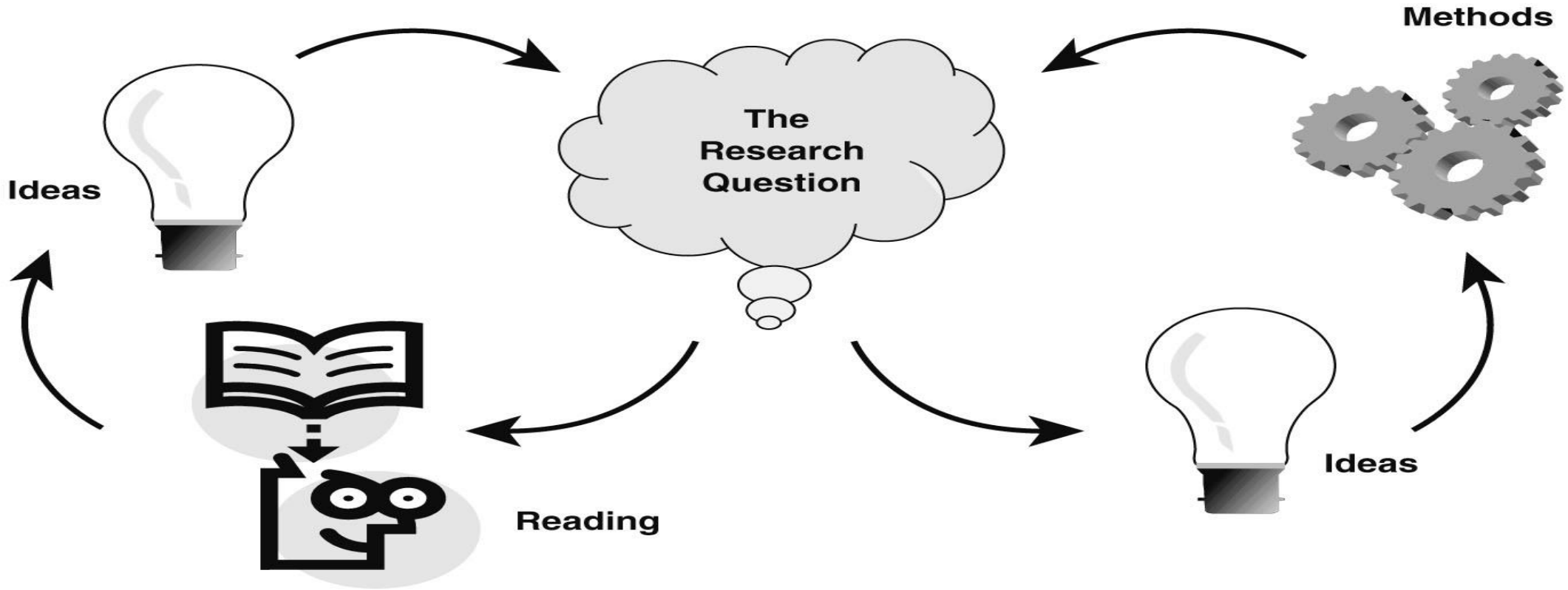


FIGURE 3.4 CYCLES OF RESEARCH QUESTION DEVELOPMENT

Effective Research Questions

- Avoid questions with yes or no answers.
  - –Should the United States/Europe help other countries when disasters occur?
- Avoid questions that are too broad.
  - –How should Europe assist in disaster relief and management?
- Avoid questions that are too narrow.
  - –How much money per year is required for disaster relief worldwide?

Your Research Questions

- State the general topic: …….
- Narrow down the focus: ……..
- Research questions (complete the following three RQs)

    What?

    Why?

    How?

A hypothesis

- Written by the researcher to **explain** the phenomenon of interest.
- The researcher's **prediction** of the relationship that exists among the variables being investigated.
- stated **before** collecting the data

If you wrote a research question, the hypothesis will be your **tentative** answer to your question.

Framing Hypothesis

- typically phrased as "**if-then**" statements.

Example: ***If*** people exercise for 30 minutes per day at least three days per week, ***then*** their cholesterol levels will be reduced."

- This hypothesis makes a **prediction** about the effects of exercising on levels of cholesterol, and the prediction can be **tested** by gathering and analysing data.

Null Hypothesis

The *null hypothesis* always **predicts** that there will be ***no*** differences between the groups being studied

1. Non Directional Null Hypothesis

- There is no statistically significant difference between two groups on variable x (as represented by their mean scores).
- There is no statistically significant relationship between variable x and variable y.

2. Directional Null Hypothesis

- Group A will not have a higher mean score than Group B.
- There is no positive relationship between variable x and variable y.

- H_1: Masters students from different subject specialisms will hold significantly different levels of knowledge of climate change.

- H01: There will be no statistically significant difference between the levels of knowledge of climate change held by Masters' students of different subject specialism.

- H2: Masters students aged 25 and under will hold significantly different attitudes towards climate change than Masters students aged 26 and over.
- H02: There will be no statistically significant difference between Masters students aged 25 and under, and 26 and over on the attitudes towards climate change scale.

- H3: Masters students' knowledge of climate change will correlate significantly with their attitude towards climate change.
- H03: There will be no statistically significant correlation between the knowledge of and attitudes towards climate change held by Masters' students.

Bibliography and further reading

- Cohen, L., Manion, L., & Morrison, K. (2017). Research Methods in Education (8th ed.). Routledge. https://doi.org/10.4324/9781315456539
- Sukamolson, S. (2007). Fundamentals of quantitative research. *Language Institute Chulalongkorn University*, *1*(3), 1-20.
- The Scientific Method: Steps, Terms & Examples. (2013, January 29). Retrieved from https://study.com/academy/lesson/the-scientific-method-steps-terms-examples.html.
- O'Leary, Z. (2004) The Essential Guide to Doing Research. London: Sage.