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IT3010

Empirical research methodologies in IT and digitalization

Overview of research strategies

January 25, 2022

Babak Farshchian

Learning goals

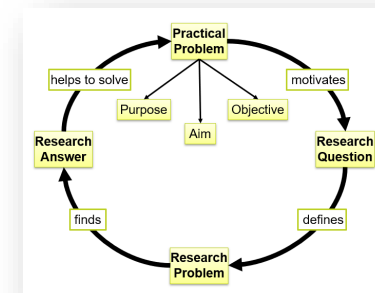
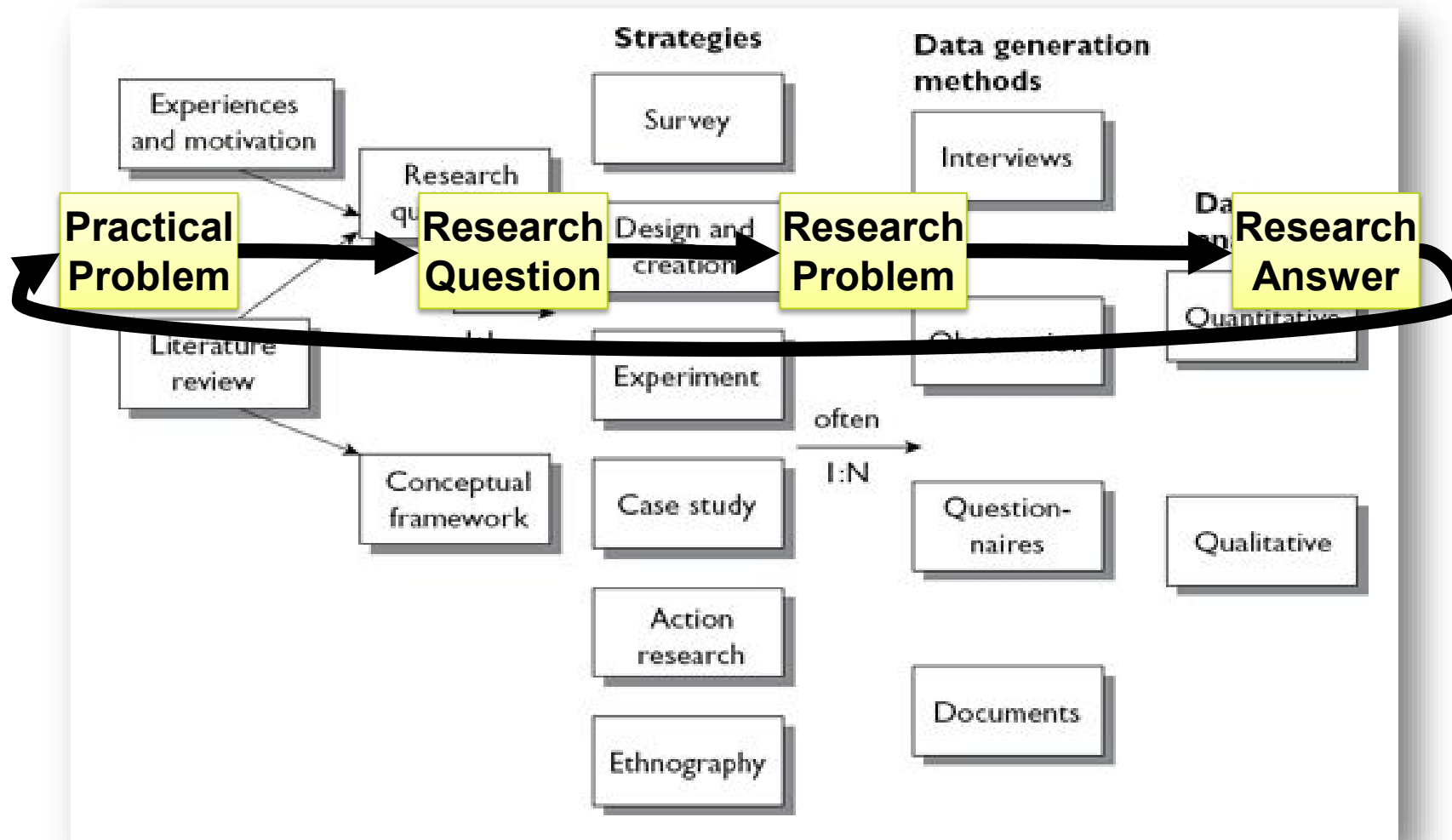
1. Designing an empirical research project in IS/SE/CS.
 1. Distinguish between IS, SE, and CS research fields.
 2. Understand the meaning of empirical research.
2. Writing research objectives/purpose for an IS/SE/CS research project.
3. Formulating research topics and questions for an IS/SE/CS research project.
4. Describing research contributions for an IS/SE/CS research project.
5. **Understanding various research strategies, and how and when to use/not use each in an IS/SE/CS research project.**
6. Understanding various data generation tools, and how and when to use/not use each in an IS/SE/CS research project.
7. Data analysis.
8. **Evaluating empirical research.**
9. Research ethics.
10. Presenting research.

IS = Information Systems
SE= Software Engineering
CS= Computer Science

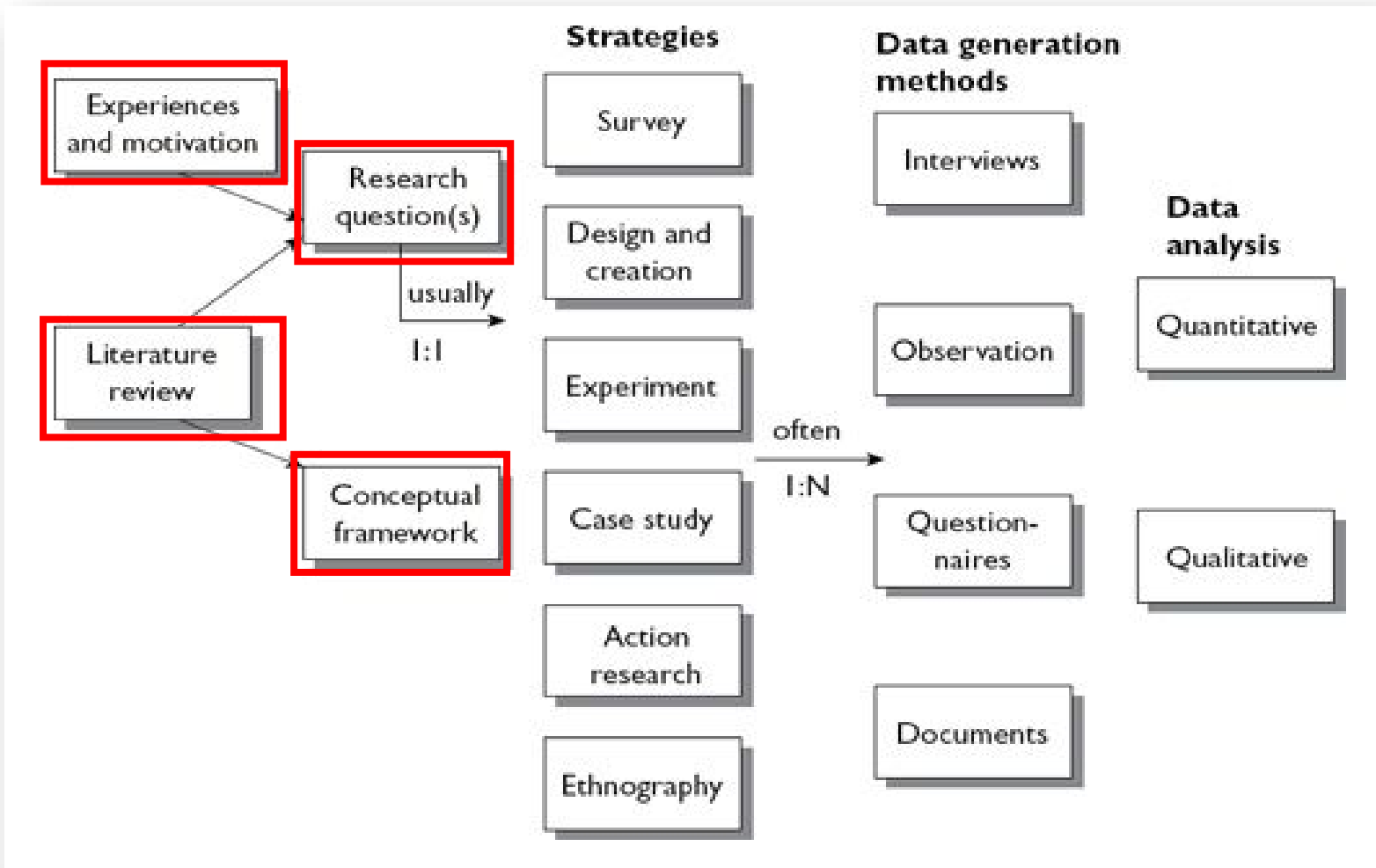
Agenda

- 1- Research design framework recap.
- 2- The strategy circumplex.
- 3- Locating a research question.
- (Break 15 minutes)
- 4- Characteristics of the different strategies.
- 5- Choosing a research strategy.
- 6- Research paradigms: Introduction.
- 7- Questions.

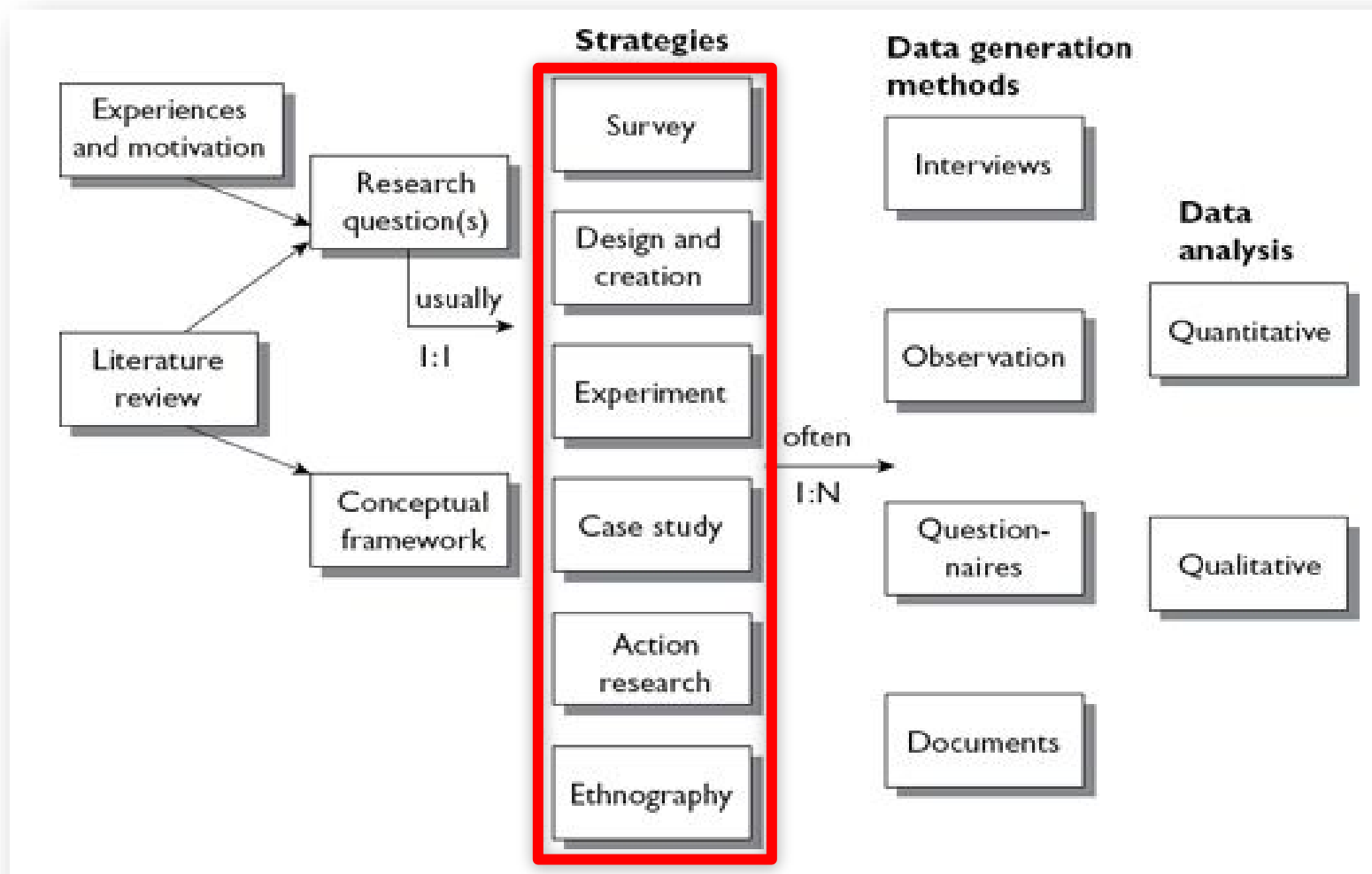
A research design framework



In last lecture



In this lecture



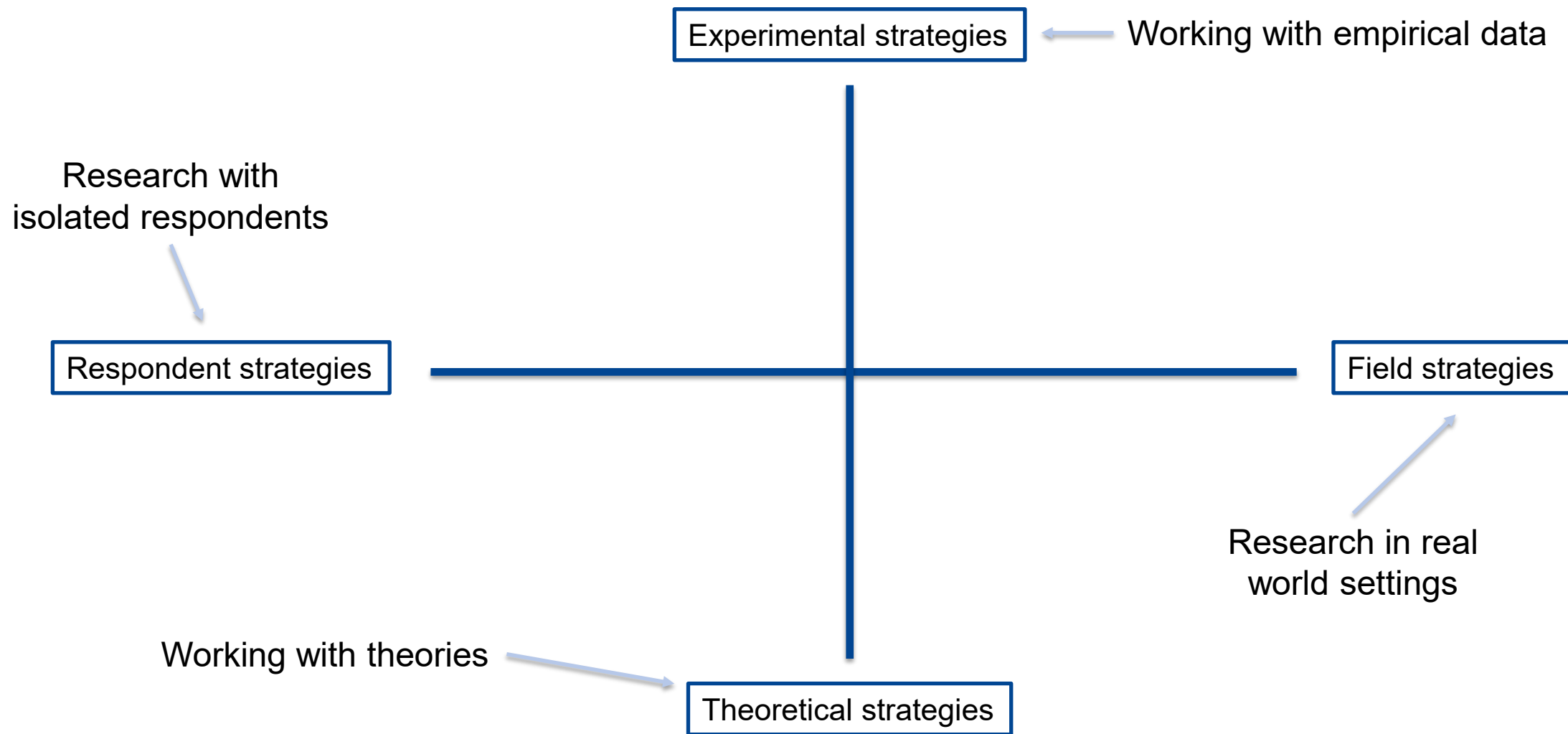
Rigorous research questions should

- Be focused,
- Drive the right research strategy and design,
 - Case study, design and creation, survey,....
- Drive the management of the research project,
 - Needed time,
 - Needed resources,
 - Inherent dependencies on others.
- Identify the right paradigm,
 - Positivist, interpretive, critical.

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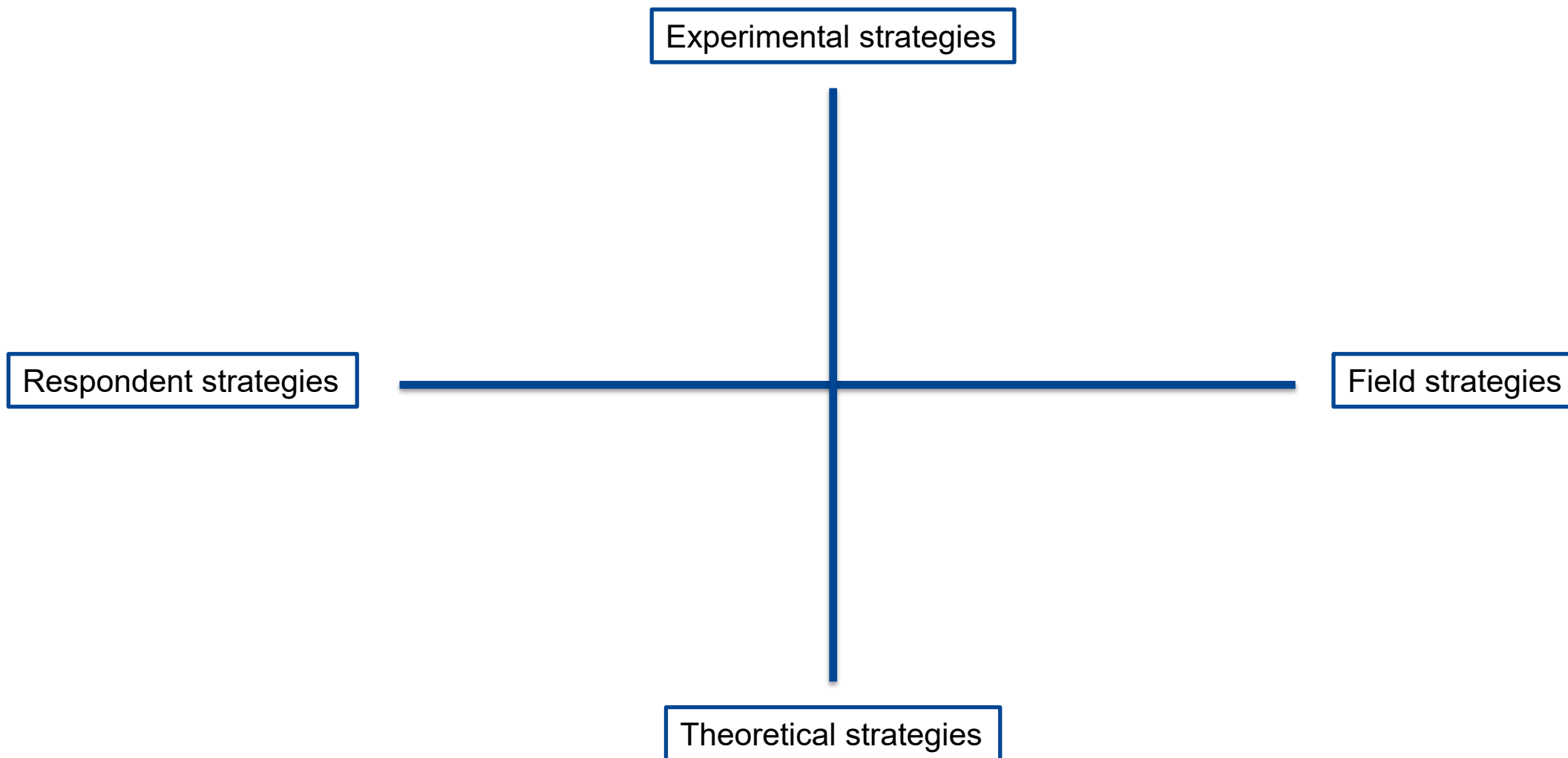
The strategy circumplex



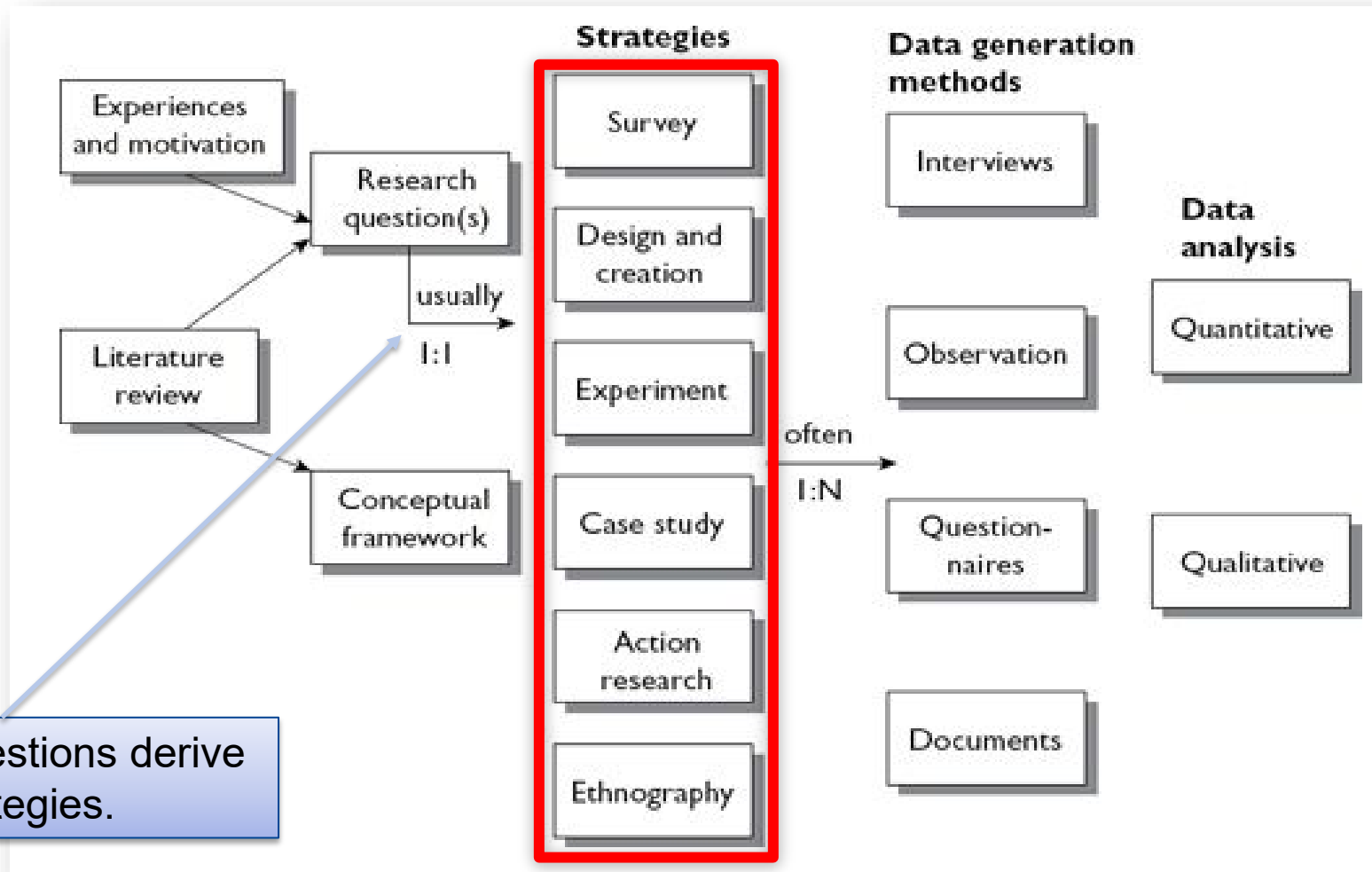
Locate the research question

- Breakout rooms, 10 minutes.
- Choose one of the following research questions:
 1. (Groups with odd numbers) What is the perceived effect of online meetings on study productivity among NTNU students?
 2. (Groups with even numbers) What are the attitudes of Norwegian adolescents towards Covid-19 contact tracking apps?
- Discuss the question with respect to the strategy circumplex and decide where you believe it belongs.
- Write or draw your decision and add a short justification.
- If you want, you can add it to Padlet.

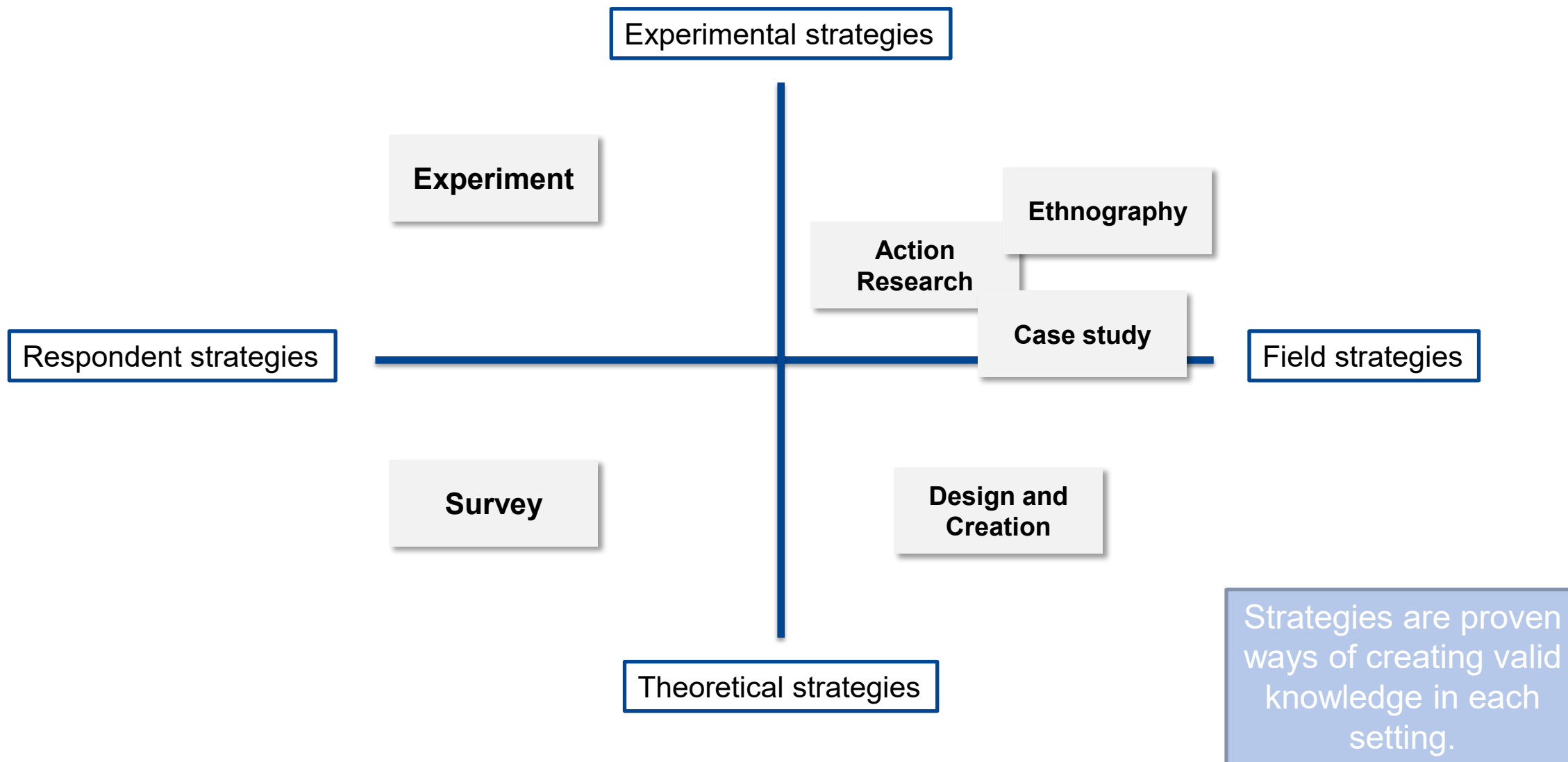
Locate the research question



Research strategies



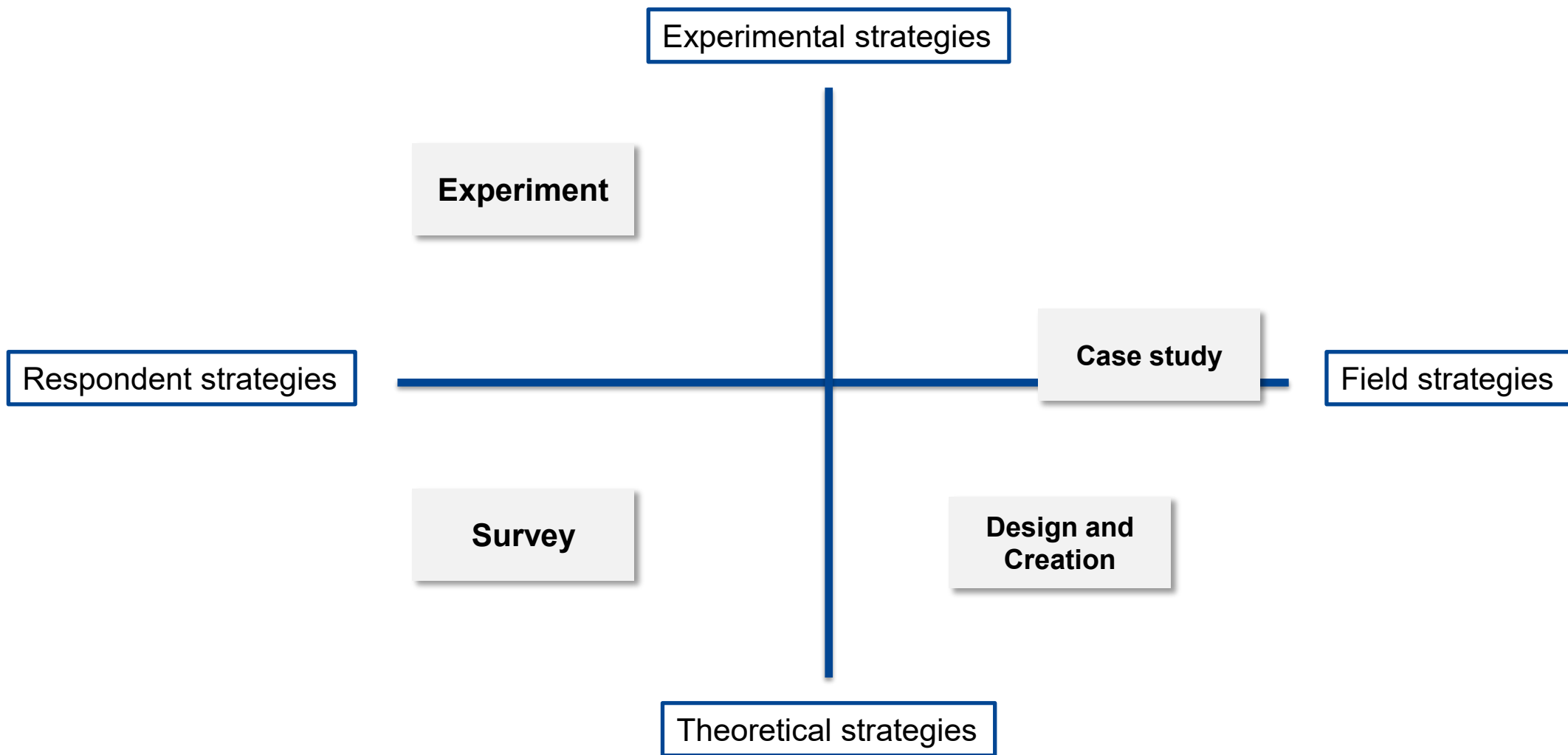
Research strategies



Agenda

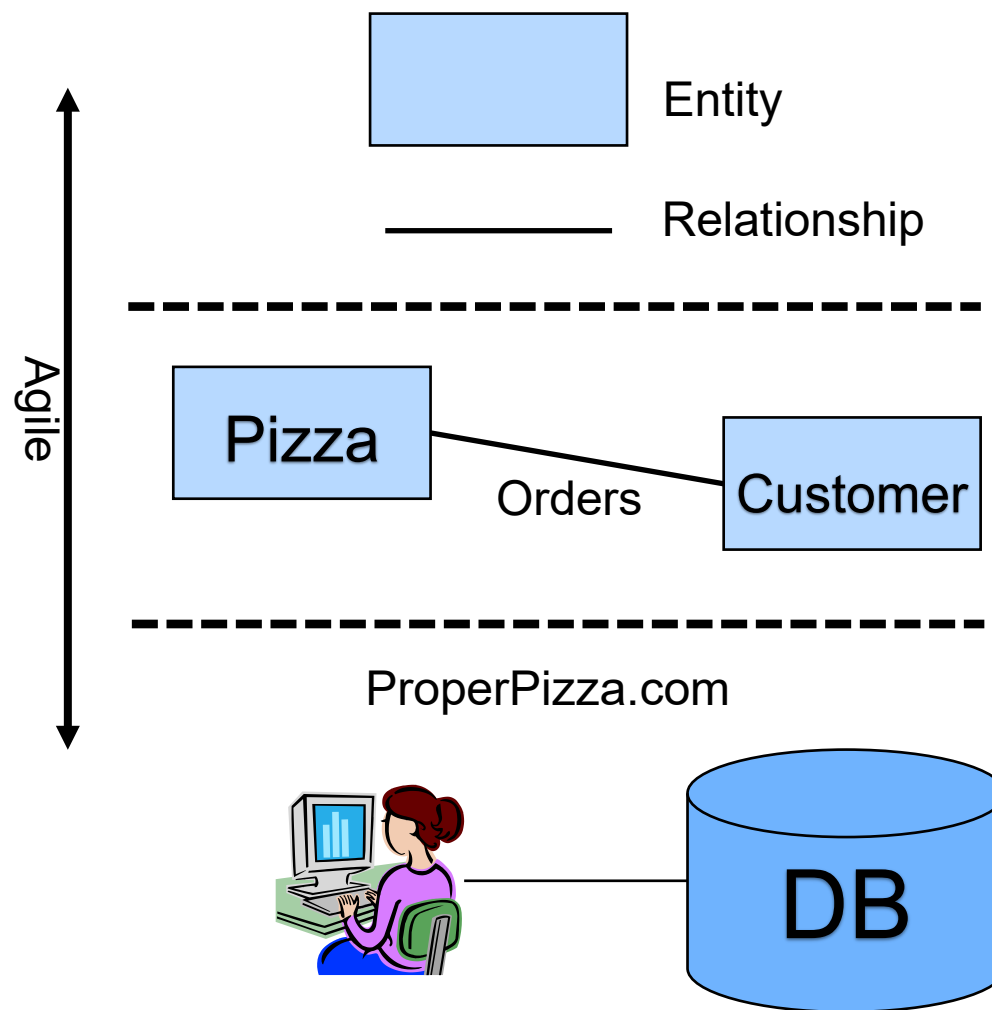
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Research strategies



Design and creation

- Research strategy where designing IT solutions is the focus.
- Different outcomes:
 - **Constructs:** Vocabulary for an IT-related domain.
 - **Models:** Description of phenomena using the vocabulary.
 - **Instantiations:** Working systems that are used as proof-of-concept to illustrate that produced constructs, models and methods are useful.
 - **Methods:** Processes and steps to follow in order to solve problems in the domain.
- Important to focus on creating new knowledge about these outcomes!

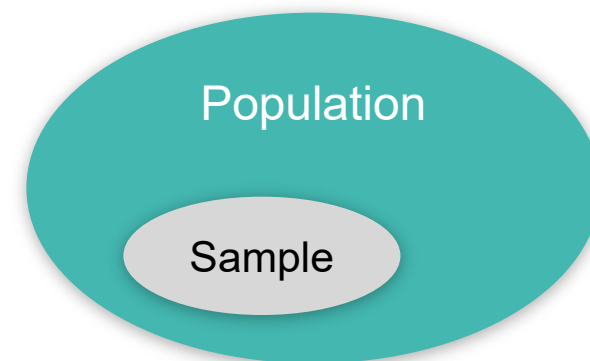


Design and creation

- What is the role of the **IT artifact** in my research?
 - The main focus of the research
 - E.g. a novel mobile Pizza order application using Big Data.
 - Research domain: Computer science (and Big Data).
 - A vehicle for something else
 - E.g. learning about mobile commerce in a population.
 - Research domain: Information systems (and mobile commerce).
 - A tangible outcome of a process, where the process is my focus
 - E.g. learning about how agile methods work when developing mobile apps.
 - Research domain: Software engineering (and agile methods).
- In any case: if you build a system, you need to document the process and what you learned from it, i.e. **the new knowledge**.

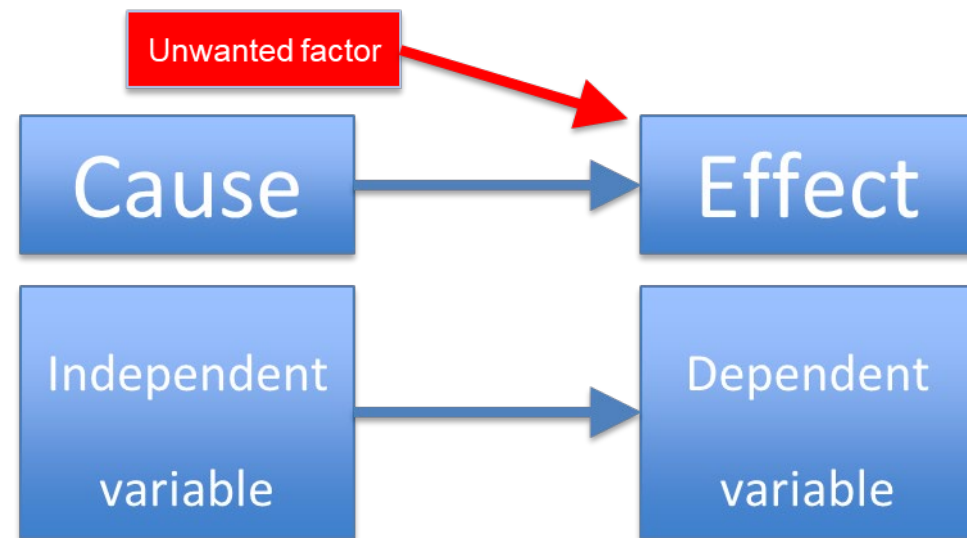
Survey

- Based on the concepts of a **population** and a **sample**.
- Assumption: The patterns in data collected from a sample can be generalized (statistically) to the whole population.
- An array of sampling strategies.
- Generalization through statistical analysis.
- Collecting structured data:
 - Often this means testing an existing hypothesis or theory.
- E.g.
 - What do NTNU students think about the effect of **online meetings** on study **productivity**?
- Does not need to be about human subjects, e.g.:
 - What does the literature say about online meetings and student productivity



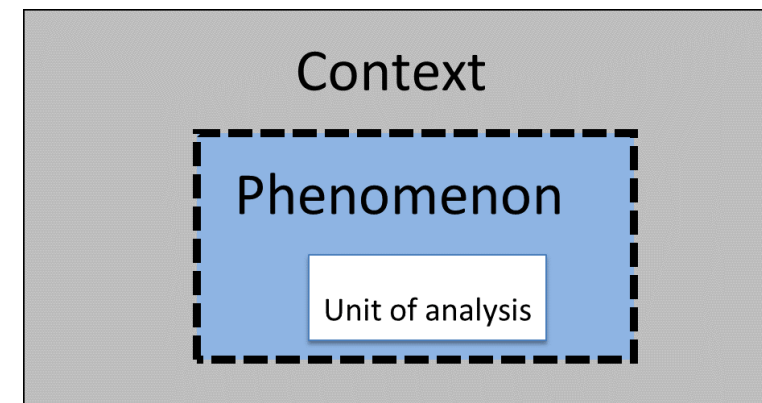
Experiment

- A strategy that investigates **cause and effect** relationships.
- Tries to prove or disprove that a cause and effect **hypothesis** is true:
 - "A causes B", "A increases B's occurrence", "A eliminates B".
- E.g.:
 - Online meetings lead to decreased study productivity among students.
- Should control unwanted factors:
 - E.g. via large samples, control groups, exclusion criteria...

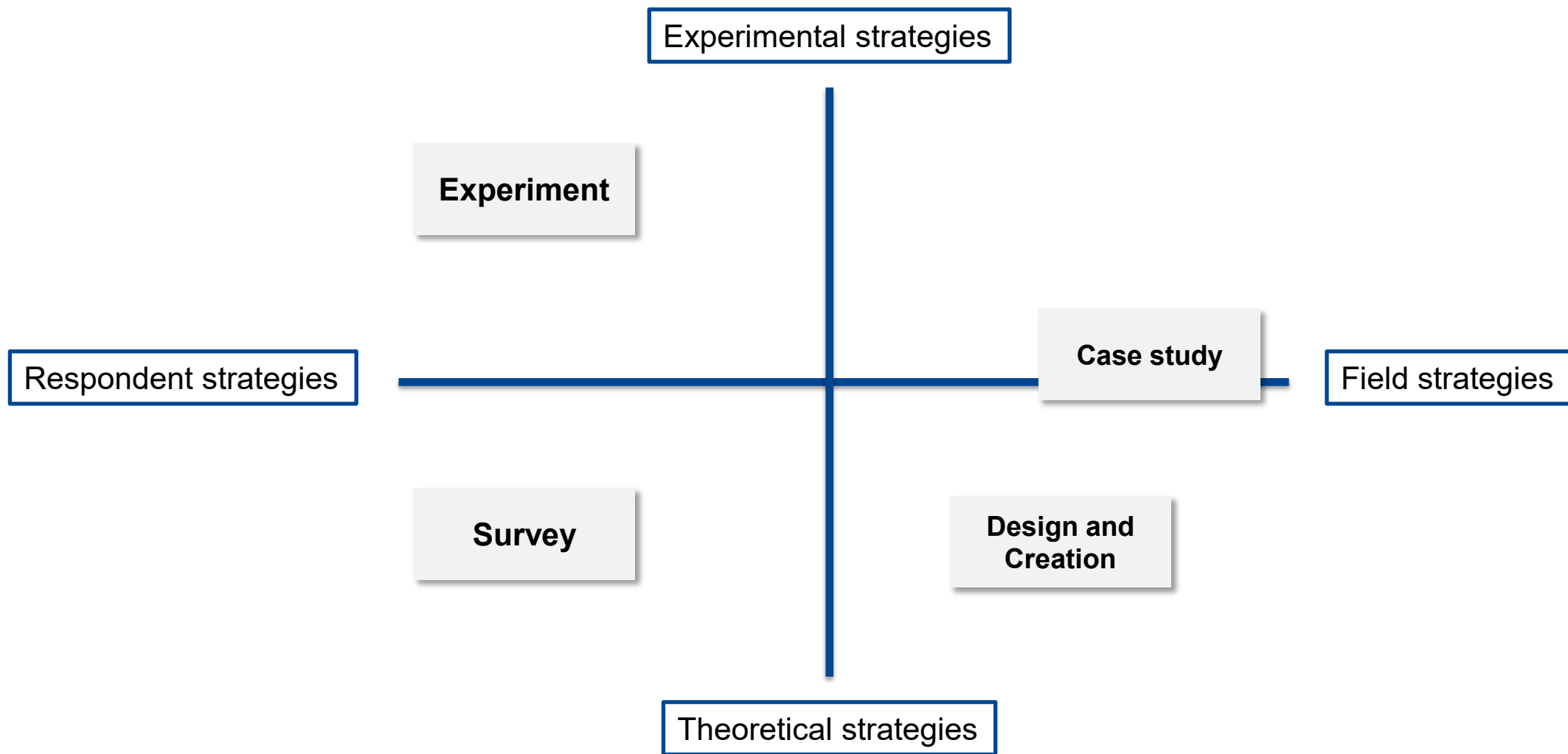


Case study

- Focus on one **real-world** instance (case) of the 'thing' that is to be investigated:
 - Generating in-depth data,
 - Using multiple data generation methods,
 - The goal: A rich and detailed description of the thing and its relationships and processes.
 - Good strategy for understanding complex phenomena.
- E.g.:
 - How did IT3010 students at NTNU migrated to digital studying tools during the pandemic lockdown in 2020?
- As opposed to surveys and experiments where the goal is to eliminate complex relationships and focus on few parameters.



Research strategies



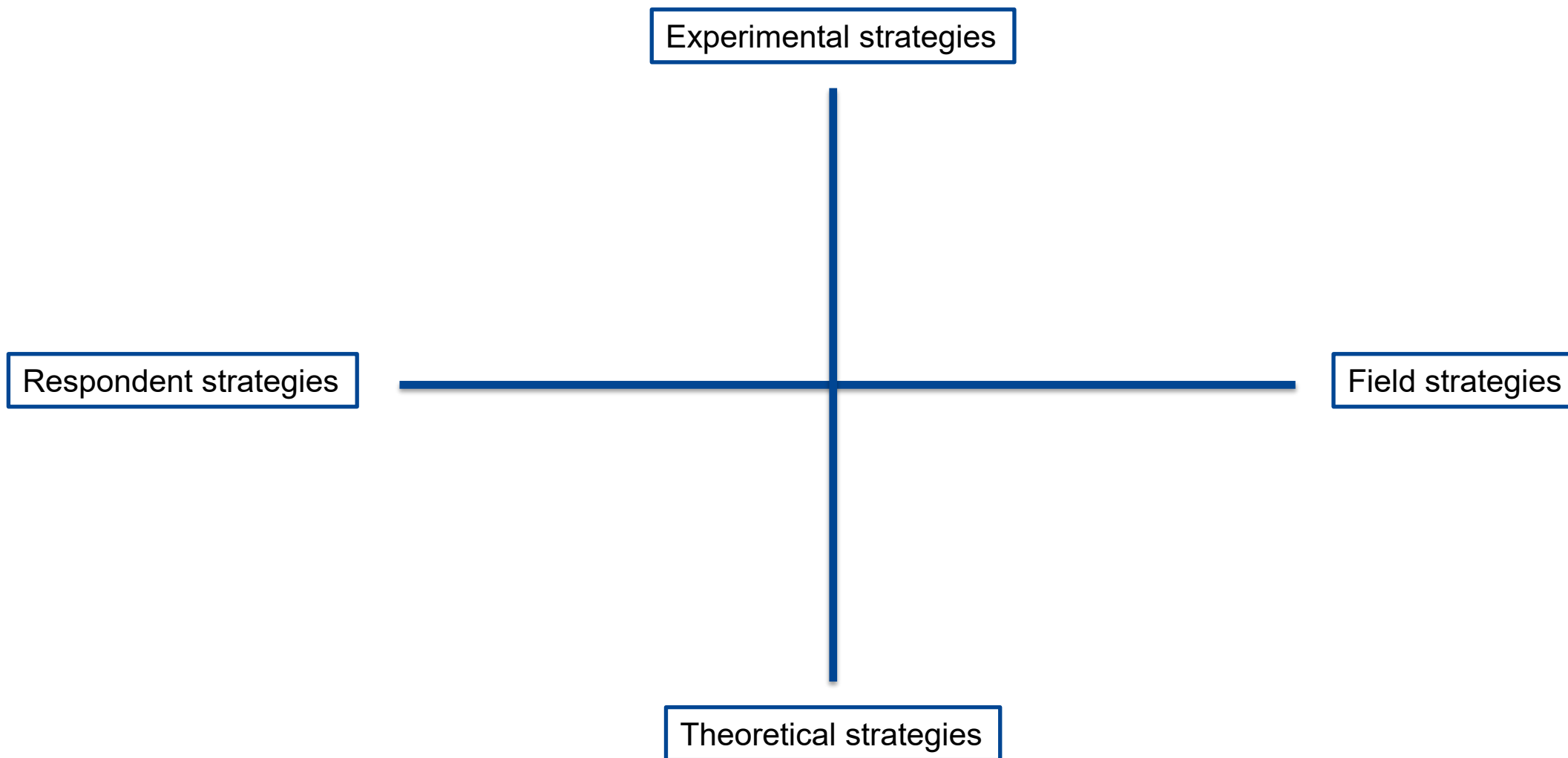
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Choosing a strategy

- Breakout rooms, 10 minutes.
- Choose one of the following research questions:
 1. (Groups with odd numbers) What is the effect of the app "Smittestopp" on the physical activity of its users?
 2. (Groups with even numbers) How does an efficient Covid-19 contact tracking app look like?
- Discuss the question and choose a research strategy that you believe is best suited for the question. (Did you find more than one candidate strategy?)
- Write down your decision and add a short justification.
- If you want, you can add it to Padlet.

Choosing a strategy



Watch out for guest lectures on specific strategies.

Online, live and on demand. Coming soon.

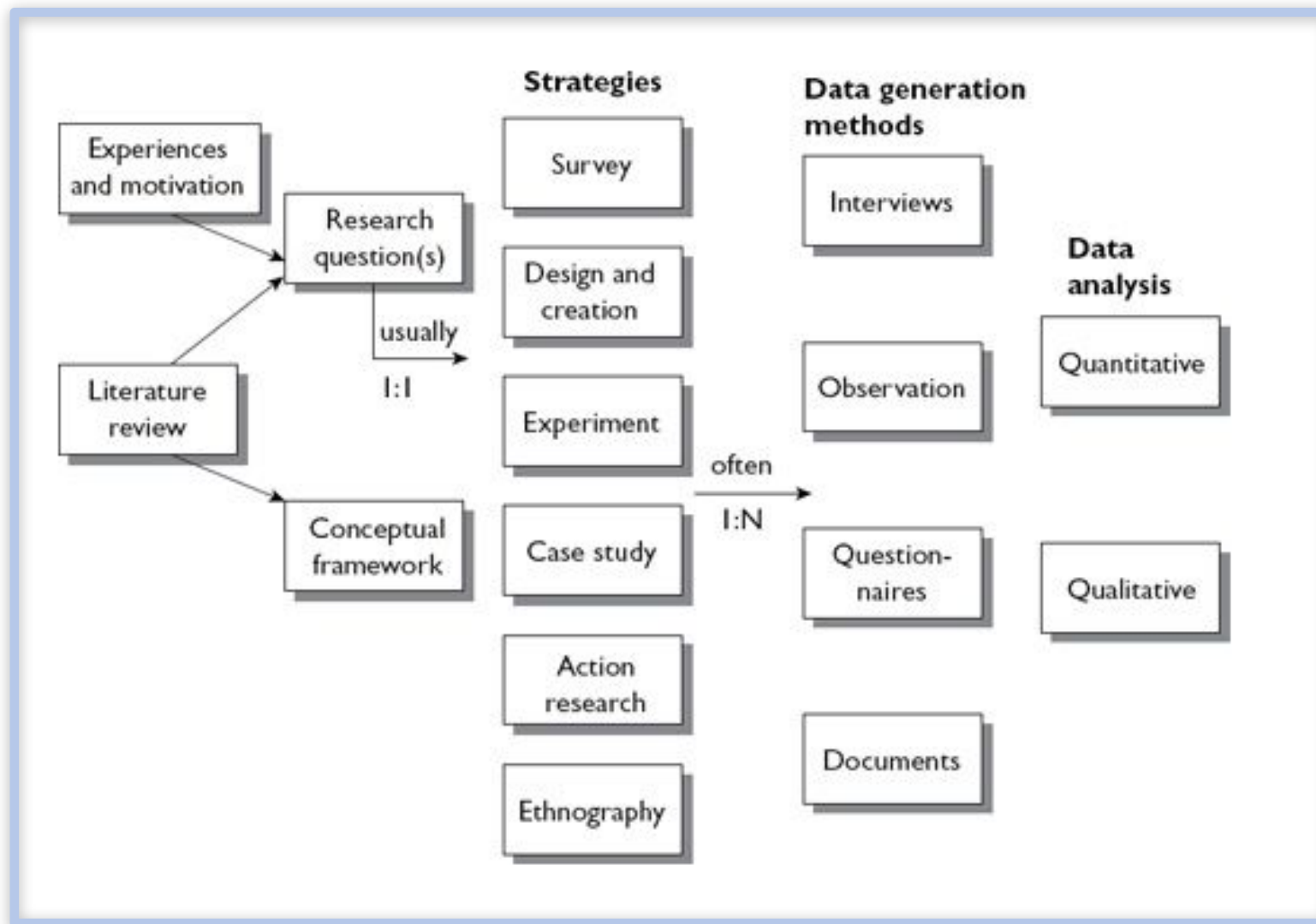
Reference group in IT3010

- Essential for improving the course for the future.
- Members to represent all the students taking the course.
- Duties:
 - Available to be contacted by students and help create a dialog with the teacher.
 - Participate in 3 meetings of max 1 hour each during the semester.
 - Contribute to the final evaluation report of 1-2 pages.
- One member from each group.
 - Dedicated Teams for the group with chat and video function.
 - Support for writing the final report.

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The research paradigm affects all our choices



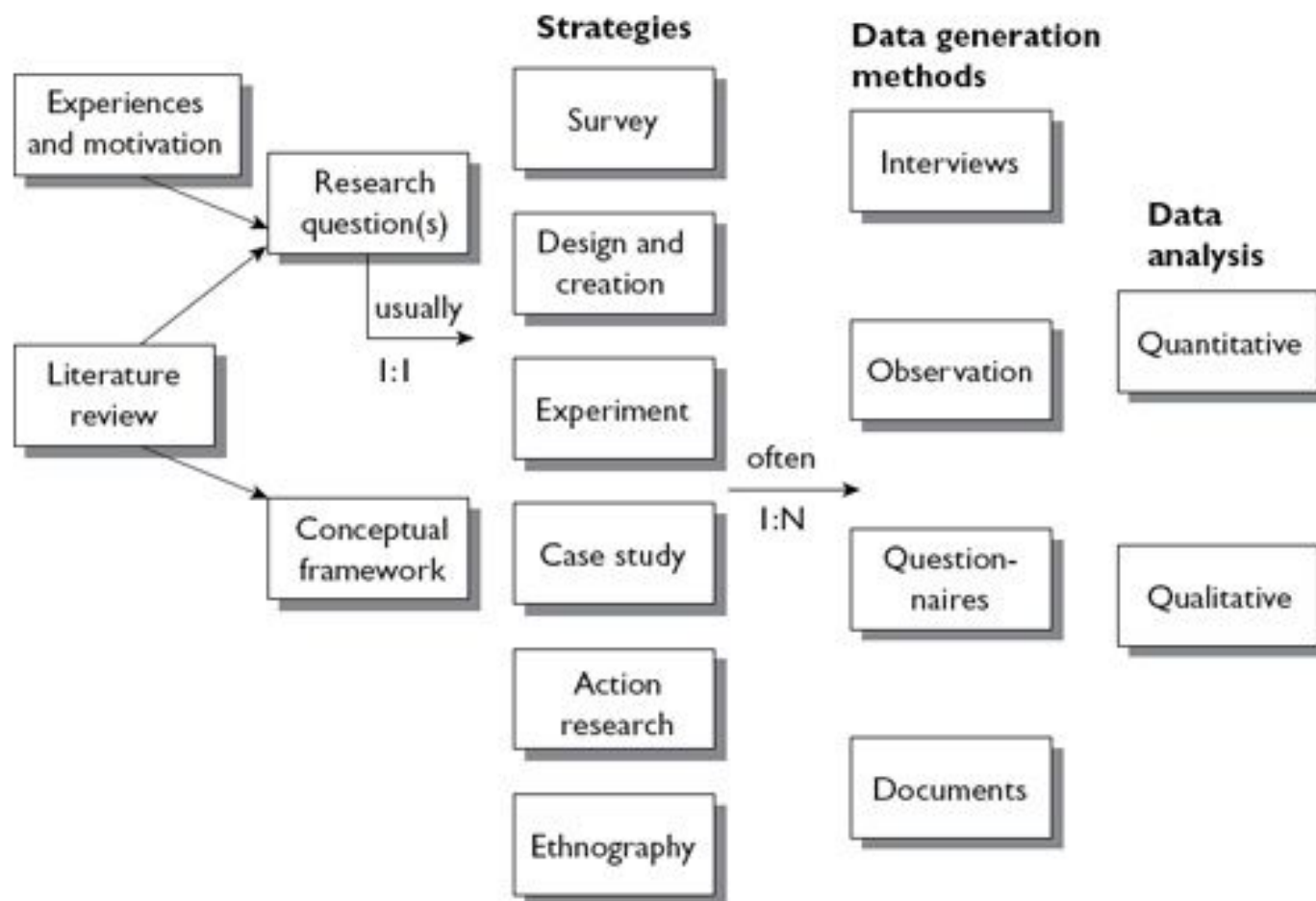
What type of person/
researcher are you?

- 1) Interested in facts?
- 2) Interested in complex social contexts?
- 3) Or maybe someone in between?

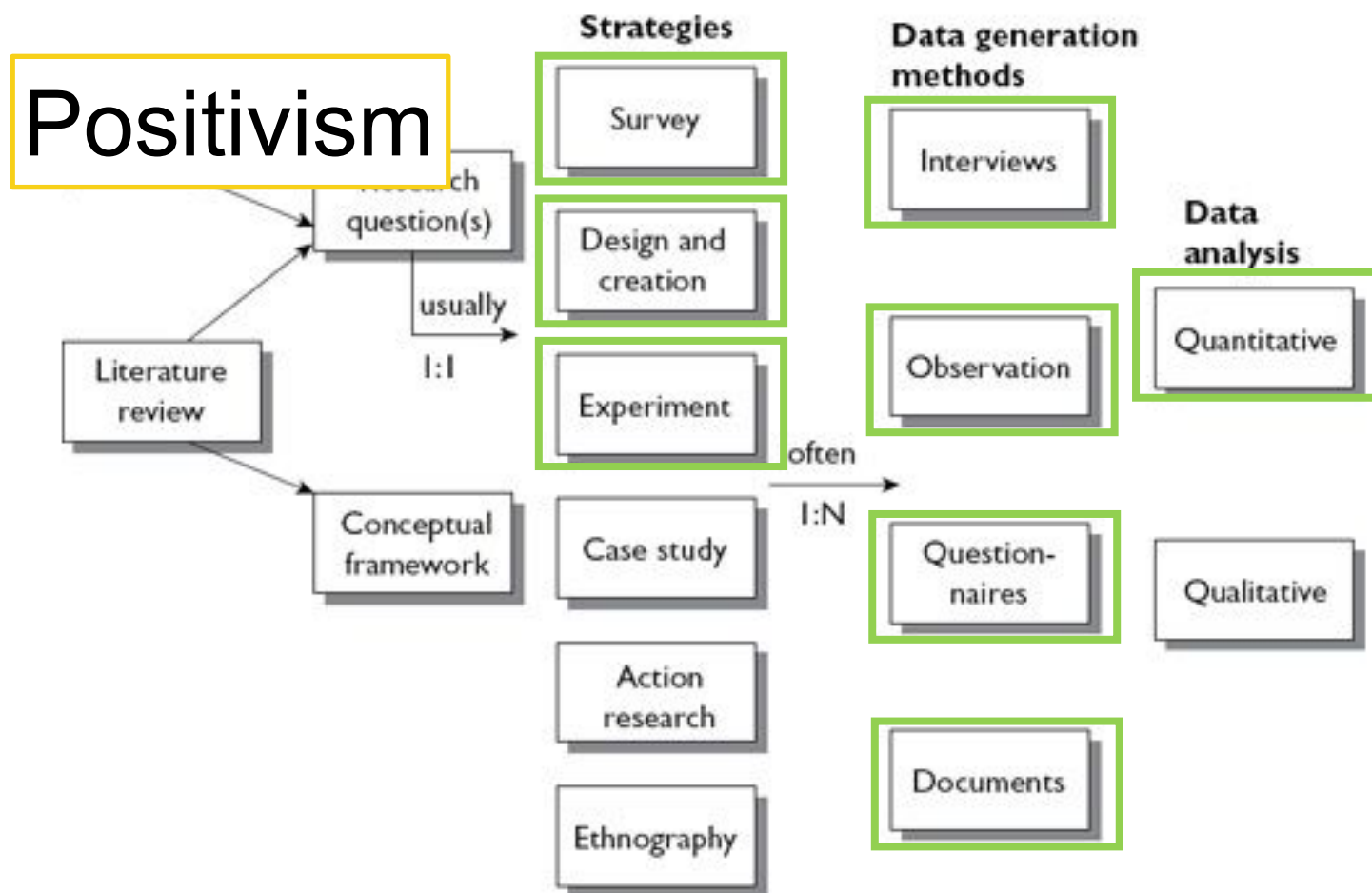
Main philosophical paradigms

- Positivism
 - We can investigate the world objectively through experiments.
 - Facts!
- Interpretivism
 - Everything is subjective. Concerned with understanding the social context of an information system.
 - There are many facts...
- Fundamental world views (**held by you as researcher**) that will affect research questions, strategy, data collection and analysis methods.

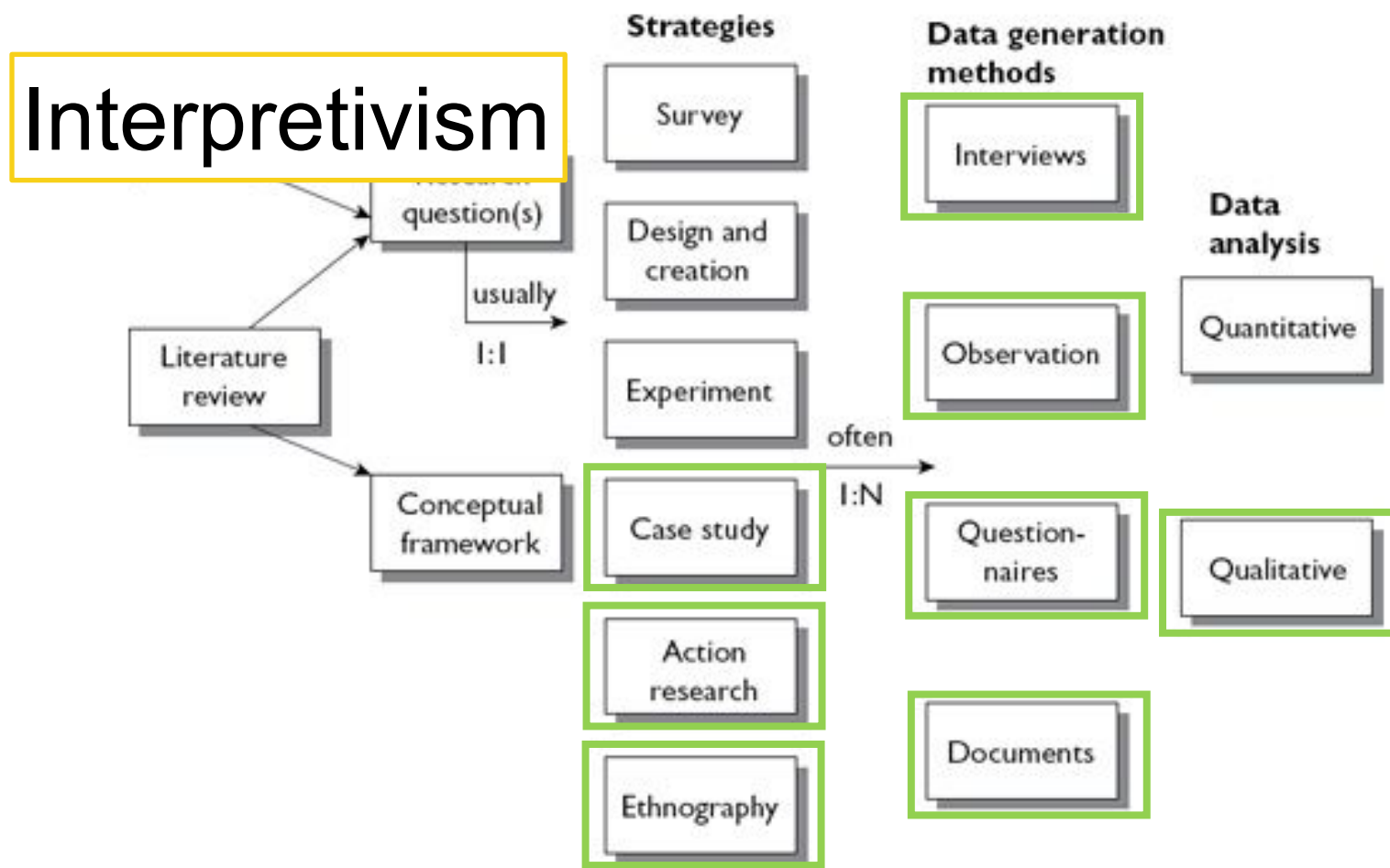
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Give us some quick feedback!

Use this fully anonymous form:

<https://nettskjema.no/a/240790>