TECHNOLOGY EVOLUTION

Etika Rekayasa

CREATIVITY

- The thinking process.
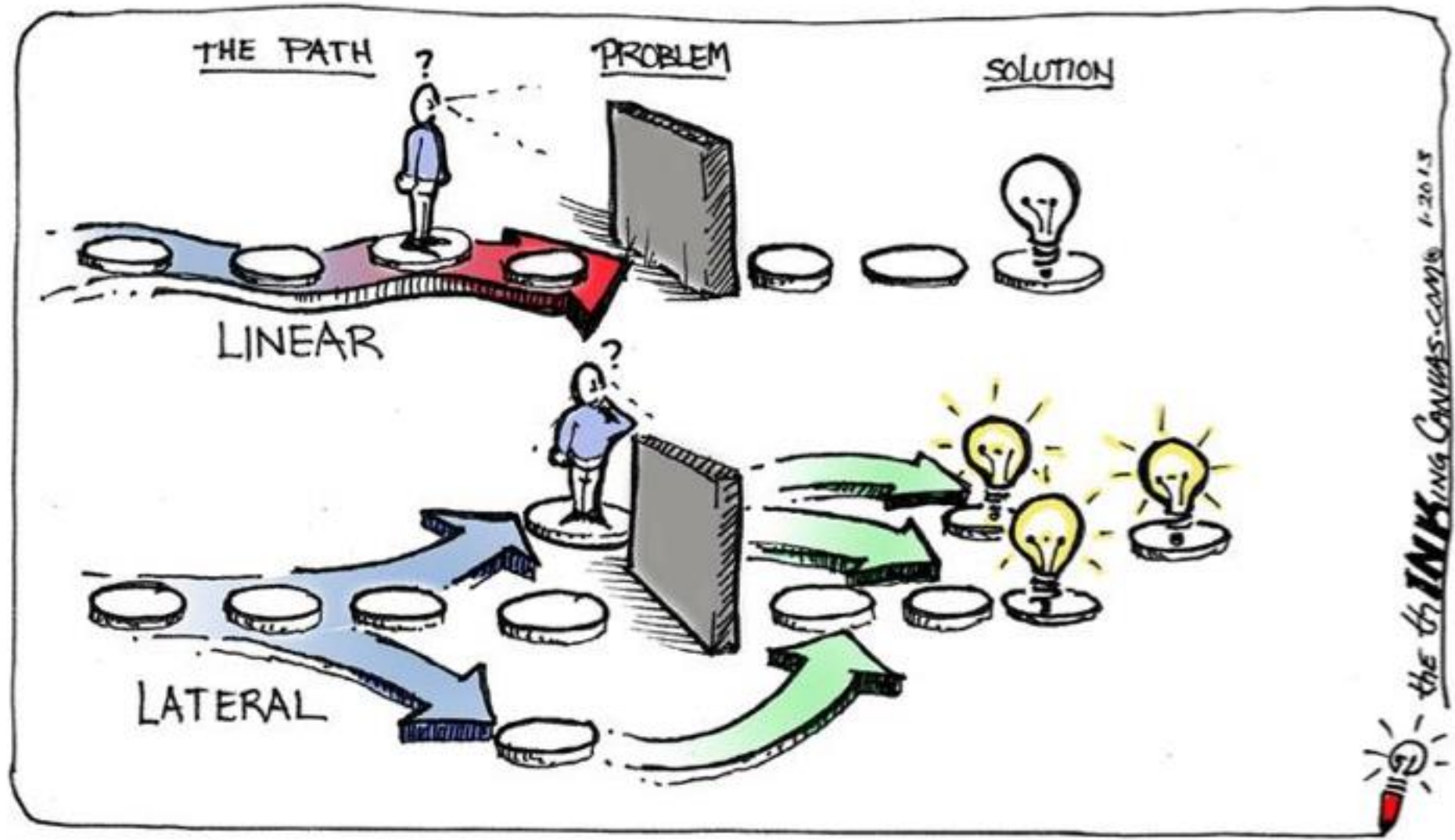- New viewpoint.
- Reconstruct and Rebuild .

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WHY DO WE NEED TO BE CREATIVE

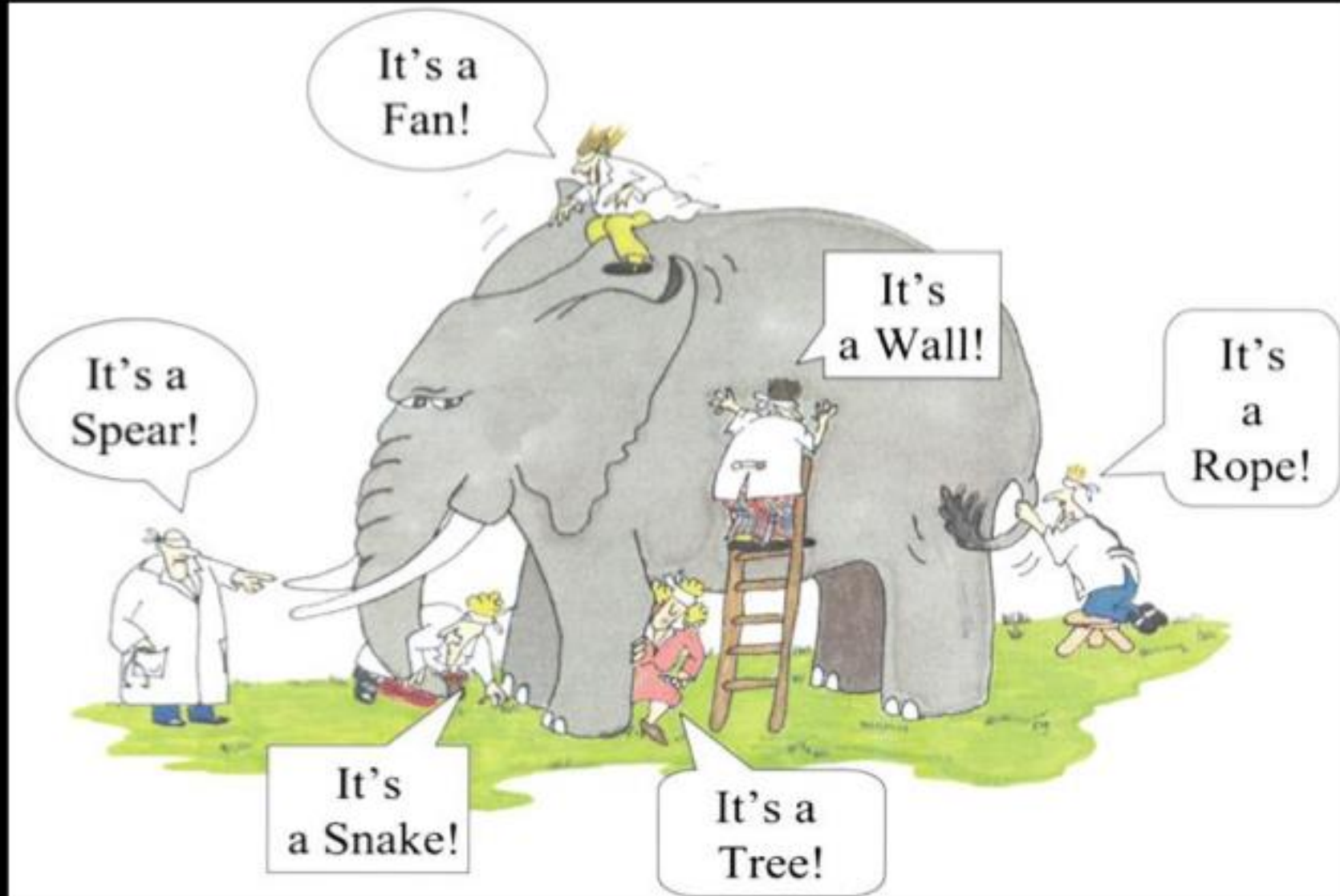Because past answers cannot overcome present problems.

Calvin & Hobbs

CRITICAL & CREATIVE THINKING

LOGIC

CREATIVE

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WORLD ECONOMIC FORUM FUTURE EDUCATION

Top skills (Fourth Industrial Revolution) in 2020

1. Complex Problem Solving.
2. Critical Thinking.
3. Creativity.
4. People Management.
5. Coordinating With Others.
6. Emotional Intelligence.
7. Judgment and Decision Making.
8. Service Orientation.
9. Negotiation.
10. CognitiveFlexibility.

http://www3.weforum.org/docs/WEF_Future_of _Jobs_2020.pdf

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WORLD ECONOMIC FORUM FUTURE EDUCATION

UMN
UNIVERSITAS
MULTIMEDIA
NUSANTARA

in 2025

1. Analytical thinking and innovation.
2. Active learning and learning strategies.
3. Complex problem-solving.
4. Critical thinking and analysis.
5. Creativity, originality and initiative.
6. Leadership and social influence.
7. Technology use, monitoring and control.
8. Technology design and programming.

9. Resilience, stress tolerance and flexibility.
10. Reasoning, problem-solving and Ideation.
11. Emotional intelligence.
12. Troubleshooting and user experience.
13. Service orientation.
14. Systems analysis and evaluation.
15. Persuasionandnegotiation.

http://www3.weforum.org/docs/WEF_Future_of _Jobs_2020.pdf

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CRITICAL THINKING

Critical thinking is the ability to think clearly and rationally about what to do or what to believe.

- Understand the **logical connection**s between ideas.
- Identify, construct and evaluate **arguments.**
- Detect **inconsistencies** and common mistakes in reasoning.
- Solve problems **systematically.**
- Identify the **relevance** and **importance** of ideas.

Dr. Joe Lau - https://philosophy.hku.hk/think/

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?

WHY?

CRITICAL THINKING

- **Critical thinking** is not a matter of accumulating information.

- **Critical thinking** should not be confused with being argumentative or being critical of other people.

- Although **critical thinking** skills can be used in exposing fallacies and bad reasoning, critical thinking can also play an important role in cooperative reasoning and constructive tasks.

Dr. Joe Lau - https://philosophy.hku.hk/think/

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INNOVATION

- Way to get better.
- Applied.

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PULL TAB
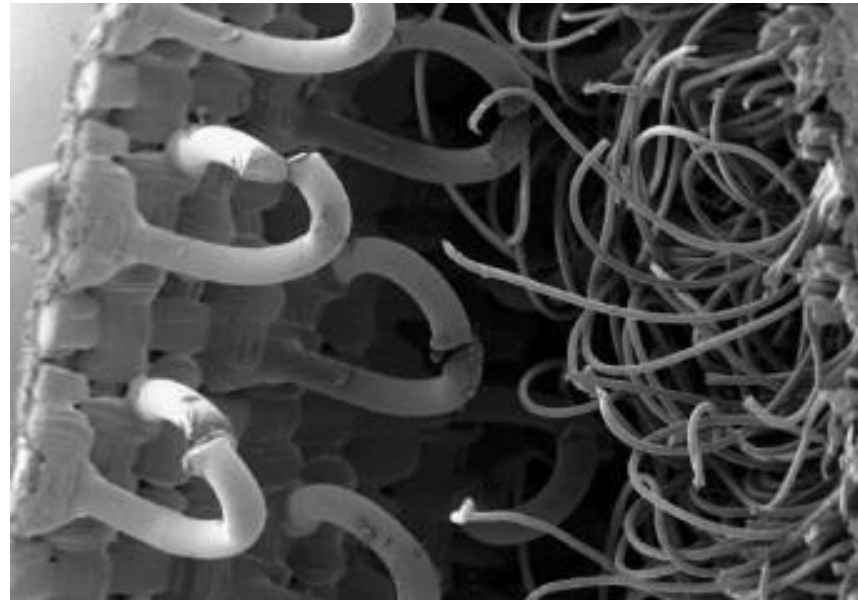
Ermal Fraze (1959)

Mengubah industry makanan dan minuman.

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Seed of Burdock

Discovery of Velcro

RESEARCH

Scientific

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RESEARCH

Analysis and
Conclusion

Implementation and
Data Collection

Hypothesis
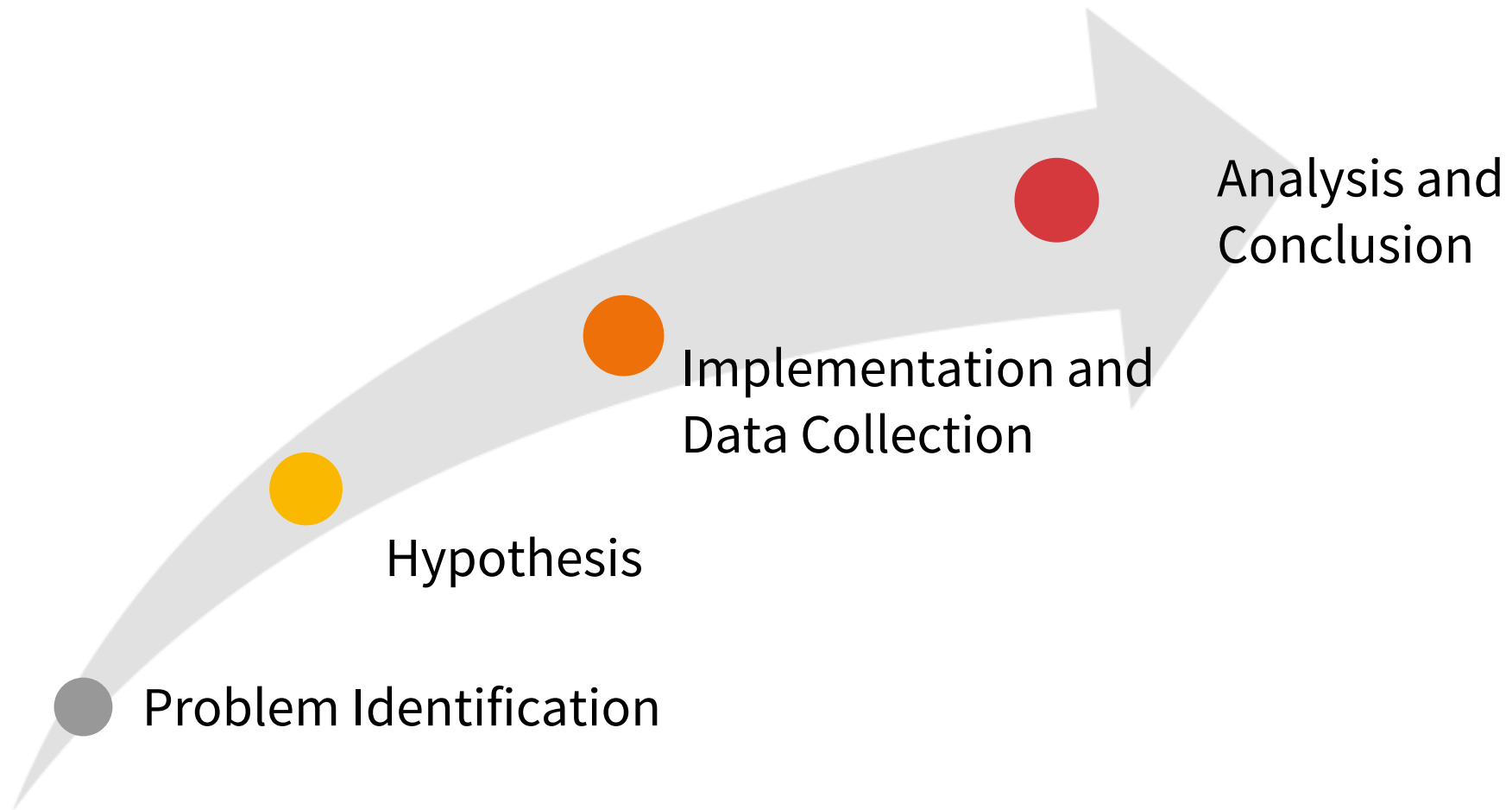
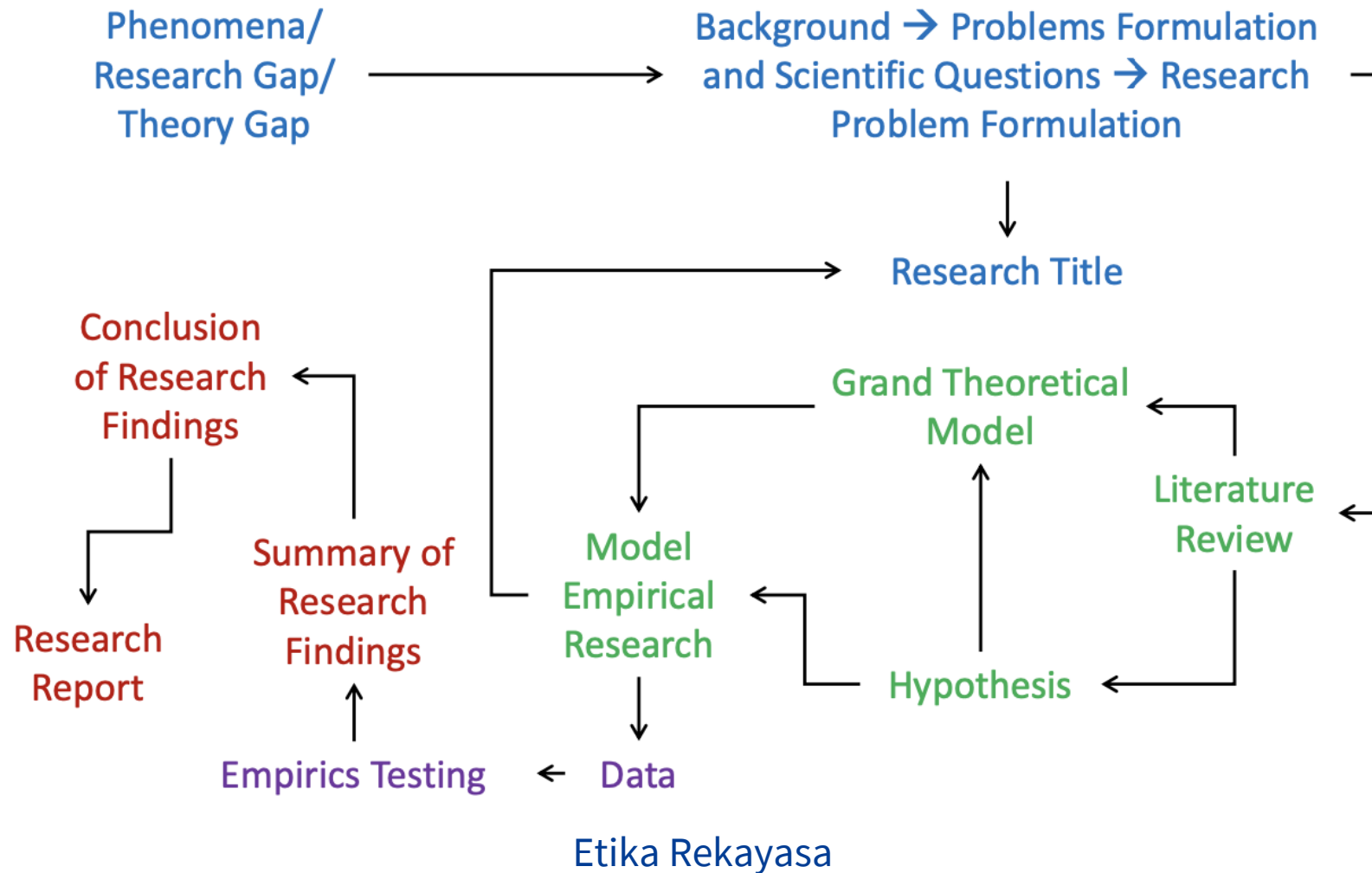Problem Identification

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RESEARCH

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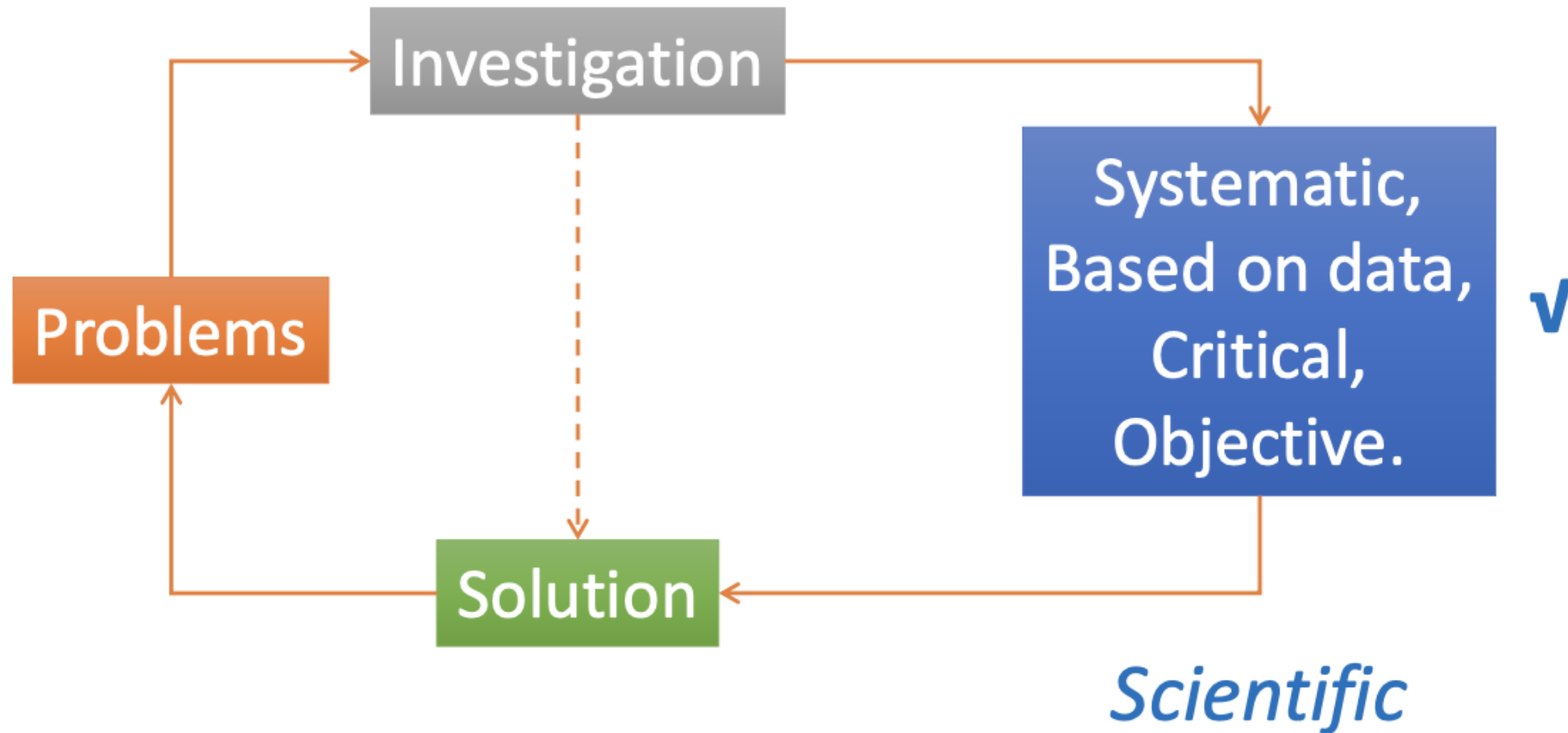
INNOVATION ETHICS

Honesty in approaching the research problem

- Relates to a state of mind essential to successfully performing research.

- This state of mind includes **avoiding preconceived notions** about what the results will be, **being open to changing the hypothesis** when such action is warranted by the evidence, and generally **ensuring that an objective frame of mind is maintained.**

Charless B. Fleddermann, Engineering Ethics 4th Edition (2012)

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INNOVATION ETHICS

Honesty in reporting the results

- Results must also be accurately reported.

- Once an experiment or test has been performed, the results of the experiment **must not be overstated,** but rather an **accurate assessment and interpretation** of the data must be given.

Charless B. Fleddermann, Engineering Ethics 4th Edition (2012)

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INNOVATION ETHICS

It is important to note the distinction **between intentional deception and results or interpretations that are simply incorrect.** Sometimes, results are published that, upon further research, turn out to be incorrect. This situation is not an ethical issue **unless a clarification of the results is never presented**. Rather, this issue indicates that **great care must be taken** before results are initially reported.

Charless B. Fleddermann, Engineering Ethics 4th Edition (2012)
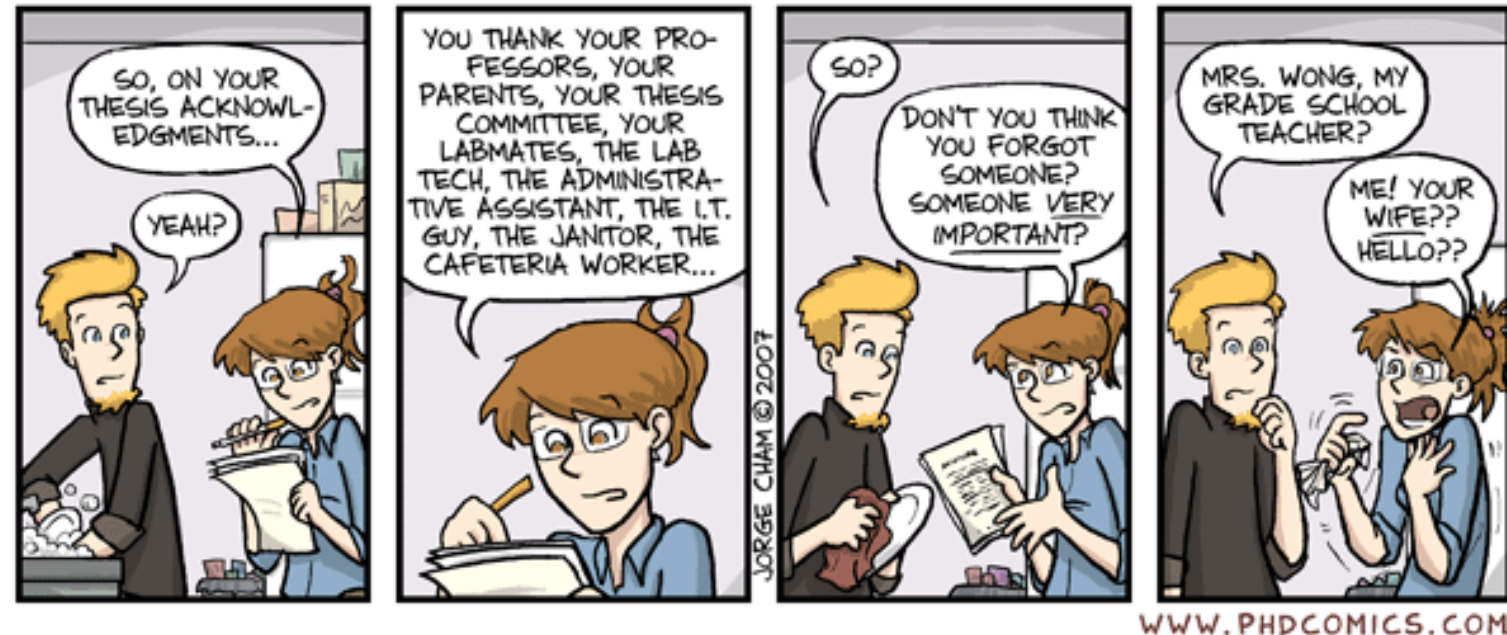
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Berry's World
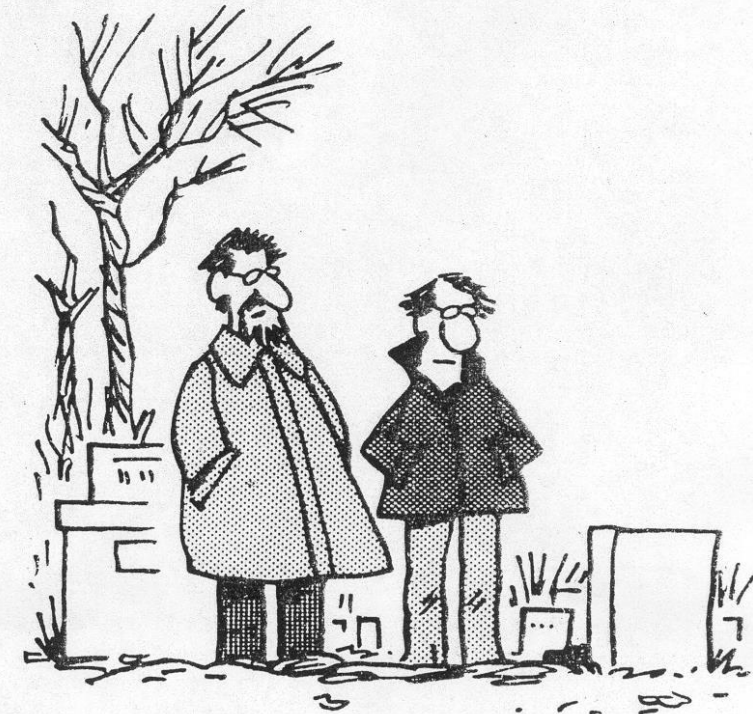
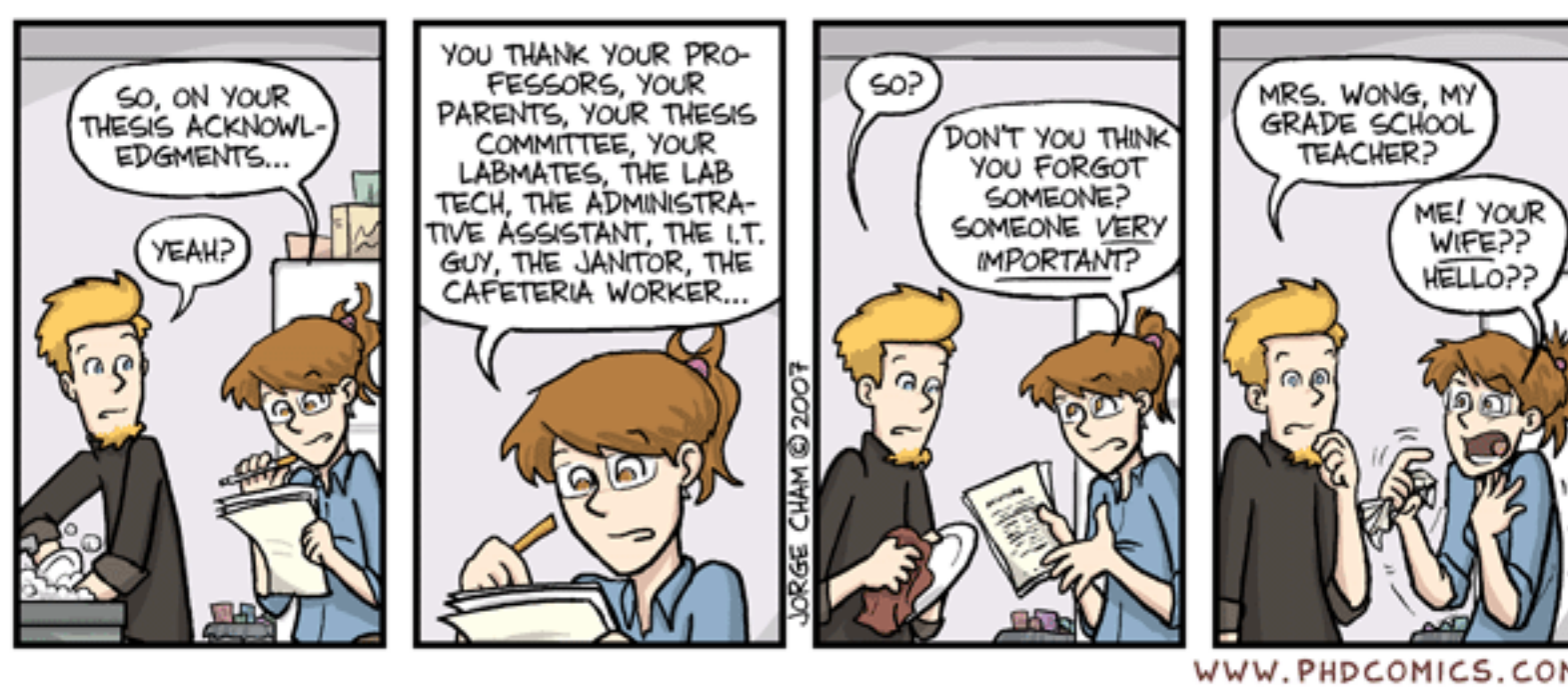"He didn't publish, so he perished."

INNOVATION ETHICS

It is also important to ensure that **proper credit** is given to everyone who **participated** in a research project.

Charless B. Fleddermann, Engineering Ethics 4th Edition (2012)

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Rarely is research performed by a single investigator working alone in her laboratory. Generally, there is participation by other people who should be acknowledged for their contributions such as discussions or guidance, construction of experimental apparatus, or substantial help with performing experiments or interpreting data.

Charless B. Fleddermann, Engineering Ethics 4th Edition (2012)

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INNOVATION ETHICS

The easiest means to determine the best ethical course in performing research and experiment is to consult the **codes of ethics of the engineering** professional societies. All of the codes include language requiring engineers to be honest in reporting the results of work and assigning credit for work done.

Charless B. Fleddermann, Engineering Ethics 4th Edition (2012)

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INNOVATION ETHICS

For example, the code of the American Institute of Chemical Engineers states that **"members shall treat fairly all colleagues and coworkers, recognize the contributions of others,"** and **"issue statements and present information only in an objective and truthful manner."** These statements apply equally well to all professional activities of an engineer, including research, experiment, and testing.

Charless B. Fleddermann, Engineering Ethics 4th Edition (2012)

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INNOVATION ETHICS

- First, norms promote the aims of research, such as knowledge, **truth**, and **avoidance of error.**

- Second, since research often involves a great deal of cooperation and coordination among many different people in different disciplines and institutions, ethical standards promote the values that are essential to collaborative work, such as **trust, accountability, mutual respect, and fairness.**

David B. Resnik, J.D., Ph.D. National Institute of Environmental Health Science, USA. December 1, 2015

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INNOVATION ETHICS

- Third, many of the ethical norms help to ensure that researchers can be held **accountable to the public.**

- Fourth, ethical norms in research also **help to build public support for research.**

- Finally, many of the norms of research promote a variety of other important moral and social values, such as **social responsibility, human rights, animal welfare, compliance with the law, and public health and safety.**

David B. Resnik, J.D., Ph.D. National Institute of Environmental Health Science, USA. December 1, 2015
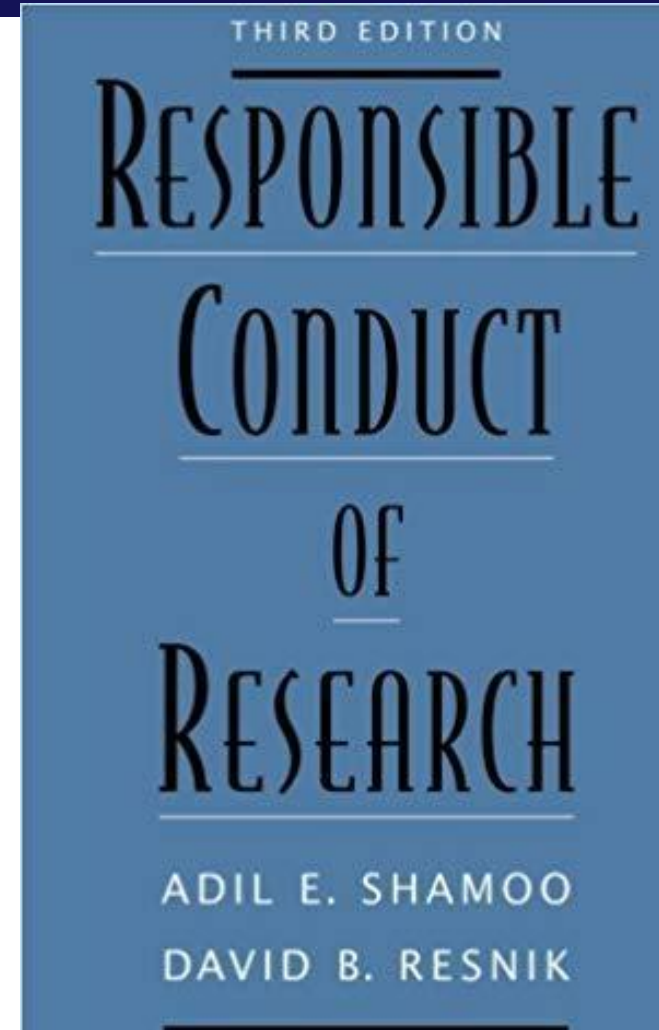
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DISKUSI

Berikan contoh aplikasi dari prinsip etika dalam pelaksanaan penelitian (pilih 3):

Shamoo A and Resnik D. 2015. Responsible Conduct of Research, 3rd ed. (New York: Oxford University Press).

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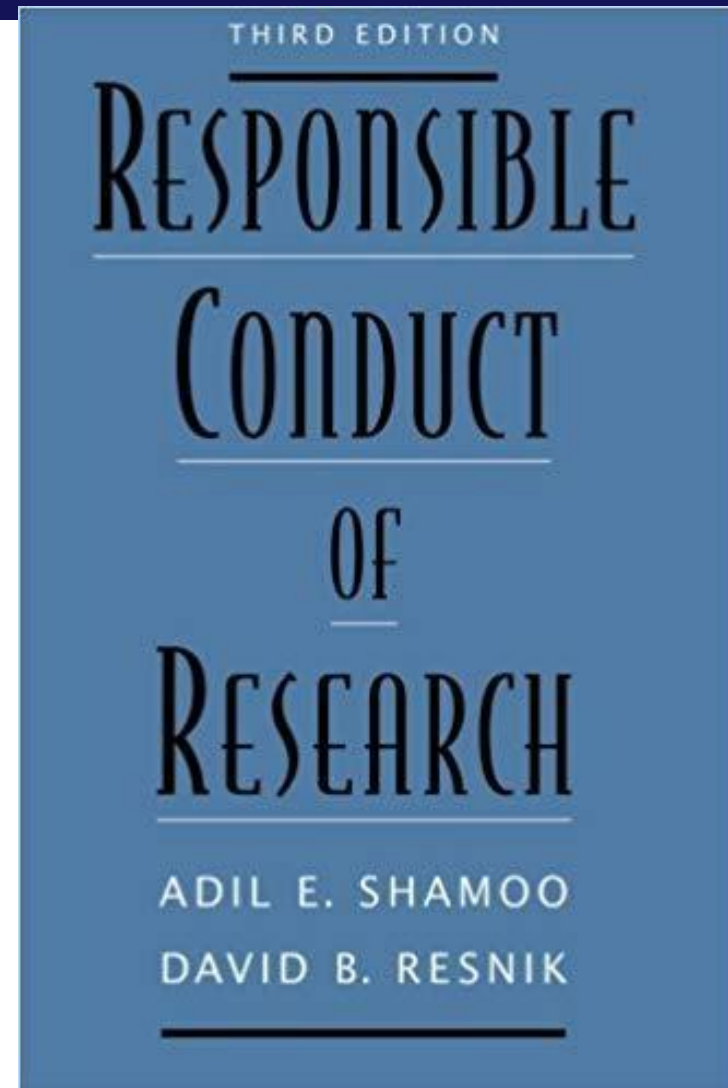
DISKUSI

1. Honesty
2. Objectivity
3. Integrity
4. Carefulness
5. Openness
6. Respect for Intellectual Property.
7. Confidentiality
8. Responsible Publication

9. Responsible Mentoring
10. Respect for Colleagues
11. SocialResponsibility
12. Non-Discrimination
13. Competence
14. Legality
15. Animal Care
16. HumanSubjectsProtection

THIRD EDITION

RESPONSIBLE CONDUCT OF RESEARCH

ADIL E. SHAMOO

DAVID B. RESNIK

Etika Rekayasa

Thank You

Etika Rekayasa