

HUG1I2 Konsep Pengembangan Sains dan Teknologi

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Prodi S1 Teknik Informatika



Why is ethical issue in science & technology critical?

- » There are several examples which is relevant to the issue:
 - » The case of Ade Sara assassination (2014). She was assassinated by Hafidt and Asyifa, who were her classmate.
 - » The case of Deudeuh Alfisarin assassination (2015). She was involved in illegal online prostitution and she was killed by Muhammad Prio Santoso, who was a teacher and a father of two as well.

What is the problem?

- » In these cases, the people who were involved in the crime were good people from good family.
- » They were well-educated: MPS is a bachelor from IPB, and Hafid and Asyifa were undergraduate students.
- » They were well-religious: They have names expressing their good religiosity.
- » They were bounded with Indonesian social ethics.

Why is it happened?

- » The understanding of ethical issues in social media is very poor.
- » They forbid several ethics in social media, which are not allowed.
- » The bad habit in social media crashes the whole social ethics in real life.
- » It crashes their entire life as well ...

*Integrating Ethics into Graduate Training in the
Environment Sciences Series*

Unit 2: Ethics in the NSF Merit Review Criteria

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How should we think about ethics in scientific research?

- Ethics is concerned with the reasons why we make judgments of right or wrong, define outcomes as positive or negative, and make normative decisions about what we ought or ought not do.
- Most scientists would agree that they are trying to practice and produce “good science.”

...but, what is good science?

... and how is ethics relevant?

NSF judges merit of proposed research project based on two main criteria

- **Criterion 1:** What is the intellectual merit of the proposed activity?
 - The first criterion focuses on the technical feasibility and creativity of the project.
- **Criterion 2:** What are the broader impacts of the proposed activity?
 - The second criterion emphasizes the project's educational impact and the potential benefits to society.

The NSF considers these two criteria essential to maintaining “high standards of excellence and accountability.”

Good science and the first criterion of the NSF merit review

- **Criterion 1: What is the intellectual merit of the proposed activity?**
 - How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields?
 - How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of prior work.)
 - To what extent does the proposed activity suggest and explore creative and original concepts?
 - How well conceived and organized is the proposed activity?
 - Is there sufficient access to resources?

The first criteria reflects two aspects of good scientific practice

- Advances knowledge
 - Building upon current knowledge and understanding
 - Adding to current knowledge and understanding
- Conducted by a well qualified scientist or team of researchers
 - Proper training and research expertise
 - Reliability of data and analysis

The relevance of ethics to the first criterion: Unethical behavior and violations of RCR undermine good science

- Some principles of the *Responsible Conduct of Research (RCR)*.
 - *Research misconduct*: Falsification, fabrication, and plagiarism comprise the three major “do nots” of research behavior.
 - *Do no unnecessary harm*: This is one of the prime directives in research ethics particularly when working with human subjects, such as in some ecology or environmental impact research.
 - *Authorship credit*: It is necessary to determine proper sharing of credit and authorship order .
 - *Dissemination of findings*: You are expected to publish results promptly, particularly if the research is of importance to public safety and/or funded through public institutions.
 - (Note: See complete RCR module.)

Good science and the second criterion of the NSF merit review

- **Criterion 2: What are the broader impacts of the proposed activity?**
 - How well does the activity advance discovery and understanding while promoting teaching, training, and learning?
 - How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)?
 - To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships?
 - Will the results be disseminated broadly to enhance scientific and technological understanding?
 - What may be the benefits of the proposed activity to society?

The second criterion reflects a broader conception of good scientific practice

- **Includes:**
 - *“Good scientific practice”*
- **But extends to also include:**
 - *“Science for the good of”*

The NSF asks scientists to consider “*science for the good of*”

- In addition to *intellectual merit*, scientists are asked to:
 - Consider for whom and for what reasons scientific research is being conducted.
 - Consider how the broader scientific community benefits
 - Consider the benefit to society
- This often brings in ethical dimensions.

Ethical dimensions of *science for the good of...*

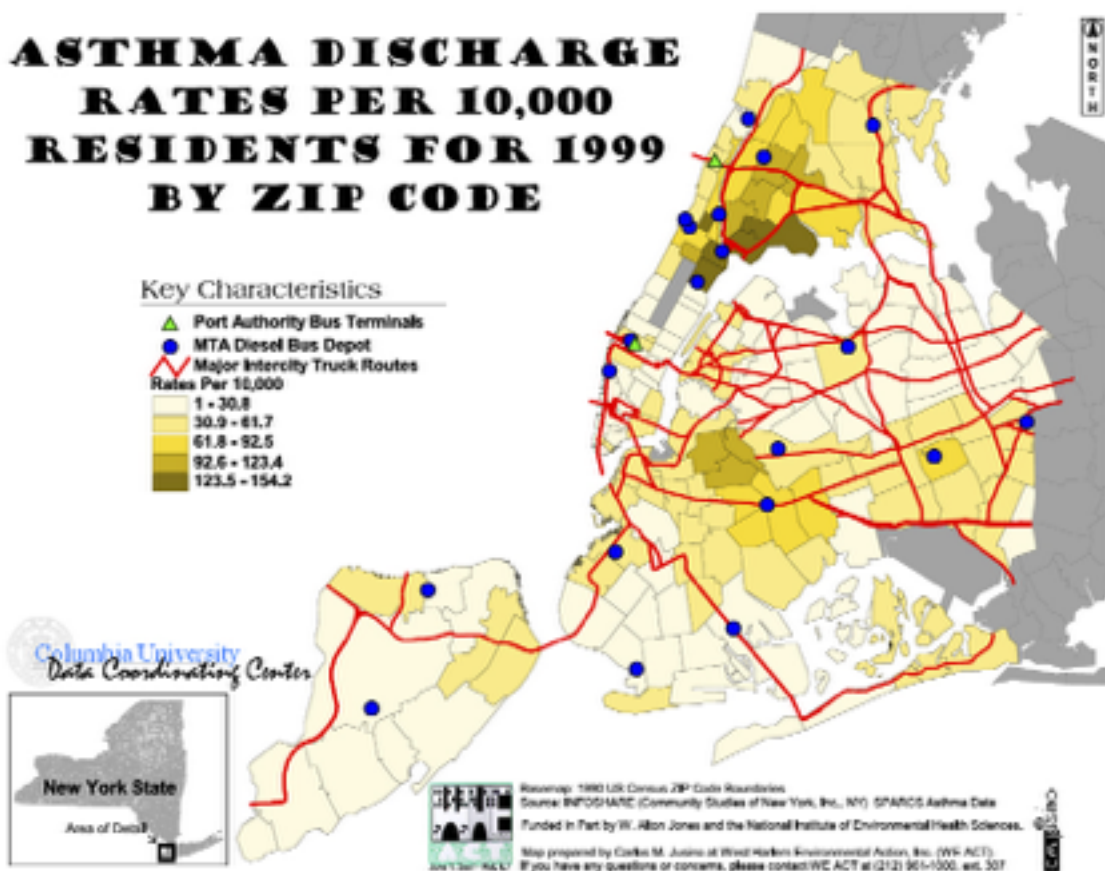
- Distributive Justice
- Intergenerational Justice
- Precautionary Principle
- Enhancing Social Capacity

Distributive Justice—fair allocation of goods

- The charge to further the *participation of underrepresented groups* reflects the ethical imperative of distributive justice.
- Satisfying this criteria includes consideration of:
 - How well are underrepresented groups being brought into the research process?
 - If the collaboration is international, are scientists from globally underrepresented nations being considered?
 - Is one region, class, or gender disproportionately represented? If so is there a justification for doing so? (E.g. EPA or NIH studies)
 - If a research network is being improved, such as International Long-term Ecological Research Network (ILTERN), is the distribution of improvements fair across players?
 - Who could benefit from the research and is this distribution fair?

Research development and distributive justice: asthma and air pollution

- Study of air quality correlated to asthma rates in New York City would require the consideration of distributive justice because the problem effects different populations in different ways.



Intergenerational Justice:

- Are the *costs and benefits* of scientific research *fairly distributed across generations*?
- Satisfying this criteria includes consideration of:
 - How far into the future can the results of your work have an impact?
 - Does the research have implications for the livelihoods or well-beings of not only the current generation of researchers, but of following generations?
 - Considerations in this area will mainly apply to long-term possibilities, such as risks, benefits, and costs.

Research development and intergenerational justice: climate change

- Climate change itself is essentially an issue of intergenerational justice.
 - What sorts of long-term burdens are we willing to put on future generations?
 - How much of a given resource should we use now as opposed to later?
 - How much can we impact ecosystems now, without imposing failure for future generations?
 - How far back into the past should actors (nations, institutions) be held accountable for their actions?

Science for the good of and the precautionary principle

- The precautionary principle is an ethical imperative to *proceed cautiously and deliberatively* in the face of *high risks of harm* to human health or the environment and to protect against such harm *even in the face of uncertainties*
- Satisfying this criteria includes consideration of:
 - Low probability (e.g. even less than 1%) but high impact (e.g. catastrophic or irreversible risks) need to be taken seriously and factored into decisions about scientific research.
 - Research that presents an uncertain potential for significant harm should be avoided unless and until it is proven safe.
 - Scientific research that helps to minimize uncertainty of harms and benefits in the context of high risks of harm can be an ethical imperative.
 - It is also an ethical imperative for scientists to report a finding promptly if there is high risk of harm.

Research development and precautionary principle: risk management & genetics

- Risk management is a normative process invoking burden of scientific proof in demonstrating presence or absence of risk, often invoking precautionary principle.
 - Genetic drift from GM crops not only raises legal concerns, but ethical concerns because of potential disruption of ecosystems and their effect on human health or livelihoods;
 - Possible genetic, ecosystem, or human health outcomes that are low probability but high risk require closer attention than typically given, and should not be disregarded simply because of a low chance of occurrence;
 - Satisfactory burden of proof that no harm will be done to humans or ecosystems through genetic modification would be required before

Enhancing Social Capacity

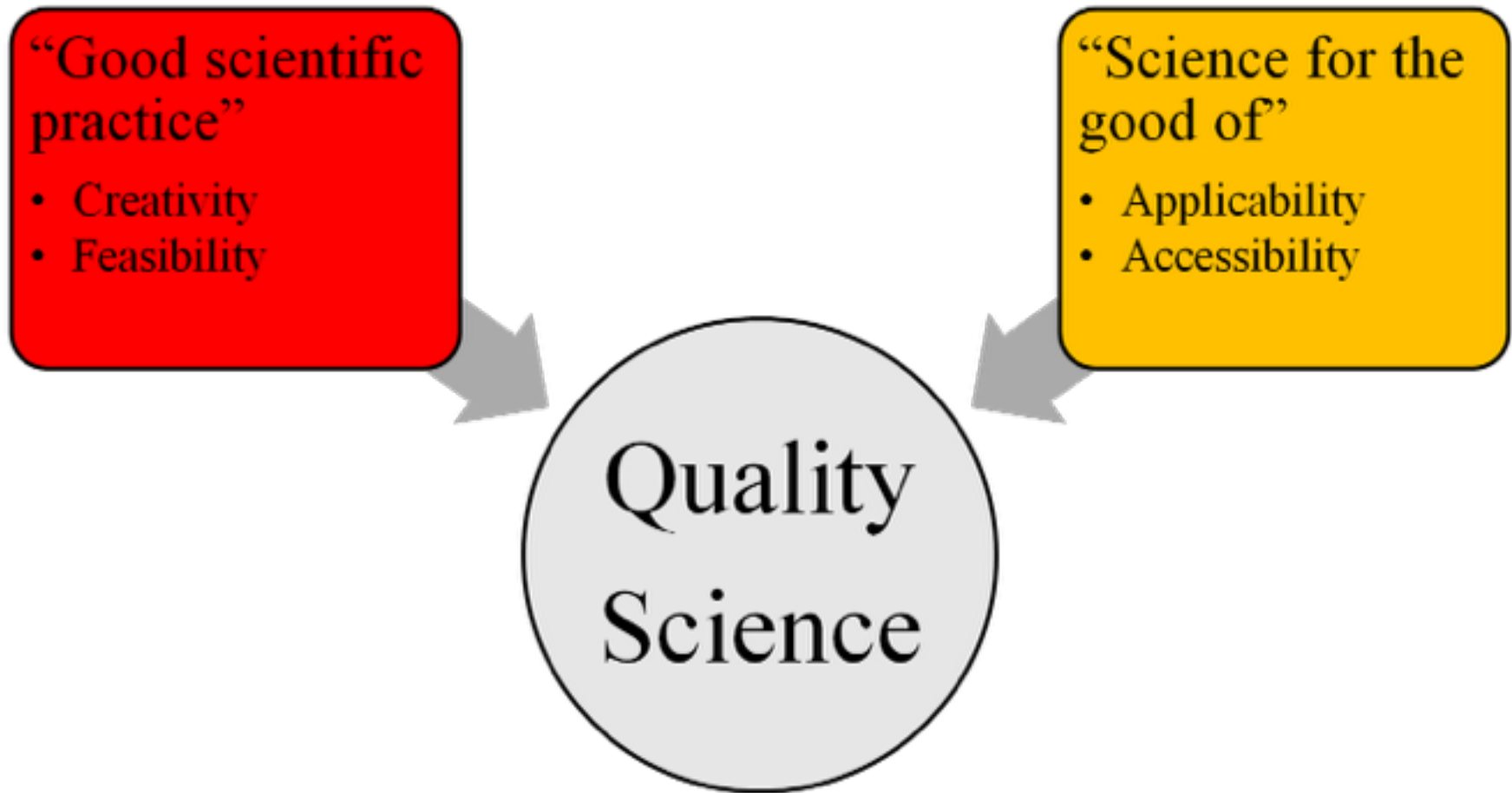
- Social capacity can be thought of society's ability to confront collective challenges and improve overall well-being.
- Satisfying this criteria includes consideration of how the scientific research:
 - Improves livelihoods and other aspects of human flourishing;
 - Improves participation in decision making;
 - Provides a scientific foundations for informing policy;
 - Provides benchmarks or standards for comparison;
 - Addresses potential harms.

Developing scientific research “for the good of” enhancing social capacity

- “The development of new pharmaceuticals to treat overlooked diseases common in developing countries by OneWorld Health--the United States' first nonprofit pharmaceutical company. (Only about 3 percent of all research and development is directed towards diseases of developing nations, which account for 90 percent of the world's diseases.)”

– (NSF website http://nsf.gov/discoveries/disc_summ.jsp?cntn_id=110848&org=NSF)

Two criteria, four aspects to judging scientific merit by the NSF



Ethical considerations in scientific practice should sensitize you to ask and answer:

- Are you adhering to principles of *good scientific practice*?
 - Following the guidelines for the responsible conduct of research?
 - Following the recommended codes of behavior as argued by main scientific organization of the field?
 - Following careful and proper scientific evaluations and laboratory practices?
- This research is being conducted *for the good of* who, what, where, or when?
 - Who will benefit from the possible outcomes of research?
 - Are we considering a broad enough audience?
 - Does the research improve social capacity in some way?
 - Are there significant risks that need to be considered?

Readings/Bibliography:

- Holbrook, J. 2005. *Assessing the science-society relation: The case of the US National Science Foundation's second merit review criterion*. *Technology in Society*: 27. 437-451.
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