Ethics in Engineering and Research

Lecture #4 Moral Framework

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What is a moral framework?

An **ethical framework** is a set of codes that an individual uses to guide his or her behavior. **Ethics** are what people use to distinguish right from wrong in the way they interact with the world. So based on your **moral** judgment what you think is the best solution for a particular problem is **moral framework**. Dec 3, 2016

Why a moral framework?

- Illuminates **connections** between engineering codes of ethics and everyday morality
- Helps make moral choices, resolve moral dilemmas

Ethical Theories for Moral Framework

- Utilitarianism
- Right Ethics
- Duty Ethics
- Virtue Ethics
- Egoism

Utilitarianism

The doctrine that actions are right if they are useful or for the benefit of a majority

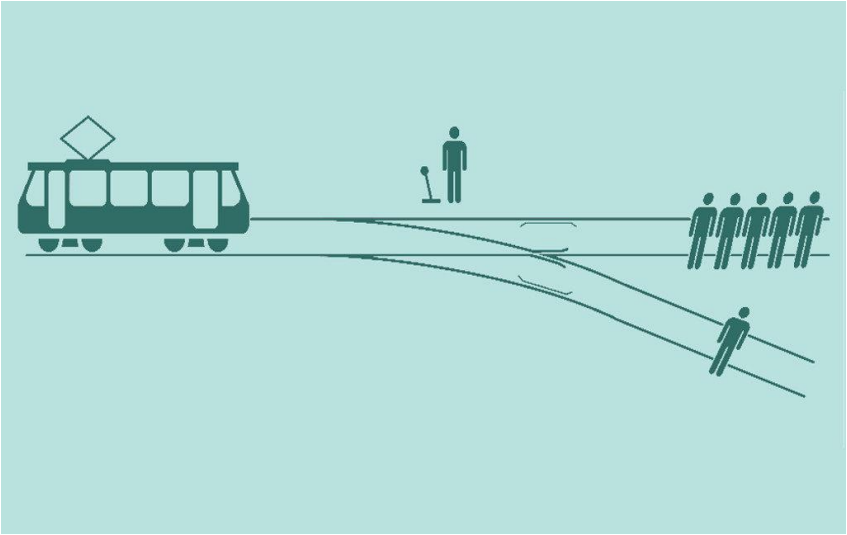
(from dictionary)

Example

- Imagine there is a trolley heading toward a group of 5 workers on the tracks. You are sitting in a control center several miles away, and you have a button that can switch the trolley onto another track where there's only 1 worker. If you flip the switch, one person will die. If you do nothing, 5 people will die. Should you flip the switch?

- 1 death is better than 5 deaths, so if you have to choose, you should try to minimize the loss of life by flipping the switch.

- This is an example of utilitarian reasoning, and the survey results show that most of the people chose to flip the switch.



- Utilitarianism:

Act utilitarianism is the belief that an action becomes morally right when it produces the greatest good for the greatest number of people, while **Rule utilitarianism** is the belief that the moral correctness of an action depends on the correctness of the rules that allows it to achieve the greatest good.

Video

Act Utilitarianism *vs* Rule Utilitarianism

Act Utilitarianism

- Looks at the consequence of each individual act and calculates utility each time the act is performed
- Considers only the results or consequences of the single act

Rule Utilitarianism

- Looks at the consequence of having everyone follow a particular rule and calculates the overall utility of accepting or rejecting the rule
- Considers the consequences that result of following a rule of conduct

Here, "Utility" mean welfare, safety, health, etc.

Example for Act *vs* Rule Utilitarianism

- Take the example of a judge sending a murderer to prison. Say the judge knows the convict will not commit any more violent crimes, and wants to be kind based on the "*theoretical knowledge*" (maybe the convict is very old or terminally ill). The judge knows that this will make the convict very happy, not to mention their family and friends. Imagine that the victim's family has forgiven the convict and will not feel pain as a result of this decision.

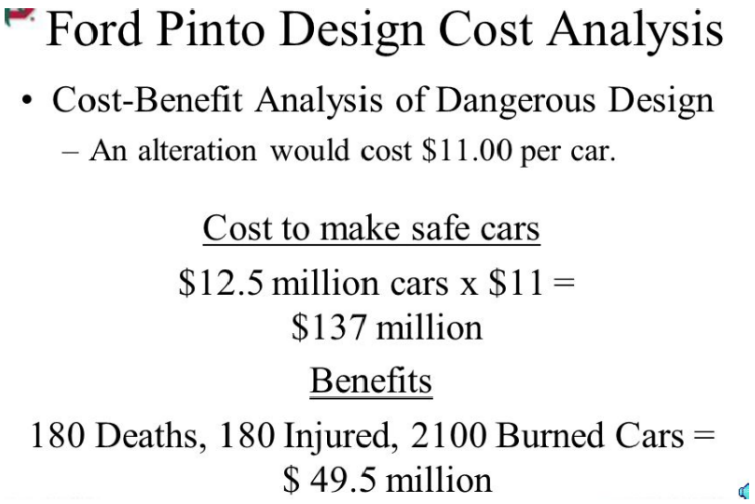
- Should the judge let the convict go? Act utilitarianism says yes, because this maximizes happiness while causing no future pain in this case. But rule utilitarianism says no, because *in general* convicts must be punished for their crimes, even if there is no chance that they will commit future crimes. The judge should follow the *rules*.

Deontology

- Deontological ethics is an ethics system that judges whether an action is right or wrong based on a moral code. Consequences of those actions are not taken into consideration.

- Works great in theory, but challenging in the real world to comply
- What happens when you have to choose between two evils? (e.g., hacking a system to prevent nuclear war)
- What happens when the situation is not black and white?

- Engineering cost-benefit analysis:
  - The same as utilitarianism? No.
  - Typical cost-benefit analysis identifies good and bad consequences of actions/policies in terms of dollars
  - Why are dollars the correct utility? How to include costs of lives, injuries?
  - Usually, focus on profits to corporation
  - Example: Cost of safe designs vs. warranty vs. loss of lives/legal issues (e.g., Ford Pinto)



Right Ethics, Duty Ethics

- Rights and duties are typically correlated with each other.
- For example, our right to life places duties on others not to kill us; our right to liberty places duties on others not to interfere with our freedom.
- *Duty ethics* reverses the order of priority by beginning with duties and deriving rights from them.

Rights Ethics, Duty Ethics

- Rights ethics: Human rights is the moral "bottom-line" (and human dignity and respect are fundamental)
  - Liberty rights: Rights to exercise one's liberty --> lead to duties of others not to interfere with one's freedoms
  - Welfare rights: Rights to benefits needed for decent human life
- Codes? "Engineers shall hold paramount the safety, health, and welfare of the public in the performance of their professional duties." (refers to each individual)
- Public has rights (life/no injuries from bad products, privacy, to get benefits through fair/honest exchange in a free market), *what are their duties in these respects?*
- Duty ethics: Right actions are those required by duties to respect the liberty or autonomy of individuals. Codes?

Virtue Ethics

- Virtue ethics emphasizes character (virtues/ vices) more than rights and rules.
- Virtues: competence, honesty, courage, fairness, loyalty, and humility (vices opposites)
- Relevance to codes? IEEE:
  - "… be honest… in stating claims…"
  - "…improve our technical competence…"
  - "…treat fairly all persons…"

A virtue is a generalized pattern of behaviour that is usually somehow beneficial in terms of its outcome. A vice is one that is instead often harmful to the individual or society at large.

Virtues in engineering

- Public-spirited virtues:
  - Focus on good of clients ("client-focused")
  - Focus on good of public
  - Generosity - going beyond minimum requirements in helping: "engineers who voluntarily give their time, talent, and money to their professional societies and local communities"

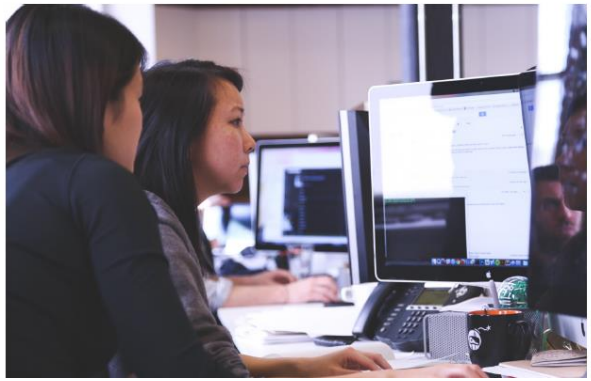
- Proficiency virtues:
  - Mastery/competence
  - Diligence (e.g., software engineering case study example)
  - Creativity (to keep up with technology)
- Teamwork virtues:
  - Working together effectively (not a loner)
  - Collegiality, cooperation, loyalty, respect for authority

diligence - careful and persistent work or effort.
due diligence - the care that a reasonable person exercises to avoid harm to other persons or their property.

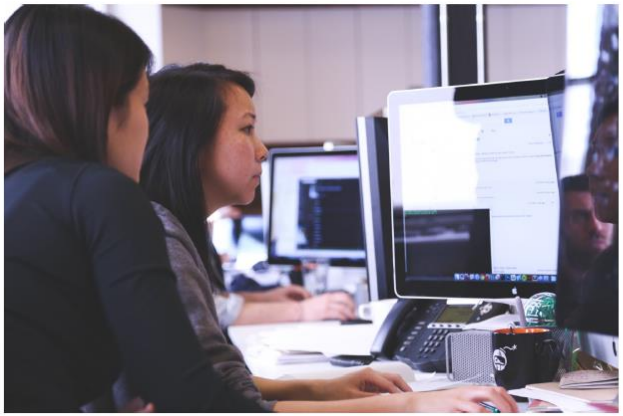
BER: Board of Ethics Review

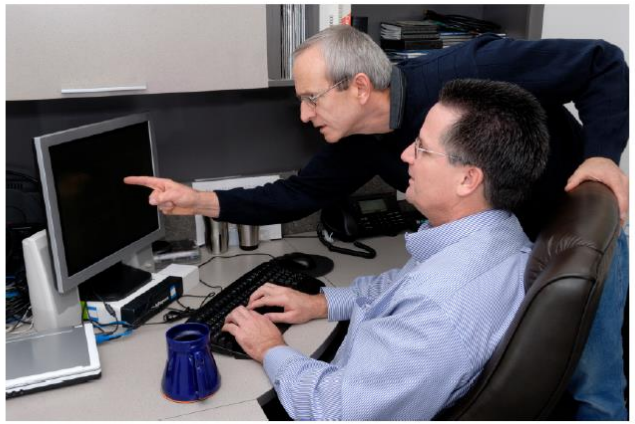
NSPE, BER Case 96-4

- Engineer A is employed by a software company and is involved in the design of specialized software in connection with the operations of facilities affecting the public health and safety (i.e., nuclear, air quality control, water quality control). As the part of the design of a particular software system, Engineer A conducts extensive testing and although the tests demonstrate…

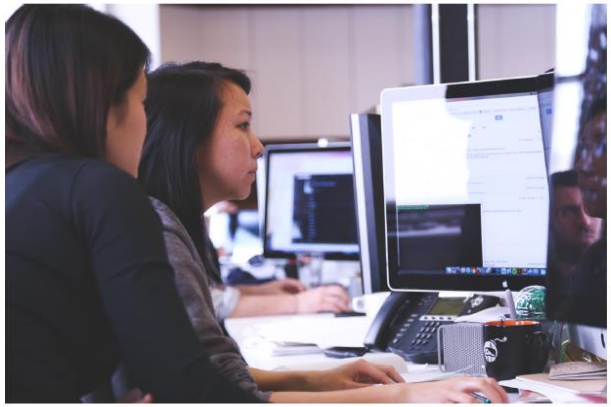


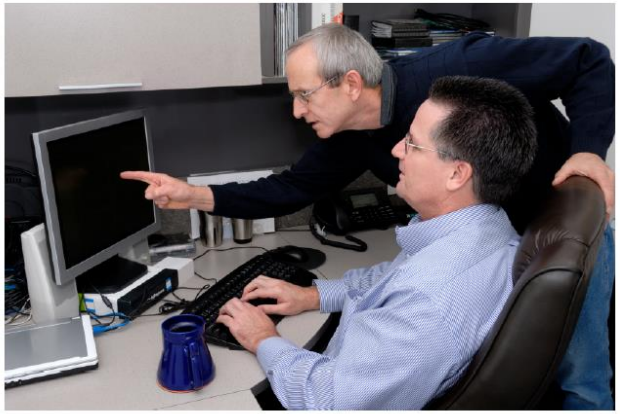
that the software is safe to use under existing standards, Engineer A is aware of new draft standards that are about to be released by a standard setting organization-standards which the newly designed software may not meet. Testing is extremely costly and the company's clients are eager to begin to move forward. The software company is eager to satisfy its clients, protect the software company's finances, and protect…





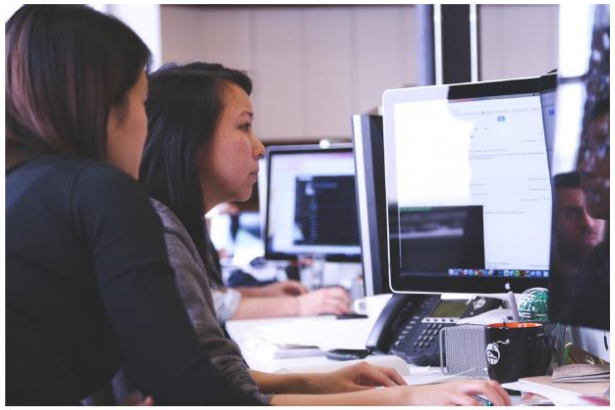
…existing jobs; but at the same time, the management of the software company wants to be sure that the software is safe to use. A series of tests proposed by Engineer A will likely result in a decision whether to move forward with the use of the software. The tests are costly and will delay the use of the software by at least six months, which will put the company at a competitive…





…disadvantage and cost the company a significant amount of money. Also, delaying implementation will mean the state public service commission utility rates will rise significantly during this time. The company requests Engineer A's recommendation concerning the need for additional software testing.

Question: Should Engineer A design the software to meet the new standards?



Analyze the case…

- Utilitarianism
  - Hold paramount the safety, health, and welfare of the public – Do the testing for the new standards.
  - This is the most good for the most people?
  - Could do a cost-benefit analysis. Analyze what costs there will be to the company if there is a software failure vs. costs of the tests

Analyze the case, continued…

- Rights and duty ethics
  - Public has a right to exposure to safe systems, not to be injured, etc.
  - Engineer has a right to provide an opinion on such an important matter
  - Engineer has a duty to provide safe systems
  - Engineer has a duty to be loyal to company (try to avoid layoffs, etc)

Analyze the case, continued…

- Virtue ethics
  - Competence – engineer's competence in coming up with a less expensive test
  - Honesty – engineer's honesty in whether meet new standards, old standards
  - Courage – engineer's courage to make a tough decision (like to do the expensive tests)
  - Loyalty – engineer's loyalty to the company to protect them from litigation by testing for new standards

Ethical Egoism and self-interest

Ethical Egoism:

- promote only our self-interest, and not both our interests and those of others which directly compete with our interests.
- allows for us to do actions that help others, as long as they promote our self interest.
- morally right to maximize one's self-interest

Ethical Egoism and Self-Interest

- Ethical egoism: promotes only your own self-interest (normative: OUGHT TO)
- Psychological egoism: is the view that humans are always motivated by self-interest and selfishness, even in what seem to be acts of altruism. (descriptive)

- Engineers:
  - Proficiency motives: Challenge self, serve public
  - Compensation motives: Make money for self/family, but helps community
  - Moral motives: Desire to do right ("give back"), integrity, feels good and positively impacts your own community
- Engineering companies:
  - Safety/profit motives! Company competence, education
  - Professional climate, compensation

Aspirational Ethics

An important distinction in engineering ethics is between **preventive ethics**, which consists of guidelines for preventing harm to the public, and **aspirational ethics**, which consists of guidelines and motivating considerations for using one's professional expertise to promote human well-being.

Inspiration is defined as, "the process of being mentally stimulated to do or feel something."
Aspiration is, "a hope or ambition of achieving something."

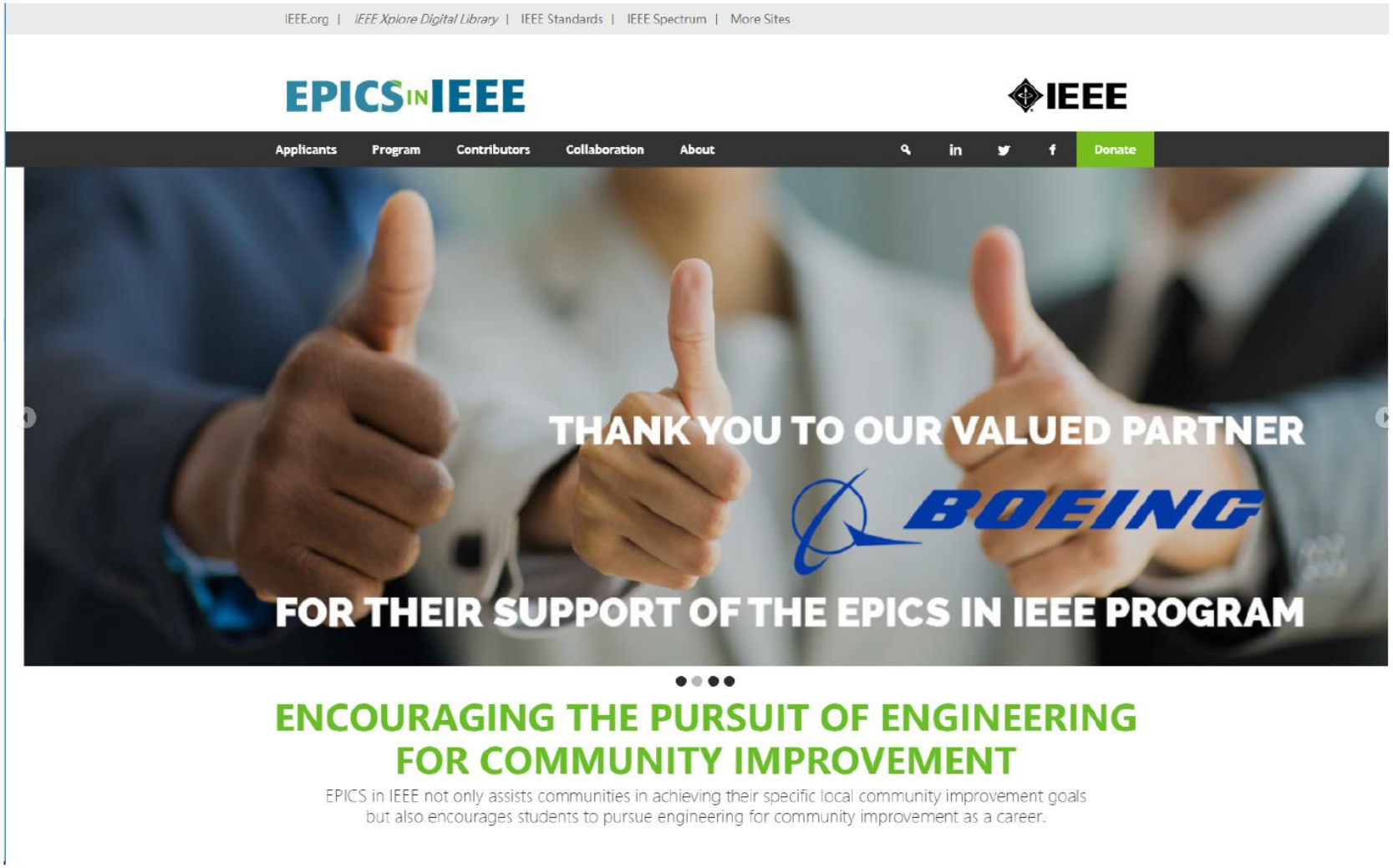
Aspirational Ethics

- Range of freedom in promoting "human welfare"
- "Good" engineers:
  - Have high "professional character" to make them the "best, or ideal, engineers"
  - Types:
    - Professional "pride", top level competence, above and beyond
    - Social awareness/concern, social embeddedness of technology (e.g., involvement in alleviating poverty and other injustices)
    - Environmental conscientiousness: above and beyond codes of ethics, sustainable design, and usual expectations

Pro Bono Engineering Work?

- Should engineering professions do more to encourage engineers to apply skills in offering voluntary service to others? Yes.
- Pro bono (or reduced rate) work is encouraged in law, medicine. Sometimes/often in engineering. Would it raise the stature of the profession by making it a "direct contact" profession?
- Engineers do a lot of volunteer work now!
- What does engineering education do to support such professionalism? *The "service-learning" initiative is happening…*

Pro Bono: work undertaken without charge



Service learning is a teaching and learning strategy that integrates meaningful community service with instruction and reflection to enrich the learning experience, teach civic responsibility, and strengthen communities. EPICS in IEEE.

https://epics.ieee.org/