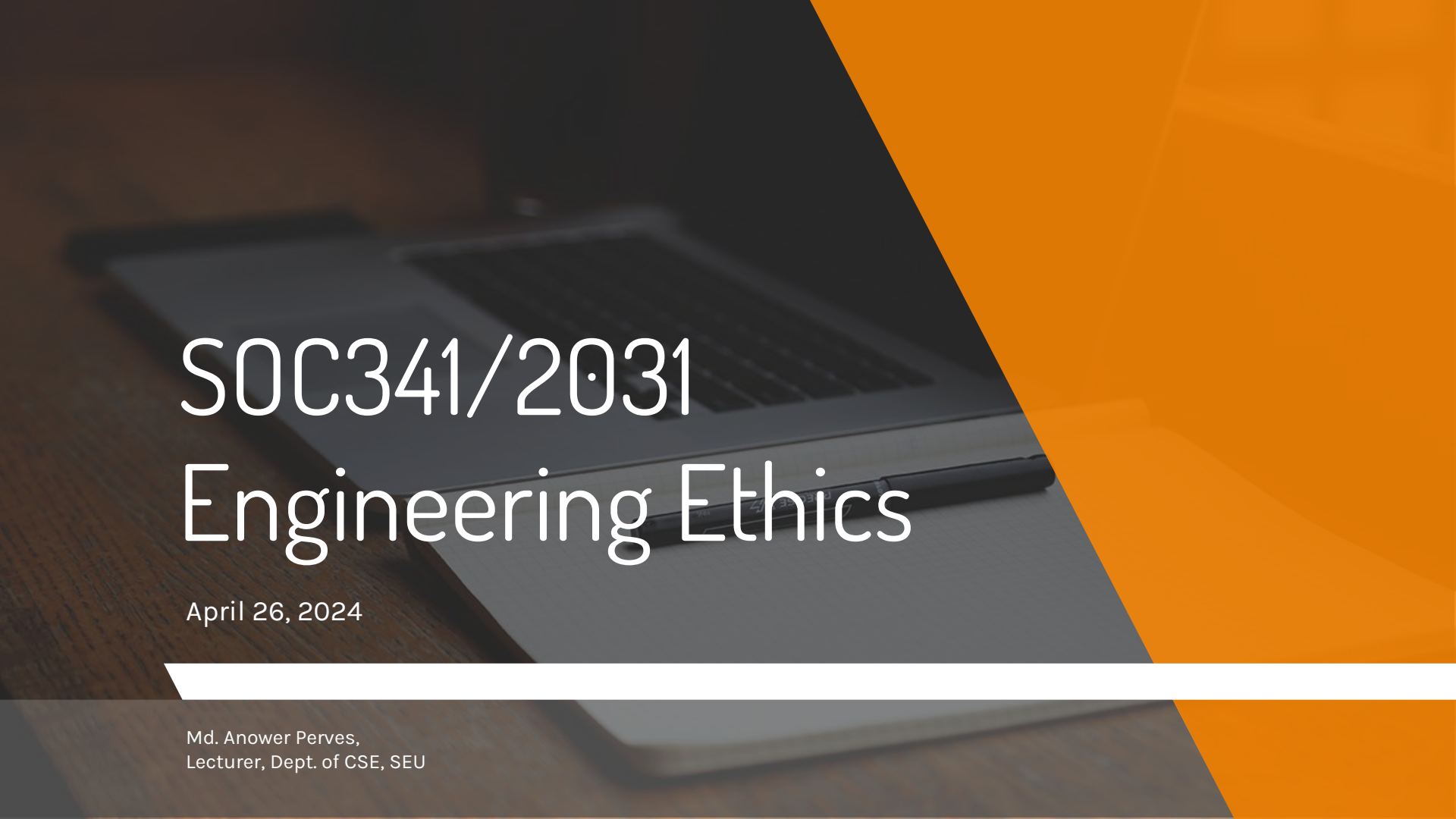

SOC341/2031 Engineering Ethics

April 26, 2024

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5.Lecture

Responsibility in Engineering

Lecture Outline

- ➔ Standard of Care
- ➔ Blame-responsibility
- ➔ Liability
- ➔ Impediments to responsible action

Standard of Care

- ❏ What is **Standard of care** and why should you want to know about it?
  - The standard of care is a legal concept that is used to evaluate whether a professional's activities meets the "standard." In a nutshell, if the things you are doing are as good as the standard of care, you are doing just fine. As you might guess, there are standards of care for just about everything. There are standards of care (thresholds of professional conduct) for record keeping confidentiality, etc. Almost everything.

Standard of Care

Engineers have a professional obligation to conform to the standard operating procedures and regulations that apply to their profession and to fulfill the basic responsibilities of their job as defined by the terms of their employment. Sometimes, however, it is not enough to follow standard operating procedures and regulations. Unexpected problems can arise that standard operating procedures and current regulations are not well equipped to handle. In light of this, engineers are expected to satisfy a more demanding norm, the standard of care.

Blame-Responsibility

Let us turn to the negative concept of responsibility for harm. We can begin by considering the relationship of responsibility for harm to the causation of harm. When the Columbia Accident Investigation Board examined the Columbia tragedy, it focused on what it called the “causes” of the accident. It identified two principal causes: the “physical cause” and the “organizational causes.” The physical cause was the damage to the leading edge of the left wing by the foam that broke loose from the external tank. The organizational causes were the defects in the organization and culture of NASA that led to an inadequate concern for safety. It also made reference to individuals who were “responsible and accountable” for the accident. The board, however, did not consider its primary mission to be the identification of individuals who should be held responsible and perhaps punished. Thus, it identified three types of explanations of the accident: the physical cause, organizational causes, and individuals responsible or accountable for the accident.

Liability

Although engineers and their employers might try to excuse failure to provide safety and quality by pointing out that they have met existing regulatory standards, it is evident that the courts will not necessarily agree. The standard of care in tort law (which is concerned with wrongful injury) is not restricted to regulatory standards.

Design Standards

Most engineering codes of ethics insist that, in designing products, engineers are expected to hold considerations of public safety paramount. However, there is likely more than one way to satisfy safety standards, especially when stated broadly. But if there is more than one way to satisfy safety standards, how are designers to proceed?

Design Standards

Design Standards

- More safe
- Space for consideration other than safety (overall quality, usability, and cost)

Example: in the late 1960s, operating under the constraints of developing an appealing automobile that weighed less than 2000 pounds and that would cost consumers no more than $2000, Ford engineers decided to make more trunk space by putting the Pinto's gas tank in an unusual place. This raised a safety question regarding rear-end collisions. Ford claimed that the vehicle passed the current standards. However, some Ford engineers urged that a protective buffer should be inserted between the gas tank and protruding bolts. This, they contended, would enable the Pinto to pass a more demanding standard that it was known would soon be imposed on newer vehicles. They warned that without the buffer, the Pinto would fail to satisfy the new standard, a standard that they believed would come much closer to meeting the standard of care enforced in tort law.

Problem of many hands

Individuals often attempt to evade personal responsibility for wrongdoing. Perhaps the most common way this is done, especially by individuals in large organizations, is by pointing out that many individuals had a hand in causing the harm. The argument goes as follows: “So many people are responsible for the tragedy that it is irrational and unfair to pin the responsibility on any individual person, including me.” Let us call this the problem of fractured responsibility or (preferably) the problem of many hands.

Impediments to responsible of action

- ❏ Self-Interest
- ❏ Self-Deception
- ❏ Fear
- ❏ Ignorance
- ❏ Egocentric Tendencies
- ❏ Microscopic Vision
- ❏ Uncritical Acceptance of Authority
- ❏ Groupthink

For better understanding, read the entire lecture from **Chapter Two: Responsibility in Engineering**, (**Engineering Ethics, Concept and Cases - Harris, Pritchard and Rabins)**

5.Lecture

Issues and Solve Techniques

Lecture Outline

- Design Standards
- The Problem of many hands
- Determining the facts
- Known and Unknown facts
- Weighing the importance of facts
- Application Issues

What does it mean to frame a problem?

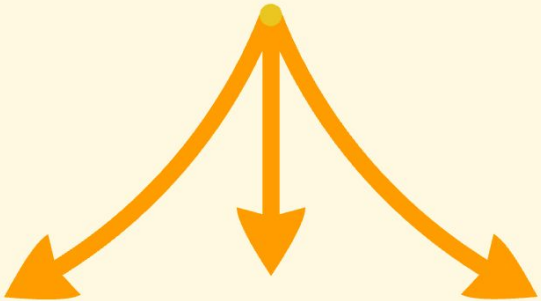
Broken phone scenario

Identification of Ethical Problems in Engineering practice

Engineers Responsibilities:

- Obligation to society and profession
- Combining the welfare, technical progress and ethics
- Desice must be in the favor of environment, life, health or other rights of human beings
- Maintain a professional, honesty, modesty and justice at the same time
- The engineer must ensure the continuous improvement of his knowledge share his experience, provide opportunities for education and training
- Follow governmental law

Types of ethical problems



Factual Problems

- State the relevant facts known for the case
  - Example: Modification in design vs. cost

Conceptual Problems

- The meaning or applicability of an idea
  - Example: Bribery vs. Gifts

Moral Problems (Ethical Problems)

- Is the act ethically acceptable or not?
- How should moral principles applied?
  - Example: Safety Vs. Price

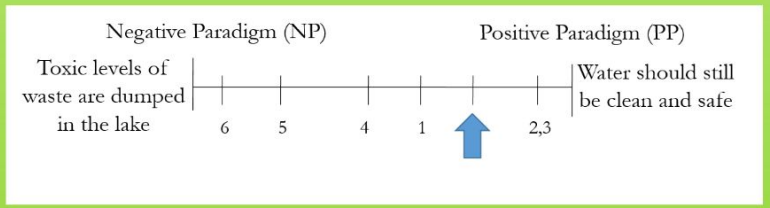
Resolving Techniques

- Line Drawing
- Flow Charting
- Creative middle way solutions

Resolving Techniques

Line Drawing

- Useful for situation where the application of the ethical principles lie in a grey area
- It can be used to reach false conclusions



Case study: Company dumping slightly toxic wastes into river

Dumping is within legal limit, but dumped material is toxic

Hypothetical Examples for Consideration

1. The chemicals would be harmless but the town's water supply will have an unusual taste
2. The chemicals can be effectively removed by the town's existing water treatment system
3. The chemicals can be removed by the town with new equipment that will be purchased by the company
4. The chemicals can be removed by the town with new equipment that the taxpayers will pay for
5. Occasional exposure to the chemicals can cause nausea but this only lasts for an hour and is rare
6. Some people can get fairly sick but the sickness only lasts a week and there is no long term harm.

Line Drawing

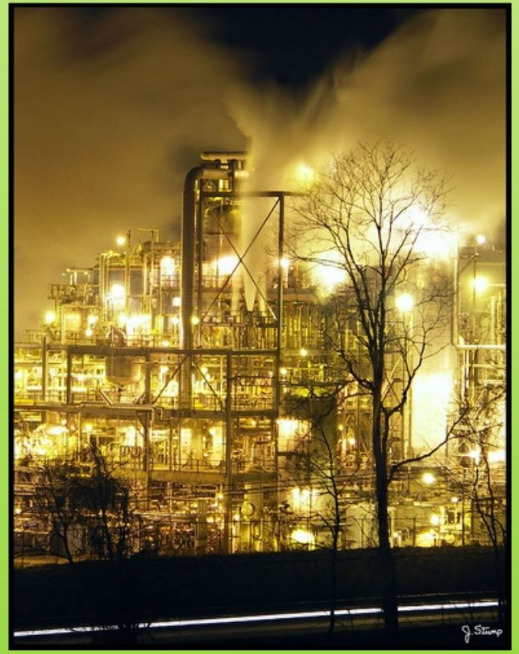
Resolving Techniques

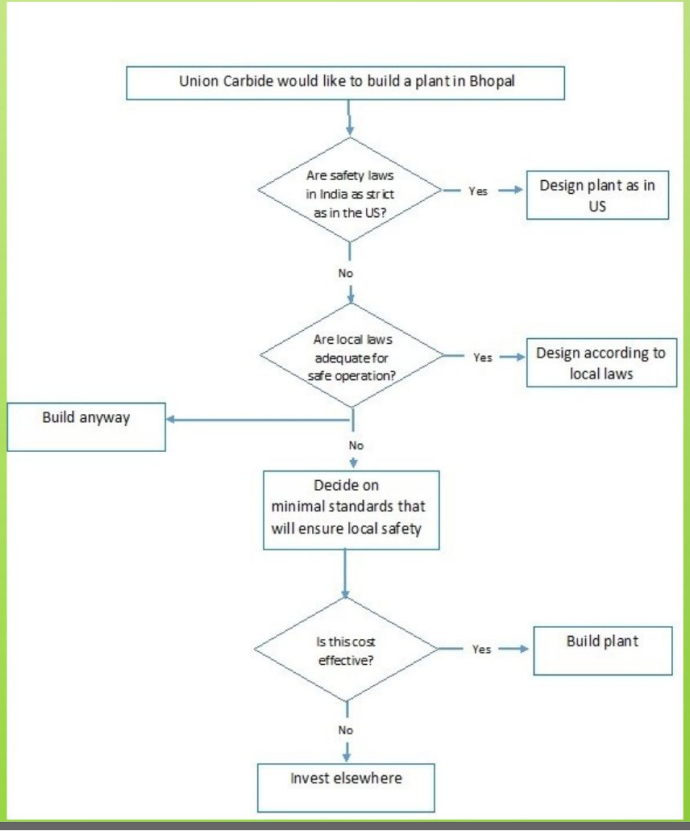
Flow Charting

For a good use of this method-

- ❏ Make flow chart as large as possible. Consider all possibilities
- ❏ Don’t be shy from presenting failed options

Case study: Bhopal Incident - Flow Charting Illustration





Flow Charting

Resolving Techniques

Creative middle way solutions

- Looks for creative solutions that satisfy both parties
- Needs imagination and determination

Case study: Using an alternative construction material on the Burj Khalifa

Window panes are normally bolted on to the wall of building

Dilemma when manufacturer runs out of supplies to provide washers and screws

Creative solution: 3M custom made glue used

Creative middle way/alternative solution

Determining Facts

We cannot discuss moral issues intelligently apart from a knowledge of the facts that bear on those issues. So we must begin by considering what those facts are. In any given case, many facts will be obvious to all, and they should be taken into account.However, sometimes people come to different moral conclusions because they do not view the facts in the same way. Sometimes they disagree about what the facts are. Sometimes they disagree about the relevance or relative importance of certain facts. Therefore, close examination of our take on the facts is critical.

Determining Facts

To understand the importance of facts in a moral controversy, we propose the following three theses about factual issues:

1. Often, moral disagreements turn out to be disagreements over the relevant facts.
2. Factual issues are sometimes very difficult to resolve.
3. Once the factual issues are clearly isolated, disagreement can reemerge on another and often more clearly defined level.

Known and Unknown Facts

It should not be surprising to find two people disagreeing in their conclusions when they are reasoning from different factual premises. Sometimes these disagreements are very difficult to resolve, especially if it is difficult to obtain the information needed to resolve them.

Frequently, important facts are not known, thereby making it difficult to resolve disagreement. Some of the facts we may want to have at our disposal relate to something that has already happened (e.g., what caused the accident). But we also want to know what consequences are likely to result from the various options before us, and there can be much uncertainty about this. Thus, it is important to distinguish not only between relevant and irrelevant facts but also between known facts and unknown facts. Here, the number of unknown facts is less important than the degree of their relevance or importance. Even a single unknown relevant fact might make a crucial difference to what should be done. In any case, we have a special responsibility to seek answers to unanswered factual questions.

Weighing the importance of Facts

Even if two or more people agree on which facts are relevant, they might nevertheless disagree about their relative importance. In the automotive industry, for example, two engineers might agree that the evidence indicates that introducing another safety feature in the new model would most likely result in saving a few lives during the next 5 years. One engineer might oppose the feature because of the additional cost, whereas the other thinks the additional cost is well worth the added safety. This raises questions about acceptable risk in relation to cost. One engineer might oppose the feature because he thinks that the burden of responsibility should be shifted to the consumer, whereas the other thinks that it is appropriate to protect consumers from their own negligence.

Application Issues

So far, we have emphasized that when engaging in ethical reflection, it is important to get as clear as we can about both the relevant facts and the basic meanings of key concepts. However, even when we are reasonably clear about what our concepts mean, disagreement about their applications in particular cases can also arise. If those who disagree are operating from different factual premises, there might well be disagreement about whether certain concepts apply in particular circumstances. For example, a disagreement about bribery might pivot around the question of whether an offer of a free weekend at an exclusive golf resort in exchange for a vendor's business was actually made. It might be agreed that if such an offer were made, this would be an attempt to bribe. However, whether or not such an offer was actually made may be at issue.

If the issue is only over whether or not a certain offer was made, the possible ways of resolving it may be readily apparent. If there were no witnesses and neither party is willing to admit that the offer was made, the issue may remain unresolved for others, but at least we can say, "Look, either the offer was made or it wasn't—there's a fact of the matter."

Application Issues

There is another kind of application issue, one that rests on a common feature of concepts. Attempts to specify the meanings of terms ahead of time can never anticipate all of the cases to which they do and do not apply. No matter how precisely we attempt to define a concept, it will always remain insufficiently specified so that some of its applications to particular circumstances will remain problematic.

One way of dealing with these problems is to change or modify our definitions of crucial concepts in the face of experience. Sometimes an experience may not appear to exemplify the concept as we have defined it, but we believe it should count as an instance of the concept anyway. In such a case, the experience prompts us to modify the definition. When this happens in analyzing a case, it is a good idea to revisit the initial depiction of the case and reassess the relevant facts and ethical considerations before attempting its final resolution.