Typical Ethical Issues that Engineers Encounter

- Safety
- Acceptable risk
- Compliance
- Confidentiality
- Environmental health
- Data integrity
- Conflict of interest
- Honesty/Dishonesty
- Societal impact
- Fairness
- Accounting for uncertainty, etc.

We are in need of ethical awareness!!!

- In the 21st century the rate of the applications of the new inventions in different areas are very fast.

- It is not always possible to reach the pace of technological developments by the pace of social and moral considerations relating to them.

- This is especially very important in engineering, bio-sciences and medicine.

Professional Responsibility

- Ethics has a second connection with engineering.

- It comes from the way in which being socially responsible puts duties and obligations on us individually.

- Ethics fits into engineering is through professional responsibility.

Two Dimensions of Ethics in Engineering

Ethics is part of engineering for two main reasons.

a) Engineers need to be **socially responsible** when building products and processes for society.

b) Social responsibility requires **professional responsibility.**

MÜDEK Says

By the time of graduation students will have an understanding of professional and ethical responsibility

A good place to start a discussion of ethics in engineering is with definitions of ethics and engineering ethics. Ethics is the study of the characteristics of morals. Ethics also deals with the moral choices that are made by each person in his or her relationship with other persons. As engineers, we are concerned with ethics because these definitions apply to all of the choices an individual makes in life, including those made while practicing engineering.

For our purposes, the definition of ethics can be narrowed a little. Engineering ethics is the rules and standards governing the conduct of engineers in their role as professionals. Engineering ethics encompasses the more general definition of ethics, but applies it more specifically to situations involving engineers in their profession-al lives. Thus, engineering ethics is a body of philosophy indicating the ways that en-gineers should conduct themselves in their professional capacity.

Our goal is frequently summed up using the term "moral autonomy." Moral autonomy is the ability to think critically and independently about moral issues and to apply this moral thinking to situations that arise in the course of professional en-gineering practice.

ENGINEERING IS MANAGING THE UNKNOWN

One source of the ethical issues encountered in the course of engineering practice is a lack of knowledge. This is by no means an unusual situation in engineering. Engineers often encounter situations in which they don't have all of the information that is needed. By its nature, engineering design is about creating new devices and products. When something is new, many questions need to be answered. How well does it work? How will it affect people? What changes will this lead to in society? How well will this work under all of the conditions that it will be exposed to? Is it safe? If there are some safety concerns, how bad are they? What are the effects of doing nothing?
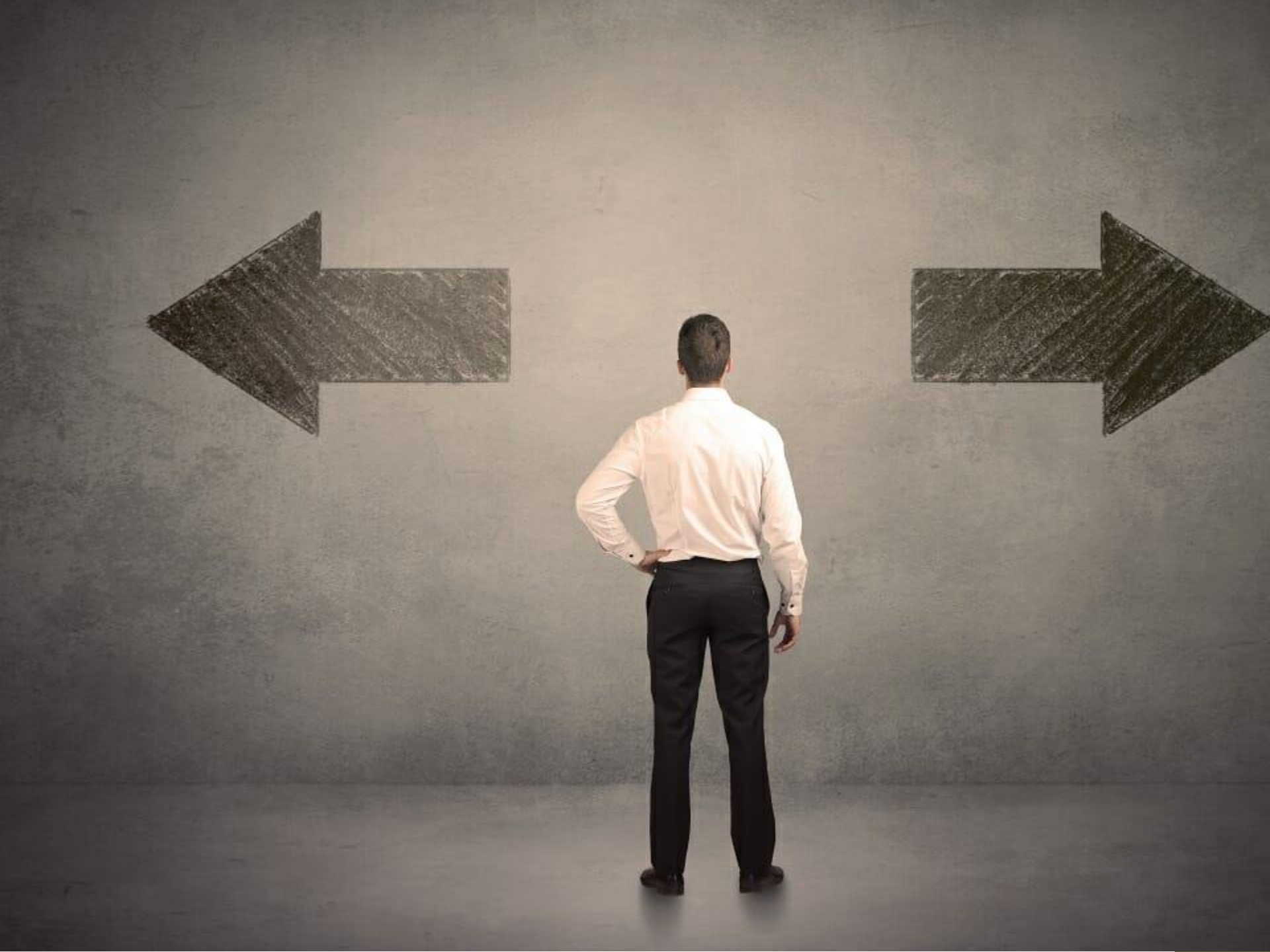
So, to a large extent, an engineer's job is about managing the unknown. How does an engineer accomplish this? Really, as an engineer you can never be absolutely certain that your design will never harm anyone or cause detrimental changes to society. But you must test your design as thoroughly as time and resources permit to ensure that it operates safely and as planned. Also, you must use your creativity to attempt to foresee the possible consequences of your work.

PERSONAL VS. BUSINESS ETHICS

In discussing engineering ethics, it is important to make a distinction between personal ethics and professional, or business, ethics, although there isn't always a clear boundary between the two. Personal ethics deals with how we treat others in our day-to-day lives. Many of these principles are applicable to ethical situations that occur in business and engineering. However, professional ethics often involves choices on an organizational level rather than a personal level. Many of the problems will seem different because they involve relationships between two corporations, between a corporation and the government, or between corporations and groups of individuals. Frequently, these types of relationships pose problems that are not encountered in personal ethics.
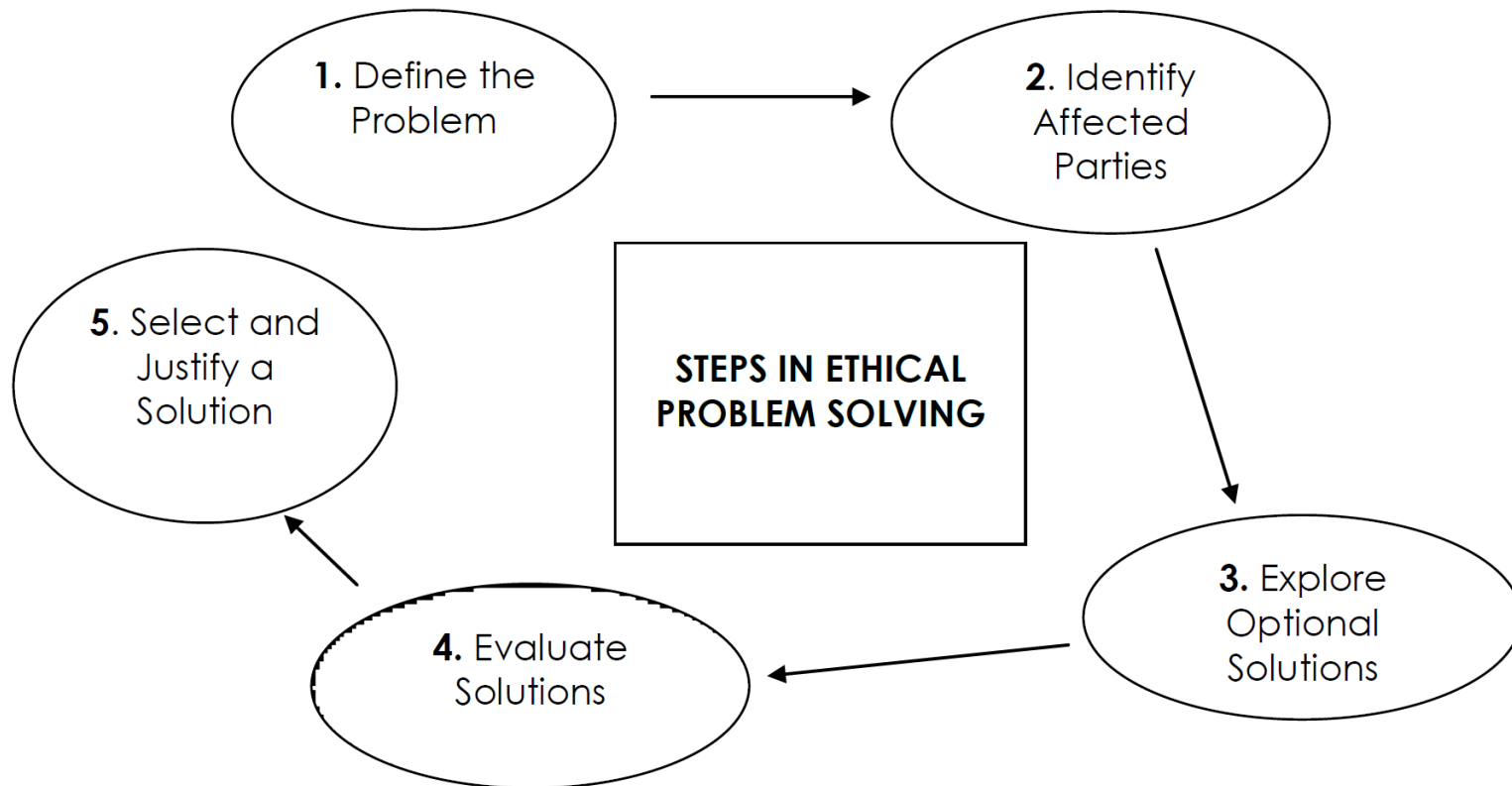
What is an Ethical Dilemma

An ethical dilemma (ethical paradox or moral dilemma) is a problem in the decision-making prosess between two possible options, neither of which is absolutely acceptable from an ethical perspective.

Ethical dilemmas are extremely complicated challenges that cannot be easily solved.

Therefore, the ability to find the optimal solution for ethical dilemmas is critical to everyone.

But How?

Steps in Ethical Decision Making

1. Define the problem

- The problem may seem obvious but it is advisable to study until it the whole problem is understood.

- Collect all the appropriate information, e.g. looking up records, asking for opinions

- Hard data is hard scientific, factual information. Soft data involves human factors such as feelings, opinions, attitudes, personality conflicts, frustrations,

- The real problem may not be what you initially think the problem is

- Apparent symptoms are clues to find out the real problem

- Clearly describe the problem.

- This description must be concise, objective, nonjudgmental, and should focus on the process

2. Identify affected Parties

- Who will be affected by any decisions made and the execution of the solution?

- If you have any doubts or questions, consult with relevant stakeholders

- It is important to communicate and consult with those affected in order to gain their support.

- A good place to start with problem recognition is an opening discussion to get all necessary stakeholder viewpoints on the table.

A problem well stated is a problem half solved.

John Dewey

3. Explore Optional Solutions

- This step involves formulating and devising a full range of alternatives
- From the information gathered, alternative actions are formulated.
- Potential strategies are explored that will address and permanently eliminate the root cause.
- A range of alternatives are generated

A problem well stated is a problem half solved.

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4. Evaluate Solutions

- Evaluate all the options in terms of cost, time, and complexity of each corrective action being considered.

- Each alternative is weighed according to its advantages and disadvantages.

- The alternative with the most advantages and the least disadvantages is then selected.

A prudent question is one-half of wisdom.

Francis Bacon

5. Select and Justify a Solution

- The final decision has to be rational and objective

- This involves comparative evaluation where poorest options are taken out of the equation and the options that remain are weighed against each other; the alternatives are ranked, scored and prioritised until a final choice is made.

- Decision-making implies using judgment, i.e. the application of knowledge, experience and common sense to analyse a matter logically

Three "ethics checks" to help individuals decide what is right:

1. **Is it legal?**
   Will I be violating either civil law or company policy?

2. **Is it balanced?**
   Is it fair to all concerned in the short term as well as the long term?
   Does it promote win-win relationships?

3. **How will it make me feel about myself?**
   Will it make me proud?
   Would I feel good if my decision was published in the newspaper?
   Would I feel good if my family knew about it?

Blanchard and Peale (1988)

Ethical Issues Facing Engineers

Some have to do with technical practice, but many others have to do with broader **considerations of business conduct**. These include:

- Relationships with clients, consultants, competitors, and contractors

- Ensuring legal compliance by clients, client's contractors, and others

- Conflict of interest

- Bribery and kickbacks, which might include:

- Gifts, meals, services, entertainment and recreation opportunities

- Treatment of confidential or proprietary information

- Consideration of the employer"s assets

- Outside employment/activities (moonlighting)

What is the meaning of Code of Ethics

A **code of ethics** document may outline;

- the mission and values of the business or organization,

- how professionals are supposed to approach problems,

- the **ethical** principles based on the organization's core values,

- and the standards to which the professional is held.

Most codes have common fundamental principles which boil down to four universal fundamental principles:

1. Respect for People's Dignity and Rights

2. Responsible Practice

3. Integrity in Relationships

4. Responsibility

IEEE – code of ethics

- IEEE - Institute of Electrical and Electronics Engineers

- Formed in 1963 as a merger of AIEE (American Institute of Electrical Engineers) and IRA (Institute of Radio Engineers)

- World's largest professional/technical organization for advancement of technology

- Majority of IEEE societies are in areas of ECE

- IEEE membership requires adherence to IEEE code of ethics

IEEE – code of ethics

1. to accept responsibility in making decisions consistent with the safety, health and welfare of the public, and to disclose promptly factors that might endanger the public or the environment;

2. to avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;

3. to be honest and realistic in stating claims or estimates based on available data;

4. to reject bribery in all its forms;

5. to improve the understanding of technology, its appropriate application, and potential consequences

6. to maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations;

7. to seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others;

8. to treat fairly all persons regardless of such factors as race, religion, gender, disability, age, or national origin;

9. to avoid injuring others, their property, reputation, or employment by false or malicious action;

10. to assist colleagues and co-workers in their professional development and to support them in following this code of ethics

Note 1: Green – overlap with NSPE fundamental cannons
Note 2: Code is broader than NSPE

Students Have a Code of Ethics too

Yıldız Technical University Academic Integrity Policy requires that each student:

1. Know the rules that preserve academic integrity and abide by them at all times. This includes learning and abiding by rules associated with specific classes, exams and course assignments.

2. Know the consequences of violating the Academic Integrity Policy.

3. Know the appeal rights, and the procedures to be followed in the event of an appeal.

4. Foster academic integrity among peers.

Engineering Ethics

TMMOB' UN mesleki davranış ilkelerinde belirtildiği gibi;

Mühendisler ,kendilerinden istenen işin toplum ve çevre için ciddi bir tehlike yaratacağı sonucuna varırlarsa ve bu konudaki mesleki yargıları işveren ya da üstü tarafından dikkate alınmıyorsa, görüşlerini işverene ya da üstlerine yazılı olarak bildirmeliler; sonuç alamamaları durumunda meslek örgütlerini ve gerektiğinde yetkili makamları ve kamu oyunu bilgilendirmeliler.

Plagiarism & Cheating

○ Many components go into being a good engineering student.

○ One of the most important, as reflected by the codes of ethics for engineers, is to be **competent** in your field of engineering.

○ To be competent, it is *necessary* that one actually knows what they claim to know.

○ Proving to others that you know what you are supposed to know requires certification through a degree.

What students Say @ Cheating

- 70% of American high school seniors admit to cheating on at least one test
- 95% of the students who said they cheated were never caught.
- An average of 75% of college students report cheating sometime during their college career
- At YTU, cheating is the act of obtaining or attempting to obtain credit for academic work through the use of any dishonest, deceptive, or fraudulent means.

Why Cheating is Wrong?

Cheating undermines the work of fellow students who are honest.

- When you cheat, all the other students who didn't cheat are penalized.

- They end up getting lower grades.

- As a consequence of lower grades they may lose out on scholarships and recommendations.

- Cheating undermines the credibility of the university and the degrees it awards.

Cheating vs. Teamwork

- Working on a team for an assigned project is *not* cheating.

- However, failing do due your assigned task on an a team project is a form of cheating. It is called *free-riding*, which is benefiting from the work of others without doing any work of your own.

- Teamwork is important in engineering, but free-riding is wrong, since if everyone did it nothing would get done.

Copying

One obvious type of cheating that we all recognize is copying someone's work on a homework assignment, exam, or paper.

Submitting someone's work as your own is a kind of cheating.

Multiple Submissions

Submitting your own work from one class to another class or submitting one piece of work to two distinct classes is a kind of cheating.

A paper for one class is not a paper for another class.

Unauthorized Sources

Using sources that one is not allowed to use as deemed by the instructor or the university as a whole is a kind of cheating, such as solution manuals.

Also a text message from your friend with the answer to a question on the exam is a form of cheating.

Surrogate

Surrogate cheating occurs when someone else either does your homework, takes an exam for you, or writes your paper.

Doing someone's work for them is a kind of cheating.

Ethics – Courage & Integrity

As we will be seeing more and more being ethical requires:

- **Courage** to do the right thing the situation calls for.

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- The **integrity** to withstand the pressures that push you in the wrong direction.

The Big Picture

- Codes of ethics are not a law

- Ethical behavior is not always protected by law

- Frequently ethical behavior may be perceived as disloyalty

- Many companies realize that ethical behavior is essential for their long term prosperity

- Ethically aware companies
  - Provide help to employees facing ethical conflicts
  - Allow employees to rise ethical concerns anonymously
  - Explicitly prevent any forms of retaliation for reporting unethical behavior

References

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