



GE105
Introduction to Engineering Design
College of Engineering
King Saud University

Studio 12.

Engineering Ethics: Case Studies

SPRING 2016

- **Case Study: Murder**

- Legal?
- Moral?
- Ethical?
- Good Etiquette?

- Answers:

- Illegal
- Immoral
- Unethical
- Bad etiquette!

Case Study: Driving over the speed limit when you are late for class

- Legal?
 - Moral?
 - Ethical?
 - Good Etiquette?
-
- Answers:
 - Illegal
 - Moral to some, immoral to others
 - Unethical
 - Bad etiquette if it effects other drivers

Case Study: Driving over the speed limit going to hospital for an emergency case.

- Legal?
- Moral?
- Ethical?
- Good Etiquette?

- Answers:
- Illegal
- Moral
- Ethical
- Etiquette does not apply

Question

- Ahmed was showing Ali a copy of a software package he got from a friend.
- Ali says, “this is great, but you didn’t pay for it, you shouldn’t really be using it.”
- Ahmed says, “Look, I can’t buy it because it is too expensive, so the company hasn’t lost a sale. Besides I didn’t take a physical object, so it isn’t stealing.”

What do you think:

- Ahmed is right – there is no problem, he isn’t stealing from the company?
- Ahmed should delete the software from his computer?
- Ahmed shouldn’t pirate software, but the company is not going to find out, so he should not delete it?

Question

On his way home from work, Ahmed goes into a store, picks up a candy bar and walks out without paying. Ethically, is this the same as pirating software?

- YES
- NO
- In some ways yes and some ways no

Question

- A chemical company develops a new process that results in some waste. Their internal studies show this waste can cause cancer.
- However, this type of waste is not on a government list of banned chemicals because it is new.
- Legal? Moral?
- Answers:
- Legal but immoral

Question

- Government self-regulations require that all purchases be made through purchasing agents.
- An engineer wishes to purchase an old alternator from a junkyard and does so with his own money.
- He reimburses himself with computer disks of equivalent value.

Legal? Moral?

Answers:

- Moral but illegal

Case study: Protecting the Safety of Society

- Your employer asks you to design a bridge that will not exceed \$1 million to build. After doing a study you determine the following:
 - An ideal bridge can be built for \$1.5 million.
 - Given the design constraints, a bridge built for \$1 million will collapse in a moderate earthquake.
- Your employer says, “if we don’t build the bridge for \$1 million, then we are going to have to fire half of the staff, including you.”
- He further asks you to go ahead with the next stage of the project
- What do you do?

What is the conflict?

- A. Your duty to your fellow employees vs. your duty to your boss
- B. Your duty to society vs. your loyalty to your own career
- C. Uncertainty about the maximum magnitude of an earthquake vs. the need to ensure a safe structure.
- D. Your duty to be honest to clients vs. your duty to complete the project

What is more important?

- The conflict is between your future employment and the employment of others in your company, and the welfare of society.
- The code of ethics for engineers requires You to take the safety of society as being of paramount importance.
- In a case like this the welfare of society comes first.

Case 2: Truth In Public Statements

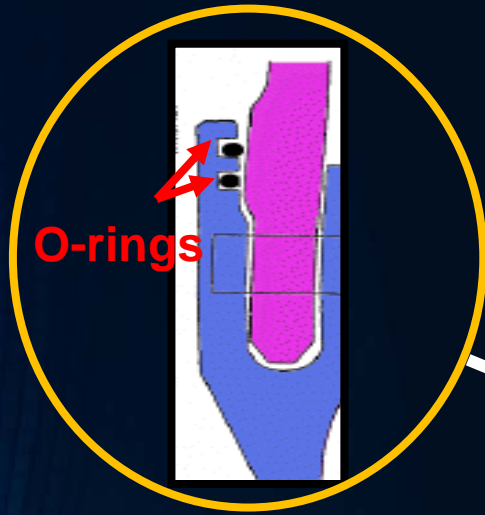
- You are asked by the government to verify that a certain industry will not leak toxic substances into the environment
- After doing a study you discover that:
 - The industry will likely cause harm within the coming 5 years, but there is significant uncertainty.
 - The industry cannot be evaluated more carefully unless it is shut down immediately.
 - Both the environment and the neighboring community are at risk

- After reading your report, the boss asks you to modify your report so as to reflect that the industry is actually safe.
- He claims that changing the report will protect the public in the area, preventing panic while the government attempts to shut down and fix the facility.
- What do you do?

What is the Conflict?

- The conflict is between your obligations as an engineer and your obligations as a citizen.
- The code of ethics requires that you safeguard the public's welfare. It also requires that you tell the truth when making public statements concerning your area of engineering.
- This means that you cannot alter data as an engineer, and that you must tell the truth about the facility.
- In this case your duty as an engineer to tell the truth when making public statement should win over your civic duty
- Role conflicts are hard!!!

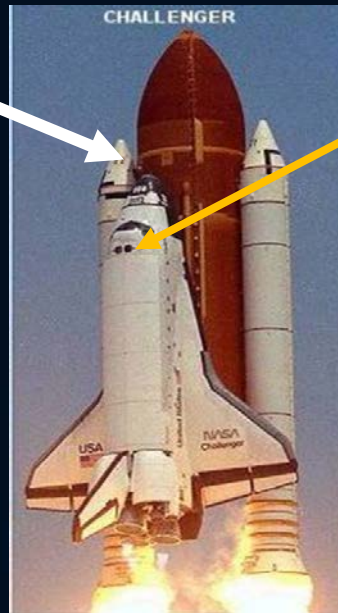
A famous case The Challenger Disaster (January 28, 1986) :



Economic considerations
Political pressures
Scheduling difficulties →
NASA decides to launch
anyway



Roger Boisjoly, chief O-ring engineer, had warned his colleagues that O-rings fail at relatively low temperatures



Challenger lifts off at
11:37 AM



Explodes 73 seconds after
launching

- O-ring seal indeed failed, flames burned the adjacent components and ignited the liquid hydrogen and oxygen in the external fuel tank; which caused orbiter to break apart
- Do you think NASA should have launched? Is there a clear moral issue here?
- Did NASA take unnecessary risks because of external pressure?
- Did the engineers violate their duty to put public safety first?

- Did NASA manager think of the potential costs?
 - Human lives
 - His reputation
 - Criminal charges
 - 100% of the blame on him
 - Suspension of the shuttle program
- How about other elements such as “whistle blowing”?
- ***It is a hard choice.*** You have to choose between the lesser of two evils.
- In the Challenger disaster, obviously the lesser of two evils choice should have been to **delay the launch.**