

Chapter 11 – Ethics in Design and the Profession

1. Describe the relationship between ethics and morals. [R]

Ethics and morals are two terms that are often used interchangeably. Ethics is the philosophy or study of moral obligations and the choices to be made by individuals. The choices made are based upon personal beliefs, and the decisions have relational repercussions. On the other hand, morals are fundamental principles, laws, or rules that are generally accepted and practiced by religions and belief systems of the world.

2. Describe the differences between morals and values. [R]

Morals are universal principles that govern behavior and are embodied in all major religions and belief systems of the world. Morals are laws or rules that are upheld by the masses as being good. However, a value is something that a certain body of people find worthwhile. A value is not often universally accepted because it's global relevance or because it may be good or bad.

3. Which patent is most relevant for engineering inventions, a design patent or utility patent? Why? [R]

The utility patent is most relevant for engineering inventions, because a design patent focuses more on the aesthetic design issues and less on the manner of technology being used.

4. What are the criteria that are used in evaluating patents? [R]

A patent must be novel, non-obvious, and useful. In order to be novel, the patent must be an original and new idea. Non-obvious states that another person would not be expected to develop the same idea based upon existing technology. Usefulness describes the fact that the device must perform a useful function that is able to be reduced to practice.

5. Explain the importance of claims in a patent application. [R]

Claims are the legal description of the invention and its unique aspects. They are used to determine if another party is infringing upon a patent; hence, they must be carefully thought out and properly worded. Because claims provided a patents protection, a very broad or very specific claim may be disadvantageous.

6. Discuss the tradeoffs involved between using patents and trade secrets to protect intellectual property. [R]

Unlike patents, trade secrets are not released to the general public. Ideas are kept secret among a select number of people, who are held liable via non-disclosure agreements. Protecting intellectual property by means of trade secrets assists in keeping other companies from finding out about it; however, once the secret is revealed, it is fair game for competitors to reverse-engineer the technology.

7. When can reverse-engineering be used, and how can the information obtained from it be used? [R]

Reverse-engineering is legal as long as the method of obtaining the information was legal. The information obtained from the reverse-engineering may not be copied it unless legally allowed to do so. Breaking encryptions is an example of illegally obtaining information.

8. What is the difference between negligence and strict liability in tort law? [R]

Negligence focuses on the method of producing a product and its effects on the end-user. It must be shown that the manufacturer did not follow reasonable standards and rules that apply to the situation and also committed a wrongful act. Negligence has three different levels – simple, gross, and criminal. These claims may be brought for design flaws, manufacturing defects, and failing to warn the user of safety hazards.

Strict liability is a less stringent standard than negligence and it focuses product itself and its effect on the end-user. Regardless of the standards used, or not used, in manufacturing, if the product had a defect or was dangerous when it left the hands of the manufacturer, the manufacturer may be held liable.

9. For the case study presented below, apply the ethical decision making paradigm presented in Section 11.5 to analyze the situation. Present potential solutions to the scenario and provide a discussion of them. [A]

This case-study is one that we use nearly every year for an in-class discussion. It always provokes the most debate among our students, and they split almost evenly on the sides of the two companies. Let's go through the steps of the process:

Step 1: Gather Information

Here are some questions to consider:

- Is Company P doing anything illegal? How about unethical? It certainly does appear that this is unethical in what Company P is trying to do – they are trying to represent themselves as Company C. It is not clear if this is illegal – probably not.
- However, many students have argued strongly that Company C may be trying to develop a monopoly. Is it monopolistic? It does not mean other companies cannot supply disks, only that they cannot use these diagnostics. In fact, other companies could probably also develop software to carry out similar diagnostics.
- Company C could have done a better job of protecting itself by using encryption or some other method to protect its diagnostics.

Step 2: Identify the Stakeholders

The following people will be affected by the decision.

- Company C. Company C will be hurt monetarily by this action.
- Company P. They stand to gain in market shares. They could be hurt if legal action is brought against them. This could also hurt their reputation.
- Users of the disks of Company P. Company C could change part of the protocols for the diagnostics, rendering the diagnostics on Company P disks useless.

Step 3: Identify Relevant Ethical Values

- IEEE Code Element 3. This is not an honest claim by Company P.
- IEEE Code Element 9. This could hurt company C.

- IEEE Code Element 9. The management of Company P is clearly asking their employee to do something unethical.

Step 4: Determine a Course of Action

Some possible courses of action are:

- A) You, the engineer, could follow the advice of management.
- B) You, the engineer, could recommend writing your own software diagnostic code and have the users of your disks install and utilize that.
- C) You could negotiate a deal with Company C to use their diagnostics and pay them a royalty based upon the number of disk drives sold.
- D) You could simply refuse to do it and explain to the management why not.

Options B, C, and D are the most ethical and advisable. Following what the management recommends is unethical. B and C seem like good approaches to provide the service in an ethical way.

10. For the case study presented below, apply the ethical decision making paradigm presented in Section 11.5 to analyze the situation. Present potential solutions to the scenario and provide a discussion of them. [A]

Step 1: Gather Information

This is a case where some unintended actions lead to an ethical dilemma. In its original use, the software was not necessarily to be distributed overseas, at least the engineer did not know that it would be. The supervisor's response is not very good, even if he is correct in that the software would not be used outside of the company, which it turns out it was.

Step 2: Identify Stakeholders

- The employees of the company – this could bring legal action against the company.
- US citizens. The reason that the government passed this law was so that the encryption algorithms would not fall into hands of people outside of the US who would want to harm its citizens.

Step 3: Relevant Ethical Values (from the IEEE Code)

- #1. This could endanger the welfare of the public.
- #7. Acknowledge and correct errors. Although this was perhaps an unintentional error, it should be acknowledged and corrected.
- #10. Again, the supervisor gave bad advice here that did not assist others in being ethical.

Step 4: Determine a Course of Action

- A) Do nothing.

B) Bring this to the attention of your supervisor. If not, go to the next level supervisor, etc, until the issue is resolved.

C) Be a whistleblower and bring it to the attention of the government.

A is clearly not a good option, and something should be done to resolve this issue. Option B makes the most sense in that attempts should be made to resolve the issue internally. Option C makes sense only after option B is exhausted. Failure to resolve it internally would lead one to believe that this could bring harm to the public.

11. For the case study presented below, apply the ethical decision making paradigm presented in Section 11.5 to analyze the situation. Present potential solutions to the scenario and provide a discussion of them. [A]

Step 1: Gather Information

The measurement equipment in question has a design fault according to your analysis of the problem. It is not clear from the problem statement whether or not a failure of this equipment could endanger the health of a patient, but presumably it could.

Step 2: Relevant Ethical Values from the Code

- #1. Could potentially endanger the safety of a patient.
- #3. To be honest in stating claims. In this case the manager is not being honest in stating that there is no problem with the equipment.
- #7. To accept criticism and correct errors that may exist.
- #8. To avoid injuring others.

Step 3: Stakeholders

Both companies, all patients who are monitored by the system, and the hospitals who use the equipment.

Step 4: Determine a Course of Action

In this case, the engineer should do something. The potential of the design fault harming somebody is a real risk. You could present a design fix to the management of your company. You should also bring this to their attention until the issue is resolved. Depending upon the severity of the potential problem of inaction, it may be necessary to blow the whistle and go outside of the company.

12. For the case study presented below, apply the ethical decision making paradigm presented in Section 11.5 to analyze the situation. Present potential solutions to the scenario and provide a discussion of them. [A]

Step 1: Gather Information

Jerry is probably being nice in this case to supervise the installation and not interfere with your vacation. However, the reality is that it is your responsibility to supervise the installation.

Step 2: Identify Stakeholders

You, your company, the other company (Boulding), and the people who utilize the equipment.

Step 3: Relevant Ethical Values

- #1. Need to make a decision that is consistent with the health & safety of the users.
- #2. To avoid conflicts of interest. The engineer has a conflict mainly because of the issue of the vacation. Otherwise, it is likely that the engineer (you) would stay to finish the job without question.
- #4. To reject bribery. It is not clear that there is bribery in this case, but it is possible that Jerry would ask for a return favor in the future.

Step 4: Determine a Course of Action

- A) Turn down the offer and stay to oversee the installation.
- B) Call your company and explain the situation. See what they recommend.
- C) Go skiing – Jerry can handle it!

Option A is the safest course of action. However, Option B is a pretty good idea. It may turn out that your company would offer to send another engineer, or perhaps agree that Jerry is capable of completing the installation. Option C) sounds like fun, but could lead to problems, particularly if anyone is ever injured by the equipment.