Engineering Ethics

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6 The Rights and Responsibilities of Engineers

Objectives

After reading this chapter, you will be able to

- Discuss the responsibilities and rights that engineers have
- Understand what a conflict of interest is and know how to manage one

- Determine what whistle-blowing is and when it is appropriate to blow the whistle.

In the early 1970s, work was nearing completion on the Bay Area Rapid Transit (BART) system in the San Francisco Bay metropolitan area. The design for BART was very innovative, utilizing a highly automated train system with no direct human control of the trains. In the spring of 1972, three engineers working for BART were fired for insubordination. During the course of their work on the project, the three had become concerned about the safety of the automated control system and were not satisfied with the test procedures being used by Westinghouse, the contractor for the BART train controls.

Unable to get a satisfactory response from their immediate supervisors, the engineers resorted to an anonymous memo to upper management detailing their concerns and even met with a BART board member to discuss the situation. The information on the problems at BART was leaked to the press by the board member, leading to the firing of the engineers. They subsequently sued BART and were aided in their suit by the Institute of Electrical and Electronics Engineers (IEEE), which contended that they were performing their ethical duties as engineers in trying to protect the safety of the public that would use BART. Eventually, the engineers were forced to settle the case out of court for only a fraction of the damages that they were seeking.

There are many rights and responsibilities that engineers must exercise in the course of their professional careers. Often, these rights and responsibilities overlap. For example, the BART engineers had a responsibility to the public to see that the BART system was safe and the right to have their concerns taken seriously by management

without risking their jobs. Unfortunately, in this case, their rights and responsibilities were not respected by BART. In this chapter, we will take a closer look at these and other rights and responsibilities of engineers.

6.1 INTRODUCTION

The codes of ethics of the professional engineering societies spell out, sometimes in great detail, the responsibilities entailed in being an engineer. However, the codes don't discuss any of the professional rights that engineers should enjoy. There is often a great deal of overlap between these rights and responsibilities. As we saw in the BART case described at the beginning of this chapter, an engineer has a duty to protect the public, by blowing the whistle if necessary, when he perceives that something improper is being done in his organization. The engineer has a right to do this even if his employer feels that it is bad for the organization.

In this chapter, we will discuss the engineer's responsibilities in more detail and also look at the rights of engineers, especially with regard to issues of conscience and conflicts with the rights of employers or clients.

6.2 PROFESSIONAL RESPONSIBILITIES

We will begin our discussion of professional rights and responsibilities by first looking more closely at a few of the important responsibilities that engineers have.

6.2.1 Confidentiality and Proprietary Information

A hallmark of the professions is the requirement that members of the profession keep certain information of their client secret or confidential. Confidentiality is mentioned in most engineering codes of ethics. This is a well-established principle in professions such as medicine, where the patient's medical information must be kept confidential, and in law, where attorney–client privilege is a well-established doctrine. This requirement applies equally to engineers, who have an obligation to keep proprietary information of their employer or client confidential.

Why must some engineering information be kept confidential? Most information about how a business is run, its products and its suppliers, directly affects the company's ability to compete in the marketplace. Such information can be used by a competitor to gain advantage or to catch up. Thus, it is in the company's (and the employee's) best interest to keep such information confidential to the extent possible.

What types of information should be kept confidential? Some of these types are very obvious, including test results and data, information about upcoming unreleased products, and designs or formulas for products. Other information that should be kept confidential is not as obvious, including business information such as the number of employees working on a project, the identity of suppliers, marketing strategies, production costs, and production yields. Most companies have strict policies regarding the disclosure of business information and require that all employees sign them. Frequently, internal company communications will be labeled as "proprietary." Engineers working for a client are frequently required to sign a nondisclosure agreement. Of course, those engineers working for the government, especially in the defense industry, have even more stringent requirements about secrecy placed on them and may even require a security clearance granted after investigation by a governmental security agency before being able to work.

It seems fairly straightforward for engineers to keep information confidential, since it is usually obvious what should be kept confidential and from whom it should be kept. However, as in many of the topics that we discuss in the context of

engineering ethics, there are gray areas that must be considered. For example, a common problem is the question of how long confidentiality extends after an engineer leaves employment with a company. Legally, an engineer is required to keep information confidential even after she has moved to a new employer in the same technical area. In practice, doing so can be difficult. Even if no specific information is divulged to a new employer, an engineer takes with her a great deal of knowledge of what works, what materials to choose, and what components not to choose. This information might be considered proprietary by her former employer. However, when going to a new job, an engineer can't be expected to forget all of the knowledge already gained during years of professional experience.

The courts have considered this issue and have attempted to strike a balance between the competing needs and rights of the individual and the company. Individuals have the right to seek career advancement wherever they choose, even from a competitor of their current employer. Companies have the right to keep information away from their competitors. The burden of ensuring that both of these competing interests are recognized and maintained lies with the individual engineer.

6.2.2 Conflict of Interest

Avoiding conflict of interest is important in any profession, and engineering is no exception. A conflict of interest arises when an interest, if pursued, could keep a professional from meeting one of his obligations [Martin and Schinzinger, 2000]. For example, a civil engineer working for a state department of highways might have a financial interest in a company that has a bid on a construction project. If that engineer has some responsibility for determining which company's bid to accept, then there is a clear conflict of interest. Pursuing his financial interest in the company might lead him not to objectively and faithfully discharge his professional duties to his employer, the highway department. The engineering codes are very clear on the need to avoid conflicts of interest like this one.

There are three types of conflicts of interest that we will consider [Harris, Pritchard, and Rabins, 2000]. First, there are actual conflicts of interest, such as the one described in the previous paragraph, which compromise objective engineering judgment. There are also potential conflicts of interest, which threaten to easily become actual conflicts of interest. For example, an engineer might find herself becoming friends with a supplier for her company. Although this situation doesn't necessarily constitute a conflict, there is the potential that the engineer's judgment might become conflicted by the desire to maintain the friendship. Finally, there are situations in which there is the appearance of a conflict of interest. This might occur when an engineer is paid based on a percentage of the cost of the design. There is clearly no incentive to cut costs in this situation, and it may appear that the engineer is making the design more expensive simply to generate a larger fee. Even cases where there is only an appearance of a conflict of interest can be significant, because the distrust that comes from this situation compromises the engineer's ability to do this work and future work and calls into question the engineer's judgment.

A good way to avoid conflicts of interest is to follow the guidance of the company policy. In the absence of such a policy, asking a coworker or your manager will give you a second opinion and will make it clear that you aren't trying to hide something. In the absence of either of these options, it is best to examine your motives and use ethical problem-solving techniques. Finally, you can look to the statements in the professional ethics codes that uniformly forbid conflicts of interest. Some of the codes have very explicit statements that can help determine whether or not your situation is a conflict of interest.

6.2.3 Competitive Bidding

Historically, the codes of ethics of the engineering societies included a prohibition on competitive bidding for engineering services. This ban mirrored similar prohibitions in the codes of ethics of other professions such as law and medicine and forbid engineers to compete for engineering work based on submitting price proposals rather than soliciting work and charging customers based on a fixed fee structure.

Competitive bidding was prohibited for several reasons. Primarily, bidding was considered to be undignified and not at all in keeping with the image that the engineering profession desired to put forth to the public. In addition, there were concerns that if engineers engaged in competitive bidding, it would lead to price being the most significant (or perhaps only) basis for awarding engineering contracts. This could lead to engineers cutting corners on design work and could ultimately undermine engineers' duty to protect the safety and welfare of the public.

In 1978, the U.S. Supreme Court ruled that professional societies may no longer prohibit competitive bidding. This ruling was based on the Sherman Anti-trust Act of 1890 and held that banning bidding was an unfair restraint on free trade. This ruling did not compel individual firms or engineers to participate in competitive bidding. Rather, it said that professional societies could not attempt to prohibit the practice. The ruling did, however, permit the licensure boards of the individual states to continue to prohibit competitive bidding. This ruling also allowed engineers to advertise, which similarly used to be prohibited by the engineering codes of ethics. The rationale behind the Supreme Court ruling was that competitive bidding allows less experienced but competent engineers to compete effectively for work, serves the public interest by helping to keep engineering costs down, and might help promote innovation that leads to better designs and lower costs.

Even though engineers in many states can now participate in competitive bidding, there are many ethical issues related to this practice that engineers should consider. From the engineer's perspective, competitive bidding can lead to temptations such as submitting an unrealistically low bid in order to secure work (lowballing) and then making up for this through change orders once the work has been secured, overstating of qualifications to secure work, making negative and disparaging comments about potential other bidders, and attempting to subvert the bidding process through back channel contacts. There are also concerns that if an engineering firm submits a lowball bid that is accepted, they are then in the position of having to cut corners in order to complete the work at the bid price. Of course, these sorts of concerns are not unique to the engineering profession nor are they unique to the competitive bidding process. But when participating in a competitive bid process, engineers must be sure to be fair, honest, and ethical.

The competitive bidding process also creates ethical concerns from the perspective of an engineer's prospective clients. For example, how does a potential client effectively weigh the relative importance of cost, the qualifications of the engineer, and the proposed approach in determining which engineer wins the job? And, how does the potential client ensure that the decision process is fair, especially since it is easy to skew the results?

6.3 PROFESSIONAL RIGHTS

We have seen how the professional status of engineering confers many responsibilities on the engineer. Engineers also have rights that go along with these responsibilities. Not all of these rights come about due to the professional status of engineering. There are rights that individuals have regardless of the professional

status, including the right to privacy, the right to participate in activities of one's own choosing outside of work, the right to reasonably object to company policies without fear of retribution, and the right to due process.

The most fundamental right of an engineer is the right of professional conscience [Martin and Schinzinger, 2000]. This involves the right to exercise professional judgment in discharging one's duties and to exercise this judgment in an ethical manner. This right is basic to an engineer's professional practice. However, it is no surprise that this right is not always easy for an employer to understand.

The right of professional conscience can have many aspects. For example, one of these aspects might be referred to as the "Right of Conscientious Refusal" [Martin and Schinzinger, 2000]. This is the right to refuse to engage in unethical behavior. Put quite simply, no employer can ask or pressure an employee into doing something that she considers unethical and unacceptable. Although this issue is very clear in cases for which an engineer is asked to falsify a test result or fudge on the safety of a product, it is less clear in cases for which the engineer refuses an assignment based on an ethical principle that is not shared by everyone. For example, an engineer ought to be allowed to refuse to work on defense projects or environmentally hazardous work if his conscience says that such work is immoral. Employers should be reasonably accommodating of that person's request. We will amplify this point with regard to defense work in the next section.

6.3.1 Engineers and the Defense Industry

One of the largest employers of engineers worldwide is the defense industry. This is by no means a modern trend; throughout history, many innovations in engineering and science have come about as the result of the development of weapons. Since fundamentally, weapons are designed for one purpose—to kill human beings—it seems important to look at this type of engineering work in the context of engineering ethics and the rights of engineers.

An engineer may choose either to work or not to work in defense-related industries and be ethically justified in either position. Many reasonable engineering professionals feel that ethically, they cannot work on designs that will ultimately be used to kill other humans. Their remoteness from the killing doesn't change this feeling. Even though they won't push the button or may never actually see the victims of the use of the weapon, they still find it morally unacceptable to work on such systems.

On the other hand, equally morally responsible engineers find this type of work ethically acceptable. They reason that the defense of our nation or other nations from aggression is a legitimate function of our government and is an honorable goal for engineers to contribute to. Both of these positions can be justified using moral theories and ethical problem-solving techniques.

Even if an engineer finds defense work ethically acceptable, there might be uses of these weapons or certain projects that he considers questionable. For example, is it acceptable to work on weapons systems that will only be sold to other nations? Is the use of weapons to guarantee our "national interests," such as maintaining a steady supply of foreign oil, an acceptable defense project?

Given the issues that surround defense work, what is an engineer to do when asked to work on a weapons project he considers questionable? As with many of the ethical dilemmas that we have discussed in this book, there is no simple solution, but rather the answer must be determined by each individual after examination of his values and personal feelings about the ethics of defense work. It is important to avoid working on any project that you deem unethical, even if it might lead to a

career advancement, or even if it is a temporary job. (This principle also holds true for projects that you feel are unsafe, bad for the environment, etc.) It can be argued that weapons work is the most important type of engineering, given its consequences for mankind. Because of the implications to human life, this type of engineering requires an even more stringent examination of ethical issues to ensure responsible participation.

6.4 WHISTLE-BLOWING

There has been increased attention paid in the last 30 years to whistle-blowing, both in government and in private industry. Whistle-blowing is the act by an employee of informing the public or higher management of unethical or illegal behavior by an employer or supervisor. There are frequent newspaper reports of cases in which an employee of a company has gone to the media with allegations of wrongdoing by his or her employer or in which a government employee has disclosed waste or fraud. In this section, we will examine the ethical aspects of whistle-blowing and discuss when it is appropriate and when it isn't appropriate. We will also look at what corporations and government agencies can do to lessen the need for employees to take this drastic action.

Whistle-blowing is included in this chapter on rights and responsibilities because it straddles the line between the two. According to the codes of ethics of the professional engineering societies, engineers have a duty to protect the health and safety of the public, so in many cases, an engineer is compelled to blow the whistle on acts or projects that harm these values. Engineers also have the professional right to disclose wrongdoing within their organizations and expect to see appropriate action taken.

6.4.1 Types of Whistle-Blowing

We will start our discussion of whistle-blowing by looking at the different forms that whistle-blowing takes. A distinction is often made between internal and external whistle-blowing. Internal whistle-blowing occurs when an employee goes over the head of an immediate supervisor to report a problem to a higher level of management. Or, all levels of management are bypassed, and the employee goes directly to the president of the company or the board of directors. However it is done, the whistle-blowing is kept within the company or organization. External whistle-blowing occurs when the employee goes outside the company and reports wrongdoing to newspapers or law-enforcement authorities. Either type of whistle-blowing is likely to be perceived as disloyalty. However, keeping it within the company is often seen as less serious than going outside of the company.

There is also a distinction between acknowledged and anonymous whistle-blowing. Anonymous whistle-blowing occurs when the employee who is blowing the whistle refuses to divulge his name when making accusations. These accusations might take the form of anonymous memos to upper management (as in the BART case discussed later) or of anonymous phone calls to the police or FBI. The employee might also talk to the news media but refuse to let her name be used as the source of the allegations of wrongdoing. Acknowledged whistle-blowing, on the other hand, occurs when the employee puts his name behind the accusations and is willing to withstand the scrutiny brought on by his accusations.

Whistle-blowing can be very bad from a corporation's point of view because it can lead to distrust, disharmony, and an inability of employees to work together. The situation can be illustrated by an analogy with sports. If the type of whistle-

blowing we are discussing here was performed during a game, it would not be the referees who stopped play because of a violation of the rules. Rather, it would be one of your own teammates who stopped the game and assessed a penalty on your own team. In sports, this type of whistle-blowing would seem like an act of extreme disloyalty, although perhaps it is the "gentlemanly" thing to do. Similarly, in business, whistle-blowing is perceived as an act of extreme disloyalty to the company and to coworkers.

6.4.2 When Should Whistle-Blowing Be Attempted?

During the course of your professional life, you might come across a few cases of wrongdoing. How do you know when you should blow the whistle? We will start to answer this question by first looking at when you *may* blow the whistle and then looking at when you *should* blow the whistle. Whistle-blowing should only be attempted if the following four conditions are met [Harris, Pritchard, and Rabins, 2000]:

1. *Need.*   There must be a clear and important harm that can be avoided by blowing the whistle. In deciding whether to go public, the employee needs to have a sense of proportion. You don't need to blow the whistle about everything, just the important things. Of course, if there is a pattern of many small things that are going on, this can add up to a major and important matter requiring that the whistle be blown. For example, if an accident occurs at your company, resulting in a spill of a small quantity of a toxic compound into a nearby waterway that is immediately cleaned up, this incident probably does not merit notifying outside authorities. However, if this type of event happens repeatedly and no action is taken to rectify the problem despite repeated attempts by employees to get the problem fixed, then perhaps this situation is serious enough to warrant the extreme measure of whistle-blowing.

2. *Proximity.*   The whistle-blower must be in a very clear position to report on the problem. Hearsay is not adequate. Firsthand knowledge is essential to making an effective case about wrongdoing. This point also implies that the whistle-blower must have enough expertise in the area to make a realistic assessment of the situation. This condition stems from the clauses in several codes of ethics which mandate that an engineer not undertake work in areas outside her expertise. This principle applies equally well to making assessments about whether wrongdoing is taking place.

3. *Capability.*   The whistle-blower must have a reasonable chance of success in stopping the harmful activity. You are not obligated to risk your career and the financial security of your family if you can't see the case through to completion or you don't feel that you have access to the proper channels to ensure that the situation is resolved.

4. *Last resort.*   Whistle-blowing should be attempted only if there is no one else more capable or more proximate to blow the whistle and if you feel that all other lines of action within the context of the organization have been explored and shut off.

These four conditions tell us when whistle-blowing is morally acceptable. But when is an engineer morally obligated to blow the whistle? There may be situations in which you are aware of wrongdoing and the four conditions discussed above have been met. In this case, the whistle *may* be blown if you feel that the matter is sufficiently important. You are only *obligated* to blow the whistle when there is great imminent danger of harm to someone if the activity continues and the four conditions have been met. A great deal of introspection and reflection is required before whistle-blowing is undertaken.

It is important for the whistle-blower to understand his motives before undertaking this step. It is acceptable to blow the whistle to protect the public interest, but not to exact revenge upon fellow employees, supervisors, or your company. Nor is it acceptable to blow the whistle in the hopes of future gains through book contracts and speaking tours.

6.4.3 Preventing Whistle-Blowing

So far, our discussion of whistle-blowing has focused on the employee who finds herself in a situation in which she feels that something must be done. We should also look at whistle-blowing from the employer's point of view. As an employer, I should seek to minimize the need for employees to blow the whistle within my organization. Clearly, any time that information about wrongdoing becomes public, it is harmful to the organization's image and will negatively affect the future prospects of the company. How, then, do I stop this type of damage?

In answering this question, we must acknowledge that it is probably impossible to eliminate all wrongdoing in a corporation or government agency. Even organizations with a very strong ethical culture will have employees who, from time to time, succumb to the temptation to do something wrong. A typical corporate approach to stemming whistle-blowing and the resulting bad publicity is to fire whistle-blowers and to intimidate others who might seem likely to blow the whistle. This type of approach is both ineffective and ethically unacceptable. No one should be made to feel bad about trying to stop ethically questionable activities.

There are four ways in which to solve the whistle-blowing problem within a corporation. First, there must be a strong corporate ethics culture. This should include a clear commitment to ethical behavior, starting at the highest levels of management, and mandatory ethics training for all employees. All managers must set the tone for the ethical behavior of their employees. Second, there should be clear lines of communication within the corporation. This openness gives an employee who feels that there is something that must be fixed a clear path to air his concerns. Third, all employees must have meaningful access to high-level managers in order to bring their concerns forward. This access must come with a guarantee that there will be no retaliation. Rather, employees willing to come forward should be rewarded for their commitment to fostering the ethical behavior of the company. Finally, there should be willingness on the part of management to admit mistakes, publicly if necessary. This attitude will set the stage for ethical behavior by all employees.
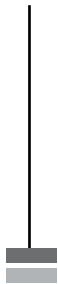
KEY TERMS

Conflict of interest   Confidentiality   Whistle-blowing

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