

# Chapter 3

## Engineering Ethics in Technological Design

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### ABSTRACT

*Engineering's main goal is to do and invent. Today's engineering, as the motive force of technology, has reached pressing new ethical issues. The objective of this chapter is to explain the role of engineering ethics in technological design. This chapter concentrates on ethical issues that have a direct influence on the design of a product and the way it is used. In general, it focuses on ethical issues concerning safety and sustainability.*

### INTRODUCTION

In the past few decades, rapid changes have been made in engineering education, including a growing emphasis on ethics and social responsibility. Engineering is not only applying scientific laws and principles to technical problems. It is focused on improving the lot of society, and as such, it brings engineers into the mainstream of business and industry. Almost all entry-level engineers become involved, at least tangentially, with situations that call for some understanding of the law and situations that call for ethical judgments.

Engineering technology has a profound influence on society. New possibilities and new risks arise as a consequence of the employment of new technologies and products. Decisions made during design processes shape the possibilities and

risks of products. These decisions are ethically relevant. Some decisions, for example, can have a large influence on the safety of people using the product. Although there is an extensive literature on design processes and on engineering ethics, specific attention to ethical issues in design processes is relatively new.

We will call a problem an ethical or moral problem if moral values are at stake. According to Nagel (1979), there are different sources of value, special allegiances, general rights, utility, and perfectionist ends of self-development and individual projects that cannot be reduced to each other or to more fundamental values (Gorp, 2005, p. 14). Values based on special allegiances are, according to Nagel, a result of a subject's relationships to others and consist of special obligations to other people or institutions. General rights are

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rights that everyone has as a human being. These rights constrain action; actions that violate these rights are morally not permitted. According to Nagel (1979), utility includes all aspects of benefit and harm to all people. Perfectionist ends of self-development refer to the intrinsic value of certain achievements. Nagel provides examples of the intrinsic value of scientific discovery or artistic creation. The fifth type of value derives from individual projects. Nagel says that “this is value in addition to whatever reasons may have led to them in the first place” (pp.129–130). An example Nagel gives is that if you have set out to climb to the top of Mount Everest then this project gains importance. Ethical theories usually focus on one of the sources of value. Kantianism focuses on universal rights. Utilitarianism only accounts for utility. Virtue ethics concentrates on perfectionist end of self-development.

In this chapter, issues that are related to one of the sources of moral values identified by Nagel are called ethical issues and decisions concerning ethical issues are called “ethically relevant” decisions. For example, issues concerning safety are related to utility but also to universal rights, therefore safety is an ethical issue. The term “ethical issue” only indicates that the way engineers deal with an issue can be evaluated from a moral point of view.

The objective of this chapter is to explain engineering ethics and issues in technological design. Engineering ethics is the field of study that focuses on the ethical aspects of the actions and decisions of engineers, both individually and collectively. To take into account all ethical issues connected in one way or another to a design process would be impossible. It is not that difficult to point out the ethical relevance of what seems to be a very trivial choice, like which dress to wear during meetings of a design team. Lots of ethical issues might play a role in the design context, for example, chocolate made by children in countries like South Africa. This chapter will concentrate on ethical issues that have a direct

influence on the design of a product and the way it is used. In general, it will focus on ethical issues concerning safety and sustainability. The reason for the focus on safety and sustainability is that these issues play a dominant role in many design processes. Given this conception of ethical issues it is clear that safety and sustainability may give rise to ethical issues. Decisions made about these issues are related to utility and general rights. Decisions regarding safety and sustainability are made in almost every design process, although the importance of these subjects may differ. In some cases, sustainability or safety will not be regarded or discussed by the engineers, but this does not mean that there are no choices made regarding sustainability or safety.

## **LEGAL AND ETHICAL ISSUES**

Some of the ethical issues are also legal issues, for example safety issues.

The following are examples of where a design engineer might be concerned with ethical issues:

- Preparing a contract to secure the services of a product data management firm.
- Reviewing a contract to determine whether a contractor who built an automated production facility has satisfactorily fulfilled the terms of a contract.
- Deciding whether it is legal and ethical to reverse engineer a product.
- Managing a design project to avoid the possibility of a product liability suit.
- Protecting the intellectual property created as part of a new product development activity.
- Deciding whether to take a job with a direct competitor that is bidding on a contract in the area where you are now working.

The law is a formalized code of conduct describing what laws reflect what society values.

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