

Professional Ethics in Engineering

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Abstract— The paper aims to discuss about the essential ethics (morals or principles) regarding profession of Engineering and the requirement also of these ethics like of responsibilities, rights, desirable ideals and personal commitments in engineering. It is the study of decisions, policies, and values desirable in engineering. This study may be helpful in improving skills in moral awareness, coherence, imagination, communication and, perhaps more indirectly, strengthening respect for persons, tolerance of diversity and confidence in resolving moral conflicts to preserve integrity. Professions are the forms of work involving expertise, independent judgement, self-regulation and service to the public. Codes of ethics state the moral responsibilities of engineers as seen by the profession and represented by professional society, they express the profession's collective commitment to ethics, codes are enormously important not only in stressing responsibilities but also the freedom to exercise the engineers. There is description of responsibilities of individual and corporate as well which will throw light on vivid meanings of it like obligations, moral accountability, praiseworthiness and blameworthiness. Professional ethics supports responsible conduct and prevents both wrong doings and doers. Importance of shared responsibilities and personal commitments also plays vital role here. An attempt has been made to elaborate and discuss the responsibilities of engineers, related to the society and human beings, in an expatiated way, as engineers are the backbone of society.

I. INTRODUCTION

Ethics and Professionalism

1. Professional Ethics:

With this overview of themes sampling of issues in mind, we can now define engineering ethics. The word ethics has several meanings. In the sense used in the Morality refers to moral values that are sound, actions that are morally required, policies and laws that are desirable. Accordingly, engineering ethics consists of the responsibilities and rights that ought to be endorsed by those engaged in engineering.

Normative sense differ from ethics or the ethics of American engineers, referring there by to what specific individuals or groups believe and how they act, without implying that their beliefs and actions are justified. In another descriptive sense, social scientists study ethics when they describe and explain what people believe and how they act, they conduct opinion poll, observe behavior, examine documents written by professional societies and uncover the social forces shaping engineering ethics.

What is morality? Dictionaries tell us that morality is about right and wrong, good and bad values and what ought to be

done. But such definitions are incomplete, morality concerns moral right and wrong. It is a 'circular definition' that uses the word we are trying to define.

Morality is not easy to define; for example, if we say that morality utilitarianism. If we say that morality is about human rights, we invoke rights ethics. And if we say that morality is essentially about good character, we might be invoking virtue ethics.

Hoover says in his days it was easier for individual engineers to work with a sense of personal responsibility for an entire project. When a bridge fell or ship sank, the engineer's responsibility could be more easily identified.

Today, the products of engineering are "out in the open" as much as they were in Hoover's time. Technological progress is taken for granted and technological failure is blamed on corporations.

This "invisibility" can make it difficult for engineers to retain a sense of mutual understanding with the public. Nevertheless, an individual who accepts responsibility for their work can make an enormous difference.

2. What Are professions?

Profession is any occupation that provides a means by which to earn a livelihood. Professions are forms of work involve advanced expertise, self-regulations and concerted service to the public good.

- 1. Advanced expertise.* Professions require sophisticated skills and theoretical knowledge. Preparation to engage in the work typically requires extensive formal education, including technical studies in one or more areas of systematic knowledge as well as broader studies in the liberal arts (humanities sciences, arts). Generally, updated knowledge is also required.
- 2. Self – regulation:* Well-established societies of professional are allowed by the public to play a major role in setting standards for admission to the profession, drafting codes of ethics, enforcing standards of conduct, and representing the profession before the public and the government and is referred to as the "autonomy of the profession".
- 3. Public good.* The occupations serve some important aspect of public good, and it does so, by making a concerted effort to maintain high ethical standards. For example, medicine is directed toward protecting the public's legal rights, and engineering toward

technological solutions which in order to ensure the public good is served, need to be taken seriously though out the profession.

Attempt to distinguish profession for other forms of works is an elitist attempt to elevate the prestige and income of certain groups of workers, for example, hair cutting, selling real estate garbage collections and professional sports do not require advanced expertise.

3. Dimensions of Engineering

Ethics involve appreciating the many positive dimensions of engineering that so deeply enrich our lives. Most technology, however, has double implications. As it creates benefits it raises new moral challenges. This chapter introduces engineering ethics and states the goals in studying it.

Engineers' motives are as many and varied. The desire for meaningful work care for other human beings and the need to maintain self- respect all combine to motivate excellence in engineering. Engineering is about people as well as products, and the people include engineers who stand in moral relationships with customer's colleagues, employers and the general public.

The personal commitments of individual engineers need to be aimed at and integrated with these shared responsibilities. Family, and personal ambitions highly personal. So "personal commitments" include both commitments to responsibilities and these more individual commitments.

Engineers encounter both moral and technical problems concerning variability in the materials available to them, the quality of work by coworkers at all levels, pressures imposed by time and the whims of the marketplace, and relationships of authority within corporations.

Products can be mass- produced household appliances or an oil refinery complex, entrepreneurs, or consultants. Tasks include creating the concept of a new product, improving an existing product, detailed design of part of an engine, or manufacture of product according to drawings.

The idea of a new product is first captured in conceptual design, which will lead to establishing performance.

Manufacturing involves scheduling and carrying out the task of purchasing materials and components.

Selling comes next, or delivery if the product is the result of a prior contract.

Errors need to be detected and corrected. Changes may be needed to improve product performance or to meet cost and time constraints. An altogether different alternative design might have to be considered.

4. Importance Codes of Professional Ethics

A code of ethics states the moral responsibilities of engineers according to the profession. Because they express the

profession's commitment to ethics codes are enormously important in stressing engineer's responsibilities and the freedom to exercise them.

1. *Serving and Protecting the Public:* Engineering involves advanced expertise professionals, who stand in a profound relationship with the public where trust and trustworthiness are essential. A code of ethics functions as a commitment by the profession as a whole that engineers will serve the public health. Safety and welfare.
2. *Guidance:* Codes provide helpful guidance since codes should be brief to be effective they offer mostly general guidance. Nonetheless, when well written they identify primary responsibilities. Specific directions may be given in to tell how to apply the code.
3. *Inspiration:* Codes express a profession's collective commitment to ethics, they and a positive motivation for ethical conduct. In a powerful way. They voice what it means to be a member of a profession committed to responsible conduct in promoting the safety. Health. And welfare of the public.
4. *Shared Standards:* The diversity of moral viewpoints among individual engineers tells, professions establish explicit standards, in particular minimum standards where people have to excel.
5. *Support for responsible professionals:* Codes give positive support to professions seeking to act ethically. A publicly proclaimed code disallows an engineer to act unethically, to say :
6. *Education and mutual understanding:* Codes can be used by professional societies and in the classroom to prompt discussion and reflection on moral issues. Widely circulated and officially approved by professional society's codes encourages a shared understanding.
7. *Discipline:* Codes can also serve as the formal basis for investigating unethical conduct. Engineering societies cannot by themselves revoke the right to practice engineering in the United States. Yet some professional societies do suspend or excel members whose professional conduct has been proven unethical.
8. *Contributing to Profession's image:* Codes can present a positive image to the public of an ethically committed profession where engineers more effectively serve the public. The reputation of profession, like the reputation of an individual professional or corporations is essential in sustaining the trust of the public.

5. Meanings of "Responsibility"

If we say that LeMessurier was responsible as a person and as an engineer, we might mean several things: he met his responsibilities (obligations) he was responsible (accountable) for doing so; he acted responsible (conscientiously); and he is

admirable (praiseworthy) Let us clarify these and related senses of “responsibility” beginning with obligations- the core idea around which all the other senses revolve.

1. *Obligations Responsibilities are obligations:* Some obligations are incumbent on each of us, such as to be honest fair, and decent, parents, employees, or professional. Thus an engineer might have responsibilities for making regular inspections at building sites, or an operation and so on.
2. *Accountable. Being responsible means being accountable:* This means general capacities to understand and being answerable for meeting particular obligations. We also hold ourselves accountable for meeting our obligations sometimes responding with emotions of self- respect and pride other times responding with guilt for harming others. Wrongdoing takes two primary forms: voluntary and negligence. First occurs when we knew we were doing was wrong and second in contrast negligence occurs when we unintentionally fail to exercise due care in meeting responsibilities. We might not have known what we were doing but we should have.
3. *Conscientious.* Morally admirable engineer diligently try to do the right thing, and they largely succeed in doing so even under difficult circumstances. No one is perfect.
4. *Blameworthy/ praiseworthy,* “Responsible” is a synonym for praiseworthy. Thus the question “who is responsible for design the antenna tower? Might be used to ask who is blameworthy for its collapse or how deserves credit for its success is with standing a severe storm.

6. Responsible Professionals and Ethical Corporations

From its inception as a profession, as distinct form a craft, much engineering has been embedded in corporations. That is due to the nature of engineering, both in its goal of producing economical and safe products for the market place and in its usual complexity of large projects that requires that many individuals work together.

Engineer and historian Edwin T. Layton, Jr. identifies two main stages in the development of engineering as a profession during the nineteenth century. First the growth of public resources during the first half of the century made possible the extensive building of railroads, canals and other large project that. Second from 1880 to 1920 the demand for engineers exploded, increasing their ranks 20 times over.

The engineer’s problem has centered on a conflict between professional independence and bureaucratic loyalty. And the role of the engineer represents a patchwork of compromises between professional ideals and business demands.

1. Senses of corporate Responsibility

We have been talking about corporate responsibility, but the word responsibility is ambiguous as noted earlier. All the

senses we distinguished in connection with individuals also apply to corporations.

1. Just as individuals have responsibilities (obligations), so do corporations. To be sure corporations are communities of individual, structured within legal frame works. Yet corporations have internal structures consisting of policy manuals and flowcharts assigning responsibilities to individual.³¹ when those individual also act (or should act) in accordance with their assigned responsibilities, the corporation as unity can be said to act. Thus when we say that Intel created a new subsidiary, we understand that individuals with the authority took certain steps.
2. Just as individuals are accountable for meeting their obligations. So corporations are accountable to the general public, to their employees and customers and to their stockholders.
3. Just as individuals manifest they virtue of responsibility when they regularly meet their obligations, so too corporations manifest the virtue of responsibility

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